# SITE CHARACTERIZATION REPORT
# AOI 8

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




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# 1.0 INTRODUCTION

Sunoco Inc. (R&M) (Sunoco) and the Pennsylvania Department of Environmental Protection (PADEP) entered into a Consent Order & Agreement (CO&A) in December 2003 with respect to remedial activities associated with Sunoco's Philadelphia Refinery (Refinery). In accordance with the CO&A, a Current Conditions Report and Comprehensive Remedial Plan (CCR), dated June 30, 2004, was prepared by Sunoco. The CCR proposed Phase II site characterization and corrective action activities for the Refinery, including preparation of Site Characterization Reports for eleven individual Areas of Interest (AOIs). The CCR presented a prioritization of all AOIs based on specific risk factors. In February 2005, the Phase II Corrective Action Activities Schedule (Figure 19 of the CCR) was modified and AOI 8 was identified by Sunoco as the fifth area of the Refinery to be investigated. Since the CCR, site characterization reports for AOIs 1, 4, 6 and 5 have been prepared and submitted to the PADEP and the United States Environmental Protection Agency (US EPA). AOI 8 is identified as the fifth AOI to be characterized in accordance with the CCR.

Sunoco prepared a Site Characterization Work Plan (Work Plan) for AOI 8 on May 16, 2008 and submitted the plan to the PADEP and US EPA. This Work Plan summarized proposed activities to be completed to characterize AOI 8 in accordance with the objectives of the CCR. The Work Plan also included proposed activities to characterize the Resource, Conservation and Recovery Act (RCRA) Solid Waste Management Unit (SWMU) in AOI 8.

This Site Characterization Report (SCR) has been prepared exclusively for AOI 8 and documents the results of the characterization activities completed in accordance with the Work Plan. The objective of this SCR is to document current environmental conditions at AOI 8 in accordance with the 2003 CO&A, the 2004 CCR and to confirm that the remedial objectives of the CO&A are being met based on the current conditions.

## 1.1 Site History and Background

The Sunoco Philadelphia Refinery is located on approximately 672 acres in southwest Philadelphia. The facility has a long history of petroleum transportation, storage, and processing. The oldest portion of the facility started petroleum related activities in the 1860's, when the Atlantic Refining Company established an oil distribution center. In the 1900's, crude oil processing began and full-scale gasoline production was initiated during World War II. In addition to refining crude oil, various chemicals, such as acids and ammonia, were also produced at the site for a time. Current operations at the

Refinery are limited to the production of fuels and basic petrochemicals for the chemical industry. The current and historic uses of AOI 8 are described on figures provided in Appendix A.

AOI 8 is the northern most area of the Refinery and is known as the Point Breeze Process Area North Yard. AOI 8 is bound by the Philadelphia Gas Works (PGW) property to the south, the Schuylkill River to the west, industrial properties to the north, and urban streets to the east (Figure 1), and encompasses approximately 250 acres.

AOI 8 was an active Refinery process area since the early twentieth century with process areas and above ground storage tanks (ASTs). The area also included the former lube, asphalt, soap, and wax plants. The majority of AOI 8 structures were demolished between 1975 and 1980. Subsequent to decommissioning of most of the process areas, a Land Treatment Unit ("LTU") was operated from 1986 through 2000. Currently, the only remaining active facilities in AOI 8 are the asphalt dock, the boiler house, a storm water separator, fuel oil storage, butane and propane storage area, and loading and unloading facilities. Much of AOI 8 is unimproved and many of the ASTs have been demolished. The majority of the land surface in AOI 8 is not covered by impervious surfaces.

The existing monitoring well network in AOI 8 includes a total of 175 monitoring points as listed in Table 2. This network includes those wells that were recently installed as part of this site characterization effort. Of the 28 existing recovery wells in AOI 8, 18 are active. These 18 active recovery wells are associated with three existing remedial systems in AOI 8. They include the PGW Border Total Fluids Recovery System, the Jackson Street Sewer Total Fluids Recovery System, and the North Yard Bulkhead / No. 3 Tank Farm Separator Total Fluids Recovery System. The wells in AOI 8 are summarized in Table 2 and the remedial systems in AOI 8 are discussed in detail in Section 5.0.

Groundwater gauging of select wells in AOI 8 occurs on a quarterly basis and is supplemented by a more comprehensive gauging event that is completed semi-annually. Sunoco samples select wells for compounds of concern (COCs) established in the CCR in AOI 8 on an annual basis. Quarterly, semi-annual and annual gauging and sampling activities, as well as the routine operation and maintenance data for the AOI 8

remedial systems, are reported to the PADEP and US EPA in Quarterly Reports prepared by Sunoco.

### 1.2 Selection of Compounds of Concern and Applicable Standards

The COCs for soil and groundwater are listed in Table 1 of this report. These COCs are the same as those listed in the Work Plan and the CCR. The following sections describe the applicable standards that were used in evaluating the site characterization data.

**Soil**

Surface (0-2 feet) soil samples were collected at each soil boring/well boring location that represents a potential complete direct contact exposure pathway (e.g., unpaved area). These surface soil results were screened against the PADEP non-residential statewide health medium-specific concentrations (MSCs) for soil (0-2 feet). As summarized in the CCR, where these MSCs are exceeded, Sunoco will evaluate attainment of the site-specific remediation standard using either the pathway elimination or calculated risk-based standard options.

**Groundwater**

Groundwater sample results were screened against the PADEP non-residential, used-aquifer (TDS<2,500) statewide health groundwater MSCs. As summarized in the CCR, where these statewide health MSCs are exceeded, Sunoco will evaluate attainment of the site-specific remediation standard using either the pathway elimination or calculated risk-based standard options. No calculated risk based numbers were generated for AOI 8 groundwater since the exceedances of the statewide health MSCs will be addressed by engineering controls, natural attenuation and pathway elimination.

### 1.3 Overview of Investigative Framework and Remedial Approach for AOI 8

The current remediation program for the Refinery is performed under the 2003 CO&A between PADEP and Sunoco. In April 2004, the PADEP and US 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 US 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 meeting, Sunoco submitted a letter dated December 2, 2005 to US EPA and PADEP memorializing the discussions at the meeting (Appendix B). As summarized in that letter, the highlighted aspects of including the Philadelphia Refinery in the One-Cleanup Program include:

1. Submittal of a Notice of Intent to Remediate (NIR) under the PADEP Act 2 Program. Sunoco submitted a NIR for the Refinery, excluding the Belmont Terminal, to the PADEP on October 12, 2006. The NIR was accompanied by a cover letter which requested that the Refinery be included in the PA One-Cleanup Program and that all remediation work be completed under the 2003 CO&A. RCRA corrective action measures will be addressed concurrently with work performed under the CO&A and within the Act 2 program. The City of Philadelphia requested that a Public Involvement Plan be prepared in response to the NIR. Sunoco held a public involvement meeting in South Philadelphia on September 19, 2007.

2. Sunoco is currently in the process of revising the corrective action permit for the Philadelphia Refinery to embody the Pennsylvania One Cleanup Plan elements.

An overview of the RCRA corrective action program for the Point Breeze North Yard portion of the Philadelphia Refinery was provided in Section 1.2.1 of the Work Plan. In development of the Work Plan, Sunoco and its consultant reviewed relevant RCRA reports previously prepared for the North Yard. Based on this review, one SWMU was identified in AOI 8 that required further characterization. This SWMU is identified as SWMU 2 – Leaded Tank Bottoms Sludge Weathering Pad. A detailed description of this SWMU and a summary of previous investigations completed are provided in Section 1.2.1 of the Work Plan. As documented in this Site Characterization Report, Sunoco completed field activities to supplement previous investigation work and to characterize this SWMU following the investigative approach outlined in Section 1.2.2 of the Work Plan. The characterization activities and results are described in Sections 3.2 and 4.2 of this report.

### *1.3.1 Overview of the Land Farm Treatment Unit (LTU) in AOI 8*

The LTU is located in the northwestern portion of AOI 8 and encompasses approximately 20 acres. RCRA closure of the LTU was mostly completed in 2005 and the unit is currently undergoing RCRA Closure and Post-Closure monitoring activities in accordance with a separate 1996 CO&A. Therefore, no characterization work was undertaken at the LTU as part of this site characterization. A description of the LTU is included in the Amended Post-Closure Plan (original dated November 1988 and amended May 2004).

## 2.0 ENVIRONMENTAL SETTING

AOI 8 is bound by the PGW property to the south, the Schuylkill River to the west, industrial properties to the north and urban streets to the east (Figure 2), and covers approximately 250 acres.

### 2.1 Historic and Current Use

AOI 8 was an active Refinery process area since the early twentieth century with significant process areas and above ground storage tanks (ASTs). The area also included the former lube, asphalt, soap, and wax plants. The majority of AOI 8 structures were demolished between 1975 and 1980. Subsequent to decommissioning of most of the process areas, the LTU was operated from 1986 through 2000.

Currently, the only remaining active facilities in AOI 8 are the asphalt dock, the boiler house, a storm water separator, fuel oil storage, butane and propane storage area, and loading and unloading facilities. Much of AOI 8 is unimproved and many of the ASTs have been demolished. The majority of the land surface in AOI 8 is not covered by impervious surfaces.

Sheet pile and wooden bulkheads exist along the River as shown in Figure 2. The bulkheads extend along the river from the storm water separator south towards and including the active asphalt loading dock in the southwestern portion of the AOI. The wooden portion of the bulkhead was constructed in the early 1930s and starts just south of the AOI 8 storm water separator and extends for approximately 2,460 feet

downstream. The southern 940 feet of the bulkhead is of newer steel sheet piling construction.

## 2.2 Geology

To further characterize geology at AOI 8, Sunoco advanced four deep soil borings to the top of bedrock and continually logged the subsurface materials throughout each boring. To illustrate the geology at AOI 8, three geologic cross sections were prepared and are provided as Figures 5a, 5b and 5c. The cross section location lines are shown in plan view in Figure 4.

The following paragraphs describe the geologic units relevant to AOI 8 beginning with the deepest units to the shallowest units:

***Wissahickon Formation*** – Bedrock beneath the refinery and AOI 8 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 8, the Wissahickon Schist ranges from approximately 40 feet beneath the ground surface in the northern portion of AOI 8 to approximately 70 feet beneath the ground surface in the southern portion. This range in bedrock depth is illustrated in Figure 5c.

***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. As shown in Figures 5a through 5c, the Lower Sand overlies bedrock in the eastern and central portions of AOI 8, but is absent in the northwestern and western portions where it has been eroded and replaced with alluvium.

The Lower Sand beneath AOI 8 is a green, brown, orange and/or red, fine gravel and course sand that grades upward into medium-to-fine sands and contains layers of silts and clay. The Lower/Middle Clay overlies the Lower Sand in the central and eastern portions of AOI 8 as shown in Figures 5a and 5b. As shown in Figures 5a through 5c, in the western and northwestern portions of the AOI, the Lower Sand is overlain by either

alluvium or Trenton Gravel and the Lower/Middle Clay is absent. Where present at AOI 8, the Lower Sand ranges in thickness between approximately 7 to 63 feet.

Fourteen deep (Lower Sand) groundwater monitoring wells were believed to exist in AOI 8 when the Work Plan was prepared. These wells included N-13, N-19, N-21, N-27, N-30, N-38D, N-4, N-43, N-46D, N-50D, N-69, N-79, N-83, and N-9. No additional deep groundwater monitoring wells were installed in AOI 8 as part of the characterization. Using the geologic information gathered in AOI 8 as part of the characterization activities, the classification of the 14 wells were re-evaluated considering known geology and well construction. Based on this evaluation, three of the wells (N-69, N-79 and N-83) are not screened in the Lower Sand and therefore have been re-classified as Intermediate wells.

***Middle/Lower Clay –*** The Middle/Lower Clay, where present in AOI 8, is characterized by very low permeability reddish-brown, brown or gray clays and sandy clays. The Middle/Lower Clay is present beneath AOI 8 as a wedge which thickens towards the west and the Schuylkill River. The clay is absent between the central and western portions of AOI 8 where it has been eroded and replaced with alluvium. As shown in Figure 5a, the clay ranges in thickness from approximately 10 feet on the east side of AOI 8 to approximately 38 feet in the central portion of AOI 8.

***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 5a through 5c, Trenton Gravel is present in the northern, central and eastern portions of AOI 8 and is absent in the western portion of AOI 8 where it has been eroded and replaced with alluvium.

***Recent Fill/Alluvium*** - The alluvium deposits in AOI 8 generally consist of dark gray organic clayey mud or silt and fine sand. As shown in Figures 5a through 5c, alluvium deposits exist in the western and central portions of AOI 8 and to a lesser extent in the northern portion. No alluvium materials are located in the eastern portion of the AOI. As shown in Figures 5a and 5c, the alluvium thickens in the western portion of the AOI where the Pleistocene age deposits have been eroded and replaced. At these

locations, the alluvium deposits are in direct contact with either Trenton Gravel, the Lower/Middle Clay, the Lower Sand, and/or bedrock. As shown in Figures 5a through 5c, the alluvium deposits range in thickness between approximately 2 and 60 feet in AOI 8.

Fill type varies across AOI 8 and includes various sands and gravels, brick and wood fragments, and cinder ash. Fill overlies native geologic deposits throughout AOI 8 and ranges between approximately 2 and 15 feet in thickness.

In addition to the above descriptions, the following general observations can be made concerning the geology in AOI 8:

- Fill materials are present throughout AOI 8;
- In the western portion of AOI 8, the Pleistocene age formations have been eroded and replaced with alluvium. The alluvium extends to the central and northern portions of AOI 8, but is absent in the eastern portion;
- Trenton Gravel is present in the northern, central and eastern portions of AOI 8 but is absent in the western portion where it has been eroded and replaced with alluvium;
- The Middle/Lower Clay is present beneath AOI 8 as a wedge that thickens towards the west and the Schuylkill River. The clay is absent between the central and western portions of AOI 8 where it has been eroded and replaced with alluvium;
- The Lower Sand overlies bedrock in the eastern and central portions of AOI 8, but is absent in the northwestern and western portions where it has been eroded and replaced with alluvium;
- In the western and northern portions of AOI 8, the middle clay is absent, and the alluvium is in direct contact with Trenton Gravel, Lower/Middle Clay, Lower Sand and/or bedrock; and
- The depth to bedrock beneath AOI 8 increases towards the south.

## 2.3 Hydrogeology

### *2.3.1 Shallow Groundwater*

Groundwater gauging data collected by SECOR in June 2008 was used to generate a groundwater flow figure for the Fill/Alluvium and Intermediate (shallow) zone in AOI 8 (Figure 6). The groundwater elevation data from this gauging event

is provided in Table 3. Groundwater in the shallow zone of AOI 8 occurs at depths ranging between approximately 1 and 37 feet below the ground surface under unconfined conditions. Based on the flow contours in Figure 6, the following observations can be made:

- A groundwater flow divide, trending northwest to southeast, is present in the central portion of AOI 8. This divide generally corresponds with the eastern extent of the alluvium materials deposited following the erosion and removal of the Pleistocene age deposits. Where the Pleistocene age deposits have been eroded, the alluvium is in direct contact with the Trenton Gravel, Lower/Middle Clay, and/or the Lower Sand (Figures 5a through 5c). Groundwater on the east side of the divide flows to the northeast. Groundwater on the west side of the divide flows to the southwest;

- The groundwater gradient in the western portion of AOI 8 is relatively flat with some depressions and mounds at isolated locations. Along the western AOI boundary, flow is more pronounced towards the bulkheads and River. This is likely due to groundwater pumping and recovery along the bulkhead;

- Groundwater flow in the vicinity of the Jackson Street Sewer is influenced by pumping in this area; and

- The groundwater gradient in the eastern and southern portions of AOI 8 is relatively flat with some depressions and mounds at isolated locations. Groundwater flow in the vicinity of the PGW border is influenced by pumping in this area.

### *2.3.2 Deep Groundwater*

Eleven Lower Sand wells are located in AOI 8. These include N-4, N-9, N-13, N-19, N-21, N-27, N-30, N-38D, N-44D, N-46D and N-50D. 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 SECOR in June 2008 was used to generate a groundwater flow figure for the deep groundwater zone in AOI 8

(Figure 7). The groundwater elevation data from this gauging event is provided in Table 3.

Groundwater in the deep groundwater zone of AOI 8 occurs at depths ranging between approximately 10 to 37 feet below the ground surface. Based on the deep groundwater flow contours in Figure 7, the following observations can be made:

- A groundwater flow divide, trending northwest to southeast, is present in the central portion of AOI 8. This divide generally corresponds with the eastern extent of the alluvium materials deposited following the erosion and removal of the Pleistocene age deposits. Where the Pleistocene age deposits have been eroded, the alluvium is in direct contact with the Trenton Gravel, Lower/Middle Clay, and/or the Lower Sand (Figures 5a through 5c). Groundwater on the east side of the divide flows to the east and southeast. Groundwater on the west side of the divide flows to the southwest;

- A downward vertical flow gradient exists between the shallow and deep zone as indicated by the groundwater elevations in the following well pairs: N-3/N-4, N-12/N-13, N-8/N-9, N-18/N-19, N-20/N-21, N-29/N-30, N-38/N-38D, N-43/N-44D, N-47/N-46D and N-51/N-50D. This is consistent with vertical gradients elsewhere in the Refinery.

No aquifer testing was performed in AOI 8 since sufficient data was available from former aquifer tests (pumping tests and slug tests) performed in AOI 8 by others (GES 1993 and 1994). Aquifer testing, consisting of 40- and 48-hour constant rate pumping tests were performed in two wells, N-76 and N-80, in AOI 8 during December 1993 by GES, Inc. Slug testing was completed in August of 1994 on wells N-29, N-32, N-81 and N-82. The highest hydraulic conductivity value calculated from these tests is 4.34 feet/day. This value is consistent with the value used for the Fill/Alluvium and Trenton Gravel modeling activities performed previously for AOI 8 as a part of the CCR.

### 2.4 Surface Water

The Schuylkill River defines the western border of AOI 8. Sheet pile and wooden bulkheads exist along the River as shown in Figure 2. The bulkheads extend along the river from the storm water separator south towards and including the active asphalt loading dock in the southwestern portion of the AOI. The wooden portion of the bulkhead was constructed in the early 1930's. and starts just south of the AOI 8 storm water separator and extends for approximately 2,460 feet downstream. In approximately 1957, upgrades were completed to approximately 100 linear feet of the timber bulkhead which included using steel sheet piles and partial replacement of timber spur piles with stell pipe piles. More recently, tie rods have also been installed in this area. The wooden bulkhead is generally in good condition below the water table, but has partially deteriorated above the water table. The southern 940 feet of the bulkhead is of newer steel sheet piling construction. The visible portions of the steel bulkhead appear to be in good condition.

## 3.0 SITE CHARACTERIZATION ACTIVITIES

The following sections summarize the site characterization activities that were completed in AOI 8 in support of this report. All activities were performed between May and August 2008 by Aquaterra Technologies, Inc. (Aquaterra). The activities were executed in accordance with the Work Plan.

### 3.1 Shallow Soil Borings and Sampling at Non-RCRA SWMU Areas

A total of 66 soil samples were collected for analysis of site COCs from areas within AOI 8 that are outside SWMU 2. The locations of all soil and monitoring well borings are shown on Figures 3 and 8. All soil samples were collected utilizing split-spoon sampling techniques. Soil borings were advanced to a maximum depth of two feet below grade at each unpaved location in accordance with the Work Plan.

Soil samples 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 as Table 4 and the results are discussed in Section 4.1. The laboratory analytical reports are provided as Appendix C.

### 3.2 Shallow Soil Borings and Sampling at SWMU 2

The 1991 RFI identified one SWMU in AOI 8 that required further characterization: SWMU 2 (Storage Leaded Tank Bottoms Sludge Weathering Pad). This SWMU area was characterized during this effort following the investigative approach outlined in Section 1.2.2 of the Work Plan and summarized below:

- If materials are encountered within the leaded tank bottom areas matching the physical description of the leaded tank bottoms, then Sunoco will collect samples for total lead;

- If the total lead results exceed 450 parts per million (ppm) (PADEP's non-residential MSC for lead) then the samples will be analyzed for lead via Toxicity Characteristic Leaching Procedure (TCLP), EPA Test Method 1311;

- Delineated areas that have soils that physically resemble leaded tank bottoms, have lead concentrations greater then 450 ppm, and are hazardous for lead will retain the leaded tank bottom designation. If no soils are encountered that meet all three of these criteria, then the area will no longer be classified as a leaded tank bottom area. Note that none of the soils identified in previous investigations at SWMU 2 in AOI 8 have matched the physical descriptions of the leaded tank bottoms.

A detailed description of SWMU 2 and a summary of previous investigation work completed at SWMU 2 are provided in Section 1.2.1 of the Work Plan. To supplement data previous collected as part of the RCRA Facility Investigation (RFI) as described in the Work Plan, a total of six borings were completed at SWMU 2. The locations of the borings are shown on Figures 3 and 9. All soil samples were collected utilizing split-spoon sampling techniques. Soil borings were advanced to a maximum depth of eight feet below grade at each location in accordance with the Work Plan. At boring locations BH-08-36 and BH-08-37, the existing sub grade concrete slab was mechanically broken up with a backhoe to advance the soil borings. Locations BH-08-19 and BH-08-20 were located on asphalt which was also removed with a backhoe. No concrete slab was encountered at these two locations. The soils were evaluated to determine if leaded tank bottom materials were present.

Soil samples requiring analysis were submitted to LLI for analysis of total lead concentrations as described in section 1.2.2 of the Work Plan. A summary of the soil analytical results is provided as Table 5 and the results are discussed in Section 4.2. The laboratory analytical reports are provided as Appendix C.

## 3.3 Installation of Groundwater Monitoring Wells

Well installation activities were performed between June and July 2008 by Aquaterra. Shallow and intermediate wells were installed to monitor the quality and occurrence of the unconfined, fill/alluvium Trenton Gravel aquifer. The well installation activities are discussed in detail in the following sections.

### *3.3.1 Fill/Alluvium (Shallow) and Trenton Gravel (intermediate) Groundwater Monitoring Wells*

Parrat Wolff, Inc. of Syracuse, New York installed 39 shallow and intermediate monitoring wells within the fill/alluvium and Trenton Gravel under the direct supervision of Aquaterra. All wells were installed and constructed in accordance with the Work Plan. Locations of these wells are shown on Figure 3. All well borings were advanced utilizing 8.25-inch inside diameter hollow stem augers and split spoon samplers to record lithology. Split spoon samples were collected at various intervals throughout the borings starting at 10 feet below grade. Monitoring wells were constructed to a maximum depth of 30 feet below grade with the screen intervals ranging from 2 to 30 feet, with the maximum screen length being 15 feet. Boring logs depicting monitoring well construction details and lithology are provided as Appendix B. Monitoring wells were constructed with a flush mount manhole cover or with three feet of 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.

### *3.3.2 Lower Sand (Deep) Groundwater Monitoring Wells*

Eleven Lower Sand groundwater monitoring wells exist in AOI 8. These wells include wells N-4, N-9, N-13, N-19, N-21, N-27, N-30, N-38D, N-44D, N-46D, and 50D. No additional deep groundwater monitoring wells were installed in AOI 8, however four deep soil borings were completed to a maximum depth of 103 feet to further geological characterization of AOI 8. The locations of the Lower Sand monitoring wells and deep soil borings are shown on Figure 7 and Figure 3, respectively. Well construction details are provided in Table 2 and deep soil borings logs are provided in Appendix B. Geologic information obtained from the deep soil borings completed in AOI 8 was used to prepare the geologic cross sections provided as Figures 5a through 5c.

## 3.4 Groundwater Monitoring

On July 15, 2006, SECOR performed monitoring well gauging activities to collect liquid levels from monitoring points within AOI 8. 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 a shallow groundwater elevation contour map provided as Figure 6. Groundwater gauging data from the eleven Lower Sand wells in Table 3 was used to generate a groundwater flow figure for the Lower Sand (deep) zone in AOI 8 (Figure 7).

## 3.5 Groundwater Sampling

Aquaterra performed a round of groundwater sampling from all accessible wells in AOI 8 between July 14 and August 6, 2008. All groundwater sampling activities were completed in accordance with the Work Plan. Three well volumes were purged from each well prior to sampling to remove stagnant water from the well and obtain a representative sample. Well purging was performed by using either a submersible pump with disposable polyethylene tubing or by hand bailing using a disposable bailer. If a submersible pump was used for purging, the pump was decontaminated by rinsing in a distilled water and alconox solution and then rinsing in distilled water. The well sampling data sheets from the sampling event are provided as Appendix D.

Samples were obtained by lowering a disposable bailer slowly into the 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. Once the sample was obtained, 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. A summary of groundwater analytical results for fill/alluvium and Trenton Gravel wells is presented in Table 6, and Lower Sand wells in Table 7. The laboratory analytical reports are included as Appendix C.

### 3.6 LNAPL Sampling

LNAPL samples for select wells in AOI 8 were previously characterized as described in the CCR. As part of the recent characterization activities, Aquaterra collected LNAPL samples from a total of eleven existing monitoring wells in AOI 8 to further characterize LNAPL in AOI 8. The wells included N-42, N-47, N-51, N-75, N-76, N-82, N-91, N-503, RW-202, RW-300 and RW-305. Eight LNAPL samples were collected from newly installed monitoring wells in AOI 8: N-107, N-113, N-116, N-125, N-127, N-129, N-130, and N-135. LNAPL samples were collected using a direct sampling or swabbing method in accordance with the Work Plan. Samples were packaged in certified hazardous material shipping boxes and sent via FedEx priority overnight to Torkelson Laboratories of Tulsa, Oklahoma for characterization. LNAPL characterization data included product types, density, proportions of product, degree of weathering, and similarities to other samples. Appendix E summarizes the LNAPL characterization results for all samples collected in AOI 8 as well as previous results from the CCR.

### 3.7 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 wells is presented in Table 3. This new survey data was used to update the Geographic Information System (GIS) for the project.

## 4.0 SITE CHARACTERIZATION ANALYTICAL RESULTS

The following sections discuss the analytical results of the site characterization activities performed in AOI 8.

### 4.1 Soil Analytical Results at Non-SWMU Areas

The results of the soil samples collected outside of SWMU 2 are provided in Table 4. All of the soil samples were collected between the ground surface and two feet below the ground surface and no saturated soils were observed at these depths in any borings. The soil sample results were screened against the PADEP non-residential MSCs for soil. Sample locations and exceedances of the MSCs are shown in Figure 8.

Below is a general summary of the screening results:

- COCs which were detected in soil, exceed their respective non-residential MSCs, and were detected in groundwater include: benzene, naphthalene, benzo(a)pyrene and total lead; and

- Toluene, ethylbenzene, ethylene dibromide, 1,2-dichloroethane, total xylenes, MTBE, cumene, anthracene, pyrene, benzo(g,h,i)perylene, benzo(b)fluoranthene, chrysene, benzo(a)anthracene, phenanthrene, and flourene were not detected in AOI 8 soil at concentrations exceeding their respective non-residential MSCs.

### 4.2 Soil Results at SWMU 2

As stated in Section 1.2.2 of the Work Plan, if materials were encountered within the leaded tank bottom sludge weathering pad area during site characterization activities matching the physical description of the leaded tank bottom materials, then samples were collected for total lead. If the total lead results exceeded 450 parts per million (ppm) (the PADEP non-residential MSC for lead), then the samples would be analyzed for lead via TCLP, EPA Test Method 1311.

A total of six soil borings were completed at SWMU 2. One sample location, BH-08-05, exhibited minor amounts of material with characteristics resembling the physical description of leaded tank bottoms and was submitted for TCLP analysis. No evidence of leaded tank bottom materials were observed in the remaining borings. The results of

the sample analyses are summarized in Table 5, illustrated in Figure 9, and the logs for these borings are provided in Appendix B.

The sample collected from boring BH-08-05 exhibited a total lead concentration below the PADEP non-residential MSC (450 ppm) and was therefore not submitted for TCLP analysis.

### 4.3 Groundwater Results

*Fill/Alluvium, Trenton Gravel, and Lower Sand Wells*

The results of the groundwater samples collected from monitoring wells in the fill/alluvium, Trenton Gravel, and Lower Sand are provided as Tables 6 and 7, respectively. The results were screened against the PADEP non-residential used aquifer (TDS<2,500) groundwater MSCs. Exceedances of the MSCs are illustrated in Figure 10. A summary of the COC concentrations that exceeded the PADEP non-residential groundwater MSCs is below:

*Fill/Alluvium and Trenton Gravel Wells*

- COCs detected in shallow groundwater at concentrations exceeding their respective non-residential MSCs include: benzene, pyrene, chrysene, phenanthrene, and naphthalene; and

- Cumene, toluene, ethylbenzene, ethylene dibromide, xylenes, fluorene, MTBE, 1,2-dichoroethane and lead were not detected in AOI 8 groundwater at concentrations exceeding their respective non-residential MSCs.

*Lower Sand Wells*

- Benzene was detected in three Lower Sand wells (N-9, N-21, N-44D) at concentrations slightly above its respective non-residential PADEP MSC; and

- Toluene, MTBE, 1,2-dichoroethane, xylenes (total), cumene, ethylbenzene, ethylene dibromide, pyrene, chrysene, phenanthrene, fluorene, naphthalene, and lead were not detected in deep groundwater in AOI 8 at concentrations exceeding their respective PADEP non-residential MSCs.

### 4.4 LNAPL Characterization Results

LNAPL characterization results are presented in a summary table in Appendix E. This appendix also includes previous LNAPL characterization data for AOI 8 which was obtained as part of the CCR. The extent of LNAPL types in AOI 8, as well as the apparent thickness of LNAPL measured during SECOR's June 2008 gauging event is illustrated in Figure 11.

As described in Appendix E of the CCR, Sunoco evaluated LNAPL mobility across the site using the American Petroleum Institute (API) LNAPL model (Publication Number 4682, "Free Product Recovery of Petroleum Hydrocarbon Liquids," June 1999), as a guide for assessing LNAPL volume, mobility and recoverability across the entire refinery. In the CCR, wells with LNAPL located within AOI 8 were identified as extremely weathered middle distillates, residual and lubrication oils all of which typically have very low potential to become mobile. Based on LNAPL modeling completed for the CCR, groundwater flow in AOI 8, engineering controls, and lack of receptors, no additional LNAPL modeling was completed for AOI 8.

Other major conclusions regarding the results of the LNAPL characterization in AOI 8 are discussed below:

- Four different types or mixtures of LNAPL were identified in AOI 8. These include residual oil, lube oil, lube oil/middle distillate mixture, and middle distillate;

- The occurrence of LNAPL in AOI 8 correlates with the COC concentrations which exceeded MSCs in shallow groundwater; and

- LNAPL in RW-305 (residual oil) along the Jackson Street sewer is considered mobile based on previous LNAPL modeling results as discussed in the CCR. LNAPL elsewhere in AOI 8 is considered to be relatively immobile based on the modeling and does not appear to have the potential to migrate off-site.

# 5.0 REMEDIAL SYSTEM UPDATE

## 5.1 PGW Border Total Fluids Recovery System

The PGW Total Fluids Recovery System is composed of recovery wells numbered RW-200 through RW-205 and an interceptor trench with a recovery sump (RW-206). The system was installed to help prevent off-site migration of LNAPL. The system recovery network consists of total fluids recovery utilizing electric submersible pumps equipped with individual timers to control the on and off cycle of each pump. Total fluids are extracted from wells RW-201, RW-202, and RW-203. Total fluids produced by the 200 series pumps are routed to the North Yard 10,000-gallon holding tank where a flow meter measures incoming fluids produced by the three recovery wells. Groundwater is passed through the tank and routed to the Point Breeze Processing Area Wastewater Treatment Plant. Accumulated LNAPL is pumped out of the 10,000-gallon holding tank as needed by a vacuum truck. The recovered LNAPL is quantified while being vacuumed from the holding tank.

## 5.2 Jackson Street Sewer Total Fluids Recovery System Description

The Jackson Street Sewer Total Fluids Recovery System network consists of total fluids (groundwater and LNAPL) recovery utilizing electric submersible pumps equipped with individual timers to control the pumping at each recovery well. The system was installed to help prevent LNAPL migration to the Jackson Street sewer and the Schuylkill River. The recovery network includes a total of three wells, RW-300, RW-301, and RW-302. Total fluids produced from the wells are routed to the North Yard 10,000-gallon holding tank where a flow meter records the combined total fluids produced from the Jackson Street recovery well network. Groundwater is passed through the tank and routed to the Point Breeze Processing Area Wastewater Treatment Plant. Accumulated LNAPL is pumped out of the 10,000-gallon holding tank as needed by a vacuum truck.

The Jackson Street combined sewer overflow ("CSO") outfall is checked once per shift by Sunoco personnel to determine if a sheen or LNAPL are present. The outfall is checked once per shift at low tide and findings are recorded twice daily. Flow through the sewer during a severe rain storm in August 2005 damaged the outfall structure beyond repair. The outfall structure has since been removed and the installation of a slide boom structure at the outfall was completed in May 2006. An absorbent boom was placed behind the slide boom in response to a slight sheen at the outfall in

April 2007. Although this was an isolated event, Sunoco intends to maintain the absorbent boom as necessary.

### 5.3 Jackson Street Sewer Water Curtain

Installation of a water curtain in the Jackson Street sewer was completed during the 4th quarter of 2003. The water curtain is designed to reduce hydrocarbon odors potentially migrating from the Jackson Street sewer to the surrounding areas. The water curtain apparatus is located in the first manhole west of the interceptor chamber along 26th Street and consists of a single centrally located nozzle that emits a radial spray pattern. Water is supplied to the water curtain apparatus from the North Yard fire water system. Heat trace equipment was installed along the water feed line allowing winter operation of the water curtain.

### 5.4 North Yard Bulkhead / No. 3 Tank Farm Separator Total Fluids Recovery System

The North Yard Bulkhead Total Fluids Recovery System consists of a 3,400-feet long interceptor trench with two recovery sumps (RW-500 and RW-501). The No. 3 Tank Farm Separator Total Fluids Recovery System consists of one recovery system RW-502 located in the center of the capped closed separator. These systems address migration of LNAPL in the Schuylkill River. RW-500, RW-501 and RW-502 utilize electric submersible pumps controlled by a timer to recover total fluids. The total fluids from the three recovery wells are pumped to the North Yard 10,000-gallon holding tank where a flow meter measures incoming fluids pumped from the recovery wells. Groundwater is passed through the tank and routed to the Point Breeze Processing Area Wastewater Treatment Plant. Accumulated LNAPL is pumped out of the 10,000-gallon holding tank as needed by a vacuum truck. The recovered LNAPL is quantified while being vacuumed from the holding tank. The holding tank was not vacuumed out this reporting period, therefore, there is no quantifiable LNAPL recovered. All three AOI-8 recovery systems are routed to the 10,000 gallon holding tank, therefore, actual volume of LNAPL recovered from each of the individual recovery systems in AOI-8 cannot be determined.

# 6.0 FATE AND TRANSPORT ANALYSIS

The following sections describe fate and transport modeling activities performed as part of AOI 8 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. The soil-to-groundwater pathway is evaluated through groundwater data. Potential exposure pathways for AOI 8 are discussed in detail in Section 8.0.

## 6.2 Groundwater

Fate and transport calculations were completed for one deep well in AOI 8 (N-9) because N-9 had a benzene concentration (8 ug/L) in excess of its groundwater MSC of 5 ug/L and is located by the property boundary. Other Lower Sand wells with benzene detections weren't modeled based on their location. The fate and transport modeling was completed to evaluate potential migration pathways/potential impacts to receptors. The Quick Domenico Version 2 (QD) spreadsheet model, developed by the PADEP, and site-specific data was used to perform the fate and transport calculations.

QD simulation results indicate benzene at N-9 will quickly fall below its MSC in the deep groundwater zone. The predicted, steady-state transport distance at which benzene would reach its groundwater MSC is 20 feet. The downgradient property boundary is approximately 25 feet from N-9. Based on this simulation, benzene has low potential to be transported off-site in this part of AOI 8. A more detailed description of QD model input parameters and results are presented in Appendix E.

## 6.3 Surface Water

To evaluate the potential contribution of dissolved phase benzene to the Schuylkill River, an acceptable benzene concentration for the groundwater to surface water pathway was calculated. This concentration is the highest allowable groundwater concentration that would not exceed surface water quality standards (PA Chapter 16). The concentration was calculated using the mass-balance water quality model: PA Single Discharge Wasteload Allocation Program for Toxics v2.0 (PENTOXSD) created by PADEP. This was a conservative exercise considering groundwater along the western

boundary of AOI 8 is pumped and recovered in the North Yard Bulkhead Recovery System's interceptor trench which runs the entire length of the bulkhead.

Based on PENTOXSD calculations, the maximum acceptable groundwater concentrations for benzene are 2,150,000 ug/L (Acute Fish Criterion), 3,030,000 ug/L (Chronic Fish Criterion), and 50,061.08 ug/L (Cancer Risk Level) to not exceed surface water quality standards. The maximum detected benzene groundwater concentration during the July 2008 sampling event is 10,000 ug/L at N-133, which is less than all three screening concentrations. Based on this analysis benzene in groundwater will not exceed surface water quality standards if it should discharge to the Schuylkill River near the wooden bulkhead in AOI 8. A more detailed description of PENTOXSD input parameters and results are presented in Appendix E.

### 6.4 LNAPL

As described in Appendix E of the CCR, Sunoco evaluated LNAPL mobility across the site using the American Petroleum Institute (API) LNAPL model (Publication Number 4682, "Free Product Recovery of Petroleum Hydrocarbon Liquids," June 1999), as a guide for assessing LNAPL volume, mobility and recoverability across the entire refinery. In the CCR, wells with LNAPL located within AOI 8 were identified as extremely weathered middle distillates, residual and lubrication oils all of which typically have very low potential to become mobile. Based on LNAPL modeling completed for the CCR, groundwater flow in AOI 8, engineering controls, and lack of receptors, no additional LNAPL modeling was completed for AOI 8.

### 6.5 Vapor Intrusion into Indoor Air

Occupied areas of AOI 8 include the Boiler House located in the central portion of the AOI and the two Philadelphia Fire Department buildings located west of the PGW border. The Boiler House is included in an on-site indoor air monitoring program and is regulated under OSHA. Indoor air monitoring was performed by Sunoco on September 25, 2008 at the Boiler House for benzene and total VOC's using an Ultra Rae PID. The Ultra Rae is calibrated for benzene and total VOC's using 5 parts per million benzene calibration gas and 100 parts per million isobutylene calibration gas respectively. The Ultra Rae has a detection limit of 100 parts per billion or 0.1 parts per million for both benzene and total VOC's. Benzene and total VOC's were not detected

in any location during the monitoring event. Therefore, no further indoor air evaluation was completed.

Based on the presence of LNAPL in well MW-7 which is located approximately 200 feet southeast of the Philadelphia Fire Department buildings, and since there are no monitoring points between MW-7 and the buildings, further evaluation of the potential vapor intrusion into indoor air pathway for these buildings will be completed by Sunoco.

Installation of a water curtain in the Jackson Street sewer was completed during the 4th quarter of 2003. The water curtain is designed to reduce hydrocarbon odors and vapors potentially migrating from the Jackson Street sewer to the surrounding areas. The water curtain apparatus is located in the first manhole west of the interceptor chamber along 26th Street and consists of a single centrally located nozzle that emits a radial spray pattern. Water is supplied to the water curtain apparatus from the North Yard fire water system. Heat trace was installed along the water feed line allowing winter operation of the water curtain.

## 7.0 SITE CONCEPTUAL MODEL

A preliminary site conceptual model (SCM) for the Refinery was presented in the CCR. Data collected from the Site characterization activities performed in AOI 8 were used to refine the SCM for this area. The SCM for AOI 8 is described below:

### 7.1 Description and Site Use

AOI 8 is the northern most area of the Refinery and is bound by the PGW plant to the south, the Schuylkill River to the west, industrial properties to the north, and urban streets to the east (Figure 1), and encompasses approximately 250 acres.

AOI 8 was an active Refinery process area since the early twentieth century with process areas and ASTs. The area also included the former lube, asphalt, soap, and wax plants. The majority of AOI 8 structures were demolished between 1975 and 1980. Subsequent to decommissioning of most of the process areas, a LTU was operated from 1986 through 2000. Currently, the only remaining active facilities in AOI 8 are the asphalt dock, the boiler house, a storm water separator, fuel oil storage, butane and propane storage area, and loading and unloading facilities. Much of AOI 8 is

unimproved and many of the ASTs have been demolished. The majority of the land surface in AOI 8 is not covered by impervious surfaces.

## 7.2 Geology and Hydrogeology

The following summarizes relevant information concerning geology and hydrogeology in AOI 8:

- Fill materials are present throughout AOI 8;

- In the western portion of AOI 8, the Pleistocene age formations have been eroded and replaced with alluvium. The alluvium is deposited atop bedrock and extends to the central and northern portions of AOI 8, but is absent in the eastern portion. Along the eroded edge (central portion of AOI 8), the alluvium is in direct contact with Trenton Gravel, Lower/Middle Clay, Lower Sand and/or bedrock;

- Trenton Gravel is present in the northern, central and eastern portions of AOI 8 but is absent in the western portion where it has been eroded and replaced with alluvium. The Lower/Middle Clay is present beneath AOI 8 as a wedge that thickens towards the west and the Schuylkill River but is absent between the central and western portions of AOI 8 where it has been eroded and replaced with alluvium. The Lower Sand overlies bedrock in the eastern and central portions of AOI 8, but is absent in the northwestern and western portions where it has been eroded and replaced with alluvium;

- The depth to bedrock beneath AOI 8 increases towards the south;

- A groundwater flow divide, trending northwest to southeast, is present in the central portion of AOI 8 in both the shallow and deep groundwater zones. This divide generally corresponds with the eastern extent of the alluvium materials deposited following the erosion and removal of the Pleistocene age deposits. In shallow and intermediate groundwater zones, groundwater on the east side of the divide flows to the northeast and groundwater on the west side of the divide flows to the southwest. In the deep zone, groundwater on the east side of the divide flows to the east and southeast and groundwater on the west side of the divide flows to the southwest;

- The shallow groundwater gradient in the western portion of AOI 8 is relatively flat with some depressions and mounds at isolated locations. Along the western AOI boundary, shallow groundwater flow is more pronounced towards the bulkheads and River;

- Shallow groundwater flow along the western site boundary, in the vicinity of the Jackson Street Sewer and along the PGW border is influenced by pumping in these areas;

- The shallow groundwater gradient in the eastern and southern portions of AOI 8 is relatively flat with some depressions and mounds at isolated locations; and

- A downward vertical flow gradient exists between the shallow and deep zone as indicated by the groundwater elevations in the following well pairs: N-3/N-4, N-12/N-13, N-8/N-9, N-18/N-19, N-20/N-21, N-29/N-30, N-38/N-38D, N-43/N-44D, N-47/N-46D and N-51/N-50D. This is consistent with vertical gradients elsewhere in the Refinery.

### 7.3 Compounds of Concern

The following summarizes relevant information concerning COCs in AOI 8:

- COCs which were detected in shallow soil, exceed their respective PADEP non-residential MSCs, and were detected in groundwater include: benzene, naphthalene, benzo(a)pyrene and total lead;

- Toluene, ethylbenzene, ethylene dibromide, 1,2-dichloroethane, total xylenes, MTBE, cumene, anthracene, pyrene, benzo(g,h,i)perylene, benzo(b)fluoranthene, chrysene, benzo(a)anthracene, phenanthrene and flourene were not detected in shallow soil samples at concentrations exceeding their respective PADEP non-residential MSCs;

- Materials resembling leaded tank bottoms were observed in only one boring location (BH-08-05) at SWMU 2. Soil from this boring exhibited a total lead concentration below the PADEP non-residential MSC (450 ppm) and was therefore not submitted for TCLP analysis. No other evidence of leaded tank bottom materials were observed in soil borings advanced at SWMU 2;

- COCs detected in shallow groundwater at concentrations exceeding their respective PADEP non-residential MSCs include: benzene, pyrene, chrysene, phenanthrene, and naphthalene;

- Cumene, toluene, ethylbenzene, ethylene dibromide, xylenes (total), fluorene, MTBE, 1,2-dichoroethane and lead were not detected in shallow groundwater at concentrations exceeding their respective PADEP non-residential MSCs;

- Benzene was detected in three Lower Sand wells (N-9, N-21, N-44D) at concentrations slightly above its respective non-residential PADEP MSC; and

- Toluene, MTBE, 1,2-dichoroethane, xylenes (total), cumene, ethylbenzene, ethylene dibromide, pyrene, chrysene, phenanthrene, fluorine, naphthalene, and lead were not detected in deep groundwater at concentrations exceeding their respective PADEP non-residential MSCs.

The exposure assessment completed for AOI 8 COCs is discussed in Section 8.0 of this report.

### 7.4 LNAPL Distribution and LNAPL Mobility

The following summarizes relevant information concerning LNAPL distribution in AOI 8:

- Four different types or mixtures of LNAPL were identified in AOI 8. These include residual oil, lube oil, lube oil/middle distillate mixture, and middle distillate;

- The occurrence of LNAPL in AOI 8 correlates with the COC concentrations which exceeded MSCs in shallow groundwater; and

- LNAPL in RW-305 (residual oil) along the Jackson Street sewer is considered mobile based on previous LNAPL modeling results as discussed in the CCR. LNAPL elsewhere in AOI 8 is considered to be relatively immobile based on the modeling and does not have the potential to migrate off-site.

## 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 one deep well in AOI 8 (N-9) because N-9 had a benzene concentration (8 ug/L) in excess of its groundwater MSC of 5 ug/L and is located by the property boundary. Fate QD simulation results indicate benzene at N-9 will quickly fall below its MSC in the deep groundwater zone. The predicted, steady-state transport distance at which benzene would reach its groundwater MSC is 20 feet. The downgradient property boundary is approximately 25 feet from N-9. Based on this simulation, benzene has low potential to be transported off-site in this part of AOI 8.

No other fate and transport modeling was completed since dissolved concentrations in groundwater in AOI 8 do not appear to have the potential to migrate off-site. Dissolved concentrations of COCs in groundwater along the western border of AOI 8 were conservatively modeled using PENTOXSD. The QD and PENTOXSD modeling is described in detail in Appendix E.

## 7.6 Potential Migration Pathways and Site Receptors

The following summarizes the relevant information concerning the potential pathways and site receptors for AOI 8.

- AOI 8 is located within a fenced secured area to prevent unauthorized access. Direct contact to site soils is governed by Sunoco's on-site procedures and PPE requirements;

- No human health receptors to groundwater exist for the refinery based on on-site procedures and PPE requirements;

- Based on the presence of LNAPL in well MW-7, and since there are no monitoring points between MW-7 and the buildings, further evaluation of the potential vapor intrusion into indoor air pathway for these buildings will be completed by Sunoco;

- Based on fate and transport modeling, dissolved phase COCs in groundwater do not appear to have the potential to extend off-site along the northern and eastern boundaries of AOI 8. Along the western boundary, concentrations of COCs in groundwater were compared to the calculated allowable surface water contribution concentrations derived using PENTOXSD. All of the COC concentrations in groundwater along the western AOI border are below these values;

- The water curtain in the Jackson Street sewer reduces hydrocarbon odors and vapors potentially migrating from the Jackson Street sewer to the surrounding areas; and

- LNAPL migration along the southern border of AOI 8 (PGW border) is addressed by the existing PGW Border Total Fluids Recovery system.

## 8.0 HUMAN HEALTH EXPOSURE ASSESSMENT/RISK ASSESSMENT

Based on the current and future intended non-residential site use, an exposure assessment was conducted for all compounds which exceeded the non-residential statewide health standards in AOI 8. Potential human health exposures for the refinery are for an industrial worker scenario. The media considered included groundwater, surface soil (less than two feet below grade), and subsurface soil (greater than two feet below grade).

Direct contact issues with soil, groundwater and LNAPL for the industrial scenario are addressed 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 8 to assess this potential exposure pathway.

The following table serves as a summary of potential pathways that can be reasonably expected under the current and intended future non-residential use for AOI 8. The table lists potentially contaminated media, potential receptors for these media, and a summary of whether any potential pathways exist at AOI 8 from the media to these receptors.

**Potential for Complete Exposure Pathways**

| Contaminated Media | Residents | Workers | Day Care | Construction | Trespassers | Recreation | Food |
|---|---|---|---|---|---|---|---|
| Groundwater | Na | No[1] | Na | No [2] | No | Na | Na |
| Air (indoor) | Na | Yes [3] | Na | No | No | Na | Na |
| Soil <2 feet bgs. | Na | Yes | Na | No [2] | No | Na | Na |
| Surface Water | Na | Na | Na | Na | Na | Na | Na |
| Sediment | Na | Na | Na | Na | 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 procedures and PPE.

(2) No complete groundwater or LNAPL pathway exists for construction workers due to PPE requirements and Standard Operating Procedures.

(3) A potential complete pathway to indoor air exists

No complete pathway exists for site soil > 2 feet deep due to PPE requirements and Standard Operating Procedures.

Na - Not applicable.

No - No potential complete exposure pathway

Yes – Potential complete exposure pathway

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

### 8.1 Surface Water /Sediment

No surface water features are located in AOI 8. The nearest surface water body to AOI 8 is the Schuylkill River which comprises the western boundary of AOI 8. However, sheet pile and wooden bulkheads are present between AOI 8 and the River as illustrated in Figure 2. Groundwater interaction with surface water/sediment is limited by the above referenced walls and is further limited by the North Yard Bulkhead Total Fluids Recovery System and the No. 3 Tank Farm Separator Total Fluids Recovery System which pump and recover water along the bulkheads.

Based on shallow groundwater flow as depicted in Figure 6 and the locations of wells with exceedances of COCs (Figure 10), groundwater exceeding the MSCs along the western border flows towards the bulkheads and is captured by recovery systems through pumping. To conservatively investigate whether concentrations of COCs in groundwater along the western border would adversely impact the surface water quality of the Schuylkill River (should the recovery systems be shutdown), modeling was completed using PENTOXSD (Appendix E)). The results of the modeling indicate that concentrations of COCs in groundwater along the western boundary would not cause a discharge to surface water in the Schuylkill River that is above the PA Chapter 16 water quality criteria.

## 8.2 Surface Soils (0-2 Feet Below Grade)

### *8.2.1 Soil-to-Groundwater*

The soil-to-groundwater pathway is being addressed through the groundwater pathway discussed in Section 8.3.

### *8.2.2 Direct Contact Exposure*

Shallow soil samples collected and analyzed as part of the AOI 8 characterization (Tables 4 and 5) exhibited concentrations of benzene, benzo(a)pyrene, naphthalene and lead above their respective non-residential direct contact MSCs. In accordance with Section IV of the PADEP's Technical Guidance Manual, site-specific standards were calculated using PADEP default intake parameters for an onsite worker and a risk level of $10^{-4}$ for these compounds. For calculating a site-specific standard for onsite workers exposed to lead, Sunoco used the Society of Environmental Geochemistry and Health (SEGH) model used by PADEP to develop the non-residential MSCs.

The risk-based site-specific standards presented in Appendix F for benzene, naphthalene, and benzo(a)pyrene were calculated to be 2,152 mg/kg, 56,778 mg/kg, and 109 mg/kg, respectively. Concentrations of benzene, naphthalene and benzo(a)pyrene detected in the surface soil samples collected in AOI 8 were below these site specific standards and, therefore, risk to onsite workers due to exposure is considered to be minimal.

The site-specific standard for lead based on the SEGH model presented in Appendix F was calculated to be 1,500 mg/kg. Concentrations of lead detected in the surface soil samples collected in AOI 8 were below this site-specific standard and, therefore, risk to an onsite worker due to exposure is considered to be minimal.

In addition to back calculating the site-specific standards for benzene, naphthalene, and benzo(a)pyrene, the cumulative risk of exposure to these compounds was also calculated. As discussed in Appendix F, lead is dependent on the blood/lead concentration and is not risk-based; therefore, lead could not be incorporated into the cumulative risk calculation. Cumulative risk, presented

in Table F-5, is the combined risk of exposure to the maximum concentrations of benzene, naphthalene and benzo(a)pyrene which, in accordance with the TGM, can not exceed $10^{-4}$. The total cumulative risk of exposure to the COCs in AOI 8 was calculated to be $5.66 \times 10^{-5}$, an order of magnitude less than PADEP's requirement.

### 8.3 Groundwater

Benzene, pyrene, chrysene, phenanthrene, and naphthalene have been detected in shallow and deep groundwater in AOI 8 at concentrations above their respective non-residential MSCs. Previous investigations (URS, 2002) verified that no wells located within 1.5 miles of the refinery are used for drinking water or agricultural use. There are no complete direct contact exposure pathways for groundwater within AOI 8 because of on-site procedures and required PPE. There is no potential direct contact exposure to impacted groundwater due to the depth of groundwater in AOI 8.

### 8.4 LNAPL

There are no complete direct contact exposure pathways for LNAPL within AOI 8 because of on-site procedures and required PPE.

### 8.5 Vapor

Occupied areas of AOI 8 include the Boiler House located in the central portion of the AOI and the two Philadelphia Fire Department buildings located west of the PGW border. The Boiler House is included in an on-site indoor air monitoring program and is regulated under OSHA. Indoor air monitoring was performed by Sunoco on September 25, 2008 at the Boiler House for benzene and total VOC's using an Ultra Rae PID. The Ultra Rae is calibrated for benzene and total VOC's using 5 parts per million benzene calibration gas and 100 parts per million isobutylene calibration gas respectively. The Ultra Rae has a detection limit of 100 parts per billion or 0.1 parts per million for both benzene and total VOC's. Benzene and total VOC's were not detected in any location during the monitoring event. Therefore, no further indoor air evaluation was completed.

Based on the presence of LNAPL in well MW-7 which is located approximately 200 feet southeast of the Philadelphia Fire Department buildings, and since there are no

monitoring points between MW-7 and the buildings, further evaluation of the potential vapor intrusion into indoor air pathway for these buildings will be completed by Sunoco.

Installation of a water curtain in the Jackson Street sewer was completed during the 4th quarter of 2003. The water curtain is designed to reduce hydrocarbon odors and vapors potentially migrating from the Jackson Street sewer to the surrounding areas

## 9.0 ECOLOGICAL ASSESSMENT

The majority of AOI 8 is covered with soil and gravel; some areas are covered by impervious surfaces as shown in Figure 12. The non-covered portions of AOI 8 are not likely to serve as a breeding area, migratory stopover, or primary habitat for wildlife. In 2002, a survey of endangered, threatened and special concern wildlife was conducted by reviewing maps provided at the Pennsylvania Department of Conservation and Natural Resources. No endangered, threatened or special concern wildlife were identified using these maps or during historical investigations. Based on this information, there are no ecological receptors of concern for AOI 8 and no related assessment was necessary.

No surface water features are located in AOI 8. The nearest surface water body to AOI 8 is the Schuylkill River which comprises the western boundary. Sheet pile and wooden bulkheads are present between AOI 8 and the River as illustrated in Figure 2. Groundwater interaction with surface water/sediment is limited by the above-referenced walls and is further limited by the North Yard Bulkhead Total Fluids Recovery System and the No. 3 Tank Farm Separator Total Fluids Recovery System which recover water along the bulkheads. As described in Section 8.1, there are no potential surface water receptors and/or exposure pathways in AOI 8.

## 10.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the completed activities, the following conclusions and recommendations have been developed for AOI 8:

- Leaded tank bottom materials were observed in one soil boring within SWMU 2, however, the result for the soil sample collected from this boring exhibited a lead concentration below the PADEP MSC for lead. Therefore no further testing was completed. Leaded tank bottom materials were not detected in any other soil samples collected at SWMU 2.

Therefore, Sunoco is requesting a Final Agency Determination for SWMU 2 in AOI 8 from US EPA.

- LNAPL (lube oil and residual oil) along the PGW border is addressed by the existing PGW Border Total Fluids Recovery System. The effectiveness of the PGW Border Total Fluids Recovery system and the need to expand the system will be evaluated by Sunoco. Updates and proposed modifications to the existing remediation system will be provided in the quarterly reports prepared for the refinery. Other LNAPL in AOI 8 is considered to have low to no mobility and does not have the potential to migrate off-site.

- Based on the presence of LNAPL in well MW-7, and since there are no monitoring points between MW-7 and the buildings, further evaluation of the potential vapor intrusion into indoor air pathway for these buildings will be completed by Sunoco. The results of the evaluation will be presented in an addendum to this report.

- Three deep wells in AOI 8 (N-9, N-21 and N-44D) exhibited benzene concentrations slightly above its PADEP MSC. The highest detection of benzene in these wells is 16 ug/L in N-21. Based on fate and transport modeling completed at N-9, the well closest to the site boundary, deep groundwater impacted with benzene at concentrations above the MSC are unlikely to reach the site boundary in the downgradient direction. Based on these results, the low benzene concentrations detected in N-21 and N-44D, and since N-21 and N-44D are located further away from the site boundary in the downgradient direction, benzene concentrations above the MSC are unlikely to reach the downgradient site boundary.

- Based on the site-specific risk assessment performed for those COCs which exceeded the non-residential MSCs in shallow soil, risk to an onsite worker due to exposure is considered acceptable.

## 11.0 REFERENCES

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

The Atlantic Lead Weathering Pad Final Closure Report, Sun Refining and marketing Company, Atlantic Refining and marketing Corporation, Philadelphia Refinery, K.W. Brown & Associates, Inc., March 1991;

Comprehensive Remedial Plan, Philadelphia Refinery, Sun Company (R&M), September 1993, ENSR Consulting and Engineering;

Remedial Action Plan for the NO.3 Tank Farm Separator, Sun Company (R&M), Philadelphia Refinery, October 1993, ENSR Consulting and Engineering;

Remedial Action Plan for the North Yard Bulkhead, Sun Company (R&M), Philadelphia Refinery, October 1993, ENSR Consulting and Engineering;

Remedial Action Plan for the North Yard Southern Property Boundary, Sun Company (R&M), Philadelphia Refinery, December 1993, ENSR Consulting and Engineering;

Consent Order and Agreement by and between the Commonwealth of Pennsylvania, Department of Environmental Protection, Atlantic Refining & Marketing Corporation and Sunoco Company, Inc. (R&M), August 1996, and amended December 2000 and July 2004;

Corrective Measures Study Work Plan, Sun Company, Inc. (R&M), Philadelphia, PA, April 1997, ENSR Consulting and Engineering;

Landfarm Treatment Unit Closure Activation Report, Philadelphia Refinery Point Breeze Processing Area, November 2000, Blazosky Associates, Inc.;

Amended Closure Plan, Sunoco, Inc. Philadelphia Refinery, Point Breeze Processing Area, Land Treatment Unit, November 1988 and amended November 2002 and May 2004, Blazosky Associates, Inc; and

Amended Post-Closure Plan, Sunoco, Inc. Philadelphia Refinery, Point Breeze Processing Area, Land Treatment Unit, November 1988 and amended June 2003 and May 2004, Blazosky Associates, Inc.

.

U.S. Department of the Interior, Geohydrology and Ground-Water Resources of Philadelphia, Pennsylvania, U.S. Geological Survey, Water-Supply Paper 2346.

Schreffler, C. L., 2001, U.S. Department of the Interior, Simulation of Ground-Water Flow in the Potomac-Raritan-Magothy Aquifer System Near the Defense Supply Center Philadelphia, and the Point Breeze Refinery, Southern Philadelphia County, Pennsylvania, Water-Resources Investigations Report 01-4218, 20 pp.

Sloto, R. A., 1988, 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.

Pennsylvania Department of Environmental Protection, 2003, Document Number 253-0300-100, Land Recycling Program Technical Guidance Manual – Section IV.A.4. Vapor Intrusion Into Buildings From Groundwater and Soil Under the Act 2 Statewide Health Standard.

# TABLES

**Table 1**
**Compounds of Concern**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| SOIL | |
|---|---|
| **METALS** | **CAS No.** |
| Lead (total) | 7439-92-1 |
| **VOLATILE ORGANIC COMPOUNDS** | **CAS No.** |
| 1,2-dichloroethane | 107-06-2 |
| 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.

**Table 1 (continued)**
**Compounds of Concern**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| GROUNDWATER | |
|---|---|
| **METALS** | **CAS No.** |
| Lead (dissolved) | 7439-92-1 |
| **VOLATILE ORGANIC COMPOUNDS** | **CAS No.** |
| 1,2-dichloroethane | 107-06-2 |
| 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.

**Table 2**
**Existing Well Summary for AOI 8**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Well ID | Former Well ID[3] | AOI # | Northing | Easting | Well Type[4] | Well Classification (Shallow, Intermediate, Deep) | Soil Boring Log Available (Y/N) | Construction Detail Available (Y/N) | Date of Well Completion | Well Construction Details[2] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Well Completion Depth (ft. bgs) | Well Diameter (in) | Top of Inner Casing Elevation (ft. msl) (NAVD88) | Ground Surface Elevation[1] (ft.) (NAVD88) | Top of Screen Elevation (ft) (NAVD88) | Bottom of Screen Elevation (ft) (NAVD88) | Depth to Screen (ft. bgs) | Screen Length (ft.) |
| **AOI - 8 (Point Breeze Process Area North Yard)** | | | | | | | | | | | | | | | | | |
| MW-4 | -- | 8 | 220715.37 | 2684313.64 | Monitoring Well | Shallow | -- | -- | -- | 42.13 | 12 | 14.87 | -- | -- | -- | -- | -- |
| MW-5 | -- | 8 | -- | -- | -- | -- | -- | -- | -- | 38.1 | 12 | -- | -- | -- | -- | -- | -- |
| MW-6 | -- | 8 | -- | -- | -- | -- | -- | -- | -- | -- | 12 | -- | -- | -- | -- | -- | -- |
| N-1 | B-2, NS-2 | 8 | 228366.23 | 2682437.20 | Monitoring Well | Shallow | Y | N | 7/22/85 | 8 | -- | 24.69 | 27.33 | -- | -- | -- | -- |
| N-10 | B-65 | 8 | 227333.89 | 2682477.63 | Monitoring Well | Shallow | Y | N | 7/29/85 | 10 | -- | 19.96 | 17.48 | -- | -- | -- | -- |
| N-100 | -- | 8 | 228209.79 | 2682716.19 | Monitoring Well | Intermediate | Y | Y | 6/13/08 | 20 | 2 | 27.01 | 24.99 | 14.99 | 4.99 | 10 | 10 |
| N-101 | -- | 8 | 227221.78 | 2683652.84 | Monitoring Well | Intermediate | Y | Y | 6/16/08 | 23 | 2 | 27.15 | 25.43 | 12.43 | 2.43 | 13 | 10 |
| N-102 | -- | 8 | 227035.48 | 2683869.61 | Monitoring Well | Intermediate | Y | Y | 6/5/08 | 30 | 2 | 33.21 | 31.59 | 11.59 | 1.59 | 20 | 10 |
| N-103 | -- | 8 | 226781.71 | 2683660.20 | Monitoring Well | Intermediate | Y | Y | 6/6/08 | 27 | 2 | 29.33 | 27.56 | 10.56 | 0.56 | 17 | 10 |
| N-104 | -- | 8 | 226914.01 | 2683419.55 | Monitoring Well | Intermediate | Y | Y | 6/16/08 | 25 | 2 | 27.64 | 25.96 | 10.96 | 0.96 | 15 | 10 |
| N-105 | -- | 8 | 226745.37 | 2683442.71 | Monitoring Well | Intermediate | Y | Y | 6/18/08 | 25 | 2 | 28.11 | 26.26 | 11.26 | 1.26 | 15 | 10 |
| N-106 | -- | 8 | 227044.24 | 2682976.54 | Monitoring Well | Intermediate | Y | Y | 6/5/08 | 19 | 2 | 23.03 | 21.50 | 12.50 | 2.50 | 9 | 10 |
| N-107 | -- | 8 | 226909.90 | 2683133.25 | Monitoring Well | Intermediate | Y | Y | 6/20/08 | 22 | 2 | 26.37 | 24.38 | 12.38 | 2.38 | 12 | 10 |
| N-108 | -- | 8 | 226848.60 | 2682983.78 | Monitoring Well | Intermediate | Y | Y | 5/29/08 | 18 | 2 | 25.07 | 23.12 | 15.12 | 5.12 | 8 | 10 |
| N-109 | -- | 8 | 226649.19 | 2681604.97 | Monitoring Well | Intermediate | Y | Y | 7/3/08 | 20 | 2 | 18.42 | 15.54 | 10.54 | -4.46 | 5 | 15 |
| N-11 | B-14 | 8 | 227226.31 | 2682914.82 | Monitoring Well | Intermediate | Y | N | 11/13/84 | 25 | -- | 29.74 | 24.36 | -- | -- | -- | -- |
| N-110 | -- | 8 | 226640.02 | 2680765.88 | Monitoring Well | Intermediate | Y | Y | 5/14/08 | 15 | 2 | 12.11 | 9.92 | 4.92 | -5.08 | 5 | 10 |
| N-111 | -- | 8 | 226514.00 | 2680519.26 | Monitoring Well | Intermediate | Y | Y | 5/14/08 | 15 | 2 | 10.52 | 8.65 | 5.52 | -4.48 | 5 | 10 |
| N-112 | -- | 8 | 226328.46 | 2681663.57 | Monitoring Well | Intermediate | Y | Y | 5/14/08 | 20 | 2 | 15.72 | 13.86 | 8.86 | -6.14 | 5 | 15 |
| N-113 | -- | 8 | 226054.27 | 2681733.33 | Monitoring Well | Intermediate | Y | Y | 5/15/08 | 15 | 2 | 14.15 | 12.32 | 7.32 | -2.68 | 5 | 10 |
| N-114 | -- | 8 | 226224.65 | 2681510.70 | Monitoring Well | Intermediate | Y | Y | 5/13/08 | 25 | 2 | 14.37 | 12.47 | 2.47 | -12.53 | 10 | 15 |
| N-115 | -- | 8 | 225824.43 | 2682246.43 | Monitoring Well | Intermediate | Y | Y | 5/28/08 | 14 | 2 | 15.33 | 13.43 | 11.33 | -2.67 | 4 | 14 |
| N-116 | -- | 8 | 225843.60 | 2682616.59 | Monitoring Well | Intermediate | Y | Y | 5/20/08 | 12 | 2 | 11.28 | 8.49 | 6.49 | -3.51 | 2 | 10 |
| N-117 | -- | 8 | 226416.38 | 2682828.26 | Monitoring Well | Intermediate | Y | Y | 6/4/08 | 20 | 2 | 24.24 | 22.16 | 16.24 | -3.76 | 8 | 20 |
| N-118 | -- | 8 | 226460.51 | 2683077.27 | Monitoring Well | Intermediate | Y | Y | 5/23/08 | 20 | 2 | 23.45 | 21.49 | 11.49 | 1.49 | 10 | 10 |
| N-119 | -- | 8 | 226406.09 | 2683561.62 | Monitoring Well | Intermediate | Y | Y | 5/29/08 | 18 | 2 | 20.43 | 18.73 | 10.73 | 0.73 | 8 | 10 |
| N-12 | B-15 | 8 | 227099.36 | 2683393.61 | Monitoring Well | Intermediate | Y | N | 11/14/84 | 20 | -- | 27.19 | 24.45 | -- | -- | -- | -- |
| N-120 | -- | 8 | 226332.60 | 2683852.90 | Monitoring Well | Intermediate | Y | Y | 5/22/08 | 18 | 2 | 22.33 | 20.18 | 12.18 | 2.18 | 8 | 10 |
| N-121 | -- | 8 | 226380.69 | 2683357.05 | Monitoring Well | Intermediate | Y | Y | 6/9/08 | 20 | 2 | 20.77 | 18.95 | 8.95 | -1.05 | 10 | 10 |
| N-122 | -- | 8 | 226074.38 | 2683576.78 | Monitoring Well | Intermediate | Y | Y | 5/21/08 | 18 | 2 | 16.68 | 14.93 | 8.93 | -3.07 | 6 | 12 |
| N-123 | -- | 8 | 225788.93 | 2684165.08 | Monitoring Well | Intermediate | Y | Y | 5/20/08 | 20 | 2 | 21.24 | 19.42 | 9.42 | -0.58 | 10 | 10 |
| N-124 | -- | 8 | 225963.42 | 2684525.33 | Monitoring Well | Intermediate | Y | Y | 5/21/08 | 25 | 2 | 25.67 | 26.02 | 16.02 | 1.02 | 10 | 15 |
| N-125 | -- | 8 | 225653.26 | 2683530.88 | Monitoring Well | Intermediate | Y | Y | 6/17/08 | 25 | 2 | 25.94 | 24.28 | 9.28 | -0.72 | 15 | 10 |
| N-126 | -- | 8 | 225829.50 | 2683283.04 | Monitoring Well | Shallow | Y | Y | 5/29/08 | 14 | 2 | 10.80 | 8.83 | 4.83 | -5.17 | 4 | 10 |
| N-127 | -- | 8 | 225192.92 | 2682768.51 | Monitoring Well | Intermediate | Y | Y | 5/28/08 | 34 | 2 | 33.45 | 31.75 | 14.45 | -19.55 | 19 | 34 |
| N-128 | -- | 8 | 225454.12 | 2682901.77 | Monitoring Well | Intermediate | Y | Y | 5/20/08 | 25 | 2 | 28.14 | 26.50 | 11.50 | 1.50 | 15 | 10 |
| N-129 | -- | 8 | 225469.92 | 2683240.94 | Monitoring Well | Intermediate | Y | Y | 7/1/08 | 30 | 2 | 28.90 | 27.12 | 13.12 | -2.88 | 14 | 16 |
| N-13 | B-16 | 8 | 227095.48 | 2683398.97 | Monitoring Well | Deep | Y | N | 12/13/84 | 50 | -- | 26.77 | 31.21 | -- | -- | -- | -- |
| N-130 | -- | 8 | 225087.60 | 2682501.02 | Monitoring Well | Intermediate | Y | Y | 5/16/08 | 32 | 2 | 31.60 | 30.07 | 13.60 | -16.40 | 18 | 30 |
| N-131 | -- | 8 | 225671.49 | 2681085.58 | Monitoring Well | Shallow | Y | Y | 6/10/08 | 15 | 2 | 9.03 | 7.10 | 2.10 | -7.90 | 5 | 10 |
| N-132 | -- | 8 | 225634.14 | 2681685.29 | Monitoring Well | Shallow | Y | Y | 5/13/08 | 25 | 2 | 11.11 | 9.06 | -5.94 | -15.94 | 15 | 10 |
| N-133 | -- | 8 | 224966.63 | 2680751.16 | Monitoring Well | Shallow | Y | Y | 5/15/08 | 12 | 2 | 9.36 | 7.19 | 5.19 | -4.81 | 2 | 10 |
| N-134 | -- | 8 | 226063.25 | 2685261.95 | Monitoring Well | Intermediate | Y | Y | 5/22/08 | 20 | 2 | 27.49 | 25.79 | 15.79 | 5.79 | 10 | 10 |
| N-135 | -- | 8 | 225141.45 | 2680687.18 | Monitoring Well | Shallow | Y | Y | 5/15/08 | 12 | 2 | 9.92 | 7.76 | 5.76 | -4.24 | 2 | 10 |
| N-136 | -- | 8 | 225342.98 | 2680714.22 | Monitoring Well | Shallow | Y | Y | 5/15/08 | 12 | 2 | 10.85 | 8.68 | 6.68 | -3.32 | 2 | 10 |
| N-14 | B-19 | 8 | 227010.93 | 2683665.27 | Monitoring Well | Intermediate | Y | N | 11/15/84 | 25 | -- | 31.99 | 25.12 | -- | -- | -- | -- |
| N-15 | B-17 | 8 | 226992.66 | 2684060.45 | Monitoring Well | Intermediate | Y | N | 11/15/84 | 24.5 | -- | 29.35 | 18.03 | -- | -- | -- | -- |

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

Abandoned wells.

**NOTES:**

AOI - Area of Interest
ft. - feet
bgs - below ground surface
in. - inches
msl - elevation relative to mean sea level

1. Elevation datum for wells within AOI 8 were suryved to NAVD 88 as a part of this report. Survey completed Langan.
2. Well construction details were taken directly from well boring logs provided by Handex, Secor, Aquaterra or collected from available historic reports. Where no well boring logs exist, no well construction data is listed.
3. Former well IDs were derived from handwritten notes on the logs themselves or the referenced report.
4. Well type was chosen based on the formation in which the well was screened. 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 were classified as either a shallow or intermediate well.

**Table 2**
**Existing Well Summary for AOI 8**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Well ID | Former Well ID[3] | AOI # | Northing | Easting | Well Type[4] | Well Classification (Shallow, Intermediate, Deep) | Soil Boring Log Available (Y/N) | Construction Detail Available (Y/N) | Date of Well Completion | Well Construction Details[2] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Well Completion Depth (ft. bgs) | Well Diameter (in) | Top of Inner Casing Elevation (ft. msl) (NAVD88) | Ground Surface Elevation[1] (ft.) (NAVD88) | Top of Screen Elevation (ft) (NAVD88) | Bottom of Screen Elevation (ft) (NAVD88) | Depth to Screen (ft. bgs) | Screen Length (ft.) |
| **AOI - 8 (Point Breeze Process Area North Yard)** | | | | | | | | | | | | | | | | | |
| N-16 | -- | 8 | 226992.62 | 2684408.64 | Monitoring Well | Intermediate | N | N | -- | 26.8 | -- | 32.98 | 31.80 | -- | -- | -- | -- |
| N-17 | B-18 | 8 | 226992.70 | 2684410.42 | Monitoring Well | Intermediate | Y | N | 11/15/84 | 25.5 | -- | 34.42 | 30.15 | -- | -- | -- | -- |
| N-18 | B-21 | 8 | 226744.10 | 2684649.89 | Monitoring Well | Intermediate | Y | N | 11/16/84 | 25 | -- | 32.90 | 30.46 | -- | -- | -- | -- |
| N-19 | B-20 | 8 | 226736.82 | 2684650.61 | Monitoring Well | Deep | Y | N | 12/14/84 | 60 | -- | 32.78 | 22.95 | -- | -- | -- | -- |
| N-2 | B-4 | 8 | 228047.58 | 2682765.80 | Abandoned | Shallow | Y | N | 11/15/84 | 25 | -- | -- | 30.35 | -- | -- | -- | -- |
| N-20 | B-23 | 8 | 226644.84 | 2683877.90 | Monitoring Well | Shallow | Y | N | 7/22/85 | 6 | -- | 28.39 | 25.04 | -- | -- | -- | -- |
| N-21 | B-24 | 8 | 226627.77 | 2683879.14 | Monitoring Well | Deep | Y | N | 11/30/84 | 51.5 | -- | 28.01 | 30.60 | -- | -- | -- | -- |
| N-22 | B-22 | 8 | 226765.48 | 2683180.27 | Abandoned | Intermediate | Y | N | 11/16/84 | 20 | -- | -- | 28.48 | -- | -- | -- | -- |
| N-23 | B-64 | 8 | 226791.47 | 2682839.04 | Monitoring Well | Intermediate | Y | N | 7/30/84 | 20 | -- | 21.14 | 22.36 | -- | -- | -- | -- |
| N-24 | B-25 | 8 | 226437.46 | 2682553.56 | Monitoring Well | Shallow | Y | N | 11/15/84 | 16 | -- | 20.65 | 16.49 | -- | -- | -- | -- |
| N-25 | B-26 | 8 | 226322.13 | 2683073.86 | Monitoring Well | Shallow | Y | N | 11/16/84 | 12 | -- | 18.78 | 22.78 | -- | -- | -- | -- |
| N-26 | B-27 | 8 | 226231.01 | 2683594.77 | Monitoring Well | Shallow | Y | N | 11/16/84 | 10 | -- | 21.03 | 17.74 | -- | -- | -- | -- |
| N-27 | B-28 | 8 | 226112.95 | 2684408.57 | Monitoring Well | Deep | Y | N | 11/29/84 | 60.5 | -- | 23.26 | 18.10 | -- | -- | -- | -- |
| N-28 | B-30, NS-30 | 8 | 226342.72 | 2684857.50 | Monitoring Well | Shallow | Y | N | 7/22/85 | 6 | -- | 20.45 | 20.43 | -- | -- | -- | -- |
| N-29 | B-36, NS-36 | 8 | 225867.46 | 2684940.39 | Monitoring Well | Shallow | Y | N | 11/19/84 | 30 | -- | 40.12 | 21.72 | -- | -- | -- | -- |
| N-3 | B-5 | 8 | 227951.85 | 2683124.61 | Monitoring Well | Shallow | Y | N | 11/14/84 | 23 | -- | 26.66 | 23.91 | -- | -- | -- | -- |
| N-30 | B-37, NS-37 | 8 | 225831.54 | 2684940.39 | Monitoring Well | Deep | Y | N | 12/6/84 | 60 | -- | 40.15 | 36.96 | -- | -- | -- | -- |
| N-31 | B-35 | 8 | 225886.80 | 2684418.16 | Monitoring Well | Shallow | Y | N | 11/19/84 | 20 | -- | 24.52 | 13.97 | -- | -- | -- | -- |
| N-32 | B-34, NS-34 | 8 | 226049.83 | 2683851.71 | Monitoring Well | Shallow | Y | N | 7/23/85 | 6 | -- | 16.27 | 21.20 | -- | -- | -- | -- |
| N-33 | PH-83 | 8 | 226174.17 | 2682934.35 | Abandoned | -- | Y | N | 1946 | 77 | 10 | -- | 14.95 | -45.05 | -62.05 | 60 | 17 |
| N-34 | B-33 | 8 | 226258.77 | 2682271.69 | Monitoring Well | Intermediate | Y | N | 11/21/84 | 14 | -- | 13.59 | 11.01 | -- | -- | -- | -- |
| N-35 | B-62 | 8 | 226288.62 | 2681868.75 | Monitoring Well | Shallow | Y | N | 7/30/85 | 20 | -- | 16.17 | 14.21 | -- | -- | -- | -- |
| N-36 | B-32 | 8 | 226219.90 | 2681731.67 | Monitoring Well | Shallow | Y | N | 11/21/84 | 13 | -- | 15.16 | 12.73 | -- | -- | -- | -- |
| N-37 | B-31 | 8 | 226842.85 | 2681527.91 | Monitoring Well | Shallow | Y | N | 11/20/84 | 17 | -- | 18.22 | 16.26 | -- | -- | -- | -- |
| N-38 | N-71 | 8 | 226898.65 | 2680805.01 | Monitoring Well | Shallow | Y | Y | 8/9/88 | 17 | 4 | 10.09 | 8.77 | 9.36 | -5.64 | 2 | 15 |
| N-38D | -- | 8 | 226897.43 | 2680792.26 | Monitoring Well | Deep | Y | Y | 2/25/94 | 85 | 2 | 10.43 | 8.77 | -66.23 | -76.23 | 75 | 10 |
| N-39 | B-38 | 8 | 226168.64 | 2681237.78 | Abandoned | -- | Y | N | 11/20/84 | -- | -- | -- | 13.03 | -- | -- | -- | -- |
| N-4 | B-6 | 8 | 227944.64 | 2683123.41 | Monitoring Well | Deep | Y | N | 12/12/84 | 44.5 | -- | 26.36 | 36.03 | -- | -- | -- | -- |
| N-40 | B-39 | 8 | 226015.40 | 2682005.80 | Monitoring Well | Shallow | Y | N | 11/20/84 | 15 | -- | 12.10 | 10.26 | -- | -- | -- | -- |
| N-41 | B-40 | 8 | 225981.06 | 2682417.61 | Monitoring Well | Shallow | Y | N | 11/20/84 | 14 | -- | 10.39 | 10.36 | -- | -- | -- | -- |
| N-42 | B-41 | 8 | 225812.91 | 2682411.56 | Monitoring Well | Shallow | Y | N | 11/20/84 | 15 | -- | 14.90 | 12.09 | -- | -- | -- | -- |
| N-43 | B-42, NS-42 | 8 | 225594.75 | 2682491.35 | Monitoring Well | Shallow | Y | N | 10/12/84 | 21 | -- | 30.34 | 27.70 | -- | -- | -- | -- |
| N-44D | B-43 | 8 | 225587.98 | 2682498.21 | Monitoring Well | Deep | N | N | -- | 58 | -- | 30.70 | 27.17 | -- | -- | -- | -- |
| N-45 | B-46 | 8 | 225781.80 | 2683522.90 | Monitoring Well | Intermediate | Y | N | 11/19/84 | 20 | -- | 22.75 | 21.20 | -- | -- | -- | -- |
| N-46D | B-60 | 8 | 225552.46 | 2683948.42 | Monitoring Well | Deep | N | N | 12/5/84 | 55 | -- | 32.80 | 31.16 | -- | -- | -- | -- |
| N-47 | B-59 | 8 | 225574.57 | 2683918.03 | Monitoring Well | Intermediate | Y | N | 11/19/84 | 25 | -- | 31.92 | 29.70 | -- | -- | -- | -- |
| N-48 | B-58 | 8 | 225381.15 | 2683495.27 | Monitoring Well | Intermediate | Y | N | 11/19/84 | 27 | -- | 31.25 | 30.58 | -- | -- | -- | -- |
| N-49 | B-63 | 8 | 225198.78 | 2683108.43 | Monitoring Well | Intermediate | Y | N | 7/29/85 | 27 | -- | 33.70 | 29.30 | -- | -- | -- | -- |
| N-5 | -- | 8 | 227645.57 | 2682201.24 | Monitoring Well | Shallow | Y | N | 11/15/84 | 13 | -- | 25.96 | 23.80 | | | | |
| N-503 | -- | 8 | 226576.30 | 2680565.72 | Monitoring Well | Shallow | Y | Y | -- | -- | -- | 12.40 | 11.46 | -- | -- | -- | -- |
| N-504 | -- | 8 | 226856.67 | 2680651.60 | Monitoring Well | Intermediate | Y | Y | -- | -- | -- | 12.31 | 11.36 | -- | -- | -- | -- |
| N-50D | B-57, NS-57 | 8 | 225295.49 | 2682959.22 | Monitoring Well | Deep | N | N | 12/7/84 | 60 | -- | 32.31 | 31.07 | -- | -- | -- | -- |
| N-51 | B-56, NS-56 | 8 | 225323.12 | 2682942.64 | Monitoring Well | Intermediate | Y | N | 11/21/84 | 28 | -- | 31.85 | 30.53 | -- | -- | -- | -- |
| N-52 | B-55 | 8 | 225060.62 | 2682630.40 | Monitoring Well | Intermediate | Y | N | 11/20/84 | 25 | -- | 33.50 | 31.61 | -- | -- | -- | -- |
| N-53 | B-50 | 8 | 225414.30 | 2682290.54 | Monitoring Well | Shallow | Y | N | 11/20/84 | 25 | -- | 29.13 | 12.73 | -- | -- | -- | -- |

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Abandoned wells.

**NOTES:**

AOI - Area of Interest
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**Table 2**
**Existing Well Summary for AOI 8**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Well ID | Former Well ID[3] | AOI # | Northing | Easting | Well Type[4] | Well Classification (Shallow, Intermediate, Deep) | Soil Boring Log Available (Y/N) | Construction Detail Available (Y/N) | Date of Well Completion | Well Construction Details[2] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Well Completion Depth (ft. bgs) | Well Diameter (in) | Top of Inner Casing Elevation (ft. msl) (NAVD88) | Ground Surface Elevation[1] (ft.) (NAVD88) | Top of Screen Elevation (ft) (NAVD88) | Bottom of Screen Elevation (ft) (NAVD88) | Depth to Screen (ft. bgs) | Screen Length (ft.) |
| **AOI - 8 (Point Breeze Process Area North Yard)** | | | | | | | | | | | | | | | | | |
| N-54 | B-52 | 8 | 225182.20 | 2681925.80 | Monitoring Well | Shallow | Y | N | 11/21/84 | 13 | -- | 10.88 | 8.99 | -- | -- | -- | -- |
| N-55 | B-51 | 8 | 225113.12 | 2681489.22 | Monitoring Well | Shallow | Y | N | 11/21/84 | 7.6 | -- | 10.26 | 10.68 | -- | -- | -- | -- |
| N-56 | B-48 | 8 | 225651.93 | 2681287.51 | Monitoring Well | Shallow | Y | N | 11/212/84 | 13 | -- | 13.37 | 8.56 | -- | -- | -- | -- |
| N-57 | B-61 | 8 | 226038.77 | 2680602.25 | Monitoring Well | Shallow | Y | N | 7/29/85 | 10 | -- | 10.91 | 7.21 | -- | -- | -- | -- |
| N-58 | N-70 | 8 | 225832.21 | 2680454.87 | Monitoring Well | Shallow | Y | Y | 8/8/88 | 17 | 4 | 9.23 | 7.21 | 4.74 | -10.26 | 2 | 15 |
| N-59 | N-69 | 8 | 225621.54 | 2680441.99 | Monitoring Well | Shallow | Y | Y | 8/8/88 | 17 | 4 | 6.95 | 8.56 | 6.56 | -8.44 | 2 | 15 |
| N-6 | -- | 8 | 227533.50 | 2682704.75 | Abandoned | -- | Y | Y | -- | | | 31.27 | 31.21 | | | | |
| N-60 | B-47, NS-47 | 8 | 225524.83 | 2680754.23 | Monitoring Well | Shallow | Y | N | 11/21/84 | 6 | -- | 10.85 | 6.27 | -- | -- | -- | -- |
| N-61 | N-68 | 8 | 225229.17 | 2680549.75 | Monitoring Well | Shallow | Y | Y | 5/8/88 | 17 | 4 | 8.91 | 6.34 | 4.34 | -10.66 | 2 | 15 |
| N-62 | N-67 | 8 | | | Abandoned | -- | Y | Y | 4/8/88 | 17 | 2 | -- | -- | -- | -- | 2 | 15 |
| N-63 | N-66 | 8 | -- | -- | Abandoned | -- | Y | Y | 4/8/88 | 17 | 2 | -- | -- | -- | -- | 2 | 15 |
| N-64 | B-54 | 8 | 224867.20 | 2682376.19 | Monitoring Well | Shallow | Y | N | 11/21/84 | 12 | -- | 11.24 | 9.39 | -- | -- | -- | -- |
| N-65 | B-29 | 8 | 226363.78 | 2684499.10 | Monitoring Well | Shallow | Y | N | 11/16/84 | 15 | -- | 23.48 | 20.73 | -- | -- | -- | -- |
| N-66 | B-44 | 8 | 225636.66 | 2682973.28 | Monitoring Well | Shallow | Y | N | 11/20/84 | 15.33 | -- | 17.59 | 15.75 | -- | -- | -- | -- |
| N-67 | -- | 8 | 226940.29 | 2682697.91 | Monitoring Well | Shallow | -- | -- | -- | 21 | 2 | 18.23 | 22.14 | -- | -- | -- | -- |
| N-68 | W-3 | 8 | 226910.74 | 2682972.83 | Monitoring Well | Shallow | Y | Y | 9/30/80 | 21 | 4 | 24.22 | 21.08 | -- | -- | -- | -- |
| N-69 | W-4 | 8 | 227391.60 | 2681821.58 | Monitoring Well | Intermediate | Y | Y | 11/4/81 | 42 | 12 | 23.20 | 22.57 | 10.57 | -9.43 | 12 | 20 |
| N-7 | B-10 | 8 | 227550.22 | 2683520.14 | Abandoned | Shallow | Y | N | 11/14/84 | 30 | -- | -- | 39.59 | -- | -- | -- | -- |
| N-70 | W-5 | 8 | 227135.67 | 2681744.97 | Monitoring Well | Intermediate | Y | Y | 11/4/81 | 38 | 12 | 22.17 | 20.86 | 10.86 | -9.14 | 10 | 20 |
| N-71 | W-6 | 8 | -- | -- | Abandoned | -- | Y | -- | 11/5/81 | 35 | -- | -- | -- | -- | -- | 12 | 10 |
| N-72 | MW-15 | 8 | 226761.05 | 2680685.87 | Monitoring Well | Shallow | N | Y | 5/19/93 | 16.5 | 4 | 12.67 | 9.46 | 5.60 | -4.40 | 3.2 | 10 |
| N-73 | MW-2D, LD-B-9 | 8 | 225822.48 | 2680415.33 | Monitoring Well | Intermediate | Y | Y | 5/21/93 | 45.6 | 2 | 8.90 | 6.49 | -26.16 | -36.16 | 32.3 | 10 |
| N-74 | MW-3, LD-B-4 | 8 | 224839.57 | 2680853.70 | Monitoring Well | Shallow | Y | Y | 5/18/93 | 35.4 | 4 | 7.88 | 6.00 | 3.30 | -6.70 | 2.7 | 10 |
| N-75 | MW-3D, LD-B-4D | 8 | 224767.73 | 2680900.67 | Monitoring Well | Intermediate | Y | Y | 5/25/93 | 47.5 | 2 | 8.19 | 5.16 | -28.34 | -38.34 | 33.5 | 10 |
| N-76 | -- | 8 | 225475.09 | 2683749.48 | Recovery Well - Inactive | Intermediate | Y | Y | 7/1/93 | 50 | 8 | 30.47 | 29.40 | 14.40 | -20.60 | 15 | 35 |
| N-77 | -- | 8 | 226734.34 | 2682467.85 | Monitoring Well | Shallow | Y | Y | 8/11/93 | 30 | 4 | 18.61 | 20.65 | 15.65 | -9.35 | 5 | 25 |
| N-78 | -- | 8 | 226634.70 | 2683036.64 | Monitoring Well | Intermediate | Y | Y | 8/10/93 | 30 | 4 | 22.18 | 22.02 | 17.02 | -7.98 | 5 | 25 |
| N-79 | -- | 8 | 226515.43 | 2683789.23 | Monitoring Well | Intermediate | Y | Y | 8/10/93 | 30 | 4 | 21.87 | 29.64 | 24.64 | -0.36 | 5 | 25 |
| N-8 | NS-11, B-11 | 8 | 227375.29 | 2684091.77 | Monitoring Well | Shallow | Y | N | 11/14/84 | 35 | -- | 37.61 | 36.00 | -- | -- | -- | -- |
| N-80 | -- | 8 | -- | -- | Abandoned | -- | Y | Y | 10/11/93 | 50 | 8 | -- | -- | -- | -- | 15 | 35 |
| N-81 | -- | 8 | 225679.57 | 2684310.40 | Monitoring Well | Shallow | Y | Y | 6/29/94 | 25 | 4 | 28.88 | 37.39 | 27.39 | 12.39 | 10 | 15 |
| N-82 | -- | 8 | 225756.93 | 2684539.74 | Monitoring Well | Shallow | Y | Y | 6/30/94 | 30 | 4 | 33.49 | 6.12 | -8.88 | -23.88 | 15 | 15 |
| N-83 | MW-12, JS-12B | 8 | 226827.81 | 2681760.79 | Monitoring Well | Intermediate | Y | Y | 5/30/02 | 27 | 4 | 21.45 | 20.29 | 12.29 | -6.71 | 8 | 19 |
| N-84 | MW-17, JS-17 | 8 | 226457.12 | 2684677.46 | Monitoring Well | Shallow | Y | Y | 5/30/02 | 23 | 4 | 25.88 | 18.36 | 5.36 | -4.64 | 13 | 10 |
| N-85 | MW-18, JS-18 | 8 | 226448.23 | 2684734.38 | Monitoring Well | Shallow | Y | Y | 5/31/02 | 24 | 4 | 25.29 | 23.32 | 19.32 | -0.68 | 4 | 20 |
| N-86 | MW-23, JS-24 | 8 | 226462.98 | 2684118.58 | Monitoring Well | Intermediate | Y | Y | 6/4/02 | 18 | 4 | 25.84 | 29.30 | 21.30 | 11.30 | 8 | 10 |
| N-87 | MW-24, JS-29 | 8 | 226550.23 | 2683965.42 | Monitoring Well | Shallow | Y | Y | 6/4/02 | 18 | 4 | 26.26 | 24.13 | 16.13 | 6.13 | 8 | 10 |
| N-88 | JS-47 | 8 | 226693.87 | 2682778.14 | Abandoned | Shallow | Y | Y | 8/1/02 | 22 | 4 | -- | 0.00 | -2.00 | -22.00 | 2 | 20 |
| N-89 | MW-27/ JS-48 | 8 | 226717.41 | 2682823.99 | Monitoring Well | Intermediate | Y | Y | 6/4/2002 - 8/1/02JSC | 22 | -- | 23.41 | 21.95 | -- | -- | -- | -- |
| N-9 | B-12, NS-12 | 8 | 227374.62 | 2684097.08 | Monitoring Well | Deep | Y | N | 11/28/84 | 78 | -- | 38.21 | 31.80 | -- | -- | -- | -- |
| N-90 | MW-29, JS-49 | 8 | 226679.05 | 2682992.99 | Monitoring Well | Shallow | Y | Y | 8/2/02 | 18 | 4 | 25.71 | 21.87 | 13.87 | 3.87 | 8 | 10 |
| N-91 | MW-32, JS-50 | 8 | 226271.00 | 2683624.68 | Monitoring Well | Shallow | Y | Y | 8/2/02 | 17 | 4 | 20.90 | 18.07 | 13.07 | -1.93 | 5 | 15 |
| N-92 | MW-36, JS-51 | 8 | 226211.45 | 2683566.50 | Monitoring Well | Shallow | Y | Y | 8/2/02 | 17 | 4 | 20.86 | 18.73 | 15.73 | 2.73 | 3 | 13 |
| N-93 | MW-48, JS-27 | 8 | 226550.37 | 2683794.42 | Monitoring Well | Shallow | Y | Y | 6/4/02 | 18 | 4 | 25.09 | 23.89 | 15.89 | 5.89 | 8 | 10 |
| N-94 | MW-49, JS-32 | 8 | 226666.53 | 2681861.39 | Monitoring Well | Shallow | Y | Y | 6/5/02 | 16 | 4 | 20.36 | 19.83 | 13.83 | 3.83 | 6 | 10 |
| N-95 | MW-50, JS-36 | 8 | 226756.67 | 2682552.16 | Monitoring Well | Shallow | Y | Y | 6/5/02 | 18 | 4 | 21.92 | 23.80 | 15.80 | 5.80 | 8 | 10 |

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**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Well ID | Former Well ID[3] | AOI # | Northing | Easting | Well Type[4] | Well Classification (Shallow, Intermediate, Deep) | Soil Boring Log Available (Y/N) | Construction Detail Available (Y/N) | Date of Well Completion | Well Construction Details[2] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Well Completion Depth (ft. bgs) | Well Diameter (in) | Top of Inner Casing Elevation (ft. msl) (NAVD88) | Ground Surface Elevation[1] (ft.) (NAVD88) | Top of Screen Elevation (ft) (NAVD88) | Bottom of Screen Elevation (ft) (NAVD88) | Depth to Screen (ft. bgs) | Screen Length (ft.) |
| **AOI - 8 (Point Breeze Process Area North Yard)** | | | | | | | | | | | | | | | | | |
| N-97 | MW-51 | 8 | -- | -- | Abandoned | -- | N | N | -- | -- | -- | 22.96 | -- | -- | -- | -- | -- |
| N-98 | -- | 8 | 227658.44 | 2683478.92 | Monitoring Well | Intermediate | Y | Y | 6/2/08 | 30 | 2 | 34.53 | 32.46 | 12.46 | 2.46 | 20 | 10 |
| N-99 | -- | 8 | 228875.12 | 2682854.56 | Monitoring Well | Intermediate | Y | Y | 6/19/08 | 28 | 2 | 28.26 | 26.26 | 8.26 | -1.74 | 18 | 10 |
| P-20 | -- | 8 | -- | -- | Abandoned | Shallow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| P-21 | -- | 8 | -- | -- | Abandoned | Shallow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| P-28 | -- | 8 | -- | -- | Abandoned | Shallow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| P-5 | -- | 8 | -- | -- | Abandoned | Shallow | -- | -- | -- | -- | -- | -- | 4.90 | -- | -- | -- | -- |
| P-6 | -- | 8 | -- | -- | Abandoned | Shallow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| P-7 | -- | 8 | -- | -- | Abandoned | Shallow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| P-8 | -- | 8 | -- | -- | Abandoned | Shallow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| P-9 | -- | 8 | -- | -- | Abandoned | Shallow | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-73 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-74 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-75 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-76 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-77 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-778 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-779 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-78 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-79 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-82 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PH-84 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PZ-201 | -- | 8 | 225464.04 | 2683705.27 | Piezometer | Intermediate | N | N | -- | 23 | | 32.28 | 30.45 | -- | -- | -- | -- |
| PZ-202 | -- | 8 | 225552.46 | 2683865.53 | Piezometer | Intermediate | N | N | -- | 23 | -- | 33.39 | 29.55 | -- | -- | -- | -- |
| PZ-203 | -- | 8 | 225638.12 | 2684014.74 | Piezometer | Intermediate | N | N | -- | 20.7 | -- | 34.11 | 29.32 | -- | -- | -- | -- |
| PZ-204 | -- | 8 | 225718.25 | 2684183.29 | Piezometer | Intermediate | N | N | -- | -- | -- | 28.88 | 26.95 | -- | -- | -- | -- |
| PZ-300 | -- | 8 | 226640.07 | 2683295.02 | Piezometer | Intermediate | N | N | -- | 26.8 | -- | 26.77 | 24.95 | -- | -- | -- | -- |
| PZ-500 | -- | 8 | 225834.73 | 2680429.24 | Piezometer | Shallow | N | N | -- | 10 | -- | 9.00 | 6.74 | -- | -- | -- | -- |
| PZ-501 | -- | 8 | 225975.22 | 2680472.39 | Piezometer | Shallow | N | N | -- | 9.5 | -- | 9.00 | 6.49 | -- | -- | -- | -- |
| PZ-502 | -- | 8 | 225715.49 | 2680469.62 | Piezometer | Intermediate | N | N | -- | -- | -- | 7.92 | 6.81 | -- | -- | -- | -- |
| PZ-503 | -- | 8 | 225160.09 | 2680585.68 | Piezometer | Shallow | N | N | -- | 9 | -- | 8.69 | 6.15 | -- | -- | -- | -- |
| PZ-504 | -- | 8 | 224798.12 | 2680875.81 | Piezometer | Shallow | N | N | -- | 6 | -- | 7.63 | 5.85 | -- | -- | -- | -- |
| PZ-505 | -- | 8 | 224654.44 | 2681226.73 | Piezometer | Shallow | N | N | -- | 8.5 | -- | 8.46 | 7.98 | -- | -- | -- | -- |
| PZ-506 | -- | 8 | 224831.28 | 2682022.51 | Piezometer | Shallow | N | N | -- | 10.3 | -- | 11.19 | 11.63 | -- | -- | -- | -- |
| PZ-507 | -- | 8 | 224903.12 | 2682337.51 | Piezometer | Shallow | N | N | -- | 9.6 | -- | 12.68 | 8.77 | -- | -- | -- | -- |
| R-1 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| R-3 | -- | 8 | -- | -- | Abandoned | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| River Gauge 2 | -- | 8 | -- | -- | Staff Gauge | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| RW-200 | PH-2 | 8 | 224961.15 | 2682436.98 | Recovery Well - Inactive | Intermediate | Y | Y | 5/20/94 | 22 | 6 | 12.02 | 31.10 | 21.10 | 11.10 | 10 | 10 |
| RW-201 | PH-12 | 8 | 225104.83 | 2682699.48 | Recovery Well - Active | Intermediate | Y | Y | 5/17/94 | 37 | 6 | 31.99 | 30.92 | 10.92 | -4.08 | 20 | 15 |
| RW-202 | PH-19 | 8 | 225107.59 | 2682881.85 | Recovery Well - Active | Intermediate | Y | Y | 5/17/94 | 36 | 6 | 29.51 | 30.32 | 10.32 | -4.68 | 20 | 15 |
| RW-203 | PH-3 | 8 | 225209.83 | 2683022.77 | Recovery Well - Active | Intermediate | Y | Y | 5/18/94 | 39 | 6 | 31.10 | 30.55 | 8.55 | -6.45 | 22 | 15 |
| RW-204 | PH-18 | 8 | 225163.20 | 2683189.66 | Recovery Well - Inactive | Intermediate | Y | Y | 6/22/94 | 34 | 6 | 28.57 | 30.98 | -- | -- | 19 | 15 |
| RW-205 | -- | 8 | 225278.91 | 2683346.06 | Recovery Well - Inactive | Intermediate | Y | Y | 5/12/94 | 31 | 6 | 29.67 | 28.92 | 14.92 | -0.08 | 14 | 15 |
| RW-206 | -- | 8 | 225403.25 | 2683597.50 | Recovery Well - Inactive | Intermediate | Y | Y | 5/11/94 | 31 | 6 | 30.94 | 29.25 | 13.25 | -1.75 | 16 | 15 |
| RW-26 | -- | 8 | 224410.49 | 2685473.62 | Recovery Well | -- | N | N | -- | -- | -- | 29.21 | 30.60 | -- | -- | -- | -- |

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**Existing Well Summary for AOI 8**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Well ID | Former Well ID[3] | AOI # | Northing | Easting | Well Type[4] | Well Classification (Shallow, Intermediate, Deep) | Soil Boring Log Available (Y/N) | Construction Detail Available (Y/N) | Date of Well Completion | Well Construction Details[2] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Well Completion Depth (ft. bgs) | Well Diameter (in) | Top of Inner Casing Elevation (ft. msl) (NAVD88) | Ground Surface Elevation[1] (ft.) (NAVD88) | Top of Screen Elevation (ft) (NAVD88) | Bottom of Screen Elevation (ft) (NAVD88) | Depth to Screen (ft. bgs) | Screen Length (ft.) |
| **AOI - 8 (Point Breeze Process Area North Yard)** | | | | | | | | | | | | | | | | | |
| RW-27 | -- | 8 | 224396.01 | 2685423.43 | Recovery Well | -- | N | N | -- | -- | -- | 29.71 | 30.74 | -- | -- | -- | -- |
| RW-28 | -- | 8 | 224377.76 | 2685357.40 | Recovery Well | -- | N | N | -- | -- | -- | 29.74 | 30.10 | -- | -- | -- | -- |
| RW-29 | -- | 8 | 224360.16 | 2685285.51 | Recovery Well | -- | N | N | -- | -- | -- | 29.44 | 30.19 | -- | -- | -- | -- |
| RW-30 | -- | 8 | 224352.41 | 2685256.62 | Recovery Well | -- | N | N | -- | -- | -- | 29.39 | 30.33 | -- | -- | -- | -- |
| RW-300 | -- | 8 | 226790.35 | 2681746.20 | Recovery Well - Active | Intermediate | N | N | -- | -- | -- | 21.64 | 19.27 | -- | -- | -- | -- |
| RW-301 | PH-16 | 8 | 226707.35 | 2682907.11 | Recovery Well - Inactive | Intermediate | Y | Y | 5/12/94 | 31 | 6 | 22.41 | 23.92 | 9.92 | -5.08 | 14 | 15 |
| RW-302 | PH-5 | 8 | 226687.49 | 2683040.09 | Recovery Well - Inactive | Intermediate | Y | Y | 5/11/94 | 31 | 6 | 24.09 | 22.82 | 6.82 | -8.18 | 16 | 15 |
| RW-303 | -- | 8 | 226663.40 | 2683166.98 | Recovery Well - Active | Intermediate | Y | Y | 5/12/94 | 31 | 6 | 24.98 | 25.11 | -- | -- | -- | -- |
| RW-304 | PH-17 | 8 | 226635.01 | 2683321.53 | Recovery Well - Inactive | Intermediate | Y | Y | 5/13/94 | 33 | 6 | 25.28 | 25.27 | 9.27 | -5.73 | 16 | 15 |
| RW-305 | PH-4 | 8 | 226614.94 | 2683458.41 | Recovery Well - Active | Intermediate | Y | Y | 5/11/94 | 33 | 6 | 25.27 | 23.22 | 7.22 | -7.78 | 16 | 15 |
| RW-306 | PH-15 | 8 | 226581.19 | 2683767.98 | Recovery Well - Active | Intermediate | Y | Y | 5/10/94 | 28 | 6 | 23.58 | 23.05 | 12.05 | -2.95 | 11 | 15 |
| RW-307 | -- | 8 | 226603.86 | 2683079.56 | Recovery Well - Active | Intermediate | -- | -- | -- | -- | -- | 23.26 | 24.76 | -- | -- | -- | -- |
| RW-308 | -- | 8 | 226622.58 | 2683240.06 | Recovery Well - Active | Intermediate | -- | -- | -- | -- | -- | 25.61 | 24.81 | -- | -- | -- | -- |
| RW-309 | -- | 8 | 226602.42 | 2683373.04 | Recovery Well - Inactive | Intermediate | -- | -- | -- | -- | -- | 25.23 | 24.89 | -- | -- | -- | -- |
| RW-31 | -- | 8 | 224339.19 | 2685206.14 | Recovery Well | -- | -- | -- | -- | -- | -- | 29.38 | 30.31 | -- | -- | -- | -- |
| RW-32 | -- | 8 | 224324.10 | 2685149.77 | Recovery Well | -- | -- | -- | -- | -- | -- | 29.05 | 30.05 | -- | -- | -- | -- |
| RW-500 | -- | 8 | 225406.01 | 2680466.86 | Recovery Well - Active | Intermediate | -- | -- | -- | -- | -- | 7.56 | 6.79 | -- | -- | -- | -- |
| RW-501 | -- | 8 | 224756.68 | 2681558.30 | Recovery Well - Inactive | Intermediate | -- | -- | -- | -- | -- | 9.79 | 8.19 | -- | -- | -- | -- |
| RW-502 | -- | 8 | 226713.57 | 2680606.72 | Recovery Well - Active | Intermediate | -- | -- | -- | -- | -- | 12.47 | 11.40 | -- | -- | -- | -- |
| WP-1 | -- | 8 | 215265.30 | 2682064.50 | Temporary Well | Shallow | Y | Y | 5/25/93 | 6.95 | 1 | -- | 9.92 | 5.97 | 2.97 | 3.95 | 3 |
| WP-2 | -- | 8 | 215256.25 | 2682083.94 | Temporary Well | Shallow | Y | Y | 6/2/93 | 6.66 | 1 | -- | 10.83 | 7.17 | 4.17 | 3.66 | 3 |
| WP-3 | -- | 8 | 215256.45 | 2682128.55 | Temporary Well | Shallow | Y | Y | 6/2/93 | 8 | 1 | -- | 11.72 | 6.72 | 3.72 | 5 | 3 |
| WP-4 | -- | 8 | -- | -- | Temporary Well | Shallow | Y | Y | 6/2/93 | 8.77 | 1 | -- | 10.73 | 4.96 | 1.96 | 5.77 | 3 |
| WP-5 | -- | 8 | 215244.77 | 2682167.86 | Temporary Well | Shallow | Y | Y | 6/2/93 | 7.88 | 1 | -- | 7.60 | 2.72 | -0.28 | 4.88 | 3 |
| WP-6 | -- | 8 | -- | -- | Temporary Well | Shallow | Y | Y | 6/2/93 | 6.86 | 1 | -- | -- | -- | -- | 3.86 | 3 |
| WP-7 | -- | 8 | 215126.58 | 2682631.12 | Temporary Well | Shallow | Y | Y | 6/2/93 | 7.88 | 1 | -- | 8.84 | 3.96 | 0.96 | 4.88 | 3 |

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

**NOTES:**

AOI - Area of Interest
ft. - feet
bgs - below ground surface
in. - inches
msl - elevation relative to mean sea level

1. Elevation datum for wells within AOI 8 were suryved to NAVD 88 as a part of this report. Survey completed Langan.
2. Well construction details were taken directly from well boring logs provided by Handex, Secor, Aquaterra or collected from available historic reports. Where no well boring logs exist, no well construction data is listed.
3. Former well IDs were derived from handwritten notes on the logs themselves or the referenced report.
4. Well type was chosen based on the formation in which the well was screened. 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 were classified as either a shallow or intermediate well.

**Table 3**
**Summary of AOI 8 Groundwater and LNAPL Elevations**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Monitoring Point ID | AOI | Well Classification | Specific Gravity (g/cc) Used for Correction | | Total Well Depth | Depth to Product | Depth to Water[3] (ft) | LNAPL Thickness (ft) | LNAPL Elevation (ft amsl) | GW Elevation (ft amsl) | Corrected GWElevation (ft amsl) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | S.G.[1] | Source[2] | | | | | | | |
| **AOI 8** | | | | | | | | | | | |
| N-1 | AOI 8 | Shallow | | | 22 | NP | 14.53 | | | 10.16 | 10.16 |
| N-10 | AOI 8 | Shallow | | | 10 | NP | 4.77 | | | 15.19 | 15.19 |
| N-11 | AOI 8 | Intermediate | | | 23.5 | NP | 18.26 | | | 11.48 | 11.48 |
| N-12 | AOI 8 | Intermediate | | | 20.7 | NP | 15.89 | | | 11.30 | 11.30 |
| N-13 | AOI 8 | Deep | | | 52 | NP | 22.34 | | | 4.43 | 4.43 |
| N-14 | AOI 8 | Intermediate | 0.9299 | N-14 | NM | 21.21 | 21.22 | 0.01 | 10.78 | 10.77 | 10.78 |
| N-15 | AOI 8 | Intermediate | | | 25 | NP | 20.83 | | | 8.52 | 8.52 |
| N-16 | AOI 8 | Intermediate | | | 26.8 | NP | 21.91 | | | 11.07 | 11.07 |
| N-17 | AOI 8 | Intermediate | | | 25.7 | NP | 23.39 | | | 11.03 | 11.03 |
| N-18 | AOI 8 | Intermediate | | | 25.5 | NP | 22.11 | | | 10.79 | 10.79 |
| N-19 | AOI 8 | Deep | | | 59.4 | NP | 30.16 | | | 2.62 | 2.62 |
| N-20 | AOI 8 | Shallow | | | 22.7 | NP | 17.49 | | | 10.90 | 10.90 |
| N-21 | AOI 8 | Deep | | | 55 | NP | 20.97 | | | 7.04 | 7.04 |
| N-23 | AOI 8 | Intermediate | | | 18 | NP | 10.17 | | | 10.97 | 10.97 |
| N-24 | AOI 8 | Shallow | | | 16.6 | NP | 11.54 | | | 9.11 | 9.11 |
| N-25 | AOI 8 | Shallow | 0.9402 | N-25 | NM | 2.78 | 3.30 | 0.52 | 16.00 | 15.48 | 15.97 |
| N-26 | AOI 8 | Shallow | | | 9.6 | NP | 5.74 | | | 15.29 | 15.29 |
| N-27 | AOI 8 | Deep | | | 62 | NP | 21.03 | | | 2.23 | 2.23 |
| N-28 | AOI 8 | Shallow | | | 16.8 | NP | 9.77 | | | 10.68 | 10.68 |
| N-29 | AOI 8 | Shallow | | | 33 | NP | 30.50 | | | 9.62 | 9.62 |
| N-3 | AOI 8 | Shallow | | | 22.8 | NP | 16.24 | | | 10.42 | 10.42 |
| N-30 | AOI 8 | Deep | | | NM | NP | 37.47 | | | 2.68 | 2.68 |
| N-31 | AOI 8 | Shallow | 0.9132 | N-82 | NM | 14.87 | 15.15 | 0.28 | 9.65 | 9.37 | 9.63 |
| N-32 | AOI 8 | Shallow | | | 22.5 | NP | 8.26 | | | 8.01 | 8.01 |
| N-34 | AOI 8 | Intermediate | | | 15 | NP | 6.23 | | | 7.36 | 7.36 |
| N-35 | AOI 8 | Shallow | 0.9205 | N-35 | 14.6 | NP | 9.33 | | | 6.84 | 6.84 |
| N-36 | AOI 8 | Shallow | | | 14 | NP | 8.29 | | | 6.87 | 6.87 |
| N-37 | AOI 8 | Shallow | | | 17.8 | NP | 11.90 | | | 6.32 | 6.32 |
| N-38 | AOI 8 | Shallow | | | 18 | NP | 5.76 | | | 4.33 | 4.33 |
| N-38D | AOI 8 | Deep | | | 84 | NP | 9.91 | | | 0.52 | 0.52 |
| N-39 | AOI 8 | Shallow | | | 13.4 | NP | 3.69 | | | 0.00 | 0.00 |
| N-4 | AOI 8 | Deep | | | 47 | NP | 19.37 | | | 6.99 | 6.99 |
| N-40 | AOI 8 | Shallow | | | 15 | NP | 5.94 | | | 6.16 | 6.16 |
| N-41 | AOI 8 | Shallow | | | 12 | NP | 4.29 | | | 6.10 | 6.10 |
| N-42 | AOI 8 | Shallow | 0.8900 | N-42 | NM | 7.37 | 8.18 | 0.81 | 7.53 | 6.72 | 7.44 |
| N-43 | AOI 8 | Shallow | | | 21 | NP | 20.07 | | | 10.27 | 10.27 |
| N-44D | AOI 8 | Deep | | | 58 | NP | 26.34 | | | 4.36 | 4.36 |
| N-45 | AOI 8 | Intermediate | 0.8922 | N-125 | NM | 13.05 | 13.27 | 0.22 | 9.70 | 9.48 | 9.68 |
| N-46D | AOI 8 | Deep | | | NM | NM | NM | | | NA | NA |
| N-47 | AOI 8 | Intermediate | 0.8834 | N-47 | NM | 19.69 | 20.57 | 0.88 | 12.23 | 11.35 | 12.13 |
| N-48 | AOI 8 | Intermediate | 0.9049 | N-48 | NM | 21.4 | 21.65 | 0.25 | 9.85 | 9.60 | 9.83 |
| N-49 | AOI 8 | Intermediate | 0.8995 | N–51 | NM | 24.41 | 26.42 | 2.01 | 9.29 | 7.28 | 9.09 |

Notes:
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2. For wells with no direct S.G. measurements, the S.G. value in the nearest well with a direct S.G was used.
3. Depth to Water and Depth to LNAPL provided by Secor July 2008.
4. Only accessible PGW wells were gauged for the presence of LNAPL.

AOI = Area of Interest
g/cc = grams per cubic centimeter
LNAPL = Light Non-Aqueous Phase Liquid
ft amsl = feet above mean sea level
GW = Groundwater
NA = Not Applicable
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**Table 3**
**Summary of AOI 8 Groundwater and LNAPL Elevations**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Monitoring Point ID | AOI | Well Classification | Specific Gravity (g/cc) Used for Correction | | Total Well Depth | Depth to Product | Depth to Water[3] (ft) | LNAPL Thickness (ft) | LNAPL Elevation (ft amsl) | GW Elevation (ft amsl) | Corrected GWElevation (ft amsl) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | S.G.[1] | Source[2] | | | | | | | |
| **AOI 8** | | | | | | | | | | | |
| N-5 | AOI 8 | Shallow | | | 15 | NP | 9.12 | | | 16.84 | 16.84 |
| N-503 | AOI 8 | Shallow | 0.9065 | N-503 | NM | 7.84 | 8.61 | 0.77 | 4.56 | 3.79 | 4.49 |
| N-504 | AOI 8 | Intermediate | 0.9065 | N-503 | 23.2 | 8.21 | 8.21 | 0.01 | 4.10 | 4.10 | 4.11 |
| N-50D | AOI 8 | Deep | | | 58 | NP | 28.56 | | | 3.75 | 3.75 |
| N-51 | AOI 8 | Intermediate | 0.8995 | N-51 | NM | 22.25 | 23.65 | 1.40 | 9.60 | 8.20 | 9.46 |
| N-52 | AOI 8 | Intermediate | 0.8613 | N-52 | NM | 24.48 | 24.50 | 0.02 | 9.02 | 9.00 | 9.02 |
| N-53 | AOI 8 | Shallow | | | 26.6 | NP | 20.08 | | | 9.05 | 9.05 |
| N-54 | AOI 8 | Shallow | | | NM | NM | NM | | | NA | NA |
| N-55 | AOI 8 | Shallow | | | 9.6 | NP | 2.65 | | | 7.61 | 7.61 |
| N-56 | AOI 8 | Shallow | | | 15 | NP | 6.87 | | | 6.50 | 6.50 |
| N-57 | AOI 8 | Shallow | | | 12 | NP | 4.74 | | | 6.17 | 6.17 |
| N-58 | AOI 8 | Shallow | | | 18.6 | NP | 3.21 | | | 6.02 | 6.02 |
| N-59 | AOI 8 | Shallow | | | NM | NM | 1.29 | | | 5.66 | 5.66 |
| N-60 | AOI 8 | Shallow | | | 15 | NP | 4.30 | | | 6.55 | 6.55 |
| N-61 | AOI 8 | Shallow | | | 19.5 | NP | 3.72 | | | 5.19 | 5.19 |
| N-64 | AOI 8 | Shallow | | | 16 | NP | 6.55 | | | 4.69 | 4.69 |
| N-65 | AOI 8 | Shallow | | | 14 | NP | 12.59 | | | 10.89 | 10.89 |
| N-66 | AOI 8 | Shallow | | | 16 | NP | 8.05 | | | 9.54 | 9.54 |
| N-67 | AOI 8 | Shallow | | | 25.4 | NP | 5.63 | | | 12.60 | 12.60 |
| N-68 | AOI 8 | Shallow | 0.9211 | N-68 | NM | 11.33 | 11.59 | 0.26 | 12.89 | 12.63 | 12.87 |
| N-69 | AOI 8 | Intermediate | | | 42 | NP | 15.42 | | | 7.78 | 7.78 |
| N-70 | AOI 8 | Intermediate | | | 38 | NP | 14.91 | | | 7.26 | 7.26 |
| N-72 | AOI 8 | Shallow | | | NM | NP | 8.21 | | | 0.69 | 0.69 |
| N-73 | AOI 8 | Intermediate | | | 45.6 | NP | 7.62 | | | 0.26 | 0.26 |
| N-74 | AOI 8 | Shallow | | | 35.4 | NP | 6.17 | | | 1.71 | 1.71 |
| N-75 | AOI 8 | Intermediate | 0.9371 | N-75 | NM | 6.14 | 6.21 | 0.07 | 2.05 | 1.98 | 2.05 |
| N-76 | AOI 8 | Intermediate | 0.8899 | N-76 | NM | 24.85 | 26.93 | 2.08 | 5.62 | 3.54 | 5.39 |
| N-77 | AOI 8 | Shallow | | | 31 | NP | NM | | | NA | NA |
| N-78 | AOI 8 | Intermediate | | N-78 | 10.4 | NP | NM | | | NA | NA |
| N-79 | AOI 8 | Intermediate | 0.8169 | N-79 | 28 | 11.1 | 11.13 | 0.03 | 10.77 | 10.74 | 10.76 |
| N-8 | AOI 8 | Shallow | | | 32.5 | NP | 25.85 | | | 11.76 | 11.76 |
| N-81 | AOI 8 | Shallow | 0.9016 | PZ-204 | NM | 18.17 | 18.18 | 0.01 | 10.71 | 10.70 | 10.71 |
| N-82 | AOI 8 | Shallow | 0.9132 | N-82 | NM | 23.29 | 23.91 | 0.62 | 10.20 | 9.58 | 10.15 |
| N-83 | AOI 8 | Intermediate | | | 30 | NP | 15.39 | | | 6.06 | 6.06 |
| N-84 | AOI 8 | Shallow | | | 25 | NP | 6.52 | | | 19.36 | 19.36 |
| N-85 | AOI 8 | Shallow | | | 24 | NP | 14.50 | | | 10.79 | 10.79 |
| N-86 | AOI 8 | Intermediate | | | 20.3 | NP | 14.87 | | | 10.97 | 10.97 |
| N-87 | AOI 8 | Shallow | | | 20.3 | NP | 15.31 | | | 10.95 | 10.95 |
| N-89 | AOI 8 | Intermediate | | | 23.4 | NP | 14.01 | | | 9.40 | 9.40 |
| N-9 | AOI 8 | Deep | | | 65 | NP | 35.24 | | | 2.97 | 2.97 |
| N-90 | AOI 8 | Shallow | | | 25 | NP | 15.01 | | | 10.70 | 10.70 |
| N-91 | AOI 8 | Shallow | 0.9471 | N-91 | NM | 8.21 | 10.79 | 2.58 | 12.69 | 10.11 | 12.55 |
| N-92 | AOI 8 | Shallow | | | 18 | NP | 7.38 | | | 13.48 | 13.48 |

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3. Depth to Water and Depth to LNAPL provided by Secor July 2008.
4. Only accessible PGW wells were gauged for the presence of LNAPL.

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LNAPL = Light Non-Aqueous Phase Liquid
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**Philadelphia, Pennsylvania**

| Monitoring Point ID | AOI | Well Classification | Specific Gravity (g/cc) Used for Correction | | Total Well Depth | Depth to Product | Depth to Water[3] (ft) | LNAPL Thickness (ft) | LNAPL Elevation (ft amsl) | GW Elevation (ft amsl) | Corrected GWElevation (ft amsl) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | S.G.[1] | Source[2] | | | | | | | |
| **AOI 8** | | | | | | | | | | | |
| N-93 | AOI 8 | Shallow | | | 20.2 | NP | 14.66 | | | 10.43 | 10.43 |
| N-94 | AOI 8 | Shallow | | | 23.4 | NP | 5.61 | | | 14.75 | 14.75 |
| N-97 | AOI 8 | Shallow | | | 17.1 | NP | 13.80 | | | 9.16 | 9.16 |
| P-30 | AOI 8 | -- | | | NM | 20.11 | 21.18 | 1.07 | -20.11 | -21.18 | -21.18 |
| P-42 | AOI 8 | -- | | | 35.35 | NP | 12.14 | | | -12.14 | -12.14 |
| P-44 | AOI 8 | -- | | | 24.7 | NP | 21.65 | | | -21.65 | -21.65 |
| P-45 | AOI 8 | -- | | | 34.85 | NP | 23.59 | | | -23.59 | -23.59 |
| PZ-201 | AOI 8 | Intermediate | 0.8834 | N-47 | 23 | 22.2 | 22.21 | 0.01 | 10.08 | 10.07 | 10.08 |
| PZ-202 | AOI 8 | Intermediate | | | 23 | NP | 22.15 | | | 11.24 | 11.24 |
| PZ-203 | AOI 8 | Intermediate | | | 20.7 | NP | 19.93 | | | 14.18 | 14.18 |
| PZ-204 | AOI 8 | Intermediate | 0.9016 | PZ-204 | NM | 19.96 | 21.01 | 1.05 | 12.43 | 11.38 | 12.33 |
| PZ-300 | AOI 8 | Intermediate | | | 26.8 | NP | 17.13 | | | 9.64 | 9.64 |
| PZ-500 | AOI 8 | Shallow | | | 10 | NP | 2.01 | | | 5.54 | 5.54 |
| PZ-501 | AOI 8 | Shallow | | | 9.5 | NP | 2.88 | | | 6.12 | 6.12 |
| PZ-502 | AOI 8 | Intermediate | 0.9155 | PZ-502 | NM | 1.91 | 4.31 | 2.40 | 6.01 | 3.61 | 5.81 |
| PZ-503 | AOI 8 | Shallow | | | 9 | NP | 3.65 | | | 5.04 | 5.04 |
| PZ-504 | AOI 8 | Shallow | | | 6 | NP | 2.64 | | | 4.99 | 4.99 |
| PZ-505 | AOI 8 | Shallow | | | 8.5 | NP | 3.44 | | | 5.02 | 5.02 |
| PZ-506 | AOI 8 | Shallow | | | 10.3 | NP | 6.23 | | | 4.96 | 4.96 |
| PZ-507 | AOI 8 | Shallow | | | 9.6 | NP | 7.89 | | | 4.79 | 4.79 |
| RW-200 | AOI 8 | Intermediate | | | 20.5 | NP | 5.57 | | | 6.45 | 6.45 |
| RW-201 | AOI 8 | Intermediate | 0.8613 | N-52 | NM | 22.9 | 23.02 | 0.12 | 9.09 | 8.97 | 9.07 |
| RW-202 | AOI 8 | Intermediate | | | NM | NP | 20.13 | | | 9.38 | 9.38 |
| RW-203 | AOI 8 | Intermediate | 0.8995 | N-51 | NM | 22.67 | 22.69 | 0.02 | 8.43 | 8.41 | 8.43 |
| RW-204 | AOI 8 | Intermediate | 0.8995 | N-51 | NM | 19.32 | 19.91 | 0.59 | 9.25 | 8.66 | 9.19 |
| RW-205 | AOI 8 | Intermediate | 0.9112 | RW-205 | NM | 19.45 | 23.43 | 3.98 | 10.22 | 6.24 | 9.87 |
| RW-206 | AOI 8 | Intermediate | | | NM | NP | 21.38 | | | 9.56 | 9.56 |
| RW-300 | AOI 8 | Intermediate | 0.8358 | RW-300 | NM | 14.6 | 15.46 | 0.86 | 7.04 | 6.18 | 6.90 |
| RW-301 | AOI 8 | Intermediate | | | 25.3 | NP | 12.02 | | | 10.39 | 10.39 |
| RW-302 | AOI 8 | Intermediate | | | 28.4 | NP | 13.39 | | | 10.70 | 10.70 |
| RW-303 | AOI 8 | Intermediate | | | 17 | NP | 14.17 | | | 10.81 | 10.81 |
| RW-304 | AOI 8 | Intermediate | | | 29.6 | NP | 14.86 | | | 10.42 | 10.42 |
| RW-305 | AOI 8 | Intermediate | | | NM | NP | 14.91 | | | 10.36 | 10.36 |
| RW-306 | AOI 8 | Intermediate | 0.8169 | N-79 | 26 | 13.02 | 13.14 | 0.12 | 10.56 | 10.44 | 10.54 |
| RW-307 | AOI 8 | Intermediate | | | 28 | NP | 14.60 | | | 8.66 | 8.66 |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | S.G.[1] | Source[2] | | | | | | | |
| **AOI 8** | | | | | | | | | | | |
| RW-308 | AOI 8 | Intermediate | | | 25 | NP | 16.72 | | | 8.89 | 8.89 |
| RW-309 | AOI 8 | Intermediate | | | 15.8 | NP | 15.55 | | | 9.68 | 9.68 |
| RW-500 | AOI 8 | Intermediate | | | NM | NP | 2.01 | | | 5.55 | 5.55 |
| RW-501 | AOI 8 | Intermediate | | | NM | NP | 4.58 | | | 5.21 | 5.21 |
| RW-502 | AOI 8 | Intermediate | 0.9065 | N-503 | NM | 8.22 | 8.23 | 0.01 | 4.25 | 4.24 | 4.25 |
| N-98 | AOI 8 | Intermediate | | | 30 | NP | 23.33 | | | 11.20 | 11.20 |
| N-99 | AOI 8 | Intermediate | | | 28 | NP | 20.07 | | | 8.19 | 8.19 |
| N-100 | AOI 8 | Intermediate | | | 20 | NP | 18.84 | | | 8.17 | 8.17 |
| N-101 | AOI 8 | Intermediate | | | 23 | NP | 15.69 | | | 11.46 | 11.46 |
| N-102 | AOI 8 | Intermediate | | | 30 | NP | 22.22 | | | 10.99 | 10.99 |
| N-103 | AOI 8 | Intermediate | | | 27 | NP | 18.37 | | | 10.96 | 10.96 |
| N-104 | AOI 8 | Intermediate | | | 25 | NP | 16.70 | | | 10.94 | 10.94 |
| N-105 | AOI 8 | Intermediate | | | 25 | NP | 17.25 | | | 10.86 | 10.86 |
| N-106 | AOI 8 | Intermediate | | | 19 | NP | 10.62 | | | 12.41 | 12.41 |
| N-107 | AOI 8 | Intermediate | 0.9033 | N-107 | 22 | 15.44 | 16.27 | 0.83 | 10.93 | 10.10 | 10.85 |
| N-108 | AOI 8 | Intermediate | | | 18 | NP | 14.03 | | | 11.04 | 11.04 |
| N-109 | AOI 8 | Intermediate | | | 20 | NP | 11.65 | | | 6.77 | 6.77 |
| N-110 | AOI 8 | Intermediate | | | 15 | NP | 7.41 | | | 4.70 | 4.70 |
| N-111 | AOI 8 | Intermediate | | | 15 | | 6.00 | | | 4.52 | 4.52 |
| N-112 | AOI 8 | Intermediate | | | 20 | NP | 9.06 | | | 6.66 | 6.66 |
| N-113 | AOI 8 | Intermediate | 0.9167 | N-113 | 15 | NP | 7.86 | | | 6.29 | 6.29 |
| N-114 | AOI 8 | Intermediate | | | 25 | NP | 8.01 | | | 6.36 | 6.36 |
| N-115 | AOI 8 | Intermediate | | | 14 | NP | 7.44 | | | 7.89 | 7.89 |
| N-116 | AOI 8 | Intermediate | 0.8985 | N-116 | 12 | 5.29 | 6.02 | 0.73 | 5.99 | 5.26 | 5.91 |
| N-117 | AOI 8 | Intermediate | | | 20 | NP | 14.65 | | | 9.59 | 9.59 |
| N-118 | AOI 8 | Intermediate | | | 20 | NP | 14.36 | | | 9.09 | 9.09 |
| N-119 | AOI 8 | Intermediate | | | 18 | NP | 9.17 | | | 11.26 | 11.26 |
| N-120 | AOI 8 | Intermediate | | | 18 | NP | 11.15 | | | 11.18 | 11.18 |
| N-121 | AOI 8 | Intermediate | | | 20 | NP | 11.13 | | | 9.64 | 9.64 |
| N-122 | AOI 8 | Intermediate | | | 18 | NP | 9.83 | | | 6.85 | 6.85 |
| N-123 | AOI 8 | Intermediate | | | 20 | NP | 11.82 | | | 9.42 | 9.42 |
| N-124 | AOI 8 | Intermediate | | | 25 | NP | 15.08 | | | 10.59 | 10.59 |
| N-125 | AOI 8 | Intermediate | 0.8922 | N-125 | 25 | 16.46 | 16.72 | 0.26 | 9.48 | 9.22 | 9.45 |
| N-126 | AOI 8 | Shallow | | | 14 | NP | 5.09 | | | 5.71 | 5.71 |
| N-127 | AOI 8 | Intermediate | 0.8785 | N-127 | 34 | 24.3 | 24.86 | 0.56 | 9.15 | 8.59 | 9.08 |
| N-128 | AOI 8 | Intermediate | | | 25 | NP | 18.82 | | | 9.32 | 9.32 |
| N-129 | AOI 8 | Intermediate | 0.9017 | N-129 | 30 | 19.46 | 20.49 | 1.03 | 9.44 | 8.41 | 9.33 |
| N-130 | AOI 8 | Intermediate | 0.7893 | N-130 | 30 | 22.53 | 23.25 | 0.72 | 9.07 | 8.35 | 8.91 |
| N-131 | AOI 8 | Shallow | | | 15 | NP | 2.75 | | | 6.28 | 6.28 |
| N-132 | AOI 8 | Shallow | | | 25 | NP | 4.54 | | | 6.57 | 6.57 |
| N-133 | AOI 8 | Shallow | | | 12 | NP | 3.93 | | | 5.43 | 5.43 |
| N-134 | AOI 8 | Intermediate | | | 20 | NP | 18.04 | | | 9.45 | 9.45 |
| N-135 | AOI 8 | Shallow | 0.9148 | N-135 | 12 | 4.35 | 4.98 | 0.63 | 5.57 | 4.94 | 5.52 |
| N-136 | AOI 8 | Shallow | | | 12 | NP | 4.09 | | | 6.76 | 6.76 |
| **PGW Wells** | | | | | | | | | | | |
| MW-5 | PGW | -- | | | 34.4 | NP | 26.80 | | NA | NA | NA |
| MW-7 | PGW | -- | Unknown | | 23.9 | 15.07 | 15.58 | 0.51 | NA | NA | NA |
| MW-8 | PGW | -- | | | 29.9 | NP | 24.15 | | NA | NA | NA |
| MW-9 | PGW | -- | | | 37 | NP | 25.29 | | NA | NA | NA |
| MW-21 | PGW | -- | | | 26.6 | NP | 5.16 | | NA | NA | NA |

Notes:
1. Specific Gravity (S.G.) values were determined from LNAPL samples taken by Aquaterra on February and July 2008 or from samples collected by SECOR in 1999-2000.
2. For wells with no direct S.G. measurements, the S.G. value in the nearest well with a direct S.G was used.
3. Depth to Water and Depth to LNAPL provided by Secor July 2008.
4. Only accessible PGW wells were gauged for the presence of LNAPL.

AOI = Area of Interest
g/cc = grams per cubic centimeter
LNAPL = Light Non-Aqueous Phase Liquid
ft amsl = feet above mean sea level
GW = Groundwater
NA = Not Available
NM = Not Measured
NP = No Product

**Table 4**
**Summary of Soil Sample Analytical Results: Non SWMU Area**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| | CAS No | PADEP Non-Residential Soil MSCs 0-2' Dry | Location ID / Sample ID / Sample Matrix / Sample Interval / Sample Date | BH-08-01 BH-08-01_1.0-2.0 Soil 1.0-2.0 6/17/2008 | | | BH-08-02 BH-08-02_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-03 BH-08-03_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-04 BH-08-04_1.0-2.0 Soil 1.0-2.0 5/8/2008 | | | BH-08-07 BH-08-07_1.0-2.0 Soil 1.0-2.0 5/8/2008 | | | BH-08-08 BH-08-08_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-09 BH-08-09_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-10 BH-08-10_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-11 BH-08-11_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds** | | | **Unit** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 2000 | ug/kg | ND | U | 240 | ND | U | 230 | ND | U | 220 | ND | U | 270 | ND | U | 250 | ND | U | 380 | ND | U | 400 | ND | U | 200 | ND | U | 240 |
| Benzene | 71-43-2 | 500 | ug/kg | ND | U | 240 | ND | U | 230 | 580 | | 220 | 3300 | | 270 | 1400 | | 250 | 1900 | | 380 | 3200 | | 400 | ND | U | 200 | 310 | | 240 |
| 1,2-Dichloroethane | 107-06-2 | 500 | ug/kg | ND | U | 240 | ND | U | 230 | ND | U | 220 | ND | U | 270 | ND | U | 250 | ND | U | 380 | ND | U | 400 | ND | U | 200 | ND | U | 240 |
| Toluene | 108-88-3 | 100000 | ug/kg | ND | U | 240 | ND | U | 230 | 230 | | 220 | 590 | | 270 | 470 | | 250 | ND | U | 380 | 990 | | 400 | 420 | | 200 | ND | U | 240 |
| Ethylene dibromide (EDB) | 106-93-4 | 5 | ug/kg | ND | U | 240 | ND | U | 230 | ND | U | 220 | ND | U | 270 | ND | U | 250 | ND | U | 380 | ND | U | 400 | ND | U | 200 | ND | U | 240 |
| Ethylbenzene | 100-41-4 | 70000 | ug/kg | ND | U | 240 | ND | U | 230 | ND | U | 220 | 8400 | | 270 | 8400 | | 250 | ND | U | 380 | ND | U | 400 | ND | U | 200 | ND | U | 240 |
| Cumene | 98-82-8 | 1600000 | ug/kg | ND | U | 240 | ND | U | 230 | 440 | | 220 | 2400 | | 270 | 3800 | | 250 | ND | U | 380 | ND | U | 400 | ND | U | 200 | ND | U | 240 |
| Xylene (Total) | 1330-20-7 | 1000000 | ug/kg | ND | U | 240 | ND | U | 230 | 340 | | 220 | 32000 | | 2700 | 28000 | | 2500 | 620 | | 380 | 3200 | | 400 | 360 | | 200 | ND | U | 240 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 2200000 | ug/kg | ND | U | 180 | ND | U | 950 | ND | U | 4700 | ND | U | 10000 | 5900 | | 5100 | ND | U | 5100 | 8500 | | 4700 | 2100 | | 940 | ND | U | 4900 |
| Naphthalene | 91-20-3 | 25000 | ug/kg | ND | U | 180 | ND | U | 950 | ND | U | 4700 | 12000 | | 10000 | 15000 | | 5100 | ND | U | 5100 | 5900 | | 4700 | ND | U | 940 | ND | U | 4900 |
| Fluorene | 86-73-7 | 3800000 | ug/kg | ND | U | 180 | ND | U | 950 | ND | U | 4700 | ND | U | 10000 | 12000 | | 5100 | ND | U | 5100 | ND | U | 4700 | ND | U | 940 | ND | U | 4900 |
| Phenanthrene | 85-01-8 | 10000000 | ug/kg | ND | U | 180 | ND | U | 950 | 6800 | | 4700 | 20000 | | 10000 | 34000 | | 5100 | ND | U | 5100 | 8500 | | 4700 | 1700 | | 940 | ND | U | 4900 |
| Anthracene | 120-12-7 | 350000 | ug/kg | ND | U | 180 | ND | U | 950 | ND | U | 4700 | ND | U | 10000 | ND | U | 5100 | ND | U | 5100 | ND | U | 4700 | ND | U | 940 | ND | U | 4900 |
| Benzo(a)anthracene | 56-55-3 | 110000 | ug/kg | ND | U | 180 | ND | U | 950 | ND | U | 4700 | ND | U | 10000 | ND | U | 5100 | ND | U | 5100 | ND | U | 4700 | 2000 | | 940 | ND | U | 4900 |
| Chrysene | 218-01-9 | 230000 | ug/kg | ND | U | 180 | ND | U | 950 | ND | U | 4700 | ND | U | 10000 | ND | U | 5100 | 7200 | | 5100 | 6900 | | 4700 | 1900 | | 940 | ND | U | 4900 |
| Benzo(b)fluoranthene | 205-99-2 | 110000 | ug/kg | ND | U | 180 | ND | U | 950 | ND | U | 4700 | ND | U | 10000 | ND | U | 5100 | ND | U | 5100 | 6300 | | 4700 | 2500 | | 940 | ND | U | 4900 |
| Benzo(a)pyrene | 50-32-8 | 11000 | ug/kg | ND | U | 180 | ND | U | 950 | ND | U | 4700 | ND | U | 10000 | ND | U | 5100 | ND | U | 5100 | ND | U | 4700 | 2600 | | 940 | ND | U | 4900 |
| Benzo(g,h,i)perylene | 191-24-2 | 180000 | ug/kg | ND | U | 180 | ND | U | 950 | ND | U | 4700 | ND | U | 10000 | ND | U | 5100 | ND | U | 5100 | ND | U | 4700 | 1800 | | 940 | ND | U | 4900 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 450 | mg/kg | 69.7 | | 1.08 | 138 | U | 1.11 | 291 | | 291 | 829 | | 2.41 | 519 | | 1.18 | 637 | | 2.41 | 262 | | 1.09 | 428 | | 1.1 | 131 | | 1.16 |

**Notes:**
PADEP - Pennsylvania Department of Environmental Protection
ug/kg - microgram per kilogram
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
RL - Reporting Limit
ND - Not Detected
NA - Not Analyzed

(1) All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected

**Exceedance Summary:**
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration cxceeds the PADEP Non-Residential Soil MSC

**Table 4**
**Summary of Soil Sample Analytical Results: Non SWMU Area**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| | CAS No | PADEP Non-Residential Soil MSCs 0-2' Dry | Location ID / Sample ID / Sample Matrix / Sample Interval / Sample Date | BH-08-12 BH-08-12_1.0-2.0 Soil 1.0-2.0 5/6/2008 | | | BH-08-13 BH-08-13_1.0-2.0 Soil 1.0-2.0 5/6/2008 | | | BH-08-14 BH-08-14_1.0-2.0 Soil 1.0-2.0 5/6/2008 | | | BH-08-15 BH-08-15_1.0-2.0 Soil 1.0-2.0 5/6/2008 | | | BH-08-16 BH-08-16_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-17 BH-08-17_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-18 BH-08-18_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-21 BH-08-21_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-22 BH-08-22_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds** | | | **Unit** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 2000 | ug/kg | ND | U | 270 | ND | U | 190 | ND | U | 230 | ND | U | 200 | ND | U | 260 | ND | U | 240 | ND | U | 240 | ND | U | 250 | ND | U | 260 |
| Benzene | 71-43-2 | 500 | ug/kg | 3100 | | 270 | ND | U | 190 | ND | U | 230 | ND | U | 200 | 3100 | | 260 | ND | U | 240 | ND | U | 240 | ND | U | 250 | ND | U | 260 |
| 1,2-Dichloroethane | 107-06-2 | 500 | ug/kg | ND | U | 270 | ND | U | 190 | ND | U | 230 | ND | U | 200 | ND | U | 260 | ND | U | 240 | ND | U | 240 | ND | U | 250 | ND | U | 260 |
| Toluene | 108-88-3 | 100000 | ug/kg | 660 | | 270 | ND | U | 190 | ND | U | 230 | ND | U | 200 | 4200 | | 260 | ND | U | 240 | ND | U | 240 | ND | U | 250 | ND | U | 260 |
| Ethylene dibromide (EDB) | 106-93-4 | 5 | ug/kg | ND | U | 270 | ND | U | 190 | ND | U | 230 | ND | U | 200 | ND | U | 260 | ND | U | 240 | ND | U | 240 | ND | U | 250 | ND | U | 260 |
| Ethylbenzene | 100-41-4 | 70000 | ug/kg | 740 | | 270 | ND | U | 190 | ND | U | 230 | ND | U | 200 | 6600 | | 260 | ND | U | 240 | ND | U | 240 | ND | U | 250 | ND | U | 260 |
| Cumene | 98-82-8 | 1600000 | ug/kg | 1500 | | 270 | ND | U | 190 | ND | U | 230 | ND | U | 200 | 2100 | | 260 | ND | U | 240 | ND | U | 240 | ND | U | 250 | ND | U | 260 |
| Xylene (Total) | 1330-20-7 | 1000000 | ug/kg | 5800 | | 270 | ND | U | 190 | ND | U | 230 | ND | U | 200 | 34000 | | 260 | ND | U | 240 | ND | U | 240 | ND | U | 250 | ND | U | 260 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 2200000 | ug/kg | 2200 | | 1000 | 2600 | | 980 | 270 | | 190 | ND | U | 190 | 15000 | | 9700 | ND | U | 990 | ND | U | 940 | ND | U | 4800 | ND | U | 4800 |
| Naphthalene | 91-20-3 | 25000 | ug/kg | 2700 | | 1000 | ND | U | 980 | ND | U | 190 | ND | U | 190 | 18000 | | 9700 | ND | U | 990 | ND | U | 940 | ND | U | 4800 | ND | U | 4800 |
| Fluorene | 86-73-7 | 3800000 | ug/kg | 2400 | | 1000 | ND | U | 980 | ND | U | 190 | ND | U | 190 | 21000 | | 9700 | ND | U | 990 | ND | U | 940 | ND | U | 4800 | ND | U | 4800 |
| Phenanthrene | 85-01-8 | 10000000 | ug/kg | 6600 | | 1000 | ND | U | 980 | 330 | | 190 | ND | U | 190 | 58000 | | 9700 | ND | U | 990 | ND | U | 940 | 9700 | | 4800 | ND | U | 4800 |
| Anthracene | 120-12-7 | 350000 | ug/kg | 1500 | | 1000 | ND | U | 980 | ND | U | 190 | ND | U | 190 | 11000 | | 9700 | ND | U | 990 | ND | U | 940 | ND | U | 4800 | ND | U | 4800 |
| Benzo(a)anthracene | 56-55-3 | 110000 | ug/kg | ND | U | 1000 | 1100 | | 980 | ND | U | 190 | ND | U | 190 | ND | U | 9700 | ND | U | 990 | ND | U | 940 | ND | U | 4800 | ND | U | 4800 |
| Chrysene | 218-01-9 | 230000 | ug/kg | 1900 | | 1000 | 2700 | | 980 | 250 | | 190 | ND | U | 190 | 13000 | | 9700 | ND | U | 990 | ND | U | 940 | ND | U | 4800 | ND | U | 4800 |
| Benzo(b)fluoranthene | 205-99-2 | 110000 | ug/kg | ND | U | 1000 | 1100 | | 980 | ND | U | 190 | ND | U | 190 | ND | U | 9700 | ND | U | 990 | ND | U | 940 | ND | U | 4800 | ND | U | 4800 |
| Benzo(a)pyrene | 50-32-8 | 11000 | ug/kg | ND | U | 1000 | 1300 | | 980 | ND | U | 190 | ND | U | 190 | ND | U | 9700 | ND | U | 990 | ND | U | 940 | ND | U | 4800 | ND | U | 4800 |
| Benzo(g,h,i)perylene | 191-24-2 | 180000 | ug/kg | ND | U | 1000 | 1100 | | 980 | ND | U | 190 | ND | U | 190 | ND | U | 9700 | ND | U | 990 | ND | U | 940 | ND | | 4800 | ND | U | 4800 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 450 | mg/kg | 1250 | | 11.6 | 314 | | 1.14 | 78.8 | | 1.12 | 22.8 | | 1.13 | 1380 | | 5.58 | 102 | | 1.16 | 22.2 | | 1.13 | 540 | | 1.15 | 213 | | 1.13 |

**Notes:**
PADEP - Pennsylvania Department of Environmental Protection
ug/kg - microgram per kilogram
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
RL - Reporting Limit
ND - Not Detected
NA - Not Analyzed

(1) All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected

**Exceedance Summary:**
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration cxceeds the PADEP Non-Residential Soil MSC

**Table 4**
**Summary of Soil Sample Analytical Results: Non SWMU Area**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| | CAS No | PADEP Non-Residential Soil MSCs 0-2' Dry | Location ID / Sample ID / Sample Matrix / Sample Interval / Sample Date | BH-08-23 BH-08-23_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-24 BH-08-24_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-25 BH-08-25_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | BH-08-26 BH-08-26_1.0-2.0 Soil 1.0-2.0 5/8/2008 | | | BH-08-27 BH-08-27_1.0-2.0 Soil 1.0-2.0 5/6/2008 | | | BH-08-28 BH-08-28_1.0-2.0 Soil 1.0-2.0 5/6/2008 | | | BH-08-29 BH-08-29_1.0-2.0 Soil 1.0-2.0 5/6/2008 | | | BH-08-31 BH-08-31_1.0-2.0 Soil 1.0-2.0 5/6/2008 | | | BH-08-32 BH-08-32_0.0-2.0 Soil 0-2.0 7/3/2008 | | | BH-08-33 BH-08-33_1.5-2.0 Soil 1.5-2.0 5/6/2008 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds** | | | **Unit** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 2000 | ug/kg | ND | U | 180 | ND | U | 380 | ND | U | 460 | ND | U | 210 | ND | U | 180 | ND | U | 270 | ND | U | 230 | ND | U | 240 | ND | U | 300 | ND | U | 280 |
| Benzene | 71-43-2 | 500 | ug/kg | ND | U | 180 | ND | U | 380 | ND | U | 460 | 9000 | | 210 | ND | U | 180 | ND | U | 270 | ND | U | 230 | ND | U | 240 | ND | U | 300 | ND | U | 280 |
| 1,2-Dichloroethane | 107-06-2 | 500 | ug/kg | ND | U | 180 | ND | U | 380 | ND | U | 460 | ND | U | 210 | ND | U | 180 | ND | U | 270 | ND | U | 230 | ND | U | 240 | ND | U | 300 | ND | U | 280 |
| Toluene | 108-88-3 | 100000 | ug/kg | ND | U | 180 | ND | U | 380 | ND | U | 460 | ND | U | 210 | ND | U | 180 | ND | U | 270 | ND | U | 230 | ND | U | 240 | ND | U | 300 | ND | U | 280 |
| Ethylene dibromide (EDB) | 106-93-4 | 5 | ug/kg | ND | U | 180 | ND | U | 380 | ND | U | 460 | ND | U | 210 | ND | U | 180 | ND | U | 270 | ND | U | 230 | ND | U | 240 | ND | U | 300 | ND | U | 280 |
| Ethylbenzene | 100-41-4 | 70000 | ug/kg | ND | U | 180 | ND | U | 380 | ND | U | 460 | ND | U | 210 | ND | U | 180 | ND | U | 270 | ND | U | 230 | ND | U | 240 | ND | U | 300 | ND | U | 280 |
| Cumene | 98-82-8 | 1600000 | ug/kg | ND | U | 180 | 1400 | | 380 | ND | U | 460 | 660 | | 210 | ND | U | 180 | ND | U | 270 | ND | U | 230 | ND | U | 240 | ND | U | 300 | ND | U | 280 |
| Xylene (Total) | 1330-20-7 | 1000000 | ug/kg | 200 | | 180 | 600 | | 380 | ND | U | 460 | ND | U | 210 | ND | U | 180 | 670 | | 270 | ND | U | 230 | ND | U | 240 | ND | U | 300 | ND | U | 280 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 2200000 | ug/kg | ND | U | 5000 | ND | U | 4600 | ND | U | 4600 | ND | U | 4900 | 580 | | 190 | 1100 | | 1000 | ND | U | 190 | 25000 | | 4600 | 1600 | | 170 | 7500 | | 970 |
| Naphthalene | 91-20-3 | 25000 | ug/kg | ND | U | 5000 | ND | U | 4600 | ND | U | 4600 | ND | U | 4900 | ND | U | 190 | ND | U | 1000 | ND | U | 190 | ND | U | 920 | ND | U | 170 | 360 | | 190 |
| Fluorene | 86-73-7 | 3800000 | ug/kg | ND | U | 5000 | ND | U | 4600 | ND | U | 4600 | ND | U | 4900 | ND | U | 190 | 1100 | | 1000 | ND | U | 190 | 2000 | | 920 | ND | U | 170 | 720 | | 190 |
| Phenanthrene | 85-01-8 | 10000000 | ug/kg | ND | U | 5000 | 5900 | | 4600 | ND | U | 4600 | ND | U | 4900 | 450 | | 190 | 2900 | | 1000 | ND | U | 190 | 26000 | | 4600 | 1400 | | 170 | 7200 | | 970 |
| Anthracene | 120-12-7 | 350000 | ug/kg | ND | U | 5000 | ND | U | 4600 | ND | U | 4600 | ND | U | 4900 | ND | U | 190 | ND | U | 1000 | ND | U | 190 | 8100 | | 920 | 350 | | 170 | 1700 | | 190 |
| Benzo(a)anthracene | 56-55-3 | 110000 | ug/kg | ND | U | 5000 | ND | U | 4600 | ND | U | 4600 | ND | U | 4900 | 370 | | 190 | ND | U | 1000 | ND | U | 190 | 16000 | | 920 | 920 | | 170 | 4600 | | 970 |
| Chrysene | 218-01-9 | 230000 | ug/kg | ND | U | 5000 | ND | U | 4600 | ND | U | 4600 | ND | U | 4900 | 440 | | 190 | 1200 | | 1000 | ND | U | 190 | 13000 | | 920 | 950 | | 170 | 4300 | | 190 |
| Benzo(b)fluoranthene | 205-99-2 | 110000 | ug/kg | ND | U | 5000 | ND | U | 4600 | ND | U | 4600 | ND | U | 4900 | 480 | | 190 | ND | U | 1000 | ND | U | 190 | 12000 | | 920 | 1200 | | 170 | 5400 | | 970 |
| Benzo(a)pyrene | 50-32-8 | 11000 | ug/kg | ND | U | 5000 | ND | U | 4600 | ND | U | 4600 | ND | U | 4900 | 400 | | 190 | ND | U | 1000 | ND | U | 190 | 11000 | | 920 | 900 | | 170 | 3600 | | 190 |
| Benzo(g,h,i)perylene | 191-24-2 | 180000 | ug/kg | ND | U | 5000 | ND | U | 4600 | ND | U | 4600 | ND | U | 4900 | 370 | | 190 | ND | U | 1000 | ND | U | 190 | 6900 | | 920 | 730 | | 170 | 2300 | | 190 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 450 | mg/kg | 374 | | 1.17 | 172 | | 1.08 | 223 | | 1.11 | 261 | | 1.13 | 89.7 | | 1.09 | 132 | | 1.15 | 96.4 | | 1.1 | 1300 | | 10.9 | 128 | | 1.01 | 172 | | 1.15 |

**Notes:**
PADEP - Pennsylvania Department of Environmental Protection
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mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
RL - Reporting Limit
ND - Not Detected
NA - Not Analyzed

(1) All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected

**Exceedance Summary:**
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration cxceeds the PADEP Non-Residential Soil MSC

**Table 4**
**Summary of Soil Sample Analytical Results: Non SWMU Area**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| | CAS No | PADEP Non-Residential Soil MSCs 0-2' Dry | Location ID / Sample ID / Sample Matrix / Sample Interval / Sample Date | BH-08-34 BH-08-34_1.5-2.0 Soil 1.5-2.0 5/6/2008 | | | BH-08-35 BH-08-35_1.0-2.0 Soil 1.0-2.0 5/6/2008 | | | N-98 N-98_1.0-2.0 Soil 1.0-2.0 6/2/2008 | | | N-99 N-99_1.0-2.0 Soil 1.0-2.0 6/17/2008 | | | N-100 N-100_0.0-2.0 Soil 0.0-2.0 6/11/2008 | | | N-101 N-101_1.0-2.0 Soil 1.0-2.0 6/16/2008 | | | N-102 N-102_1.0-2.0 Soil 1.0-2.0 6/5/2008 | | | N-103 N-103_1.0-2.0 Soil 1.0-2.0 6/6/2008 | | | N-104 N-104_1.0-2.0 Soil 1.0-2.0 6/17/2008 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds** | | | **Unit** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 2000 | ug/kg | ND | U | 260 | ND | U | 220 | ND | U | 210 | ND | U | 270 | ND | U | 280 | ND | U | 210 | ND | U | 250 | ND | U | 260 | ND | U | 230 |
| Benzene | 71-43-2 | 500 | ug/kg | ND | U | 260 | ND | U | 220 | ND | U | 210 | ND | U | 270 | ND | U | 280 | ND | U | 210 | ND | U | 250 | ND | U | 260 | ND | U | 230 |
| 1,2-Dichloroethane | 107-06-2 | 500 | ug/kg | ND | U | 260 | ND | U | 220 | ND | U | 210 | ND | U | 270 | ND | U | 280 | ND | U | 210 | ND | U | 250 | ND | U | 260 | ND | U | 230 |
| Toluene | 108-88-3 | 100000 | ug/kg | ND | U | 260 | ND | U | 220 | ND | U | 210 | ND | U | 270 | ND | U | 280 | ND | U | 210 | ND | U | 250 | ND | U | 260 | ND | U | 230 |
| Ethylene dibromide (EDB) | 106-93-4 | 5 | ug/kg | ND | U | 260 | ND | U | 220 | ND | U | 210 | ND | U | 270 | ND | U | 280 | ND | U | 210 | ND | U | 250 | ND | U | 260 | ND | U | 230 |
| Ethylbenzene | 100-41-4 | 70000 | ug/kg | ND | U | 260 | ND | U | 220 | ND | U | 210 | ND | U | 270 | ND | U | 280 | ND | U | 210 | ND | U | 250 | ND | U | 260 | ND | U | 230 |
| Cumene | 98-82-8 | 1600000 | ug/kg | ND | U | 260 | ND | U | 220 | ND | U | 210 | ND | U | 270 | ND | U | 280 | ND | U | 210 | ND | U | 250 | ND | U | 260 | ND | U | 230 |
| Xylene (Total) | 1330-20-7 | 1000000 | ug/kg | ND | U | 260 | ND | U | 220 | ND | U | 210 | ND | U | 270 | ND | U | 280 | ND | U | 210 | ND | U | 250 | ND | U | 260 | ND | U | 230 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 2200000 | ug/kg | 63000 | | 9700 | ND | U | 180 | 2400 | | 980 | 140000 | | 25000 | 1900 | | 190 | 440 | | 200 | 390 | | 190 | ND | U | 950 | 2200 | | 920 |
| Naphthalene | 91-20-3 | 25000 | ug/kg | ND | U | 1900 | ND | U | 180 | 1000 | | 980 | 53000 | | 5000 | ND | U | 190 | ND | U | 200 | ND | U | 190 | ND | U | 950 | ND | U | 920 |
| Fluorene | 86-73-7 | 3800000 | ug/kg | 8000 | | 1900 | ND | U | 180 | ND | U | 980 | 78000 | | 5000 | ND | U | 190 | 280 | | 200 | ND | U | 190 | ND | U | 950 | ND | U | 920 |
| Phenanthrene | 85-01-8 | 10000000 | ug/kg | 64000 | | 1900 | ND | U | 180 | 4500 | | 980 | 280000 | | 25000 | 1500 | | 190 | 530 | | 200 | 310 | | 190 | ND | U | 950 | 1500 | | 920 |
| Anthracene | 120-12-7 | 350000 | ug/kg | 18000 | | 1900 | ND | U | 180 | ND | U | 980 | 64000 | | 5000 | 320 | | 190 | 240 | | 200 | ND | U | 190 | ND | U | 950 | ND | U | 920 |
| Benzo(a)anthracene | 56-55-3 | 110000 | ug/kg | 37000 | | 1900 | ND | U | 180 | ND | U | 980 | 82000 | | 5000 | 1100 | | 190 | ND | U | 200 | ND | U | 190 | ND | U | 950 | ND | U | 920 |
| Chrysene | 218-01-9 | 230000 | ug/kg | 32000 | | 1900 | ND | U | 180 | ND | U | 980 | 71000 | | 5000 | 1100 | | 190 | 250 | | 200 | 270 | | 190 | ND | U | 950 | 1200 | | 920 |
| Benzo(b)fluoranthene | 205-99-2 | 110000 | ug/kg | 39000 | | 1900 | ND | U | 180 | ND | U | 980 | 69000 | | 5000 | 1200 | | 190 | ND | U | 200 | 320 | | 190 | ND | U | 950 | ND | U | 920 |
| Benzo(a)pyrene | 50-32-8 | 11000 | ug/kg | 29000 | | 1900 | ND | U | 180 | ND | U | 980 | 61000 | | 5000 | ND | U | 190 | ND | U | 200 | 200 | | 190 | ND | U | 950 | ND | U | 920 |
| Benzo(g,h,i)perylene | 191-24-2 | 180000 | ug/kg | 18000 | | 1900 | ND | U | 180 | ND | U | 980 | 29000 | | 5000 | 620 | | 190 | ND | U | 200 | ND | U | 190 | 1000 | | 950 | ND | U | 920 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 450 | mg/kg | 354 | | 1.12 | 14.3 | | 1.05 | 94.5 | | 1.14 | 146 | | 1.14 | 135 | | 1.09 | 78.1 | | 1.15 | 24.7 | | 0.115 | 174 | | 0.567 | 164 | | 1.07 |

**Notes:**
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MSC - PADEP's Medium Specific Concentration for Soil
RL - Reporting Limit
ND - Not Detected
NA - Not Analyzed

(1) All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected

**Exceedance Summary:**
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration cxceeds the PADEP Non-Residential Soil MSC

**Table 4**
**Summary of Soil Sample Analytical Results: Non SWMU Area**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| | CAS No | PADEP Non-Residential Soil MSCs 0-2' Dry | Location ID / Sample ID / Sample Matrix / Sample Interval / Sample Date | N-105 / N-105_1.0-2.0 / Soil / 1.0-2.0 / 6/17/2008 | | | N-106 / N-106_1.0-2.0 / Soil / 1.0-2.0 / 6/5/2008 | | | N-107 / N-107_1.0-2.0 / Soil / 1.0-2.0 / 6/17/2008 | | | N-108 / N-108_1.0-2.0 / Soil / 1.0-2.0 / 5/29/2008 | | | N-109 / N-109_1.0-2.0 / Soil / 1.0-2.0 / 6/17/2008 | | | N-110 / N-110_1.0-2.0 / Soil / 1.0-2.0 / 5/14/2008 | | | N-111 / N-111_1.0-2.0 / Soil / 1.0-2.0 / 5/14/2008 | | | N-112 / N-112_1.0-2.0 / Soil / 1.0-2.0 / 5/8/2008 | | | N-113 / N-113_1.0-2.0 / Soil / 1.0-2.0 / 5/15/2008 | | | N-114 / N-114_1.0-2.0 / Soil / 1.0-2.0 / 5/8/2008 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds** | | | **Unit** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 2000 | ug/kg | ND | U | 240 | ND | U | 190 | ND | U | 220 | ND | U | 230 | ND | U | 3100 | ND | U | 240 | ND | U | 240 | ND | U | 440 | ND | U | 180 | ND | U | 240 |
| Benzene | 71-43-2 | 500 | ug/kg | ND | U | 240 | ND | U | 190 | 740 | | 220 | ND | U | 230 | ND | U | 3100 | ND | U | 240 | ND | U | 240 | ND | U | 440 | ND | U | 180 | 510 | | 240 |
| 1,2-Dichloroethane | 107-06-2 | 500 | ug/kg | ND | U | 240 | ND | U | 190 | ND | U | 220 | ND | U | 230 | ND | U | 3100 | ND | U | 240 | ND | U | 240 | ND | U | 440 | ND | U | 180 | ND | U | 240 |
| Toluene | 108-88-3 | 100000 | ug/kg | ND | U | 240 | ND | U | 190 | 420 | | 220 | ND | U | 230 | ND | U | 3100 | ND | U | 240 | ND | U | 240 | ND | U | 440 | ND | U | 180 | 420 | | 240 |
| Ethylene dibromide (EDB) | 106-93-4 | 5 | ug/kg | ND | U | 240 | ND | U | 190 | ND | U | 220 | ND | U | 230 | ND | U | 3100 | ND | U | 240 | ND | U | 240 | ND | U | 440 | ND | U | 180 | ND | U | 240 |
| Ethylbenzene | 100-41-4 | 70000 | ug/kg | ND | U | 240 | ND | U | 190 | 1600 | | 220 | ND | U | 230 | ND | U | 3100 | ND | U | 240 | ND | U | 240 | ND | U | 440 | ND | U | 180 | 250 | | 240 |
| Cumene | 98-82-8 | 1600000 | ug/kg | ND | U | 240 | ND | U | 190 | 360 | | 220 | ND | U | 230 | ND | U | 3100 | ND | U | 240 | ND | U | 240 | ND | U | 440 | 320 | | 180 | 590 | | 240 |
| Xylene (Total) | 1330-20-7 | 1000000 | ug/kg | ND | U | 240 | ND | U | 190 | 2700 | | 220 | ND | U | 230 | ND | U | 3100 | ND | U | 240 | ND | U | 240 | ND | U | 440 | ND | U | 180 | 690 | | 240 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 2200000 | ug/kg | ND | U | 920 | 270 | | 190 | ND | U | 1800 | ND | U | 1900 | ND | U | 950 | ND | U | 180 | 1400 | | 910 | ND | U | 200 | ND | U | 4400 | 13000 | | 4700 |
| Naphthalene | 91-20-3 | 25000 | ug/kg | ND | U | 920 | ND | U | 190 | ND | U | 1800 | ND | U | 1900 | ND | U | 950 | ND | U | 180 | ND | U | 910 | ND | U | 200 | ND | U | 4400 | ND | U | 4700 |
| Fluorene | 86-73-7 | 3800000 | ug/kg | ND | U | 920 | ND | U | 190 | ND | U | 1800 | ND | U | 1900 | ND | U | 950 | ND | U | 180 | ND | U | 910 | ND | U | 200 | ND | U | 4400 | 10000 | | 4700 |
| Phenanthrene | 85-01-8 | 10000000 | ug/kg | ND | U | 920 | ND | U | 190 | ND | U | 1800 | 2100 | | 1900 | ND | U | 950 | ND | U | 180 | 1100 | | 910 | ND | U | 200 | ND | U | 4400 | 26000 | | 4700 |
| Anthracene | 120-12-7 | 350000 | ug/kg | ND | U | 920 | ND | U | 190 | ND | U | 1800 | ND | U | 1900 | ND | U | 950 | ND | U | 180 | ND | U | 910 | ND | U | 200 | ND | U | 4400 | ND | U | 4700 |
| Benzo(a)anthracene | 56-55-3 | 110000 | ug/kg | ND | U | 920 | ND | U | 190 | ND | U | 1800 | 2000 | | 1900 | ND | U | 950 | ND | U | 180 | ND | U | 910 | ND | U | 200 | ND | U | 4400 | ND | U | 4700 |
| Chrysene | 218-01-9 | 230000 | ug/kg | ND | U | 920 | 190 | | 190 | ND | U | 1800 | 3800 | | 1900 | ND | U | 950 | ND | U | 180 | ND | U | 910 | ND | U | 200 | ND | U | 4400 | 6900 | | 4700 |
| Benzo(b)fluoranthene | 205-99-2 | 110000 | ug/kg | ND | U | 920 | 300 | | 190 | ND | U | 1800 | 3300 | | 1900 | ND | U | 950 | ND | U | 180 | 960 | | 910 | ND | U | 200 | ND | U | 4400 | ND | U | 4700 |
| Benzo(a)pyrene | 50-32-8 | 11000 | ug/kg | ND | U | 920 | 190 | | 190 | ND | U | 1800 | 5400 | | 1900 | ND | U | 950 | ND | U | 180 | ND | U | 910 | ND | U | 200 | ND | U | 4400 | ND | U | 4700 |
| Benzo(g,h,i)perylene | 191-24-2 | 180000 | ug/kg | ND | U | 920 | 220 | | 190 | ND | U | 1800 | 20000 | | 1900 | ND | U | 950 | ND | U | 180 | ND | U | 910 | ND | U | 200 | ND | U | 4400 | ND | U | 4700 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 450 | mg/kg | 36.4 | | 1.08 | 76.7 | | 0.546 | 173 | | 1.07 | 147 | | 1.16 | 294 | | 1.13 | 15 | | 1.06 | 117 | | 1.06 | 11.6 | | 1.16 | 77.9 | | 1.06 | 139 | | 139 1.11 |

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(1) All soil samples collected and analyzed were unsaturated.

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**Exceedance Summary:**
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10 - Concentration cxceeds the PADEP Non-Residential Soil MSC

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**Summary of Soil Sample Analytical Results: Non SWMU Area**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| | CAS No | PADEP Non-Residential Soil MSCs 0-2' Dry | Location ID / Sample ID / Sample Matrix / Sample Interval / Sample Date | N-115 N-115_0.0-2.0 Soil 0.0-2.0 5/28/2008 | | | N-116 N-116_1.0-2.0 Soil 1.0-2.0 5/20/2008 | | | N-117 N-117_1.0-2.0 Soil 1.0-2.0 6/4/2008 | | | N-118 N-118_1.0-2.0 Soil 1.0-2.0 5/23/2008 | | | N-119 N-119_1.0-2.0 Soil 1.0-2.0 6/17/2008 | | | N-120 N-120_1.0-2.0 Soil 1.0-2.0 5/22/2008 | | | N-121 N-121_1.0-2.0 Soil 1.0-2.0 6/9/2008 | | | N-122 N-122_1.0-2.0 Soil 1.0-2.0 5/7/2008 | | | N-123 N-123_1.0-2.0 Soil 1.0-2.0 5/20/2008 | | | N-124 N-124_1.0-2.0 Soil 1.0-2.0 5/21/2008 | | | N-125 N-125_1.0-2.0 Soil 1.0-2.0 6/17/2008 | | | N-126 N-126_1.0-2.0 Soil 1.0-2.0 6/17/2008 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds** | | | **Unit** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 2000 | ug/kg | ND | U | 380 | ND | U | 230 | ND | U | 230 | ND | U | 220 | ND | U | 240 | ND | U | 170 | ND | U | 230 | ND | U | 200 | ND | U | 240 | ND | U | 370 | ND | U | 230 | ND | U | 3100 |
| Benzene | 71-43-2 | 500 | ug/kg | ND | U | 380 | ND | U | 230 | ND | U | 230 | ND | U | 220 | ND | U | 240 | ND | U | 170 | ND | U | 230 | ND | U | 200 | ND | U | 240 | ND | U | 370 | ND | U | 230 | ND | U | 3100 |
| 1,2-Dichloroethane | 107-06-2 | 500 | ug/kg | ND | U | 380 | ND | U | 230 | ND | U | 230 | ND | U | 220 | ND | U | 240 | ND | U | 170 | ND | U | 230 | ND | U | 200 | ND | U | 240 | ND | U | 370 | ND | U | 230 | ND | U | 3100 |
| Toluene | 108-88-3 | 100000 | ug/kg | ND | U | 380 | ND | U | 230 | ND | U | 230 | ND | U | 220 | ND | U | 240 | ND | U | 170 | ND | U | 230 | ND | U | 200 | ND | U | 240 | ND | U | 370 | ND | U | 230 | ND | U | 3100 |
| Ethylene dibromide (EDB) | 106-93-4 | 5 | ug/kg | ND | U | 380 | ND | U | 230 | ND | U | 230 | ND | U | 220 | ND | U | 240 | ND | U | 170 | ND | U | 230 | ND | U | 200 | ND | U | 240 | ND | U | 370 | ND | U | 230 | ND | U | 3100 |
| Ethylbenzene | 100-41-4 | 70000 | ug/kg | ND | U | 380 | ND | U | 230 | ND | U | 230 | ND | U | 220 | ND | U | 240 | ND | U | 170 | ND | U | 230 | ND | U | 200 | ND | U | 240 | ND | U | 370 | ND | U | 230 | ND | U | 3100 |
| Cumene | 98-82-8 | 1600000 | ug/kg | ND | U | 380 | 810 | | 230 | ND | U | 230 | 470 | | 220 | ND | U | 240 | ND | U | 170 | ND | U | 230 | ND | U | 200 | ND | U | 240 | ND | U | 370 | ND | U | 230 | ND | U | 3100 |
| Xylene (Total) | 1330-20-7 | 1000000 | ug/kg | ND | U | 380 | ND | U | 230 | ND | U | 230 | ND | U | 220 | ND | U | 240 | ND | U | 170 | ND | U | 230 | ND | U | 200 | ND | U | 240 | ND | U | 370 | ND | U | 230 | ND | U | 3100 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 2200000 | ug/kg | 32000 | | 5200 | 1200 | | 970 | 1100 | | 190 | 1200 | | 940 | 560 | | 200 | ND | U | 980 | 2500 | | 990 | 1200 | | 940 | 25000 | | 1100 | ND | U | 190 | 2500 | | 930 | 2200 | | 1000 |
| Naphthalene | 91-20-3 | 25000 | ug/kg | ND | U | 5200 | ND | U | 970 | ND | U | 190 | ND | U | 940 | ND | U | 200 | ND | U | 980 | ND | U | 990 | ND | U | 940 | ND | U | 1100 | ND | U | 190 | ND | U | 930 | ND | U | 1000 |
| Fluorene | 86-73-7 | 3800000 | ug/kg | ND | U | 5200 | 2100 | | 970 | ND | U | 190 | 1200 | | 940 | ND | U | 200 | ND | U | 980 | ND | U | 990 | 980 | | 940 | ND | U | 1100 | ND | U | 190 | ND | U | 930 | 1200 | | 1000 |
| Phenanthrene | 85-01-8 | 10000000 | ug/kg | 14000 | | 5200 | 5900 | | 970 | 1400 | | 190 | 3700 | | 940 | ND | U | 200 | ND | U | 980 | 2500 | | 990 | 2100 | | 940 | 16000 | | 1100 | ND | U | 190 | 1600 | | 930 | 1100 | | 1000 |
| Anthracene | 120-12-7 | 350000 | ug/kg | ND | U | 5200 | 1000 | | 970 | 350 | | 190 | ND | U | 940 | ND | U | 200 | ND | U | 980 | ND | U | 990 | 2100 | | 940 | 5000 | | 1100 | ND | U | 190 | ND | U | 930 | 1100 | | 1000 |
| Benzo(a)anthracene | 56-55-3 | 110000 | ug/kg | 10000 | | 5200 | ND | U | 970 | 740 | | 190 | ND | U | 940 | 340 | | 200 | ND | U | 980 | ND | U | 990 | ND | U | 940 | 17000 | | 1100 | ND | U | 190 | 2000 | | 930 | ND | U | 1000 |
| Chrysene | 218-01-9 | 230000 | ug/kg | 15000 | | 5200 | ND | U | 970 | 680 | | 190 | ND | U | 940 | 650 | | 200 | ND | U | 980 | 1500 | | 990 | ND | U | 940 | 16000 | | 1100 | ND | U | 190 | 2100 | | 930 | 1400 | | 1000 |
| Benzo(b)fluoranthene | 205-99-2 | 110000 | ug/kg | ND | U | 5200 | ND | U | 970 | 940 | | 190 | ND | U | 940 | 210 | | 200 | ND | U | 980 | ND | U | 990 | ND | U | 940 | 18000 | | 1100 | ND | U | 190 | 1600 | | 930 | ND | U | 1000 |
| Benzo(a)pyrene | 50-32-8 | 11000 | ug/kg | 6500 | | 5200 | ND | U | 970 | 630 | | 190 | ND | U | 940 | 430 | | 200 | ND | U | 980 | ND | U | 990 | ND | U | 940 | 13000 | | 1100 | ND | U | 190 | 1500 | | 930 | ND | U | 1000 |
| Benzo(g,h,i)perylene | 191-24-2 | 180000 | ug/kg | 7100 | | 5200 | ND | U | 970 | 420 | | 190 | ND | U | 940 | 330 | | 200 | ND | U | 980 | ND | U | 990 | ND | U | 940 | 8000 | | 1100 | ND | U | 190 | ND | U | 930 | 1000 | | 1000 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 450 | mg/kg | 1250 | N | 3 | 340 | | 1.16 | 219 | | 0.565 | 200 | | 1.11 | 101 | | 1.17 | 181 | | 1.16 | 64 | | 1.17 | 207 | | 1.11 | 254 | | 1.27 | 43.9 | | 1.15 | 150 | | 1.07 | 912 | | 2.36 |

**Notes:**
PADEP - Pennsylvania Department of Environmental Protection
ug/kg - microgram per kilogram
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
RL - Reporting Limit
ND - Not Detected
NA - Not Analyzed

(1) All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected

**Exceedance Summary:**
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration cxceeds the PADEP Non-Residential Soil MSC

**Table 4**
**Summary of Soil Sample Analytical Results: Non SWMU Area**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| | CAS No | PADEP Non-Residential Soil MSCs<br>0-2' Dry | Location ID<br>Sample ID<br>Sample Matrix<br>Sample Interval<br>Sample Date | N-127<br>N-127_1.0-2.0<br>Soil<br>1.0-2.0<br>5/22/2008 | | | N-128<br>N-128_1.0-2.0<br>Soil<br>1.0-2.0<br>5/20/2008 | | | N-129<br>N-129_1.0-2.0<br>Soil<br>1.0-2.0<br>6/17/2008 | | | N-130<br>N-130_0.0-2.0<br>Soil<br>0.0-2.0<br>5/16/2008 | | | N-131<br>N-131_1.0-2.0<br>Soil<br>1.0-2.0<br>6/17/2008 | | | N-132<br>N-132_1.0-2.0<br>Soil<br>1.0-2.0<br>5/13/2008 | | | N-133<br>N-133_1.0-2.0<br>Soil<br>1.0-2.0<br>5/15/2008 | | | N-134<br>N-134_1.0-2.0<br>Soil<br>1.0-2.0<br>5/22/2008 | | | N-135<br>N-135_1.0-2.0<br>Soil<br>1.0-2.0<br>5/15/2008 | | | N-136<br>N-136_1.0-2.0<br>Soil<br>1.0-2.0<br>5/15/2008 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds** | | | **Unit** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 2000 | ug/kg | ND | U | 190 | ND | U | 290 | ND | U | 230 | ND | U | 220 | ND | U | 380 | ND | U | 230 | ND | U | 300 | ND | U | 320 | ND | U | 350 | ND | U | 210 |
| Benzene | 71-43-2 | 500 | ug/kg | ND | U | 190 | 1900 | | 290 | ND | U | 230 | ND | U | 220 | ND | U | 380 | ND | U | 230 | 3700 | | 300 | ND | U | 320 | ND | U | 350 | 700 | | 210 |
| 1,2-Dichloroethane | 107-06-2 | 500 | ug/kg | ND | U | 190 | ND | U | 290 | ND | U | 230 | ND | U | 220 | ND | U | 380 | ND | U | 230 | ND | U | 300 | ND | U | 320 | ND | U | 350 | ND | U | 210 |
| Toluene | 108-88-3 | 100000 | ug/kg | ND | U | 190 | ND | U | 290 | ND | U | 230 | ND | U | 220 | ND | U | 380 | ND | U | 230 | ND | U | 300 | ND | U | 320 | ND | U | 350 | ND | U | 210 |
| Ethylene dibromide (EDB) | 106-93-4 | 5 | ug/kg | ND | U | 190 | ND | U | 290 | ND | U | 230 | ND | U | 220 | ND | U | 380 | ND | U | 230 | ND | U | 300 | ND | U | 320 | ND | U | 350 | ND | U | 210 |
| Ethylbenzene | 100-41-4 | 70000 | ug/kg | ND | U | 190 | 340 | | 290 | ND | U | 230 | ND | U | 220 | ND | U | 380 | ND | U | 230 | ND | U | 300 | ND | U | 320 | ND | U | 350 | ND | U | 210 |
| Cumene | 98-82-8 | 1600000 | ug/kg | ND | U | 190 | ND | U | 290 | ND | U | 230 | ND | U | 220 | ND | U | 380 | ND | U | 230 | ND | U | 300 | ND | U | 320 | ND | U | 350 | ND | U | 210 |
| Xylene (Total) | 1330-20-7 | 1000000 | ug/kg | ND | U | 190 | 610 | | 290 | ND | U | 230 | ND | U | 220 | ND | U | 380 | ND | U | 230 | 480 | U | 300 | ND | U | 320 | ND | U | 350 | ND | U | 210 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 2200000 | ug/kg | 1400 | | 940 | ND | U | 1000 | ND | U | 970 | ND | U | 940 | ND | U | 1000 | ND | U | 9400 | ND | U | 9800 | 50000 | | 4900 | 4400 | | 1000 | ND | U | 190 |
| Naphthalene | 91-20-3 | 25000 | ug/kg | ND | U | 940 | 2200 | | 1000 | ND | U | 970 | ND | U | 940 | ND | U | 1000 | ND | U | 9400 | ND | U | 9800 | 4700 | | 9900 | 2100 | | 1000 | ND | U | 190 |
| Fluorene | 86-73-7 | 3800000 | ug/kg | ND | U | 940 | ND | U | 1000 | ND | U | 970 | ND | U | 940 | ND | U | 1000 | ND | U | 9400 | ND | U | 9800 | 3300 | | 9900 | ND | U | 1000 | ND | U | 190 |
| Phenanthrene | 85-01-8 | 10000000 | ug/kg | 1200 | | 940 | 1900 | | 1000 | ND | U | 970 | ND | U | 940 | ND | U | 1000 | ND | U | 9400 | ND | U | 9800 | 48000 | | 4900 | 7700 | | 1000 | ND | U | 190 |
| Anthracene | 120-12-7 | 350000 | ug/kg | ND | U | 940 | ND | U | 1000 | ND | U | 970 | ND | U | 940 | ND | U | 1000 | ND | U | 9400 | ND | U | 9800 | 11000 | | 9900 | 1600 | | 1000 | ND | U | 190 |
| Benzo(a)anthracene | 56-55-3 | 110000 | ug/kg | ND | U | 940 | 1700 | | 1000 | ND | U | 970 | ND | U | 940 | ND | U | 1000 | ND | U | 9400 | ND | U | 9800 | 41000 | | 4900 | 1500 | | 1000 | ND | U | 190 |
| Chrysene | 218-01-9 | 230000 | ug/kg | ND | U | 940 | 1900 | | 1000 | 1000 | | 970 | ND | U | 940 | ND | U | 1000 | ND | U | 9400 | ND | U | 9800 | 35000 | | 4900 | 3000 | | 1000 | ND | U | 190 |
| Benzo(b)fluoranthene | 205-99-2 | 110000 | ug/kg | ND | U | 940 | 3300 | | 1000 | ND | U | 970 | ND | U | 940 | ND | U | 1000 | ND | U | 9400 | ND | U | 9800 | 44000 | | 4900 | ND | U | 1000 | ND | U | 190 |
| Benzo(a)pyrene | 50-32-8 | 11000 | ug/kg | ND | U | 940 | 6000 | | 1000 | ND | U | 970 | ND | U | 940 | ND | U | 1000 | ND | U | 9400 | ND | U | 9800 | 37000 | | 4990 | 1500 | | 1000 | ND | U | 190 |
| Benzo(g,h,i)perylene | 191-24-2 | 180000 | ug/kg | ND | U | 940 | 20000 | | 1000 | 1700 | | 970 | ND | U | 940 | ND | U | 1000 | ND | U | 9400 | ND | U | 9800 | 21000 | | 990 | 2400 | | 1000 | ND | U | 190 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 450 | mg/kg | 191 | | 1.09 | 61.4 | | 1.18 | 31.3 | | 1.14 | 670 | | 2.25 | 88.8 | | 1.23 | 94.9 | | 1.11 | 865 | | 2.36 | 74.6 | | 1.17 | 273 | | 1.21 | 320 | | 1.13 |

**Notes:**
PADEP - Pennsylvania Department of Environmental Protection
ug/kg - microgram per kilogram
mg/kg - milligram per kilogram
MSC - PADEP's Medium Specific Concentration for Soil
RL - Reporting Limit
ND - Not Detected
NA - Not Analyzed

(1) All soil samples collected and analyzed were unsaturated.

**Qualifiers:**
Q - Qualifier
U - The analyte was analyzed but not detected

**Exceedance Summary:**
10 - RL exceeds the PADEP Non-Residential Soil MSC
10 - Concentration cxceeds the PADEP Non-Residential Soil MSC

**Table 5**
**Summary of Soil Sample Analytical Results: SWMU 2**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| | Analytical Method | CAS No | PADEP Non-Residential MSCs | EPA Maximum Concentration of Contaminants for Toxicity Concentration | Location ID<br>Sample ID<br>Sample Matrix<br>Sample Interval<br>Sample Date<br>SWMU Number | BH-08-05<br>BH-08-05_6.0-8.0<br>Soil<br>6.0-8.0<br>5/8/2008<br>2 | | |
|---|---|---|---|---|---|---|---|---|
| | | | 0-2' Dry | | | | | |
| **Metals** | | | | | **Unit** | **Result** | **Q** | **RL** |
| Lead (Total) | SW846 6010B | 7439-92-1 | 450 | - | mg/kg | 63.4 | | 1.35 |
| **TCLP Metals** | | | | | | | | |
| Lead (Total) | SW846 1311 | 7439-92-1 | - | 5 | mg/l | - | | - |

**Notes:**
TCLP - Toxicity Characteristic Leachning Procedure
EPA - Environmental Protection Agency
PADEP - Pennsylvania Department of Environmental Protection
mg/kg - milligrams per kilogram
mg/l - milligrams per liter
MSC - PADEP's Medium Specific Concentration for Soil
RL - Reporting Limit
(1) All soil samples collected and analyzed were unsaturated

**Qualifiers:**
Q - Qualifier

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

**TABLE 6**
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS:**
**FILL-ALLUVIUM/TRENTON GRAVEL WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-1 | | | N-3 | | | N-5 | | | N-8 | | | N-10 | | | N-11 | | | N-12 | | | N-15 | | | N-16 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-1 | | | N-3 | | | N-5 | | | N-8 | | | N-10 | | | N-11 | | | N-12 | | | N-15 | | | N-16 | | |
| | | | Sample Date | 7/15/2008 | | | 7/15/2008 | | | 7/15/2008 | | | 7/16/2008 | | | 7/15/2008 | | | 7/15/2008 | | | 7/23/2008 | | | 7/15/2008 | | | 7/16/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 1 | ND | U | 1 | 2 | | 1 | 1 | 1 | 1 | ND | U | 2 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 2 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 1 | ND | U | 1 | 9 | | 1 | 10 | | 1 | 6 | | 2 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 1 | 1 | | 1 | 13 | | 1 | 14 | | 1 | 10 | | 2 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 2 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 5 | 1 | | 1 | 1 | | 1 | 6 | | 1 | 6 | | 1 | 3 | | 2 | ND | U | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | ND | U | 2 | ND | U | 2 | ND | U | 10 | ND | U | 2 | ND | U | 2 | 38 | 38 | 2 | 15 | 15 | 2 | 230 | | 4 | ND | U | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | 870 | | 50 | ND | U | 99 | ND | U | 50 |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | 470 | | 50 | ND | U | 99 | ND | U | 50 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | 5500 | | 500 | 440 | | 99 | ND | U | 50 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | 1600 | | 500 | 180 | | 99 | ND | U | 50 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 50 | ND | U | 99 | ND | U | 50 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | 0.0011 | 0 | 0.001 | 1.13 | 1 | 0.005 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | 0.0011 | 0 | 0.001 | ND | U | 0.001 |

**Notes:**
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
mg/l - Milligrams 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

**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 6**
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS:**
**FILL-ALLUVIUM/TRENTON GRAVEL WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-17 | | | N-18 | | | N-20 | | | N-23 | | | N-24 | | | N-26 | | | N-28 | | | N-29 | | | N-30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-17 | | | N-18 | | | N-20 | | | N-23 | | | N-24 | | | N-26 | | | N-28 | | | N-29 | | | N-30 | | |
| | | | Sample Date | 7/16/2008 | | | 7/16/2008 | | | 7/23/2008 | | | 7/22/2008 | | | 7/18/2008 | | | 7/17/2008 | | | 7/16/2008 | | | 7/22/2008 | | | 7/22/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.03 | ND | U | 0.03 | 0.029 | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | ND | U | 1 | 1 | | 1 | ND | U | 1 | ND | U | 10 | 3 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 1 | 3 | | 1 | ND | U | 1 | ND | U | 10 | 3 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | ND | U | 2 | 20 | 20 | 2 | 42 | | 2 | ND | U | 20 | 44 | | 2 | ND | U | 2 | ND | U | 2 | ND | U | 2 | ND | U | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | 130 | | 50 | ND | U | 25 | 90 | | 50 | 1900 | | 120 | ND | U | 47 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 50 | ND | U | 25 | 70 | | 50 | 620 | | 120 | ND | U | 47 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 50 | ND | U | 25 | ND | U | 50 | 520 | | 120 | ND | U | 47 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 50 | ND | U | 25 | 66 | | 50 | 1100 | | 120 | ND | U | 47 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 50 | ND | U | 25 | ND | U | 50 | 260 | | 120 | ND | U | 47 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

**Notes:**
PADEP - Pennsylvania Department of Environmental Protection
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mg/l - Milligrams 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

**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 6**
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS:**
**FILL-ALLUVIUM/TRENTON GRAVEL WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-32 | | | N-34 | | | N-35 | | | N-36 | | | N-37 | | | N-38 | | | N-39 | | | N-40 | | | N-41 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-32 | | | N-34 | | | N-35 | | | N-36 | | | N-37 | | | N-38 | | | N-39 | | | N-40 | | | N-41 | | |
| | | | Sample Date | 7/22/2008 | | | 7/24/2008 | | | 7/24/2008 | | | 7/25/2008 | | | 7/24/2008 | | | 7/24/2008 | | | 7/28/2008 | | | 7/25/2008 | | | 7/28/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | ND | U | 10 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.029 | ND | U | 0.028 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 10 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 1 | ND | U | 10 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | ND | U | 1 | ND | U | 10 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 1 | 3 | | 1 | 1 | | 1 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 1 | ND | U | 10 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 1 | ND | U | 10 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | ND | U | 2 | ND | U | 20 | ND | U | 20 | ND | U | 2 | ND | U | 2 | ND | U | 2 | 24 | | 2 | 7 | | 2 | 8 | | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | ND | U | 5 | 610 | | 50 | 70 | | 47 | ND | U | 120 | ND | U | 5 | ND | U | 5 | 25 | | 5 | ND | U | 24 | 390 | | 50 |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 5 | 290 | | 50 | 61 | | 47 | ND | U | 120 | ND | U | 5 | ND | U | 5 | 41 | | 5 | ND | U | 24 | 280 | | 50 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 5 | 200 | | 50 | ND | U | 47 | ND | U | 120 | ND | U | 5 | ND | U | 5 | 7 | | 5 | ND | U | 24 | 1100 | | 50 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 5 | 200 | | 50 | ND | U | 47 | ND | U | 120 | ND | U | 5 | ND | U | 5 | 9 | | 5 | ND | U | 24 | 450 | | 50 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 5 | ND | U | 50 | ND | U | 47 | ND | U | 120 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 24 | ND | U | 50 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

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

**Qualifiers:**
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**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 6**
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS:**
**FILL-ALLUVIUM/TRENTON GRAVEL WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-53 | | | N-55 | | | N-57 | | | N-58 | | | N-59 | | | N-60 | | | N-61 | | | N-64 | | | N-65 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-53 | | | N-55 | | | N-57 | | | N-58 | | | N-59 | | | N-60 | | | N-61 | | | N-64 | | | N-65 | | |
| | | | Sample Date | 7/28/2008 | | | 7/28/2008 | | | 7/25/2008 | | | 7/25/2008 | | | 8/6/2008 | | | 7/25/2008 | | | 7/25/2008 | | | 7/23/2008 | | | 7/16/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 10 | 3 | | 1 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | 1 | | 1 | ND | U | 1 | ND | U | 5 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | 11 | | 1 | ND | U | 1 | 120 | | 5 | 100 | | 10 | 4 | | 1 | ND | U | 1 | 23 | 23 | 10 | ND | U | 1 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 10 | ND | U | 1 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 10 | 98 | | 1 | ND | U | 1 | 8700 | | 50 | ND | U | 1 | ND | U | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | 17 | | 2 | ND | U | 2 | ND | U | 10 | ND | U | 20 | 2 | 2 | 2 | ND | U | 2 | ND | U | 20 | ND | U | 2 | ND | U | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | 220 | | 50 | ND | U | 5 | ND | U | 24 | ND | U | 5 | ND | U | 5 | 12 | | 5 | ND | U | 24 | ND | U | 5 | ND | U | 5 |
| Chrysene | 218-01-9 | 1.9 | ug/l | 180 | | 50 | ND | U | 5 | ND | U | 24 | ND | U | 5 | ND | U | 5 | 14 | | 5 | ND | U | 24 | ND | U | 5 | ND | U | 5 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | 610 | | 50 | ND | U | 5 | ND | U | 24 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 24 | ND | U | 5 | ND | U | 5 |
| Fluorene | 86-73-7 | 1900 | ug/l | 360 | | 50 | ND | U | 5 | ND | U | 24 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 24 | ND | U | 5 | ND | U | 5 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 50 | ND | U | 5 | ND | U | 24 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 24 | ND | U | 5 | ND | U | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

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10 - Reporting limit exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500
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**FILL-ALLUVIUM/TRENTON GRAVEL WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-66 | | | N-67 | | | N-69 | | | N-70 | | | N-73 | | | N-74 | | | N-77 | | | N-84 | | | N-85 | | | N-86 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-66 | | | N-67 | | | N-69 | | | N-70 | | | N-73 | | | N-74 | | | N-77 | | | N-84 | | | N-85 | | | N-86 | | |
| | | | Sample Date | 7/22/2008 | | | 7/18/2008 | | | 7/18/2008 | | | 7/18/2008 | | | 7/25/2008 | | | 7/25/2008 | | | 7/18/2008 | | | 7/16/2008 | | | 7/16/2008 | | | 7/17/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | 1 | 1 | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | 1 | | 1 | 1 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | 4 | | 1 | 4 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | 4 | | 2 | ND | U | 2 | 2 | | 2 | 35 | | 2 | ND | U | 2 | ND | U | 2 | 15 | | 2 | 11 | | 2 | 2 | | 2 | 21 | | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | 19 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 50 | ND | U | 5 |
| Chrysene | 218-01-9 | 1.9 | ug/l | 7 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 50 | ND | U | 5 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | 67 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 50 | 13 | | 5 |
| Fluorene | 86-73-7 | 1900 | ug/l | 31 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | 7 | | 5 | ND | U | 5 | ND | U | 50 | 9 | | 5 |
| Naphthalene | 91-20-3 | 100 | ug/l | 48 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 50 | ND | U | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

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**TABLE 6**
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**FILL-ALLUVIUM/TRENTON GRAVEL WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-87 | | | N-89 | | | N-90 | | | N-92 | | | N-93 | | | N-94 | | | N-97 | | | N-98 | | | N-99 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-87 | | | N-89 | | | N-90 | | | N-92 | | | N-93 | | | N-94 | | | N-97 | | | N-98 | | | N-99 | | |
| | | | Sample Date | 7/17/2008 | | | 7/22/2008 | | | 7/22/2008 | | | 7/17/2008 | | | 7/17/2008 | | | 7/18/2008 | | | 8/6/2008 | | | 7/14/2008 | | | 7/23/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 1 | 2 | | 1 | 4 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | ND | U | 1 | 5 | | 1 | 6 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 1 | 1 | | 1 | 5 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | 2 | | 1 | ND | U | 1 | ND | U | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | 34 | | 2 | 23 | 23 | 2 | 8 | | 2 | ND | U | 2 | 17 | | 2 | ND | U | 2 | 140 | | 2 | ND | U | 2 | ND | U | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | 27 | | 5 | ND | U | 5 | ND | U | 5 | 10 | | 5 | ND | U | 5 | ND | U | 50 |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | 11 | | 5 | ND | U | 5 | ND | U | 5 | 6 | | 5 | ND | U | 5 | ND | U | 50 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | 45 | | 5 | ND | U | 5 | ND | U | 50 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 5 | 7 | | 5 | ND | U | 5 | 17 | | 5 | ND | U | 5 | ND | U | 5 | 13 | | 5 | ND | U | 5 | ND | U | 50 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | 50 | | 5 | ND | U | 5 | ND | U | 50 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

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10 - Reporting limit exceeds the PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500
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**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-100 | | | N-101 | | | N-102 | | | N-103 | | | N-104 | | | N-105 | | | N-106 | | | N-108 | | | N-109 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-100 | | | N-101 | | | N-102 | | | N-103 | | | N-104 | | | N-105 | | | N-106 | | | N-108 | | | N-109 | | |
| | | | Sample Date | 7/14/2008 | | | 7/15/2008 | | | 7/15/2008 | | | 7/23/2008 | | | 7/23/2008 | | | 7/23/2008 | | | 7/14/2008 | | | 7/22/2008 | | | 7/24/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | ND | U | 5 | 8 | | 1 | ND | U | 5 | 2 | | 1 | ND | U | 1 | 22 | | 2 | ND | U | 5 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 5 | ND | U | 1 | ND | U | 5 | ND | U | 1 | ND | U | 1 | ND | U | 2 | ND | U | 5 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 1 | ND | U | 5 | 4 | 4 | 1 | 22 | | 5 | 13 | | 1 | 3 | | 1 | 60 | | 2 | 11 | | 5 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | ND | U | 1 | 12 | | 5 | 16 | | 1 | 47 | | 5 | 30 | | 1 | 7 | | 1 | 120 | | 2 | 15 | | 5 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 1 | ND | U | 5 | ND | U | 1 | ND | U | 5 | ND | U | 1 | ND | U | 1 | ND | U | 2 | ND | U | 5 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 1 | ND | U | 5 | 25 | | 1 | 16 | | 5 | 7 | | 1 | ND | U | 1 | 410 | | 20 | 14 | | 5 | ND | U | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | ND | U | 2 | 26 | | 10 | 7 | 7 | 2 | 360 | | 10 | 44 | | 2 | 9 | | 2 | 57 | | 4 | 28 | | 10 | 11 | 11 | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | ND | U | 5 | 9 | | 5 | 9 | | 5 | 390 | | 50 | 150 | | 50 | ND | U | 50 | ND | U | 5 | 13 | | 5 | 63 | | 50 |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 5 | 8 | | 5 | 15 | | 5 | 360 | | 50 | 85 | | 50 | ND | U | 50 | ND | U | 5 | 8 | | 5 | ND | U | 50 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 5 | 67 | | 5 | 77 | | 5 | 2500 | | 250 | 740 | | 50 | 100 | | 50 | ND | U | 5 | 47 | | 5 | 230 | | 50 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 5 | 28 | | 5 | 22 | | 5 | 740 | 740 | 50 | 310 | | 50 | 72 | | 50 | ND | U | 5 | 19 | | 5 | 140 | | 50 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 5 | ND | U | 5 | 10 | | 5 | ND | U | 50 | ND | U | 50 | ND | U | 50 | 20 | | 5 | ND | U | 5 | ND | U | 50 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

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**TABLE 6**
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS:**
**FILL-ALLUVIUM/TRENTON GRAVEL WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-110 | | | N-111 | | | N-112 | | | N-114 | | | N-115 | | | N-117 | | | N-118 | | | N-119 | | | N-120 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-110 | | | N-111 | | | N-112 | | | N-114 | | | N-115 | | | N-117 | | | N-118 | | | N-119 | | | N-120 | | |
| | | | Sample Date | 7/24/2008 | | | 7/24/2008 | | | 7/24/2008 | | | 7/24/2008 | | | 7/28/2008 | | | 7/17/2008 | | | 7/22/2008 | | | 7/17/2008 | | | 7/17/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | 3 | 3 | 1 | 210 | | 20 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 20 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | 7 | | 1 | 64 | | 20 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | 3 | | 1 | ND | U | 1 | ND | U | 1 | 18 | | 1 | 570 | | 20 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 20 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | 9 | | 1 | 81 | | 20 | ND | U | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | ND | U | 2 | 8 | | 2 | 22 | | 2 | 24 | | 2 | 6 | | 2 | 14 | | 2 | 97 | | 2 | 520 | | 40 | 130 | | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | ND | U | 50 | 160 | | 50 | 760 | | 50 | ND | U | 5 | 8 | | 5 | 11 | | 5 | 9 | | 5 | 6 | | 5 | 7 | | 5 |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 50 | 110 | | 50 | 290 | | 50 | ND | U | 5 | 7 | | 5 | 11 | | 5 | 9 | | 5 | ND | U | 5 | ND | U | 5 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 50 | 380 | | 50 | 1400 | | 250 | 7 | | 5 | 10 | 10 | 5 | 71 | | 5 | 70 | | 5 | 63 | | 5 | 21 | | 5 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 50 | 170 | | 50 | 380 | | 50 | 9 | | 5 | ND | U | 5 | 24 | | 5 | 34 | | 5 | 31 | | 5 | 13 | | 5 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 50 | ND | U | 50 | ND | U | 50 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | 220 | | 48 | ND | U | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | Nd | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

**Notes:**
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
mg/l - Milligrams 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

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

**TABLE 6**
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS:**
**FILL-ALLUVIUM/TRENTON GRAVEL WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-121 | | | N-122 | | | N-123 | | | N-124 | | | N-126 | | | N-128 | | | N-131 | | | N-132 | | | N-133 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-121 | | | N-122 | | | N-123 | | | N-124 | | | N-126 | | | N-128 | | | N-131 | | | N-132 | | | N-133 | | |
| | | | Sample Date | 7/17/2008 | | | 7/22/2008 | | | 7/22/2008 | | | 7/22/2008 | | | 7/22/2008 | | | 7/23/2008 | | | 7/28/2008 | | | 7/28/2008 | | | 7/23/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | 2 | | 1 | ND | U | 1 | 5 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 2 | ND | U | 1 | 11 | | 10 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.028 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.03 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 2 | ND | U | 1 | ND | U | 10 |
| Toluene | 108-88-3 | 1000 | ug/l | 11 | 11 | 1 | ND | U | 1 | 1 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 2 | ND | U | 1 | ND | U | 10 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | 36 | | 1 | 1 | | 1 | 2 | | 1 | ND | U | 1 | 2 | | 1 | ND | U | 1 | ND | U | 2 | 4 | | 1 | 17 | | 10 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 2 | ND | U | 1 | ND | U | 10 |
| Benzene | 71-43-2 | 5 | ug/l | 27 | | 1 | ND | U | 1 | 6 | | 1 | ND | U | 1 | 1 | | 1 | ND | U | 1 | 3 | | 2 | ND | U | 1 | 10000 | | 100 |
| Cumene | 98-82-8 | 2300 | ug/l | 34 | | 2 | 5 | | 2 | 34 | | 2 | ND | U | 2 | 3 | | 2 | 30 | | 2 | 370 | | 4 | ND | U | 2 | ND | U | 20 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | ND | U | 20 | 16 | | 5 | 110 | | 5 | ND | U | 5 | 20 | | 5 | 940 | | 100 | ND | U | 50 | ND | U | 5 | 6 | | 5 |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 20 | 5 | | 5 | 66 | | 5 | ND | U | 5 | 30 | | 5 | 470 | | 100 | 86 | | 50 | ND | U | 5 | ND | U | 5 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 20 | 250 | | 24 | 170 | | 24 | ND | U | 5 | 45 | | 5 | 4300 | | 500 | ND | U | 50 | ND | U | 5 | 9 | | 5 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 20 | 84 | | 5 | 60 | | 5 | ND | U | 5 | 13 | | 5 | ND | U | 100 | ND | U | 50 | ND | U | 5 | ND | U | 5 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 20 | ND | U | 5 | 140 | | 24 | ND | U | 5 | 14 | | 5 | ND | U | 100 | ND | U | 50 | ND | U | 5 | ND | U | 40 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

**Notes:**
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
mg/l - Milligrams 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

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

**TABLE 6**
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS:**
**FILL-ALLUVIUM/TRENTON GRAVEL WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-134 | | | N-136 | | | PZ-300 | | | PZ-503 | | | PZ-504 | | | PZ-505 | | | PZ-506 | | | PZ-507 | | | RW-200 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-134 | | | N-136 | | | PZ-300 | | | PZ-503 | | | PZ-504 | | | PZ-505 | | | PZ-506 | | | PZ-507 | | | RW-200 | | |
| | | | Sample Date | 7/16/2008 | | | 7/25/2008 | | | 7/29/2008 | | | 7/25/2008 | | | 7/25/2008 | | | 7/23/2008 | | | 7/23/2008 | | | 7/23/2008 | | | 7/23/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | ND | U | 5 | 9 | | 1 | ND | U | 1 | ND | U | 2 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 5 | ND | U | 1 | ND | U | 1 | ND | U | 2 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 1 | ND | U | 5 | 1 | | 1 | ND | U | 1 | ND | U | 2 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | ND | U | 1 | ND | U | 5 | 9 | | 1 | 3 | | 1 | 6 | | 2 | 2 | | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | ND | U | 1 | ND | U | 5 | ND | U | 1 | ND | U | 1 | ND | U | 2 | ND | U | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 1 | 110 | | 5 | 110 | | 1 | 13 | | 1 | 2400 | | 20 | 160 | | 1 | ND | U | 10 | ND | U | 1 | ND | U | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | ND | U | 2 | ND | U | 10 | 6 | | 2 | 6 | 6 | 2 | ND | U | 4 | 3 | 3 | 2 | ND | U | 20 | ND | U | 2 | ND | U | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | ND | U | 50 | ND | U | 24 | 6 | | 5 | 62 | | 50 | ND | U | 5 | 61 | | 10 | 11 | | 5 | 120 | | 50 | 300 | | 50 |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 50 | ND | U | 24 | ND | U | 5 | 51 | | 50 | ND | U | 5 | 41 | | 10 | 8 | | 5 | 120 | | 50 | 97 | | 50 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 50 | ND | U | 24 | ND | U | 5 | ND | U | 50 | ND | U | 5 | ND | U | 10 | ND | U | 5 | ND | U | 50 | 100 | 100 | 50 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 50 | ND | U | 24 | ND | U | 5 | ND | U | 50 | ND | U | 5 | 11 | 11 | 10 | ND | U | 5 | ND | U | 50 | 72 | 72 | 50 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 50 | ND | U | 24 | ND | U | 5 | ND | U | 50 | ND | U | 5 | ND | U | 10 | ND | U | 5 | ND | U | 50 | ND | U | 50 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

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

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

**TABLE 6**
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS:**
**FILL-ALLUVIUM/TRENTON GRAVEL WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | RW-202 | | | RW-301 | | | RW-302 | | | RW-303 | | | RW-304 | | | RW-305 | | | RW-307 | | | RW-308 | | | RW-500 | | | RW-501 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | RW-202 | | | RW-301 | | | RW-302 | | | RW-303 | | | RW-304 | | | RW-305 | | | RW-307 | | | RW-308 | | | RW-500 | | | RW-501 | | |
| | | | Sample Date | 7/29/2008 | | | 7/22/2008 | | | 7/23/2008 | | | 7/25/2008 | | | 7/22/2008 | | | 7/22/2008 | | | 7/23/2008 | | | 7/25/2008 | | | 7/25/2008 | | | 7/23/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | 1 | | 1 | ND | U | 1 | 1 | | 1 | ND | U | 1 | ND | U | 1 | 3 | 3 | 1 | 1 | 1 | 1 | ND | U | 5 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.016 | ND | U | 0.03 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | 1 | | 1 | 16 | | 1 | 2 | | 1 | 13 | | 1 | 9 | | 1 | 4 | | 1 | 30 | | 1 | ND | U | 1 | ND | U | 5 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | 1 | | 1 | 21 | | 1 | 4 | | 1 | 21 | | 1 | 15 | | 1 | 10 | | 1 | 34 | | 1 | ND | U | 1 | ND | U | 5 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | 2 | | 1 | ND | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 5 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | ND | U | 1 | 10 | | 1 | 3 | | 1 | 14 | | 1 | 9 | | 1 | 3 | | 1 | 52 | | 1 | 46 | | 1 | 300 | | 5 | 3 | | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | 17 | | 2 | 18 | | 2 | 17 | | 2 | 16 | | 2 | 13 | | 2 | 18 | 18 | 2 | 30 | | 2 | 5 | 5 | 2 | ND | U | 10 | ND | U | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | 36 | | 5 | ND | U | 5 | 5 | | 5 | ND | U | 5 | ND | U | 5 | 6 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Chrysene | 218-01-9 | 1.9 | ug/l | 17 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | 6 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | 33 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | 15 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Fluorene | 86-73-7 | 1900 | ug/l | 19 | | 5 | ND | U | 5 | 8 | | 5 | ND | U | 5 | ND | U | 5 | 10 | | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

**Notes:**
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ug/l - Micrograms per liter
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MSC - PADEP's Medium Specific Concentration for Impact to Groundwater
RL - Reporting limit (limit of quantitation)
ND - Not detected

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

**TABLE 7**
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS:**
**LOWER SAND WELLS**
**SUNOCO PHILADELPHIA REFINERY**
**PHILADELPHIA, PENNSYLVANIA**

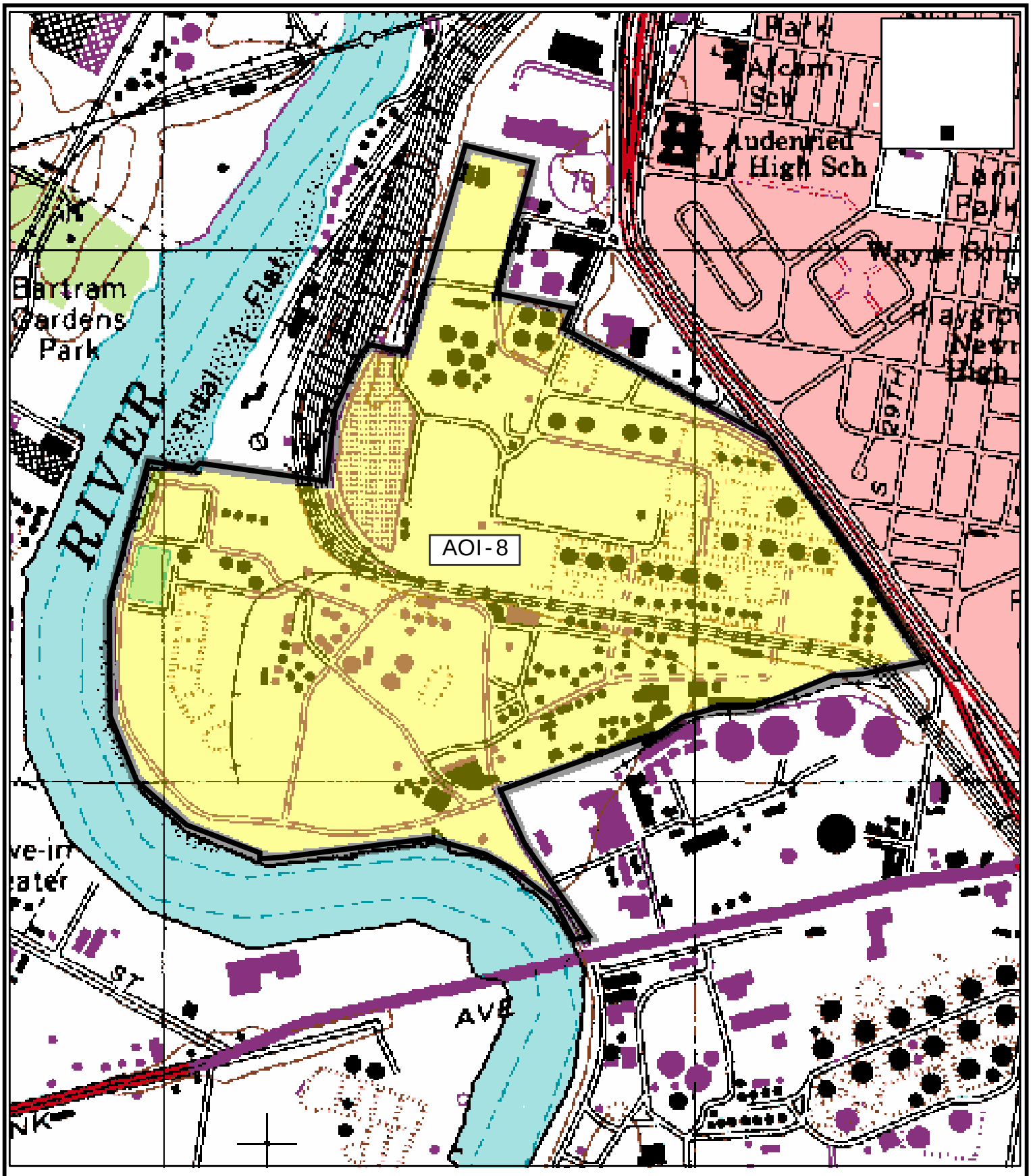
| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 | Location ID | N-4 | | | N-9 | | | N-13 | | | N-19 | | | N-21 | | | N-27 | | | N-30 | | | N-38D | | | N-44D | | | N-50D | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample ID | N-4 | | | N-9 | | | N-13 | | | N-19 | | | N-21 | | | N-27 | | | N-30 | | | N-38D | | | N-44D | | | N-50D | | |
| | | | Sample Date | 7/15/2008 | | | 7/16/2008 | | | 7/23/2008 | | | 7/16/2008 | | | 7/23/2008 | | | 7/17/2008 | | | 7/22/2008 | | | 7/24/2008 | | | 7/25/2008 | | | 7/23/2008 | | |
| **Volatile Organic Compounds** | | | Unit | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** | **Result** | **Q** | **RL** |
| Ethylbenzene | 100-41-4 | 700 | ug/l | ND | U | 1 | 2 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 | ug/l | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.03 | ND | U | 0.03 | ND | U | 0.029 | ND | U | 0.029 | ND | U | 0.029 |
| 1,2-Dichloroethane | 107-06-2 | 5 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Toluene | 108-88-3 | 1000 | ug/l | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Xylene (Total) | 1330-20-7 | 10000 | ug/l | 2 | | 1 | 6 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | 4 | | 1 | ND | U | 1 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 | ug/l | 2 | | 1 | ND | U | 1 | 2 | | 1 | ND | U | 1 | ND | U | 1 | 4 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 |
| Benzene | 71-43-2 | 5 | ug/l | 5 | | 1 | 8 | | 1 | ND | U | 1 | ND | U | 1 | 16 | | 1 | ND | U | 1 | ND | U | 1 | ND | U | 1 | 6 | | 1 | ND | U | 1 |
| Cumene | 98-82-8 | 2300 | ug/l | 3 | | 2 | ND | U | 2 | ND | U | 2 | ND | U | 2 | 190 | | 2 | ND | U | 2 | ND | U | 2 | ND | U | 2 | 5 | | 2 | ND | U | 2 |
| **Semi Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pyrene | 129-00-0 | 130 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Chrysene | 218-01-9 | 1.9 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Phenanthrene | 85-01-8 | 1100 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Fluorene | 86-73-7 | 1900 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| Naphthalene | 91-20-3 | 100 | ug/l | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 | ND | U | 5 |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Total) | 7439-92-1 | 5 | mg/l | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 | ND | U | 0.001 |

**Notes:**
PADEP - Pennsylvania Department of Environmental Protection
ug/l - Micrograms per liter
mg/l - Milligrams 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

**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

# 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 8
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery

Philadelphia Pennsylvania

| Job Number | Scale: 1" = 800' | Date |
|---|---|---|
| 2574601 | 0 400 800 Feet | August 29, 2008 |

Q:\Data6\2574601\ArcGIS\MapDocuments\AOI 8 SCR\Final Figures\Figure 1 - AOI 8 Site Location Map 8-29-08.mxd




## Legend

- Steel Bulkhead
- Wooden Bulkhead
- AOI 8 Boundary

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.

Figure 2: Site Plan
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: August 22, 2008
DRN. BY: MIH
CKD. BY: JSC
JOB #: 2574601

Q:\Data\2574601\ArcGIS\MapDocuments\AOI 8 SCR\Final Figures\Figure 2 - AOI 8 Site Plan 8-29-08.mxd

AOI-8

SWMU 2

Schuylkill River

## Legend

- Shallow Soil Boring and Sample Locations (0-2 feet)
- SWMU Soil Boring and Sample Locations (6-8 feet)
- N-101 A — New Shallow/Intermediate Groundwater Monitoring Well with Shallow Soil Sample
- N-107 A — New Shallow/Intermediate Groundwater Monitoring Well with Shallow Soil and LNAPL Samples
- N-100 A — New Shallow/Intermediate Groundwater Monitoring Well with Deep Soil Borings and Shallow Soil Samples
- N-1 A — Existing Monitoring Well
- N-44 A — Existing Monitoring Well with LNAPL Sample
- RW-200 D — Existing Recovery Well
- RW-201 D — Existing Recovery Well with LNAPL Sample
- MW-5 A — PGW Monitoring Well
- RW-1 E — PGW Recovery Well
- Steel Bulkhead
- Wooden Bulkhead
- Lead Weathering Pad Solid Waste Management Unit (SWMU 2)
- AOI Boundary

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.
3. Boundary of SWMUs referenced from the RCRA Facility Investigation Chevron Refinery Vol 1, Dames and Moore, 11-24-93.

Figure 3: Completed Activities
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: May 1, 2008
DRN. BY: MPH
CKD. BY:
JOB#: 2574601

Q:\Data\62574601\ArcGIS\MapDocuments\AOI 8 SCR\Final Figures\Figure 3 - AOI 8 SCR Completed Activities - 8-29-08.mxd




## Legend

- All Existing Monitoring Points
- PGW Monitoring Well Location
- PGW Recovery Well Location
- AOI 8 Cross Section Location
- AOI 8 Cross Section Location
- AOI 8 Cross Section Location
- Steel Bulkhead
- Wooden Bulkhead
- AOI 8 Boundary

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.

Figure 4: Cross Section Location Plan
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

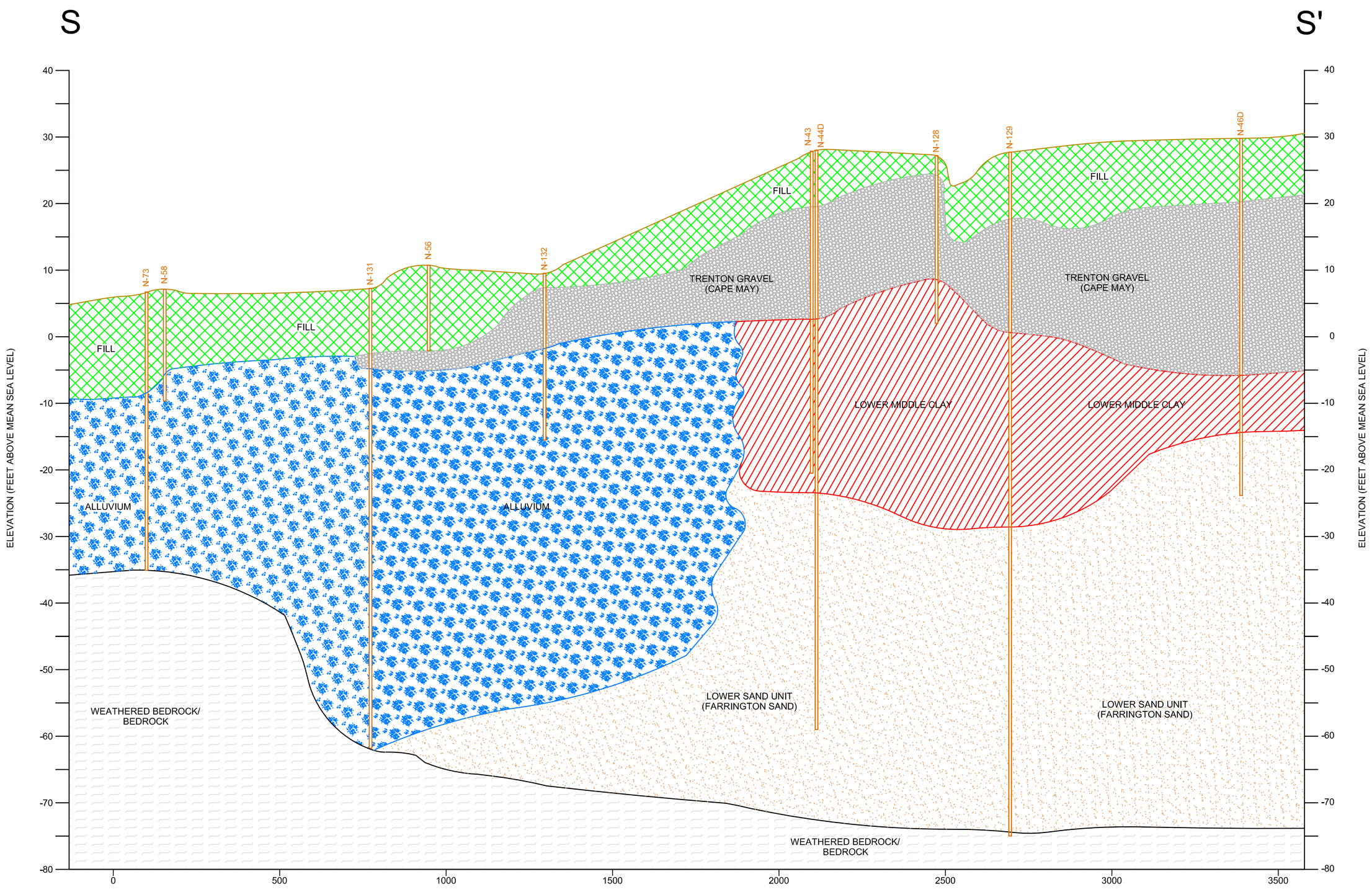
0 250 500 Feet

SCALE: 1" = 250'
DATE: August 22, 2008
DRN. BY: MRH
CKD. BY: JSC
JOB#: 2574601

Q:\Data\62574601\ArcGIS\Map\Documents\AOI 8 SCR\Final Figures\Figure 4 - AOI 8 Cross Section Plan 8-29-08.mxd

**LEGEND:**

- FILL
- ALLUVIUM
- CLAY
- SAND
- WEATHERED BEDROCK / BEDROCK
- GRAVEL
- B-129 LOCATION ID
- WELL BORE HOLE




**NOTES:**

1. LITHOLOGY BASED ON INTERPOLATION FROM AVAILABLE NEW AND HISTORIC WELL/BORING LOGS.
2. WELL CONSTRUCTION INFORMATION IS NOT AVAILABLE FOR ALL WELLS. ONLY THE WELL BOREHOLE IS ILLUSTRATED ON THIS SECTION.

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 S-S'
AOI 8 SITE CHARACTERIZATION REPORT

| | |
|---|---|
| Project No. 2574601 | Drawing No. 5a |
| Date 14 AUGUST 2007 | |
| Scale 1"=200' HOR. 1"=10' VER. | |
| Drn. By DMM/TS | |
| Last Revised X | 1 Of 1 |

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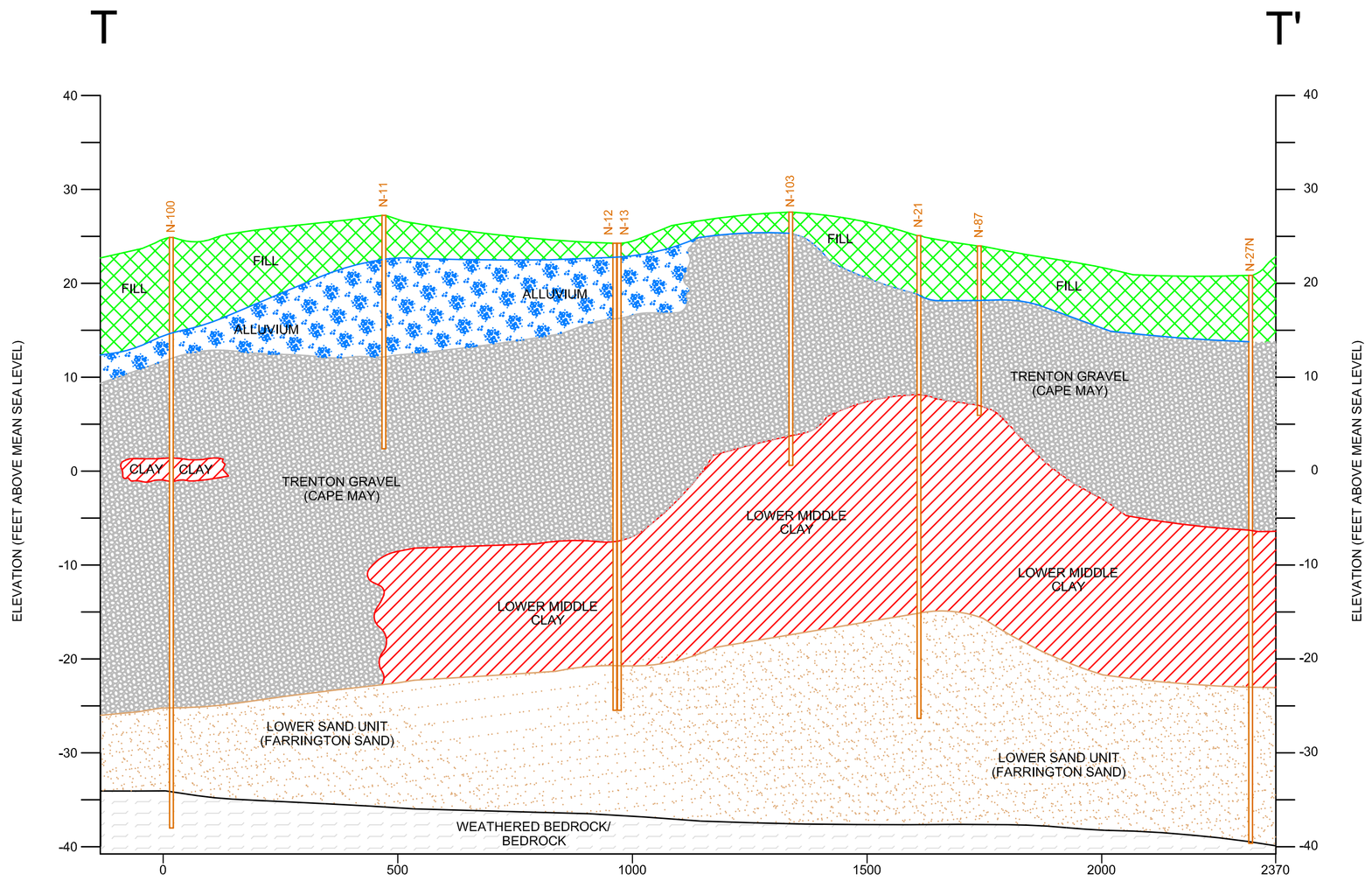
Filename: G:\Other\Tfoster\2574601 SECTION S.dwg Date: 9/26/2008 Time: 10:08 User: tfoster Style Table: Langan.stb Layout: D Size Sheet (Bottom)

**LEGEND:**

- FILL
- SAND
- ALLUVIUM
- WEATHERED BEDROCK / BEDROCK
- CLAY
- GRAVEL
- B-129 LOCATION ID
- WELL BORE HOLE

**NOTES:**

1. LITHOLOGY BASED ON INTERPOLATION FROM AVAILABLE NEW AND HISTORIC WELL/BORING LOGS.
2. WELL CONSTRUCTION INFORMATION IS NOT AVAILABLE FOR ALL WELLS. ONLY THE WELL BOREHOLE IS ILLUSTRATED ON THIS SECTION.




10 0 2 4 10
VERTICAL SCALE IN FEET

200 0 100 200
HORIZONTAL SCALE IN FEET

| | |
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| Drawing Title | GEOLOGIC CROSS SECTION T-T'<br>AOI 8 SITE CHARACTERIZATION REPORT |
| Project No. | 2574601 |
| Date | 14 AUGUST 2007 |
| Scale | 1"=200' HOR.<br>1"=10' VER. |
| Drn. By | DMM/TS |
| Last Revised | X |
| Drawing No. | 5b |
| | 1 Of 1 |

Filename: G:\Other\Tfoster\2574601 SECTION T.dwg Date: 9/2/2008 Time: 14:09 User: acofrancesco Style Table: Langan.stb Layout: D Size Sheet (Bottom)

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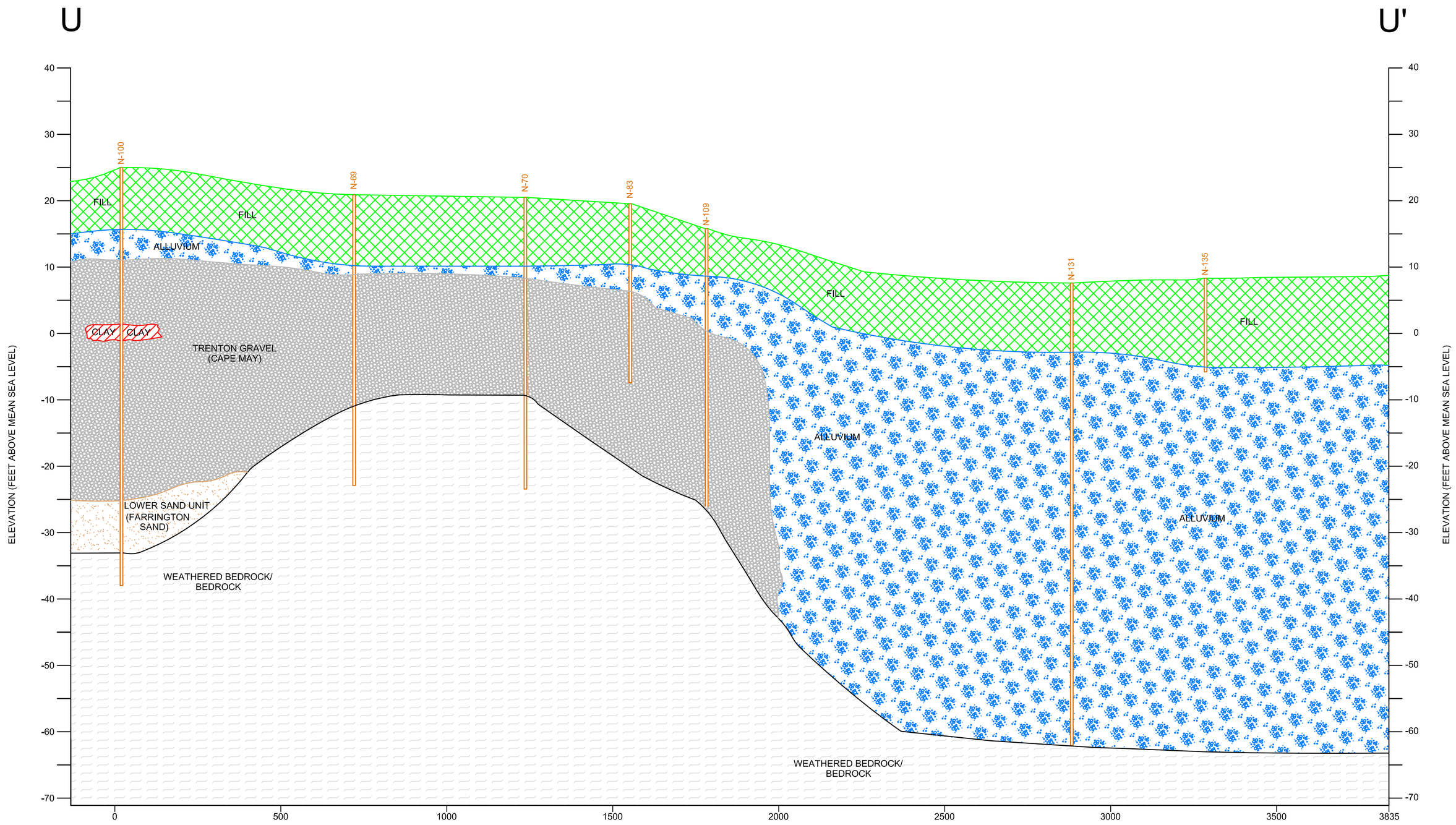
**LEGEND:**

- FILL
- ALLUVIUM
- CLAY
- SAND
- WEATHERED BEDROCK / BEDROCK
- GRAVEL
- B-129 LOCATION ID
- WELL BORE HOLE
- ——?—— ——?—— INFERRED CONTACTS

**NOTES:**

LITHOLOGY BASED ON INTERPOLATION FROM AVAILABLE NEW OR HISTORIC WELL/BORING LOGS.

1. WELL CONSTRUCTION INFORMATION IS NOT AVAILABLE FOR ALL WELLS. ONLY THE WELL BOREHOLE IS ILLUSTRATED ON THIS SECTION.




10 0 2 4 10
VERTICAL SCALE IN FEET

200 0 100 200
HORIZONTAL SCALE IN FEET

| | |
|---|---|
| Project | SUNOCO PHILADELPHIA REFINERY |
| | PHILADELPHIA COUNTY PENNSYLVANIA |
| Drawing Title | GEOLOGIC CROSS SECTION U-U' AOI 8 SITE CHARACTERIZATION REPORT |
| Project No. | 2574601 |
| Date | 14 AUGUST 2007 |
| Scale | 1"=200' HOR. 1"=10' VER. |
| Drn. By | DMM/TS |
| Last Revised | X |
| Drawing No. | 5C |
| | 1 Of 1 |

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## Legend

- Fill / Alluvium Wells and Groundwater Elevations (ft amsl)
- Trenton Gravel Wells and Groundwater Elevations (ft amsl)
- Trenton Gravel Recovery Wells and Groundwater Elevations (ft amsl)
- Other Monitoring Well
- Piezometer
- Abandoned Well
- Steel Bulkhead
- Wooden Bulkhead
- Groundwater Elevation Contour (ft amsl)
- Inferred Groundwater Elevation Contour (ft amsl)
- Groundwater Elevation Contour Depression (ft amsl)
- Groundwater elevation data not used to contour
- AOIs

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.
3. Groundwater elevations based on groundwater gauging data provided by Secor, June 2008.
4. Only those wells accessible during the gauging were used for contouring.
5. ft amsl = feet above mean sea level.

Figure 6: Fill / Alluvium Groundwater Elevations
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: May 1, 2008
DRN. BY: MRH
CKD. BY:
JOB#: 2574601

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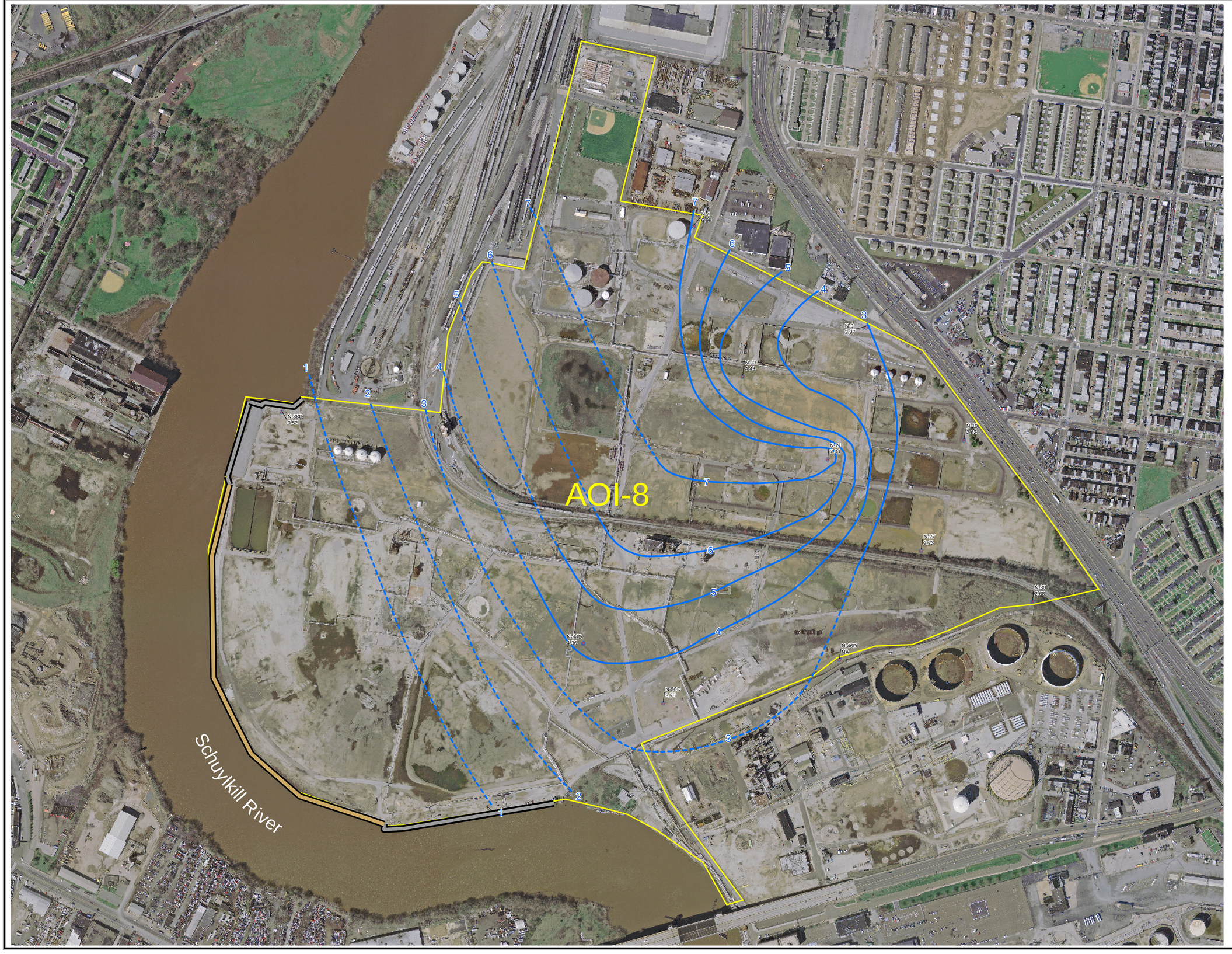


## Legend

- N-19 2.62 — Deep Monitoring Well and Groundwater Elevation (ft amsl)
- 2 — Groundwater Elevation Contour (ft amsl)
- 2 — Inferred Groundwater Elevation Contour (ft amsl)
- Steel Bulkhead
- Wooden Bulkhead
- AOIs

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.
3. Groundwater elevations based on groundwater gauging data provided by Secor, June 2008.
4. Only those wells accessible during the gauging were used for contouring.
5. ft amsl = feet above mean sea level.

Figure 7: Lower Sand Groundwater Elevations
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: May 1, 2008
DRN. BY: MIH
CKD. BY:
JOB#: 2574601

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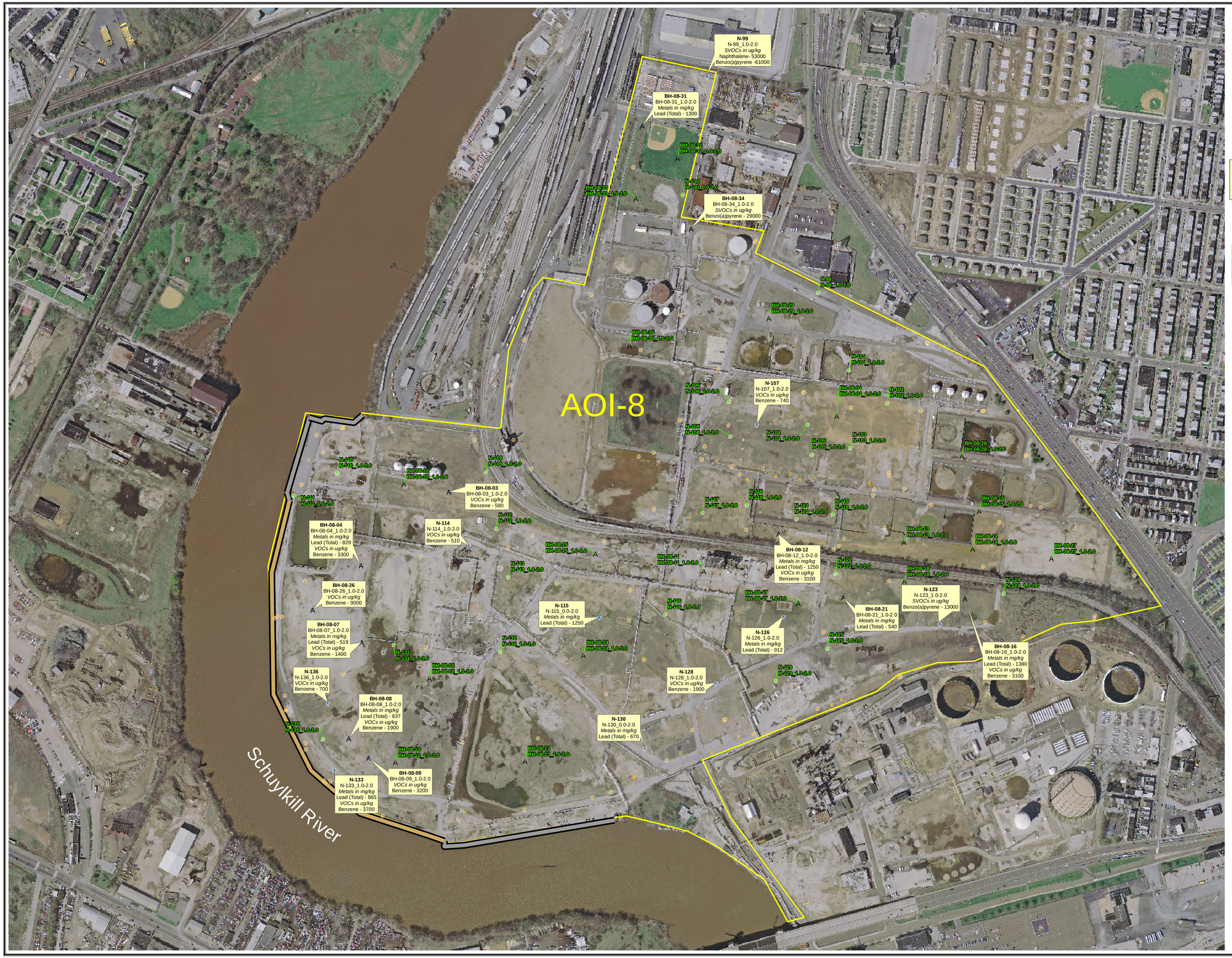


## Legend

- Shallow Soil Boring Location with No Exceedance of PADEP MSCs
- Shallow Soil Boring Location with Exccedance of PADEP MSCs
- New Fill/Alluvium Monitoring Well with Soil Sample Not Exceeding PADEP MSCs
- New Fill/Alluvium Monitoring Well with Soil Sample Exceeding PADEP MSCs
- Existing Monitoring Point
- Existing Recovery Well
- Steel Bulkhead
- Wooden Bulkhead
- AOI Boundary

### Compounds of Concern for Site Soil and Associated MSCs

| | CAS No. | PADEP Non-Residential Soil MSCs 0-2' Dry (ug/kg) |
|---|---|---|
| Volatile Organic Compounds | | |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 2000 |
| Benzene | 71-43-2 | 500 |
| 1,2-Dichloroethane | 107-06-2 | 500 |
| Toluene | 108-88-3 | 100000 |
| Ethylene dibromide (EDB) | 106-93-4 | 5 |
| Ethylbenzene | 100-41-4 | 70000 |
| Cumene | 98-82-8 | 1600000 |
| Xylene (Total) | 1330-20-7 | 1000000 |
| Semi Volatile Organic Compounds | | |
| Pyrene | 129-00-0 | 2200000 |
| Naphthalene | 91-20-3 | 25000 |
| Fluorene | 86-73-7 | 3800000 |
| Phenanthrene | 85-01-8 | 10000000 |
| Anthracene | 120-12-7 | 350000 |
| Benzo(a)anthracene | 56-55-3 | 110000 |
| Chrysene | 218-01-9 | 230000 |
| Benzo(b)fluoranthene | 205-99-2 | 110000 |
| Benzo(a)pyrene | 50-32-8 | 11000 |
| Benzo(g,h,i)perylene | 191-24-2 | 180000 |
| Metals | | |
| Lead (Total) | 7439-92-1 | 450 (mg/kg) |

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.

Figure 8: Summary of Soil Sample Exceedances
Non SWMU Areas
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: August 22, 2008
DRN. BY: MH
CKD. BY: JSC
JOB#: 2574601

Q:\Data\25746\01\ArcGIS\MapDocuments\AOI 8 SCRF\Final Figures\Figure 8 - AOI 8 Summary of Non SMWUs Soil Sample Exceedances.mxd




## Legend

BH-08-05
BH-08-05_6.0-8.0
Metals in mg/kg
Lead (Total) - 63.4

Shallow SWMU Soil Boring Locations with Leaded Tank Bottom Materials in Sample

BH-08-18

Shallow SWMU Soil Boring Locations with Leaded Tank Bottom Materials Not in Sample

A — Existing Monitoring Point

D — Existing Recovery Well

Steel Bulkhead

Wooden Bulkhead

Lead Weathering Pad Solid Waste Management Unit (SWMU 2)

AOI Boundary

Compound of Concern for SWMU Areas with PADEP MSCs

| | CAS No | PADEP Non-Residential Soil MSCs |
|---|---|---|
| | | 0-2' Dry |
| Metals | | |
| Lead (Total) | 7439-92-1 | 450 |

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.

Figure 9: Summary of Soil Sample Exceedances
SWMU Areas
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: August 22, 2008
DRN. BY: MPH
CKD. BY: JSC
JOB #: 2574601

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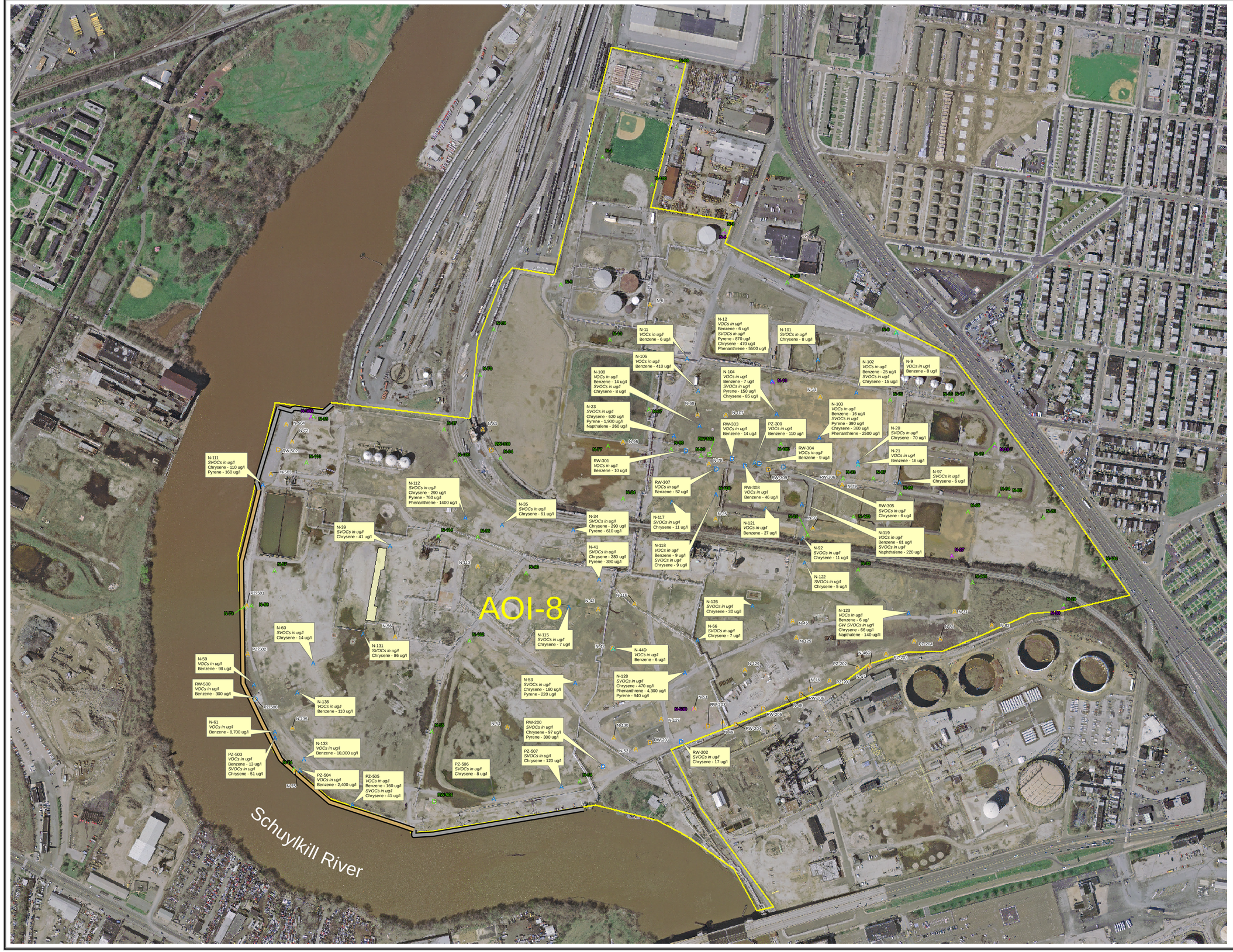


## Legend

- N-43A — Fill/Alluvium Monitoring Well with No Exceedance of PADEP MSCs
- N-20 SVOCs in ug/l Chrysene - 70 ug/l A — Fill/Alluvium Monitoring Well with Exceedance of PADEP MSCs
- N-27A — Lower Sand Monitoring Well with No Exceedance of PADEP MSCs
- N-9 VOCs in ug/l Benzene - 8 ug/l A — Lower Sand Monitoring Well with Exceedance of PADEP MSCs
- N-43A — Monitoring Well (Unclassified) with No Exceedance of PADEP MSCs
- N-52A — Existing Monitoring Point Not Sampled
- Steel Bulkhead
- Wooden Bulkhead
- Leaded Tank Bottom Solid Waste Management Unit (SWMU)
- AOI Boundary

### Compounds of Concern for Site Groundwater and Associated MSCs

| | CAS No | PADEP Non-Residential Used Aquifer MSC for Groundwater TDS<2,500 (ug/l) |
|---|---|---|
| **Volatile Organic Compounds** | | |
| Ethylbenzene | 100-41-4 | 700 |
| Ethylene dibromide (EDB) | 106-93-4 | 0.05 |
| 1,2-Dichloroethane | 107-06-2 | 5 |
| Toluene | 108-88-3 | 1000 |
| Xylene (Total) | 1330-20-7 | 10000 |
| Methyl Tertiary Butyl Ether | 1634-04-4 | 20 |
| Benzene | 71-43-2 | 5 |
| Cumene | 98-82-8 | 2300 |
| **Semi-Volatile Organic Compounds** | | |
| Pyrene | 129-00-0 | 130 |
| Chrysene | 218-01-9 | 1.9 |
| Phenanthrene | 85-01-8 | 1100 |
| Fluorene | 86-73-7 | 1900 |
| Naphthalene | 91-20-3 | 100 |
| **Metals** | | |
| Lead (Total) | 7439-92-1 | 5 (mg/l) |

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.

Figure 10: Summary of Groundwater Sample Exceedances
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: August 29, 2008
DRN. BY: MH
CKD. BY: JSC
JOB#: 2574601

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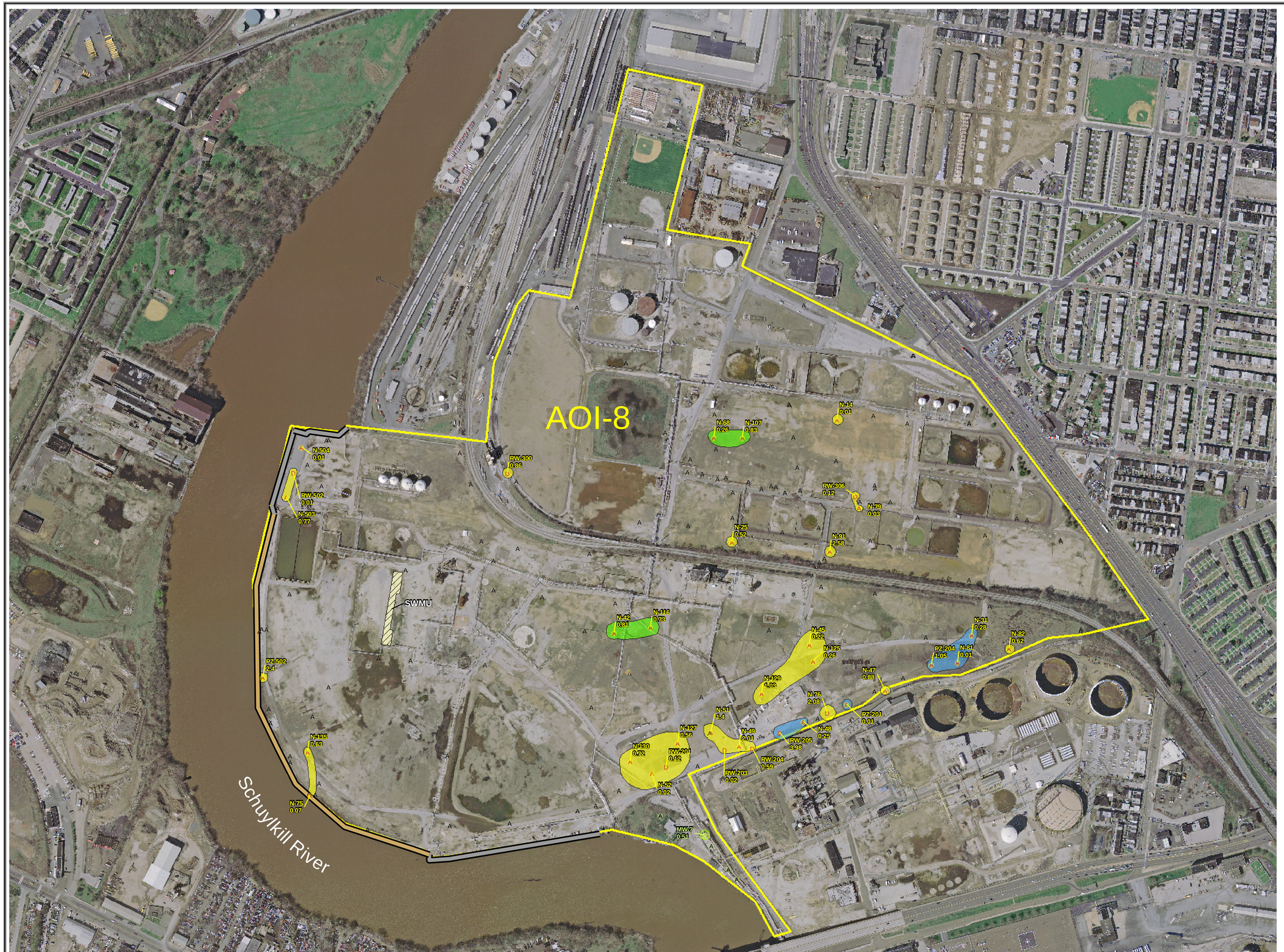


## Legend

- Fill / Alluvium Monitoring Well with Apparent LNAPL Thickness (ft.)
- Fill / Alluvium Recovery Well with Apparent LNAPL Thickness (ft)
- Monitoring Wells with No LNAPL
- Monitoring Well (Unclassified)
- Monitoring Wells with No Gauging
- PGW Wells with Apparent LNAPL Thickness (ft.)
- PGW Monitoring Wells with No LNAPL
- Steel Bulkhead
- Wooden Bulkhead
- Lead Weathering Pad Solid Waste Management Unit (SWMU 2)
- AOIs

Light Non-Aqeous Phase Liquid (LNAPL) Types

- Middle Distillate
- Lube Oil
- Residual Oil
- Unknown

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.
3. Boundary of SWMUs referenced from the RCRA Facility Investigation Chevron Refinery Vol 1, Dames and Moore, 11-24-93.
4. Only accessible PGW wells were gauged for the presence of LNAPL

Figure 11: Apparent LNAPL Thickness
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: August 22, 2008
DRN. BY: MRH
CKD. BY: JEC
JOB#: 2574601

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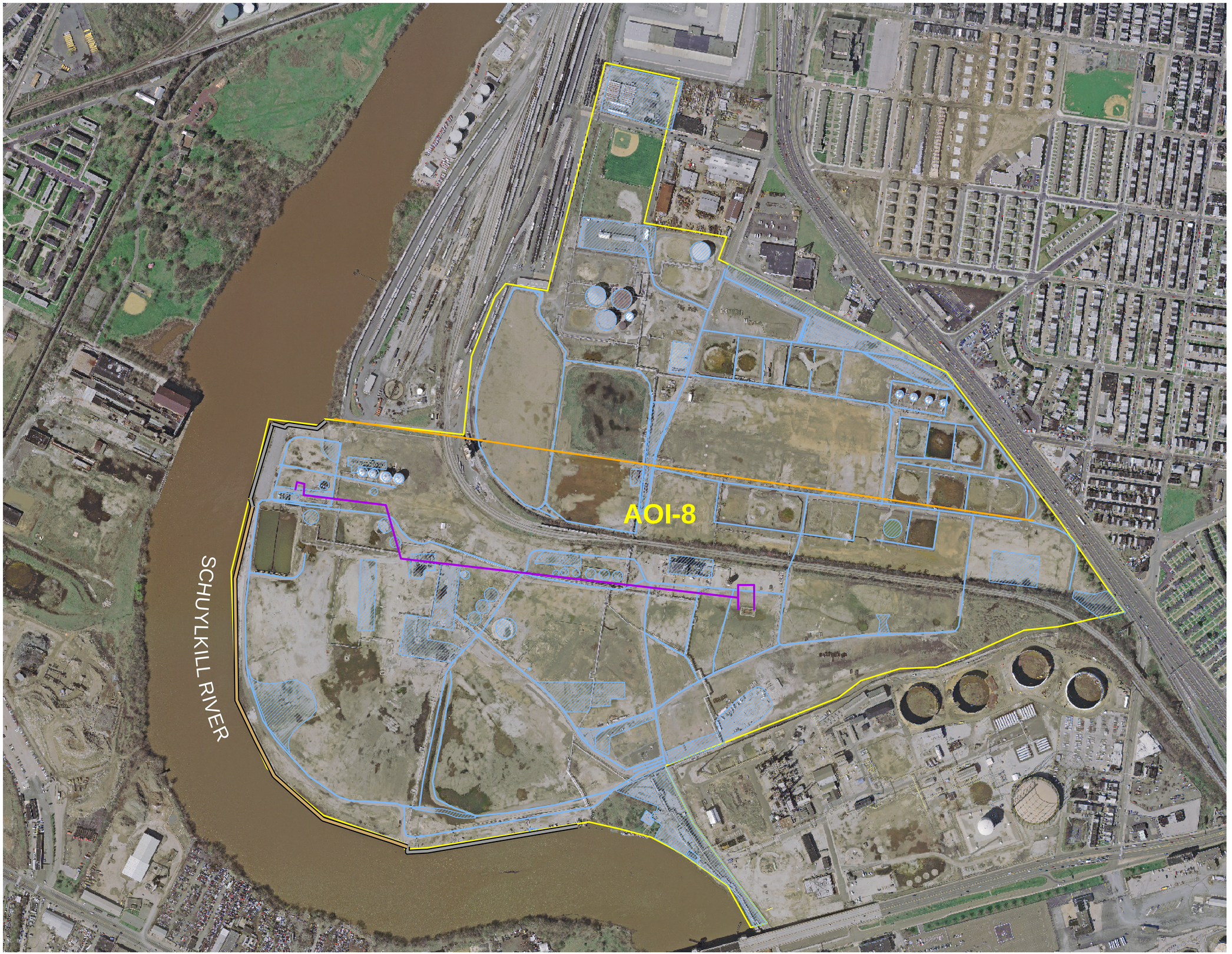



## Legend

- Approximate extent of impervious surfaces
- Approximate extent of impervious surfaces
- Rambo Creek Sewer
- Jackson Street Sewer
- Steel Bulkhead
- Wooden Bulkhead
- AOI Boundary

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.

Figure 12: Impervious Surfaces and Sewers
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: August 26, 2008
DRN. BY: MRH
CKD. BY: JSC
JOB#: 2574601

Q:\Data\62574601\ArcGIS\MapDocuments\AOI 8 SCR\Final Figures\Figure 12 - AOI 8 SCR Impervious Surface - 8-26-08.mxd

# APPENDIX A

## Current and Historical Use Figures




## Legend

- Steel Bulkhead
- Wooden Bulkhead
- Current Uses
- AOI Boundary

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.

Figure A-1: Current Use
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: August 26, 2008
DRN. BY: MRH
CKD. BY: JSC
JOB#: 2574601

Q:\Data\62574601\ArcGIS\MapDocuments\AOI 8 SCRFinal Figures\Figure A-1 - AOI 8 SCR Current Use - rev8-29-08.mxd




## Legend

- Steel Bulkhead
- Wooden Bulkhead
- Historic Uses
- AOI Boundary

Notes:
1. 2005 aerial photography provided by the Delaware Valley Regional Planning Commission (DVRPC).
2. Bulkhead referenced from Remedial Action Plan for the North Yard Bulkhead, ENSR Consulting and Engineering, October 1993.

Figure A-2: Historic Use
AOI 8 Site Characterization Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

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

0 250 500 Feet

SCALE: 1" = 250'
DATE: August 26, 2008
DRN. BY: MPH
CKD. BY: JSC
JOB #: 257460.1

Q:\Data\257460\1\ArcGIS\MapDocuments\AOI 8 SCR\Final Figures\Figure A-2 - AOI 8 SCR Historic Use - rev8-29-08.mxd

# APPENDIX B

## Soil Boring Logs and Monitoring Well

## Construction Summaries

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-01**



PROJECT: **Sunoco Philadelphia Refinery**
SITE LOCATION: **AOI-8**
JOB NO.: -
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **6/17/08**

DRILLING CO.: **Parrat Wolff Inc.**
DRILLING METHOD **Direct Push**
SAMPLING METHOD **Split Spoon**
TOTAL DEPTH: **2'**

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - dry gravel and fine sand | | |
| | | 0.0 | Same | | |
| | | 0.1 | Dry brown sandy silt and gravel | | |
| | Sample taken from 1-2' for laboratory analysis | 0.2 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-02**



PROJECT: **Sunoco Philadelphia Refinery**
SITE LOCATION: **AOI-8**
JOB NO.: -
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **5/7/08**

DRILLING CO.: **Parrat Wolff Inc.**
DRILLING METHOD **Direct Push**
SAMPLING METHOD **Split Spoon**
TOTAL DEPTH: **2'**

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, tan silt | | |
| | | 0.0 | Same | | |
| | | 0.0 | Fill, stiff brown/gray sandy silt, gravel | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-03**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 5.6 | Fill - stiff med. brown andy silt, gravel, brick | | |
| | | 83 | Fill - black/brown silty sand and gravel, dry | | |
| | | 265 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 142 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-04**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/8/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - brown sandy silt and gravel, dry | | |
| | | 7.9 | Same, stiff | | |
| | | 122 | Fill - black sandy silt and gravel | | |
| | Sample taken from 1-2' for laboratory analysis | 179 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-05**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **8'** |
| DATES DRILLED: | **5/8/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, some tan sandy silt, dry | | |
| | | 0.0 | Same | | |
| | | 1,7 | Fill - black/brown sandy silt, brick | | |
| | | 5.5 | Same | | |
| | | 13.8 | Same | | |
| | | 25.4 | Same | | |
| | | 16.7 | Same | | |
| | | 7.9 | Same | | |
| | | 12.3 | Fill - gravel | | |
| | | 14.7 | Fill - black sand and gravel | | |
| -5 | | 16.9 | Same | | |
| | | 8.4 | Same | | Water at 4.5-5' |
| | | 4.4 | Fill - brown/black gravel, wet, some metallic objects | | |
| | | 7.8 | Same | | |
| | Sample taken 6-8' for laboratory analysis | 59.3 | Same | | |
| | | 26.7 | Same, increased sand content | | Boring complete @ 8' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-06**



PROJECT: **Sunoco Philadelphia Refinery**
SITE LOCATION: **AOI-8**
JOB NO.: -
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **5/8/2008**

DRILLING CO.: **Parrat Wolff Inc.**
DRILLING METHOD **Direct Push**
SAMPLING METHOD **Split Spoon**
TOTAL DEPTH: **8'**

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - tan brown sandy silt, gravel, dry | | |
| | | 0.0 | Same | | |
| | | 0.0 | Same | | |
| | | 0.0 | Gravel | | |
| | | 48.8 | Black/brown sandy silt and gravel | | |
| | | 14.4 | Same | | |
| | | 20.7 | Same | | |
| | | | Same | | |
| | No sample taken (no tank bottom material observed) | 43.7 | Same | | |
| | | 56.8 | Same | | |
| -5 | | 103 | Fill - brick, black sandy silt | | |
| | | 76.5 | Same | | Water at 5.5-6' |
| | | 56.4 | Same | | |
| | | 65.5 | Fill - black sandy clay, brick | | |
| | | 43.4 | Same | | |
| | | 36.5 | Same | | Boring complete @ 8' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-07**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/8/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill, gravel, tan sandy silt, dry | | |
| | | 35.6 | Fill, stiff, brown sandy silt and gravel | | |
| | | 163 | Fill, black sandy silt and gravel | | |
| | Sample taken from 1-2' for laboratory analysis | 287 | Fill, black sandy clay and gravel | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-08**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, tan sandy silt, dry | | |
| | | 0.0 | Same | | |
| | | 0.0 | Fill - black/brown sandy silt & gravel | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Same, brick | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-09**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, tan sandy silt, dry | | |
| | | 2.8 | Fill - black/brown sandy silt & gravel | | |
| | | 7.9 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 8.0 | Same, wood | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-10**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill, dark brown silt, gravel, dry | | |
| | | 0.0 | Same, brick | | |
| | | 0.0 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-11**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, cement | | |
| | | 0.0 | Same | | |
| | | 6.4 | Fill - black/brown sandy silt, fill, gravel | | |
| | Sample taken from 1-2' for laboratory analysis | 19.1 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-12**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/6/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - brown sandy silt, gravel | | |
| | | 13.3 | Same | | |
| | | 55.8 | Fill - compact brown/black silty clay, gravel | | |
| | Sample taken from 1-2' for laboratory analysis | 95.6 | Fill - black silty clay, gravel | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-13**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/6/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, light brown silt, dry | | |
| | | 0.0 | Same | | |
| | | 17.2 | Fill - brown/black silty clay, gravel | | |
| | Sample taken from 1-2' for laboratory analysis | 20.7 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-14**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/6/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - very stiff orange brown sandy clay, rock frags, dry | | |
| | | 10.4 | Black layer, clay | | |
| | | 0.0 | Fill - dark brown/black clay with sand and gravel, cinders | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Fill - brick, dry | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-15**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/6/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, brown sandy silt, dry | | |
| | | 0.0 | Same | | |
| | | 0.0 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Fill - brown silty clay | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-16**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, brown sandy silt, dry | | |
| | | 193 | Same | | |
| | | 215 | Black silty clay, gravel, stiff | | |
| | Sample taken from 1-2' for laboratory analysis | 286 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-17**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - brown sandy silt, dry | | |
| | | 0.0 | Same, gravel | | |
| | | 0.0 | Fill - brown/black sandy silt, gravel | | |
| | Sample taken from 1-2' for laboratory analysis | 0.9 | Same, some clay | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-18**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - brown sandy silt, gravel, dry | | |
| | | 0.0 | Same | | |
| | | 0.0 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-19**

Page 1 of 1

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **8'** |
| DATES DRILLED: | **6/19/2008** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | | Fill, concrete, gravel | | |
| | | 105 | Black sand, wood, brick, moist | | |
| | | 216 | Same | | |
| | | 173 | Black sand and gravel, very moist | | |
| | No sample taken (no tank bottom material observed) | 356 | Same | | |
| -5 | | 211 | Same | | |
| | | 256 | Coarse sand and gravel, black, wet | | Water at 6-6.5' |
| | | 108 | Same | | |
| | | | | | Boring complete @ 8' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-21**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - brown/orange sandy silt, gravel, dry | | |
| | | 3.6 | Same | | |
| | | 10.4 | Same, dark brown/black | | |
| | Sample taken from 1-2' for laboratory analysis | 0.1 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-22**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - tan sitly sand, gravel, dry | | |
| | | 3.5 | Fill - stiff brown/black sandy silt, gravel, brick dry | | |
| | | 40.0 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 115 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-23**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill, tan sandy silt, gravel, dry | | |
| | | 75.6 | Fill - stiff brown/black sandy silt, gravel, dry | | |
| | | 89.8 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 38.6 | Same, dark brown | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-24**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/7/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 3.6 | Fill, brown sandy silt, gravel, dry | | |
| | | 282 | Same | | |
| | | 598 | Fill, black/brown silty sand, gravel, dry | | |
| | Sample taken from 1-2' for laboratory analysis | 968 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-25**



PROJECT: **Sunoco Philadelphia Refinery**
SITE LOCATION: **AOI-8**
JOB NO.: -
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **5/7/08**

DRILLING CO.: **Parrat Wolff Inc.**
DRILLING METHOD **Direct Push**
SAMPLING METHOD **Split Spoon**
TOTAL DEPTH: **2'**

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 72.4 | Fill - brown/black sandy silt, gravel, brick, dry | | |
| | | 103 | Same | | |
| | | 276 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 137 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-26**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/8/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill, tan/brown sandy silt and gravel, dry | | |
| | | 0.0 | Same | | |
| | | 1.2 | Fill, brown/black silty sand and gravel, some clay | | |
| | Sample taken from 1-2' for laboratory analysis | 2.1 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-27**



PROJECT: **Sunoco Philadelphia Refinery**
SITE LOCATION: **AOI-8**
JOB NO.: -
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **5/6/08**

DRILLING CO.: **Parrat Wolff Inc.**
DRILLING METHOD **Direct Push**
SAMPLING METHOD **Split Spoon**
TOTAL DEPTH: **2'**

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, brown silt, dry | | |
| | | 0.0 | Fill - gravel, brown sandy silt, brick, compact | | |
| | | 0.0 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-28**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/6/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, brown sandy silt, dry | | |
| | | 13.3 | Fill, brown/black sandy silt, gravel | | |
| | | 55.8 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 95.6 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-29**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/6/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 15.1 | Fill - gravel, dry | | |
| | | 10.0 | Fill - gravel, black | | |
| | | 43.1 | Fill - brick, sandy clay, brown/black | | |
| | Sample taken from 1-2' for laboratory analysis | 56.3 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-31**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/6/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Grass, fill - dark brown silt, gravel, brick, dry | | |
| | | 0.0 | Fill - silt, gravel, brick, dry | | |
| | | 0.0 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Same | | Boring complete @ 2' |

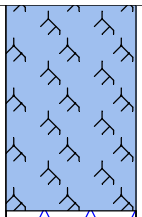
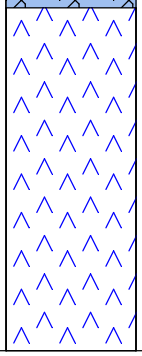
# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-32**



PROJECT: **Sunoco Philadelphia Refinery**
SITE LOCATION: **AOI-8**
JOB NO.: -
LOGGED BY: **Tiffani Doerr**
DATES DRILLED: **7/3/08**

DRILLING CO.: **NA**
DRILLING METHOD **Hand Auger**
SAMPLING METHOD **Hand Auger**
TOTAL DEPTH: **2'**

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Grass and topsoil top 8" |  | |
| | | 0.0 | Dry, medium brown sandy clay with few gravels |  | |
| | | 0.0 | | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-33**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/6/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, brick, sandy silt, dry | | |
| | | 0.0 | Same | | |
| | | 0.0 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-34**



PROJECT: **Sunoco Philadelphia Refinery**
SITE LOCATION: **AOI-8**
JOB NO.: -
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **5/6/08**

DRILLING CO.: **Parrat Wolff Inc.**
DRILLING METHOD **Direct Push**
SAMPLING METHOD **Split Spoon**
TOTAL DEPTH: **2'**

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, brick, sandy silt, dry | | |
| | | 0.0 | Same | | |
| | | 0.0 | Same | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-35**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **2'** |
| DATES DRILLED: | **5/6/08** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | 0.0 | Fill - gravel, light brown silt & sand, dry | | |
| | | 0.0 | Fill - dark brown sandy silt, gravel, brick | | |
| | | 0.0 | Fill - gravel, light brown sandy silt | | |
| | Sample taken from 1-2' for laboratory analysis | 0.0 | Same | | Boring complete @ 2' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-36**



PROJECT: **Sunoco Philadelphia Refinery**
SITE LOCATION: **AOI-8**
JOB NO.: -
LOGGED BY: **Shaun Sykes**
DATES DRILLED: **6/19/2008**

DRILLING CO.: **Parrat Wolff Inc.**
DRILLING METHOD **Direct Push**
SAMPLING METHOD **Split Spoon**
TOTAL DEPTH: **8'**

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | | Fill, gravel, concrete | | |
| | | 177 | Black sandy silt, slightly moist | | |
| | | 242 | Black sandy clay and gravel, very moist to wet | | |
| | | 218 | Same | | Water at 3-3.5' |
| | No sample taken (no tank bottom material observed) | 81.8 | Same, wet | | |
| -5 | | 101 | Same, wet | | |
| | | 212 | Black sand and gravel, wet | | |
| | | 243 | Same | | |
| | | | | | Boring complete @ 8' |

# SUBSURFACE BORING LOG

BOREHOLE NO. **BH-08-37**



| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD | **Direct Push** |
| JOB NO.: | - | SAMPLING METHOD | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | TOTAL DEPTH: | **8'** |
| DATES DRILLED: | **6/19/2008** | | |

| DEPTH (feet) | SAMPLE INTERVAL | PID (ppm) | LITHOLOGY DESCRIPTION | LITH-OLOGY | COMMENTS |
|---|---|---|---|---|---|
| 0 | | | Fill, gravel, concrete | | |
| | | 136 | Black sandy silt, slightly moist | | |
| | | 252 | Same | | |
| | No sample taken (no tank bottom material observed) | 341 | Black sandy clay and gravel, wet | | Water at 4-4.5' |
| -5 | | 262 | Same | | |
| | | 115 | Same | | |
| | | 102 | Same | | |
| | | | | | Boring complete @ 8' |

# MONITORING WELL LOG: N-98

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/2/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **30'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.3 | | Fill - asphalt, black/brown sandy silt and gravel, dry | | | |
| | 0.3 | | | | | |
| | 2.2 | | | Sample taken 1-2' for laboratory analysis | | |
| | 0.6 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 0.0 | | Brown/tan fine sand, slightly moist | | 20' riser | |
| | 0.0 | | | | | |
| | 0.0 | | | | | |
| | 0.0 | | | | | |
| | 0.3 | | Medium sand and gravel, slightly moist | | | |
| -15 | 0.2 | | | | | |
| | 0.0 | | | | | |
| | 0.0 | | | | | |
| | 1.1 | | Medium sand and gravel, moist | | | |
| | 0.3 | | | | | |
| -20 | 0.1 | | Medium to fine sand and gravel, trace tan clay, very moist to wet | | | |
| | 0.0 | | Sand and gravel, trace clay, wet | | | |
| | 0.0 | | Tan/brown sandy clay and gravel, trace clay, wet | | | |
| | 0.0 | | Tan/brown sand and gravel, trace clay | | | |
| | 0.0 | | Gray sand and clay, wet | | | |
| -25 | 0.0 | | Fine gray sand, trace clay, wet | | 10' screen | |
| | 0.0 | | | | | |
| | 0.0 | | Brown/gray medium sand and gravel, wet | | | |
| | 0.0 | | | | | |
| | 0.0 | | | Auger/boring complete to 30' | | |
| -30 | | | | | | |

# MONITORING WELL LOG: N-99

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/19/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **28'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - brown fine sand, dry | | | |
| | 0.0 | | | | | |
| | 0.0 | | | Sample taken 1-2' for laboratory analysis | | |
| | 0.0 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 18' riser | |
| -10 | 0.8 | | Coarse sand and gravel, trace gray clay | | | |
| | 2.5 | | | | | |
| | 4.8 | | Same, no clay | | | |
| | 1.2 | | Fine sand, slightly moist | | | |
| | 0.9 | | Fine sand and gravel, slightly moist | | | |
| -15 | 0.3 | | Same, very moist | | | |
| | 0.0 | | Coarse sand and gravel, very moist to wet | | | |
| | 3.4 | | | | | |
| | 0.5 | | | | | |
| | 0.0 | | | | | |
| -20 | 0.0 | | Gray fine sand, wet, trace clay | | 10' screen | |
| | 0.0 | | | | | |
| | 0.0 | | | | | |
| | 0.0 | | Coarse tan/brown sand and gravel, wet | | | |
| | 0.0 | | | | | |
| -25 | 0.0 | | | | | |
| | 0.0 | | | | | |
| | 0.0 | | Fine sand, trace gray/orange clay | Auger complete to 28' | | |

# SUBSURFACE LOG: N-100
# AND WELL CONSTRUCTION : N-100

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco-Philadelphia Refinery** | DRILLING CO.: | **Parratt-Wolffe** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **Hollow Stem Auger & Mud Rotary** |
| LOGGED BY: | **Tiffani Doerr/Shaun Sykes** | SAMPLING METHOD: | **Split Spoon** |
| DATES DRILLED: | **6/11-6/13/08** | SCREEN/RISER DIAMETER: | **2-inch** |
| TOTAL BORING DEPTH: | **63** | WELLBORE DIAMETER: | **8-inch** |
| BORING ELEVATION | | TOC (inner) ELEVATION: | |

NOTE: Well N-100 was drilled within 5 feet of boring N-100. Screen=0.010 slot; "0" sand; 2' stickup finish. Screen (10'-20'); Riser (2' stickup - 10'); Sand (8'-20'); Bentonite (4'-8'); Grout (surface to 4')

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| | 8-4 | 0.0 | | Fill - dry mixture of brick, gravel, glass, brown sandy clay | Boring location pre-cleared by Mobile Dredge to 10' | |
| | 7-4 | 0.0 | | | Sample 1'-2' submitted for laboratory analysis | |
| -5 | | | | | | |
| -10 | 16-14 | | | Tan clayey sand, large sandstone cobble in bottom | | |
| | 14-14 | | | | | |
| | 14-8 | 0.0 | | Tan medium sand, trace fine gravel, moist, wet at bottom | | |
| | 8-10 | 0.0 | | | | |
| | 13-12 | 1.3 | | Bottom 4" mottled gray/lt.brown and yellow plastic sand w/ trace gravel<br>Same as above to 15' (mottled plastic sand), Remainder gray gravelly med-coarse sand | | |
| -15 | 10-10 | 3.1 | | | | |

Aquaterra Technologies, Inc.

# SUBSURFACE LOG: N-100
# AND WELL CONSTRUCTION: N-100

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| | 5-8 | 9.6 | | Saturated at 17', same sand and gravel to 17' | | |
| | 12-9 | 2.4 | | 17-17.5' Gray coarse sand 17.5-18' Mixed sand and gravel | | |
| | 9-8 | | | Coarse gray sand with few fine gravels (coarser and more frequent gravels @ 19.5'). Fining upward sequence. | | |
| | 9-12 | | | 19.5'-20' thin fine sandy clay lense and 3" fine sand, last 3" same coarse sand w/ few small gravels | | |
| -20 | 13-12 | 4.2 | | Tan/gray med-coarse sand w/ few gravels (fine to 1") sm. clay plug @ 21.5' | Switch from auger to mud rotary | |
| | 12-14 | 3.6 | | | | |
| | 13-14 | 13.6 | | Same as above | | |
| | 7-14 | 4.6 | | Yellow/gray mottled clay w/ some fine sand to 23.8', | | |
| | 9-6 | 20.3 | | Moist red-brown clay w/ some fine sand and few fine gravels<br>Brown clayey fine sand w/ few round gravels to 25.5' (granite, red sandstone) | | |
| -25 | 14-28 | 152 | | | | |
| | 45-46 | 615 | | Dark gray coarse sand and gravel, strong petroleum odors<br>Med-coarse dense gravel w/ sand matrix (red and gray sandstone, white qtz & qtzite). Heterogeneous, up to 2+" gravels. | | |
| | 50-50/0' | | | | | |
| | 34-29 | 1286 | | Same, large gravel in sand matrix | | |
| | 29-34 | | | | | |
| -30 | 13-30 | 356 | | 6" Recovery - red/brown/gray sand and gravel (gray sand is gray qtz, fine sand is completely weathered sandstone; gravels are granite, qtzite, sandstone). | | |
| | 33-39 | | | | | |
| | 47-30 | 1020 | | Same, gravels w/ sand | | |
| | 30-24 | | | | | |
| | 49-35 | 660 | | Same as above - formation very tight (does not seem saturated) | | |
| -35 | 17-12 | 21.7 | | | | |

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# SUBSURFACE LOG: N-100
# AND WELL CONSTRUCTION: N-100

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| | 20-22 | | | Same as above | | |
| | 18-17 | | | | | |
| | 20-20 | 0.8 | | Same but smaller gravels and more sand now with few fines (clay and silt ~5%), saturated | | |
| | 25-25 | | | | | |
| -40 | 20-25 | | | No recovery (cobble in bottom - little recovery likely due to pushing larger gravels) | | |
| | 19-20 | | | | | |
| | 14-14 | 7.2 | | Brown med-coarse sand w/ few coarse gravels (extremely weathered gray & lt. gray fine sandstones) and few fine-med gravels (white and gray qtz and qtzite) | | |
| | 17-23 | 0.8 | | | | |
| | 22-10 | 32.2 | | Lt. brown/gray coarse sand w/ few fine gravels, grades into orange-brown fine sand, last 2" gray clay w/ trace sand | | |
| -45 | 12-6 | 1.1 | | | | |
| | 12-13 | 46.8 | | Top 8" coarse gray sand w/ few gravels grade to orange fine sand, 4" lt. gray fat clay, 4" layers of gray/yellow and orange fine -med sand w/ coarse sand and fine gravel at bottom of spoon | | |
| | 13-18 | 0.8 | | | | |
| | 10-14 | | | No recovery - rock lodged in tip | | |
| | 20-32 | | | | | |
| -50 | 12-11 | 0.1 | | Top 1' - laminated gray/orange silty clay and very fine sand, Bottom 1' - homogeneous coarse orange sand w/ trace fine gravel | | |
| | 17-18 | 0.1 | | | | |
| | 10-14 | 5.8 | | Same as above to 53.5, orange brown clayey silt and fine sand w/ black laminations | | |
| | 18-25 | 0.3 | | | | |
| | | 0.5 | | Gray clayey silt and fine sand | | |
| -55 | | 0.5 | | Red/brown fine sand | | |
| | | 1.9 | | Orange-brown fine sand, saturated | | |

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# SUBSURFACE LOG: N-100
# AND WELL CONSTRUCTION: N-100

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| | | 0.7 | | Same as above | | |
| | 15 | 4.3 | | Red/brown fine sand and clayey silt | | |
| | 22 | 0.9 | | Orange-brown fine sand and weathered rock | | |
| -60 | 50 | 5.3 | | Orange-brown sand and weathered rock, micaceous | Borehole complete to 63' | |
| | 22 | 7.3 | | | | |
| | | 15.3 | | 6" recovery, mica SCHIST in spoon | | |
| -65 | | | | | | |
| -70 | | | | | | |

# MONITORING WELL LOG: N-101

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/16/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **23'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | | | Fill - gravel, brown silt and sand, dry | | | |
| | | | Fill - dark brown clayey silt, dry | Sample taken 1-2' for laboratory analysis | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 13' riser | |
| -10 | | | Brown silty sand and gravel, dry | | | |
| | | | Brown silty coarse and and gravel, moist | | | |
| | | | Same, wet at 14' | | | |
| | | | Coarse sand and gravel, wet, sheen on spoon | | | |
| -15 | | | | | 10' screen | |
| -20 | | | Gray fine sand, trace clay, very mosit | | | |
| | | | | Auger complete to 23' | | |

# MONITORING WELL LOG: N-102

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/5/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **30'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, silty sand, dry | | | |
| | 1.2 | | | | | |
| | 2.6 | | | | | |
| | 10.3 | | Fill - brown/orange sandy clay, gravel | Sample taken 1-2' for laboratory analysis | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 869 | | Black fine sand, trace clay, very moist | | 20' riser | |
| | 1112 | | | | | |
| | 1442 | | Black sand and gravel, very moist | | | |
| | 1283 | | | | | |
| | 1515 | | Same, fine sand | | | |
| -15 | 1414 | | | | | |
| | 1312 | | | | | |
| | 1474 | | | | | |
| | 1374 | | Same, trace clay | | | |
| | 1054 | | Tan/light brown fine sand and gravel | | | |
| -20 | 871 | | Black/gray fine sand and gravel, very moist | | | |
| | 603 | | Same, wet | | | |
| | 561 | | Black/gray coarse sand and gravel, wet | | | |
| | 230 | | Same, brown clay at 24' | | | |
| | 11.8 | | Brown sandy clay, compact, very moist | | | |
| -25 | 7.2 | | Gray/green fine sand and gravel, trace layers of clay | | 10' screen | |
| | 11.7 | | Same, some clay layers | | | |
| | 6.0 | | Brown/red fine sand, slightly moist | | | |
| | 5.6 | | | | | |
| | 7.5 | | | Auger/boring complete to 30' | | |
| -30 | | | | | | |

# MONITORING WELL LOG: N-103

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/6/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **27'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill -gravel, silty sand, dry with some brick | | | |
| | 0.0 | | | | | |
| | 0.2 | | Black/brown silty sand and gravel, dry | Sample taken 1-2' for laboratory analysis | | |
| | 10.6 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 6.6 | | Brown fine sand and some gravel, moist | | 17' riser | |
| | 8.8 | | | | | |
| | 28.8 | | | | | |
| | 32.1 | | Coarse sand and gravel, moist | | | |
| | 252 | | | | | |
| -15 | 269 | | | | | |
| | 1120 | | Same, wet | | | |
| | 1432 | | Same, wet | | | |
| | 1226 | | Same, black, wet | | | |
| | 1134 | | Same, black, wet | | | |
| -20 | 1652 | | Coarse sand and gravel, wet | | 10' screen | |
| | 1466 | | Same, sheen on spoon | | | |
| | 1720 | | | | | |
| | 321 | | Coarse sand and gravel, trace gray/brown clay, wet | | | |
| | 9.2 | | Fine gray/brown sand, trace clay, moist | | | |
| -25 | 6.6 | | | | | |
| | 13.3 | | Orange/gray fine sand, trace clay, moist | Auger complete to 27' | | |
| | 5.2 | | | Boring complete to 28' | | |

# MONITORING WELL LOG: N-104

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/18/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **25'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, fine sand, dry | | | |
| | 0.0 | | | | | |
| | 0.3 | | Fill - dark brown/black silty sand and gravel, dry | Sample taken 1-2' for laboratory analysis | | |
| | 6.1 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 15' riser | |
| -10 | | | Sand from clearance | | | |
| | | | Sand from clearance | | | |
| | 780 | | Brown fine sand, slightly moist | | | |
| | 1303 | | | | | |
| | 860 | | Brown/black coarse sand and gravel, wet | | | |
| -15 | 927 | | Same, sheen on spoon | | | |
| | 923 | | Black sand and gravel, wet | | | |
| | 1206 | | | | | |
| | 525 | | | | | |
| | 969 | | | | | |
| -20 | 16,1 | | Brown/orange fine sand, very moist | | 10' screen | |
| | 7.4 | | Brown/orange fine sand, trace clay, moist | | | |
| | 362 | | Brown/orange fine sand, moist | | | |
| | 37.6 | | | | | |
| -25 | | | | Auger complete to 25' | | |

# MONITORING WELL LOG: N-105

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/18/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **25'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, fine sand, dry | | | |
| | 0.0 | | | | | |
| | 0.2 | | Dark brown/black sandy silt and gravel, dry | Sample taken 1-2' for laboratory analysis | | |
| | 3.1 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 15' riser | |
| -10 | | | Sand from clearance | | | |
| | | | Sand from clearance | | | |
| | 478 | | Brown coarse sand and gravel, very moist | | | |
| | 918 | | | | | |
| | 1109 | | | | | |
| -15 | 738 | | | | | |
| | 341 | | Black coarse sand and gravel, wet | | | |
| | 437 | | Same, sheen on spoon | | | |
| | 1468 | | Same, wet | | | |
| | 37.7 | | Brown/tan sand and gravel, wet | | | |
| -20 | 9.9 | | Brown/orange fine sand, trace clay, moist | | 10' screen | |
| | 3.2 | | Brown/orange sand and clay, moist | | | |
| | 106 | | | | | |
| | 5.9 | | Brown/orange fine sand, slightly moist | | | |
| -25 | | | | Auger complete to 25' | | |

# MONITORING WELL LOG: N-106

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/5/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **19'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, silt | | | |
| | 0.1 | | Concrete | | | |
| | | | Concrete, fill - brown silt and sand | Sample taken 1-2' for laboratory analysis | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 9' riser | |
| -10 | 763 | | Gray sandy clay and gravel, wet | | | |
| | 1793 | | Coarse sand and gravel, trace black/gray clay, wet | | | |
| | 2150 | | | | | |
| | 1768 | | Fine sand and gravel, black/gray, red sand 13.75-14' | | | |
| | 1376 | | Coarse sand and gravel, trace clay, wet | | | |
| -15 | 261 | | Tan/orange clay and sand, slightly moist | | 10' screen | |
| | 119 | | | | | |
| | 49.1 | | Orange/brown sand and clay, compact, slightly moist | | | |
| | 163 | | Same, gravel | Auger complete to 19' | | |
| | 52.1 | | Fine light brown/orange sand, trace clay | Boring complete to 20' | | |
| -20 | | | | | | |

# MONITORING WELL LOG: N-107

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/20/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **22'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.1 | | Fill - fine sand and gravel, dry | | | |
| | 5.2 | | Fill - black/brown silty sand and gravel, dry | | | |
| | 20.6 | | | Sample taken 1-2' for laboratory analysis | | |
| | 28.3 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 12' riser | |
| -10 | | | Medium sand, black, very moist | | | |
| | 478 | | Coarse sand and gravel, black, wet | | | |
| | 918 | | | | | |
| | 1109 | | | | | |
| -15 | 738 | | | | | |
| | 341 | | | | 10' screen | |
| | 437 | | Fine sand and gravel, wet | | | |
| | 1468 | | | | | |
| | 37.7 | | Tan/orange sandy clay, very moist | | | |
| -20 | 9.9 | | Tan fine sand, very moist | | | |
| | 3.2 | | | Auger complete to 22' | | |

# MONITORING WELL LOG: N-108

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/29/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **18'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, sand, dry | | | |
| | 0.5 | | Fill - brown/black silty sand, gravel, dry | | | |
| | 123 | | | Sample taken 1-2' for laboratory analysis | | |
| | 57.6 | | | | | |
| | | | | | 8' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 849 | | Coarse sand and gravel, gray/black, wet | | | |
| | 1248 | | | | | |
| | 756 | | Medium to fine sand and gravel, wet | | 10' screen | |
| | 842 | | | | | |
| | 756 | | | | | |
| -15 | 121 | | Brown sandy clay and gravel, very moist | | | |
| | 42.9 | | Brown/orange sandy clay and gravel, very moist, stiff | | | |
| | 3.7 | | | Auger/boring complete to 18' | | |

# SUBSURFACE LOG: N-109
# AND WELL CONSTRUCTION : N-109

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco-Philadelphia Refinery** | DRILLING CO.: | **Parratt-Wolff** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **Hollow Stem Auger & Mud Rotary** |
| LOGGED BY: | **Tiffani Doerr/Shaun Sykes** | SAMPLING METHOD: | **Split Spoon** |
| DATES DRILLED: | **7/2-7/3/08** | SCREEN/RISER DIAMETER: | **2-inch** |
| TOTAL BORING DEPTH: | **42'6"** | WELLBORE DIAMETER: | **8-inch** |
| BORING ELEVATION | | TOC (inner) ELEVATION: | |

NOTE: Well N-109 was drilled within 5 feet of boring N-109. Screen=0.010 slot; "0" sand; 2' stickup finish. Screen (5'-20'); Riser (2' stickup - 5'); Sand (3'-20'); Bentonite (1'-3'); Grout (surface to 1')

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | | 0.0 | | | Boring location pre-cleared by Mobile Dredge to 10' | |
| | | 0.0 | | FILL - dry, brown/black silty sand and gravel with brick. | Sample 1'-2' submitted for laboratory analysis | |
| -5 | | | | | | |
| -10 | 4-4 | 156 | | Moist to wet med brown silty fine sandy CLAY, gray mottling from 11-12', Fine-med gravel in bottom 2" | | |
| | 6-10 | 139 | | | | |
| | 15-16 | 51.6 | | Wet med SAND w/ clay plugs to 13.5, last 6" fine-coarse sand w/ some fine to coarse gravels | | |
| | 32-50/0.4 | 18.5 | | | | |
| | 18-20 | 252 | | Saturated med brown fine to med GRAVELS w/ coarse sand to 15' | | |

Aquaterra Technologies, Inc.

# SUBSURFACE LOG: N-109
# AND WELL CONSTRUCTION: N-109

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| -15 | 21-17 | 176 | | Med-coarse sand w/ gravel (fine-coarse 1") | | |
| | 20-32 | 58.4 | | Grades from lt. brown/gray fine to coarse sand from 16' to 16'10", then grades from coarse sand and fine gravel to heterogenous gravels, fine to 1" with coarse sand (gravels qtz, qtzite, sandstone) | | |
| | 27-27 | 322 | | | | |
| | 50/0.2 | | | Crushed gravel in tip, no return | | |
| | | | | Cobble/boulder from 18'2" to ~19'. Auger through to 20'. | | |
| -20 | 4-7 | 0.0 | | Top 8" grading through orange/gray mix to mostly orange at bottom. 60-70% Mica, rest clay and fine sand. Saprolite - original rock structure present throughout. Overall, fine sandy clay. | Switch to mud rotary | |
| | 8-9 | 0.0 | | | | |
| | 6-6 | 0.0 | | | | |
| | | | | Only 2" recovery - same as above. | | |
| | 9-8 | | | | | |
| | 5-16 | 0.0 | | Same to 25' | | |
| -25 | 15-11 | 0.0 | | 25-25'10" - Larger mica flakes and qtz. grains, few qtz-mica gravels, last 2" white clay w/ gray fine qtz. gravels | | |
| | 24-25 | 0.0 | | 12" Recovery - top 2" same as above, 90% mica (up to 0.5" books) w/few fine sands and white clay (not layered) | | |
| | 27-35 | | | | | |
| | 24-28 | 1.6 | | Same to 29' | | |
| | 29-29 | 0.0 | | Layered/laminated white/gray coarse mica w/ clay and orange/black mica w/ clay | | |
| -30 | 11-9 | 0.0 | | Top 1' - light gray fine - med micaceous clayey sand, next 6" same as above but coarse, last 6" layered alternating lt. gray/orange brown mica w/ little clay | | |
| | 11-19 | 0.0 | | | | |
| | 32-24 | 0.0 | | Same as above, heavy mica saprolite, gray and clayey to 33' | | |
| | 37-47 | 0.0 | | 1" layer of round med-coarse gray qtzite gravel @ 33', last 1' laminated orange white/gray clay | | |
| | 15-12 | 0.0 | | Yellow-gray medium grained qtz-mica sand, 2" white clay w/ very fine qtz gravels | | |

# SUBSURFACE LOG: N-109
# AND WELL CONSTRUCTION: N-109

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| -35 | 13-15 | 0.0 | | | | |
| | 16-19 | | | No recovery | | |
| | 26-32 | | | | | |
| | 18-19 | 0.0 | | Slight layering orange-yellow gray muscovite-biotite and fine qtz sand. Some yellow-white clay layers w/ coarse qtz gravels | | |
| | 47-50/0.4 | 0.0 | | | | |
| -40 | 34-45 | 5.3 | | Same as above | | |
| | 50/0.3 | 1.0 | | | | |
| | 78/6" | 8.2 | | Extremely weathered bedrock | Borehole complete to 42'6" | |

# MONITORING WELL LOG: N-110

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/14/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **15'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, tan sandy silt, dry | | | |
| | 0.1 | | | | | |
| | 0.3 | | | | | |
| | 0.3 | | Brown sandy silt and gravel, dry | Sample taken 1-2' for laboratory analysis | | |
| | | | | | 5' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 27.3 | | Brown/black sand with clay, wet | | 10' screen | |
| | 28.9 | | | | | |
| | 52.2 | | Black/brown coarse sand, gravel, wet | | | |
| | 98.9 | | | | | |
| | 97.6 | | Black/brown coarse sand and gravel, wet | Auger to 15' | | |
| -15 | 89.2 | | | | | |
| | 78.5 | | | | | |
| | 22.9 | | Black/brown clay, very moist | Boring complete to 18' | | |

# MONITORING WELL LOG: N-111

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/14/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **15'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - brown sandy silt, dry | | | |
| | 1.3 | | Same with gravel | | | |
| | 1.7 | | Fill - brown/black silty sand and gravel, dry, some brick | Sample taken 1-2' for laboratory analysis | | |
| | 1.2 | | | | 5' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 84.6 | | Black/gray sand and gravel, wet, some brick | | 10' screen | |
| | 92.1 | | | | | |
| | 112 | | | | | |
| | 59.9 | | Black sandy clay with gravel, wet | | | |
| | 149 | | Black coarse sand and gravel, wet | Auger to 15' | | |
| -15 | 46.3 | | Black clay, very moist to wet | | | |
| | 56.8 | | Black sandy clay, very moist to wet | | | |
| | 38.5 | | | Boring complete to 18' | | |

# MONITORING WELL LOG: N-112

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/14/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **20'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, brown sandy silt, dry | | | |
| | 2.8 | | | | | |
| | 6.4 | | Fill - brown/black silty sand and gravel, dry | Sample taken 1-2' for laboratory analysis | | |
| | 8.5 | | | | | |
| | | | | | 5' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 89,7 | | Dark brown clayey sand and gravel, wet | | 15' screen | |
| | 143 | | | | | |
| | 178 | | | | | |
| | 128 | | Brown/tan sand and gravel, wet | | | |
| | 193 | | Brown sand and coarse gravel, wet | Visible sheen on spoon at 14' | | |
| -15 | 223 | | | | | |
| | 145 | | | | | |
| | 194 | | | | | |
| | 9.8 | | Sand and gravel, very moist | | | |
| | 8.7 | | Sand and gravel, greenish tint, trace clay, very moist | Auger complete to 20' | | |
| -20 | | | | | | |

# MONITORING WELL LOG: N-113

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/15/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **15'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - tar, brown sandy clay and gravel | | | |
| | 0.9 | | Fill - brown/gray silty clay and gravel | | | |
| | 7.5 | | | Sample taken 1-2' for laboratory analysis | 5' | |
| | 6.6 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 106 | | Brown sand w/ clay, wet | | 10' screen | |
| | 95.6 | | | | | |
| | 260 | | | | | |
| | 25.8 | | | | | |
| | 5.8 | | Brown/tan stiff sandy clay, very moist | Auger complete to 15' | | |
| -15 | | | | | | |

# MONITORING WELL LOG: N-114

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/13/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **25'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 45.4 | | Fill - gravel, brown sandy silt, dry | | | |
| | 288 | | | | | |
| | 302 | | Fill - brown/black sandy silt and gravel, wood fragments | Sample taken 1-2' for laboratory analysis | | |
| | 292 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 10' riser | |
| -10 | 349 | | Coarse sand and gravel, very moist | | | |
| | 562 | | Brown sandy clay and gravel, very moist | | | |
| | 342 | | Brown sand and gravel, trace clay, very moist | | | |
| | 284 | | | | | |
| | 181 | | Sand and coarse gravel, trace brown clay, very moist | | | |
| -15 | 240 | | | | | |
| | 249 | | Sand and gravel turning to coarse gravel, very moist | | | |
| | 7.3 | | Sand and coarse gravel, trace orange/brown sandy silt | | | |
| | 293 | | Sand and coarse gravel, moist | | | |
| | 12.4 | | Tan clay and micaceous sand | | | |
| -20 | 69.6 | | | | 15' screen | |
| | 13.2 | | | | | |
| | 8.0 | | Same, trace brown/gray clay | | | |
| | 1.8 | | | | | |
| | 1.5 | | Micaceous sand | Auger complete to 25' | | |
| -25 | | | | | | |

# MONITORING WELL LOG: N-115

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Continuous Split Spoon** |
| LOGGED BY: | **T. Doerr** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/28/08** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **14'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | | | | | | |
| | 1.2 | | FILL material - dry dark brown to black brick, sandy clay material (few layers), cinders | Sample taken 1-2' for laboratory analysis | ~2' stick up | |
| | 4.6 | | | | 0'-4' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 80.5 | | Gray/black coarse SAND and GRAVEL, petroleum soaked | | 4'-14' screen | |
| | 3.6 | | Light brown sl plastic very fine sandy SILT, slightly micaceous, moist | | | |
| | 72.2 | | Gray/black coarse SAND and GRAVEL to 13'4" | | | |
| | 0.9 | | Slightly mottled light brown and gray CLAY with some silt | Auger complete to 14' | | |
| | 2.3 | | 14'-14'4" CLAY | | | |
| | | | Gray fine SAND | Saturated at 15' | | |
| -15 | 1.0 | | Gray clayey SAND | Boring complete to 16' | | |
| | | | Bottom 1" gray/orange mottled CLAY | | | |

# MONITORING WELL LOG: N-116

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/20/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **12'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 4.9 | | Fill - gravel, sand, tan/brown silty sand, dry | | | |
| | 16.8 | | Fill - brown/black sand and gravel, dry | | | |
| | 182 | | | Sample taken 1-2' for laboratory analysis | | |
| | 147 | | Gray sandy clay, moist, stiff | | 2' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 98.8 | | Black/gray sandy clay, very moist, sheen | | 10' screen | |
| | 85.6 | | | Auger complete to 12' | | |
| | 46.5 | | | | | |
| | 87.5 | | | Boring complete to 14' | | |

# MONITORING WELL LOG: N-117

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Continuous Split Spoon** |
| LOGGED BY: | **T. Doerr** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/4/08** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **20'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 1.3 | | FILL - gravel w/ sand to 1.5' | | ~2' stick up | |
| | 2.4 | | Brown moist clayey sand and gravel | Sample taken 1-2' for laboratory analysis | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 0'-8' riser | |
| -10 | 94.8 | | Very moist dark brown sandy CLAY mottled with black product to 13' | Product present from 10' to 16' | 8'-20' screen | |
| | 66.9 | | | | | |
| | 251 | | | | | |
| | 743 | | Wet brown to black product laden GRAVEL (sub-angular up to 1.5") with coarse sand | | | |
| | 480 | | | | | |
| -15 | 732 | | | | | |
| | 855 | | Saturated (water) at 16' | | | |
| | 282 | | Medium brown to red-brown fine SAND | | | |
| | 56.4 | | Micaceous fine to medium SAND | Auger/boring complete to 20' | | |
| | 30.2 | | Orange and gray mottled very fine sandy SILT grading to clayey silt (19.5'-20') | | | |
| -20 | | | | | | |

# MONITORING WELL LOG: N-118

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/23/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **20'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.1 | | Fill - brown silty sand and gravel, moist | | | |
| | 3.6 | | Fill - black/brown sitly sand and gravel | | | |
| | 142 | | | Sample taken 1-2' for laboratory analysis | | |
| | 156 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 10' riser | |
| -10 | 86.6 | | Coarse sand and gravel, wet | | | |
| | 225 | | | | | |
| | 971 | | Same, trace brown clay | | | |
| | 1633 | | Same, trace brown clay | | | |
| | 966 | | | | | |
| -15 | 781 | | Coarse sand and gravel. trace clay | | 10' screen | |
| | 93.5 | | Red/brown sandy clay and gravel | | | |
| | 13.7 | | Tan/orange sandy clay | | | |
| | 14.7 | | Tan/orange sand, some clay | | | |
| | 22.1 | | | Auger/boring complete to 20' | | |
| -20 | | | | | | |

# MONITORING WELL LOG: N-119

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/29/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **18'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 5.9 | | Fill - gravel, sand, dry | | | |
| | 6.2 | | Fill - orange/brown sandy silt and gravel, dry | | | |
| | 7.4 | | | | | |
| | 14.1 | | Brown/black silt and clay, dry | Sample taken 1-2' for laboratory analysis | | |
| | | | | | 8' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 1341 | | Black coarse sand and gravel, wet | | | |
| | 1678 | | | | | |
| | 186 | | Black/gray medium sand and gravel, trace clay, wet | | 10' screen | |
| | 35.5 | | | | | |
| | 28.7 | | | | | |
| -15 | 14.3 | | | | | |
| | 26.6 | | Coarse sand and gravel, wet | | | |
| | 7.5 | | | Auger complete to 18' | | |

# MONITORING WELL LOG: N-120

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/22/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **18'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - medium brown sandy clay and gravel, dry | | | |
| | 0.0 | | | | | |
| | 0.0 | | | Sample taken 1-2' for laboratory analysis | | |
| | 0.4 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 8' riser | |
| -10 | 994 | | Black coarse sand and gravel, wet, sheen | | | |
| | 1063 | | | | | |
| | 1074 | | | | 10' screen | |
| | 983 | | | | | |
| | 35.7 | | Tan/orange sandy clay, very moist | | | |
| -15 | 29.3 | | | | | |
| | 43.4 | | Gray sand and clay, some gravel, very moist | | | |
| | 28.6 | | | Auger/boring complete to 18' | | |

# MONITORING WELL LOG: N-121

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/9/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **20'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, brown silty and sand, dry | | | |
| | 5.3 | | | | | |
| | 34.6 | | Dark brown fill, gravel, sandy clay | Sample taken 1-2' for laboratory analysis | | |
| | 40.8 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 10' riser | |
| -10 | 1446 | | Fine sand and gravel, brown, wet | | | |
| | 1332 | | Coarse sand and gravel, wet | | | |
| | 1177 | | | | | |
| | 36.1 | | Gray/orange fine sand and clay, very moist | | | |
| | 72.6 | | Gray fine sand, trace clay, very moist | | | |
| -15 | 39.6 | | | | 10' screen | |
| | 535 | | Coarse sand and gravel, very moist to wet | | | |
| | 80.1 | | Gray/orange fine sand, very moist | | | |
| | 45.5 | | Tan/orange fine sand, trace clay, very moist | | | |
| | 26.6 | | Same, increased clay content | Auger/boring complete to 20' | | |
| -20 | | | | | | |

# MONITORING WELL LOG: N-122

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/21/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **18'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, stiff brown silty, dry | | | |
| | 18.8 | | | | | |
| | 78.9 | | Fill - gray/black stiff sandy silt, gravel, dry | Sample taken 1-2' for laboratory analysis | | |
| | 15.7 | | | | | |
| | | | | | 6' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| | | | | Water at 8' | | |
| -10 | 6.6 | | Dark brown/gray sand and clay, some gravel, very moist to wet | | | |
| | 7.2 | | Same, increased clay content | | | |
| | 5.3 | | Brown/gray sand with clay, very moist | | 12' screen | |
| | 3.9 | | Gray sand with clay, very moist | | | |
| | 1.3 | | | | | |
| -15 | 1.1 | | Orange-tan/gray sandy clay, very moist | | | |
| | 4.3 | | Same, some gravel | | | |
| | 2.2 | | Gray/brown sand and clay, moist | Auger/boring complete to 18' | | |

# MONITORING WELL LOG: N-123

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/20/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **20'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, sand, brick | | | |
| | 0.5 | | | | | |
| | 0.8 | | | Sample taken 1-2' for laboratory analysis | | |
| | 1.2 | | Same, trace silt and clay | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 10' riser | |
| -10 | 24.5 | | Coarse sand and gravel, black, sheen, very moist | | | |
| | 37.6 | | | | | |
| | 116 | | Same, wet | | | |
| | 254 | | | | | |
| | 236 | | Same, very moist to wet | | | |
| -15 | 117 | | | | 10' screen | |
| | 65.2 | | Same, trace clay | | | |
| | 20.3 | | | | | |
| | 6.5 | | Coarse sand and gravel, trace clay | | | |
| | 7.9 | | | Auger/boring complete to 20' | | |
| -20 | | | | | | |

# MONITORING WELL LOG: N-124

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/21/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **25'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - sand, gravel, brick, dry | | | |
| | 0.0 | | | | | |
| | 0.4 | | | Sample taken 1-2' for laboratory analysis | | |
| | 0.5 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 10' riser | |
| -10 | 0.0 | | Fill - sand, gravel, brick, trace brown clay | | | |
| | 0.0 | | | | | |
| | 0.2 | | Black coarse sand and gravel, very moist | | | |
| | 0.4 | | | | | |
| | 0.0 | | Brown/gray sandy clay and gravel, very moist to wet | | | |
| -15 | 0.0 | | | | 15' screen | |
| | 0.0 | | Orange/brown sandy clay and gravel, very moist to wet | | | |
| | 0.0 | | | | | |
| | 0.0 | | Same, wet | | | |
| | 0.0 | | | | | |
| -20 | 0.0 | | Light brown sand and clay, some gravel, wet | | | |
| | 0.0 | | | | | |
| | 0.0 | | Same, very moist | | | |
| | 0.0 | | | | | |
| | 0.0 | | | Auger complete to 25' | | |
| -25 | | | | | | |

# MONITORING WELL LOG: N-125

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **6/17/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **25'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, sand, brick, concrete, dry | | | |
| | 4.2 | | | | | |
| | 3.7 | | | Sample taken 1-2' for laboratory analysis | | |
| | 35.2 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 15' riser | |
| -10 | 392 | | Clayey sand and gravel, dry | | | |
| | 894 | | | | | |
| | 1065 | | Brown/tan coarse sand and gravel, moist | | | |
| | 1225 | | | | | |
| | 770 | | Brown fine sand, very moist to wet | | | |
| -15 | 756 | | | | | |
| | 467 | | Brown fine sand, very moist (6" recovery) | | | |
| | 401 | | | | | |
| | 302 | | | | | |
| -20 | 483 | | Same, wet | | 10' screen | |
| | 92 | | Coarse sand and gravel, wet | | | |
| | 96.2 | | | | | |
| | 10.2 | | Gray fine clayey sand, very moist | | | |
| -25 | | | | Auger complete to 25' | | |

# MONITORING WELL LOG: N-126

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/29/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **14'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.8 | | Fill - brown sandy silt, gravel, brick, dry | | | |
| | 1.2 | | | | | |
| | 120 | | Fill - brown/black sandy silt, gravel, dry, trace clay | Sample taken 1-2' for laboratory analysis | | |
| | 456 | | | | 4' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 348 | | Fill - black gravel, wood, wet | | 10' screen | |
| | 57.4 | | Black coarse sand and gravel, wet | | | |
| | 409 | | | | | |
| | 20.0 | | Black/brown sandy clay, very moist | Auger/boring complete to 14' | | |

# SUBSURFACE LOG: N-129
# AND WELL CONSTRUCTION : N-129

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco-Philadelphia Refinery** | DRILLING CO.: | **Parratt-Wolff** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **Hollow Stem Auger & Mud Rotary** |
| LOGGED BY: | **Tiffani Doerr/Shaun Sykes** | SAMPLING METHOD: | **Split Spoon** |
| DATES DRILLED: | **6/24-6/26/08 & 7/1/08** | SCREEN/RISER DIAMETER: | **2-inch** |
| TOTAL BORING DEPTH: | **103** | WELLBORE DIAMETER: | **8-inch** |
| BORING ELEVATION | | TOC (inner) ELEVATION: | |

NOTE: Well N-129 was drilled within 5 feet of boring N-129. Screen=0.010 slot; "0" sand; 2' stickup finish. Screen (14'-30'); Riser (2' stickup - 14'); Sand (12'-30'); Bentonite (10'-12'); Grout (surface to 10')

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | | | | FILL - brown sandy silt and gravel, dry. | Boring location pre-cleared by Mobile Dredge to 10'<br>Sample 1'-2' submitted for laboratory analysis | |
| -5 | | | | | | |
| -10 | 1-7 | | | No recovery | | |
| | 13-16 | | | | | |
| | 12-9 | 0.0 | | Moist coarse SAND and fine GRAVEL, light brown | | |
| | 12-12 | 0.1 | | | | |
| | 19-22 | 187 | | Wet, brown, heterogeneous mix of fine sand to coarse gravel (gravels vary in color and comp: sandstone, quartzite: brn, blk, wht). Strong odors. | Boring augered to 14', then switched to mud rotary drilling. | |
| -15 | 15-11 | | | | | |
| | 12-5 | 869 | | Wet, brown medium SAND (no gravel) w/1" plug of fine sandy clay at 17'10". | | |

Aquaterra Technologies, Inc.

# SUBSURFACE LOG: N-129
# AND WELL CONSTRUCTION: N-129

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| | 7-8 | | | Sand saturated w/ product at 18'. | | |
| | 11-15 | 371 | | | | |
| | 17-14 | | | | | |
| -20 | 18-15 | | | Medium SAND with GRAVELS (brn, blk, red), not prod saturated. No recovery | | |
| | 13-16 | | | | | |
| | 16-12 | 114 | | Brown, medium coarse SAND w/ few fine gravels. Prod saturated | | |
| | 14-15 | | | | | |
| | 5-9 | 102 | | Prod. saturated coarse sand & fine gravel to 26.5'. Only few vugs of product at 26.5'. | | |
| -25 | 11-9 | | | | | |
| | 10-19 | 11.7 | | Yellow and gray fine sandy CLAY | At 26' stong odors, but not petroleum. Pungent, fruity (like additive or solvent). | |
| | 16-25 | 13.3 | | Slightly micaceous, moist tan and gray fine to med. SAND | | |
| | 17-21 | 14.6 | | | | |
| | 18-8 | | | | | |
| -30 | 3-1 | 9.9 | | Moist layered orange/gray SILTY CLAY w/ very fine SAND, color change to dark gray 31.5' | | |
| | 3-4 | 18.4 | | | | |
| | 17-21 | 13.8 | | Same as 31.5'-32', moist dark gray micaceious sl. plastic very fine SANDY SILT | | |
| | 19-15 | 28.8 | | | | |
| | 4-4 | 6.2 | | | | |
| -35 | 5-10 | 5.0 | | | | |
| | 6-9 | 1.6 | | Few sandier layers at 36'. | | |
| | 9-10 | 1.7 | | | | |
| | 8-9 | 0.9 | | | | |
| | 8-9 | 0.7 | | | | |

Aquaterra Technologies, Inc.

# SUBSURFACE LOG: N-129
# AND WELL CONSTRUCTION: N-129

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| -40 | 5-5 | 0.3 | | Silty CLAY w/ trace fine sand to 41'10" | | |
| | 5-9 | 0.3 | | | | |
| | 9-7 | 0.2 | | Sat. brown medium SAND, trace fine gravel. At 43', brown slightly plastic silty very fine micaceous sand | | |
| | 9-9 | 0.2 | | | | |
| | 2-2 | 0.4 | | Brown slightly micaceous very fine sandy CLAY | | |
| -45 | 2-3 | 0.3 | | | | |
| | 2-4 | 0.5 | | 1" layers of fine sand at 46.5' and 47.5' | | |
| | 5-5 | 0.4 | | | | |
| | 4-5 | | | No recovery | | |
| | 6-8 | | | | | |
| -50 | 12-13 | 0.0 | | Alternating layers of brown clayey fine SAND and med sand (1-3" layers) | | |
| | 15-9 | 0.0 | | | | |
| | 11-9 | 0.4 | | Brown medium sand w/ few coarse grains | | |
| | 18-19 | 0.2 | | Alternating layers of brown fine clayey sand and brown medium sand with coarse grains | | |
| | 10-4 | 0.0 | | Same alternating layers to 57.5'; sand layers only 1" thick and all fine sands, Fine sandy clay layers 6" thick. | | |
| -55 | 6-5 | 0.0 | | | | |
| | 12-16 | 3.3 | | | | |
| | 18-13 | 2.2 | | Medium-coarse sand w/ trace fine gravels, saturated, slight odors | | |
| | 12-18 | 9.1 | | Same as last 1', Sandy clay plug at 59.5', orange-brown in color near bottom | | |
| | 19-24 | 3.1 | | | | |
| -60 | 18-16 | 12.3 | | 18" Recovery - Top 6" - 3" Brown fine sandy clay, 3" - Brown fine sand, Lower 1' - yellow brown coarse sand with few fine gravels | | |
| | 13-15 | 3.6 | | | | |
| | 34-24 | 18.7 | | 12" Recovery - Top 6" - Lt. brown medium sands, Lower 6" - Coarse sand and fine gravel with medium gravel in bottom 1" | | |

Aquaterra Technologies, Inc.

# SUBSURFACE LOG: N-129
# AND WELL CONSTRUCTION: N-129

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| | 24-17 | | | | | |
| | 23-17 | 2.5 | | 12" Recovery - Red-brown and gray heterogeneous gravel and coarse sand with trace clay | | |
| -65 | 13-15 | | | | | |
| | 18-17 | 13.7 | | Medium gray/brown med-coarse sand and fine gravel at top grades to coarse sand and fine-med gravel at 67' | | |
| | 19-27 | 2.0 | | Mix of coarse sand with fine gravel | | |
| | 27-50/0.4 | 57.2 | | Brown med-coarse gravels w/ sand | | |
| | | 35.4 | | | | |
| -70 | 38-40 | 9.3 | | Brown med-coarse gravels w/ sand | | |
| | 50/0.3 | | | | | |
| | 50/0.6 | | | Same | | |
| | 48-25 | 4.6 | | Same | | |
| -75 | 50/0.4 | | | | | |
| | 45-38 | 3.6 | | 14" Recovery, gravel and sand to 77.5', 2" layer gray fine sand w/ clay, 3" gray coarse sand w/ few fine gravels, 1" gray fine sand | | |
| | 19-26 | | | | | |
| | | 4.0 | | 6" gray fine sand, 1' Orange/yellow coarse sand and gravel, 6" compact dark gray clay, trace sand | | |
| | | 3.2 | | | | |
| -80 | 8-9 | 0.0 | | 10" recovery, compact dark gray clay, trace fine sand | | |
| | 14-20 | 0.0 | | | | |
| | 15-14 | 1.0 | | 6" recovery, top 2" compact dark gray clay, trace sand, bottom 4" gray/brown med. sand and gravel | | |
| | 18-17 | 0.3 | | | | |
| | 7-8 | 0.0 | | Compact dark gray clay, trace fine sand | | |
| -85 | 9-9 | 0.0 | | | | |

Aquaterra Technologies, Inc.

# SUBSURFACE LOG: N-129
# AND WELL CONSTRUCTION: N-129

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| | 7-6 | 0.0 | | Same, increase in sand content bottom 4" | | |
| | 7-12 | 0.0 | | | | |
| | 11-12 | 0.0 | | 6" recovery, same | | |
| | 7-12 | 0.0 | | | | |
| -90 | 12-13 | 0.0 | | Compact dark gray clay w/ trace fine sand layers | | |
| | 5-7 | 0.0 | | | | |
| | 7-12 | 0.0 | | Compact dark gray clay w/ numerous thin fine sand layers | | |
| | 7-13 | 0.0 | | | | |
| | 18-18 | | | | | |
| -95 | | | | | | |
| | 11-10 | 0.6 | | Moist, stiff dark gray silty clay, few thin layers of fine sand | | |
| | 14-20 | 0.1 | | | | |
| -100 | 17-19 | 3.6 | | Moist, fine to medium gray micaceous sand w/ few fine gravels, clayey sand plugs present | Borehole complete to 103' | |
| | 17-10 | 0.8 | | | | |
| | 76-105 | 1.6 | | Moist, fine to med. gray micaceous sand to 102'10", bottom 2" - gray qtz. gravels w/ black/white SCHIST in bottom of spoon | | |

# MONITORING WELL LOG: N-130

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Continuous Split Spoon** |
| LOGGED BY: | **T. Doerr** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/16/08** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **32'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | | | | |
| | 0.0 | | Med brown moist plastic fine sandy SILT, no gravel | | ~2' stick up | |
| | 0.1 | | | Sample taken 1-2' for laboratory analysis | | |
| | 0.2 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 0'-18' riser | |
| -10 | 0.4 | | Moist, light brown SAND and GRAVEL. White/yellow coarse sand with 50% round to subround gravel from 1/8" to 1.5" (quartz, sandstone and brn siltstone gravels). Extends to 19.5' | | | |
| | 0.3 | | | | | |
| | 0.1 | | | | | |
| | 0.1 | | | | | |
| | 0.3 | | | | | |

# MONITORING WELL LOG: N-130

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| -15 | 0.3 | | | | | |
| | 0.4 | | | | | |
| | 0.4 | | | | | |
| | 45.5 | | Slightly more orange at 19' | | | |
| | 120 | | Dark gray coarse SAND with fine GRAVEL with fewer and smaller gravel extends from 19.5' to 25'. Heavy petroleum odors start at 19.5' | | | |
| -20 | 293 | | 2" layer medium SAND at 20' | | | |
| | 398 | | | Saturated at 21' (sheen) | | |
| | 547 | | 2" layer medium SAND at 21'10" | | | |
| | 421 | | | | | |
| | 393 | | | | | |
| -25 | 126 | | From 25' to 26' grades to medium-fine SAND with sandstone cobble in bottom of spoon | | 18'-30' screen | |
| | 13.7 | | Brown coarse SAND and fine GRAVELS (yellow & white quartz) from 26' to 26.5' | | | |
| | 6.7 | | 26.5'-28' - Alternating 3" layers of gray med-coarse sand and gray sand and gravels (<1") of qtz and brn-red siltstone | | | |
| | 22 | | Gray med-coarse sand with few gravels to 32' | | | |
| | 2.9 | | | Auger complete to 30' | | |
| -30 | 99.7 | | | Boring complete to 32' | | |
| | 4.1 | | | | | |

# SUBSURFACE LOG: N-131
# AND WELL CONSTRUCTION : N-131

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco-Philadelphia Refinery** | DRILLING CO.: | **Parratt-Wolffe** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **Hollow Stem Auger & Mud Rotary** |
| LOGGED BY: | **Tiffani Doerr** | SAMPLING METHOD: | **Split Spoon** |
| DATES DRILLED: | **6/3/08 & 6/10/08** | SCREEN/RISER DIAMETER: | **2-inch** |
| TOTAL BORING DEPTH: | **70** | WELLBORE DIAMETER: | **8-inch** |
| BORING ELEVATION | | TOC (inner) ELEVATION: | |

NOTE: Well N-131 was drilled within 5 feet of boring N-131 on 6/17/2008. Screen=0.010 slot; "0" sand; 2' stickup finish. Screen (5'-15'); Riser (2' stickup - 5'); Sand (3'-15'); Bentonite (1'-3'); Grout (surface to 1')

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | | 0.1 | | | | |
| | | 15.5 | | | Boring location pre-cleared by Mobile Dredge to 10' | |
| | | 46.5 | | | | |
| | | 52.2 | | Brown-black silty sand and gravel. Asphalt layer at 3.5 feet. | Sample 1'-2' submitted for laboratory analysis | |
| -5 | | | | | | |
| -10 | 3-6 | 241 | | Wet, black, medium SAND and GRAVEL. | | |
| | 1/1' | 207 | | | | |
| | 2-1 | 128 | | Dark brown micaceous silty CLAY, with wood and organic matter. | | |
| | 2-1 | 70.1 | | | | |
| | 1-2 | 3.2 | | | | |

Aquaterra Technologies, Inc.

# SUBSURFACE LOG: N-131
# AND WELL CONSTRUCTION: N-131

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| -15 | 3-1 | 1.9 | | | | |
| | 1-2 | 0.6 | | | | |
| | 2-1 | 0.8 | | | | |
| | 1-1 | 0.9 | | | | |
| | 1-1 | | | | | |
| -20 | 1-2 | 0.0 | | Same, but becomes gray at 20'. | Augers pulled at 20'. Switch to mud rotary for remainder of drilling. | |
| | 3-6 | 0.0 | | | | |
| | 2-1 | 0.0 | | | | |
| | 1-1 | 0.0 | | | | |
| | woh/2' | 0.0 | | | | |
| -25 | woh/2' | 0.0 | | | | |
| | woh/1' | 0.1 | | Becomes silty at 26'. Less organic matter. | | |
| | 4-2 | 0.0 | | | | |
| | woh/1' | 0.0 | | | | |
| | 3-2 | 0.0 | | | | |
| -30 | woh/2' | 0.0 | | Dark gray CLAY with trace fine sand and organics. | | |
| | woh/2' | 0.0 | | | | |
| | woh/2' | 0.0 | | | | |
| | woh/2' | 0.0 | | | | |
| | woh/3' | 0.0 | | | | |

Aquaterra Technologies, Inc.

# SUBSURFACE LOG: N-131
# AND WELL CONSTRUCTION: N-131

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| -35 | woh/3' | 0.0 | | | | |
| | 2-2 | 0.0 | | | | |
| | 2-2 | 0.0 | | 36.5' to 37' - Fine clayey sand layer. | | |
| | 3-2 | 0.0 | | Fine brown/gray slightly micaceous SAND with layers of clay. | | |
| | 3-2 | 0.0 | | | | |
| -40 | woh/2' | 0.0 | | | | |
| | woh/2' | 0.0 | | Dark gray CLAY with few fine sands and organics. Some silt. | | |
| | 3-2 | 0.0 | | | | |
| | 3-2 | 0.0 | | | | |
| | 3-3 | 0.0 | | Dark gray silty CLAY wtih 1" spaced fine sand laminations. Some woody layers. | | |
| -45 | 3-3 | 0.0 | | | | |
| | 5-6 | 0.0 | | | | |
| | 5-6 | 0.0 | | | | |
| | 4-5 | 0.0 | | Brown/gray fine SAND, trace clay and organic matter. | | |
| | 4-5 | 0.0 | | | | |
| -50 | 4-6 | 0.0 | | | | |
| | 4-6 | 0.6 | | | | |
| | 7-9 | 0.3 | | Sand grains increasing in size. | | |
| | 7-9 | 1.0 | | Brown/gray coarse SAND, slight odor, saturated. | | |
| | 2-4 | 0.0 | | Moist, gray plastic micaceous SILT to SILTY CLAY to 55.5'. 2" layer of coarse sand at 54.5'. | | |

Aquaterra Technologies, Inc.

# SUBSURFACE LOG: N-131
# AND WELL CONSTRUCTION: N-131

| Depth (feet) | Blow Counts | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| -55 | 2-8 | 0.2 | | | | |
| | 3-5 | 0.3 | | Gray/brown medium coarse SAND (mostly qtz with mica flakes) with trace fine gravels to 60.5'. 2" clay/silt lenses at 56.5' and 57.5'. Very weathered petroleum odors. Saturated. | | |
| | 6-11 | 1.2 | | | | |
| | 5-6 | 0.3 | | | | |
| | 0-2 | 0.4 | | | | |
| -60 | 2-2 | 0.0 | | | | |
| | | | | 60.5' to 61' soft clay and sand layer | | |
| | 2-2 | 0.1 | | Gray clayey SILT/silty CLAY with very fine sand laminations at 1 cm intervals. | | |
| | 2-2 | 0.5 | | Very loose/soft, wet clay/sand mixture to 63'4". 63'4" clayey silt with very fine sand (few irregular laminations). Layer of fine gravel near 64'. | | |
| | 2-2 | 0.2 | | | | |
| | 7-8 | 0.0 | | Finely laminated clayey SILTS and very fine SANDS. 1" wood layer at 64.5'. 1" coarse-grained weathered qtz-mica rock at 65.5'. | | |
| -65 | 2-2 | 0.2 | | | | |
| | 4-4 | 1.2 | | Coarse SAND and fine GRAVEL. Homogeneous with exception of band of larger gravel (~1") at 66.5'. Gravel is variable in color and composition: white, yellow, green, brown, orange, black - qtz, sandstone, qtzite, biotite. Few fines give overall gray appearance. | | |
| | 4-8 | 0.2 | | | | |
| | 8-8 | 0.1 | | 6" plastic sitly very fine SAND. Gray and red-brown fine to medium SAND grading to coarse sand at 69'4" and into GRAVEL at 69'8". | | |
| | 4-50 | 0.7 | | 3" of silty CLAY with few gravels. Bottom 1" of last spoon is fine grained black/white qtz-mica SCHIST. | Augered to 70', attempted another spoon 50/0" - schist in tip of spoon. | |
| -70 | | | | | | |

# MONITORING WELL LOG: N-132

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/13/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **25'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.2 | | Fill - gravel, brown/black sandy silt, dry | | | |
| | 1.2 | | | | | |
| | 2.3 | | Fill - gravel, brown/black silty sand, brick, dry | Sample taken 1-2' for laboratory analysis | | |
| | 3.2 | | | | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 15' riser | |
| -10 | 8.7 | | Brown/black silty sand, gravel, wet | | | |
| | 13.5 | | Brown/black silty clay, very moist to wet | | | |
| | 23.4 | | | | | |
| | 30.6 | | Brown/black silty sand, very moist to wet | | | |
| | 29.9 | | Brown/black sandy clay, very moist | | | |
| -15 | 30.4 | | | | | |
| | 30.2 | | Brown/black silty sand, moist | | | |
| | 2.0 | | Brown/black clay with organic matter, moist | | | |
| | 0.9 | | Brown/black sandy clay, moist | | | |
| | 0.8 | | Dark brown clay, trace sand | | | |
| -20 | 1.2 | | Dark brown clay, trace sand, organic matter, moist | | 10' screen | |
| | 0.9 | | | | | |
| | 3.2 | | Brown/black sand, trace clay, wet | | | |
| | 1.4 | | Same, increased clay content | | | |
| | 0.9 | | Brown/black sand and clay, wet | Auger complete to 25' | | |
| -25 | | | | | | |

# MONITORING WELL LOG: N-133

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/15/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **12'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.1 | | Fill - gravel, tan silty sand, dry | | | |
| | 2.9 | | Fill - brown/black silty sand, gravel, brick, dry | | | |
| | 6.7 | | Fill - brown/black silty sand, gravel, wood, dry | | | |
| | 11.9 | | Same, wet at 2' | Sample taken 1-2' for laboratory analysis | 2' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 215 | | Black sand and gravel, wet | | 10' screen | |
| | 185 | | | Auger complete to 12' | | |

# MONITORING WELL LOG: N-134

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/22/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **20'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - dark brown silty sand, gravel, brick | | | |
| | 0.0 | | | | | |
| | 0.0 | | | | | |
| | 0.0 | | | Sample taken 1-2' for laboratory analysis | | |
| -5 | | | | Previously cleared to 10', backfilled with sand | 10' riser | |
| -10 | 0.0 | | Tan/orange sandy clay and gravel, very moist to wet | | | |
| | 0.0 | | | | | |
| | 0.0 | | Reb/brown/orange sand and gravel, trace clay, very moist to wet | | | |
| | 0.0 | | | | | |
| | 0.0 | | | | | |
| -15 | 0.0 | | | | 10' screen | |
| | 0.0 | | Brown/red/orange sand and gravel, trace clay | | | |
| | 8.0 | | | | | |
| | 58.4 | | Gray/red sand and gravel, trace clay | | | |
| | 62.2 | | | Auger/boring complete to 20' | | |
| -20 | | | | | | |

# MONITORING WELL LOG: N-135

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/15/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **12'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - black/brown silty sand and gravel, dry | | | |
| | 0.7 | | | | | |
| | 1.2 | | Black sand and gravel, very moist | Sample taken 1-2' for laboratory analysis | | |
| | 2.3 | | Same, wet at 2' | | 2' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 57.1 | | Fill - gravel, wood, brick | | 10' screen | |
| | 69.3 | | | Auger complete to 12' | | |
| | 115 | | | | | |
| | 121 | | Black sandy clay, wet | Boring complete to 14' | | |

# MONITORING WELL LOG: N-136

| | | | |
|---|---|---|---|
| PROJECT: | **Sunoco Philadelphia Refinery** | DRILLING CO.: | **Parrat Wolff Inc.** |
| SITE LOCATION: | **AOI-8** | DRILLING METHOD: | **6" Hollow Stem Auger** |
| JOB NO.: | | SAMPLING METHOD: | **Split Spoon** |
| LOGGED BY: | **Shaun Sykes** | SCREEN/RISER DIAMETER: | **2"** |
| DATES DRILLED: | **5/15/2008** | WELLBORE DIAMETER: | **6"** |
| TOTAL DEPTH: | **12'** | ELEVATION: | |

| Depth (feet) | OVM (ppm) | USCS | LITHOLOGY | COMMENTS | WELL CONSTRUCTION | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| 0 | 0.0 | | Fill - gravel, brown sandy silt, slightly moist | | | |
| | 0.5 | | | | | |
| | 0.6 | | | Sample taken 1-2' for laboratory analysis | | |
| | 1.2 | | Brown/black silty sand and gravel, very moist | | 2' riser | |
| -5 | | | | Previously cleared to 10', backfilled with sand | | |
| -10 | 75.6 | | Black/gray sand and gravel, trace clay, wet | | 10' screen | |
| | 124 | | Black/gray sandy clay, wet | Auger complete to 12' | | |
| | 89.2 | | Black/gray sandy clay, very moist | | | |
| | 75.6 | | | Boring complete to 15' | | |
| | 64.2 | | | | | |
| -15 | | | | | | |

# APPENDIX C

## Soil and Groundwater Analytical Reports

Lancaster 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 for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1090076. Samples arrived at the laboratory on Wednesday, May 07, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| BH-08-31_1.0-2.0 Grab Soil | 5353907 |
| BH-08-33_1.5-2.0 Grab Soil | 5353908 |
| BH-08-34_1.5-2.0 Grab Soil | 5353909 |
| BH-08-29_1.0-2.0 Grab Soil | 5353910 |
| BH-08-15_1.0-2.0 Grab Soil | 5353911 |
| BH-08-35_1.0-2.0 Grab Soil | 5353912 |
| BH-08-14_1.0-2.0 Grab Soil | 5353913 |
| BH-08-27_1.0-2.0 Grab Soil | 5353914 |
| BH-08-13_1.0-2.0 Grab Soil | 5353915 |
| BH-08-28_1.0-2.0 Grab Soil | 5353916 |
| BH-08-12_1.0-2.0 Grab Soil | 5353917 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |

Lancaster 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 Heun at (717) 656-2300

Respectfully Submitted,

Michele M. Turner

Michele M. Turner
Director

Lancaster Laboratories

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

# Analysis Report



**Lancaster Laboratories Sample No. SW5353907 Group No. 1090076**

**BH-08-31_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-31_1.0-2.0**
Collected:05/06/2008 10:30 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH831

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 1,300. | 10.9 | mg/kg | 100 |
| 00111 | Moisture | n.a. | 9.4 | 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | 25,000. | 4,600. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 920. | 920. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | 2,000. | 920. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 26,000. | 4,600. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | 8,100. | 920. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 16,000. | 920. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 13,000. | 920. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 12,000. | 920. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 11,000. | 920. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 6,900. | 920. | ug/kg | 1 |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | ug/kg | 44.09 |
| 05460 | Benzene | 71-43-2 | < 240. | 240. | ug/kg | 44.09 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | ug/kg | 44.09 |
| 05466 | Toluene | 108-88-3 | < 240. | 240. | ug/kg | 44.09 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | ug/kg | 44.09 |
| 05474 | Ethylbenzene | 100-41-4 | < 240. | 240. | ug/kg | 44.09 |
| 05479 | Isopropylbenzene | 98-82-8 | < 240. | 240. | ug/kg | 44.09 |
| 06301 | Xylene (Total) | 1330-20-7 | < 240. | 240. | ug/kg | 44.09 |

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

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

Laboratory Chronicle

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353907 Group No. 1090076**

**BH-08-31_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-31_1.0-2.0**
Collected:05/06/2008 10:30 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH831

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 17:34 | James R Williams II | 100 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/13/2008 16:06 | Timothy J Trees | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/14/2008 09:59 | Linda M Hartenstine | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/14/2008 05:29 | Stephanie A Selis | 44.09 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 10:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353908** **Group No. 1090076**

**BH-08-33_1.5-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-33_1.5-2.0**
Collected:05/06/2008 10:40 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH833

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 172. | 1.15 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 13.9 | 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | 7,500. | 970. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | 360. | 190. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | 720. | 190. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 7,200. | 970. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | 1,700. | 190. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 4,600. | 970. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 4,300. | 190. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 5,400. | 970. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 3,600. | 190. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 2,300. | 190. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 280. | 280. | ug/kg | 47.53 |
| 05460 | Benzene | 71-43-2 | < 280. | 280. | ug/kg | 47.53 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 280. | 280. | ug/kg | 47.53 |
| 05466 | Toluene | 108-88-3 | < 280. | 280. | ug/kg | 47.53 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 280. | 280. | ug/kg | 47.53 |
| 05474 | Ethylbenzene | 100-41-4 | < 280. | 280. | ug/kg | 47.53 |
| 05479 | Isopropylbenzene | 98-82-8 | < 280. | 280. | ug/kg | 47.53 |
| 06301 | Xylene (Total) | 1330-20-7 | < 280. | 280. | ug/kg | 47.53 |

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353908 Group No. 1090076**

**BH-08-33_1.5-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-33_1.5-2.0**
Collected:05/06/2008 10:40 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH833

| | | | | | | |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 13:05 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/13/2008 19:13 | Timothy J Trees | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/14/2008 10:22 | Linda M Hartenstine | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/14/2008 05:52 | Stephanie A Selis | 47.53 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 10:40 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353909** **Group No. 1090076**

**BH-08-34_1.5-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-34_1.5-2.0**
Collected:05/06/2008 11:00 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH834

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 354. | 1.12 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 13.7 | 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | 63,000. | 9,700. | ug/kg | 50 |
| 03761 | Naphthalene | 91-20-3 | < 1,900. | 1,900. | ug/kg | 10 |
| 03768 | Fluorene | 86-73-7 | 8,000. | 1,900. | ug/kg | 10 |
| 03775 | Phenanthrene | 85-01-8 | 64,000. | 9,700. | ug/kg | 50 |
| 03776 | Anthracene | 120-12-7 | 18,000. | 1,900. | ug/kg | 10 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 37,000. | 1,900. | ug/kg | 10 |
| 03782 | Chrysene | 218-01-9 | 32,000. | 1,900. | ug/kg | 10 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 39,000. | 1,900. | ug/kg | 10 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 29,000. | 1,900. | ug/kg | 10 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 18,000. | 1,900. | ug/kg | 10 |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 260. | 260. | ug/kg | 45.13 |
| 05460 | Benzene | 71-43-2 | < 260. | 260. | ug/kg | 45.13 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 260. | 260. | ug/kg | 45.13 |
| 05466 | Toluene | 108-88-3 | < 260. | 260. | ug/kg | 45.13 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 260. | 260. | ug/kg | 45.13 |
| 05474 | Ethylbenzene | 100-41-4 | < 260. | 260. | ug/kg | 45.13 |
| 05479 | Isopropylbenzene | 98-82-8 | < 260. | 260. | ug/kg | 45.13 |
| 06301 | Xylene (Total) | 1330-20-7 | < 260. | 260. | ug/kg | 45.13 |

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353909 Group No. 1090076**

**BH-08-34_1.5-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-34_1.5-2.0**
Collected:05/06/2008 11:00 by SS Account Number: 10132

Submitted: 05/07/2008 17:25 SUN: Aquaterra Tech.
Reported: 05/19/2008 at 18:53 PO Box 744
Discard: 07/19/2008 West Chester PA 19381

BH834

| | | | | | | |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 13:14 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/13/2008 21:57 | Timothy J Trees | 10 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/14/2008 10:46 | Linda M Hartenstine | 50 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/14/2008 06:14 | Stephanie A Selis | 45.13 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 11:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353910** **Group No. 1090076**

**BH-08-29_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-29_1.0-2.0**
Collected:05/06/2008 11:10 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH829

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 96.4 | 1.10 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 12.4 | 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | < 190. | 190. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 190. | 190. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 190. | 190. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 190. | 190. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | < 190. | 190. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 190. | 190. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 190. | 190. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 190. | 190. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | ug/kg | 40.72 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | ug/kg | 40.72 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | ug/kg | 40.72 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | ug/kg | 40.72 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | ug/kg | 40.72 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | ug/kg | 40.72 |
| 05479 | Isopropylbenzene | 98-82-8 | < 230. | 230. | ug/kg | 40.72 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | ug/kg | 40.72 |

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353910 Group No. 1090076**

**BH-08-29_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-29_1.0-2.0**
Collected:05/06/2008 11:10 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH829

| | | | | | | |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 13:17 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/13/2008 22:20 | Timothy J Trees | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/14/2008 06:37 | Stephanie A Selis | 40.72 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 11:10 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353911** **Group No. 1090076**

**BH-08-15_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-15_1.0-2.0**
Collected:05/06/2008 12:25 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH815

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 22.8 | 1.13 | mg/kg | 10 |
| 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | < 190. | 190. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 190. | 190. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 190. | 190. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 190. | 190. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | < 190. | 190. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 190. | 190. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 190. | 190. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 190. | 190. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 200. | 200. | ug/kg | 34.44 |
| 05460 | Benzene | 71-43-2 | < 200. | 200. | ug/kg | 34.44 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 200. | 200. | ug/kg | 34.44 |
| 05466 | Toluene | 108-88-3 | < 200. | 200. | ug/kg | 34.44 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 200. | 200. | ug/kg | 34.44 |
| 05474 | Ethylbenzene | 100-41-4 | < 200. | 200. | ug/kg | 34.44 |
| 05479 | Isopropylbenzene | 98-82-8 | < 200. | 200. | ug/kg | 34.44 |
| 06301 | Xylene (Total) | 1330-20-7 | < 200. | 200. | ug/kg | 34.44 |

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353911 Group No. 1090076**

**BH-08-15_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-15_1.0-2.0**
Collected:05/06/2008 12:25 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH815

| | | | | | | |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 13:20 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/13/2008 22:44 | Timothy J Trees | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/15/2008 17:17 | Kerri E Koch | 34.44 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 12:25 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353912** **Group No. 1090076**

**BH-08-35_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-35_1.0-2.0**
Collected:05/06/2008 12:50 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH835

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 14.3 | 1.05 | mg/kg | 10 |
| 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | < 180. | 180. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 180. | 180. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 180. | 180. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 180. | 180. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 180. | 180. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 180. | 180. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | < 180. | 180. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 180. | 180. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 180. | 180. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 180. | 180. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 220. | 220. | ug/kg | 40.58 |
| 05460 | Benzene | 71-43-2 | < 220. | 220. | ug/kg | 40.58 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 220. | 220. | ug/kg | 40.58 |
| 05466 | Toluene | 108-88-3 | < 220. | 220. | ug/kg | 40.58 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 220. | 220. | ug/kg | 40.58 |
| 05474 | Ethylbenzene | 100-41-4 | < 220. | 220. | ug/kg | 40.58 |
| 05479 | Isopropylbenzene | 98-82-8 | < 220. | 220. | ug/kg | 40.58 |
| 06301 | Xylene (Total) | 1330-20-7 | < 220. | 220. | ug/kg | 40.58 |

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353912 Group No. 1090076**

**BH-08-35_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-35_1.0-2.0**
Collected:05/06/2008 12:50 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH835

| | | | | | | |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 13:23 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/14/2008 11:09 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/14/2008 07:21 | Stephanie A Selis | 40.58 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 12:50 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353913** **Group No. 1090076**

**BH-08-14_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-14_1.0-2.0**
Collected:05/06/2008 13:15 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH814

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 78.8 | 1.12 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 11.8 | 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | 270. | 190. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 330. | 190. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 190. | 190. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 190. | 190. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 250. | 190. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 190. | 190. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 190. | 190. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 190. | 190. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | ug/kg | 41.39 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | ug/kg | 41.39 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | ug/kg | 41.39 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | ug/kg | 41.39 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | ug/kg | 41.39 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | ug/kg | 41.39 |
| 05479 | Isopropylbenzene | 98-82-8 | < 230. | 230. | ug/kg | 41.39 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | ug/kg | 41.39 |

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353913 Group No. 1090076**

**BH-08-14_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-14_1.0-2.0**
Collected:05/06/2008 13:15 by SS Account Number: 10132

Submitted: 05/07/2008 17:25 SUN: Aquaterra Tech.
Reported: 05/19/2008 at 18:53 PO Box 744
Discard: 07/19/2008 West Chester PA 19381

BH814

| | | | | | | |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 13:26 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/14/2008 11:32 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/14/2008 07:44 | Stephanie A Selis | 41.39 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 13:15 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353914 Group No. 1090076**

**BH-08-27_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-27_1.0-2.0**
Collected:05/06/2008 13:45 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH827

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 89.7 | 1.09 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 10. | 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | 580. | 190. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 450. | 190. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 190. | 190. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 370. | 190. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 440. | 190. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 480. | 190. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 400. | 190. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 370. | 190. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 180. | 180. | ug/kg | 31.57 |
| 05460 | Benzene | 71-43-2 | < 180. | 180. | ug/kg | 31.57 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 180. | 180. | ug/kg | 31.57 |
| 05466 | Toluene | 108-88-3 | < 180. | 180. | ug/kg | 31.57 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 180. | 180. | ug/kg | 31.57 |
| 05474 | Ethylbenzene | 100-41-4 | < 180. | 180. | ug/kg | 31.57 |
| 05479 | Isopropylbenzene | 98-82-8 | < 180. | 180. | ug/kg | 31.57 |
| 06301 | Xylene (Total) | 1330-20-7 | < 180. | 180. | ug/kg | 31.57 |

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353914 Group No. 1090076**

**BH-08-27_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-27_1.0-2.0**
Collected:05/06/2008 13:45 by SS Account Number: 10132

Submitted: 05/07/2008 17:25 SUN: Aquaterra Tech.
Reported: 05/19/2008 at 18:53 PO Box 744
Discard: 07/19/2008 West Chester PA 19381

BH827

| | | | | | | |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 13:29 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/14/2008 11:56 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/14/2008 08:07 | Stephanie A Selis | 31.57 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 13:45 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353915 Group No. 1090076**

**BH-08-13_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-13_1.0-2.0**
Collected:05/06/2008 14:35 by SS Account Number: 10132

Submitted: 05/07/2008 17:25 SUN: Aquaterra Tech.
Reported: 05/19/2008 at 18:53 PO Box 744
Discard: 07/19/2008 West Chester PA 19381

BH813

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 314. | 1.14 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 14.8 | 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | 2,600. | 980. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 980. | 980. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 980. | 980. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 980. | 980. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 980. | 980. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 1,100. | 980. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 2,700. | 980. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 1,100. | 980. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 1,300. | 980. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 1,100. | 980. | ug/kg | 1 |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 190. | 190. | ug/kg | 33.2 |
| 05460 | Benzene | 71-43-2 | < 190. | 190. | ug/kg | 33.2 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 190. | 190. | ug/kg | 33.2 |
| 05466 | Toluene | 108-88-3 | < 190. | 190. | ug/kg | 33.2 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 190. | 190. | ug/kg | 33.2 |
| 05474 | Ethylbenzene | 100-41-4 | < 190. | 190. | ug/kg | 33.2 |
| 05479 | Isopropylbenzene | 98-82-8 | < 190. | 190. | ug/kg | 33.2 |
| 06301 | Xylene (Total) | 1330-20-7 | < 190. | 190. | ug/kg | 33.2 |

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353915 Group No. 1090076**

**BH-08-13_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-13_1.0-2.0**
Collected:05/06/2008 14:35 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH813

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 13:32 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/15/2008 04:09 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/14/2008 08:29 | Stephanie A Selis | 33.2 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 14:35 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353916 Group No. 1090076**

**BH-08-28_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-28_1.0-2.0**
Collected:05/06/2008 14:50 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH828

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 132. | 1.15 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 16.4 | 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | 1,100. | 1,000. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 1,000. | 1,000. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | 1,100. | 1,000. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 2,900. | 1,000. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 1,000. | 1,000. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 1,000. | 1,000. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 1,200. | 1,000. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 1,000. | 1,000. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 1,000. | 1,000. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 1,000. | 1,000. | ug/kg | 1 |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 270. | 270. | ug/kg | 44.8 |
| 05460 | Benzene | 71-43-2 | < 270. | 270. | ug/kg | 44.8 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 270. | 270. | ug/kg | 44.8 |
| 05466 | Toluene | 108-88-3 | < 270. | 270. | ug/kg | 44.8 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 270. | 270. | ug/kg | 44.8 |
| 05474 | Ethylbenzene | 100-41-4 | < 270. | 270. | ug/kg | 44.8 |
| 05479 | Isopropylbenzene | 98-82-8 | < 270. | 270. | ug/kg | 44.8 |
| 06301 | Xylene (Total) | 1330-20-7 | 670. | 270. | ug/kg | 44.8 |

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

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

Laboratory Chronicle

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353916** **Group No. 1090076**

**BH-08-28_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-28_1.0-2.0**
Collected:05/06/2008 14:50 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH828

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 13:35 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/15/2008 04:33 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/14/2008 09:14 | Stephanie A Selis | 44.8 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 14:50 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353917 Group No. 1090076**

**BH-08-12_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-12_1.0-2.0**
Collected:05/06/2008 15:10 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH812

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation | Units | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 1,250. | 11.6 | mg/kg | 100 |
| 00111 | Moisture | n.a. | 16.6 | 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. | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | |
| 01195 | Pyrene | 129-00-0 | 2,200. | 1,000. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | 2,700. | 1,000. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | 2,400. | 1,000. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 6,600. | 1,000. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | 1,500. | 1,000. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 1,000. | 1,000. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 1,900. | 1,000. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 1,000. | 1,000. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 1,000. | 1,000. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 1,000. | 1,000. | ug/kg | 1 |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 270. | 270. | ug/kg | 44.33 |
| 05460 | Benzene | 71-43-2 | 3,100. | 270. | ug/kg | 44.33 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 270. | 270. | ug/kg | 44.33 |
| 05466 | Toluene | 108-88-3 | 660. | 270. | ug/kg | 44.33 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 270. | 270. | ug/kg | 44.33 |
| 05474 | Ethylbenzene | 100-41-4 | 740. | 270. | ug/kg | 44.33 |
| 05479 | Isopropylbenzene | 98-82-8 | 1,500. | 270. | ug/kg | 44.33 |
| 06301 | Xylene (Total) | 1330-20-7 | 5,800. | 270. | ug/kg | 44.33 |

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

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

## Laboratory Chronicle

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. SW5353917 Group No. 1090076**

**BH-08-12_1.0-2.0 Grab Soil**
**Philadelphia Refinery A01-8**
**BH-08-12_1.0-2.0**
Collected:05/06/2008 15:10 by SS

Account Number: 10132

Submitted: 05/07/2008 17:25
Reported: 05/19/2008 at 18:53
Discard: 07/19/2008

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

BH812

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 17:36 | James R Williams II | 100 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/08/2008 16:23 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/15/2008 04:56 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/15/2008 18:02 | Kerri E Koch | 44.33 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/12/2008 20:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/06/2008 15:10 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/10/2008 20:20 | Patricia L Foreman | 1 |

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1090076
Reported: 05/19/08 at 06:53 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 | Report Units | LCS %REC | LCSD %REC | LCS/LCSD Limits | RPD | RPD Max |
|---|---|---|---|---|---|---|---|---|
| Batch number: 08129820005B | Sample number(s): 5353907-5353917 | | | | | | | |
| Moisture | | | | 100 | | 99-101 | | |
| Batch number: 081306150002A | Sample number(s): 5353907-5353917 | | | | | | | |
| Lead | < 0.100 | 0.100 | mg/kg | 111 | | 82-118 | | |
| Batch number: 08130SLA026 | Sample number(s): 5353907-5353917 | | | | | | | |
| Pyrene | < 170. | 170. | ug/kg | 92 | | 75-115 | | |
| Naphthalene | < 170. | 170. | ug/kg | 89 | | 73-106 | | |
| Fluorene | < 170. | 170. | ug/kg | 91 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | ug/kg | 98 | | 77-113 | | |
| Anthracene | < 170. | 170. | ug/kg | 93 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | ug/kg | 90 | | 73-112 | | |
| Chrysene | < 170. | 170. | ug/kg | 90 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | ug/kg | 86 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | ug/kg | 89 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | ug/kg | 88 | | 65-122 | | |
| Batch number: Q081351AA | Sample number(s): 5353907-5353910,5353912-5353916 | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | ug/kg | 94 | 94 | 72-117 | 0 | 30 |
| Benzene | < 250. | 250. | ug/kg | 94 | 96 | 84-115 | 2 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | ug/kg | 98 | 98 | 76-135 | 1 | 30 |
| Toluene | < 250. | 250. | ug/kg | 91 | 93 | 81-116 | 2 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | ug/kg | 93 | 91 | 77-114 | 1 | 30 |
| Ethylbenzene | < 250. | 250. | ug/kg | 90 | 91 | 82-115 | 1 | 30 |
| Isopropylbenzene | < 250. | 250. | ug/kg | 88 | 88 | 82-110 | 0 | 30 |
| Xylene (Total) | < 250. | 250. | ug/kg | 90 | 92 | 82-117 | 1 | 30 |
| Batch number: Q081361AA | Sample number(s): 5353911,5353917 | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | ug/kg | 102 | 102 | 72-117 | 0 | 30 |
| Benzene | < 250. | 250. | ug/kg | 104 | 104 | 84-115 | 0 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | ug/kg | 108 | 109 | 76-135 | 1 | 30 |
| Toluene | < 250. | 250. | ug/kg | 96 | 96 | 81-116 | 0 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | ug/kg | 96 | 96 | 77-114 | 0 | 30 |
| Ethylbenzene | < 250. | 250. | ug/kg | 94 | 95 | 82-115 | 2 | 30 |
| Isopropylbenzene | < 250. | 250. | ug/kg | 90 | 92 | 82-110 | 2 | 30 |
| Xylene (Total) | < 250. | 250. | ug/kg | 93 | 95 | 82-117 | 2 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|

*- 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: SUN: Aquaterra Tech. Group Number: 1090076
Reported: 05/19/08 at 06:53 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 |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08129820005B | Sample number(s): 5353907-5353917 BKG: P353871 | | | | | | | | |
| Moisture | | | | | | 57.6 | 57.5 | 0 | 15 |
| Batch number: 081306150002A | Sample number(s): 5353907-5353917 UNSPK: P357306 BKG: P357306 | | | | | | | | |
| Lead | -41570 (2) | 29412 (2) | 75-125 | 25* | 20 | 4,370. | 5,800. | 28* | 20 |
| Batch number: 08130SLA026 | Sample number(s): 5353907-5353917 UNSPK: 5353907 | | | | | | | | |
| Pyrene | -226 (2) | -688 (2) | 19-162 | 51* | 30 | | | | |
| Naphthalene | 96 | 94 | 29-140 | 2 | 30 | | | | |
| Fluorene | 69 | 31* | 42-139 | 24 | 30 | | | | |
| Phenanthrene | -218 (2) | -715 (2) | 1-181 | 53* | 30 | | | | |
| Anthracene | -33 (2) | -173 (2) | 34-148 | 42* | 30 | | | | |
| Benzo(a)anthracene | -184 (2) | -427 (2) | 20-156 | 45* | 30 | | | | |
| Chrysene | -90 (2) | -343 (2) | 19-158 | 50* | 30 | | | | |
| Benzo(b)fluoranthene | -39 (2) | -314 (2) | 13-161 | 55* | 30 | | | | |
| Benzo(a)pyrene | -90 (2) | -273 (2) | 24-154 | 42* | 30 | | | | |
| Benzo(g,h,i)perylene | -3* | -114* | 26-154 | 35* | 30 | | | | |

### 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: PAHs in Soil by GC/MS
Batch number: 08130SLA026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5353907 | 103 | 112 | 107 |
| 5353908 | 83 | 89 | 85 |
| 5353909 | 80 | 84 | 83 |
| 5353910 | 83 | 88 | 81 |
| 5353911 | 77 | 84 | 78 |
| 5353912 | 85 | 88 | 90 |
| 5353913 | 90 | 92 | 87 |
| 5353914 | 89 | 93 | 87 |
| 5353915 | 102 | 104 | 90 |
| 5353916 | 108 | 97 | 86 |
| 5353917 | 104 | 100 | 84 |
| Blank | 86 | 89 | 84 |
| LCS | 86 | 88 | 86 |
| MS | 94 | 99 | 97 |
| MSD | 98 | 107 | 98 |

*- 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: SUN: Aquaterra Tech. Group Number: 1090076
Reported: 05/19/08 at 06:53 PM

## Surrogate Quality Control

| | | | | |
|---|---|---|---|---|
| Limits: | 49-120 | 55-117 | 43-131 | |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081351AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5353907 | 98 | 97 | 88 | 83 |
| 5353908 | 94 | 92 | 87 | 83 |
| 5353909 | 82 | 79 | 73 | 67* |
| 5353910 | 86 | 84 | 80 | 75 |
| 5353912 | 84 | 81 | 78 | 73 |
| 5353913 | 87 | 85 | 78 | 78 |
| 5353914 | 82 | 79 | 75 | 70 |
| 5353915 | 79 | 77 | 70 | 71 |
| 5353916 | 74 | 72 | 68* | 124* |
| Blank | 92 | 92 | 86 | 82 |
| LCS | 98 | 97 | 94 | 94 |
| LCSD | 100 | 98 | 97 | 94 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081361AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5353911 | 88 | 84 | 75 | 72 |
| 5353917 | 81 | 76 | 58* | 63* |
| Blank | 102 | 102 | 92 | 86 |
| LCS | 99 | 98 | 91 | 91 |
| LCSD | 100 | 95 | 92 | 93 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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. # 10132 Group# 1090076 Sample # 5353907-17

**COC #** 183722

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

(1) Client: Aquaterra Tech Acct. #:

Project Name/#: Sun Refinery AOI-8 PWSID #:

Project Manager: Tiff Doerr P.O.#:

Sampler: Shaun Sykes Quote #:

Name of state where samples were collected: PA

| (2) Sample Identification | Date Collected | Time Collected | (3) # of containers | Matrix (4) Soil | Water | Other | Total # of Containers | (5) Analyses Requested — Preservation Codes: 8260B PAH6 | Lead | Moisture | PAHs by 6CIMS | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH-08-31_1.0-2.0 | 5/16/08 | 1030 | X | X | | | 2 | 1 | X | X | X | temp 1.1-1.3°C |
| BH-08-33_1.5-2.0 | 5/16/08 | 1040 | X | X | | | 2 | 1 | X | X | X | * pls copy Kevin Martin & Jason Logan * |
| BH-08-34_1.5-2.0 | 5/16/08 | 1100 | X | X | | | 2 | 1 | X | X | X | |
| BH-08-29_1.0-2.0 | 5/16/08 | 1110 | X | X | | | 2 | 1 | X | X | X | |
| BH-08-15_1.0-2.0 | 5/16/08 | 1225 | X | X | | | 2 | 1 | X | X | X | |
| BH-08-35_1.0-2.0 | 5/16/08 | 1250 | X | X | | | 2 | 1 | X | X | X | * analyses per Table provided |
| BH-08-14_1.0-2.0 | 5/16/08 | 1315 | X | X | | | 2 | 1 | X | X | X | |
| BH-08-27_1.0-2.0 | 5/16/08 | 1345 | X | X | | | 2 | 1 | X | X | X | |
| BH-08-13_1.0-2.0 | 5/16/08 | 1435 | X | X | | | 2 | 1 | X | X | X | * call Tiffani Doerr w questions * |
| BH-08-28_1.0-2.0 | 5/16/08 | 1450 | X | X | | | 2 | 1 | X | X | X | |

**For Lab Use Only**

FSC:

SCR#:

**Preservation Codes**

H=HCl T=Thiosulfate

N=$HNO_3$ B=NaOH

S=$H_2SO_4$ O=Other

(6) Preservation Codes

(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 |
|---|---|---|---|---|---|
| Shaun Sykes / AQUATERRA | 5/16/08 | 1730 | AQUATERRA FRIDGE | 5/16/08 | 1730 |
| AT FRIDGE | 5/17/08 | 1000 | Lisa [illegible] | 5/17/08 | 1000 |
| Lisa [illegible] | 5/17/08 | 1000 | Marvin McWilliams | 5/17/08 | 10:10 |
| Marvin McWilliams | 5/17/08 | 17:25 | | | |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| | | | [illegible] | 5/17/08 | 17:2[illegible] |

(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.

2102.03

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1090076 Sample # 5353907-17

**COC #** 183723

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

**For Lab Use Only**
FSC: _____
SCR#: _____

(1)
Client: _____ Acct. #: _____
Project Name/#: _____ PWSID #: _____
Project Manager: _____ P.O.#: _____
Sampler: Shaun Sykes Quote #: _____
Name of state where samples were collected: PA

(2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water | Other | Total # of Containers | (5) Analyses Requested / Preservation Codes: 8260B PAHs | Lead | Moisture | PAHs by 6C/MS

| Sample Identification | Date Collected | Time Collected | Grab | Composite | Soil | Water | Other | Total # of Containers | 8260B PAHs | Lead | Moisture | PAHs by 6C/MS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH-08-12_1.0-2.0 | 5/6/08 | 1510 | X | | X | | | 2 | 1 | X | X | X |

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

(6) Remarks

* pls copy Kevin Martin @ Jason @ Lagan *

* analyses per table provided *

temp 1.1-1.3

(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 |
|---|---|---|---|---|---|
| [illegible] / AQUATERRA | 5/6/08 | 1730 | AQUATERRA FRIDGE | 5/6/08 | 1730 |
| AT FRIDGE | 5/7/08 | 1000 | [illegible] Aquaterra | 5/7/08 | 1000 |
| [illegible] Aquaterra | 5/7/08 | 1050 | Maureen McFadden | 5/7/08 | 1050 |
| Maureen McFadden | 5/7/08 | 1725 | | | |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| | | | [illegible] | 5/7/08 | 1725 |

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1090550. Samples arrived at the laboratory on Friday, May 09, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| BH-08-16_1.0-2.0 Grab Soil | 5356699 |
| BH-08-18_1.0-2.0 Grab Soil | 5356700 |
| BH-08-17_1.0-2.0 Grab Soil | 5356701 |
| BH-08-21_1.0-2.0 Grab Soil | 5356702 |
| BH-08-11_1.0-2.0 Grab Soil | 5356703 |
| BH-08-25_1.0-2.0 Grab Soil | 5356704 |
| BH-08-03_1.0-2.0 Grab Soil | 5356705 |
| BH-08-22_1.0-2.0 Grab Soil | 5356706 |
| BH-08-24_1.0-2.0 Grab Soil | 5356707 |
| BH-08-23_1.0-2.0 Grab Soil | 5356708 |
| BH-08-10_1.0-2.0 Grab Soil | 5356709 |
| BH-08-09_1.0-2.0 Grab Soil | 5356710 |
| BH-08-08_1.0-2.0 Grab Soil | 5356711 |
| BH-08-02_1.0-2.0 Grab Soil | 5356712 |
| N-122_1.0-2.0 Grab Soil | 5356713 |
| BH-08-04_1.0-2.0 Grab Soil | 5356714 |
| BH-08-26_1.0-2.0 Grab Soil | 5356715 |
| BH-08-07_1.0-2.0 Grab Soil | 5356716 |
| N-112_1.0-2.0 Grab Soil | 5356717 |
| N-114_1.0-2.0 Grab Soil | 5356718 |
| BH-08-05_6.0-8.0 Grab Soil | 5356719 |

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# Analysis Report

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |

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

Respectfully Submitted,

Michele M. Turner

Michele M. Turner
Director

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5356699 SW  Group No. 1090550**

**BH-08-16_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-16**

Collected:05/07/2008 10:00  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-16

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 1,380. | 5.58 | 0.838 | mg/kg | 50 |
| 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.

07804 PAHs in Soil by GC/MS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 01195 | Pyrene | 129-00-0 | 15,000. | 9,700. | 1,900. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | 18,000. | 9,700. | 1,900. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | 21,000. | 9,700. | 1,900. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 58,000. | 9,700. | 1,900. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | 11,000. | 9,700. | 1,900. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 9,700. | 9,700. | 1,900. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 13,000. | 9,700. | 1,900. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 9,700. | 9,700. | 1,900. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 9,700. | 9,700. | 1,900. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 9,700. | 9,700. | 1,900. | ug/kg | 5 |

Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised.

Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained.

02308 UST-Leaded Soils by 8260B

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 260. | 260. | 26. | ug/kg | 45.45 |
| 05460 | Benzene | 71-43-2 | 3,100. | 260. | 26. | ug/kg | 45.45 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 260. | 260. | 53. | ug/kg | 45.45 |
| 05466 | Toluene | 108-88-3 | 4,200. | 260. | 53. | ug/kg | 45.45 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 260. | 260. | 53. | ug/kg | 45.45 |
| 05474 | Ethylbenzene | 100-41-4 | 6,600. | 260. | 53. | ug/kg | 45.45 |
| 05479 | Isopropylbenzene | 98-82-8 | 2,100. | 260. | 53. | ug/kg | 45.45 |
| 06301 | Xylene (Total) | 1330-20-7 | 34,000. | 260. | 53. | ug/kg | 45.45 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356699 SW  Group No. 1090550**

**BH-08-16_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-16**

Collected:05/07/2008 10:00  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-16

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/17/2008 09:42 | David K Beck | 50 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 16:09 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 15:44 | Kerri E Koch | 45.45 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 10:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356700 SW  Group No. 1090550**

**BH-08-18_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-18**

Collected:05/07/2008 08:45  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-18

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 22.2 | 1.13 | 0.169 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 11.5 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 940. | 940. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 940. | 940. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 940. | 940. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 940. | 940. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 940. | 940. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 940. | 940. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 940. | 940. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 940. | 940. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | 24. | ug/kg | 42.09 |
| 05460 | Benzene | 71-43-2 | < 240. | 240. | 24. | ug/kg | 42.09 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | 48. | ug/kg | 42.09 |
| 05466 | Toluene | 108-88-3 | < 240. | 240. | 48. | ug/kg | 42.09 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | 48. | ug/kg | 42.09 |
| 05474 | Ethylbenzene | 100-41-4 | < 240. | 240. | 48. | ug/kg | 42.09 |
| 05479 | Isopropylbenzene | 98-82-8 | < 240. | 240. | 48. | ug/kg | 42.09 |
| 06301 | Xylene (Total) | 1330-20-7 | < 240. | 240. | 48. | ug/kg | 42.09 |

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

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

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

**Lancaster Laboratories Sample No. 5356700 SW  Group No. 1090550**

**BH-08-18_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-18**

Collected:05/07/2008 08:45  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

08-18

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 16:12 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 17:21 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 16:28 | Kerri E Koch | 42.09 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 08:45 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356701 SW  Group No. 1090550**

**BH-08-17_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-17**

Collected:05/07/2008 09:15  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-17

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 102. | 1.16 | 0.174 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 990. | 990. | 200. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 990. | 990. | 200. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 990. | 990. | 200. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 990. | 990. | 200. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 990. | 990. | 200. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 990. | 990. | 200. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 990. | 990. | 200. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 990. | 990. | 200. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 990. | 990. | 200. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 990. | 990. | 200. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | 24. | ug/kg | 39.68 |
| 05460 | Benzene | 71-43-2 | < 240. | 240. | 24. | ug/kg | 39.68 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | 47. | ug/kg | 39.68 |
| 05466 | Toluene | 108-88-3 | < 240. | 240. | 47. | ug/kg | 39.68 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | 47. | ug/kg | 39.68 |
| 05474 | Ethylbenzene | 100-41-4 | < 240. | 240. | 47. | ug/kg | 39.68 |
| 05479 | Isopropylbenzene | 98-82-8 | < 240. | 240. | 47. | ug/kg | 39.68 |
| 06301 | Xylene (Total) | 1330-20-7 | < 240. | 240. | 47. | ug/kg | 39.68 |

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

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

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

**Lancaster Laboratories Sample No. 5356701 SW  Group No. 1090550**

**BH-08-17_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-17**

Collected:05/07/2008 09:15  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

08-17

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 16:40 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 17:44 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 16:51 | Kerri E Koch | 39.68 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 09:15 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356702 SW  Group No. 1090550**

**BH-08-21_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-21**

Collected:05/07/2008 09:30  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-21

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 540. | 1.15 | 0.172 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 9,700. | 4,800. | 960. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 250. | 250. | 25. | ug/kg | 44.01 |
| 05460 | Benzene | 71-43-2 | < 250. | 250. | 25. | ug/kg | 44.01 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 250. | 250. | 51. | ug/kg | 44.01 |
| 05466 | Toluene | 108-88-3 | < 250. | 250. | 51. | ug/kg | 44.01 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 250. | 250. | 51. | ug/kg | 44.01 |
| 05474 | Ethylbenzene | 100-41-4 | < 250. | 250. | 51. | ug/kg | 44.01 |
| 05479 | Isopropylbenzene | 98-82-8 | < 250. | 250. | 51. | ug/kg | 44.01 |
| 06301 | Xylene (Total) | 1330-20-7 | < 250. | 250. | 51. | ug/kg | 44.01 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356702 SW  Group No. 1090550**

**BH-08-21_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-21**

Collected:05/07/2008 09:30  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

08-21

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 16:43 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 18:08 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 17:13 | Kerri E Koch | 44.01 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 09:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356703 SW  Group No. 1090550**

**BH-08-11_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-11**

Collected:05/07/2008 10:15  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-11

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 131. | 1.16 | 0.174 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | 24. | ug/kg | 40.26 |
| 05460 | Benzene | 71-43-2 | 310. | 240. | 24. | ug/kg | 40.26 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | 48. | ug/kg | 40.26 |
| 05466 | Toluene | 108-88-3 | < 240. | 240. | 48. | ug/kg | 40.26 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | 48. | ug/kg | 40.26 |
| 05474 | Ethylbenzene | 100-41-4 | < 240. | 240. | 48. | ug/kg | 40.26 |
| 05479 | Isopropylbenzene | 98-82-8 | < 240. | 240. | 48. | ug/kg | 40.26 |
| 06301 | Xylene (Total) | 1330-20-7 | < 240. | 240. | 48. | ug/kg | 40.26 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356703 SW  Group No. 1090550**

**BH-08-11_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-11**

Collected:05/07/2008 10:15  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

08-11

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 16:46 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 2 | 05/13/2008 18:00 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 18:31 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 17:35 | Kerri E Koch | 40.26 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 10:15 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356704 SW  Group No. 1090550**

**BH-08-25_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-25**

Collected:05/07/2008 10:40  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-25

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 223. | 1.11 | 0.167 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 10.3 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 4,600. | 4,600. | 930. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 4,600. | 4,600. | 930. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 4,600. | 4,600. | 930. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 4,600. | 4,600. | 930. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 4,600. | 4,600. | 930. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 4,600. | 4,600. | 930. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 4,600. | 4,600. | 930. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 4,600. | 4,600. | 930. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,600. | 4,600. | 930. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,600. | 4,600. | 930. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 460. | 460. | 46. | ug/kg | 83.06 |
| 05460 | Benzene | 71-43-2 | < 460. | 460. | 46. | ug/kg | 83.06 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 460. | 460. | 93. | ug/kg | 83.06 |
| 05466 | Toluene | 108-88-3 | < 460. | 460. | 93. | ug/kg | 83.06 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 460. | 460. | 93. | ug/kg | 83.06 |
| 05474 | Ethylbenzene | 100-41-4 | < 460. | 460. | 93. | ug/kg | 83.06 |
| 05479 | Isopropylbenzene | 98-82-8 | < 460. | 460. | 93. | ug/kg | 83.06 |
| 06301 | Xylene (Total) | 1330-20-7 | < 460. | 460. | 93. | ug/kg | 83.06 |
| | The reporting limits for the GC/MS volatile compounds were raised due to the level of non-target compounds. | | | | | | |

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356704 SW  Group No. 1090550**

**BH-08-25_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-25**

Collected:05/07/2008 10:40  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

08-25

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 16:48 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 18:55 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 17:58 | Kerri E Koch | 83.06 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 10:40 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356705 SW  Group No. 1090550**

**BH-08-03_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-03**

Collected:05/07/2008 11:00  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

B0803

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 291. | 1.09 | 0.164 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 11.3 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 6,800. | 4,700. | 940. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 220. | 220. | 22. | ug/kg | 39.43 |
| 05460 | Benzene | 71-43-2 | 580. | 220. | 22. | ug/kg | 39.43 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 220. | 220. | 44. | ug/kg | 39.43 |
| 05466 | Toluene | 108-88-3 | 230. | 220. | 44. | ug/kg | 39.43 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 220. | 220. | 44. | ug/kg | 39.43 |
| 05474 | Ethylbenzene | 100-41-4 | < 220. | 220. | 44. | ug/kg | 39.43 |
| 05479 | Isopropylbenzene | 98-82-8 | 440. | 220. | 44. | ug/kg | 39.43 |
| 06301 | Xylene (Total) | 1330-20-7 | 340. | 220. | 44. | ug/kg | 39.43 |

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356705 SW  Group No. 1090550**

**BH-08-03_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-03**

Collected:05/07/2008 11:00  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

B0803

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 16:51 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 19:19 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 18:43 | Kerri E Koch | 39.43 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 11:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356706 SW  Group No. 1090550**

**BH-08-22_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-22**

Collected:05/07/2008 11:15  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-22

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 213. | 1.13 | 0.169 | mg/kg | 10 |
| 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.

07804 PAHs in Soil by GC/MS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 01195 | Pyrene | 129-00-0 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,800. | 4,800. | 960. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,800. | 4,800. | 960. | ug/kg | 5 |

Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised.

Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained.

02308 UST-Leaded Soils by 8260B

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 260. | 260. | 26. | ug/kg | 44.88 |
| 05460 | Benzene | 71-43-2 | < 260. | 260. | 26. | ug/kg | 44.88 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 260. | 260. | 52. | ug/kg | 44.88 |
| 05466 | Toluene | 108-88-3 | < 260. | 260. | 52. | ug/kg | 44.88 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 260. | 260. | 52. | ug/kg | 44.88 |
| 05474 | Ethylbenzene | 100-41-4 | < 260. | 260. | 52. | ug/kg | 44.88 |
| 05479 | Isopropylbenzene | 98-82-8 | < 260. | 260. | 52. | ug/kg | 44.88 |
| 06301 | Xylene (Total) | 1330-20-7 | < 260. | 260. | 52. | ug/kg | 44.88 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356706 SW  Group No. 1090550**

**BH-08-22_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-22**

Collected:05/07/2008 11:15  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

08-22

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 16:54 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 19:43 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 19:06 | Kerri E Koch | 44.88 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 11:15 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356707 SW  Group No. 1090550**

**BH-08-24_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-24**

Collected:05/07/2008 12:20  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-24

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 172. | 1.08 | 0.162 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 9.4 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 4,600. | 4,600. | 920. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 4,600. | 4,600. | 920. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 4,600. | 4,600. | 920. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 5,900. | 4,600. | 920. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 4,600. | 4,600. | 920. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 4,600. | 4,600. | 920. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 4,600. | 4,600. | 920. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 4,600. | 4,600. | 920. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,600. | 4,600. | 920. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,600. | 4,600. | 920. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 380. | 380. | 38. | ug/kg | 68.87 |
| 05460 | Benzene | 71-43-2 | < 380. | 380. | 38. | ug/kg | 68.87 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 380. | 380. | 76. | ug/kg | 68.87 |
| 05466 | Toluene | 108-88-3 | < 380. | 380. | 76. | ug/kg | 68.87 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 380. | 380. | 76. | ug/kg | 68.87 |
| 05474 | Ethylbenzene | 100-41-4 | < 380. | 380. | 76. | ug/kg | 68.87 |
| 05479 | Isopropylbenzene | 98-82-8 | 1,400. | 380. | 76. | ug/kg | 68.87 |
| 06301 | Xylene (Total) | 1330-20-7 | 600. | 380. | 76. | ug/kg | 68.87 |

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

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

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

**Lancaster Laboratories Sample No. 5356707 SW  Group No. 1090550**

**BH-08-24_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-24**

Collected:05/07/2008 12:20  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

08-24

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 16:57 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 20:06 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 19:28 | Kerri E Koch | 68.87 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 12:20 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356708 SW  Group No. 1090550**

**BH-08-23_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-23**

Collected:05/07/2008 12:40  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-23

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 374. | 1.17 | 0.175 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 15.9 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 5,000. | 5,000. | 990. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 5,000. | 5,000. | 990. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 5,000. | 5,000. | 990. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 5,000. | 5,000. | 990. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 5,000. | 5,000. | 990. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 5,000. | 5,000. | 990. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 5,000. | 5,000. | 990. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 5,000. | 5,000. | 990. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 5,000. | 5,000. | 990. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 5,000. | 5,000. | 990. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 180. | 180. | 18. | ug/kg | 30.64 |
| 05460 | Benzene | 71-43-2 | < 180. | 180. | 18. | ug/kg | 30.64 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 180. | 180. | 36. | ug/kg | 30.64 |
| 05466 | Toluene | 108-88-3 | < 180. | 180. | 36. | ug/kg | 30.64 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 180. | 180. | 36. | ug/kg | 30.64 |
| 05474 | Ethylbenzene | 100-41-4 | < 180. | 180. | 36. | ug/kg | 30.64 |
| 05479 | Isopropylbenzene | 98-82-8 | < 180. | 180. | 36. | ug/kg | 30.64 |
| 06301 | Xylene (Total) | 1330-20-7 | 200. | 180. | 36. | ug/kg | 30.64 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356708 SW  Group No. 1090550**

**BH-08-23_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-23**

Collected:05/07/2008 12:40  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-23

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 17:00 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 20:30 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 20:13 | Kerri E Koch | 30.64 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 12:40 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356709 SW  Group No. 1090550**

**BH-08-10_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-10**

Collected:05/07/2008 13:15  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-10

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 428. | 1.10 | 0.165 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 11.5 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 2,100. | 940. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 940. | 940. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 1,700. | 940. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 940. | 940. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 2,000. | 940. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 1,900. | 940. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 2,500. | 940. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 2,600. | 940. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 1,800. | 940. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 200. | 200. | 20. | ug/kg | 35.92 |
| 05460 | Benzene | 71-43-2 | < 200. | 200. | 20. | ug/kg | 35.92 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 200. | 200. | 41. | ug/kg | 35.92 |
| 05466 | Toluene | 108-88-3 | 420. | 200. | 41. | ug/kg | 35.92 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 200. | 200. | 41. | ug/kg | 35.92 |
| 05474 | Ethylbenzene | 100-41-4 | < 200. | 200. | 41. | ug/kg | 35.92 |
| 05479 | Isopropylbenzene | 98-82-8 | < 200. | 200. | 41. | ug/kg | 35.92 |
| 06301 | Xylene (Total) | 1330-20-7 | 360. | 200. | 41. | ug/kg | 35.92 |

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

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

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

**Lancaster Laboratories Sample No. 5356709 SW  Group No. 1090550**

**BH-08-10_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-10**

Collected:05/07/2008 13:15  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

08-10

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 17:02 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/20/2008 20:54 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 20:36 | Kerri E Koch | 35.92 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 13:15 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356710 SW  Group No. 1090550**

**BH-08-09_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-09**

Collected:05/07/2008 14:00  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-09

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 262. | 1.09 | 0.163 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 10.7 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 8,500. | 4,700. | 930. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | 5,900. | 4,700. | 930. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 4,700. | 4,700. | 930. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 8,500. | 4,700. | 930. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 4,700. | 4,700. | 930. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 4,700. | 4,700. | 930. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 6,900. | 4,700. | 930. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 6,300. | 4,700. | 930. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,700. | 4,700. | 930. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,700. | 4,700. | 930. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 400. | 400. | 40. | ug/kg | 71.63 |
| 05460 | Benzene | 71-43-2 | 3,200. | 400. | 40. | ug/kg | 71.63 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 400. | 400. | 80. | ug/kg | 71.63 |
| 05466 | Toluene | 108-88-3 | 990. | 400. | 80. | ug/kg | 71.63 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 400. | 400. | 80. | ug/kg | 71.63 |
| 05474 | Ethylbenzene | 100-41-4 | < 400. | 400. | 80. | ug/kg | 71.63 |
| 05479 | Isopropylbenzene | 98-82-8 | < 400. | 400. | 80. | ug/kg | 71.63 |
| 06301 | Xylene (Total) | 1330-20-7 | 3,200. | 400. | 80. | ug/kg | 71.63 |

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

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

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

**Lancaster Laboratories Sample No. 5356710 SW  Group No. 1090550**

**BH-08-09_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-09**

Collected:05/07/2008 14:00  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

08-09

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 17:05 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/21/2008 05:45 | Linda M Hartenstine | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 20:58 | Kerri E Koch | 71.63 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 14:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356711 SW  Group No. 1090550**

**BH-08-08_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-08**

Collected:05/07/2008 14:20  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

B0808

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 637. | 2.41 | 0.361 | mg/kg | 20 |
| 00111 | Moisture | n.a. | 17.7 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 7,200. | 5,100. | 1,000. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised.<br><br>Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 380. | 380. | 38. | ug/kg | 62.19 |
| 05460 | Benzene | 71-43-2 | 1,900. | 380. | 38. | ug/kg | 62.19 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 380. | 380. | 76. | ug/kg | 62.19 |
| 05466 | Toluene | 108-88-3 | < 380. | 380. | 76. | ug/kg | 62.19 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 380. | 380. | 76. | ug/kg | 62.19 |
| 05474 | Ethylbenzene | 100-41-4 | < 380. | 380. | 76. | ug/kg | 62.19 |
| 05479 | Isopropylbenzene | 98-82-8 | < 380. | 380. | 76. | ug/kg | 62.19 |
| 06301 | Xylene (Total) | 1330-20-7 | 620. | 380. | 76. | ug/kg | 62.19 |
| | Surrogate recoveries are outside of QC limits for the GC/MS volatile fraction. The analysis was repeated and the reanalysis surrogate recoveries are also out of specification indicating a matrix effect. An internal standard peak area was also outside the QC limits for the re-analysis. | | | | | | |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356711 SW  Group No. 1090550**

**BH-08-08_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-08**

Collected:05/07/2008 14:20  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

B0808

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/17/2008 09:45 | David K Beck | 20 |
| 00111 | Moisture | SM20 2540 G | 2 | 05/13/2008 18:00 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/21/2008 06:08 | Linda M Hartenstine | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 14:41 | Nicholas R Rossi | 62.19 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 14:20 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356712 SW  Group No. 1090550**

**BH-08-02_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-02**

Collected:05/07/2008 14:50  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-02

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 138. | 1.11 | 0.167 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 11.9 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 950. | 950. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 950. | 950. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 950. | 950. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 950. | 950. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 950. | 950. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 950. | 950. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 950. | 950. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 950. | 950. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 950. | 950. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 950. | 950. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | 23. | ug/kg | 39.81 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | 23. | ug/kg | 39.81 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | 45. | ug/kg | 39.81 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | 45. | ug/kg | 39.81 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | 45. | ug/kg | 39.81 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | 45. | ug/kg | 39.81 |
| 05479 | Isopropylbenzene | 98-82-8 | < 230. | 230. | 45. | ug/kg | 39.81 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | 45. | ug/kg | 39.81 |

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

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

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

**Lancaster Laboratories Sample No. 5356712 SW  Group No. 1090550**

**BH-08-02_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-02**

Collected:05/07/2008 14:50  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

08-02

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 17:17 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/21/2008 06:32 | Linda M Hartenstine | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 15:04 | Nicholas R Rossi | 39.81 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 14:50 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356713 SW  Group No. 1090550**

**N-122_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 N-122**

Collected:05/07/2008 09:05  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

N-122

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 207. | 1.11 | 0.166 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 11.3 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 1,200. | 940. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | 980. | 940. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 2,100. | 940. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | 2,100. | 940. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 940. | 940. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 940. | 940. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 940. | 940. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 940. | 940. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 200. | 200. | 20. | ug/kg | 35.06 |
| 05460 | Benzene | 71-43-2 | < 200. | 200. | 20. | ug/kg | 35.06 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 200. | 200. | 40. | ug/kg | 35.06 |
| 05466 | Toluene | 108-88-3 | < 200. | 200. | 40. | ug/kg | 35.06 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 200. | 200. | 40. | ug/kg | 35.06 |
| 05474 | Ethylbenzene | 100-41-4 | < 200. | 200. | 40. | ug/kg | 35.06 |
| 05479 | Isopropylbenzene | 98-82-8 | < 200. | 200. | 40. | ug/kg | 35.06 |
| 06301 | Xylene (Total) | 1330-20-7 | < 200. | 200. | 40. | ug/kg | 35.06 |

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

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

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

**Lancaster Laboratories Sample No. 5356713 SW  Group No. 1090550**

**N-122_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 N-122**

Collected:05/07/2008 09:05  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

N-122

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 17:19 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/21/2008 06:56 | Linda M Hartenstine | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 15:26 | Nicholas R Rossi | 35.06 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/07/2008 09:05 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356714 SW  Group No. 1090550**

**BH-08-04_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-04**

Collected:05/08/2008 08:45  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

B0804

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 829. | 2.41 | 0.362 | mg/kg | 20 |
| 00111 | Moisture | n.a. | 17.9 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 10,000. | 10,000. | 2,000. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | 12,000. | 10,000. | 2,000. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 10,000. | 10,000. | 2,000. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 20,000. | 10,000. | 2,000. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 10,000. | 10,000. | 2,000. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 10,000. | 10,000. | 2,000. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 10,000. | 10,000. | 2,000. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 10,000. | 10,000. | 2,000. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 10,000. | 10,000. | 2,000. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 10,000. | 10,000. | 2,000. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 270. | 270. | 27. | ug/kg | 43.71 |
| 05460 | Benzene | 71-43-2 | 3,300. | 270. | 27. | ug/kg | 43.71 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 270. | 270. | 53. | ug/kg | 43.71 |
| 05466 | Toluene | 108-88-3 | 590. | 270. | 53. | ug/kg | 43.71 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 270. | 270. | 53. | ug/kg | 43.71 |
| 05474 | Ethylbenzene | 100-41-4 | 8,400. | 270. | 53. | ug/kg | 43.71 |
| 05479 | Isopropylbenzene | 98-82-8 | 2,400. | 270. | 53. | ug/kg | 43.71 |
| 06301 | Xylene (Total) | 1330-20-7 | 32,000. | 2,700. | 530. | ug/kg | 437.06 |

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

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

**Lancaster Laboratories Sample No. 5356714 SW  Group No. 1090550**

**BH-08-04_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-04**

Collected:05/08/2008 08:45  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

B0804

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/17/2008 09:55 | David K Beck | 20 |
| 00111 | Moisture | SM20 2540 G | 2 | 05/13/2008 16:38 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/21/2008 07:20 | Linda M Hartenstine | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 16:56 | Nicholas R Rossi | 43.71 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 17:18 | Nicholas R Rossi | 437.06 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/08/2008 08:45 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356715 SW  Group No. 1090550**

**BH-08-26_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-26**

Collected:05/08/2008 09:00  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-26

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 261. | 1.13 | 0.170 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,900. | 4,900. | 980. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 210. | 210. | 21. | ug/kg | 35.31 |
| 05460 | Benzene | 71-43-2 | 9,000. | 210. | 21. | ug/kg | 35.31 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 210. | 210. | 42. | ug/kg | 35.31 |
| 05466 | Toluene | 108-88-3 | < 210. | 210. | 42. | ug/kg | 35.31 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 210. | 210. | 42. | ug/kg | 35.31 |
| 05474 | Ethylbenzene | 100-41-4 | < 210. | 210. | 42. | ug/kg | 35.31 |
| 05479 | Isopropylbenzene | 98-82-8 | 660. | 210. | 42. | ug/kg | 35.31 |
| 06301 | Xylene (Total) | 1330-20-7 | < 210. | 210. | 42. | ug/kg | 35.31 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356715 SW  Group No. 1090550**

**BH-08-26_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-26**

Collected:05/08/2008 09:00  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

08-26

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 17:25 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/21/2008 07:44 | Linda M Hartenstine | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 15:49 | Nicholas R Rossi | 35.31 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/08/2008 09:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356716 SW  Group No. 1090550**

**BH-08-07_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-07**

Collected:05/08/2008 09:15  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

B0807

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 519. | 1.18 | 0.177 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 17.6 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 5,900. | 5,100. | 1,000. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | 15,000. | 5,100. | 1,000. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | 12,000. | 5,100. | 1,000. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 34,000. | 5,100. | 1,000. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 5,100. | 5,100. | 1,000. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 250. | 250. | 25. | ug/kg | 41.12 |
| 05460 | Benzene | 71-43-2 | 1,400. | 250. | 25. | ug/kg | 41.12 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 250. | 250. | 50. | ug/kg | 41.12 |
| 05466 | Toluene | 108-88-3 | 470. | 250. | 50. | ug/kg | 41.12 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 250. | 250. | 50. | ug/kg | 41.12 |
| 05474 | Ethylbenzene | 100-41-4 | 8,400. | 250. | 50. | ug/kg | 41.12 |
| 05479 | Isopropylbenzene | 98-82-8 | 3,800. | 250. | 50. | ug/kg | 41.12 |
| 06301 | Xylene (Total) | 1330-20-7 | 28,000. | 2,500. | 500. | ug/kg | 411.18 |

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

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

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

**Lancaster Laboratories Sample No. 5356716 SW  Group No. 1090550**

**BH-08-07_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-07**

Collected:05/08/2008 09:15  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

B0807

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 17:28 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/21/2008 08:08 | Linda M Hartenstine | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 17:40 | Nicholas R Rossi | 41.12 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 18:03 | Nicholas R Rossi | 411.18 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/08/2008 09:15 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356717 SW  Group No. 1090550**

**N-112_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 N-112**

Collected:05/08/2008 14:20  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

N-112

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 11.6 | 1.16 | 0.173 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 200. | 200. | 39. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 200. | 200. | 39. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 200. | 200. | 39. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 200. | 200. | 39. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 200. | 200. | 39. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 200. | 200. | 39. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | < 200. | 200. | 39. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 200. | 200. | 39. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 200. | 200. | 39. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 200. | 200. | 39. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 440. | 440. | 44. | ug/kg | 73.96 |
| 05460 | Benzene | 71-43-2 | < 440. | 440. | 44. | ug/kg | 73.96 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 440. | 440. | 87. | ug/kg | 73.96 |
| 05466 | Toluene | 108-88-3 | < 440. | 440. | 87. | ug/kg | 73.96 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 440. | 440. | 87. | ug/kg | 73.96 |
| 05474 | Ethylbenzene | 100-41-4 | < 440. | 440. | 87. | ug/kg | 73.96 |
| 05479 | Isopropylbenzene | 98-82-8 | < 440. | 440. | 87. | ug/kg | 73.96 |
| 06301 | Xylene (Total) | 1330-20-7 | < 440. | 440. | 87. | ug/kg | 73.96 |

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

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

## Laboratory Chronicle

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356717 SW  Group No. 1090550**

**N-112_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 N-112**

Collected:05/08/2008 14:20  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

N-112

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 17:31 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 2 | 05/13/2008 16:38 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/21/2008 08:31 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 16:11 | Nicholas R Rossi | 73.96 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/08/2008 14:20 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356718 SW  Group No. 1090550**

**N-114_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 N-114**

Collected:05/08/2008 14:50  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

N-114

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 139. | 1.11 | 0.167 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 11.0 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 13,000. | 4,700. | 940. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | 10,000. | 4,700. | 940. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 26,000. | 4,700. | 940. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 6,900. | 4,700. | 940. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,700. | 4,700. | 940. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | 24. | ug/kg | 42.66 |
| 05460 | Benzene | 71-43-2 | 510. | 240. | 24. | ug/kg | 42.66 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | 48. | ug/kg | 42.66 |
| 05466 | Toluene | 108-88-3 | 420. | 240. | 48. | ug/kg | 42.66 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | 48. | ug/kg | 42.66 |
| 05474 | Ethylbenzene | 100-41-4 | 250. | 240. | 48. | ug/kg | 42.66 |
| 05479 | Isopropylbenzene | 98-82-8 | 590. | 240. | 48. | ug/kg | 42.66 |
| 06301 | Xylene (Total) | 1330-20-7 | 690. | 240. | 48. | ug/kg | 42.66 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356718 SW  Group No. 1090550**

**N-114_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 N-114**

Collected:05/08/2008 14:50  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20
Reported: 05/22/2008 at 17:49
Discard: 07/22/2008

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

N-114

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/18/2008 14:34 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 17:13 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/21/2008 08:55 | Linda M Hartenstine | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/16/2008 16:33 | Nicholas R Rossi | 42.66 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/14/2008 20:40 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/08/2008 14:50 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/15/2008 02:00 | David V Hershey Jr | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5356719 SW  Group No. 1090550**

**BH-08-05_6.0-8.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC:  183724 BH-08-05**

Collected:05/08/2008 13:50  by SS  Account Number: 10132

Submitted: 05/09/2008 15:20  SUN: Aquaterra Tech.
Reported: 05/22/2008 at 17:49  PO Box 744
Discard: 07/22/2008  West Chester PA 19381

B0805

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 63.4 | 1.35 | 0.203 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 27.6 | 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.

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/15/2008 16:28 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/12/2008 15:01 | Scott W Freisher | 1 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/13/2008 20:10 | Annamaria Stipkovits | 1 |

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

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1090550
Reported: 05/22/08 at 05:49 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: 08133820005A | Sample number(s): 5356719 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08133820006A | Sample number(s): 5356699-5356702,5356704-5356708 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08133820006B | Sample number(s): 5356709-5356710,5356712-5356713,5356715-5356716,5356718 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 081346150002A | Sample number(s): 5356699-5356717,5356719 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 111 | | 82-118 | | |
| Batch number: 08134820002A | Sample number(s): 5356703 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08134820002B | Sample number(s): 5356711 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08134820003A | Sample number(s): 5356714 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08134820003B | Sample number(s): 5356717 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 081356150001A | Sample number(s): 5356718 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 104 | | 82-118 | | |
| Batch number: 08135SLD026 | Sample number(s): 5356699-5356718 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 104 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 89 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 105 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 108 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 102 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 104 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 101 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 115 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 113 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 109 | | 65-122 | | |
| Batch number: Q081371AA | Sample number(s): 5356699-5356710 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 110 | 105 | 72-117 | 4 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 110 | 105 | 84-115 | 4 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 116 | 110 | 76-135 | 5 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 97 | 93 | 81-116 | 4 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 96 | 94 | 77-114 | 2 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 94 | 92 | 82-115 | 3 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 92 | 90 | 82-110 | 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: 1090550
Reported: 05/22/08 at 05:49 PM

### Laboratory Compliance Quality Control

| Analysis Name | Blank Result | Blank LOQ** | Blank MDL | Report Units | LCS %REC | LCSD %REC | LCS/LCSD Limits | RPD | RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 95 | 92 | 82-117 | 3 | 30 |
| Batch number: R081371AA | Sample number(s): 5356711-5356718 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 89 | 89 | 72-117 | 0 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 95 | 93 | 84-115 | 2 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 93 | 95 | 76-135 | 2 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 100 | 99 | 81-116 | 1 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 99 | 98 | 77-114 | 1 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 99 | 98 | 82-115 | 1 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 100 | 98 | 82-110 | 2 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 99 | 98 | 82-117 | 1 | 30 |

### Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08133820005A | Sample number(s): 5356719 BKG: P355918 | | | | | | | | |
| Moisture | | | | | | 41.0 | 41.5 | 1 | 15 |
| Batch number: 08133820006A | Sample number(s): 5356699-5356702,5356704-5356708 BKG: 5356701 | | | | | | | | |
| Moisture | | | | | | 15.6 | 15.0 | 4 | 15 |
| Batch number: 08133820006B | Sample number(s): 5356709-5356710,5356712-5356713,5356715-5356716,5356718 BKG: P356714 | | | | | | | | |
| Moisture | | | | | | 14.2 | 17.1 | 19* | 15 |
| Batch number: 081346150002A | Sample number(s): 5356699-5356717,5356719 UNSPK: 5356700 BKG: 5356700 | | | | | | | | |
| Lead | 214 (2) | 154 (2) | 75-125 | 4 | 20 | 19.6 | 20.2 | 3 | 20 |
| Batch number: 08134820002A | Sample number(s): 5356703 BKG: 5356703 | | | | | | | | |
| Moisture | | | | | | 15.3 | 16.8 | 9 | 15 |
| Batch number: 08134820002B | Sample number(s): 5356711 BKG: 5356711 | | | | | | | | |
| Moisture | | | | | | 17.7 | 17.5 | 1 | 15 |
| Batch number: 08134820003A | Sample number(s): 5356714 BKG: 5356714 | | | | | | | | |
| Moisture | | | | | | 17.9 | 18.3 | 2 | 15 |
| Batch number: 08134820003B | Sample number(s): 5356717 BKG: 5356717 | | | | | | | | |
| Moisture | | | | | | 15.2 | 15.9 | 4 | 15 |
| Batch number: 081356150001A | Sample number(s): 5356718 UNSPK: P356481 BKG: P356481 | | | | | | | | |
| Lead | -7815 (2) | -8833 (2) | 75-125 | 52* | 20 | 155. | 31.4 | 132* | 20 |
| Batch number: 08135SLD026 | Sample number(s): 5356699-5356718 UNSPK: 5356699 | | | | | | | | |
| Pyrene | 171 (2) | 210 (2) | 19-162 | 4 | 30 | | | | |
| Naphthalene | 126 (2) | 152 (2) | 29-140 | 2 | 30 | | | | |
| Fluorene | 172 (2) | 207 (2) | 42-139 | 3 | 30 | | | | |
| Phenanthrene | 207 (2) | 316 (2) | 1-181 | 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: 1090550
Reported: 05/22/08 at 05:49 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 |
|---|---|---|---|---|---|---|---|---|---|
| Anthracene | 119 (2) | 96 (2) | 34-148 | 4 | 30 | | | | |
| Benzo(a)anthracene | 112 | 150 | 20-156 | 8 | 30 | | | | |
| Chrysene | 171 (2) | 168 (2) | 19-158 | 0 | 30 | | | | |
| Benzo(b)fluoranthene | 131 | 147 | 13-161 | 5 | 30 | | | | |
| Benzo(a)pyrene | 129 | 102 | 24-154 | 8 | 30 | | | | |
| Benzo(g,h,i)perylene | 129 | 110 | 26-154 | 8 | 30 | | | | |

### 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: PAHs in Soil by GC/MS
Batch number: 08135SLD026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5356699 | 110 | 119* | 116 |
| 5356700 | 96 | 104 | 91 |
| 5356701 | 95 | 102 | 90 |
| 5356702 | 109 | 120* | 102 |
| 5356703 | 95 | 101 | 92 |
| 5356704 | 114 | 109 | 102 |
| 5356705 | 112 | 124* | 103 |
| 5356706 | 126* | 129* | 115 |
| 5356707 | 109 | 119* | 107 |
| 5356708 | 119 | 113 | 94 |
| 5356709 | 91 | 98 | 85 |
| 5356710 | 55 | 61 | 55 |
| 5356711 | 100 | 108 | 97 |
| 5356712 | 100 | 106 | 96 |
| 5356713 | 100 | 103 | 92 |
| 5356714 | 132* | 126* | 117 |
| 5356715 | 104 | 113 | 111 |
| 5356716 | 139* | 102 | 84 |
| 5356717 | 90 | 93 | 75 |
| 5356718 | 163* | 133* | 111 |
| Blank | 93 | 97 | 88 |
| LCS | 92 | 99 | 90 |
| MS | 112 | 113 | 119 |
| MSD | 108 | 107 | 107 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081371AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5356699 | 78 | 76 | 61* | 66* |
| 5356700 | 89 | 88 | 72 | 71 |
| 5356701 | 87 | 86 | 69* | 67* |

*- 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: 1090550
Reported: 05/22/08 at 05:49 PM

### Surrogate Quality Control

| | | | | |
|---|---|---|---|---|
| 5356702 | 84 | 81 | 62* | 62* |
| 5356703 | 85 | 84 | 69* | 61* |
| 5356704 | 86 | 86 | 74 | 73 |
| 5356705 | 90 | 87 | 81 | 76 |
| 5356706 | 91 | 88 | 72 | 72 |
| 5356707 | 97 | 93 | 76 | 101 |
| 5356708 | 93 | 90 | 74 | 83 |
| 5356709 | 89 | 79 | 68* | 64* |
| 5356710 | 79 | 67* | 49* | 39* |
| Blank | 106 | 105 | 91 | 87 |
| LCS | 106 | 102 | 92 | 92 |
| LCSD | 101 | 99 | 88 | 89 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: R081371AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5356711 | 61* | 57* | 50* | 39* |
| 5356712 | 77 | 75 | 77 | 77 |
| 5356713 | 73 | 71 | 74 | 76 |
| 5356714 | 56* | 56* | 46* | 50* |
| 5356715 | 72 | 70 | 70 | 68* |
| 5356716 | 59* | 59* | 59* | 66* |
| 5356717 | 74 | 74 | 48* | 21* |
| 5356718 | 71 | 71 | 78 | 106 |
| Blank | 85 | 87 | 88 | 87 |
| LCS | 83 | 82 | 87 | 91 |
| LCSD | 83 | 83 | 86 | 89 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1090550 Sample # 5356699-719

**COC # 183724**

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

**For Lab Use Only**
FSC:
SCR#:

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHIL REF-AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES 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: Soil | Water (Potable / Non-Potable) | Other | (4) Total # of Containers | 8260B PAVG | Lead | Moisture | PAHs by GC/MS 8270 | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH-08-16_1.0-2.0 | 5/7/08 | 1000 | X | | X | | | 2 | 1 | X | X | X | | | | | temp 1.9-2.1°C |
| BH-08-18_1.0-2.0 | | 845 | X | | X | | | 2 | 1 | X | X | X | | | | | |
| BH-08-17_1.0-2.0 | | 915 | X | | X | | | 2 | 1 | X | X | X | | | | | * Pls copy |
| BH-08-21_1.0-2.0 | | 930 | X | | X | | | 2 | 1 | X | X | X | | | | | Kevin Martin & |
| BH-08-11_1.0-2.0 | | 1015 | X | | X | | | 2 | 1 | X | X | X | | | | | Jason @ Langan |
| BH-08-25_1.0-2.0 | | 1040 | X | | X | | | 2 | 1 | X | X | X | | | | | |
| BH-08-03_1.0-2.0 | | 1100 | X | | X | | | 2 | 1 | X | X | X | | | | | * Analyses per table |
| BH-08-22_1.0-2.0 | | 1115 | X | | X | | | 2 | 1 | X | X | X | | | | | provided |
| BH-08-24_1.0-2.0 | | 1220 | X | | X | | | 2 | 1 | X | X | X | | | | | |
| BH-08-23_1.0-2.0 | | 1240 | X | | X | | | 2 | 1 | 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] / AQUATERRA | 5/7/08 | 1730 | AQUATERRA FRIDGE | 5/7/08 | 1730 |
| [signature] | 5/9/08 | 0950 | Erma Dellman | 5/9/08 | 9:50 |
| Erma Dellman | 5/9/08 | 15:20 | | | |
| | | | | | |
| | | | [signature] | 5/9/08 | 1520 |

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2102.03

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1090550 Sample # 5356699-719

**COC # 183725**

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

**For Lab Use Only**
FSC:
SCR#:

(1) Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILREF-AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water | Other | Total # of Containers | (5) Analyses Requested / Preservation Codes: 8260B PAH's | Lead | Moisture | PAHs by GC/MS 8270 | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH-08-10_1.0-2.0 | 5/7/08 | 1315 | X | | X | | | 2 | X | X | X | X | temp 1.9-2.1°C |
| BH-08-09_1.0-2.0 | 5/7/08 | 1400 | X | | X | | | 2 | X | X | X | X | * pls copy Kevin Martin & Jason @ Langan |
| BH-08-08_1.0-2.0 | 5/7/08 | 1420 | X | | X | | | 2 | X | X | X | X | |
| BH-08-02_1.0-2.0 | 5/7/08 | 1450 | X | | X | | | 2 | X | X | X | X | * Analyses per table provided |
| N-122_1.0-2.0 | 5/7/08 | 905 | X | | X | | | 2 | X | X | X | X | |

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

(6) Temperature upon receipt

(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] / AQUATERRA | 5/7/08 | 1730 | AQUATERRA FRIDGE | 5/7/08 | 1730 |
| [signature] | 5/8/08 | 0950 | Erma Hellman | 5/8/08 | 9:50 |
| Erma Hellman | 5/9/08 | 1520 | | | |
| | | | | | |
| | | | [signature] | 5/6/08 | 1520 |

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# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1090550 Sample # 5356699-719 **COC #** 183726

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

**For Lab Use Only**
FSC: _____
SCR#: _____

(1)
Client: SUN-AQUATERRA Acct. #: _____
Project Name/#: PHILA REF-AOI-8 PWSID #: _____
Project Manager: T. DOERR P.O.#: _____
Sampler: S. SYKES 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 (Check if Applicable) | Other | Total # of Containers | 8260B PAVG | Moisture | Lead | PAHs by GC/MS 8270 | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH-08-04_1.0-2.0 | 5/8/08 | 845 | X | | X | | | 2 | X | X | X | X | | | | | *Pls copy Kevin Martin |
| BH-08-26_1.0-2.0 | | 900 | X | | X | | | 2 | X | X | X | X | | | | | + Jason O'Langan |
| BH-08-07_1.0-2.0 | | 915 | X | | X | | | 2 | X | X | X | X | | | | | |
| N-112_1.0-2.0 | | 1420 | X | | X | | | 2 | X | X | X | X | | | | | *Analyses per table |
| N-114_1.0-2.0 | | 1450 | X | | X | | | 2 | X | X | X | X | | | | | provided |
| BH-08-05_6.0-8.0 | | 1350 | X | | X | | | 1 | | | X | | | | | | *Hold for TCLP Analysis |
| | | | | | | | | | | | | | | | | | (BH-08-05) |
| | | | | | | | | | | | | | | | | | temp 1.9-2.1°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) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)

SDG Complete? Yes No

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

(9)

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| [signature] / AQUATERRA | 5/8/08 | 1700 | AQUATERRA FRIDGE | 5/8/08 | 1700 |
| [signature] | 5/9/08 | 0950 | Erma Dellman | 5/9/08 | 9:50 |
| Erma Dellman | 5/9/08 | 15:20 | | | |
| | | | | | |
| | | | [signature] | 5/9/08 | 1520 |

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# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1091319. Samples arrived at the laboratory on Wednesday, May 14, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-132_1.0-2.0 Grab Soil | 5361075 |

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

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# Analysis Report

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

Respectfully Submitted,

Michele M. Turner

Michele M. Turner
Director

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5361075 SW  Group No. 1091319**

**N-132_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183729 N-132_1.0-2.0**

Collected:05/13/2008 08:00  by SS  Account Number: 10132

Submitted: 05/14/2008 16:45
Reported: 05/30/2008 at 11:29
Discard: 07/30/2008

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

N-132

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 94.9 | 1.11 | 0.166 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 11.6 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 9,400. | 9,400. | 1,900. | ug/kg | 10 |
| 03761 | Naphthalene | 91-20-3 | < 9,400. | 9,400. | 1,900. | ug/kg | 10 |
| 03768 | Fluorene | 86-73-7 | < 9,400. | 9,400. | 1,900. | ug/kg | 10 |
| 03775 | Phenanthrene | 85-01-8 | < 9,400. | 9,400. | 1,900. | ug/kg | 10 |
| 03776 | Anthracene | 120-12-7 | < 9,400. | 9,400. | 1,900. | ug/kg | 10 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 9,400. | 9,400. | 1,900. | ug/kg | 10 |
| 03782 | Chrysene | 218-01-9 | < 9,400. | 9,400. | 1,900. | ug/kg | 10 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 9,400. | 9,400. | 1,900. | ug/kg | 10 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 9,400. | 9,400. | 1,900. | ug/kg | 10 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 9,400. | 9,400. | 1,900. | ug/kg | 10 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | 23. | ug/kg | 41.39 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | 23. | ug/kg | 41.39 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | 47. | ug/kg | 41.39 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | 47. | ug/kg | 41.39 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | 47. | ug/kg | 41.39 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | 47. | ug/kg | 41.39 |
| 05479 | Isopropylbenzene | 98-82-8 | < 230. | 230. | 47. | ug/kg | 41.39 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | 47. | ug/kg | 41.39 |

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

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5361075 SW  Group No. 1091319**

**N-132_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183729 N-132_1.0-2.0**

Collected:05/13/2008 08:00  by SS  Account Number: 10132

Submitted: 05/14/2008 16:45
Reported: 05/30/2008 at 11:29
Discard: 07/30/2008

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

N-132

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 05/20/2008 14:35 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/15/2008 18:50 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/25/2008 19:15 | Gregory J Drahovsky | 10 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/21/2008 18:09 | Lauren C Marzario | 41.39 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/18/2008 20:50 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/13/2008 08:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/18/2008 22:00 | Patricia L Foreman | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1091319
Reported: 05/30/08 at 11:29 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: 08136820006A | Sample number(s): 5361075 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 081376150002A | Sample number(s): 5361075 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 112 | | 82-118 | | |
| Batch number: 08138SLA026 | Sample number(s): 5361075 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 100 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 92 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 110 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 103 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 99 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 98 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 97 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 103 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 103 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 102 | | 65-122 | | |
| Batch number: Q081422AA | Sample number(s): 5361075 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 92 | 94 | 72-117 | 2 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 90 | 92 | 84-115 | 2 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 98 | 99 | 76-135 | 1 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 90 | 91 | 81-116 | 1 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 91 | 92 | 77-114 | 1 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 88 | 90 | 82-115 | 3 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 86 | 88 | 82-110 | 2 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 89 | 91 | 82-117 | 3 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08136820006A | Sample number(s): 5361075 BKG: P361398 | | | | | | | | |
| Moisture | | | | | | 34.2 | 31.3 | 9 | 15 |
| Batch number: 081376150002A | Sample number(s): 5361075 UNSPK: P360657 BKG: P360657 | | | | | | | | |
| Lead | 3039 (2) | 492 (2) | 75-125 | 37* | 20 | 76.2 | 102. | 29* | 20 |
| Batch number: 08138SLA026 | Sample number(s): 5361075 UNSPK: P361321 | | | | | | | | |
| Pyrene | 104 | 108 | 19-162 | 4 | 30 | | | | |
| Naphthalene | 93 | 98 | 29-140 | 6 | 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: 1091319
Reported: 05/30/08 at 11:29 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 |
|---|---|---|---|---|---|---|---|---|---|
| Fluorene | 110 | 115 | 42-139 | 5 | 30 | | | | |
| Phenanthrene | 103 | 108 | 1-181 | 5 | 30 | | | | |
| Anthracene | 101 | 106 | 34-148 | 5 | 30 | | | | |
| Benzo(a)anthracene | 99 | 104 | 20-156 | 5 | 30 | | | | |
| Chrysene | 99 | 102 | 19-158 | 3 | 30 | | | | |
| Benzo(b)fluoranthene | 103 | 106 | 13-161 | 3 | 30 | | | | |
| Benzo(a)pyrene | 105 | 110 | 24-154 | 5 | 30 | | | | |
| Benzo(g,h,i)perylene | 107 | 113 | 26-154 | 5 | 30 | | | | |

### 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: PAHs in Soil by GC/MS
Batch number: 08138SLA026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5361075 | 95 | 106 | 101 |
| Blank | 87 | 96 | 93 |
| LCS | 88 | 98 | 94 |
| MS | 89 | 101 | 100 |
| MSD | 94 | 106 | 103 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081422AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5361075 | 73 | 68* | 60* | 58* |
| Blank | 94 | 92 | 87 | 89 |
| LCS | 88 | 86 | 85 | 89 |
| LCSD | 91 | 87 | 89 | 92 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only
Acct. # 10132 Group# 1091319 Sample # 5361075

**COC # 183729**

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 4.7°C

(1) Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 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#:

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Groundwater | Wastewater | Other | Total # of Containers | (5) Analyses Requested: Preservation Codes | | | | | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | PAN 8260 B | Moisture | Lead | PAHs 8270 | | | | | | |
| N-132_1.0-2.0 | 5/13/08 | 800 | X | | X | | | | 2 | X | X | X | X | | | | | | * pls copy Kenmarlin and Jason @ Langan<br>** See table per analyses |

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

(6) Preservation of Samples (Preservation must be noted below if sample(s) received outside of recommended temperature)

(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] / AQUATERRA | 5/13/08 | 1640 | AQUATERRA FRIDGE | 5/13/08 | 1640 |
| [signature] | 5/14/08 | 9:10 | Marvin McCallister | 5/14/08 | 9:10 |
| Marvin McCallister | 5/14/08 | 1648 | | | |
| | | | | | |
| | | | Katie Hartline | 5/14/08 | 16:45 |

(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.

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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

Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1092714. Samples arrived at the laboratory on Thursday, May 22, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-110_1.0-2.0 Grab Soil | 5369564 |
| N-111_1.0-2.0 Grab Soil | 5369565 |
| N-113_1.0-2.0 Grab Soil | 5369566 |
| N-133_1.0-2.0 Grab Soil | 5369567 |
| N-135_1.0-2.0 Grab Soil | 5369568 |
| N-136_1.0-2.0 Grab Soil | 5369569 |

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

Lancaster Laboratories

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# Analysis Report

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

Respectfully Submitted,

Marla S. Lord
Senior Specialist

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5369564 SW  Group No. 1092714**

**N-110_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-110_1.0-2.0**

Collected:05/14/2008 09:10  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:24
Discard: 08/03/2008

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

N110-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 15.0 | 1.06 | 0.159 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 6.7 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 180. | 180. | 36. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 180. | 180. | 36. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 180. | 180. | 36. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 180. | 180. | 36. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 180. | 180. | 36. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 180. | 180. | 36. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | < 180. | 180. | 36. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 180. | 180. | 36. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 180. | 180. | 36. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 180. | 180. | 36. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | 24. | ug/kg | 43.86 |
| 05460 | Benzene | 71-43-2 | < 240. | 240. | 24. | ug/kg | 43.86 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | 47. | ug/kg | 43.86 |
| 05466 | Toluene | 108-88-3 | < 240. | 240. | 47. | ug/kg | 43.86 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | 47. | ug/kg | 43.86 |
| 05474 | Ethylbenzene | 100-41-4 | < 240. | 240. | 47. | ug/kg | 43.86 |
| 05479 | Isopropylbenzene | 98-82-8 | < 240. | 240. | 47. | ug/kg | 43.86 |
| 06301 | Xylene (Total) | 1330-20-7 | < 240. | 240. | 47. | ug/kg | 43.86 |

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

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

## Laboratory Chronicle

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5369564 SW  Group No. 1092714**

**N-110_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-110_1.0-2.0**

Collected:05/14/2008 09:10  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:24
Discard: 08/03/2008

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

N110-

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 06:07 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 13:27 | Joseph M Gambler | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/28/2008 13:51 | Kerri E Koch | 43.86 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/26/2008 19:25 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/14/2008 09:10 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5369565 SW  Group No. 1092714**

**N-111_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-111_1.0-2.0**

Collected:05/14/2008 11:00  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:24
Discard: 08/03/2008

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

N111-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 117. | 1.06 | 0.158 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 8.9 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 1,400. | 910. | 180. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 910. | 910. | 180. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 910. | 910. | 180. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 1,100. | 910. | 180. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 910. | 910. | 180. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 910. | 910. | 180. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 910. | 910. | 180. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 960. | 910. | 180. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 910. | 910. | 180. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 910. | 910. | 180. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | 24. | ug/kg | 43.1 |
| 05460 | Benzene | 71-43-2 | < 240. | 240. | 24. | ug/kg | 43.1 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | 47. | ug/kg | 43.1 |
| 05466 | Toluene | 108-88-3 | < 240. | 240. | 47. | ug/kg | 43.1 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | 47. | ug/kg | 43.1 |
| 05474 | Ethylbenzene | 100-41-4 | < 240. | 240. | 47. | ug/kg | 43.1 |
| 05479 | Isopropylbenzene | 98-82-8 | < 240. | 240. | 47. | ug/kg | 43.1 |
| 06301 | Xylene (Total) | 1330-20-7 | < 240. | 240. | 47. | ug/kg | 43.1 |

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

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

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

**Lancaster Laboratories Sample No. 5369565 SW  Group No. 1092714**

**N-111_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-111_1.0-2.0**

Collected:05/14/2008 11:00  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:24
Discard: 08/03/2008

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

N111-

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 06:10 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 13:51 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/28/2008 14:14 | Kerri E Koch | 43.1 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/26/2008 19:25 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/14/2008 11:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5369566 SW  Group No. 1092714**

**N-113_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-113_1.0-2.0**

Collected:05/15/2008 08:00  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:25
Discard: 08/03/2008

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

N113-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 77.9 | 1.06 | 0.158 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 5.3 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 4,400. | 4,400. | 880. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 4,400. | 4,400. | 880. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 4,400. | 4,400. | 880. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 4,400. | 4,400. | 880. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 4,400. | 4,400. | 880. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 4,400. | 4,400. | 880. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 4,400. | 4,400. | 880. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 4,400. | 4,400. | 880. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,400. | 4,400. | 880. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,400. | 4,400. | 880. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 180. | 180. | 18. | ug/kg | 34.72 |
| 05460 | Benzene | 71-43-2 | < 180. | 180. | 18. | ug/kg | 34.72 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 180. | 180. | 37. | ug/kg | 34.72 |
| 05466 | Toluene | 108-88-3 | < 180. | 180. | 37. | ug/kg | 34.72 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 180. | 180. | 37. | ug/kg | 34.72 |
| 05474 | Ethylbenzene | 100-41-4 | < 180. | 180. | 37. | ug/kg | 34.72 |
| 05479 | Isopropylbenzene | 98-82-8 | 320. | 180. | 37. | ug/kg | 34.72 |
| 06301 | Xylene (Total) | 1330-20-7 | < 180. | 180. | 37. | ug/kg | 34.72 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5369566 SW  Group No. 1092714**

**N-113_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-113_1.0-2.0**

Collected:05/15/2008 08:00  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30  SUN: Aquaterra Tech.
Reported: 06/03/2008 at 12:25  PO Box 744
Discard: 08/03/2008  West Chester PA 19381

N113-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 06:14 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 14:15 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/29/2008 18:27 | Kerri E Koch | 34.72 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/26/2008 19:25 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/15/2008 08:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5369567 SW  Group No. 1092714**

**N-133_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-133_1.0-2.0**

Collected:05/15/2008 11:00  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:25
Discard: 08/03/2008

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

N133-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 865. | 2.36 | 0.353 | mg/kg | 20 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 9,800. | 9,800. | 2,000. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 9,800. | 9,800. | 2,000. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 9,800. | 9,800. | 2,000. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 9,800. | 9,800. | 2,000. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 9,800. | 9,800. | 2,000. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 9,800. | 9,800. | 2,000. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 9,800. | 9,800. | 2,000. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 9,800. | 9,800. | 2,000. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 9,800. | 9,800. | 2,000. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 9,800. | 9,800. | 2,000. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 300. | 300. | 30. | ug/kg | 51.65 |
| 05460 | Benzene | 71-43-2 | 3,700. | 300. | 30. | ug/kg | 51.65 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 300. | 300. | 61. | ug/kg | 51.65 |
| 05466 | Toluene | 108-88-3 | < 300. | 300. | 61. | ug/kg | 51.65 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 300. | 300. | 61. | ug/kg | 51.65 |
| 05474 | Ethylbenzene | 100-41-4 | < 300. | 300. | 61. | ug/kg | 51.65 |
| 05479 | Isopropylbenzene | 98-82-8 | < 300. | 300. | 61. | ug/kg | 51.65 |
| 06301 | Xylene (Total) | 1330-20-7 | 480. | 300. | 61. | ug/kg | 51.65 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5369567 SW  Group No. 1092714**

**N-133_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-133_1.0-2.0**

Collected:05/15/2008 11:00  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30  SUN: Aquaterra Tech.
Reported: 06/03/2008 at 12:25  PO Box 744
Discard: 08/03/2008  West Chester PA 19381

N133-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 09:22 | David K Beck | 20 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 14:39 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/29/2008 18:50 | Kerri E Koch | 51.65 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/26/2008 19:25 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/15/2008 11:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5369568 SW  Group No. 1092714**

**N-135_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-135_1.0-2.0**

Collected:05/15/2008 14:00  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:25
Discard: 08/03/2008

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

N135-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 273. | 1.21 | 0.181 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 4,400. | 1,000. | 200. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | 2,100. | 1,000. | 200. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 1,000. | 1,000. | 200. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 7,700. | 1,000. | 200. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | 1,600. | 1,000. | 200. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 1,500. | 1,000. | 200. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 3,000. | 1,000. | 200. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 1,000. | 1,000. | 200. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 1,500. | 1,000. | 200. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 2,400. | 1,000. | 200. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 350. | 350. | 35. | ug/kg | 57.47 |
| 05460 | Benzene | 71-43-2 | < 350. | 350. | 35. | ug/kg | 57.47 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 350. | 350. | 70. | ug/kg | 57.47 |
| 05466 | Toluene | 108-88-3 | < 350. | 350. | 70. | ug/kg | 57.47 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 350. | 350. | 70. | ug/kg | 57.47 |
| 05474 | Ethylbenzene | 100-41-4 | < 350. | 350. | 70. | ug/kg | 57.47 |
| 05479 | Isopropylbenzene | 98-82-8 | < 350. | 350. | 70. | ug/kg | 57.47 |
| 06301 | Xylene (Total) | 1330-20-7 | < 350. | 350. | 70. | ug/kg | 57.47 |

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

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

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

**Lancaster Laboratories Sample No. 5369568 SW  Group No. 1092714**

**N-135_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-135_1.0-2.0**

Collected:05/15/2008 14:00  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:25
Discard: 08/03/2008

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

N135-

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 06:29 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 15:03 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/29/2008 19:13 | Kerri E Koch | 57.47 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/26/2008 19:25 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/15/2008 14:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5369569 SW  Group No. 1092714**

**N-136_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-136_1.0-2.0**

Collected:05/15/2008 15:30  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:25
Discard: 08/03/2008

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

N-136

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 320. | 1.13 | 0.170 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 190. | 190. | 39. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | 39. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | 39. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 190. | 190. | 39. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 190. | 190. | 39. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 190. | 190. | 39. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | < 190. | 190. | 39. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 190. | 190. | 39. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 190. | 190. | 39. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 190. | 190. | 39. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 210. | 210. | 21. | ug/kg | 35.56 |
| 05460 | Benzene | 71-43-2 | 700. | 210. | 21. | ug/kg | 35.56 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 210. | 210. | 41. | ug/kg | 35.56 |
| 05466 | Toluene | 108-88-3 | < 210. | 210. | 41. | ug/kg | 35.56 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 210. | 210. | 41. | ug/kg | 35.56 |
| 05474 | Ethylbenzene | 100-41-4 | < 210. | 210. | 41. | ug/kg | 35.56 |
| 05479 | Isopropylbenzene | 98-82-8 | < 210. | 210. | 41. | ug/kg | 35.56 |
| 06301 | Xylene (Total) | 1330-20-7 | < 210. | 210. | 41. | ug/kg | 35.56 |

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

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

## Laboratory Chronicle

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5369569 SW  Group No. 1092714**

**N-136_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183728 N-136_1.0-2.0**

Collected:05/15/2008 15:30  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30  SUN: Aquaterra Tech.
Reported: 06/03/2008 at 12:25  PO Box 744
Discard: 08/03/2008  West Chester PA 19381

N-136

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 06:33 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 15:27 | Joseph M Gambler | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/29/2008 19:36 | Kerri E Koch | 35.56 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/26/2008 19:25 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/15/2008 15:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1092714
Reported: 06/03/08 at 12:25 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: 081446150001A | Sample number(s): 5369564-5369569 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 84 | | 82-118 | | |
| Batch number: 08144820005A | Sample number(s): 5369564-5369569 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08144SLA026 | Sample number(s): 5369564-5369569 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 92 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 81 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 87 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 89 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 83 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 84 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 85 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 80 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 81 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 84 | | 65-122 | | |
| Batch number: Q081491AA | Sample number(s): 5369564-5369565 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 106 | | 72-117 | | |
| Benzene | < 250. | 250. | 25. | ug/kg | 106 | | 84-115 | | |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 120 | | 76-135 | | |
| Toluene | < 250. | 250. | 50. | ug/kg | 94 | | 81-116 | | |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 96 | | 77-114 | | |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 94 | | 82-115 | | |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 91 | | 82-110 | | |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 94 | | 82-117 | | |
| Batch number: Q081501AA | Sample number(s): 5369566-5369569 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 112 | 96 | 72-117 | 16 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 104 | 90 | 84-115 | 14 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 120 | 105 | 76-135 | 13 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 90 | 91 | 81-116 | 1 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 90 | 93 | 77-114 | 4 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 89 | 92 | 82-115 | 3 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 86 | 87 | 82-110 | 0 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 90 | 91 | 82-117 | 1 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|

*- 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: 1092714
Reported: 06/03/08 at 12:25 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: 081446150001A | Sample number(s): 5369564-5369569 UNSPK: P368322 BKG: P368322 | | | | | | | | |
| Lead | 16 (2) | 49 (2) | 75-125 | 4 | 20 | 12.5 | 12.0 | 4 | 20 |
| Batch number: 08144820005A | Sample number(s): 5369564-5369569 BKG: P368711 | | | | | | | | |
| Moisture | | | | | | 27.1 | 25.7 | 5 | 15 |
| Batch number: 08144SLA026 | Sample number(s): 5369564-5369569 UNSPK: P369443 | | | | | | | | |
| Pyrene | 87 | 81 | 19-162 | 7 | 30 | | | | |
| Naphthalene | 79 | 75 | 29-140 | 6 | 30 | | | | |
| Fluorene | 83 | 79 | 42-139 | 6 | 30 | | | | |
| Phenanthrene | 83 | 79 | 1-181 | 4 | 30 | | | | |
| Anthracene | 84 | 78 | 34-148 | 7 | 30 | | | | |
| Benzo(a)anthracene | 80 | 75 | 20-156 | 6 | 30 | | | | |
| Chrysene | 81 | 77 | 19-158 | 4 | 30 | | | | |
| Benzo(b)fluoranthene | 75 | 71 | 13-161 | 5 | 30 | | | | |
| Benzo(a)pyrene | 79 | 76 | 24-154 | 5 | 30 | | | | |
| Benzo(g,h,i)perylene | 84 | 81 | 26-154 | 4 | 30 | | | | |
| Batch number: Q081491AA | Sample number(s): 5369564-5369565 UNSPK: P363004 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 109 | 99 | 59-119 | 6 | 30 | | | | |
| Benzene | 103 | 96 | 66-112 | 3 | 30 | | | | |
| 1,2-Dichloroethane | 122 | 114 | 62-130 | 3 | 30 | | | | |
| Toluene | 93 | 87 | 58-116 | 3 | 30 | | | | |
| 1,2-Dibromoethane | 97 | 89 | 66-108 | 4 | 30 | | | | |
| Ethylbenzene | 95 | 88 | 54-116 | 4 | 30 | | | | |
| Isopropylbenzene | 98 | 87 | 54-113 | 7 | 30 | | | | |
| Xylene (Total) | 97 | 88 | 52-117 | 6 | 30 | | | | |

### 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: PAHs in Soil by GC/MS
Batch number: 08144SLA026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5369564 | 87 | 93 | 101 |
| 5369565 | 76 | 78 | 79 |
| 5369566 | 89 | 83 | 87 |
| 5369567 | 82 | 78 | 80 |
| 5369568 | 73 | 69 | 72 |
| 5369569 | 95 | 99 | 97 |
| Blank | 81 | 87 | 94 |
| LCS | 85 | 90 | 94 |
| MS | 82 | 89 | 94 |
| MSD | 78 | 86 | 90 |
| Limits: | 49-120 | 55-117 | 43-131 |

*- 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: 1092714
Reported: 06/03/08 at 12:25 PM

## Surrogate Quality Control

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081491AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5369564 | 93 | 87 | 75 | 74 |
| 5369565 | 95 | 90 | 78 | 74 |
| Blank | 106 | 100 | 88 | 85 |
| LCS | 112 | 106 | 95 | 94 |
| MS | 91 | 88 | 75 | 79 |
| MSD | 95 | 89 | 80 | 81 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081501AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5369566 | 81 | 75 | 68* | 80 |
| 5369567 | 71 | 67* | 56* | 53* |
| 5369568 | 65* | 58* | 50* | 44* |
| 5369569 | 83 | 76 | 69* | 76 |
| Blank | 112 | 107 | 89 | 85 |
| LCS | 112 | 108 | 91 | 94 |
| LCSD | 98 | 93 | 93 | 96 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1092714 Sample # 5369564-69

**COC # 183728**

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

temp 1.2°C

**For Lab Use Only**
FSC:
SCR#:

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES 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 (Check if Applicable: ☐ Potable ☐ NPDES) | Other | Total # of Containers | PAUG 8260B | Moisture | Lead | PAHs by GC/MS 8270 | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-110_1.0-2.0 | 5/14/08 | 910 | X | | X | | | 2 | 1 | X | X | X | | | | | * Pls Copy ~~Kevin Martin~~ Joe Catrics |
| N-111_1.0-2.0 | 5/14/08 | 1100 | X | | X | | | 2 | 1 | X | X | X | | | | | + Jason @ Langan |
| N-113_1.0-2.0 | 5/15/08 | 800 | X | | X | | | 2 | 1 | X | X | X | | | | | |
| N-133_1.0-2.0 | 5/15/08 | 1100 | X | | X | | | 2 | 1 | X | X | X | | | | | * Analyses per |
| N-135_1.0-2.0 | 5/15/08 | 1400 | X | | X | | | 2 | 1 | X | X | X | | | | | table provided |
| N-136_1.0-2.0 | 5/15/08 | 1530 | X | | X | | | 2 | 1 | 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] / AQUATERRA | 5/15/08 | 1745 | AQUATERRA 'FRIDGE | 5/15/08 | 1745 |
| [signature] | 5/22/08 | 0904 | Marvin McFallick | 5/22/08 | 9:04 |
| Marvin McFallick | 5/22/08 | 1630 | | | |
| | | | | | |
| | | | [signature] | 5/22/08 | 1630 |

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

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1092715. Samples arrived at the laboratory on Thursday, May 22, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-116_1.0-2.0 Grab Soil | 5369570 |
| N-128_1.0-2.0 Grab Soil | 5369571 |
| N-123_1.0-2.0 Grab Soil | 5369572 |
| N-124_1.0-2.0 Grab Soil | 5369573 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |

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# Analysis Report

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

Respectfully Submitted,

Marla S. Lord
Senior Specialist

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5369570 SW  Group No. 1092715**

**N-116_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183727 N-116_1.0-2.0**

Collected:05/20/2008 08:00  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:25
Discard: 08/03/2008

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

N116-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 340. | 1.16 | 0.174 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 14.5 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 1,200. | 970. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 970. | 970. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | 2,100. | 970. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 5,900. | 970. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | 1,000. | 970. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 970. | 970. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 970. | 970. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 970. | 970. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 970. | 970. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 970. | 970. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | 23. | ug/kg | 39.12 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | 23. | ug/kg | 39.12 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | 46. | ug/kg | 39.12 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | 46. | ug/kg | 39.12 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | 46. | ug/kg | 39.12 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | 46. | ug/kg | 39.12 |
| 05479 | Isopropylbenzene | 98-82-8 | 810. | 230. | 46. | ug/kg | 39.12 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | 46. | ug/kg | 39.12 |

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

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

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

**Lancaster Laboratories Sample No. 5369570 SW  Group No. 1092715**

**N-116_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183727 N-116_1.0-2.0**

Collected:05/20/2008 08:00  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30  SUN: Aquaterra Tech.
Reported: 06/03/2008 at 12:25  PO Box 744
Discard: 08/03/2008  West Chester PA 19381

N116-

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 06:37 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 15:51 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/30/2008 16:55 | Kerri E Koch | 39.12 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/26/2008 19:25 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/20/2008 08:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5369571 SW  Group No. 1092715**

**N-128_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183727 N-128_1.0-2.0**

Collected:05/20/2008 09:30  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:25
Discard: 08/03/2008

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

N128-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 61.4 | 1.18 | 0.178 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 17.2 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 1,000. | 1,000. | 200. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | 2,200. | 1,000. | 200. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 1,000. | 1,000. | 200. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 1,900. | 1,000. | 200. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 1,000. | 1,000. | 200. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 1,700. | 1,000. | 200. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 1,900. | 1,000. | 200. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 3,300. | 1,000. | 200. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 6,000. | 1,000. | 200. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 20,000. | 1,000. | 200. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 290. | 290. | 29. | ug/kg | 48.08 |
| 05460 | Benzene | 71-43-2 | 1,900. | 290. | 29. | ug/kg | 48.08 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 290. | 290. | 58. | ug/kg | 48.08 |
| 05466 | Toluene | 108-88-3 | < 290. | 290. | 58. | ug/kg | 48.08 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 290. | 290. | 58. | ug/kg | 48.08 |
| 05474 | Ethylbenzene | 100-41-4 | 340. | 290. | 58. | ug/kg | 48.08 |
| 05479 | Isopropylbenzene | 98-82-8 | < 290. | 290. | 58. | ug/kg | 48.08 |
| 06301 | Xylene (Total) | 1330-20-7 | 610. | 290. | 58. | ug/kg | 48.08 |

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

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

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

**Lancaster Laboratories Sample No. 5369571 SW  Group No. 1092715**

**N-128_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183727 N-128_1.0-2.0**

Collected:05/20/2008 09:30  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30  SUN: Aquaterra Tech.
Reported: 06/03/2008 at 12:25  PO Box 744
Discard: 08/03/2008  West Chester PA 19381

N128-

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 06:40 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 16:15 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/31/2008 17:00 | Kerri E Koch | 48.08 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/26/2008 19:25 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/20/2008 09:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5369572 SW  Group No. 1092715**

**N-123_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183727 N-123_1.0-2.0**

Collected:05/20/2008 14:45  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:25
Discard: 08/03/2008

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

N123-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 254. | 1.27 | 0.191 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 22.2 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 25,000. | 1,100. | 210. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 1,100. | 1,100. | 210. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 1,100. | 1,100. | 210. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 16,000. | 1,100. | 210. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | 5,000. | 1,100. | 210. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 17,000. | 1,100. | 210. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 16,000. | 1,100. | 210. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 18,000. | 1,100. | 210. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 13,000. | 1,100. | 210. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 8,000. | 1,100. | 210. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | 24. | ug/kg | 37.09 |
| 05460 | Benzene | 71-43-2 | < 240. | 240. | 24. | ug/kg | 37.09 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | 48. | ug/kg | 37.09 |
| 05466 | Toluene | 108-88-3 | < 240. | 240. | 48. | ug/kg | 37.09 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | 48. | ug/kg | 37.09 |
| 05474 | Ethylbenzene | 100-41-4 | < 240. | 240. | 48. | ug/kg | 37.09 |
| 05479 | Isopropylbenzene | 98-82-8 | < 240. | 240. | 48. | ug/kg | 37.09 |
| 06301 | Xylene (Total) | 1330-20-7 | < 240. | 240. | 48. | ug/kg | 37.09 |

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

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

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

**Lancaster Laboratories Sample No. 5369572 SW  Group No. 1092715**

**N-123_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183727 N-123_1.0-2.0**

Collected:05/20/2008 14:45  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30  SUN: Aquaterra Tech.
Reported: 06/03/2008 at 12:25  PO Box 744
Discard: 08/03/2008  West Chester PA 19381

N123-

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 06:44 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 16:39 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/31/2008 17:22 | Kerri E Koch | 37.09 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/26/2008 19:25 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/20/2008 14:45 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5369573 SW  Group No. 1092715**

**N-124_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183727 N-124_1.0-2.0**

Collected:05/21/2008 11:30  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:25
Discard: 08/03/2008

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

N124-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 43.9 | 1.15 | 0.173 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 190. | 190. | 39. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | 39. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | 39. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 190. | 190. | 39. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 190. | 190. | 39. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 190. | 190. | 39. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | < 190. | 190. | 39. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 190. | 190. | 39. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 190. | 190. | 39. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 190. | 190. | 39. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 370. | 370. | 37. | ug/kg | 63.94 |
| 05460 | Benzene | 71-43-2 | < 370. | 370. | 37. | ug/kg | 63.94 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 370. | 370. | 75. | ug/kg | 63.94 |
| 05466 | Toluene | 108-88-3 | < 370. | 370. | 75. | ug/kg | 63.94 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 370. | 370. | 75. | ug/kg | 63.94 |
| 05474 | Ethylbenzene | 100-41-4 | < 370. | 370. | 75. | ug/kg | 63.94 |
| 05479 | Isopropylbenzene | 98-82-8 | < 370. | 370. | 75. | ug/kg | 63.94 |
| 06301 | Xylene (Total) | 1330-20-7 | < 370. | 370. | 75. | ug/kg | 63.94 |

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

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

## Laboratory Chronicle

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5369573 SW  Group No. 1092715**

**N-124_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 183727 N-124_1.0-2.0**

Collected:05/21/2008 11:30  by SS  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/03/2008 at 12:25
Discard: 08/03/2008

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

N124-

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 06:48 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 17:03 | Joseph M Gambler | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/29/2008 19:59 | Kerri E Koch | 63.94 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/26/2008 19:25 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/21/2008 11:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1092715
Reported: 06/03/08 at 12:25 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: 081446150001A | Sample number(s): 5369570-5369573 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 84 | | 82-118 | | |
| Batch number: 08144820005A | Sample number(s): 5369570-5369573 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08144SLA026 | Sample number(s): 5369570-5369573 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 92 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 81 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 87 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 89 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 83 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 84 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 85 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 80 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 81 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 84 | | 65-122 | | |
| Batch number: Q081501AA | Sample number(s): 5369573 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 112 | 96 | 72-117 | 16 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 104 | 90 | 84-115 | 14 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 120 | 105 | 76-135 | 13 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 90 | 91 | 81-116 | 1 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 90 | 93 | 77-114 | 4 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 89 | 92 | 82-115 | 3 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 86 | 87 | 82-110 | 0 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 90 | 91 | 82-117 | 1 | 30 |
| Batch number: Q081511AA | Sample number(s): 5369570 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 98 | 100 | 72-117 | 2 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 95 | 93 | 84-115 | 2 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 108 | 107 | 76-135 | 1 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 94 | 93 | 81-116 | 1 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 94 | 91 | 77-114 | 4 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 94 | 91 | 82-115 | 3 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 91 | 90 | 82-110 | 1 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 93 | 92 | 82-117 | 1 | 30 |
| Batch number: Q081521AA | Sample number(s): 5369571-5369572 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 105 | 106 | 72-117 | 1 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 97 | 97 | 84-115 | 0 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 114 | 116 | 76-135 | 2 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 91 | 94 | 81-116 | 3 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 91 | 95 | 77-114 | 4 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 91 | 93 | 82-115 | 2 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 88 | 91 | 82-110 | 3 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 90 | 92 | 82-117 | 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: 1092715
Reported: 06/03/08 at 12:25 PM

### Laboratory Compliance Quality Control

| Analysis Name | Blank Result | Blank LOQ** | Blank MDL | Report Units | LCS %REC | LCSD %REC | LCS/LCSD Limits | RPD | RPD Max |
|---|---|---|---|---|---|---|---|---|---|

### 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: 081446150001A | Sample number(s): 5369570-5369573 UNSPK: P368322 BKG: P368322 | | | | | | | | |
| Lead | 16 (2) | 49 (2) | 75-125 | 4 | 20 | 12.5 | 12.0 | 4 | 20 |
| Batch number: 08144820005A | Sample number(s): 5369570-5369573 BKG: P368711 | | | | | | | | |
| Moisture | | | | | | 27.1 | 25.7 | 5 | 15 |
| Batch number: 08144SLA026 | Sample number(s): 5369570-5369573 UNSPK: P369443 | | | | | | | | |
| Pyrene | 87 | 81 | 19-162 | 7 | 30 | | | | |
| Naphthalene | 79 | 75 | 29-140 | 6 | 30 | | | | |
| Fluorene | 83 | 79 | 42-139 | 6 | 30 | | | | |
| Phenanthrene | 83 | 79 | 1-181 | 4 | 30 | | | | |
| Anthracene | 84 | 78 | 34-148 | 7 | 30 | | | | |
| Benzo(a)anthracene | 80 | 75 | 20-156 | 6 | 30 | | | | |
| Chrysene | 81 | 77 | 19-158 | 4 | 30 | | | | |
| Benzo(b)fluoranthene | 75 | 71 | 13-161 | 5 | 30 | | | | |
| Benzo(a)pyrene | 79 | 76 | 24-154 | 5 | 30 | | | | |
| Benzo(g,h,i)perylene | 84 | 81 | 26-154 | 4 | 30 | | | | |

### 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: PAHs in Soil by GC/MS
Batch number: 08144SLA026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5369570 | 78 | 77 | 83 |
| 5369571 | 72 | 71 | 76 |
| 5369572 | 80 | 77 | 78 |
| 5369573 | 88 | 93 | 87 |
| Blank | 81 | 87 | 94 |
| LCS | 85 | 90 | 94 |
| MS | 82 | 89 | 94 |
| MSD | 78 | 86 | 90 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081501AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5369573 | 82 | 79 | 61* | 41* |

*- 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: 1092715
Reported: 06/03/08 at 12:25 PM

### Surrogate Quality Control

| | | | | |
|---|---|---|---|---|
| Blank | 112 | 107 | 89 | 85 |
| LCS | 112 | 108 | 91 | 94 |
| LCSD | 98 | 93 | 93 | 96 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081511AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5369570 | 78 | 73 | 74 | 85 |
| Blank | 100 | 97 | 92 | 87 |
| LCS | 100 | 93 | 96 | 97 |
| LCSD | 103 | 97 | 97 | 96 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081521AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5369571 | 76 | 61* | 70 | 117* |
| 5369572 | 71 | 63* | 56* | 60* |
| Blank | 105 | 98 | 90 | 87 |
| LCS | 103 | 96 | 92 | 91 |
| LCSD | 105 | 100 | 94 | 94 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1092715 Sample # 5369570-78

**COC # 183727**

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

temp 1.2°C

**For Lab Use Only**
FSC:
SCR#:

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES 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

(2) (3) (4) (6)

| Sample Identification | Date Collected | Time Collected | Grab | Composite | Soil | Water | Other | Total # of Containers | PAVG 8260b | Moisture | Lead | PAHs by GC/MS 8270 | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-116_1.0-2.0 | 5/20/08 | 800 | X | | X | | | 2 | 1 | X | X | X | * Analyses per table provided |
| N-128_1.0-2.0 | 5/20/08 | 930 | X | | X | | | 2 | 1 | X | X | X | |
| N-123_1.0-2.0 | 5/20/08 | 1445 | X | | X | | | 2 | 1 | X | X | X | |
| N-124_1.0-2.0 | 5/21/08 | 1130 | X | | X | | | 2 | 1 | X | X | X | * Pls Copy Jason @ Langan + Kevin Martin @ Aquaterra |

(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] / AQUATERRA | 5/21/08 | 1700 | AQUATERRA 'FRIDGE | 5/21/08 | 1700 |
| [signature] | 5/22/08 | 0904 | Marvin McCallister | 5/22/08 | 9:04 |
| Marvin McCallister | 5/22/08 | 1630 | | | |
| | | | | | |
| | | | [signature] | 5/22/08 | 1630 |

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

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1092716. Samples arrived at the laboratory on Thursday, May 22, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-130_0.0-2.0 Grab Soil | 5369574 |

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

Lancaster 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 Heun at (717) 656-2300

Respectfully Submitted,

Marla S. Lord
Senior Specialist

Lancaster Laboratories

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

# Analysis Report



**Lancaster Laboratories Sample No. 5369574 SW  Group No. 1092716**

**N-130_0.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 0286 N-130_0.0-2.0**

Collected:05/16/2008 08:30  by TD  Account Number: 10132

Submitted: 05/22/2008 16:30
Reported: 06/04/2008 at 13:08
Discard: 08/04/2008

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

NW130

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 670. | 2.25 | 0.338 | mg/kg | 20 |
| 00111 | Moisture | n.a. | 11.2 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 940. | 940. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 940. | 940. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 940. | 940. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 940. | 940. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 940. | 940. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 940. | 940. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 940. | 940. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 940. | 940. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 220. | 220. | 22. | ug/kg | 38.46 |
| 05460 | Benzene | 71-43-2 | < 220. | 220. | 22. | ug/kg | 38.46 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 220. | 220. | 43. | ug/kg | 38.46 |
| 05466 | Toluene | 108-88-3 | < 220. | 220. | 43. | ug/kg | 38.46 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 220. | 220. | 43. | ug/kg | 38.46 |
| 05474 | Ethylbenzene | 100-41-4 | < 220. | 220. | 43. | ug/kg | 38.46 |
| 05479 | Isopropylbenzene | 98-82-8 | < 220. | 220. | 43. | ug/kg | 38.46 |
| 06301 | Xylene (Total) | 1330-20-7 | < 220. | 220. | 43. | ug/kg | 38.46 |

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

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

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

**Lancaster Laboratories Sample No. 5369574 SW  Group No. 1092716**

**N-130_0.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 0286 N-130_0.0-2.0**

Collected:05/16/2008 08:30  by TD  Account Number: 10132

Submitted: 05/22/2008 16:30  SUN: Aquaterra Tech.
Reported: 06/04/2008 at 13:08  PO Box 744
Discard: 08/04/2008  West Chester PA 19381

NW130

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/04/2008 08:11 | David K Beck | 20 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/23/2008 15:56 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/27/2008 17:27 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 05/30/2008 18:27 | Kerri E Koch | 38.46 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/29/2008 20:40 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/16/2008 08:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/23/2008 13:15 | Doreen K Robles | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1092716
Reported: 06/04/08 at 01:08 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: 08144820005A | Sample number(s): 5369574 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08144SLA026 | Sample number(s): 5369574 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 92 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 81 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 87 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 89 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 83 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 84 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 85 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 80 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 81 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 84 | | 65-122 | | |
| Batch number: 081506150002A | Sample number(s): 5369574 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 85 | | 82-118 | | |
| Batch number: Q081511AA | Sample number(s): 5369574 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 98 | 100 | 72-117 | 2 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 95 | 93 | 84-115 | 2 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 108 | 107 | 76-135 | 1 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 94 | 93 | 81-116 | 1 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 94 | 91 | 77-114 | 4 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 94 | 91 | 82-115 | 3 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 91 | 90 | 82-110 | 1 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 93 | 92 | 82-117 | 1 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08144820005A | Sample number(s): 5369574 BKG: P368711 | | | | | | | | |
| Moisture | | | | | | 27.1 | 25.7 | 5 | 15 |
| Batch number: 08144SLA026 | Sample number(s): 5369574 UNSPK: P369443 | | | | | | | | |
| Pyrene | 87 | 81 | 19-162 | 7 | 30 | | | | |
| Naphthalene | 79 | 75 | 29-140 | 6 | 30 | | | | |
| Fluorene | 83 | 79 | 42-139 | 6 | 30 | | | | |
| Phenanthrene | 83 | 79 | 1-181 | 4 | 30 | | | | |
| Anthracene | 84 | 78 | 34-148 | 7 | 30 | | | | |
| Benzo(a)anthracene | 80 | 75 | 20-156 | 6 | 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: 1092716
Reported: 06/04/08 at 01:08 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 | 81 | 77 | 19-158 | 4 | 30 | | | | |
| Benzo(b)fluoranthene | 75 | 71 | 13-161 | 5 | 30 | | | | |
| Benzo(a)pyrene | 79 | 76 | 24-154 | 5 | 30 | | | | |
| Benzo(g,h,i)perylene | 84 | 81 | 26-154 | 4 | 30 | | | | |
| Batch number: 081506150002A | Sample number(s): 5369574 UNSPK: 5369574 BKG: 5369574 | | | | | | | | |
| Lead | -10812 (2) | -9875 (2) | 75-125 | 3 | 20 | 595. | 612. | 3 | 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: PAHs in Soil by GC/MS
Batch number: 08144SLA026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5369574 | 76 | 76 | 76 |
| Blank | 81 | 87 | 94 |
| LCS | 85 | 90 | 94 |
| MS | 82 | 89 | 94 |
| MSD | 78 | 86 | 90 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081511AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5369574 | 86 | 79 | 74 | 71 |
| Blank | 100 | 97 | 92 | 87 |
| LCS | 100 | 93 | 96 | 97 |
| LCSD | 103 | 97 | 97 | 96 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# PA UST Analysis Request/Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. #: 10132 Group #: 1092716 Sample #: 5369574 0286

SCR #:

temp 1.2°C

Consultant/Office #: Sun-Aquaterra

Consultant Prj. Mgr.: T. Doerr

Consultant Phone #: _____ Fax #: _____

Site Name: Philadelphia Refinery AOI-8

Site Address: _____

Sampler: T. Doerr

| Sample Identification | Date Collected | Time Collected | Grab | Composite | Matrix: Soil | Matrix: Water (Potable ☐ NPDES ☐) | Matrix: Oil ☐ Air ☐ | Total Number of Containers | Number of EnCores | PA Unleaded Gasoline | PA Leaded Gasoline | PA Kerosene (No. 1) | PA Diesel Fuel (No. 2) | PA Fuel Oil No. 4, 5, 6 | PA Used Motor Oil | 8260B | 8270C | Lead | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-130_0.0-2.0 | 5/16/08 | 0830 | X | | X | | | 2 | - | | | | | | | X | X | X | | | * Specific list of analytes provided to Lancaster in table form. * Results go to Jason & Joe at Langan, too. |

Analyses Requested — List total number of containers in the box under each analyses.

Turnaround Time: (STD (7-10)) RUSH

Comments:

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| | 5/16/08 | 1240 | Aquaterra Fridge | 5/16/08 | 1240 |
| | 5/22/08 | 0904 | Marvin McCallister | 5/22/08 | 9:04 |
| Marvin McCallister | 5/22/08 | 16:30 | | | |
| | | | | | |

Lancaster Laboratories, Inc., 2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 (717) 656-2300

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

4400 Rev. 4/26/05

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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Lancaster 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 for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1092862. Samples arrived at the laboratory on Friday, May 23, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-127_1.0-2.0 Grab Soil | 5370416 |
| N-134_1.0-2.0 Grab Soil | 5370417 |
| N-120_1.0-2.0 Grab Soil | 5370418 |

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

Lancaster Laboratories

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# Analysis Report

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

Respectfully Submitted,

Christine Dulaney
Senior Specialist

Lancaster Laboratories

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

# Analysis Report



**Lancaster Laboratories Sample No. 5370416 SW  Group No. 1092862**

**N-127_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 0153801 N-127_1.0-2.0**

Collected:05/22/2008 08:00  by SS  Account Number: 10132

Submitted: 05/23/2008 15:15
Reported: 06/09/2008 at 00:14
Discard: 08/09/2008

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

N-127

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 191. | 1.09 | 0.164 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 1,400. | 940. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 940. | 940. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 1,200. | 940. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 940. | 940. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 940. | 940. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 940. | 940. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 940. | 940. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 940. | 940. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 190. | 190. | 19. | ug/kg | 33.03 |
| 05460 | Benzene | 71-43-2 | < 190. | 190. | 19. | ug/kg | 33.03 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 190. | 190. | 37. | ug/kg | 33.03 |
| 05466 | Toluene | 108-88-3 | < 190. | 190. | 37. | ug/kg | 33.03 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 190. | 190. | 37. | ug/kg | 33.03 |
| 05474 | Ethylbenzene | 100-41-4 | < 190. | 190. | 37. | ug/kg | 33.03 |
| 05479 | Isopropylbenzene | 98-82-8 | < 190. | 190. | 37. | ug/kg | 33.03 |
| 06301 | Xylene (Total) | 1330-20-7 | < 190. | 190. | 37. | ug/kg | 33.03 |

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

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

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

**Lancaster Laboratories Sample No. 5370416 SW  Group No. 1092862**

**N-127_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 0153801 N-127_1.0-2.0**

Collected:05/22/2008 08:00  by SS  Account Number: 10132

Submitted: 05/23/2008 15:15  SUN: Aquaterra Tech.
Reported: 06/09/2008 at 00:14  PO Box 744
Discard: 08/09/2008  West Chester PA 19381

N-127

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 08:53 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/27/2008 14:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/31/2008 01:58 | Gregory J Drahovsky | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/05/2008 03:44 | Stephanie A Selis | 33.03 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/29/2008 20:40 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/22/2008 08:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/28/2008 23:15 | Patricia L Foreman | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5370417 SW  Group No. 1092862**

**N-134_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 0153801 N-134_1.0-2.0**

Collected:05/22/2008 10:45  by SS  Account Number: 10132

Submitted: 05/23/2008 15:15
Reported: 06/09/2008 at 00:14
Discard: 08/09/2008

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

N-134

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 74.6 | 1.17 | 0.176 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 50,000. | 4,900. | 990. | ug/kg | 25 |
| 03761 | Naphthalene | 91-20-3 | 4,700. | 990. | 200. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | 3,300. | 990. | 200. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 48,000. | 4,900. | 990. | ug/kg | 25 |
| 03776 | Anthracene | 120-12-7 | 11,000. | 990. | 200. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 41,000. | 4,900. | 990. | ug/kg | 25 |
| 03782 | Chrysene | 218-01-9 | 35,000. | 4,900. | 990. | ug/kg | 25 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 44,000. | 4,900. | 990. | ug/kg | 25 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 37,000. | 4,900. | 990. | ug/kg | 25 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 21,000. | 990. | 200. | ug/kg | 5 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 320. | 320. | 32. | ug/kg | 53.42 |
| 05460 | Benzene | 71-43-2 | < 320. | 320. | 32. | ug/kg | 53.42 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 320. | 320. | 63. | ug/kg | 53.42 |
| 05466 | Toluene | 108-88-3 | < 320. | 320. | 63. | ug/kg | 53.42 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 320. | 320. | 63. | ug/kg | 53.42 |
| 05474 | Ethylbenzene | 100-41-4 | < 320. | 320. | 63. | ug/kg | 53.42 |
| 05479 | Isopropylbenzene | 98-82-8 | < 320. | 320. | 63. | ug/kg | 53.42 |
| 06301 | Xylene (Total) | 1330-20-7 | < 320. | 320. | 63. | ug/kg | 53.42 |

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

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

## Laboratory Chronicle

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5370417 SW  Group No. 1092862**

**N-134_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 0153801 N-134_1.0-2.0**

Collected:05/22/2008 10:45  by SS  Account Number: 10132

Submitted: 05/23/2008 15:15
Reported: 06/09/2008 at 00:14
Discard: 08/09/2008

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

N-134

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 08:56 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/27/2008 14:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/31/2008 03:10 | Gregory J Drahovsky | 5 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/31/2008 10:49 | Joseph M Gambler | 25 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/04/2008 20:52 | Kerri E Koch | 53.42 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/29/2008 20:40 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/22/2008 10:45 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/28/2008 23:15 | Patricia L Foreman | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5370418 SW  Group No. 1092862**

**N-120_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 0153801 N-120_1.0-2.0**

Collected:05/22/2008 14:30  by SS  Account Number: 10132

Submitted: 05/23/2008 15:15
Reported: 06/09/2008 at 00:14
Discard: 08/09/2008

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

N-120

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 181. | 1.16 | 0.174 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 14.8 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 980. | 980. | 200. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 980. | 980. | 200. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 980. | 980. | 200. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 980. | 980. | 200. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 980. | 980. | 200. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 980. | 980. | 200. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 980. | 980. | 200. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 980. | 980. | 200. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 980. | 980. | 200. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 980. | 980. | 200. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 170. | 170. | 17. | ug/kg | 29.1 |
| 05460 | Benzene | 71-43-2 | < 170. | 170. | 17. | ug/kg | 29.1 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 170. | 170. | 34. | ug/kg | 29.1 |
| 05466 | Toluene | 108-88-3 | < 170. | 170. | 34. | ug/kg | 29.1 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 170. | 170. | 34. | ug/kg | 29.1 |
| 05474 | Ethylbenzene | 100-41-4 | < 170. | 170. | 34. | ug/kg | 29.1 |
| 05479 | Isopropylbenzene | 98-82-8 | < 170. | 170. | 34. | ug/kg | 29.1 |
| 06301 | Xylene (Total) | 1330-20-7 | < 170. | 170. | 34. | ug/kg | 29.1 |

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

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

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

**Lancaster Laboratories Sample No. 5370418 SW  Group No. 1092862**

**N-120_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 0153801 N-120_1.0-2.0**

Collected:05/22/2008 14:30  by SS  Account Number: 10132

Submitted: 05/23/2008 15:15
Reported: 06/09/2008 at 00:14
Discard: 08/09/2008

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

N-120

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/01/2008 09:07 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/27/2008 14:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 05/31/2008 03:34 | Gregory J Drahovsky | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/05/2008 04:30 | Stephanie A Selis | 29.1 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 05/29/2008 20:40 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/22/2008 14:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/28/2008 23:15 | Patricia L Foreman | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1092862
Reported: 06/09/08 at 12:14 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: 08148820001A | Sample number(s): 5370416-5370418 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08149SLE026 | Sample number(s): 5370416-5370418 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 97 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 87 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 94 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 94 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 88 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 91 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 89 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 89 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 90 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 84 | | 65-122 | | |
| Batch number: 081506150002A | Sample number(s): 5370416-5370418 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 85 | | 82-118 | | |
| Batch number: Q081561AA | Sample number(s): 5370417 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 103 | 101 | 72-117 | 2 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 93 | 92 | 84-115 | 1 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 109 | 108 | 76-135 | 1 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 93 | 89 | 81-116 | 4 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 96 | 93 | 77-114 | 4 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 93 | 91 | 82-115 | 1 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 91 | 89 | 82-110 | 3 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 92 | 90 | 82-117 | 3 | 30 |
| Batch number: Q081563AA | Sample number(s): 5370416,5370418 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 107 | 109 | 72-117 | 2 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 98 | 100 | 84-115 | 2 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 115 | 113 | 76-135 | 2 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 92 | 92 | 81-116 | 0 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 93 | 96 | 77-114 | 3 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 92 | 93 | 82-115 | 2 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 90 | 91 | 82-110 | 1 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 91 | 92 | 82-117 | 2 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|

*- 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: 1092862
Reported: 06/09/08 at 12:14 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: 08148820001A | Sample number(s): 5370416-5370418 | | | | | BKG: P368699 | | | |
| Moisture | | | | | | 21.9 | 22.0 | 0 | 15 |
| Batch number: 08149SLE026 | Sample number(s): 5370416-5370418 UNSPK: 5370416 | | | | | | | | |
| Pyrene | 89 | 113 | 19-162 | 13 | 30 | | | | |
| Naphthalene | 64 | 84 | 29-140 | 27 | 30 | | | | |
| Fluorene | 60 | 93 | 42-139 | 31* | 30 | | | | |
| Phenanthrene | 41 | 80 | 1-181 | 32* | 30 | | | | |
| Anthracene | 59 | 85 | 34-148 | 30 | 30 | | | | |
| Benzo(a)anthracene | 74 | 86 | 20-156 | 11 | 30 | | | | |
| Chrysene | 61 | 91 | 19-158 | 25 | 30 | | | | |
| Benzo(b)fluoranthene | 62 | 77 | 13-161 | 14 | 30 | | | | |
| Benzo(a)pyrene | 59 | 88 | 24-154 | 27 | 30 | | | | |
| Benzo(g,h,i)perylene | 55 | 86 | 26-154 | 27 | 30 | | | | |
| Batch number: 081506150002A | Sample number(s): 5370416-5370418 UNSPK: P369574 BKG: P369574 | | | | | | | | |
| Lead | -10812 (2) | -9875 (2) | 75-125 | 3 | 20 | 595. | 612. | 3 | 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: PAHs in Soil by GC/MS
Batch number: 08149SLE026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5370416 | 75 | 81 | 74 |
| 5370417 | 81 | 88 | 100 |
| 5370418 | 75 | 79 | 79 |
| Blank | 82 | 88 | 89 |
| LCS | 79 | 87 | 89 |
| MS | 56 | 61 | 62 |
| MSD | 74 | 83 | 83 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081561AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5370417 | 72 | 68* | 63* | 63* |
| Blank | 99 | 91 | 91 | 89 |
| LCS | 94 | 88 | 87 | 86 |
| LCSD | 95 | 90 | 88 | 87 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

Analysis Name: UST-Leaded Soils by 8260B

*- 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: 1092862
Reported: 06/09/08 at 12:14 AM

## Surrogate Quality Control

Batch number: Q081563AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5370416 | 71 | 65* | 61* | 71 |
| 5370418 | 74 | 70 | 64* | 72 |
| Blank | 101 | 95 | 89 | 86 |
| LCS | 97 | 91 | 87 | 85 |
| LCSD | 101 | 95 | 91 | 89 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 109862 Sample # 5370416-18

**COC # 0153801**

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

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

Project Name/#: PHILA REF AOI-8 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) Preservation Codes (Preservation Codes for Containers)

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water | Other | Total # of Containers | (5) Analyses Requested: Preservation Codes: PAHs 8260 | Moisture | Lead | PAHs by 8270 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-127_1.0-2.0 | 5/22/08 | 800 | X | | X | | | 2 | 1 | X | X | X |
| N-134_1.0-2.0 | 5/22/08 | 1045 | X | | X | | | 2 | 1 | X | X | X |
| N-120_1.0-2.0 | 5/22/08 | 1430 | X | | X | | | 2 | 1 | X | X | X |

Remarks

* Analyses per table provided

* PLS copy Kevin Martin + Jason @ Langan

temp 3.0°C

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush

(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)

Date results are needed:

Rush results requested by (please circle): Phone Fax E-mail

Phone #: Fax #:

E-mail address:

(8) **Data Package Options** (please circle if required)

Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)

TX TRRP-13
MA MCP CT RCP

SDG Complete? Yes No

Site-specific QC (MS/MSD/Dup)? Yes No

(If yes, indicate QC sample and submit triplicate volume.)

Internal COC Required? Yes / No

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| Steve Ger / AQUATERRA | 5/22/08 | 1735 | AQUATERRA FRIDGE | 5/22/08 | 1735 |
| [signature] | 10/16 | 5/23/08 | Erma Allmon | 5/23/08 | 10/16 |
| Erma Allmon | 5/23/08 | 1515 | | | |
| | | | | | |
| | | | [signature] | 5/23/08 | 1515 |

(9)

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.

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.

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1093507. Samples arrived at the laboratory on Thursday, May 29, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-118_1.0-2.0 Grab Soil | 5374122 |
| N-115_0.0-2.0 Grab Soil | 5374123 |

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

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# Analysis Report

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

Respectfully Submitted,

Marla S. Lord
Senior Specialist

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5374122 SW  Group No. 1093507**

**N-118_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 0153802 N-118_1.0-2.0**

Collected:05/23/2008 08:30  by SS  Account Number: 10132

Submitted: 05/29/2008 16:05
Reported: 06/09/2008 at 19:02
Discard: 08/09/2008

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

N-118

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 200. | 1.11 | 0.166 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 11.3 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 1,200. | 940. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | 1,200. | 940. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 3,700. | 940. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 940. | 940. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 940. | 940. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 940. | 940. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 940. | 940. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 940. | 940. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 940. | 940. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 220. | 220. | 22. | ug/kg | 39.31 |
| 05460 | Benzene | 71-43-2 | < 220. | 220. | 22. | ug/kg | 39.31 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 220. | 220. | 44. | ug/kg | 39.31 |
| 05466 | Toluene | 108-88-3 | < 220. | 220. | 44. | ug/kg | 39.31 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 220. | 220. | 44. | ug/kg | 39.31 |
| 05474 | Ethylbenzene | 100-41-4 | < 220. | 220. | 44. | ug/kg | 39.31 |
| 05479 | Isopropylbenzene | 98-82-8 | 470. | 220. | 44. | ug/kg | 39.31 |
| 06301 | Xylene (Total) | 1330-20-7 | < 220. | 220. | 44. | ug/kg | 39.31 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5374122 SW  Group No. 1093507**

**N-118_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 0153802 N-118_1.0-2.0**

Collected:05/23/2008 08:30  by SS  Account Number: 10132

Submitted: 05/29/2008 16:05
Reported: 06/09/2008 at 19:02
Discard: 08/09/2008

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

N-118

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/04/2008 08:03 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/30/2008 16:18 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/04/2008 09:38 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/05/2008 22:30 | Lauren C Marzario | 39.31 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/02/2008 20:20 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/23/2008 08:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/31/2008 08:25 | Adrienne E Fellenbaum | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5374123 SW  Group No. 1093507**

**N-115_0.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 0153802 N-115_0.0-2.0**

Collected:05/28/2008 13:30  by TD  Account Number: 10132

Submitted: 05/29/2008 16:05
Reported: 06/09/2008 at 19:02
Discard: 08/09/2008

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

N-115

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 1,250. | 3.00 | 0.451 | mg/kg | 25 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 32,000. | 5,200. | 1,000. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 5,200. | 5,200. | 1,000. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 5,200. | 5,200. | 1,000. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 14,000. | 5,200. | 1,000. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 5,200. | 5,200. | 1,000. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 10,000. | 5,200. | 1,000. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 15,000. | 5,200. | 1,000. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 5,200. | 5,200. | 1,000. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 6,500. | 5,200. | 1,000. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 7,100. | 5,200. | 1,000. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 380. | 380. | 38. | ug/kg | 61.12 |
| 05460 | Benzene | 71-43-2 | < 380. | 380. | 38. | ug/kg | 61.12 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 380. | 380. | 76. | ug/kg | 61.12 |
| 05466 | Toluene | 108-88-3 | < 380. | 380. | 76. | ug/kg | 61.12 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 380. | 380. | 76. | ug/kg | 61.12 |
| 05474 | Ethylbenzene | 100-41-4 | < 380. | 380. | 76. | ug/kg | 61.12 |
| 05479 | Isopropylbenzene | 98-82-8 | < 380. | 380. | 76. | ug/kg | 61.12 |
| 06301 | Xylene (Total) | 1330-20-7 | < 380. | 380. | 76. | ug/kg | 61.12 |

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

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5374123 SW  Group No. 1093507**

**N-115_0.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 0153802 N-115_0.0-2.0**

Collected:05/28/2008 13:30 by TD

Account Number: 10132

Submitted: 05/29/2008 16:05
Reported: 06/09/2008 at 19:02
Discard: 08/09/2008

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

N-115

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/07/2008 07:08 | David K Beck | 25 |
| 00111 | Moisture | SM20 2540 G | 1 | 05/30/2008 16:18 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/04/2008 16:50 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/05/2008 07:59 | Stephanie A Selis | 61.12 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/02/2008 20:20 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/28/2008 13:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 05/31/2008 08:25 | Adrienne E Fellenbaum | 1 |

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

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1093507
Reported: 06/09/08 at 07:02 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: 08151820004A | Sample number(s): 5374122-5374123 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08151SLC026 | Sample number(s): 5374122-5374123 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 98 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 87 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 83 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 86 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 81 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 89 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 84 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 86 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 83 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 80 | | 65-122 | | |
| Batch number: 081546150001A | Sample number(s): 5374122-5374123 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 104 | | 82-118 | | |
| Batch number: Q081563AA | Sample number(s): 5374123 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 107 | 109 | 72-117 | 2 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 98 | 100 | 84-115 | 2 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 115 | 113 | 76-135 | 2 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 92 | 92 | 81-116 | 0 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 93 | 96 | 77-114 | 3 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 92 | 93 | 82-115 | 2 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 90 | 91 | 82-110 | 1 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 91 | 92 | 82-117 | 2 | 30 |
| Batch number: Q081571AA | Sample number(s): 5374122 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 106 | 103 | 72-117 | 3 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 96 | 93 | 84-115 | 3 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 110 | 108 | 76-135 | 2 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 95 | 91 | 81-116 | 5 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 100 | 95 | 77-114 | 5 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 95 | 92 | 82-115 | 4 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 93 | 89 | 82-110 | 5 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 94 | 90 | 82-117 | 4 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|

*- 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: 1093507
Reported: 06/09/08 at 07:02 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: 08151820004A | Sample number(s): 5374122-5374123 | | | | | BKG: P373845 | | | |
| Moisture | | | | | | 25.8 | 23.6 | 9 | 15 |
| Batch number: 08151SLC026 | Sample number(s): 5374122-5374123 UNSPK: P373847 | | | | | | | | |
| Pyrene | 99 | 98 | 19-162 | 1 | 30 | | | | |
| Naphthalene | 87 | 85 | 29-140 | 2 | 30 | | | | |
| Fluorene | 90 | 89 | 42-139 | 1 | 30 | | | | |
| Phenanthrene | 93 | 94 | 1-181 | 1 | 30 | | | | |
| Anthracene | 89 | 90 | 34-148 | 1 | 30 | | | | |
| Benzo(a)anthracene | 87 | 87 | 20-156 | 0 | 30 | | | | |
| Chrysene | 90 | 89 | 19-158 | 1 | 30 | | | | |
| Benzo(b)fluoranthene | 74 | 80 | 13-161 | 7 | 30 | | | | |
| Benzo(a)pyrene | 84 | 85 | 24-154 | 1 | 30 | | | | |
| Benzo(g,h,i)perylene | 84 | 83 | 26-154 | 1 | 30 | | | | |
| Batch number: 081546150001A | Sample number(s): 5374122-5374123 UNSPK: P374581 BKG: P374581 | | | | | | | | |
| Lead | 95 (2) | 225 (2) | 75-125 | 8 | 20 | 20.9 | 23.0 | 10 | 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: PAHs in Soil by GC/MS
Batch number: 08151SLC026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5374122 | 83 | 84 | 90 |
| 5374123 | 84 | 83 | 92 |
| Blank | 88 | 89 | 86 |
| LCS | 87 | 81 | 88 |
| MS | 85 | 91 | 96 |
| MSD | 84 | 88 | 94 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081563AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5374123 | 82 | 75 | 58* | 56* |
| Blank | 101 | 95 | 89 | 86 |
| LCS | 97 | 91 | 87 | 85 |
| LCSD | 101 | 95 | 91 | 89 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081571AA

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

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

# Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1093507
Reported: 06/09/08 at 07:02 PM

## Surrogate Quality Control

| | | | | |
|---|---|---|---|---|
| 5374122 | 84 | 79 | 73 | 71 |
| Blank | 99 | 95 | 92 | 91 |
| LCS | 95 | 90 | 89 | 88 |
| LCSD | 95 | 89 | 88 | 87 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1093507 Sample # 5374122-23

**COC # 0153802**

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

**For Lab Use Only**
FSC:
SCR#:

(1) Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

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

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | Matrix: Soil | Water (☐ Potable ☐ NPDES) | Other (Check if Applicable) | (4) Total # of Containers | (5) Analyses Requested — Preservation Codes: PAUG 82606 | Lead | moisture | PAHs by 6/ms 8270 | | | | | | Remarks (6) Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-118_1.0-2.0 | 5/23/08 | 830 | X | | X | | | 2 | 1 | X | X | X | | | | | | * Analyses per table provided |
| | | | | | | | | | | | | | | | | | | * Pls copy Kevin Martin & Jason O Langan |
| | | | | | | | | | | | | | | | | | | temp 4.4°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) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| [signature] / AQUATERRA | 5/23/08 | 1430 | AQUATERRA 'FRIDGE | 5/23/08 | 1430 |
| AT FRIDGE | 5/29/08 | 1310 | [signature] | 5/29/08 | 1310 |
| [signature] | 5/29/08 | 1310 | Erma Dellman | 5/29/08 | 13:10 |
| Erma Dellman | 5/29/08 | 16:05 | | | |
| | | | [signature] | 5/29/08 | 16:05 |

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

2102.03

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1098507 Sample # 5374122-23

**COC # 176471**

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

**For Lab Use Only**
FSC:
SCR#: 53717

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

(1)
Client: Sun - Aquaterra Acct. #:
Project Name/#: Philly Refinery A01-8 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 | Grab | Composite | Soil | Water (☐ Potable ☐ NPDES) | Other | Total # of Containers | PA UST 8260B | PA UST 8270C | Lead 6020 | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-115 - 0.0-2.0 | 5/28/08 | 1330 | X | | X | | | 2 | ✓ | ✓ | ✓ | Specific Analysis list per previously submitted table. CC results to Jason Hanna & Joe Catricks @ Langan temp 4.4°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: td@aquaterra-tech.com

(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 |
|---|---|---|---|---|---|
| Bob Westorage | 1/15/08 | 830 | P. Lefevre | 1/15/08 | 830 |
| P. Lefevre | 1/15/08 | 1100 | | | |
| [signature] | 5/28/08 | 1600 | Aquaterra Fridge | 5/28/08 | 1600 |
| AT FRIDGE | 5/29/08 | 1310 | [signature] | 5/29/08 | 1310 |
| [signature] | 5/29/08 | 1310 | Erma Dillman | 5/29/08 | 13:10 |

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

Erma Dillman 5/29/08 16:05 Kate Hartlane 5/29/08 16:05

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.

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1094202. Samples arrived at the laboratory on Tuesday, June 03, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-126_1.0-2.0 Grab Soil | 5378093 |
| N-119_1.0-2.0 Grab Soil | 5378094 |
| N-108_1.0-2.0 Grab Soil | 5378095 |
| N-98_1.0-2.0 Grab Soil | 5378096 |

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

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# Analysis Report

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

Respectfully Submitted,

Christine Dulaney
Senior Specialist

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5378093 SW  Group No. 1094202**

**N-126_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# NA COC: 0153799 N-126_1.0-2.0**

Collected:05/29/2008 08:00  by SS  Account Number: 10132

Submitted: 06/03/2008 15:58
Reported: 06/13/2008 at 11:18
Discard: 08/13/2008

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

SA126

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 1,090. | 5.98 | 0.897 | mg/kg | 50 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 21,000. | 4,100. | 810. | ug/kg | 10 |
| 03761 | Naphthalene | 91-20-3 | 50,000. | 4,100. | 810. | ug/kg | 10 |
| 03768 | Fluorene | 86-73-7 | 21,000. | 4,100. | 810. | ug/kg | 10 |
| 03775 | Phenanthrene | 85-01-8 | 55,000. | 4,100. | 810. | ug/kg | 10 |
| 03776 | Anthracene | 120-12-7 | 61,000. | 4,100. | 810. | ug/kg | 10 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 8,100. | 4,100. | 810. | ug/kg | 10 |
| 03782 | Chrysene | 218-01-9 | 9,100. | 4,100. | 810. | ug/kg | 10 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 4,100. | 4,100. | 810. | ug/kg | 10 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 4,100. | 4,100. | 810. | ug/kg | 10 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 4,100. | 4,100. | 810. | ug/kg | 10 |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/07/2008 12:11 | David K Beck | 50 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/04/2008 16:53 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/10/2008 10:12 | Joseph M Gambler | 10 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/04/2008 20:15 | Annamaria Stipkovits | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/04/2008 16:55 | Adrienne E Fellenbaum | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5378094 SW  Group No. 1094202**

**N-119_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# NA COC: 0153799 N-119_1.0-2.0**

Collected:05/29/2008 10:30  by SS  Account Number: 10132

Submitted: 06/03/2008 15:58
Reported: 06/13/2008 at 11:18
Discard: 08/13/2008

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

SA119

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 68.1 | 1.16 | 0.173 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 190. | 190. | 39. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | 39. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | 39. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 190. | 190. | 39. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 190. | 190. | 39. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 190. | 190. | 39. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | < 190. | 190. | 39. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 190. | 190. | 39. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 190. | 190. | 39. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 190. | 190. | 39. | ug/kg | 1 |

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

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

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/07/2008 11:05 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/04/2008 16:53 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/10/2008 10:36 | Joseph M Gambler | 1 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/04/2008 20:15 | Annamaria Stipkovits | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/04/2008 16:55 | Adrienne E Fellenbaum | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5378095 SW  Group No. 1094202**

**N-108_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# NA COC: 0153799 N-108_1.0-2.0**

Collected:05/29/2008 14:30  by SS  Account Number: 10132

Submitted: 06/03/2008 15:58
Reported: 06/13/2008 at 11:18
Discard: 08/13/2008

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

SA108

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 147. | 1.16 | 0.174 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 14.5 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 1,900. | 1,900. | 390. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 1,900. | 1,900. | 390. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 1,900. | 1,900. | 390. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 2,100. | 1,900. | 390. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 1,900. | 1,900. | 390. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 2,000. | 1,900. | 390. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 3,800. | 1,900. | 390. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 3,300. | 1,900. | 390. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 5,400. | 1,900. | 390. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 20,000. | 1,900. | 390. | ug/kg | 5 |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | 23. | ug/kg | 39.12 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | 23. | ug/kg | 39.12 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | 46. | ug/kg | 39.12 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | 46. | ug/kg | 39.12 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | 46. | ug/kg | 39.12 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | 46. | ug/kg | 39.12 |
| 05479 | Isopropylbenzene | 98-82-8 | < 230. | 230. | 46. | ug/kg | 39.12 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | 46. | ug/kg | 39.12 |

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

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

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

**Lancaster Laboratories Sample No. 5378095 SW  Group No. 1094202**

**N-108_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# NA COC: 0153799 N-108_1.0-2.0**

Collected:05/29/2008 14:30  by SS  Account Number: 10132

Submitted: 06/03/2008 15:58
Reported: 06/13/2008 at 11:18
Discard: 08/13/2008

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

SA108

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/07/2008 11:09 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/04/2008 16:53 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/10/2008 11:00 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/09/2008 18:16 | Kerri E Koch | 39.12 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/04/2008 20:15 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 05/29/2008 14:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/04/2008 16:55 | Adrienne E Fellenbaum | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5378096 SW  Group No. 1094202**

**N-98_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# NA COC: 0153799 N-98_1.0-2.0**

Collected:06/02/2008 14:00  by SS  Account Number: 10132

Submitted: 06/03/2008 15:58
Reported: 06/13/2008 at 11:18
Discard: 08/13/2008

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

SA098

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 94.5 | 1.14 | 0.171 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 2,400. | 980. | 200. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | 1,000. | 980. | 200. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 980. | 980. | 200. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 4,500. | 980. | 200. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 980. | 980. | 200. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 980. | 980. | 200. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 980. | 980. | 200. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 980. | 980. | 200. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 980. | 980. | 200. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 980. | 980. | 200. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 210. | 210. | 21. | ug/kg | 36.23 |
| 05460 | Benzene | 71-43-2 | < 210. | 210. | 21. | ug/kg | 36.23 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 210. | 210. | 42. | ug/kg | 36.23 |
| 05466 | Toluene | 108-88-3 | < 210. | 210. | 42. | ug/kg | 36.23 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 210. | 210. | 42. | ug/kg | 36.23 |
| 05474 | Ethylbenzene | 100-41-4 | < 210. | 210. | 42. | ug/kg | 36.23 |
| 05479 | Isopropylbenzene | 98-82-8 | < 210. | 210. | 42. | ug/kg | 36.23 |
| 06301 | Xylene (Total) | 1330-20-7 | < 210. | 210. | 42. | ug/kg | 36.23 |

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

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

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

**Lancaster Laboratories Sample No. 5378096 SW  Group No. 1094202**

**N-98_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# NA COC: 0153799 N-98_1.0-2.0**

Collected:06/02/2008 14:00  by SS  Account Number: 10132

Submitted: 06/03/2008 15:58
Reported: 06/13/2008 at 11:18
Discard: 08/13/2008

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

SA098

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/07/2008 11:13 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/04/2008 16:53 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/10/2008 11:24 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/09/2008 17:53 | Kerri E Koch | 36.23 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/04/2008 20:15 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/02/2008 14:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/04/2008 16:55 | Adrienne E Fellenbaum | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1094202
Reported: 06/13/08 at 11:18 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: 081566150002A | Sample number(s): 5378093-5378096 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 104 | | 82-118 | | |
| Batch number: 08156820005B | Sample number(s): 5378093-5378096 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08156SLC026 | Sample number(s): 5378093-5378096 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 93 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 83 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 87 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 92 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 87 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 85 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 91 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 75 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 84 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 85 | | 65-122 | | |
| Batch number: Q081611AA | Sample number(s): 5378095-5378096 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 107 | 111 | 72-117 | 4 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 95 | 98 | 84-115 | 4 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 112 | 116 | 76-135 | 3 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 90 | 92 | 81-116 | 2 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 94 | 97 | 77-114 | 3 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 90 | 93 | 82-115 | 4 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 87 | 90 | 82-110 | 4 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 88 | 92 | 82-117 | 5 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 081566150002A | Sample number(s): 5378093-5378096 UNSPK: P377502 BKG: P377502 | | | | | | | | |
| Lead | -1238 (2) | -2757 (2) | 75-125 | 14 | 20 | 197. | 137. | 36* | 20 |
| Batch number: 08156820005B | Sample number(s): 5378093-5378096 BKG: P377706 | | | | | | | | |
| Moisture | | | | | | 7.4 | 6.9 | 8 | 15 |
| Batch number: 08156SLC026 | Sample number(s): 5378093-5378096 UNSPK: P375888 | | | | | | | | |
| Pyrene | 105 | 125 | 19-162 | 17 | 30 | | | | |
| Naphthalene | 87 | 83 | 29-140 | 4 | 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: 1094202
Reported: 06/13/08 at 11:18 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 |
|---|---|---|---|---|---|---|---|---|---|
| Fluorene | 89 | 87 | 42-139 | 3 | 30 | | | | |
| Phenanthrene | 96 | 114 | 1-181 | 17 | 30 | | | | |
| Anthracene | 88 | 87 | 34-148 | 1 | 30 | | | | |
| Benzo(a)anthracene | 86 | 88 | 20-156 | 2 | 30 | | | | |
| Chrysene | 92 | 100 | 19-158 | 9 | 30 | | | | |
| Benzo(b)fluoranthene | 71 | 80 | 13-161 | 12 | 30 | | | | |
| Benzo(a)pyrene | 75 | 77 | 24-154 | 3 | 30 | | | | |
| Benzo(g,h,i)perylene | 71 | 74 | 26-154 | 4 | 30 | | | | |

### 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: PAHs in Soil by GC/MS
Batch number: 08156SLC026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5378093 | 103 | 95 | 87 |
| 5378094 | 91 | 87 | 93 |
| 5378095 | 106 | 86 | 85 |
| 5378096 | 92 | 87 | 78 |
| Blank | 91 | 88 | 97 |
| LCS | 90 | 85 | 94 |
| MS | 90 | 86 | 102 |
| MSD | 87 | 83 | 103 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081611AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5378095 | 82 | 80 | 71 | 66* |
| 5378096 | 84 | 80 | 69* | 65* |
| Blank | 104 | 100 | 91 | 90 |
| LCS | 95 | 93 | 87 | 85 |
| LCSD | 103 | 100 | 92 | 92 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1094202 Sample #5378093

**COC # 0153799**

Please print. Instructions on reverse side correspond with circled numbers. 4.1 °C

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 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) Preservation Codes (Preservation Codes should be listed together in the analysis request and on the bottle labels)

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water | Other | Total # of Containers | (5) Analyses Requested / Preservation Codes: PAHs 8260 | Lead | Moisture | PAHs by 8270 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-126_1.0-2.0 | 5/29/08 | 800 | X | | X | | | 2 | X | X | X | X |
| N-119_1.0-2.0 | 5/29/08 | 1080 | X | | X | | | 2 | X | X | X | X |
| N-108_1.0-2.0 | 5/29/08 | 1430 | X | | X | | | 2 | X | X | X | X |

Remarks
* Analyses per table provided
* Please copy Kevin Morley & Jason @ Langan

(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 |
|---|---|---|---|---|---|
| Shane Gen / AQUATERRA | 5/29/08 | 1730 | AQUATERRA / FRIDGE | 5/29/08 | 1730 |
| AT FRIDGE | 6/3/08 | 1000 | Aquaterra | 6/3/08 | 1000 |
| Aquaterra | 6/3/08 | 1000 | P. Lefever | 6/3/08 | 1000 |
| P. Lefever | 6/3/08 | 1558 | | | |
| | | | | 6/3/08 | 1558 |

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1094202 Sample # 5378093

**COC # 0154360**

Please print. Instructions on reverse side correspond with circled numbers. 4.1 °C

**For Lab Use Only**
FSC:
SCR#:

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES 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: Soil | Water (Check if Applicable: ☐ Potable ☐ NPDES) | Other | (4) Total # of Containers | PAHs 8260 | Moisture | Lead | PAHs by GC/MS 8270 | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-98_1.0-2.0 | 6/2/08 | 1400 | X | | X | | | 2 | 1 | X | X | X | | | | | * Analyses per table provided |
| | | | | | | | | | | | | | | | | | * Pls copy Kevin Martin + Jason @ Langan |

(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] / AQUATERRA | 6/2/08 | 1715 | AQUATERRA FRIDGE | 6/2/08 | 1714 |
| AT FRIDGE | 6/3/08 | 1000 | [signature] | 6/3/08 | 1000 |
| [signature] | 6/3/08 | 1000 | P. Lefever | 6/3/08 | 1000 |
| P. Lefever | 6/3/08 | 1558 | | | |
| | | | [signature] | 6/3/08 | 1558 |

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

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

SAMPLE GROUP

The sample group for this submittal is 1094907. Samples arrived at the laboratory on Friday, June 06, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-117-1.0-2.0 Grab Soil | 5382600 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |

Lancaster Laboratories

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# Analysis Report

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

Respectfully Submitted,

Dorothy M. Love

Dorothy M. Love
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5382600 SW  Group No. 1094907**

**N-117-1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 0156515 N-117**

Collected:06/04/2008 13:20  by TD  Account Number: 10132

Submitted: 06/06/2008 14:25
Reported: 06/19/2008 at 12:07
Discard: 08/19/2008

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

PN117

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 219. | 0.565 | 0.0848 | mg/kg | 5 |
| 00111 | Moisture | n.a. | 12.4 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 1,100. | 190. | 38. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | 38. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | 38. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 1,400. | 190. | 38. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | 350. | 190. | 38. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 740. | 190. | 38. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 680. | 190. | 38. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 940. | 190. | 38. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 630. | 190. | 38. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 420. | 190. | 38. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | 23. | ug/kg | 39.81 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | 23. | ug/kg | 39.81 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | 45. | ug/kg | 39.81 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | 45. | ug/kg | 39.81 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | 45. | ug/kg | 39.81 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | 45. | ug/kg | 39.81 |
| 05479 | Isopropylbenzene | 98-82-8 | < 230. | 230. | 45. | ug/kg | 39.81 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | 45. | ug/kg | 39.81 |

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

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

## Laboratory Chronicle

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5382600 SW  Group No. 1094907**

**N-117-1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 0156515 N-117**

Collected:06/04/2008 13:20  by TD  Account Number: 10132

Submitted: 06/06/2008 14:25
Reported: 06/19/2008 at 12:07
Discard: 08/19/2008

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

PN117

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/17/2008 11:26 | David K Beck | 5 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/09/2008 16:26 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/17/2008 04:45 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/12/2008 10:34 | Stephanie A Selis | 39.81 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/12/2008 20:45 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035A | 1 | 06/04/2008 13:20 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/12/2008 07:30 | Joseph S Feister | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1094907
Reported: 06/19/08 at 12:07 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: 08161820007A | Sample number(s): 5382600 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08163SLF026 | Sample number(s): 5382600 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 84 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 83 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 88 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 90 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 86 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 89 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 87 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 90 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 91 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 95 | | 65-122 | | |
| Batch number: 081646150002A | Sample number(s): 5382600 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 104 | | 82-118 | | |
| Batch number: Q081641AA | Sample number(s): 5382600 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 104 | 101 | 72-117 | 3 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 96 | 93 | 84-115 | 4 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 110 | 108 | 76-135 | 2 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 95 | 92 | 81-116 | 3 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 94 | 92 | 77-114 | 2 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 95 | 93 | 82-115 | 2 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 91 | 90 | 82-110 | 2 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 93 | 91 | 82-117 | 2 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08161820007A | Sample number(s): 5382600 BKG: P364193 | | | | | | | | |
| Moisture | | | | | | 14.3 | 14.0 | 2 | 15 |
| Batch number: 08163SLF026 | Sample number(s): 5382600 UNSPK: P383118 | | | | | | | | |
| Pyrene | 84 | 80 | 19-162 | 5 | 30 | | | | |
| Naphthalene | 94 | 93 | 29-140 | 0 | 30 | | | | |
| Fluorene | 85 | 86 | 42-139 | 2 | 30 | | | | |
| Phenanthrene | 95 | 95 | 1-181 | 0 | 30 | | | | |
| Anthracene | 91 | 93 | 34-148 | 2 | 30 | | | | |
| Benzo(a)anthracene | 94 | 93 | 20-156 | 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: 1094907
Reported: 06/19/08 at 12:07 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 | 89 | 19-158 | 1 | 30 | | | | |
| Benzo(b)fluoranthene | 103 | 97 | 13-161 | 6 | 30 | | | | |
| Benzo(a)pyrene | 93 | 92 | 24-154 | 2 | 30 | | | | |
| Benzo(g,h,i)perylene | 117 | 122 | 26-154 | 4 | 30 | | | | |
| Batch number: 081646150002A | Sample number(s): 5382600 UNSPK: P385625 BKG: P385625 | | | | | | | | |
| Lead | -379 (2) | -168 (2) | 75-125 | 15 | 20 | 25.4 | 21.0 | 19 | 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: PAHs in Soil by GC/MS
Batch number: 08163SLF026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5382600 | 85 | 91 | 81 |
| Blank | 74 | 78 | 70 |
| LCS | 79 | 81 | 79 |
| MS | 90 | 95 | 82 |
| MSD | 88 | 92 | 79 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081641AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5382600 | 87 | 82 | 78 | 75 |
| Blank | 99 | 96 | 94 | 93 |
| LCS | 98 | 94 | 94 | 93 |
| LCSD | 98 | 94 | 94 | 93 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1094907 Sample # 5382600

**COC # 0156515**

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

(1)
Client: Aquaterra Acct. #:
Project Name/#: Sun Philly Refinery AOL8 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#: 46650

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 Check if Applicable) | Other | Total # of Containers | (5) Analyses Requested — Preservation Codes: PA UST 8260B | PA UST 8270C | Lead | Remarks (6) Temperature of samples upon receipt (if requested)

| Sample Identification | Date Collected | Time Collected | Grab | Composite | Soil | Water | Other | Total # of Containers | PA UST 8260B | PA UST 8270C | Lead | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-117-1.0-2.0 | 6/4/08 | 1320 | X | | X | | | 2 | x | x | x | *Analyte List per previously provided table! |
| | | | | | | | | | | | | *Copy results to Langan |

(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)

SDC 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] Storage | 8/1/07 | 7:15 | Marvin McLallister | 8/1/07 | 7:15 |
| Marvin McLallister | 8/1/07 | 10:10 | | | |
| [signature] | 6/4/08 | 1600 | Aquaterra Fridge | 6/4/08 | 1600 |
| [signature] Doerr | 6/6/08 | 0945 | Erma Dillman | 6/6/08 | 9:45 |
| Erma Dillman | 6/6/08 | 14:35 | [signature] | 6/6/08 | 1425 |

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

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

SAMPLE GROUP

The sample group for this submittal is 1094908. Samples arrived at the laboratory on Friday, June 06, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-106_1.0-2.0 Grab Soil | 5382601 |
| N-102_1.0-2.0 Grab Soil | 5382602 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |

Lancaster Laboratories

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# Analysis Report

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

Respectfully Submitted,

Dorothy M. Love

Dorothy M. Love
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5382601 SW  Group No. 1094908**

**N-106_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 178086 N-106**

Collected:06/05/2008 09:30  by SS  Account Number: 10132

Submitted: 06/06/2008 14:25
Reported: 06/19/2008 at 12:07
Discard: 08/19/2008

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

PN106

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 76.7 | 0.546 | 0.0819 | mg/kg | 5 |
| 00111 | Moisture | n.a. | 11.1 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 270. | 190. | 37. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | 37. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | 37. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 190. | 190. | 37. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 190. | 190. | 37. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 190. | 190. | 37. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 190. | 190. | 37. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 300. | 190. | 37. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 190. | 190. | 37. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 220. | 190. | 37. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 190. | 190. | 19. | ug/kg | 34.39 |
| 05460 | Benzene | 71-43-2 | < 190. | 190. | 19. | ug/kg | 34.39 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 190. | 190. | 39. | ug/kg | 34.39 |
| 05466 | Toluene | 108-88-3 | < 190. | 190. | 39. | ug/kg | 34.39 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 190. | 190. | 39. | ug/kg | 34.39 |
| 05474 | Ethylbenzene | 100-41-4 | < 190. | 190. | 39. | ug/kg | 34.39 |
| 05479 | Isopropylbenzene | 98-82-8 | < 190. | 190. | 39. | ug/kg | 34.39 |
| 06301 | Xylene (Total) | 1330-20-7 | < 190. | 190. | 39. | ug/kg | 34.39 |

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

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

## Laboratory Chronicle

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5382601 SW  Group No. 1094908**

**N-106_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 178086 N-106**

Collected:06/05/2008 09:30  by SS  Account Number: 10132

Submitted: 06/06/2008 14:25
Reported: 06/19/2008 at 12:07
Discard: 08/19/2008

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

PN106

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/17/2008 11:30 | David K Beck | 5 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/09/2008 16:26 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/17/2008 05:57 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/12/2008 10:57 | Stephanie A Selis | 34.39 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/12/2008 20:45 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035A | 1 | 06/05/2008 09:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/12/2008 07:30 | Joseph S Feister | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5382602 SW  Group No. 1094908**

**N-102_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 178086 N-102**

Collected:06/05/2008 13:30  by SS  Account Number: 10132

Submitted: 06/06/2008 14:25
Reported: 06/19/2008 at 12:07
Discard: 08/19/2008

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

PN102

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 24.7 | 0.115 | 0.0172 | mg/kg | 1 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 390. | 190. | 39. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | 39. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | 39. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 310. | 190. | 39. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 190. | 190. | 39. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 190. | 190. | 39. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 270. | 190. | 39. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 320. | 190. | 39. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 200. | 190. | 39. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 190. | 190. | 39. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 250. | 250. | 25. | ug/kg | 42.44 |
| 05460 | Benzene | 71-43-2 | < 250. | 250. | 25. | ug/kg | 42.44 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 250. | 250. | 49. | ug/kg | 42.44 |
| 05466 | Toluene | 108-88-3 | < 250. | 250. | 49. | ug/kg | 42.44 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 250. | 250. | 49. | ug/kg | 42.44 |
| 05474 | Ethylbenzene | 100-41-4 | < 250. | 250. | 49. | ug/kg | 42.44 |
| 05479 | Isopropylbenzene | 98-82-8 | < 250. | 250. | 49. | ug/kg | 42.44 |
| 06301 | Xylene (Total) | 1330-20-7 | < 250. | 250. | 49. | ug/kg | 42.44 |

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

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

## Laboratory Chronicle

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5382602 SW  Group No. 1094908**

**N-102_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 178086 N-102**

Collected:06/05/2008 13:30  by SS  Account Number: 10132

Submitted: 06/06/2008 14:25  SUN: Aquaterra Tech.
Reported: 06/19/2008 at 12:07  PO Box 744
Discard: 08/19/2008  West Chester PA 19381

PN102

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/16/2008 16:28 | David K Beck | 1 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/09/2008 16:26 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/17/2008 06:21 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/12/2008 11:20 | Stephanie A Selis | 42.44 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/12/2008 20:45 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035A | 1 | 06/05/2008 13:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/12/2008 07:30 | Joseph S Feister | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1094908
Reported: 06/19/08 at 12:07 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: 08161820007A | Sample number(s): 5382601-5382602 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08163SLF026 | Sample number(s): 5382601-5382602 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 84 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 83 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 88 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 90 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 86 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 89 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 87 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 90 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 91 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 95 | | 65-122 | | |
| Batch number: 081646150002A | Sample number(s): 5382601-5382602 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 104 | | 82-118 | | |
| Batch number: Q081641AA | Sample number(s): 5382601-5382602 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 104 | 101 | 72-117 | 3 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 96 | 93 | 84-115 | 4 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 110 | 108 | 76-135 | 2 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 95 | 92 | 81-116 | 3 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 94 | 92 | 77-114 | 2 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 95 | 93 | 82-115 | 2 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 91 | 90 | 82-110 | 2 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 93 | 91 | 82-117 | 2 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08161820007A | Sample number(s): 5382601-5382602 | | | | | BKG: P364193 | | | |
| Moisture | | | | | | 14.3 | 14.0 | 2 | 15 |
| Batch number: 08163SLF026 | Sample number(s): 5382601-5382602 | | | | | UNSPK: P383118 | | | |
| Pyrene | 84 | 80 | 19-162 | 5 | 30 | | | | |
| Naphthalene | 94 | 93 | 29-140 | 0 | 30 | | | | |
| Fluorene | 85 | 86 | 42-139 | 2 | 30 | | | | |
| Phenanthrene | 95 | 95 | 1-181 | 0 | 30 | | | | |
| Anthracene | 91 | 93 | 34-148 | 2 | 30 | | | | |
| Benzo(a)anthracene | 94 | 93 | 20-156 | 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: 1094908
Reported: 06/19/08 at 12:07 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 | 89 | 19-158 | 1 | 30 | | | | |
| Benzo(b)fluoranthene | 103 | 97 | 13-161 | 6 | 30 | | | | |
| Benzo(a)pyrene | 93 | 92 | 24-154 | 2 | 30 | | | | |
| Benzo(g,h,i)perylene | 117 | 122 | 26-154 | 4 | 30 | | | | |
| Batch number: 081646150002A | Sample number(s): 5382601-5382602 UNSPK: P385625 BKG: P385625 | | | | | | | | |
| Lead | -379 (2) | -168 (2) | 75-125 | 15 | 20 | 25.4 | 21.0 | 19 | 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: PAHs in Soil by GC/MS
Batch number: 08163SLF026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5382601 | 80 | 87 | 77 |
| 5382602 | 79 | 86 | 74 |
| Blank | 74 | 78 | 70 |
| LCS | 79 | 81 | 79 |
| MS | 90 | 95 | 82 |
| MSD | 88 | 92 | 79 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081641AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5382601 | 88 | 85 | 81 | 78 |
| 5382602 | 85 | 81 | 78 | 75 |
| Blank | 99 | 96 | 94 | 93 |
| LCS | 98 | 94 | 94 | 93 |
| LCSD | 98 | 94 | 94 | 93 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1094908 Sample # 5382601-02

**COC # 178086**

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

**For Lab Use Only**
FSC:
SCR#:

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES 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

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | Matrix (4) Soil | Water (☐ Potable ☐ NPDES) | Other | Total # of Containers | PAUG 82606 | Moisture | Lead | PAHs by GC/MS 8270 | | | | | Remarks (6) Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-106_1.0-2.0 | 6/5/08 | 930 | X | | X | | | 2 | X | X | X | X | | | | | ☆ Pls copy Kevin |
| N-102_1.0-2.0 | 6/5/08 | 1330 | X | | X | | | 2 | X | X | X | X | | | | | Martin & Jason @ |
| | | | | | | | | | | | | | | | | | Langan |
| | | | | | | | | | | | | | | | | | ☆ Analyses per |
| | | | | | | | | | | | | | | | | | table provided |

(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] / AQUATERRA | 6/5/08 | 1745 | AQUATERRA FRIDGE | 6/5/08 | 1745 |
| [signature] | 6/6/08 | 0945 | Erma Dillman | 6/6/08 | 9:45 |
| Erma Dillman | 6/6/08 | 14:25 | | | |
| | | | | | |
| | | | [signature] | 6/6/08 | 1425 |

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

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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

Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1095356. Samples arrived at the laboratory on Tuesday, June 10, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-103_1.0-2.0 Grab Soil | 5385262 |

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

Lancaster Laboratories

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# Analysis Report

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

Respectfully Submitted,

Chad A. Moline
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5385262 SW  Group No. 1095356**

**N-103_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 178085 N-103_1.0-2.0**

Collected:06/06/2008 08:30  by SS  Account Number: 10132

Submitted: 06/10/2008 15:55
Reported: 06/20/2008 at 11:10
Discard: 08/20/2008

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

AOI8N

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 174. | 0.567 | 0.0851 | mg/kg | 5 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 950. | 950. | 190. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 950. | 950. | 190. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 950. | 950. | 190. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 950. | 950. | 190. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 950. | 950. | 190. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 950. | 950. | 190. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | < 950. | 950. | 190. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 950. | 950. | 190. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 950. | 950. | 190. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 1,000. | 950. | 190. | ug/kg | 1 |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 260. | 260. | 26. | ug/kg | 45.96 |
| 05460 | Benzene | 71-43-2 | < 260. | 260. | 26. | ug/kg | 45.96 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 260. | 260. | 53. | ug/kg | 45.96 |
| 05466 | Toluene | 108-88-3 | < 260. | 260. | 53. | ug/kg | 45.96 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 260. | 260. | 53. | ug/kg | 45.96 |
| 05474 | Ethylbenzene | 100-41-4 | < 260. | 260. | 53. | ug/kg | 45.96 |
| 05479 | Isopropylbenzene | 98-82-8 | < 260. | 260. | 53. | ug/kg | 45.96 |
| 06301 | Xylene (Total) | 1330-20-7 | < 260. | 260. | 53. | ug/kg | 45.96 |

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

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

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

**Lancaster Laboratories Sample No. 5385262 SW  Group No. 1095356**

**N-103_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 178085 N-103_1.0-2.0**

Collected:06/06/2008 08:30  by SS  Account Number: 10132

Submitted: 06/10/2008 15:55  SUN: Aquaterra Tech.
Reported: 06/20/2008 at 11:10  PO Box 744
Discard: 08/20/2008  West Chester PA 19381

AOI8N

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/17/2008 11:46 | David K Beck | 5 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/11/2008 18:01 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/19/2008 04:20 | William T Parker | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/13/2008 04:51 | Stephanie A Selis | 45.96 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/12/2008 20:45 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035A | 1 | 06/06/2008 08:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/16/2008 18:40 | Doreen K Robles | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1095356
Reported: 06/20/08 at 11:10 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: 08163820009B | Sample number(s): 5385262 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 081646150002A | Sample number(s): 5385262 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 104 | | 82-118 | | |
| Batch number: 08165SLC026 | Sample number(s): 5385262 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 91 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 87 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 92 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 95 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 90 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 92 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 88 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 107 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 101 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 111 | | 65-122 | | |
| Batch number: Q081651AA | Sample number(s): 5385262 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 102 | 102 | 72-117 | 0 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 93 | 96 | 84-115 | 3 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 111 | 115 | 76-135 | 3 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 92 | 96 | 81-116 | 4 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 96 | 99 | 77-114 | 3 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 95 | 98 | 82-115 | 3 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 92 | 95 | 82-110 | 3 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 92 | 95 | 82-117 | 3 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08163820009B | Sample number(s): 5385262 BKG: P383045 | | | | | | | | |
| Moisture | | | | | | 21.0 | 17.1 | 21* | 15 |
| Batch number: 081646150002A | Sample number(s): 5385262 UNSPK: P385625 BKG: P385625 | | | | | | | | |
| Lead | -379 (2) | -168 (2) | 75-125 | 15 | 20 | 25.4 | 21.0 | 19 | 20 |
| Batch number: 08165SLC026 | Sample number(s): 5385262 UNSPK: P383302 | | | | | | | | |
| Pyrene | 89 | 90 | 19-162 | 1 | 30 | | | | |
| Naphthalene | 83 | 86 | 29-140 | 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: 1095356
Reported: 06/20/08 at 11:10 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 |
|---|---|---|---|---|---|---|---|---|---|
| Fluorene | 90 | 92 | 42-139 | 2 | 30 | | | | |
| Phenanthrene | 92 | 91 | 1-181 | 1 | 30 | | | | |
| Anthracene | 88 | 89 | 34-148 | 1 | 30 | | | | |
| Benzo(a)anthracene | 90 | 92 | 20-156 | 2 | 30 | | | | |
| Chrysene | 85 | 86 | 19-158 | 1 | 30 | | | | |
| Benzo(b)fluoranthene | 104 | 105 | 13-161 | 1 | 30 | | | | |
| Benzo(a)pyrene | 98 | 99 | 24-154 | 1 | 30 | | | | |
| Benzo(g,h,i)perylene | 109 | 106 | 26-154 | 2 | 30 | | | | |

### 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: PAHs in Soil by GC/MS
Batch number: 08165SLC026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5385262 | 99 | 107 | 110 |
| Blank | 88 | 93 | 98 |
| LCS | 89 | 94 | 95 |
| MS | 83 | 90 | 92 |
| MSD | 86 | 91 | 94 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081651AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5385262 | 83 | 78 | 79 | 75 |
| Blank | 99 | 94 | 92 | 94 |
| LCS | 92 | 86 | 88 | 89 |
| LCSD | 98 | 94 | 96 | 101 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1095356 Sample # 5385262

**COC # 178085**

Please print. Instructions on reverse side correspond with circled numbers. 1.5°C

**For Lab Use Only**
FSC:
SCR#: 56493

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

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHLA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES 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 | PAVG 82606 | Moisture | Lead | PAHs by GC/MS 8270 | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-103_1.0-2.0 | 6/6/08 | 830 | X | | X | | | 2 | X | X | X | X | | | | | * Analyses per table provided |
| | | | | | | | | | | | | | | | | | * Pls copy Kevin Martin + Jason @ Langan |

(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 |
|---|---|---|---|---|---|
| Bottle Storage | 3/13/08 | 7:30 | Marvin McFallen | 3/13/08 | 7:30 |
| Marvin McFallen | 3/13/08 | 10:00 | — | — | — |
| [signature] / Aquaterra | 6/6/08 | 1300 | AQUATERRA FRIDGE | 6/6/08 | 1300 |
| [signature] | 6/10/08 | 1:59 pm | P. Lefever | 6/10/08 | 1359 |
| P. Lefever | 6/10/08 | 1555 | Genevieve [signature] | 6/10/08 | 1555 |

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

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

**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.

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1095850. Samples arrived at the laboratory on Thursday, June 12, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-121_1.0-2.0 Grab Soil | 5388263 |

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

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# Analysis Report

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

Respectfully Submitted,

Dorothy M. Love

Dorothy M. Love
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5388263 SW  Group No. 1095850**

**N-121_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 177767 N-121_1.0-2.0**

Collected:06/09/2008 13:30  by SS  Account Number: 10132

Submitted: 06/12/2008 15:15
Reported: 06/27/2008 at 08:30
Discard: 08/27/2008

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

12110

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 64.0 | 1.17 | 0.176 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 2,500. | 990. | 200. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 990. | 990. | 200. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 990. | 990. | 200. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 2,500. | 990. | 200. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 990. | 990. | 200. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 990. | 990. | 200. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 1,500. | 990. | 200. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 990. | 990. | 200. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 990. | 990. | 200. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 990. | 990. | 200. | ug/kg | 1 |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | 23. | ug/kg | 38.94 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | 23. | ug/kg | 38.94 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | 46. | ug/kg | 38.94 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | 46. | ug/kg | 38.94 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | 46. | ug/kg | 38.94 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | 46. | ug/kg | 38.94 |
| 05479 | Isopropylbenzene | 98-82-8 | < 230. | 230. | 46. | ug/kg | 38.94 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | 46. | ug/kg | 38.94 |

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

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

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

**Lancaster Laboratories Sample No. 5388263 SW  Group No. 1095850**

**N-121_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**COC: 177767 N-121_1.0-2.0**

Collected:06/09/2008 13:30  by SS  Account Number: 10132

Submitted: 06/12/2008 15:15  SUN: Aquaterra Tech.
Reported: 06/27/2008 at 08:30  PO Box 744
Discard: 08/27/2008  West Chester PA 19381

12110

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/26/2008 21:09 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/13/2008 15:39 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/19/2008 04:43 | William T Parker | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/18/2008 17:36 | Nicholas R Rossi | 38.94 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/18/2008 19:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/09/2008 13:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/16/2008 18:40 | Doreen K Robles | 1 |

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

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1095850
Reported: 06/27/08 at 08:30 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: 08165820003B | Sample number(s): 5388263 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08165SLC026 | Sample number(s): 5388263 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 91 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 87 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 92 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 95 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 90 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 92 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 88 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 107 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 101 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 111 | | 65-122 | | |
| Batch number: 081706150003A | Sample number(s): 5388263 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 103 | | 82-118 | | |
| Batch number: Q081701AA | Sample number(s): 5388263 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 109 | 106 | 72-117 | 2 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 97 | 96 | 84-115 | 2 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 122 | 116 | 76-135 | 5 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 98 | 94 | 81-116 | 4 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 101 | 97 | 77-114 | 4 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 100 | 95 | 82-115 | 5 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 96 | 94 | 82-110 | 2 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 97 | 93 | 82-117 | 4 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08165820003B | Sample number(s): 5388263 | | | | BKG: P387347 | | | | |
| Moisture | | | | | | 11.0 | 10.7 | 3 | 15 |
| Batch number: 08165SLC026 | Sample number(s): 5388263 | | | | UNSPK: P383302 | | | | |
| Pyrene | 89 | 90 | 19-162 | 1 | 30 | | | | |
| Naphthalene | 83 | 86 | 29-140 | 3 | 30 | | | | |
| Fluorene | 90 | 92 | 42-139 | 2 | 30 | | | | |
| Phenanthrene | 92 | 91 | 1-181 | 1 | 30 | | | | |
| Anthracene | 88 | 89 | 34-148 | 1 | 30 | | | | |
| Benzo(a)anthracene | 90 | 92 | 20-156 | 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.

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1095850
Reported: 06/27/08 at 08:30 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 | 85 | 86 | 19-158 | 1 | 30 | | | | |
| Benzo(b)fluoranthene | 104 | 105 | 13-161 | 1 | 30 | | | | |
| Benzo(a)pyrene | 98 | 99 | 24-154 | 1 | 30 | | | | |
| Benzo(g,h,i)perylene | 109 | 106 | 26-154 | 2 | 30 | | | | |
| Batch number: 081706150003A | Sample number(s): 5388263 UNSPK: P377658 BKG: P377658 | | | | | | | | |
| Lead | -266426 (2) | -166027 (2) | 75-125 | 11 | 20 | 16,800. | 13,000. | 25* | 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: PAHs in Soil by GC/MS
Batch number: 08165SLC026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5388263 | 112 | 117 | 112 |
| Blank | 88 | 93 | 98 |
| LCS | 89 | 94 | 95 |
| MS | 83 | 90 | 92 |
| MSD | 86 | 91 | 94 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081701AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5388263 | 86 | 80 | 79 | 86 |
| Blank | 82 | 76 | 75 | 74 |
| LCS | 106 | 97 | 101 | 100 |
| LCSD | 103 | 96 | 97 | 95 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1095850 Sample # 5388263

**COC # 177767**

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

**For Lab Use Only**
FSC:
SCR#: 56494

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

(1) Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

(2) Matrix (4) (5) Analyses Requested — Preservation Codes

| Sample Identification | Date Collected | Time Collected | Grab (3) | Composite | Soil | Water (Potable / NPDES / Check if Applicable) | Other | Total # of Containers | PAVG 8260 B | moisture | Lead | PAHs by GC/MS 8270 | | | | | Remarks (6) Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-121_1.0-2.0 | 6/9/08 | 1330 | X | | X | | | 2 | X | X | X | X | | | | | ☒ Analyses per table provided |
| | | | | | | | | | | | | | | | | | ☒ Pls Copy Kevin Martin & Jason @ Langan |

(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] | 3/13/08 | 7:30 | Marvin McFallister | 3/13/08 | 7:30 |
| Marvin McFallister | 3/13/08 | 10:00 | | | |
| [signature] / AQUATERRA | 6/10/08 | 1700 | AQUATERRA / FRIDOT | 6/10/08 | 1700 |
| [signature] | 6/12/08 | 11:40 | Erma Dillmore | 6/12/08 | 11:40 |
| Erma Dillmore | 6/12/08 | 15:15 | [signature] | 6/12/08 | 1515 |

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

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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

Lancaster Laboratories

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 for:

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

610-431-5733

Prepared by:

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

SAMPLE GROUP

The sample group for this submittal is 1096046. Samples arrived at the laboratory on Friday, June 13, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-100_0.0-2.0 Grab Soil | 5389508 |

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

Lancaster Laboratories

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# Analysis Report

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

Respectfully Submitted,

Dorothy M. Love

Dorothy M. Love
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5389508 SW  Group No. 1096046**

**N-100_0.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 177179 N-100_0.0-2.0**

Collected:06/11/2008 08:30  by TD  Account Number: 10132

Submitted: 06/13/2008 15:30
Reported: 06/27/2008 at 08:35
Discard: 08/27/2008

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

AQ100

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 135. | 1.09 | 0.164 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 10.3 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 1,900. | 190. | 37. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 190. | 190. | 37. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 190. | 190. | 37. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 1,500. | 190. | 37. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | 320. | 190. | 37. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 1,100. | 190. | 37. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 1,100. | 190. | 37. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 1,200. | 190. | 37. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 920. | 190. | 37. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 620. | 190. | 37. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 280. | 280. | 28. | ug/kg | 51.12 |
| 05460 | Benzene | 71-43-2 | < 280. | 280. | 28. | ug/kg | 51.12 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 280. | 280. | 57. | ug/kg | 51.12 |
| 05466 | Toluene | 108-88-3 | < 280. | 280. | 57. | ug/kg | 51.12 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 280. | 280. | 57. | ug/kg | 51.12 |
| 05474 | Ethylbenzene | 100-41-4 | < 280. | 280. | 57. | ug/kg | 51.12 |
| 05479 | Isopropylbenzene | 98-82-8 | < 280. | 280. | 57. | ug/kg | 51.12 |
| 06301 | Xylene (Total) | 1330-20-7 | < 280. | 280. | 57. | ug/kg | 51.12 |

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

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

## Laboratory Chronicle

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5389508 SW  Group No. 1096046**

**N-100_0.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 177179 N-100_0.0-2.0**

Collected:06/11/2008 08:30 by TD

Account Number: 10132

Submitted: 06/13/2008 15:30
Reported: 06/27/2008 at 08:35
Discard: 08/27/2008

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

AQ100

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/26/2008 21:11 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/13/2008 20:10 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/19/2008 07:00 | William T Parker | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/18/2008 17:59 | Nicholas R Rossi | 51.12 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/18/2008 19:55 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/11/2008 08:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/17/2008 23:30 | Patricia L Foreman | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1096046
Reported: 06/27/08 at 08:35 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 LOQ** | Blank MDL | Report Units | LCS %REC | LCSD %REC | LCS/LCSD Limits | RPD | RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08165820006A | Sample number(s): 5389508 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08169SLD026 | Sample number(s): 5389508 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 98 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 87 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 95 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 101 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 95 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 94 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 92 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 89 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 86 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 81 | | 65-122 | | |
| Batch number: 081706150003A | Sample number(s): 5389508 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 103 | | 82-118 | | |
| Batch number: Q081701AA | Sample number(s): 5389508 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 109 | 106 | 72-117 | 2 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 97 | 96 | 84-115 | 2 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 122 | 116 | 76-135 | 5 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 98 | 94 | 81-116 | 4 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 101 | 97 | 77-114 | 4 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 100 | 95 | 82-115 | 5 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 96 | 94 | 82-110 | 2 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 97 | 93 | 82-117 | 4 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08165820006A | Sample number(s): 5389508 BKG: P389572 | | | | | | | | |
| Moisture | | | | | | 24.5 | 22.7 | 8 | 15 |
| Batch number: 08169SLD026 | Sample number(s): 5389508 UNSPK: P389704 | | | | | | | | |
| Pyrene | 92 | 95 | 19-162 | 3 | 30 | | | | |
| Naphthalene | 87 | 90 | 29-140 | 3 | 30 | | | | |
| Fluorene | 90 | 97 | 42-139 | 8 | 30 | | | | |
| Phenanthrene | 94 | 99 | 1-181 | 5 | 30 | | | | |
| Anthracene | 90 | 94 | 34-148 | 5 | 30 | | | | |
| Benzo(a)anthracene | 89 | 93 | 20-156 | 4 | 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: 1096046
Reported: 06/27/08 at 08:35 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 | 86 | 89 | 19-158 | 3 | 30 | | | | |
| Benzo(b)fluoranthene | 83 | 82 | 13-161 | 1 | 30 | | | | |
| Benzo(a)pyrene | 79 | 84 | 24-154 | 6 | 30 | | | | |
| Benzo(g,h,i)perylene | 81 | 87 | 26-154 | 7 | 30 | | | | |
| Batch number: 081706150003A | Sample number(s): 5389508 UNSPK: P377658 BKG: P377658 | | | | | | | | |
| Lead | -266426 (2) | -166027 (2) | 75-125 | 11 | 20 | 16,800. | 13,000. | 25* | 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: PAHs in Soil by GC/MS
Batch number: 08169SLD026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5389508 | 83 | 87 | 82 |
| Blank | 88 | 89 | 91 |
| LCS | 88 | 93 | 95 |
| MS | 90 | 94 | 94 |
| MSD | 90 | 96 | 92 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081701AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5389508 | 91 | 83 | 83 | 88 |
| Blank | 82 | 76 | 75 | 74 |
| LCS | 106 | 97 | 101 | 100 |
| LCSD | 103 | 96 | 97 | 95 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1096046 Sample # 5389508

**COC # 177179**

Please print. Instructions on reverse side correspond with circled numbers. 3.5°C

(1) Client: Aquatera (Sun) Acct. #:

Project Name/#: Philly-Refinery AW-8 PWSID #:

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

Sampler: T.D. Quote #:

Name of state where samples were collected: PA

For Lab Use Only

FSC:

SCR#: 569762

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water | Other | Potable / NPDES (Check if Applicable) | Total # of Containers | (5) Analyses Requested: Preservation Codes — 8260 B | 8270 C | Lead | Temperature of samples when received (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-100-0.0-2.0 | 6/11/08 | 0830 | X | | X | | | | 2 | X | X | X | |

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

(6) Remarks

* Analytes for each method provided notable

* CC data to Langan

(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 |
|---|---|---|---|---|---|
| Bottle Storage | 3/24/08 | 800 | P. Lefever | 3/24/08 | 800 |
| P. Lefever | 3/24/08 | 1050 | | | |
| | 6/12/08 | 1500 | Aquatera Bridge | 6/12/08 | 1500 |
| | 6/13/08 | 1035 | Gina Kellman | 6/13/08 | 10:30 |
| Gina Kellman | 6/13/08 | 15:30 | | 6/13/08 | 530 |

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766

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

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1096740. Samples arrived at the laboratory on Wednesday, June 18, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-101_1.0-2.0 Grab Soil | 5393378 |

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

Lancaster Laboratories

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 Heun at (717) 656-2300

Respectfully Submitted,

Michele M. Turner

Michele M. Turner
Director

Lancaster Laboratories

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

# Analysis Report



**Lancaster Laboratories Sample No. 5393378 SW  Group No. 1096740**

**N-101_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 0330 N-101_1.0-2.0**

Collected:06/16/2008 13:30  by SS  Account Number: 10132

Submitted: 06/18/2008 17:40
Reported: 06/26/2008 at 14:38
Discard: 08/26/2008

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

A8101

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 78.1 | 1.15 | 0.173 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 440. | 200. | 39. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 200. | 200. | 39. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | 280. | 200. | 39. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 530. | 200. | 39. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | 240. | 200. | 39. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 200. | 200. | 39. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 250. | 200. | 39. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 200. | 200. | 39. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 200. | 200. | 39. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 200. | 200. | 39. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 210. | 210. | 21. | ug/kg | 35.87 |
| 05460 | Benzene | 71-43-2 | < 210. | 210. | 21. | ug/kg | 35.87 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 210. | 210. | 42. | ug/kg | 35.87 |
| 05466 | Toluene | 108-88-3 | < 210. | 210. | 42. | ug/kg | 35.87 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 210. | 210. | 42. | ug/kg | 35.87 |
| 05474 | Ethylbenzene | 100-41-4 | < 210. | 210. | 42. | ug/kg | 35.87 |
| 05479 | Isopropylbenzene | 98-82-8 | < 210. | 210. | 42. | ug/kg | 35.87 |
| 06301 | Xylene (Total) | 1330-20-7 | < 210. | 210. | 42. | ug/kg | 35.87 |

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

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

## Laboratory Chronicle

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5393378 SW  Group No. 1096740**

**N-101_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 0330 N-101_1.0-2.0**

Collected:06/16/2008 13:30  by SS  Account Number: 10132

Submitted: 06/18/2008 17:40  SUN: Aquaterra Tech.
Reported: 06/26/2008 at 14:38  PO Box 744
Discard: 08/26/2008  West Chester PA 19381

A8101

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/25/2008 03:27 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/19/2008 15:57 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/20/2008 17:20 | Linda M Hartenstine | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/20/2008 16:30 | Nicholas R Rossi | 35.87 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/19/2008 19:35 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035A | 1 | 06/16/2008 13:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/19/2008 23:15 | Patricia L Foreman | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1096740
Reported: 06/26/08 at 02:38 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: 081716150003A | Sample number(s): 5393378 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 107 | | 82-118 | | |
| Batch number: 08171820004A | Sample number(s): 5393378 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08171SLD026 | Sample number(s): 5393378 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 81 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 78 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 88 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 90 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 87 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 83 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 85 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 75 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 76 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 80 | | 65-122 | | |
| Batch number: Q081721AA | Sample number(s): 5393378 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 103 | 106 | 72-117 | 3 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 93 | 94 | 84-115 | 1 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 117 | 120 | 76-135 | 3 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 95 | 95 | 81-116 | 1 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 96 | 100 | 77-114 | 4 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 96 | 98 | 82-115 | 2 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 95 | 96 | 82-110 | 1 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 94 | 95 | 82-117 | 2 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 081716150003A | Sample number(s): 5393378 UNSPK: P391409 BKG: P391409 | | | | | | | | |
| Lead | -414 (2) | -185 (2) | 75-125 | 7 | 20 | 50.4 | 70.4 | 33* | 20 |
| Batch number: 08171820004A | Sample number(s): 5393378 BKG: P393413 | | | | | | | | |
| Moisture | | | | | | 61.5 | 61.4 | 0 | 15 |
| Batch number: 08171SLD026 | Sample number(s): 5393378 UNSPK: 5393378 | | | | | | | | |
| Pyrene | 75 | 82 | 19-162 | 7 | 30 | | | | |
| Naphthalene | 82 | 89 | 29-140 | 8 | 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.

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1096740
Reported: 06/26/08 at 02:38 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 | 77 | 86 | 42-139 | 9 | 30 | | | | |
| Phenanthrene | 95 | 106 | 1-181 | 8 | 30 | | | | |
| Anthracene | 90 | 98 | 34-148 | 8 | 30 | | | | |
| Benzo(a)anthracene | 83 | 89 | 20-156 | 6 | 30 | | | | |
| Chrysene | 81 | 86 | 19-158 | 6 | 30 | | | | |
| Benzo(b)fluoranthene | 73 | 75 | 13-161 | 2 | 30 | | | | |
| Benzo(a)pyrene | 74 | 77 | 24-154 | 4 | 30 | | | | |
| Benzo(g,h,i)perylene | 82 | 85 | 26-154 | 4 | 30 | | | | |

### 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: PAHs in Soil by GC/MS
Batch number: 08171SLD026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5393378 | 103 | 96 | 79 |
| Blank | 86 | 84 | 84 |
| LCS | 79 | 80 | 78 |
| MS | 89 | 85 | 73 |
| MSD | 99 | 94 | 82 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: Q081721AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5393378 | 86 | 80 | 78 | 85 |
| Blank | 81 | 77 | 76 | 75 |
| LCS | 101 | 93 | 96 | 97 |
| LCSD | 103 | 94 | 99 | 100 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# PA UST Analysis Request/Chain of Custody

Lancaster Laboratories

Acct. #: 10132 For Lancaster Laboratories use only Group #: 1096740 Sample #: 5393378 0330

SCR #:

Consultant/Office #: Aquaterra (Sun)
Consultant Prj. Mgr.: T. Doerr
Consultant Phone #: 610-431-9733 Fax #:
Site Name: Philly Refinery A01-8
Site Address:
Sampler: SS

| Sample Identification | Date Collected | Time Collected | Grab | Composite | Matrix: Soil | Matrix: Water | Matrix: Oil | Matrix: Air | Potable | NPDES | Total Number of Containers | Number of EnCores | PA Unleaded Gasoline | PA Leaded Gasoline | PA Kerosene (No. 1) | PA Diesel Fuel (No. 2) | PA Fuel Oil No. 4, 5, 6 | PA Used Motor Oil | 8260B | 8270C | Lead | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-101 - 1.0-2.0 | 6/16/08 | 1330 | X | | X | | | | | | 2 | | | | | | | | X | X | X | | | * Specific analyte list previously provided. |

Analyses Requested — List total number of containers in the box under each analyses.

Turnaround Time: STD (7-10) RUSH

Comments:

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| [signature] | 6/18/08 | 1142 | P. Lefever | 6/18/08 | 1740 |
| P. Lefever | 6/18/08 | 1740 | | | |
| | | | | | |
| | | | Katie Hartline | 6/18/08 | 17:40 |

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1096931. Samples arrived at the laboratory on Thursday, June 19, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-129_1.0-2.0 Grab Soil | 5394557 |
| N-126_1.0-2.0 Grab Soil | 5394558 |
| N-109_1.0-2.0 Grab Soil | 5394559 |
| N-131_1.0-2.0 Grab Soil | 5394560 |
| N-119_1.0-2.0 Grab Soil | 5394561 |
| BH-08-01_1.0-2.0 Grab Soil | 5394562 |
| N-104_1.0-2.0 Grab Soil | 5394563 |
| N-105_1.0-2.0 Grab Soil | 5394564 |
| N-107_1.0-2.0 Grab Soil | 5394565 |
| N-99_1.0-2.0 Grab Soil | 5394566 |
| N-125_1.0-2.0 Grab Soil | 5394567 |

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

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# Analysis Report

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

Respectfully Submitted,



Chad A. Moline
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5394557 SW  Group No. 1096931**

**N-129_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-129_1.0-2.0**

Collected:06/17/2008 08:00  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-129

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 31.3 | 1.14 | 0.171 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 14.0 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 970. | 970. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 970. | 970. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 970. | 970. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 970. | 970. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 970. | 970. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 970. | 970. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 1,000. | 970. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 970. | 970. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 970. | 970. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 1,700. | 970. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | 23. | ug/kg | 39.31 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | 23. | ug/kg | 39.31 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | 46. | ug/kg | 39.31 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | 46. | ug/kg | 39.31 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | 46. | ug/kg | 39.31 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | 46. | ug/kg | 39.31 |
| 05479 | Isopropylbenzene | 98-82-8 | < 230. | 230. | 46. | ug/kg | 39.31 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | 46. | ug/kg | 39.31 |

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

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

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

**Lancaster Laboratories Sample No. 5394557 SW  Group No. 1096931**

**N-129_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-129_1.0-2.0**

Collected:06/17/2008 08:00  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15  SUN: Aquaterra Tech.
Reported: 07/08/2008 at 08:53  PO Box 744
Discard: 09/07/2008  West Chester PA 19381

N-129

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/29/2008 14:18 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/24/2008 07:30 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 19:51 | Kelly E Brickley | 39.31 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 08:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/22/2008 07:55 | Doreen K Robles | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5394558 SW  Group No. 1096931**

**N-126_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-126_1.0-2.0**

Collected:06/17/2008 08:10  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-126

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 912. | 2.36 | 0.354 | mg/kg | 20 |
| 00111 | Moisture | n.a. | 17.7 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 2,200. | 1,000. | 200. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 1,000. | 1,000. | 200. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | 1,200. | 1,000. | 200. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 1,100. | 1,000. | 200. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | 1,100. | 1,000. | 200. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 1,000. | 1,000. | 200. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 1,400. | 1,000. | 200. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 1,000. | 1,000. | 200. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 1,000. | 1,000. | 200. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 1,000. | 1,000. | 200. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 3,100. | 3,100. | 310. | ug/kg | 517.6 |
| 05460 | Benzene | 71-43-2 | < 3,100. | 3,100. | 310. | ug/kg | 517.6 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 3,100. | 3,100. | 630. | ug/kg | 517.6 |
| 05466 | Toluene | 108-88-3 | < 3,100. | 3,100. | 630. | ug/kg | 517.6 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 3,100. | 3,100. | 630. | ug/kg | 517.6 |
| 05474 | Ethylbenzene | 100-41-4 | < 3,100. | 3,100. | 630. | ug/kg | 517.6 |
| 05479 | Isopropylbenzene | 98-82-8 | < 3,100. | 3,100. | 630. | ug/kg | 517.6 |
| 06301 | Xylene (Total) | 1330-20-7 | < 3,100. | 3,100. | 630. | ug/kg | 517.6 |
| | The reporting limits for the GC/MS volatile compounds were raised due to sample foaming. | | | | | | |

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394558 SW  Group No. 1096931**

**N-126_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-126_1.0-2.0**

Collected:06/17/2008 08:10  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-126

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 07/07/2008 06:58 | David K Beck | 20 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/24/2008 08:42 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 20:13 | Kelly E Brickley | 517.6 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 08:10 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/22/2008 07:55 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394559 SW  Group No. 1096931**

**N-109_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-109_1.0-2.0**

Collected:06/17/2008 08:20  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-109

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 294. | 1.13 | 0.169 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 12.2 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 950. | 950. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 950. | 950. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 950. | 950. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 950. | 950. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 950. | 950. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 950. | 950. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 950. | 950. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 950. | 950. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 950. | 950. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 950. | 950. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 3,100. | 3,100. | 310. | ug/kg | 539.96 |
| 05460 | Benzene | 71-43-2 | < 3,100. | 3,100. | 310. | ug/kg | 539.96 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 3,100. | 3,100. | 610. | ug/kg | 539.96 |
| 05466 | Toluene | 108-88-3 | < 3,100. | 3,100. | 610. | ug/kg | 539.96 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 3,100. | 3,100. | 610. | ug/kg | 539.96 |
| 05474 | Ethylbenzene | 100-41-4 | < 3,100. | 3,100. | 610. | ug/kg | 539.96 |
| 05479 | Isopropylbenzene | 98-82-8 | < 3,100. | 3,100. | 610. | ug/kg | 539.96 |
| 06301 | Xylene (Total) | 1330-20-7 | < 3,100. | 3,100. | 610. | ug/kg | 539.96 |
| | The reporting limits for the GC/MS volatile compounds were raised due to sample foaming. | | | | | | |

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394559 SW  Group No. 1096931**

**N-109_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-109_1.0-2.0**

Collected:06/17/2008 08:20  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-109

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/29/2008 14:33 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/30/2008 23:54 | Gregory J Drahovsky | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 20:35 | Kelly E Brickley | 539.96 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 08:20 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 2 | 06/27/2008 14:55 | Adrienne E Fellenbaum | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394560 SW  Group No. 1096931**

**N-131_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-131_1.0-2.0**

Collected:06/17/2008 08:40  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-131

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 88.8 | 1.23 | 0.185 | mg/kg | 10 |
| 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 1,000. | 1,000. | 210. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 1,000. | 1,000. | 210. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 1,000. | 1,000. | 210. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 1,000. | 1,000. | 210. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 1,000. | 1,000. | 210. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 1,000. | 1,000. | 210. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 1,000. | 1,000. | 210. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 1,000. | 1,000. | 210. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 1,000. | 1,000. | 210. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 1,000. | 1,000. | 210. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 380. | 380. | 38. | ug/kg | 61.12 |
| 05460 | Benzene | 71-43-2 | < 380. | 380. | 38. | ug/kg | 61.12 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 380. | 380. | 76. | ug/kg | 61.12 |
| 05466 | Toluene | 108-88-3 | < 380. | 380. | 76. | ug/kg | 61.12 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 380. | 380. | 76. | ug/kg | 61.12 |
| 05474 | Ethylbenzene | 100-41-4 | < 380. | 380. | 76. | ug/kg | 61.12 |
| 05479 | Isopropylbenzene | 98-82-8 | < 380. | 380. | 76. | ug/kg | 61.12 |
| 06301 | Xylene (Total) | 1330-20-7 | < 380. | 380. | 76. | ug/kg | 61.12 |

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

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

**Lancaster Laboratories Sample No. 5394560 SW  Group No. 1096931**

**N-131_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-131_1.0-2.0**

Collected:06/17/2008 08:40  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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West Chester PA 19381

N-131

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/29/2008 14:37 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/24/2008 09:30 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 20:58 | Kelly E Brickley | 61.12 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 08:40 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/22/2008 07:55 | Doreen K Robles | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. 5394561 SW  Group No. 1096931**

**N-119_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-119_1.0-2.0**

Collected:06/17/2008 09:00  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-119

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 101. | 1.17 | 0.176 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 15.7 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 560. | 200. | 40. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 200. | 200. | 40. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 200. | 200. | 40. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 200. | 200. | 40. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 200. | 200. | 40. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 340. | 200. | 40. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 650. | 200. | 40. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 210. | 200. | 40. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 430. | 200. | 40. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 330. | 200. | 40. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | 24. | ug/kg | 40.26 |
| 05460 | Benzene | 71-43-2 | < 240. | 240. | 24. | ug/kg | 40.26 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | 48. | ug/kg | 40.26 |
| 05466 | Toluene | 108-88-3 | < 240. | 240. | 48. | ug/kg | 40.26 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | 48. | ug/kg | 40.26 |
| 05474 | Ethylbenzene | 100-41-4 | < 240. | 240. | 48. | ug/kg | 40.26 |
| 05479 | Isopropylbenzene | 98-82-8 | < 240. | 240. | 48. | ug/kg | 40.26 |
| 06301 | Xylene (Total) | 1330-20-7 | < 240. | 240. | 48. | ug/kg | 40.26 |

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

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## Laboratory Chronicle

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# Analysis Report



**Lancaster Laboratories Sample No. 5394561 SW  Group No. 1096931**

**N-119_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-119_1.0-2.0**

Collected:06/17/2008 09:00  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15  SUN: Aquaterra Tech.
Reported: 07/08/2008 at 08:53  PO Box 744
Discard: 09/07/2008  West Chester PA 19381

N-119

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/29/2008 14:41 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/24/2008 09:54 | Joseph M Gambler | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 21:42 | Kelly E Brickley | 40.26 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 09:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/22/2008 07:55 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394562 SW  Group No. 1096931**

**BH-08-01_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 BH-08-01_1.0-2.0**

Collected:06/17/2008 09:30  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

BH081

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 69.7 | 1.08 | 0.162 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 9.5 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 180. | 180. | 37. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 180. | 180. | 37. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 180. | 180. | 37. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | < 180. | 180. | 37. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | < 180. | 180. | 37. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 180. | 180. | 37. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | < 180. | 180. | 37. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 180. | 180. | 37. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 180. | 180. | 37. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 180. | 180. | 37. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | 24. | ug/kg | 43.78 |
| 05460 | Benzene | 71-43-2 | < 240. | 240. | 24. | ug/kg | 43.78 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | 48. | ug/kg | 43.78 |
| 05466 | Toluene | 108-88-3 | < 240. | 240. | 48. | ug/kg | 43.78 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | 48. | ug/kg | 43.78 |
| 05474 | Ethylbenzene | 100-41-4 | < 240. | 240. | 48. | ug/kg | 43.78 |
| 05479 | Isopropylbenzene | 98-82-8 | < 240. | 240. | 48. | ug/kg | 43.78 |
| 06301 | Xylene (Total) | 1330-20-7 | < 240. | 240. | 48. | ug/kg | 43.78 |

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

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

## Laboratory Chronicle

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# Analysis Report



**Lancaster Laboratories Sample No. 5394562 SW  Group No. 1096931**

**BH-08-01_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 BH-08-01_1.0-2.0**

Collected:06/17/2008 09:30  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15  SUN: Aquaterra Tech.
Reported: 07/08/2008 at 08:53  PO Box 744
Discard: 09/07/2008  West Chester PA 19381

BH081

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/29/2008 14:44 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/24/2008 10:18 | Joseph M Gambler | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 22:05 | Kelly E Brickley | 43.78 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 09:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/22/2008 07:55 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394563 SW  Group No. 1096931**

**N-104_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-104_1.0-2.0**

Collected:06/17/2008 09:45  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-104

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 164. | 1.07 | 0.161 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 9.3 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 2,200. | 920. | 180. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 920. | 920. | 180. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 920. | 920. | 180. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 1,500. | 920. | 180. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 920. | 920. | 180. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 920. | 920. | 180. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 1,200. | 920. | 180. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 920. | 920. | 180. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 920. | 920. | 180. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 920. | 920. | 180. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | 23. | ug/kg | 41.19 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | 23. | ug/kg | 41.19 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | 45. | ug/kg | 41.19 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | 45. | ug/kg | 41.19 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | 45. | ug/kg | 41.19 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | 45. | ug/kg | 41.19 |
| 05479 | Isopropylbenzene | 98-82-8 | < 230. | 230. | 45. | ug/kg | 41.19 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | 45. | ug/kg | 41.19 |

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

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

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

**Lancaster Laboratories Sample No. 5394563 SW  Group No. 1096931**

**N-104_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-104_1.0-2.0**

Collected:06/17/2008 09:45  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15  SUN: Aquaterra Tech.
Reported: 07/08/2008 at 08:53  PO Box 744
Discard: 09/07/2008  West Chester PA 19381

N-104

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/29/2008 14:48 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/24/2008 10:42 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 22:27 | Kelly E Brickley | 41.19 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 09:45 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/22/2008 07:55 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394564 SW  Group No. 1096931**

**N-105_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-105_1.0-2.0**

Collected:06/17/2008 10:00  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-105

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 36.4 | 1.08 | 0.162 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 9.0 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 920. | 920. | 180. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 920. | 920. | 180. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 920. | 920. | 180. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 920. | 920. | 180. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 920. | 920. | 180. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 920. | 920. | 180. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 920. | 920. | 180. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 920. | 920. | 180. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 920. | 920. | 180. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 920. | 920. | 180. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 240. | 240. | 24. | ug/kg | 43.03 |
| 05460 | Benzene | 71-43-2 | < 240. | 240. | 24. | ug/kg | 43.03 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 240. | 240. | 47. | ug/kg | 43.03 |
| 05466 | Toluene | 108-88-3 | < 240. | 240. | 47. | ug/kg | 43.03 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 240. | 240. | 47. | ug/kg | 43.03 |
| 05474 | Ethylbenzene | 100-41-4 | < 240. | 240. | 47. | ug/kg | 43.03 |
| 05479 | Isopropylbenzene | 98-82-8 | < 240. | 240. | 47. | ug/kg | 43.03 |
| 06301 | Xylene (Total) | 1330-20-7 | < 240. | 240. | 47. | ug/kg | 43.03 |

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

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

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

**Lancaster Laboratories Sample No. 5394564 SW  Group No. 1096931**

**N-105_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-105_1.0-2.0**

Collected:06/17/2008 10:00  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15  SUN: Aquaterra Tech.
Reported: 07/08/2008 at 08:53  PO Box 744
Discard: 09/07/2008  West Chester PA 19381

N-105

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/29/2008 14:52 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/24/2008 11:06 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 22:49 | Kelly E Brickley | 43.03 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 10:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/22/2008 07:55 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394565 SW  Group No. 1096931**

**N-107_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-107_1.0-2.0**

Collected:06/17/2008 10:15  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-107

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 173. | 1.07 | 0.161 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 7.7 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | < 1,800. | 1,800. | 360. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 1,800. | 1,800. | 360. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 1,800. | 1,800. | 360. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | < 1,800. | 1,800. | 360. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 1,800. | 1,800. | 360. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | < 1,800. | 1,800. | 360. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | < 1,800. | 1,800. | 360. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | < 1,800. | 1,800. | 360. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | < 1,800. | 1,800. | 360. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 1,800. | 1,800. | 360. | ug/kg | 5 |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 220. | 220. | 22. | ug/kg | 40.19 |
| 05460 | Benzene | 71-43-2 | 740. | 220. | 22. | ug/kg | 40.19 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 220. | 220. | 44. | ug/kg | 40.19 |
| 05466 | Toluene | 108-88-3 | 420. | 220. | 44. | ug/kg | 40.19 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 220. | 220. | 44. | ug/kg | 40.19 |
| 05474 | Ethylbenzene | 100-41-4 | 1,600. | 220. | 44. | ug/kg | 40.19 |
| 05479 | Isopropylbenzene | 98-82-8 | 360. | 220. | 44. | ug/kg | 40.19 |
| 06301 | Xylene (Total) | 1330-20-7 | 2,700. | 220. | 44. | ug/kg | 40.19 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394565 SW  Group No. 1096931**

**N-107_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-107_1.0-2.0**

Collected:06/17/2008 10:15  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15  SUN: Aquaterra Tech.
Reported: 07/08/2008 at 08:53  PO Box 744
Discard: 09/07/2008  West Chester PA 19381

N-107

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/29/2008 14:56 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/24/2008 11:31 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 23:12 | Kelly E Brickley | 40.19 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 10:15 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/22/2008 07:55 | Doreen K Robles | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394566 SW  Group No. 1096931**

**N-99_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-99_1.0-2.0**

Collected:06/17/2008 10:30  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-99-

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 146. | 1.14 | 0.170 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 16.2 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 140,000. | 25,000. | 5,000. | ug/kg | 125 |
| 03761 | Naphthalene | 91-20-3 | 53,000. | 5,000. | 990. | ug/kg | 25 |
| 03768 | Fluorene | 86-73-7 | 78,000. | 5,000. | 990. | ug/kg | 25 |
| 03775 | Phenanthrene | 85-01-8 | 280,000. | 25,000. | 5,000. | ug/kg | 125 |
| 03776 | Anthracene | 120-12-7 | 64,000. | 5,000. | 990. | ug/kg | 25 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 82,000. | 5,000. | 990. | ug/kg | 25 |
| 03782 | Chrysene | 218-01-9 | 71,000. | 5,000. | 990. | ug/kg | 25 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 69,000. | 5,000. | 990. | ug/kg | 25 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 61,000. | 5,000. | 990. | ug/kg | 25 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 29,000. | 5,000. | 990. | ug/kg | 25 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 270. | 270. | 27. | ug/kg | 45.79 |
| 05460 | Benzene | 71-43-2 | < 270. | 270. | 27. | ug/kg | 45.79 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 270. | 270. | 55. | ug/kg | 45.79 |
| 05466 | Toluene | 108-88-3 | < 270. | 270. | 55. | ug/kg | 45.79 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 270. | 270. | 55. | ug/kg | 45.79 |
| 05474 | Ethylbenzene | 100-41-4 | < 270. | 270. | 55. | ug/kg | 45.79 |
| 05479 | Isopropylbenzene | 98-82-8 | < 270. | 270. | 55. | ug/kg | 45.79 |
| 06301 | Xylene (Total) | 1330-20-7 | < 270. | 270. | 55. | ug/kg | 45.79 |

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

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

## Laboratory Chronicle

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5394566 SW  Group No. 1096931**

**N-99_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-99_1.0-2.0**

Collected:06/17/2008 10:30  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-99-

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/29/2008 14:59 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/24/2008 15:33 | Joseph M Gambler | 25 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/24/2008 15:57 | Joseph M Gambler | 125 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 23:34 | Kelly E Brickley | 45.79 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 10:30 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/22/2008 07:55 | Doreen K Robles | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5394567 SW  Group No. 1096931**

**N-125_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-125_1.0-2.0**

Collected:06/17/2008 15:00  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15
Reported: 07/08/2008 at 08:53
Discard: 09/07/2008

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

N-125

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 150. | 1.07 | 0.160 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 10.7 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 2,500. | 930. | 190. | ug/kg | 5 |
| 03761 | Naphthalene | 91-20-3 | < 930. | 930. | 190. | ug/kg | 5 |
| 03768 | Fluorene | 86-73-7 | < 930. | 930. | 190. | ug/kg | 5 |
| 03775 | Phenanthrene | 85-01-8 | 1,600. | 930. | 190. | ug/kg | 5 |
| 03776 | Anthracene | 120-12-7 | < 930. | 930. | 190. | ug/kg | 5 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 2,000. | 930. | 190. | ug/kg | 5 |
| 03782 | Chrysene | 218-01-9 | 2,100. | 930. | 190. | ug/kg | 5 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 1,600. | 930. | 190. | ug/kg | 5 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 1,500. | 930. | 190. | ug/kg | 5 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | < 930. | 930. | 190. | ug/kg | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 230. | 230. | 23. | ug/kg | 41.88 |
| 05460 | Benzene | 71-43-2 | < 230. | 230. | 23. | ug/kg | 41.88 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 230. | 230. | 47. | ug/kg | 41.88 |
| 05466 | Toluene | 108-88-3 | < 230. | 230. | 47. | ug/kg | 41.88 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 230. | 230. | 47. | ug/kg | 41.88 |
| 05474 | Ethylbenzene | 100-41-4 | < 230. | 230. | 47. | ug/kg | 41.88 |
| 05479 | Isopropylbenzene | 98-82-8 | < 230. | 230. | 47. | ug/kg | 41.88 |
| 06301 | Xylene (Total) | 1330-20-7 | < 230. | 230. | 47. | ug/kg | 41.88 |

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

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

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

**Lancaster Laboratories Sample No. 5394567 SW  Group No. 1096931**

**N-125_1.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS#  COC: 0153804 N-125_1.0-2.0**

Collected:06/17/2008 15:00  by SS  Account Number: 10132

Submitted: 06/19/2008 16:15  SUN: Aquaterra Tech.
Reported: 07/08/2008 at 08:53  PO Box 744
Discard: 09/07/2008  West Chester PA 19381

N-125

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 06/29/2008 15:03 | James R Williams II | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 06/23/2008 16:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 06/26/2008 10:38 | Joseph M Gambler | 5 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 06/23/2008 23:56 | Kelly E Brickley | 41.88 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 06/22/2008 14:30 | Mirit S Shenouda | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035 | 1 | 06/17/2008 15:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 06/25/2008 14:45 | Doreen K Robles | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1096931
Reported: 07/08/08 at 08:53 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 LOQ** | Blank MDL | Report Units | LCS %REC | LCSD %REC | LCS/LCSD Limits | RPD | RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 081726150001A | Sample number(s): 5394557-5394567 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 111 | | 82-118 | | |
| Batch number: 08173SLA026 | Sample number(s): 5394557-5394558,5394560-5394566 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 101 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 93 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 101 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 103 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 98 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 94 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 100 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 88 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 98 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 98 | | 65-122 | | |
| Batch number: 08175820005A | Sample number(s): 5394557-5394567 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 08177SLA026 | Sample number(s): 5394567 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 104 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 95 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 107 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 105 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 98 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 96 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 100 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 84 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 95 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 90 | | 65-122 | | |
| Batch number: 08179SLB026 | Sample number(s): 5394559 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 104 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 96 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 107 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 104 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 100 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 97 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 101 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 84 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 93 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 89 | | 65-122 | | |
| Batch number: R081751AA | Sample number(s): 5394557-5394567 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 93 | 94 | 72-117 | 1 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 97 | 96 | 84-115 | 1 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 103 | 103 | 76-135 | 1 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 102 | 102 | 81-116 | 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: 1096931
Reported: 07/08/08 at 08:53 AM

### Laboratory Compliance Quality Control

| Analysis Name | Blank Result | Blank LOQ** | Blank MDL | Report Units | LCS %REC | LCSD %REC | LCS/LCSD Limits | RPD | RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 100 | 99 | 77-114 | 2 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 101 | 100 | 82-115 | 1 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 96 | 95 | 82-110 | 1 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 101 | 99 | 82-117 | 1 | 30 |

### Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 081726150001A | Sample number(s): 5394557-5394567 UNSPK: P393503 BKG: P393503 | | | | | | | | |
| Lead | -29 (2) | 190 (2) | 75-125 | 7 | 20 | 44.6 | 45.7 | 2 | 20 |
| Batch number: 08173SLA026 | Sample number(s): 5394557-5394558,5394560-5394566 UNSPK: 5394557 | | | | | | | | |
| Pyrene | 88 | 111 | 19-162 | 19 | 30 | | | | |
| Naphthalene | 78 | 91 | 29-140 | 16 | 30 | | | | |
| Fluorene | 82 | 97 | 42-139 | 17 | 30 | | | | |
| Phenanthrene | 91 | 106 | 1-181 | 15 | 30 | | | | |
| Anthracene | 82 | 99 | 34-148 | 19 | 30 | | | | |
| Benzo(a)anthracene | 83 | 111 | 20-156 | 22 | 30 | | | | |
| Chrysene | 95 | 120 | 19-158 | 15 | 30 | | | | |
| Benzo(b)fluoranthene | 77 | 99 | 13-161 | 19 | 30 | | | | |
| Benzo(a)pyrene | 84 | 113 | 24-154 | 20 | 30 | | | | |
| Benzo(g,h,i)perylene | 105 | 123 | 26-154 | 9 | 30 | | | | |
| Batch number: 08175820005A | Sample number(s): 5394557-5394567 BKG: P395348 | | | | | | | | |
| Moisture | | | | | | 17.9 | 17.0 | 5 | 15 |
| Batch number: 08177SLA026 | Sample number(s): 5394567 UNSPK: P77LAUS | | | | | | | | |
| Pyrene | 64 | 74 | 19-162 | 6 | 30 | | | | |
| Naphthalene | 74 | 79 | 29-140 | 6 | 30 | | | | |
| Fluorene | 76 | 81 | 42-139 | 7 | 30 | | | | |
| Phenanthrene | 67 | 77 | 1-181 | 9 | 30 | | | | |
| Anthracene | 69 | 77 | 34-148 | 10 | 30 | | | | |
| Benzo(a)anthracene | 55 | 67 | 20-156 | 9 | 30 | | | | |
| Chrysene | 60 | 63 | 19-158 | 2 | 30 | | | | |
| Benzo(b)fluoranthene | 48 | 52 | 13-161 | 2 | 30 | | | | |
| Benzo(a)pyrene | 53 | 61 | 24-154 | 6 | 30 | | | | |
| Benzo(g,h,i)perylene | 52 | 62 | 26-154 | 10 | 30 | | | | |
| Batch number: 08179SLB026 | Sample number(s): 5394559 UNSPK: P401644 | | | | | | | | |
| Pyrene | 81 | 63 | 19-162 | 13 | 30 | | | | |
| Naphthalene | 64 (2) | 60 (2) | 29-140 | 1 | 30 | | | | |
| Fluorene | 95 | 77 | 42-139 | 17 | 30 | | | | |
| Phenanthrene | 92 | 74 | 1-181 | 11 | 30 | | | | |
| Anthracene | 111 | 96 | 34-148 | 15 | 30 | | | | |
| Benzo(a)anthracene | 99 | 80 | 20-156 | 16 | 30 | | | | |
| Chrysene | 66 | 57 | 19-158 | 6 | 30 | | | | |
| Benzo(b)fluoranthene | 82 | 74 | 13-161 | 11 | 30 | | | | |
| Benzo(a)pyrene | 103 | 82 | 24-154 | 23 | 30 | | | | |
| Benzo(g,h,i)perylene | 95 | 75 | 26-154 | 24 | 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: 1096931
Reported: 07/08/08 at 08:53 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 |
|---|---|---|---|---|---|---|---|---|---|

### 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: PAHs in Soil by GC/MS
Batch number: 08173SLA026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5394557 | 81 | 90 | 89 |
| 5394558 | 69 | 75 | 74 |
| 5394560 | 75 | 80 | 76 |
| 5394561 | 87 | 91 | 95 |
| 5394562 | 83 | 88 | 86 |
| 5394563 | 86 | 91 | 91 |
| 5394564 | 77 | 84 | 82 |
| 5394565 | 78 | 84 | 81 |
| 5394566 | 77 | 88 | 91 |
| Blank | 85 | 90 | 92 |
| LCS | 93 | 98 | 97 |
| MS | 79 | 84 | 83 |
| MSD | 91 | 94 | 95 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: PAHs in Soil by GC/MS
Batch number: 08177SLA026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5394567 | 87 | 95 | 95 |
| Blank | 89 | 91 | 95 |
| LCS | 95 | 93 | 98 |
| MS | 74 | 77 | 75 |
| MSD | 75 | 78 | 78 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: PAHs in Soil by GC/MS
Batch number: 08179SLB026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5394559 | 71 | 72 | 69 |
| Blank | 102 | 100 | 102 |
| LCS | 98 | 95 | 97 |
| MS | 95 | 93 | 91 |
| MSD | 84 | 83 | 79 |
| Limits: | 49-120 | 55-117 | 43-131 |

*- 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: 1096931
Reported: 07/08/08 at 08:53 AM

### Surrogate Quality Control

Analysis Name: UST-Leaded Soils by 8260B
Batch number: R081751AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5394557 | 73 | 72 | 75 | 66* |
| 5394558 | 58* | 58* | 48* | 49* |
| 5394559 | 65* | 68* | 64* | 60* |
| 5394560 | 68* | 67* | 68* | 63* |
| 5394561 | 75 | 76 | 78 | 74 |
| 5394562 | 79 | 79 | 80 | 73 |
| 5394563 | 82 | 84 | 85 | 78 |
| 5394564 | 77 | 77 | 79 | 72 |
| 5394565 | 76 | 76 | 74 | 71 |
| 5394566 | 74 | 74 | 75 | 70 |
| 5394567 | 78 | 78 | 79 | 75 |
| Blank | 97 | 98 | 100 | 94 |
| LCS | 92 | 90 | 96 | 91 |
| LCSD | 90 | 90 | 94 | 90 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1096931 Sample # 5394557-67

**COC # 0153804**

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

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

(2) (3) (4) (5) Analyses Requested — Preservation Codes

| Sample Identification | Date Collected | Time Collected | Grab | Composite | Soil | Water | Other | Total # of Containers | BTEX + MTBE (PAVG 82606) |
|---|---|---|---|---|---|---|---|---|---|
| N-129_1.0-2.0 | 6/17/08 | 800 | X | | X | | | 2 | X |
| N-126_1.0-2.0 | | 810 | X | | X | | | 2 | X |
| N-109_1.0-2.0 | | 820 | X | | X | | | 2 | X |
| N-131_1.0-2.0 | | 840 | X | | X | | | 2 | X |
| N-119_1.0-2.0 | | 900 | X | | X | | | 2 | X |
| BH-08-01_1.0-2.0 | | 930 | X | | X | | | 2 | X |
| N-104_1.0-2.0 | | 945 | X | | X | | | 2 | X |
| N-105_1.0-2.0 | | 1000 | X | | X | | | 2 | X |
| N-107_1.0-2.0 | | 1015 | X | | X | | | 2 | X |
| N-99_1.0-2.0 | | 1030 | X | | X | | | 2 | X |

For Lab Use Only
FSC:
SCR#:

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

(6) Remarks
+ PER T. DOERR LANCASTER WILL FOLLOW ANALYSES ON TABLE. TS 6-20-08

* Analyses per table provided

* Pls Copy Kevin Martin & Jason Langan

temp 4.7°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) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)

SDG Complete? Yes No

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

(9)

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| [signature] / AQUATERRA | 6/18/08 | 1730 | AQUATERRA FRIDGE | 6/18/08 | 1730 |
| AT FRIDGE | 6/19/08 | 1300 | [signature] Aquaterra | 6/19/08 | 1300 |
| [signature] Aquaterra | 6/19/08 | 1300 | P. Lefever | 6/19/08 | 1300 |
| P. Lefever | 6/19/08 | 1645 | | | |
| | | | Katie Hartlane | 6/19/08 | 16:15 |

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

2102.03

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1096931 Sample # 5394557-67

**COC # 0153803**

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

(1)
Client: SUN- AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 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) (3) (4) (5) (6)

| Sample Identification | Date Collected | Time Collected | Grab | Composite | Soil | Water | Other | Total # of Containers | BTEX + MTBE (PAVG 82606) | | | | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-125_1.0-2.0 | 6/17/08 | 1500 | X | | X | | | 2 | X | | | | | | | | * Analyses per table provided |
| | | | | | | | | | | | | | | | | | * Pls copy Kevin Martin + Jason (1) Langan |
| | | | | | | | | | | | | | | | | | temp 4.7°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) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)

SDG Complete? Yes No

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

(9)

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| [signature] / AQUATERRA | 6/18/08 | 1730 | AQUATERRA FRIDGE | 6/18/08 | 1730 |
| AT FRIDGE | 6/19/08 | 1300 | [signature] Aquaterra | 6/19/08 | 1300 |
| [signature] | 6/19/08 | 1300 | P. Lefever | 6/19/08 | 1300 |
| P. Lefever | 6/19/08 | 1615 | | | |
| | | | Katie Hartlane | 6/19/08 | 16:15 |

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

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1099596. Samples arrived at the laboratory on Tuesday, July 08, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| BH-08-32_0.0-2.0 Grab Soil | 5409889 |

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

Lancaster Laboratories

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# Analysis Report

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

Respectfully Submitted,

Robert Strocko Jr.
Manager

Lancaster Laboratories

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

# Analysis Report



**Lancaster Laboratories Sample No. 5409889 SW  Group No. 1099596**

**BH-08-32_0.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 0334 BH-08-32_0.0-2.0**

Collected:07/03/2008 11:00  by TD  Account Number: 10132

Submitted: 07/08/2008 18:15
Reported: 07/16/2008 at 17:26
Discard: 09/15/2008

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

AOI08

| CAT No. | Analysis Name | CAS Number | Dry Result | Dry Limit of Quantitation* | Dry Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06135 | Lead | 7439-92-1 | 128. | 1.01 | 0.152 | mg/kg | 10 |
| 00111 | Moisture | n.a. | 3.2 | 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. | | | | | | |
| 07804 | PAHs in Soil by GC/MS | | | | | | |
| 01195 | Pyrene | 129-00-0 | 1,600. | 170. | 34. | ug/kg | 1 |
| 03761 | Naphthalene | 91-20-3 | < 170. | 170. | 34. | ug/kg | 1 |
| 03768 | Fluorene | 86-73-7 | < 170. | 170. | 34. | ug/kg | 1 |
| 03775 | Phenanthrene | 85-01-8 | 1,400. | 170. | 34. | ug/kg | 1 |
| 03776 | Anthracene | 120-12-7 | 350. | 170. | 34. | ug/kg | 1 |
| 03781 | Benzo(a)anthracene | 56-55-3 | 920. | 170. | 34. | ug/kg | 1 |
| 03782 | Chrysene | 218-01-9 | 950. | 170. | 34. | ug/kg | 1 |
| 03786 | Benzo(b)fluoranthene | 205-99-2 | 1,200. | 170. | 34. | ug/kg | 1 |
| 03788 | Benzo(a)pyrene | 50-32-8 | 900. | 170. | 34. | ug/kg | 1 |
| 03791 | Benzo(g,h,i)perylene | 191-24-2 | 730. | 170. | 34. | ug/kg | 1 |
| 02308 | UST-Leaded Soils by 8260B | | | | | | |
| 02016 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 300. | 300. | 30. | ug/kg | 57.34 |
| 05460 | Benzene | 71-43-2 | < 300. | 300. | 30. | ug/kg | 57.34 |
| 05461 | 1,2-Dichloroethane | 107-06-2 | < 300. | 300. | 59. | ug/kg | 57.34 |
| 05466 | Toluene | 108-88-3 | < 300. | 300. | 59. | ug/kg | 57.34 |
| 05471 | 1,2-Dibromoethane | 106-93-4 | < 300. | 300. | 59. | ug/kg | 57.34 |
| 05474 | Ethylbenzene | 100-41-4 | < 300. | 300. | 59. | ug/kg | 57.34 |
| 05479 | Isopropylbenzene | 98-82-8 | < 300. | 300. | 59. | ug/kg | 57.34 |
| 06301 | Xylene (Total) | 1330-20-7 | < 300. | 300. | 59. | ug/kg | 57.34 |

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

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

## Laboratory Chronicle

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5409889 SW  Group No. 1099596**

**BH-08-32_0.0-2.0 Grab Soil**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 0334 BH-08-32_0.0-2.0**

Collected:07/03/2008 11:00  by TD  Account Number: 10132

Submitted: 07/08/2008 18:15  SUN: Aquaterra Tech.
Reported: 07/16/2008 at 17:26  PO Box 744
Discard: 09/15/2008  West Chester PA 19381

AOI08

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06135 | Lead | SW-846 6020 | 1 | 07/14/2008 08:31 | David K Beck | 10 |
| 00111 | Moisture | SM20 2540 G | 1 | 07/10/2008 15:35 | Scott W Freisher | 1 |
| 07804 | PAHs in Soil by GC/MS | SW-846 8270C | 1 | 07/10/2008 16:52 | Joseph M Gambler | 1 |
| 02308 | UST-Leaded Soils by 8260B | SW-846 8260B | 1 | 07/15/2008 15:07 | Nicholas R Rossi | 57.34 |
| 06150 | ICP/MS SW-846 Solid digest | SW-846 3050B | 1 | 07/13/2008 20:45 | Annamaria Stipkovits | 1 |
| 06171 | GC/MS - Field Preserved MeOH | SW-846 5035A | 1 | 07/03/2008 11:00 | Client Supplied | 1 |
| 07806 | BNA Soil Extraction | SW-846 3550B | 1 | 07/09/2008 15:20 | Doreen K Robles | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1099596
Reported: 07/16/08 at 05:26 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: 08191SLB026 | Sample number(s): 5409889 | | | | | | | | |
| Pyrene | < 170. | 170. | 33. | ug/kg | 96 | | 75-115 | | |
| Naphthalene | < 170. | 170. | 33. | ug/kg | 84 | | 73-106 | | |
| Fluorene | < 170. | 170. | 33. | ug/kg | 85 | | 75-116 | | |
| Phenanthrene | < 170. | 170. | 33. | ug/kg | 92 | | 77-113 | | |
| Anthracene | < 170. | 170. | 33. | ug/kg | 88 | | 76-112 | | |
| Benzo(a)anthracene | < 170. | 170. | 33. | ug/kg | 87 | | 73-112 | | |
| Chrysene | < 170. | 170. | 33. | ug/kg | 89 | | 76-113 | | |
| Benzo(b)fluoranthene | < 170. | 170. | 33. | ug/kg | 80 | | 61-127 | | |
| Benzo(a)pyrene | < 170. | 170. | 33. | ug/kg | 86 | | 69-122 | | |
| Benzo(g,h,i)perylene | < 170. | 170. | 33. | ug/kg | 83 | | 65-122 | | |
| Batch number: 08192820006A | Sample number(s): 5409889 | | | | | | | | |
| Moisture | | | | | 100 | | 99-101 | | |
| Batch number: 081936150001A | Sample number(s): 5409889 | | | | | | | | |
| Lead | < 0.100 | 0.100 | 0.0150 | mg/kg | 105 | | 82-118 | | |
| Batch number: R081971AA | Sample number(s): 5409889 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 250. | 250. | 25. | ug/kg | 95 | 95 | 72-117 | 1 | 30 |
| Benzene | < 250. | 250. | 25. | ug/kg | 98 | 98 | 84-115 | 0 | 30 |
| 1,2-Dichloroethane | < 250. | 250. | 50. | ug/kg | 106 | 106 | 76-135 | 0 | 30 |
| Toluene | < 250. | 250. | 50. | ug/kg | 101 | 99 | 81-116 | 2 | 30 |
| 1,2-Dibromoethane | < 250. | 250. | 50. | ug/kg | 98 | 98 | 77-114 | 1 | 30 |
| Ethylbenzene | < 250. | 250. | 50. | ug/kg | 99 | 97 | 82-115 | 2 | 30 |
| Isopropylbenzene | < 250. | 250. | 50. | ug/kg | 94 | 92 | 82-110 | 2 | 30 |
| Xylene (Total) | < 250. | 250. | 50. | ug/kg | 99 | 97 | 82-117 | 2 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 08191SLB026 | Sample number(s): 5409889 | | UNSPK: 5409889 | | | | | | |
| Pyrene | 102 | 253* | 19-162 | 56* | 30 | | | | |
| Naphthalene | 85 | 94 | 29-140 | 9 | 30 | | | | |
| Fluorene | 87 | 102 | 42-139 | 14 | 30 | | | | |
| Phenanthrene | 105 | 270* | 1-181 | 62* | 30 | | | | |
| Anthracene | 91 | 125 | 34-148 | 27 | 30 | | | | |
| Benzo(a)anthracene | 90 | 153 | 20-156 | 36* | 30 | | | | |
| Chrysene | 84 | 145 | 19-158 | 36* | 30 | | | | |
| Benzo(b)fluoranthene | 66 | 145 | 13-161 | 45* | 30 | | | | |
| Benzo(a)pyrene | 89 | 140 | 24-154 | 31* | 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: 1099596
Reported: 07/16/08 at 05:26 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 |
|---|---|---|---|---|---|---|---|---|---|
| Benzo(g,h,i)perylene | 85 | 121 | 26-154 | 25 | 30 | | | | |
| Batch number: 08192820006A | Sample number(s): 5409889 BKG: P410435 | | | | | | | | |
| Moisture | | | | | | 27.3 | 27.4 | 1 | 15 |
| Batch number: 081936150001A | Sample number(s): 5409889 UNSPK: P411178 BKG: P411178 | | | | | | | | |
| Lead | -279 (2) | -88 (2) | 75-125 | 4 | 20 | 67.1 | 61.8 | 8 | 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: PAHs in Soil by GC/MS
Batch number: 08191SLB026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5409889 | 92 | 95 | 99 |
| Blank | 89 | 88 | 101 |
| LCS | 92 | 91 | 97 |
| MS | 88 | 91 | 96 |
| MSD | 98 | 99 | 106 |
| Limits: | 49-120 | 55-117 | 43-131 |

Analysis Name: UST-Leaded Soils by 8260B
Batch number: R081971AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5409889 | 86 | 88 | 83 | 78 |
| Blank | 93 | 96 | 94 | 87 |
| LCS | 96 | 95 | 98 | 92 |
| LCSD | 96 | 96 | 95 | 90 |
| Limits: | 71-114 | 70-109 | 70-123 | 70-111 |

*- 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.

# PA UST Analysis Request/Chain of Custody

Lancaster Laboratories

0334

For Lancaster Laboratories use only

Acct. #: 10132 Group #: 109596 Sample #: 541989

SCR #:

Consultant/Office #: Aquaterra

Consultant Prj. Mgr.: T. Deer

Consultant Phone #: 610-431-9733 Fax #:

Site Name: Sun Philly Refinery AOI-8

Site Address:

Sampler: T. Deer

| Sample Identification | Date Collected | Time Collected | Grab | Composite | Matrix: Soil | Matrix: Water | Matrix: Oil | Matrix: Air | Matrix: Potable | Matrix: NPDES | Total Number of Containers | Number of EnCores | PA Unleaded Gasoline | PA Leaded Gasoline | PA Kerosene (No. 1) | PA Diesel Fuel (No. 2) | PA Fuel Oil No. 4, 5, 6 | PA Used Motor Oil | 8260 | 8270 | Lead | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH-08-32_0.0-2.0 | 7/3/08 | 1100 | X | | X | | | | | | 2 | | | | | | | | X | X | X | (X) Specific analyte list provided to Lancaster (Jessica Huen) temp 1.5°C |

Analyses Requested — List total number of containers in the box under each analyses.

Turnaround Time: STD (7-10) RUSH

Comments:

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| | 7/3/08 | 1300 | Aquaterra Fridg | 7/3/08 | 1300 |
| AT RELEASE | 7/8/08 | 1400 | | 7/8/08 | 1400 |
| | 7/8/08 | 1400 | | 7/8/08 | 1400 |
| | 7/8/08 | 8:15 | | 7/9/08 | 1015 |

Lancaster Laboratories, Inc., 2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 (717) 656-2300

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

4400 Rev. 4/26/05

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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

Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1100643. Samples arrived at the laboratory on Tuesday, July 15, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-100 Grab Water | 5415095 |
| N-98 Grab Water | 5415096 |
| N-106 Grab Water | 5415097 |

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

Lancaster Laboratories

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# Analysis Report

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

Respectfully Submitted,

Marla S. Lord
Senior Specialist

Lancaster Laboratories

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

# Analysis Report



**Lancaster Laboratories Sample No. 5415095 WW  Group No. 1100643**

**N-100 Grab Water**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 336 N-100**

Collected:07/14/2008 11:30  by TD  Account Number: 10132

Submitted: 07/15/2008 16:20
Reported: 07/24/2008 at 08:49
Discard: 09/23/2008

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

N-100

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5415095 WW  Group No. 1100643**

**N-100 Grab Water**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 336 N-100**

Collected:07/14/2008 11:30  by TD  Account Number: 10132

Submitted: 07/15/2008 16:20
Reported: 07/24/2008 at 08:49
Discard: 09/23/2008

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

N-100

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/18/2008 19:04 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/18/2008 01:59 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/18/2008 22:08 | Ryan P Byrne | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/18/2008 23:16 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/18/2008 23:16 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/17/2008 07:45 | Suzette L Lehman | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/17/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/17/2008 09:20 | Cynthia J Stoltzfus | 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



**Lancaster Laboratories Sample No. 5415096 WW  Group No. 1100643**

**N-98 Grab Water**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 336 N-98**

Collected:07/14/2008 12:30  by TD  Account Number: 10132

Submitted: 07/15/2008 16:20
Reported: 07/24/2008 at 08:49
Discard: 09/23/2008

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

N--98

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5415096 WW  Group No. 1100643**

**N-98 Grab Water**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 336 N-98**

Collected:07/14/2008 12:30  by TD  Account Number: 10132

Submitted: 07/15/2008 16:20  SUN: Aquaterra Tech.
Reported: 07/24/2008 at 08:49  PO Box 744
Discard: 09/23/2008  West Chester PA 19381

N--98

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/18/2008 19:13 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/18/2008 02:59 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/18/2008 22:31 | Ryan P Byrne | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/18/2008 23:43 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/18/2008 23:43 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/17/2008 07:45 | Suzette L Lehman | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/17/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/17/2008 09:20 | Cynthia J Stoltzfus | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5415097 WW  Group No. 1100643**

**N-106 Grab Water**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 336 N-106**

Collected:07/14/2008 13:00  by TD  Account Number: 10132

Submitted: 07/15/2008 16:20
Reported: 07/24/2008 at 08:49
Discard: 09/23/2008

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

N-106

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | 20. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 2. | 2. | 1. | ug/l | 2 |
| 05401 | Benzene | 71-43-2 | 410. | 20. | 10. | ug/l | 20 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 2. | 2. | 1. | ug/l | 2 |
| 05407 | Toluene | 108-88-3 | 60. | 2. | 1. | ug/l | 2 |
| 05415 | Ethylbenzene | 100-41-4 | 22. | 2. | 1. | ug/l | 2 |
| 05420 | Isopropylbenzene | 98-82-8 | 57. | 4. | 1. | ug/l | 2 |
| 06310 | Xylene (Total) | 1330-20-7 | 120. | 2. | 1. | ug/l | 2 |

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5415097 WW  Group No. 1100643**

**N-106 Grab Water**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 336 N-106**

Collected:07/14/2008 13:00  by TD  Account Number: 10132

Submitted: 07/15/2008 16:20
Reported: 07/24/2008 at 08:49
Discard: 09/23/2008

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

N-106

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/18/2008 19:16 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/18/2008 03:29 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/18/2008 22:55 | Ryan P Byrne | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/19/2008 00:36 | Kelly E Brickley | 2 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/19/2008 01:03 | Kelly E Brickley | 20 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/19/2008 00:36 | Kelly E Brickley | 2 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 2 | 07/19/2008 01:03 | Kelly E Brickley | 20 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/17/2008 07:45 | Suzette L Lehman | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/17/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/17/2008 09:20 | Cynthia J Stoltzfus | 1 |

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

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1100643
Reported: 07/24/08 at 08:49 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: 081980022A | Sample number(s): 5415095-5415097 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 92 | 92 | 60-140 | 0 | 20 |
| Batch number: 081986050001A | Sample number(s): 5415095-5415097 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 110 | | 90-115 | | |
| Batch number: 08198WAJ026 | Sample number(s): 5415095-5415097 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 100 | 94 | 77-107 | 6 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 106 | 107 | 82-113 | 1 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 106 | 102 | 83-112 | 4 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 97 | 94 | 80-115 | 3 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 106 | 106 | 82-112 | 0 | 30 |
| Batch number: P082003AA | Sample number(s): 5415095-5415097 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 91 | 95 | 73-119 | 4 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 90 | 92 | 78-119 | 2 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 91 | 94 | 69-135 | 3 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 89 | 92 | 85-115 | 4 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 88 | 90 | 82-119 | 3 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 87 | 90 | 80-113 | 3 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 88 | 92 | 83-113 | 4 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 081980022A | Sample number(s): 5415095-5415097 UNSPK: 5415095 BKG: P415064 | | | | | | | | |
| Ethylene dibromide | 83 | | 65-135 | | | < 0.029 | < 0.030 | 0 (1) | 30 |
| Batch number: 081986050001A | Sample number(s): 5415095-5415097 UNSPK: P414402 BKG: P414402 | | | | | | | | |
| Lead | 108 | 106 | 75-125 | 1 | 20 | 0.0049 | 0.0052 | 6 (1) | 20 |
| Batch number: P082003AA | Sample number(s): 5415095-5415097 UNSPK: 5415096 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 94 | | 69-127 | | | | | | |
| Benzene | 93 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 92 | | 70-143 | | | | | | |
| Toluene | 94 | | 83-127 | | | | | | |
| Ethylbenzene | 92 | | 82-129 | | | | | | |
| Isopropylbenzene | 93 | | 81-130 | | | | | | |
| Xylene (Total) | 92 | | 82-130 | | | | | | |

*- 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: 1100643
Reported: 07/24/08 at 08:49 AM

## 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: EDB in Wastewater
Batch number: 081980022A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5415095 | 84 |
| 5415096 | 91 |
| 5415097 | 83 |
| Blank | 97 |
| DUP | 92 |
| LCS | 96 |
| LCSD | 99 |
| MS | 80 |
| Limits: | 46-136 |

Analysis Name: PAHs in Water by GC/MS
Batch number: 08198WAJ026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5415095 | 107 | 113 | 102 |
| 5415096 | 100 | 107 | 93 |
| 5415097 | 102 | 96 | 75 |
| Blank | 103 | 109 | 92 |
| LCS | 101 | 107 | 91 |
| LCSD | 96 | 105 | 89 |
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: UST-Waters by 8260B
Batch number: P082003AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5415095 | 86 | 84 | 84 | 85 |
| 5415096 | 87 | 87 | 85 | 83 |
| 5415097 | 86 | 83 | 85 | 87 |
| Blank | 87 | 86 | 84 | 82 |
| LCS | 87 | 86 | 84 | 85 |
| LCSD | 87 | 85 | 84 | 84 |
| MS | 85 | 85 | 84 | 85 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

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

# PA UST Analysis Request/Chain of Custody

0336

Lancaster Laboratories

3.0 °C

For Lancaster Laboratories use only

Acct. #: 10132 Group #: 1100643 Sample #: 5415095-97

SCR #:

Consultant/Office #: Aquaterra (Sun)

Consultant Prj. Mgr.: T. Doerr

Consultant Phone #: _____ Fax #: _____

Site Name: Sun - Philly Refinery AOI-8

Site Address: _____

Sampler: T. Doerr

| Sample Identification | Date Collected | Time Collected | Grab | Composite | Matrix: Soil | Matrix: Water | Matrix: Oil | Matrix: Air | Matrix: Potable | Matrix: NPDES | Total Number of Containers | Number of EnCores | PA Unleaded Gasoline | PA Leaded Gasoline | PA Kerosene (No. 1) | PA Diesel Fuel (No. 2) | PA Fuel Oil No. 4, 5, 6 | PA Used Motor Oil | 8260 | 8270 | Lead | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-100 | 7/14/08 | 1130 | X | | | X | | | | | 8 | | | | | | | | X | X | X | | | See attached table for Spec H&C analyte list. |
| N-98 | 7/14/08 | 1230 | X | | | X | | | | | 8 | | | | | | | | X | X | X | | | |
| N-106 | 7/14/08 | 1300 | X | | | X | | | | | 8 | | | | | | | | X | X | X | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
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Turnaround Time: ~~STD (7-10)~~ RUSH

Comments:

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| | 7/14/08 | 1500 | Locked Fridge | 7/14/08 | 1500 |
| AT FEDEX | 7/18/08 | 1110 | | 7/18/08 | 1110 |
| | 7/18/08 | 1110 | | 7/15/08 | 11:10 |
| | 7/15/08 | 1620 | | 7/15/08 | 1620 |

Lancaster Laboratories, Inc., 2425 New Holland Pike, PO Box 12425, Lancaster, PA 17605-2425 (717) 656-2300

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

4400 Rev. 4/26/05

10132 | 1100643 | 5415095-97

# Table 1
## Constituents of Concern for Groundwater
## AOI 8 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 |
| 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.

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

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

**ppb** parts per billion

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

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

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

**Inorganic Qualifiers**

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

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

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

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Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1100865. Samples arrived at the laboratory on Wednesday, July 16, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-1 Grab Water | 5416333 |
| N-3 Grab Water | 5416334 |
| N-4 Grab Water | 5416335 |
| N-101 Grab Water | 5416336 |
| N-11 Grab Water | 5416337 |
| N-10 Grab Water | 5416338 |
| N-5 Grab Water | 5416339 |
| N-102 Grab Water | 5416340 |
| N-15 Grab Water | 5416341 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |

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# Analysis Report

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

Respectfully Submitted,

Chad A. Moline
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416333 WW  Group No. 1100865**

**N-1 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-1**

Collected:07/15/2008 10:00  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA01

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416333 WW  Group No. 1100865**

**N-1 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-1**

Collected:07/15/2008 10:00  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA01

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 23:09 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/19/2008 03:55 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/19/2008 00:28 | Ryan P Byrne | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 03:34 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 03:34 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 19:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/18/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/18/2008 09:30 | Cynthia J Stoltzfus | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416334 WW  Group No. 1100865**

**N-3 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-3**

Collected:07/15/2008 10:40  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA03

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | 0.0011 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5416334 WW  Group No. 1100865**

**N-3 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-3**

Collected:07/15/2008 10:40  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA03

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 23:11 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/19/2008 04:55 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/19/2008 00:52 | Ryan P Byrne | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 04:01 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 04:01 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 19:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/18/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/18/2008 09:30 | Cynthia J Stoltzfus | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5416335 WW  Group No. 1100865**

**N-4 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-4**

Collected:07/15/2008 10:55  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA04

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | 2. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 5. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 3. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 2. | 1. | 0.5 | ug/l | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5416335 WW  Group No. 1100865**

**N-4 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-4**

Collected:07/15/2008 10:55  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA04

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 23:18 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/19/2008 06:25 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/19/2008 01:15 | Ryan P Byrne | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 04:28 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 04:28 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 19:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/18/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/18/2008 09:30 | Cynthia J Stoltzfus | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5416336 WW  Group No. 1100865**

**N-101 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-101**

Collected:07/15/2008 11:40  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PR101

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 28. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 67. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 9. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 8. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05401 | Benzene | 71-43-2 | < 5. | 5. | 3. | ug/l | 5 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 5. | 5. | 3. | ug/l | 5 |
| 05407 | Toluene | 108-88-3 | < 5. | 5. | 3. | ug/l | 5 |
| 05415 | Ethylbenzene | 100-41-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05420 | Isopropylbenzene | 98-82-8 | 26. | 10. | 3. | ug/l | 5 |
| 06310 | Xylene (Total) | 1330-20-7 | 12. | 5. | 3. | ug/l | 5 |

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

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

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

**Lancaster Laboratories Sample No. 5416336 WW  Group No. 1100865**

**N-101 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-101**

Collected:07/15/2008 11:40  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PR101

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 23:21 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/19/2008 06:55 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/19/2008 01:38 | Ryan P Byrne | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 04:55 | Florida A Cimino | 5 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 04:55 | Florida A Cimino | 5 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 19:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/18/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/18/2008 09:30 | Cynthia J Stoltzfus | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416337 WW  Group No. 1100865**

**N-11 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-11**

Collected:07/15/2008 12:10  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA11

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 6. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 9. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 2. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 38. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 13. | 1. | 0.5 | ug/l | 1 |

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

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

**Lancaster Laboratories Sample No. 5416337 WW  Group No. 1100865**

**N-11 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-11**

Collected:07/15/2008 12:10  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA11

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 12:33 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/19/2008 07:25 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 03:27 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 05:21 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 05:21 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/18/2008 09:23 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/18/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/18/2008 09:30 | Cynthia J Stoltzfus | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416338 WW  Group No. 1100865**

**N-10 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-10**

Collected:07/15/2008 12:40  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA10

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 1. | 1. | 0.5 | ug/l | 1 |

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416338 WW  Group No. 1100865**

**N-10 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-10**

Collected:07/15/2008 12:40  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA10

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 12:36 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/19/2008 07:55 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 03:50 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 05:48 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 05:48 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/18/2008 09:23 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/18/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/18/2008 09:30 | Cynthia J Stoltzfus | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416339 WW  Group No. 1100865**

**N-5 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-5**

Collected:07/15/2008 13:15  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA05

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | 1.13 | 0.0050 | 0.00025 | mg/l | 5 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05401 | Benzene | 71-43-2 | < 5. | 5. | 3. | ug/l | 5 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 5. | 5. | 3. | ug/l | 5 |
| 05407 | Toluene | 108-88-3 | < 5. | 5. | 3. | ug/l | 5 |
| 05415 | Ethylbenzene | 100-41-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05420 | Isopropylbenzene | 98-82-8 | < 10. | 10. | 3. | ug/l | 5 |
| 06310 | Xylene (Total) | 1330-20-7 | < 5. | 5. | 3. | ug/l | 5 |

The reporting limits for the GC/MS volatile compounds were raised due to sample foaming.

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

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

**Lancaster Laboratories Sample No. 5416339 WW  Group No. 1100865**

**N-5 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-5**

Collected:07/15/2008 13:15  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA05

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 15:23 | James R Williams II | 5 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/19/2008 08:25 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 04:14 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 06:15 | Florida A Cimino | 5 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 06:15 | Florida A Cimino | 5 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/18/2008 09:23 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/18/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/18/2008 09:30 | Cynthia J Stoltzfus | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416340 WW  Group No. 1100865**

**N-102 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-102**

Collected:07/15/2008 13:45  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PR102

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | 10. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 22. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 77. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 9. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 15. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 25. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 4. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 8. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 7. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 16. | 1. | 0.5 | ug/l | 1 |

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416340 WW  Group No. 1100865**

**N-102 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-102**

Collected:07/15/2008 13:45  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PR102

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 12:45 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/19/2008 08:55 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 04:37 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 06:41 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 06:41 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/18/2008 09:23 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/18/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/18/2008 09:30 | Cynthia J Stoltzfus | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416341 WW  Group No. 1100865**

**N-15 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-15**

Collected:07/15/2008 14:15  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA15

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | 0.0011 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 99. | 99. | 20. | ug/l | 10 |
| 03956 | Fluorene | 86-73-7 | 180. | 99. | 20. | ug/l | 10 |
| 03963 | Phenanthrene | 85-01-8 | 440. | 99. | 20. | ug/l | 10 |
| 03967 | Pyrene | 129-00-0 | < 99. | 99. | 20. | ug/l | 10 |
| 03971 | Chrysene | 218-01-9 | < 99. | 99. | 20. | ug/l | 10 |

Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised.

Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 2. | 2. | 1. | ug/l | 2 |
| 05401 | Benzene | 71-43-2 | 3. | 2. | 1. | ug/l | 2 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 2. | 2. | 1. | ug/l | 2 |
| 05407 | Toluene | 108-88-3 | 6. | 2. | 1. | ug/l | 2 |
| 05415 | Ethylbenzene | 100-41-4 | < 2. | 2. | 1. | ug/l | 2 |
| 05420 | Isopropylbenzene | 98-82-8 | 230. | 4. | 1. | ug/l | 2 |
| 06310 | Xylene (Total) | 1330-20-7 | 10. | 2. | 1. | ug/l | 2 |

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5416341 WW  Group No. 1100865**

**N-15 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187456 N-15**

Collected:07/15/2008 14:15  by SS  Account Number: 10132

Submitted: 07/16/2008 15:15
Reported: 07/25/2008 at 08:50
Discard: 09/24/2008

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

PRA15

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 12:47 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/19/2008 09:25 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 06:34 | Linda M Hartenstine | 10 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/23/2008 04:06 | Florida A Cimino | 2 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/23/2008 04:06 | Florida A Cimino | 2 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/18/2008 09:23 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/18/2008 10:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/18/2008 09:30 | Cynthia J Stoltzfus | 1 |

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

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1100865
Reported: 07/25/08 at 08:50 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: 081990023A | Sample number(s): 5416333-5416341 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 100 | 100 | 60-140 | 0 | 20 |
| Batch number: 081996050004A | Sample number(s): 5416337-5416341 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 105 | | 90-115 | | |
| Batch number: 08199WAI026 | Sample number(s): 5416333-5416341 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 93 | 98 | 77-107 | 6 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 100 | 102 | 82-113 | 3 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 98 | 102 | 83-112 | 4 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 86 | 92 | 80-115 | 7 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 104 | 109 | 82-112 | 5 | 30 |
| Batch number: 082036050002A | Sample number(s): 5416333-5416336 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 103 | | 90-115 | | |
| Batch number: P082034AA | Sample number(s): 5416333-5416340 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 93 | 93 | 73-119 | 0 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 86 | 88 | 78-119 | 1 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 94 | 94 | 69-135 | 0 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 87 | 88 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 87 | 89 | 82-119 | 3 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 86 | 90 | 80-113 | 4 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 86 | 90 | 83-113 | 4 | 30 |
| Batch number: P082043AA | Sample number(s): 5416341 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 92 | 95 | 73-119 | 3 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 88 | 90 | 78-119 | 2 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 93 | 92 | 69-135 | 0 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 85 | 87 | 85-115 | 3 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 85 | 87 | 82-119 | 2 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 84 | 87 | 80-113 | 4 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 86 | 88 | 83-113 | 3 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 081990023A | Sample number(s): 5416333-5416341 UNSPK: 5416333 BKG: 5416334 | | | | | | | | |
| Ethylene dibromide | 87 | | 65-135 | | | < 0.029 | < 0.030 | 0 (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: 1100865
Reported: 07/25/08 at 08:50 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: 081996050004A | Sample number(s): 5416337-5416341 UNSPK: P416638 BKG: P416638 | | | | | | | | |
| Lead | 103 | 104 | 75-125 | 1 | 20 | 0.0090 | 0.0090 | 0 | 20 |
| Batch number: 082036050002A | Sample number(s): 5416333-5416336 UNSPK: P417253 BKG: P417253 | | | | | | | | |
| Lead | 98 | 100 | 75-125 | 2 | 20 | < 0.0010 | < 0.0010 | 0 (1) | 20 |
| Batch number: P082034AA | Sample number(s): 5416333-5416340 UNSPK: P415066 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 96 | | 69-127 | | | | | | |
| Benzene | 93 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 98 | | 70-143 | | | | | | |
| Toluene | 93 | | 83-127 | | | | | | |
| Ethylbenzene | 93 | | 82-129 | | | | | | |
| Isopropylbenzene | 94 | | 81-130 | | | | | | |
| Xylene (Total) | 93 | | 82-130 | | | | | | |
| Batch number: P082043AA | Sample number(s): 5416341 UNSPK: P417522 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 96 | | 69-127 | | | | | | |
| Benzene | 96 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 95 | | 70-143 | | | | | | |
| Toluene | 95 | | 83-127 | | | | | | |
| Ethylbenzene | 95 | | 82-129 | | | | | | |
| Isopropylbenzene | 95 | | 81-130 | | | | | | |
| Xylene (Total) | 94 | | 82-130 | | | | | | |

### Surrogate Quality Control

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

Analysis Name: EDB in Wastewater
Batch number: 081990023A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5416333 | 84 |
| 5416334 | 77 |
| 5416335 | 81 |
| 5416336 | 79 |
| 5416337 | 84 |
| 5416338 | 80 |
| 5416339 | 80 |
| 5416340 | 81 |
| 5416341 | 66 |
| Blank | 100 |
| DUP | 82 |
| LCS | 99 |
| LCSD | 100 |
| MS | 83 |

*- 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: 1100865
Reported: 07/25/08 at 08:50 AM

### Surrogate Quality Control

Limits: 46-136

Analysis Name: PAHs in Water by GC/MS
Batch number: 08199WAI026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5416333 | 96 | 104 | 87 |
| 5416334 | 101 | 109 | 85 |
| 5416335 | 97 | 101 | 84 |
| 5416336 | 119 | 91 | 66 |
| 5416337 | 97 | 99 | 93 |
| 5416338 | 98 | 102 | 90 |
| 5416339 | 94 | 104 | 85 |
| 5416340 | 100 | 87 | 60 |
| 5416341 | 239* | 105 | 91 |
| Blank | 98 | 105 | 88 |
| LCS | 98 | 104 | 81 |
| LCSD | 99 | 103 | 88 |
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: UST-Waters by 8260B
Batch number: P082034AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5416333 | 93 | 90 | 89 | 86 |
| 5416334 | 92 | 92 | 88 | 87 |
| 5416335 | 92 | 88 | 89 | 91 |
| 5416336 | 92 | 90 | 90 | 90 |
| 5416337 | 92 | 90 | 89 | 89 |
| 5416338 | 91 | 91 | 91 | 89 |
| 5416339 | 93 | 92 | 89 | 86 |
| 5416340 | 92 | 90 | 89 | 89 |
| Blank | 93 | 91 | 89 | 86 |
| LCS | 91 | 91 | 89 | 89 |
| LCSD | 91 | 93 | 89 | 88 |
| MS | 92 | 94 | 89 | 88 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

Analysis Name: UST-Waters by 8260B
Batch number: P082043AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5416341 | 87 | 86 | 84 | 88 |
| Blank | 88 | 84 | 83 | 82 |
| LCS | 87 | 87 | 82 | 84 |
| LCSD | 87 | 88 | 82 | 83 |
| MS | 87 | 85 | 83 | 85 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

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

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1100865 Sample # 5416333-41

**COC #** 187456

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 1.9-5.6°C

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

Project Name/#: PHILA REF AOI-8 PWSID #:

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

Sampler: S. SYKES Quote #:

Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

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

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water | Other | Total # of Containers | (5) Analyses Requested: Preservation Codes: Pb (Unfiltered) 8260B | Lead | EDB | PAHs by 6270 SIM | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-1 | 7/15/08 | 1000 | X | | | X | | 8 | 3 | 1 | 2 | 2 | * One Amber for N-102 broken at time of pick-up. |
| N-3 | | 1040 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-4 | | 1055 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-101 | | 1140 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-11 | | 1210 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-10 | | 1240 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-5 | | 1315 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-102 | | 1345 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-15 | | 1415 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |

(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] /AQUATERRA | 7/15/08 | | | | |
| [signature] | 7/16/08 | 1310 | [signature] | 7/16/08 | 1310 |
| [signature] | 7/16/08 | 1515 | | | |
| | | | | | |
| | | | [signature] | 7/16/08 | 1515 |

# 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.

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

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

610-431-5733

Prepared by:

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

## SAMPLE GROUP

The sample group for this submittal is 1101087. Samples arrived at the laboratory on Thursday, July 17, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-8 Grab Water | 5417522 |
| N-9 Grab Water | 5417523 |
| N-16 Grab Water | 5417524 |
| N-17 Grab Water | 5417525 |
| N-18 Grab Water | 5417526 |
| N-19 Grab Water | 5417527 |
| N-85 Grab Water | 5417528 |
| N-84 Grab Water | 5417529 |
| N-28 Grab Water | 5417530 |
| N-134 Grab Water | 5417531 |
| N-65 Grab Water | 5417532 |

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

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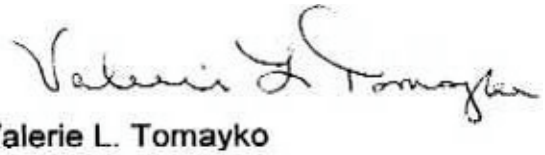
Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

Respectfully Submitted,



Valerie L. Tomayko
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5417522 WW  Group No. 1101087**

**N-8 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-8**

Collected:07/16/2008 09:30  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR808

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5417522 WW  Group No. 1101087**

**N-8 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-8**

Collected:07/16/2008 09:30  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR808

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:19 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/21/2008 23:09 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 05:24 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 22:17 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 22:17 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5417523 WW  Group No. 1101087**

**N-9 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-9**

Collected:07/16/2008 09:45  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR809

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 8. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 2. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 6. | 1. | 0.5 | ug/l | 1 |

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

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5417523 WW  Group No. 1101087**

**N-9 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-9**

Collected:07/16/2008 09:45  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR809

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:22 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/22/2008 00:09 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 05:47 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 21:50 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 21:50 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5417524 WW  Group No. 1101087**

**N-16 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-16**

Collected:07/16/2008 10:30  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR816

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 50. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 50. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 50. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 50. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

**Lancaster Laboratories Sample No. 5417524 WW  Group No. 1101087**

**N-16 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-16**

Collected:07/16/2008 10:30  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR816

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:25 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/22/2008 00:39 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 06:11 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 23:11 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 23:11 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5417525 WW  Group No. 1101087**

**N-17 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-17**

Collected:07/16/2008 10:45  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR817

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.010 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 50. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 50. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 130. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 50. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

**Lancaster Laboratories Sample No. 5417525 WW  Group No. 1101087**

**N-17 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-17**

Collected:07/16/2008 10:45  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR817

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:28 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/22/2008 01:09 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 06:57 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/22/2008 23:37 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/22/2008 23:37 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5417526 WW  Group No. 1101087**

**N-18 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-18**

Collected:07/16/2008 11:25  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR818

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 25. | 25. | 5. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 25. | 25. | 5. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 25. | 25. | 5. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 25. | 25. | 5. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 25. | 25. | 5. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 3. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 20. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 1. | 1. | 0.5 | ug/l | 1 |

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

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

**Lancaster Laboratories Sample No. 5417526 WW  Group No. 1101087**

**N-18 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-18**

Collected:07/16/2008 11:25  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR818

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:31 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/22/2008 01:39 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 07:21 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 03:35 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 03:35 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5417527 WW  Group No. 1101087**

**N-19 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-19**

Collected:07/16/2008 11:45  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR819

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5417527 WW  Group No. 1101087**

**N-19 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-19**

Collected:07/16/2008 11:45  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR819

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:34 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/22/2008 02:09 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 07:44 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 03:56 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 03:56 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5417528 WW  Group No. 1101087**

**N-85 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-85**

Collected:07/16/2008 12:35  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR885

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 50. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 50. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 50. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 50. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

**Lancaster Laboratories Sample No. 5417528 WW  Group No. 1101087**

**N-85 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-85**

Collected:07/16/2008 12:35  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR885

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:37 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/22/2008 03:09 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 08:08 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/23/2008 01:25 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/23/2008 01:25 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5417529 WW  Group No. 1101087**

**N-84 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-84**

Collected:07/16/2008 12:55  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR884

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 11. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

**Lancaster Laboratories Sample No. 5417529 WW  Group No. 1101087**

**N-84 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-84**

Collected:07/16/2008 12:55  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30  SUN: Aquaterra Tech.
Reported: 07/28/2008 at 12:58  PO Box 744
Discard: 09/27/2008  West Chester PA 19381

PR884

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:40 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/22/2008 03:39 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 08:31 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/23/2008 01:52 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/23/2008 01:52 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

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# Analysis Report



**Lancaster Laboratories Sample No. 5417530 WW  Group No. 1101087**

**N-28 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-28**

Collected:07/16/2008 13:20  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR828

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5417530 WW  Group No. 1101087**

**N-28 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-28**

Collected:07/16/2008 13:20  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR828

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:49 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/22/2008 04:09 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 08:55 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/23/2008 02:19 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/23/2008 02:19 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5417531 WW  Group No. 1101087**

**N-134 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-134**

Collected:07/16/2008 13:45  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR134

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 50. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 50. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 50. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 50. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

**Lancaster Laboratories Sample No. 5417531 WW  Group No. 1101087**

**N-134 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-134**

Collected:07/16/2008 13:45  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR134

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:52 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/22/2008 04:39 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 09:18 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/23/2008 02:45 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/23/2008 02:45 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5417532 WW  Group No. 1101087**

**N-65 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-65**

Collected:07/16/2008 14:30  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR865

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

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

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

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5417532 WW  Group No. 1101087**

**N-65 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187458 N-65**

Collected:07/16/2008 14:30  by SS  Account Number: 10132

Submitted: 07/17/2008 13:30
Reported: 07/28/2008 at 12:58
Discard: 09/27/2008

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

PR865

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/23/2008 03:55 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/22/2008 05:09 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 09:41 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/23/2008 03:12 | Florida A Cimino | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/23/2008 03:12 | Florida A Cimino | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/21/2008 06:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/19/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 04:30 | Tracy L Schickel | 1 |

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

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1101087
Reported: 07/28/08 at 12:58 PM

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

## Laboratory Compliance Quality Control

| Analysis Name | Blank Result | Blank LOQ** | Blank MDL | Report Units | LCS %REC | LCSD %REC | LCS/LCSD Limits | RPD | RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 082000009A | Sample number(s): 5417522-5417532 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 104 | 104 | 60-140 | 0 | 20 |
| Batch number: 082006050004A | Sample number(s): 5417522-5417532 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 105 | | 90-115 | | |
| Batch number: 08201WAH026 | Sample number(s): 5417522-5417532 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 96 | 97 | 77-107 | 1 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 101 | 99 | 82-113 | 1 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 106 | 108 | 83-112 | 2 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 105 | 107 | 80-115 | 2 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 104 | 108 | 82-112 | 4 | 30 |
| Batch number: P082043AA | Sample number(s): 5417522-5417525,5417528-5417532 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 92 | 95 | 73-119 | 3 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 88 | 90 | 78-119 | 2 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 93 | 92 | 69-135 | 0 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 85 | 87 | 85-115 | 3 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 85 | 87 | 82-119 | 2 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 84 | 87 | 80-113 | 4 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 86 | 88 | 83-113 | 3 | 30 |
| Batch number: P082053AA | Sample number(s): 5417526-5417527 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 92 | 93 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 89 | 89 | 78-119 | 0 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 93 | 91 | 69-135 | 2 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 86 | 88 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 84 | 85 | 82-119 | 2 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 85 | 85 | 80-113 | 0 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 85 | 86 | 83-113 | 1 | 30 |

## Sample Matrix Quality Control

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

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 082000009A | Sample number(s): 5417522-5417532 UNSPK: 5417522 BKG: P417548 | | | | | | | | |
| Ethylene dibromide | 100 | | 65-135 | | | < 0.029 | < 0.029 | 0 (1) | 30 |
| Batch number: 082006050004A | Sample number(s): 5417522-5417532 UNSPK: P416579 BKG: P416579 | | | | | | | | |
| Lead | 107 | 106 | 75-125 | 0 | 20 | 0.0174 | 0.0178 | 2 | 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: 1101087
Reported: 07/28/08 at 12:58 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: P082043AA | Sample number(s): 5417522-5417525,5417528-5417532 UNSPK: 5417522 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 96 | | 69-127 | | | | | | |
| Benzene | 96 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 95 | | 70-143 | | | | | | |
| Toluene | 95 | | 83-127 | | | | | | |
| Ethylbenzene | 95 | | 82-129 | | | | | | |
| Isopropylbenzene | 95 | | 81-130 | | | | | | |
| Xylene (Total) | 94 | | 82-130 | | | | | | |
| Batch number: P082053AA | Sample number(s): 5417526-5417527 UNSPK: P418824 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 96 | | 69-127 | | | | | | |
| Benzene | 94 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 95 | | 70-143 | | | | | | |
| Toluene | 82* | | 83-127 | | | | | | |
| Ethylbenzene | 65* | | 82-129 | | | | | | |
| Isopropylbenzene | 67 (2) | | 81-130 | | | | | | |
| Xylene (Total) | 64* | | 82-130 | | | | | | |

### Surrogate Quality Control

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

Analysis Name: EDB in Wastewater
Batch number: 082000009A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5417522 | 92 |
| 5417523 | 87 |
| 5417524 | 88 |
| 5417525 | 91 |
| 5417526 | 77 |
| 5417527 | 124 |
| 5417528 | 101 |
| 5417529 | 135 |
| 5417530 | 91 |
| 5417531 | 86 |
| 5417532 | 79 |
| Blank | 100 |
| DUP | 90 |
| LCS | 100 |
| LCSD | 100 |
| MS | 92 |
| Limits: | 46-136 |

Analysis Name: PAHs in Water by GC/MS
Batch number: 08201WAH026

| Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|

*- 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: 1101087
Reported: 07/28/08 at 12:58 PM

### Surrogate Quality Control

| | | | | |
|---|---|---|---|---|
| 5417522 | 100 | 127* | 96 | |
| 5417523 | 92 | 100 | 97 | |
| 5417524 | 94 | 100 | 96 | |
| 5417525 | 101 | 107 | 94 | |
| 5417526 | 110 | 102 | 93 | |
| 5417527 | 92 | 98 | 96 | |
| 5417528 | 98 | 105 | 96 | |
| 5417529 | 88 | 94 | 105 | |
| 5417530 | 91 | 97 | 111 | |
| 5417531 | 101 | 109 | 82 | |
| 5417532 | 94 | 101 | 89 | |
| Blank | 98 | 104 | 101 | |
| LCS | 100 | 103 | 101 | |
| LCSD | 101 | 102 | 102 | |
| Limits: | 44-127 | 63-114 | 30-126 | |

Analysis Name: UST-Waters by 8260B
Batch number: P082043AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5417522 | 88 | 85 | 82 | 82 |
| 5417523 | 87 | 84 | 83 | 83 |
| 5417524 | 87 | 85 | 83 | 82 |
| 5417525 | 88 | 84 | 84 | 82 |
| 5417528 | 87 | 83 | 84 | 83 |
| 5417529 | 87 | 83 | 83 | 85 |
| 5417530 | 87 | 85 | 82 | 82 |
| 5417531 | 88 | 85 | 83 | 82 |
| 5417532 | 89 | 84 | 83 | 82 |
| Blank | 88 | 84 | 83 | 82 |
| LCS | 87 | 87 | 82 | 84 |
| LCSD | 87 | 88 | 82 | 83 |
| MS | 87 | 85 | 83 | 85 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

Analysis Name: UST-Waters by 8260B
Batch number: P082053AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5417526 | 87 | 84 | 82 | 86 |
| 5417527 | 88 | 87 | 82 | 83 |
| Blank | 88 | 85 | 83 | 83 |
| LCS | 87 | 87 | 81 | 84 |
| LCSD | 87 | 86 | 82 | 83 |
| MS | 87 | 85 | 83 | 85 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

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

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only
Acct. # 10132 Group# 1101087 Sample # 5417522-32

**COC #** 187458

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 2.1-2.5°C

**For Lab Use Only**
FSC:
SCR#:

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

(4) Matrix: Potable / NPDES (Check if Applicable)

(5) Analyses Requested — Preservation Codes

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

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | Soil | Water | Other | Total # of Containers | Rx Unleaded 8260 | Lead | PAHs by GC/MS 8270 | EDB | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-8 | 7/16/08 | 930 | X | | X | X | | 8 | 3 | 1 | 2 | 2 | |
| N-9 | | 945 | X | | X | X | | 8 | 3 | 1 | 2 | 2 | |
| N-16 | | 1030 | X | | X | X | | 8 | 3 | 1 | 2 | 2 | |
| N-17 | | 1045 | X | | X | X | | 8 | 3 | 1 | 2 | 2 | |
| N-18 | | 1125 | X | | X | X | | 8 | 3 | 1 | 2 | 2 | |
| N-19 | | 1145 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-85 | | 1235 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-84 | | 1255 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-28 | | 1320 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-134 | | 1345 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |

(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 |
|---|---|---|---|---|---|
| SUN-AQUATERRA | 7/16/08 | 1630 | | 7/16/08 | 1630 |
| | 7/16/08 | 1045 | P. Lefever | 7/17/08 | 1045 |
| P. Lefever | 7/17/08 | 1330 | | | |
| | | | | | |
| | | | | 7-17-08 | 0945 1330 |

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

2102.03

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1101087 Sample # 5417522-32

**COC # 187459**

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 2.1-2.5°C

**For Lab Use Only**
FSC:
SCR#:

(1) Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water (Potable / NPDES) | Other | Total # of Containers | (5) Analyses Requested: Pb Unleaded 82606 | Lead | PAHs by GC/MS 8270 | EDB | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-65 | 7/16/08 | 1430 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |

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

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

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

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg) 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 |
|---|---|---|---|---|---|
| S. Sykes / AQUATERRA | 7/16/08 | 1630 | [illegible] | 7/16/08 | 1630 |
| [illegible] | 7/17/08 | 1045 | P. Lefever | 7/17/08 | 1045 |
| P. Lefever | 7/17/08 | 1330 | | | |
| | | | | | |
| | | | [illegible] | 7/17/08 | 0940 1330 |

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

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

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

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

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

**>** greater than

**ppm** parts per million – One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

**ppb** parts per billion

**Dry weight basis** Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture.

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

| | |
|---|---|
| **A** | TIC is a possible aldol-condensation product |
| **B** | Analyte was also detected in the blank |
| **C** | Pesticide result confirmed by GC/MS |
| **D** | Compound quatitated on a diluted sample |
| **E** | Concentration exceeds the calibration range of the instrument |
| **J** | Estimated value |
| **N** | Presumptive evidence of a compound (TICs only) |
| **P** | Concentration difference between primary and confirmation columns >25% |
| **U** | Compound was not detected |
| **X,Y,Z** | Defined in case narrative |

**Inorganic Qualifiers**

| | |
|---|---|
| **B** | Value is <CRDL, but ≥IDL |
| **E** | Estimated due to interference |
| **M** | Duplicate injection precision not met |
| **N** | Spike amount not within control limits |
| **S** | Method of standard additions (MSA) used for calculation |
| **U** | Compound was not detected |
| **W** | Post digestion spike out of control limits |
| ***** | Duplicate analysis not within control limits |
| **+** | Correlation coefficient for MSA <0.995 |

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

## SAMPLE GROUP

The sample group for this submittal is 1101339. Samples arrived at the laboratory on Friday, July 18, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-27 Grab Water | 5418823 |
| N-120 Grab Water | 5418824 |
| N-26 Grab Water | 5418825 |
| N-92 Grab Water | 5418826 |
| N-93 Grab Water | 5418827 |
| N-87 Grab Water | 5418828 |
| N-86 Grab Water | 5418829 |
| N-119 Grab Water | 5418830 |
| N-121 Grab Water | 5418831 |
| N-117 Grab Water | 5418832 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | LLI | Attn: EDD Group |

Lancaster Laboratories

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# Analysis Report

Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

Respectfully Submitted,

Valerie L. Tomayko
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5418823 WW  Group No. 1101339**

**N-27 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-27**

Collected:07/17/2008 09:35  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR027

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | 4. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5418823 WW  Group No. 1101339**

**N-27 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-27**

Collected:07/17/2008 09:35  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR027

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 11:47 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 00:59 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 12:13 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/23/2008 23:07 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/23/2008 23:07 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/22/2008 12:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 14:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418824 WW  Group No. 1101339**

**N-120 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-120**

Collected:07/17/2008 09:50  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR120

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 13. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 21. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 7. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 130. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

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# Analysis Report



**Lancaster Laboratories Sample No. 5418824 WW  Group No. 1101339**

**N-120 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-120**

Collected:07/17/2008 09:50  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20  SUN: Aquaterra Tech.
Reported: 07/29/2008 at 12:28  PO Box 744
Discard: 09/28/2008  West Chester PA 19381

PR120

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 11:50 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 01:59 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 12:36 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/23/2008 23:27 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/23/2008 23:27 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/22/2008 12:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 14:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5418825 WW  Group No. 1101339**

**N-26 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-26**

Collected:07/17/2008 10:20  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR026

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5418825 WW  Group No. 1101339**

**N-26 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-26**

Collected:07/17/2008 10:20  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20  SUN: Aquaterra Tech.
Reported: 07/29/2008 at 12:28  PO Box 744
Discard: 09/28/2008  West Chester PA 19381

PR026

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 11:57 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 02:29 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 13:00 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 00:09 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 00:09 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/22/2008 12:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 14:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418826 WW  Group No. 1101339**

**N-92 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-92**

Collected:07/17/2008 11:00  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR092

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 17. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 27. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 11. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418826 WW  Group No. 1101339**

**N-92 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-92**

Collected:07/17/2008 11:00  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR092

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 11:59 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 02:59 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 13:24 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 00:29 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 00:29 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/22/2008 12:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 14:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418827 WW  Group No. 1101339**

**N-93 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-93**

Collected:07/17/2008 11:40  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR093

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 17. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418827 WW  Group No. 1101339**

**N-93 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-93**

Collected:07/17/2008 11:40  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR093

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:01 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 03:29 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 13:47 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 00:50 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 00:50 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/22/2008 12:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 14:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418828 WW  Group No. 1101339**

**N-87 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-87**

Collected:07/17/2008 12:45  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR087

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 34. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418828 WW  Group No. 1101339**

**N-87 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-87**

Collected:07/17/2008 12:45  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR087

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:04 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 05:32 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 14:11 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 01:11 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 01:11 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 14:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5418829 WW  Group No. 1101339**

**N-86 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-86**

Collected:07/17/2008 13:15  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR086

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 9. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 13. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 21. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418829 WW  Group No. 1101339**

**N-86 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-86**

Collected:07/17/2008 13:15  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20  SUN: Aquaterra Tech.
Reported: 07/29/2008 at 12:28  PO Box 744
Discard: 09/28/2008  West Chester PA 19381

PR086

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:06 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 07:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 14:34 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 01:31 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 01:31 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 14:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418830 WW  Group No. 1101339**

**N-119 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-119**

Collected:07/17/2008 13:35  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR119

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | 220. | 48. | 10. | ug/l | 10 |
| 03956 | Fluorene | 86-73-7 | 31. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 63. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 6. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 20. | 20. | 10. | ug/l | 20 |
| 05401 | Benzene | 71-43-2 | 81. | 20. | 10. | ug/l | 20 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 20. | 20. | 10. | ug/l | 20 |
| 05407 | Toluene | 108-88-3 | 64. | 20. | 10. | ug/l | 20 |
| 05415 | Ethylbenzene | 100-41-4 | 210. | 20. | 10. | ug/l | 20 |
| 05420 | Isopropylbenzene | 98-82-8 | 520. | 40. | 10. | ug/l | 20 |
| 06310 | Xylene (Total) | 1330-20-7 | 570. | 20. | 10. | ug/l | 20 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418830 WW  Group No. 1101339**

**N-119 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-119**

Collected:07/17/2008 13:35  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR119

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:08 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 07:32 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 19:48 | William T Parker | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/23/2008 00:30 | William T Parker | 10 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 01:52 | Kelly E Brickley | 20 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 01:52 | Kelly E Brickley | 20 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 14:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418831 WW  Group No. 1101339**

**N-121 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-121**

Collected:07/17/2008 14:10  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR121

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.028 | 0.028 | 0.0095 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 20. | 20. | 4. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 20. | 20. | 4. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 20. | 20. | 4. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 20. | 20. | 4. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 20. | 20. | 4. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 27. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 11. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 2. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 34. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 36. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5418831 WW  Group No. 1101339**

**N-121 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-121**

Collected:07/17/2008 14:10  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR121

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:11 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 08:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 20:12 | William T Parker | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 02:33 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 02:33 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 14:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418832 WW  Group No. 1101339**

**N-117 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-117**

Collected:07/17/2008 14:45  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR117

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 24. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 71. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 11. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 11. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 14. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5418832 WW  Group No. 1101339**

**N-117 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187468 N-117**

Collected:07/17/2008 14:45  by SS  Account Number: 10132

Submitted: 07/18/2008 13:20
Reported: 07/29/2008 at 12:28
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR117

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:13 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 08:32 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 20:35 | William T Parker | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 02:54 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 02:54 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/21/2008 14:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1101339
Reported: 07/29/08 at 12:28 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: 082030022A | Sample number(s): 5418823-5418827 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 104 | 108 | 60-140 | 4 | 20 |
| Batch number: 08203WAB026 | Sample number(s): 5418823-5418832 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 99 | 89 | 77-107 | 11 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 104 | 93 | 82-113 | 11 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 105 | 96 | 83-112 | 9 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 96 | 91 | 80-115 | 6 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 99 | 91 | 82-112 | 9 | 30 |
| Batch number: 082040017A | Sample number(s): 5418828-5418832 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 100 | 113 | 60-140 | 12 | 20 |
| Batch number: 082046050002A | Sample number(s): 5418823-5418832 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 105 | | 90-115 | | |
| Batch number: P082053AA | Sample number(s): 5418823-5418832 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 92 | 93 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 89 | 89 | 78-119 | 0 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 93 | 91 | 69-135 | 2 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 86 | 88 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 84 | 85 | 82-119 | 2 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 85 | 85 | 80-113 | 0 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 85 | 86 | 83-113 | 1 | 30 |

## Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 082030022A | Sample number(s): 5418823-5418827 UNSPK: P416213 BKG: 5418823 | | | | | | | | |
| Ethylene dibromide | 109 | | 65-135 | | | < 0.030 | < 0.029 | 0 (1) | 30 |
| Batch number: 082040017A | Sample number(s): 5418828-5418832 UNSPK: 5418828 BKG: P420233 | | | | | | | | |
| Ethylene dibromide | 92 | | 65-135 | | | < 0.029 | < 0.029 | 0 (1) | 30 |
| Batch number: 082046050002A | Sample number(s): 5418823-5418832 UNSPK: P417553 BKG: P417553 | | | | | | | | |
| Lead | 105 | 104 | 75-125 | 2 | 20 | < 0.0010 | < 0.0010 | 0 (1) | 20 |
| Batch number: P082053AA | Sample number(s): 5418823-5418832 UNSPK: 5418824 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 96 | | 69-127 | | | | | | |
| Benzene | 94 | | 83-128 | | | | | | |

*- 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: 1101339
Reported: 07/29/08 at 12:28 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 |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dichloroethane | 95 | | 70-143 | | | | | | |
| Toluene | 82* | | 83-127 | | | | | | |
| Ethylbenzene | 65* | | 82-129 | | | | | | |
| Isopropylbenzene | 67 (2) | | 81-130 | | | | | | |
| Xylene (Total) | 64* | | 82-130 | | | | | | |

### Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: EDB in Wastewater
Batch number: 082030022A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5418823 | 97 |
| 5418824 | 222* |
| 5418825 | 95 |
| 5418826 | 92 |
| 5418827 | 135 |
| Blank | 100 |
| DUP | 84 |
| LCS | 99 |
| LCSD | 102 |
| MS | 97 |
| Limits: | 46-136 |

Analysis Name: PAHs in Water by GC/MS
Batch number: 08203WAB026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5418823 | 103 | 99 | 98 |
| 5418824 | 98 | 82 | 69 |
| 5418825 | 103 | 97 | 91 |
| 5418826 | 125 | 98 | 91 |
| 5418827 | 94 | 92 | 92 |
| 5418828 | 92 | 88 | 85 |
| 5418829 | 97 | 96 | 89 |
| 5418830 | 100 | 89 | 79 |
| 5418831 | 103 | 98 | 79 |
| 5418832 | 93 | 72 | 65 |
| Blank | 103 | 97 | 89 |
| LCS | 103 | 100 | 91 |
| LCSD | 92 | 90 | 85 |
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: EDB in Wastewater

*- 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.

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# Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1101339
Reported: 07/29/08 at 12:28 PM

## Surrogate Quality Control

Batch number: 082040017A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5418828 | 158* |
| 5418829 | 130 |
| 5418830 | 86 |
| 5418831 | 98 |
| 5418832 | 87 |
| Blank | 106 |
| DUP | 86 |
| LCS | 91 |
| LCSD | 108 |
| MS | 161* |
| Limits: | 46-136 |

Analysis Name: UST-Waters by 8260B
Batch number: P082053AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5418823 | 88 | 84 | 83 | 83 |
| 5418824 | 88 | 85 | 81 | 85 |
| 5418825 | 87 | 84 | 82 | 83 |
| 5418826 | 88 | 86 | 82 | 84 |
| 5418827 | 88 | 85 | 82 | 84 |
| 5418828 | 87 | 85 | 83 | 86 |
| 5418829 | 87 | 85 | 81 | 84 |
| 5418830 | 87 | 84 | 82 | 86 |
| 5418831 | 88 | 86 | 86 | 85 |
| 5418832 | 88 | 84 | 83 | 83 |
| Blank | 88 | 85 | 83 | 83 |
| LCS | 87 | 87 | 81 | 84 |
| LCSD | 87 | 86 | 82 | 83 |
| MS | 87 | 85 | 83 | 85 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1101339 Sample # 5418823-32

**COC # 187468**

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 0.9-2.6°C

**For Lab Use Only**
FSC: _____
SCR#: _____

(1)
Client: SUN-AQUATERRA Acct. #: _____
Project Name/#: PHILA REF AOI-8 PWSID #: _____
Project Manager: T. DOERR P.O.#: _____
Sampler: S. SYKES Quote #: _____
Name of state where samples were collected: PA

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | Matrix (4) Soil | Water | Other | Total # of Containers | (5) Analyses Requested / Preservation Codes: PA Unleaded 8260 | Lead | PAHs by 6270 | EDB | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-27 | 7/17/08 | 935 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-120 | | 950 | | | | | | | | | | | |
| N-26 | | 1020 | | | | | | | | | | | |
| N-92 | | 1100 | | | | | | | | | | | |
| N-93 | | 1140 | | | | | | | | | | | |
| N-87 | | 1245 | | | | | | | | | | | |
| N-86 | | 1315 | | | | | | | | | | | |
| N-119 | | 1335 | | | | | | | | | | | |
| N-121 | | 1410 | | | | | | | | | | | |
| N-117 | | 1445 | | | | | | | | | | | |

Matrix: ☐ Potable ☐ NPDES (Check if Applicable)

**Preservation Codes**
H=HCl T=Thiosulfate
N=$HNO_3$ B=NaOH
S=$H_2SO_4$ O=Other

(6) Temperature of samples upon receipt (if requested)

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed: _____
Rush results requested by (please circle): Phone Fax E-mail
Phone #: _____ Fax #: _____
E-mail address: _____

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| S. Sykes / AQUATERRA | 7/17/08 | 1730 | L. Wolf | 7/18/08 | 10:30 |
| L. Wolf | 7/18/08 | 13:20 | | | |
| | | | | | |
| | | | | | |
| | | | | 7/18 08 | 1320 |

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.

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.

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

## SAMPLE GROUP

The sample group for this submittal is 1101473. Samples arrived at the laboratory on Saturday, July 19, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-69 Grab Water | 5419603 |
| N-70 Grab Water | 5419604 |
| N-24 Grab Water | 5419605 |
| N-94 Grab Water | 5419606 |
| N-67 Grab Water | 5419607 |
| N-77 Grab Water | 5419608 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | LLI | Attn: EDD Group |

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Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

Respectfully Submitted,

Valerie L. Tomayko
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5419603 WW  Group No. 1101473**

**N-69 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-69**

Collected:07/18/2008 10:10  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF69

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5419603 WW  Group No. 1101473**

**N-69 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-69**

Collected:07/18/2008 10:10  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF69

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:25 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 09:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 23:08 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 22:03 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 22:03 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/22/2008 10:15 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5419604 WW  Group No. 1101473**

**N-70 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-70**

Collected:07/18/2008 11:20  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF70

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 35. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5419604 WW  Group No. 1101473**

**N-70 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-70**

Collected:07/18/2008 11:20  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF70

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:27 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 09:32 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 23:31 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 22:30 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 22:30 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/22/2008 10:15 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5419605 WW  Group No. 1101473**

**N-24 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-24**

Collected:07/18/2008 12:25  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF24

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 47. | 47. | 9. | ug/l | 10 |
| 03956 | Fluorene | 86-73-7 | < 47. | 47. | 9. | ug/l | 10 |
| 03963 | Phenanthrene | 85-01-8 | < 47. | 47. | 9. | ug/l | 10 |
| 03967 | Pyrene | 129-00-0 | < 47. | 47. | 9. | ug/l | 10 |
| 03971 | Chrysene | 218-01-9 | < 47. | 47. | 9. | ug/l | 10 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 3. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 44. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 3. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5419605 WW  Group No. 1101473**

**N-24 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-24**

Collected:07/18/2008 12:25  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF24

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:29 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 10:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/23/2008 01:07 | Gregory J Drahovsky | 10 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 23:23 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 23:23 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/22/2008 10:15 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5419606 WW  Group No. 1101473**

**N-94 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-94**

Collected:07/18/2008 12:00  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF94

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.010 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5419606 WW  Group No. 1101473**

**N-94 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-94**

Collected:07/18/2008 12:00  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF94

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:32 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 10:32 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/22/2008 23:55 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/24/2008 23:50 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/24/2008 23:50 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/22/2008 10:15 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5419607 WW  Group No. 1101473**

**N-67 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-67**

Collected:07/18/2008 13:10  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF67

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5419607 WW  Group No. 1101473**

**N-67 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-67**

Collected:07/18/2008 13:10  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF67

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:34 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 11:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/23/2008 00:19 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/25/2008 00:17 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/25/2008 00:17 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/22/2008 10:15 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5419608 WW  Group No. 1101473**

**N-77 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-77**

Collected:07/18/2008 14:15  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF77

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 7. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 15. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5419608 WW  Group No. 1101473**

**N-77 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187460 N-77**

Collected:07/18/2008 14:15  by SS  Account Number: 10132

Submitted: 07/19/2008 10:10
Reported: 07/29/2008 at 08:31
Discard: 09/28/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PRF77

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/24/2008 12:37 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/24/2008 12:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/23/2008 00:43 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/25/2008 00:44 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/25/2008 00:44 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/23/2008 06:45 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/23/2008 10:15 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/22/2008 10:15 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1101473
Reported: 07/29/08 at 08:31 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: 08203WAK026 | Sample number(s): 5419603-5419608 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 100 | 98 | 77-107 | 1 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 102 | 102 | 82-113 | 0 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 108 | 105 | 83-112 | 3 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 108 | 109 | 80-115 | 2 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 103 | 102 | 82-112 | 1 | 30 |
| Batch number: 082040017A | Sample number(s): 5419603-5419608 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 100 | 113 | 60-140 | 12 | 20 |
| Batch number: 082046050002A | Sample number(s): 5419603-5419608 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00050 | mg/l | 105 | | 90-115 | | |
| Batch number: P082062AA | Sample number(s): 5419603-5419608 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 98 | 91 | 73-119 | 7 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 87 | 85 | 78-119 | 2 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 96 | 93 | 69-135 | 3 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 85 | 85 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 87 | 86 | 82-119 | 1 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 86 | 85 | 80-113 | 1 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 87 | 86 | 83-113 | 1 | 30 |

## Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 082040017A | Sample number(s): 5419603-5419608 UNSPK: P418828 BKG: P420233 | | | | | | | | |
| Ethylene dibromide | 92 | | 65-135 | | | < 0.029 | < 0.029 | 0 (1) | 30 |
| Batch number: 082046050002A | Sample number(s): 5419603-5419608 UNSPK: P417553 BKG: P417553 | | | | | | | | |
| Lead | 105 | 104 | 75-125 | 2 | 20 | < 0.0010 | < 0.0010 | 0 (1) | 20 |
| Batch number: P082062AA | Sample number(s): 5419603-5419608 UNSPK: 5419604 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 97 | | 69-127 | | | | | | |
| Benzene | 93 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 96 | | 70-143 | | | | | | |
| Toluene | 92 | | 83-127 | | | | | | |
| Ethylbenzene | 90 | | 82-129 | | | | | | |
| Isopropylbenzene | 88 | | 81-130 | | | | | | |
| Xylene (Total) | 90 | | 82-130 | | | | | | |

*- 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: 1101473
Reported: 07/29/08 at 08:31 AM

## 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: PAHs in Water by GC/MS
Batch number: 08203WAK026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5419603 | 103 | 105 | 117 |
| 5419604 | 108 | 104 | 120 |
| 5419605 | 84 | 85 | 88 |
| 5419606 | 105 | 104 | 116 |
| 5419607 | 106 | 105 | 110 |
| 5419608 | 106 | 105 | 117 |
| Blank | 110 | 106 | 118 |
| LCS | 111 | 105 | 113 |
| LCSD | 108 | 104 | 115 |
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: EDB in Wastewater
Batch number: 082040017A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5419603 | 70 |
| 5419604 | 67 |
| 5419605 | 124 |
| 5419606 | 74 |
| 5419607 | 88 |
| 5419608 | 102 |
| Blank | 106 |
| DUP | 86 |
| LCS | 91 |
| LCSD | 108 |
| MS | 161* |
| Limits: | 46-136 |

Analysis Name: UST-Waters by 8260B
Batch number: P082062AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5419603 | 92 | 89 | 91 | 94 |
| 5419604 | 92 | 89 | 87 | 97 |
| 5419605 | 92 | 91 | 89 | 90 |
| 5419606 | 93 | 91 | 89 | 87 |
| 5419607 | 93 | 89 | 89 | 87 |
| 5419608 | 92 | 90 | 88 | 86 |
| Blank | 92 | 89 | 89 | 85 |
| LCS | 92 | 92 | 88 | 87 |
| LCSD | 91 | 92 | 88 | 88 |
| MS | 91 | 90 | 97 | 97 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

# Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1101473
Reported: 07/29/08 at 08:31 AM

## Surrogate 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1101473 Sample # 5419603-08

**COC #** 187460

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 2.7-3.8°C

(1)
Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 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#:

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water | Other (Potable / NPDES) | Total # of Containers | (5) Analyses Requested / Preservation Codes: PA Unleaded 8260B | Lead | PAHs by GCMS 8270 | EDB | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-69 | 7/18/08 | 1010 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-70 | | 1120 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-24 | | 1225 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-94 | | 1200 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-67 | | 1310 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |
| N-77 | | 1415 | X | | | X | | 8 | 3 | 1 | 2 | 2 | |

**Preservation Codes**
H=HCl T=Thiosulfate
N=$HNO_3$ B=NaOH
S=$H_2SO_4$ O=Other

(6) Temperature of samples upon receipt (if requested)

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg) TX TRRP-13
Type II (Tier II) MA MCP CT RCP
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| [signature] AQUATERRA | 7/18/08 | 1700 | | | |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Relinquished by: | Date | Time | Received by: [signature] | 7/19/08 | 1010 |

# 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.

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

## SAMPLE GROUP

The sample group for this submittal is 1102042. Samples arrived at the laboratory on Wednesday, July 23, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-124 Grab Water | 5422552 |
| N-29 Grab Water | 5422553 |
| N-30 Grab Water | 5422554 |
| N-123 Grab Water | 5422555 |
| N-32 Grab Water | 5422556 |
| N-122 Grab Water | 5422557 |
| N-126 Grab Water | 5422558 |
| N-66 Grab Water | 5422559 |
| N-118 Grab Water | 5422560 |
| N-89 Grab Water | 5422561 |
| N-23 Grab Water | 5422562 |
| N-90 Grab Water | 5422563 |
| RW-301 Grab Water | 5422564 |
| N-108 Grab Water | 5422565 |
| RW-305 Grab Water | 5422566 |
| RW-304 Grab Water | 5422567 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |

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# Analysis Report

COPY TO
ELECTRONIC LLI Attn: EDD Group
COPY TO

Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

Respectfully Submitted,

Sarah Snyder
Specialist

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5422552 WW  Group No. 1102042**

**N-124 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-124**

Collected:07/22/2008 08:30  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:14
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR124

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422552 WW  Group No. 1102042**

**N-124 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-124**

Collected:07/22/2008 08:30  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:14  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR124

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/27/2008 16:22 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 03:35 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 12:58 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 11:57 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 11:57 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/25/2008 09:32 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 11:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/24/2008 16:45 | JoElla L Rice | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422553 WW  Group No. 1102042**

**N-29 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-29**

Collected:07/22/2008 09:45  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:14
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR029

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422553 WW  Group No. 1102042**

**N-29 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-29**

Collected:07/22/2008 09:45  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:14  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR029

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/27/2008 16:25 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 04:05 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 13:22 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 12:18 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 12:18 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/25/2008 09:32 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 11:00 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/24/2008 16:45 | JoElla L Rice | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. 5422554 WW  Group No. 1102042**

**N-30 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-30**

Collected:07/22/2008 09:30  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:14
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR030

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

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# Analysis Report



**Lancaster Laboratories Sample No. 5422554 WW  Group No. 1102042**

**N-30 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-30**

Collected:07/22/2008 09:30  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:14  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR030

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/27/2008 16:27 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 17:01 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 13:46 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 12:39 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 12:39 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/25/2008 09:32 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/24/2008 16:45 | JoElla L Rice | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422555 WW  Group No. 1102042**

**N-123 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-123**

Collected:07/22/2008 10:35  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:14
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR123

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | 140. | 24. | 5. | ug/l | 5 |
| 03956 | Fluorene | 86-73-7 | 60. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 170. | 24. | 5. | ug/l | 5 |
| 03967 | Pyrene | 129-00-0 | 110. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 66. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 6. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 5. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 34. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 2. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422555 WW  Group No. 1102042**

**N-123 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-123**

Collected:07/22/2008 10:35  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:14
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR123

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/27/2008 16:34 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 18:31 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 14:09 | Joseph M Gambler | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 22:31 | Gregory J Drahovsky | 5 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 12:59 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 12:59 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/25/2008 09:32 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/24/2008 16:45 | JoElla L Rice | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5422556 WW  Group No. 1102042**

**N-32 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-32**

Collected:07/22/2008 11:10  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:14
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR032

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422556 WW  Group No. 1102042**

**N-32 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-32**

Collected:07/22/2008 11:10  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:14
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR032

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/27/2008 16:36 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 19:01 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 14:33 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 13:20 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 13:20 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/25/2008 09:32 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/24/2008 16:45 | JoElla L Rice | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422557 WW  Group No. 1102042**

**N-122 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-122**

Collected:07/22/2008 12:15  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:14
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR122

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 84. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 250. | 24. | 5. | ug/l | 5 |
| 03967 | Pyrene | 129-00-0 | 16. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 5. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

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# Analysis Report



**Lancaster Laboratories Sample No. 5422557 WW  Group No. 1102042**

**N-122 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-122**

Collected:07/22/2008 12:15  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:14
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR122

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/27/2008 16:39 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 19:31 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 14:57 | Joseph M Gambler | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 22:55 | Gregory J Drahovsky | 5 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 14:01 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 14:01 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/25/2008 09:32 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/24/2008 16:45 | JoElla L Rice | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422558 WW  Group No. 1102042**

**N-126 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-126**

Collected:07/22/2008 12:40  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR126

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | 14. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 13. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 45. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 20. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 30. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 3. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 2. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

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# Analysis Report



**Lancaster Laboratories Sample No. 5422558 WW  Group No. 1102042**

**N-126 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-126**

Collected:07/22/2008 12:40  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR126

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/27/2008 16:41 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 20:31 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 15:21 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 14:21 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 14:21 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/25/2008 09:32 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/24/2008 16:45 | JoElla L Rice | 1 |

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# Analysis Report



**Lancaster Laboratories Sample No. 5422559 WW  Group No. 1102042**

**N-66 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-66**

Collected:07/22/2008 13:15  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR066

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | 48. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 31. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 67. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 19. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 7. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 4. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422559 WW  Group No. 1102042**

**N-66 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-66**

Collected:07/22/2008 13:15  by MH  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:15  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR066

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/27/2008 16:43 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 21:01 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 15:45 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 14:42 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 14:42 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/25/2008 09:32 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/24/2008 16:45 | JoElla L Rice | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422560 WW  Group No. 1102042**

**N-118 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-118**

Collected:07/22/2008 08:30  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR118

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 34. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 70. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 9. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 9. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 9. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 7. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 3. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 97. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 18. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422560 WW  Group No. 1102042**

**N-118 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-118**

Collected:07/22/2008 08:30  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR118

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/27/2008 16:46 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 21:31 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 16:09 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/31/2008 06:18 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/31/2008 06:18 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/25/2008 09:32 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/24/2008 16:45 | JoElla L Rice | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422561 WW  Group No. 1102042**

**N-89 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-89**

Collected:07/22/2008 09:20  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR089

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 7. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 2. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 23. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 5. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5422561 WW  Group No. 1102042**

**N-89 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-89**

Collected:07/22/2008 09:20  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:15  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR089

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/27/2008 16:48 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 22:01 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 16:32 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 15:45 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 15:45 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/25/2008 09:32 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/24/2008 16:45 | JoElla L Rice | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5422562 WW  Group No. 1102042**

**N-23 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-23**

Collected:07/22/2008 09:45  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR023

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.013 | ug/l | 1 |
| | Due to interfering peaks on the chromatogram, the values reported represent the lowest reporting limits attainable. | | | | | | |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | 260. | 120. | 24. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 1,100. | 120. | 24. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 520. | 120. | 24. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 1,900. | 120. | 24. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 620. | 120. | 24. | ug/l | 1 |
| | Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05401 | Benzene | 71-43-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05407 | Toluene | 108-88-3 | < 10. | 10. | 5. | ug/l | 10 |
| 05415 | Ethylbenzene | 100-41-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05420 | Isopropylbenzene | 98-82-8 | < 20. | 20. | 5. | ug/l | 10 |
| 06310 | Xylene (Total) | 1330-20-7 | < 10. | 10. | 5. | ug/l | 10 |
| | The usual reporting limits were not attained due to the matrix of the sample in the GC/MS volatile analysis. | | | | | | |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5422562 WW  Group No. 1102042**

**N-23 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-23**

Collected:07/22/2008 09:45  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:15  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR023

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 06:55 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 22:31 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 19:44 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 16:06 | Anita M Dale | 10 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 16:06 | Anita M Dale | 10 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/25/2008 09:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422563 WW  Group No. 1102042**

**N-90 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-90**

Collected:07/22/2008 10:20  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR090

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 5. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 4. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 8. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 6. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5422563 WW  Group No. 1102042**

**N-90 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-90**

Collected:07/22/2008 10:20  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:15  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR090

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:05 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 23:01 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 20:08 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 16:26 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 16:26 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/25/2008 09:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422564 WW  Group No. 1102042**

**RW-301 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 RW-301**

Collected:07/22/2008 11:15  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR301

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 10. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 16. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 18. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 21. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422564 WW  Group No. 1102042**

**RW-301 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 RW-301**

Collected:07/22/2008 11:15  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR301

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:07 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/25/2008 23:31 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 20:32 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 16:47 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 16:47 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/25/2008 09:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422565 WW  Group No. 1102042**

**N-108 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-108**

Collected:07/22/2008 11:35  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:15  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR108

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 19. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 47. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 13. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 8. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05401 | Benzene | 71-43-2 | 14. | 5. | 3. | ug/l | 5 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 5. | 5. | 3. | ug/l | 5 |
| 05407 | Toluene | 108-88-3 | 11. | 5. | 3. | ug/l | 5 |
| 05415 | Ethylbenzene | 100-41-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05420 | Isopropylbenzene | 98-82-8 | 28. | 10. | 3. | ug/l | 5 |
| 06310 | Xylene (Total) | 1330-20-7 | 15. | 5. | 3. | ug/l | 5 |

The reporting limits for the GC/MS volatile compounds were raised due to the level of non-target compounds.

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5422565 WW  Group No. 1102042**

**N-108 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 N-108**

Collected:07/22/2008 11:35  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:15  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR108

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:12 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/26/2008 00:01 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 20:56 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 17:08 | Anita M Dale | 5 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 17:08 | Anita M Dale | 5 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/25/2008 09:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5422566 WW  Group No. 1102042**

**RW-305 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 RW-305**

Collected:07/22/2008 12:20  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR305

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 10. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 15. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 6. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 6. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 3. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 4. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 18. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 10. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5422566 WW  Group No. 1102042**

**RW-305 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 RW-305**

Collected:07/22/2008 12:20  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:15  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR305

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:14 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/26/2008 00:32 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 21:20 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/31/2008 05:51 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/31/2008 05:51 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/25/2008 09:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5422567 WW  Group No. 1102042**

**RW-304 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 RW-304**

Collected:07/22/2008 13:30  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20
Reported: 08/01/2008 at 14:15
Discard: 10/01/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR304

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 9. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 9. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 13. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 15. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5422567 WW  Group No. 1102042**

**RW-304 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187462 RW-304**

Collected:07/22/2008 13:30  by SS  Account Number: 10132

Submitted: 07/23/2008 16:20  SUN: Aquaterra Tech.
Reported: 08/01/2008 at 14:15  PO Box 744
Discard: 10/01/2008  West Chester PA 19381

PR304

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:15 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/26/2008 01:02 | James H Place | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/25/2008 21:44 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 07/28/2008 17:49 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 07/28/2008 17:49 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/24/2008 17:40 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/25/2008 09:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1102042
Reported: 08/01/08 at 02:15 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: 082060000A | Sample number(s): 5422552-5422553 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 113 | 113 | 60-140 | 0 | 20 |
| Batch number: 082060014A | Sample number(s): 5422554-5422567 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 100 | 100 | 60-140 | 0 | 20 |
| Batch number: 082066050003A | Sample number(s): 5422552-5422561 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 109 | | 90-115 | | |
| Batch number: 08206WAD026 | Sample number(s): 5422552-5422561 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 90 | 92 | 77-107 | 2 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 90 | 94 | 82-113 | 5 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 97 | 102 | 83-112 | 5 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 103 | 106 | 80-115 | 3 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 95 | 97 | 82-112 | 2 | 30 |
| Batch number: 08206WAK026 | Sample number(s): 5422562-5422567 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 98 | 100 | 77-107 | 2 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 106 | 104 | 82-113 | 2 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 108 | 109 | 83-112 | 1 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 106 | 106 | 80-115 | 1 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 102 | 100 | 82-112 | 1 | 30 |
| Batch number: 082116050002A | Sample number(s): 5422562-5422567 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 105 | | 90-115 | | |
| Batch number: F082102AA | Sample number(s): 5422552-5422559,5422561-5422565,5422567 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 85 | 85 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 94 | 92 | 78-119 | 1 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 90 | 93 | 69-135 | 2 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 93 | 92 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 93 | 90 | 82-119 | 2 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 92 | 91 | 80-113 | 1 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 91 | 90 | 83-113 | 1 | 30 |
| Batch number: P082122AA | Sample number(s): 5422560,5422566 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 103 | 100 | 73-119 | 3 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 100 | 99 | 78-119 | 1 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 99 | 97 | 69-135 | 1 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 98 | 98 | 85-115 | 0 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 98 | 98 | 82-119 | 0 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 98 | 100 | 80-113 | 2 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 99 | 99 | 83-113 | 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: 1102042
Reported: 08/01/08 at 02:15 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: 082060000A | Sample number(s): 5422552-5422553 UNSPK: P422319 BKG: P422318 | | | | | | | | |
| Ethylene dibromide | 87 | | 65-135 | | | < 0.029 | < 0.029 | 0 (1) | 30 |
| Batch number: 082060014A | Sample number(s): 5422554-5422567 UNSPK: 5422554 BKG: 5422555 | | | | | | | | |
| Ethylene dibromide | 96 | | 65-135 | | | < 0.029 | < 0.029 | 0 (1) | 30 |
| Batch number: 082066050003A | Sample number(s): 5422552-5422561 UNSPK: P421516 BKG: P421516 | | | | | | | | |
| Lead | 104 | 105 | 75-125 | 0 | 20 | 0.0257 | 0.0265 | 3 | 20 |
| Batch number: 082116050002A | Sample number(s): 5422562-5422567 UNSPK: 5422562 BKG: 5422562 | | | | | | | | |
| Lead | 98 | 96 | 75-125 | 2 | 20 | < 0.0010 | < 0.0010 | 0 (1) | 20 |
| Batch number: F082102AA | Sample number(s): 5422552-5422559,5422561-5422565,5422567 UNSPK: 5422556 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 89 | | 69-127 | | | | | | |
| Benzene | 99 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 98 | | 70-143 | | | | | | |
| Toluene | 99 | | 83-127 | | | | | | |
| Ethylbenzene | 98 | | 82-129 | | | | | | |
| Isopropylbenzene | 98 | | 81-130 | | | | | | |
| Xylene (Total) | 96 | | 82-130 | | | | | | |
| Batch number: P082122AA | Sample number(s): 5422560,5422566 UNSPK: P422377 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 100 | | 69-127 | | | | | | |
| Benzene | 101 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 98 | | 70-143 | | | | | | |
| Toluene | 102 | | 83-127 | | | | | | |
| Ethylbenzene | 101 | | 82-129 | | | | | | |
| Isopropylbenzene | 101 | | 81-130 | | | | | | |
| Xylene (Total) | 100 | | 82-130 | | | | | | |

### Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: EDB in Wastewater
Batch number: 082060000A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5422552 | 96 |
| 5422553 | 100 |
| Blank | 107 |
| DUP | 66 |
| LCS | 106 |
| LCSD | 104 |
| MS | 61 |

*- 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: 1102042
Reported: 08/01/08 at 02:15 PM

## Surrogate Quality Control

Limits: 46-136

Analysis Name: EDB in Wastewater
Batch number: 082060014A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5422554 | 88 |
| 5422555 | 69 |
| 5422556 | 88 |
| 5422557 | 94 |
| 5422558 | 81 |
| 5422559 | 98 |
| 5422560 | 75 |
| 5422561 | 90 |
| 5422562 | 62 |
| 5422563 | 89 |
| 5422564 | 103 |
| 5422565 | 75 |
| 5422566 | 70 |
| 5422567 | 57 |
| Blank | 104 |
| DUP | 77 |
| LCS | 103 |
| LCSD | 99 |
| MS | 92 |
| Limits: | 46-136 |

Analysis Name: PAHs in Water by GC/MS
Batch number: 08206WAD026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5422552 | 90 | 90 | 83 |
| 5422553 | 92 | 97 | 89 |
| 5422554 | 88 | 92 | 97 |
| 5422555 | 90 | 90 | 91 |
| 5422556 | 90 | 89 | 63 |
| 5422557 | 85 | 89 | 77 |
| 5422558 | 81 | 75 | 86 |
| 5422559 | 86 | 89 | 98 |
| 5422560 | 78 | 88 | 85 |
| 5422561 | 89 | 98 | 104 |
| Blank | 96 | 91 | 113 |
| LCS | 95 | 94 | 111 |
| LCSD | 98 | 96 | 116 |
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: PAHs in Water by GC/MS
Batch number: 08206WAK026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5422562 | 148* | 154* | 111 |
| 5422563 | 94 | 101 | 113 |
| 5422564 | 74 | 80 | 94 |
| 5422565 | 96 | 112 | 115 |
| 5422566 | 99 | 113 | 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: 1102042
Reported: 08/01/08 at 02:15 PM

### Surrogate Quality Control

| | | | | |
|---|---|---|---|---|
| 5422567 | 96 | 107 | 117 | |
| Blank | 106 | 109 | 126 | |
| LCS | 100 | 108 | 117 | |
| LCSD | 99 | 102 | 114 | |
| Limits: | 44-127 | 63-114 | 30-126 | |

Analysis Name: UST-Waters by 8260B
Batch number: F082102AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5422552 | 87 | 90 | 88 | 87 |
| 5422553 | 87 | 94 | 87 | 87 |
| 5422554 | 86 | 90 | 88 | 87 |
| 5422555 | 88 | 92 | 87 | 95 |
| 5422556 | 87 | 94 | 88 | 89 |
| 5422557 | 85 | 92 | 88 | 93 |
| 5422558 | 91 | 91 | 89 | 92 |
| 5422559 | 86 | 91 | 87 | 91 |
| 5422561 | 86 | 91 | 88 | 92 |
| 5422562 | 89 | 92 | 86 | 89 |
| 5422563 | 88 | 91 | 88 | 90 |
| 5422564 | 90 | 90 | 87 | 90 |
| 5422565 | 87 | 94 | 89 | 100 |
| 5422567 | 90 | 95 | 91 | 101 |
| Blank | 88 | 93 | 87 | 86 |
| LCS | 89 | 93 | 88 | 89 |
| LCSD | 90 | 93 | 89 | 90 |
| MS | 90 | 94 | 88 | 88 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

Analysis Name: UST-Waters by 8260B
Batch number: P082122AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5422560 | 98 | 99 | 98 | 103 |
| 5422566 | 98 | 98 | 103 | 103 |
| Blank | 98 | 97 | 99 | 93 |
| LCS | 99 | 99 | 98 | 93 |
| LCSD | 98 | 98 | 99 | 95 |
| MS | 99 | 101 | 98 | 94 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1102042 Sample # 5422552767

**COC # 187462**

Please print. Instructions on reverse side correspond with circled numbers. Cooler Temp 1.0-4.0°C

For Lab Use Only
FSC:
SCR#:

(1) Client: Sunoco, AquaTerra Acct. #:
Project Name/#: A01-8 PWSID #:
Project Manager: Tiffani Doerr P.O.#:
Sampler: Mike Hinderling Quote #:
Name of state where samples were collected: PA

| (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: H | O | | O | | | | | | Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 8260 | 8011 | Pb | PAHs 8270 | | | | | | |
| N-124 | 7/22/08 | 830 | X | | | X | | 8 | X | X | X | X | | | | | | |
| N-29 | 7/22/08 | 945 | X | | | X | | 8 | X | X | X | X | | | | | | |
| N-30 | 7/22/08 | 930 | X | | | X | | 8 | X | X | X | X | | | | | | |
| N-123 | 7/22/08 | 1035 | X | | | X | | 8 | X | X | X | X | | | | | | |
| N-32 | 7/22/08 | 1110 | X | | | X | | 8 | X | X | X | X | | | | | | |
| N-122 | 7/22/08 | 1215 | X | | | X | | 8 | X | X | X | X | | | | | | |
| N-126 | 7/22/08 | 1240 | X | | | X | | 8 | X | X | X | X | | | | | | |
| N-66 | 7/22/08 | 1315 | X | | | X | | 8 | X | X | X | X | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

Preservation Codes: H=HCl T=Thiosulfate; N=$HNO_3$ B=NaOH; S=$H_2SO_4$ O=Other

Remarks

(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] | 7/22/08 | 1400 | Aquatherma Fridge | 7/22/08 | 1400 |
| AT PHOSE | 7/23/08 | 1145 | [signature] | 7/23/08 | 1145 |
| [signature] | 7/23/08 | 1145 | P. Lefever | 7/23/08 | 1145 |
| P. Lefever 7/23/08 | | 1620 | | | |
| | | | Katie Hartlove | 7/24/08 | 16:30 |

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

2102.03

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1102042 Sample # 5422552-67

**COC # 187469**

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 1.0-4.0°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: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

(2) (3) (4) (5) (6)

| Sample Identification | Date Collected | Time Collected | Grab | Composite | Soil | Water (Potable / NPDES) | Other | Total # of Containers | PA Unleaded 8260B | Lead | PAHs by GC/MS 8270 | EDB | | | | | | Remarks | Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-118 | 7/22/08 | 830 | X | | | X | | 8 | 3 | 1 | 2 | 2 | | | | | | | |
| N-89 | | 920 | | | | | | | | | | | | | | | | | |
| N-23 | | 945 | | | | | | | | | | | | | | | | | |
| N-90 | | 1020 | | | | | | | | | | | | | | | | | |
| RW-301 | | 1115 | | | | | | | | | | | | | | | | | |
| N-108 | | 1135 | | | | | | | | | | | | | | | | | |
| RW-305 | | 1220 | | | | | | | | | | | | | | | | | |
| RW-304 | | 1330 | | | | | | | | | | | | | | | | | |

(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 |
|---|---|---|---|---|---|
| Sun Lab / AQUATERRA | 7/22/08 | 1530 | Aquaterra Fridge | 7/22/08 | 1530 |
| AT FRIDGE | 7/23/08 | 1145 | [signature] | 7/23/08 | 1145 |
| [signature] | 7/23/08 | 1145 | P. Lefever | 7/23/08 | 1145 |
| P. Lefever | 7/23/08 | 1620 | | | |
| | | | Katie Hartlane | 7/23/08 | 16:20 |

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

*The following defines common symbols and abbreviations used in reporting technical data:*

| | | | |
|---|---|---|---|
| **N.D.** | none detected | **BMQL** | Below Minimum Quantitation Level |
| **TNTC** | Too Numerous To Count | **MPN** | Most Probable Number |
| **IU** | International Units | **CP Units** | cobalt-chloroplatinate units |
| **umhos/cm** | micromhos/cm | **NTU** | nephelometric turbidity units |
| **C** | degrees Celsius | **F** | degrees Fahrenheit |
| **Cal** | (diet) calories | **lb.** | pound(s) |
| **meq** | milliequivalents | **kg** | kilogram(s) |
| **g** | gram(s) | **mg** | milligram(s) |
| **ug** | microgram(s) | **l** | liter(s) |
| **ml** | milliliter(s) | **ul** | microliter(s) |
| **m3** | cubic meter(s) | **fib >5 um/ml** | fibers greater than 5 microns in length per ml |

**<** less than – The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

**>** greater than

**ppm** parts per million – One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

**ppb** parts per billion

**Dry weight basis** Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture.

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

| | |
|---|---|
| **A** | TIC is a possible aldol-condensation product |
| **B** | Analyte was also detected in the blank |
| **C** | Pesticide result confirmed by GC/MS |
| **D** | Compound quatitated on a diluted sample |
| **E** | Concentration exceeds the calibration range of the instrument |
| **J** | Estimated value |
| **N** | Presumptive evidence of a compound (TICs only) |
| **P** | Concentration difference between primary and confirmation columns >25% |
| **U** | Compound was not detected |
| **X,Y,Z** | Defined in case narrative |

**Inorganic Qualifiers**

| | |
|---|---|
| **B** | Value is <CRDL, but ≥IDL |
| **E** | Estimated due to interference |
| **M** | Duplicate injection precision not met |
| **N** | Spike amount not within control limits |
| **S** | Method of standard additions (MSA) used for calculation |
| **U** | Compound was not detected |
| **W** | Post digestion spike out of control limits |
| ***** | Duplicate analysis not within control limits |
| **+** | Correlation coefficient for MSA <0.995 |

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

## SAMPLE GROUP

The sample group for this submittal is 1102389. Samples arrived at the laboratory on Friday, July 25, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| PZ-504 Grab Water | 5424682 |
| N-74 Grab Water | 5424683 |
| PZ-503 Grab Water | 5424684 |
| N-61 Grab Water | 5424685 |
| RW-500 Grab Water | 5424686 |
| N-73 Grab Water | 5424687 |
| N-58 Grab Water | 5424688 |
| N-57 Grab Water | 5424689 |
| N-136 Grab Water | 5424690 |
| RW-308 Grab Water | 5424691 |
| RW-303 Grab Water | 5424692 |
| N-36 Grab Water | 5424693 |
| N-40 Grab Water | 5424694 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | LLI | Attn: EDD Group |

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# Analysis Report

Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

Respectfully Submitted,

Marla S. Lord
Senior Specialist

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5424682 WW  Group No. 1102389**

**PZ-504 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 PZ-504**

Collected:07/25/2008 07:30  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR504

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 2. | 2. | 1. | ug/l | 2 |
| 05401 | Benzene | 71-43-2 | 2,400. | 20. | 10. | ug/l | 20 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 2. | 2. | 1. | ug/l | 2 |
| 05407 | Toluene | 108-88-3 | < 2. | 2. | 1. | ug/l | 2 |
| 05415 | Ethylbenzene | 100-41-4 | < 2. | 2. | 1. | ug/l | 2 |
| 05420 | Isopropylbenzene | 98-82-8 | < 4. | 4. | 1. | ug/l | 2 |
| 06310 | Xylene (Total) | 1330-20-7 | 6. | 2. | 1. | ug/l | 2 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424682 WW  Group No. 1102389**

**PZ-504 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 PZ-504**

Collected:07/25/2008 07:30  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 16:46  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR504

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 10:43 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 00:15 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 14:08 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 19:26 | Anita M Dale | 2 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 19:53 | Anita M Dale | 20 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 19:26 | Anita M Dale | 2 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 2 | 08/04/2008 19:53 | Anita M Dale | 20 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424683 WW  Group No. 1102389**

**N-74 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-74**

Collected:07/25/2008 07:45  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR074

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 4. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424683 WW  Group No. 1102389**

**N-74 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-74**

Collected:07/25/2008 07:45  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 16:46  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR074

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 10:45 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 13:48 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 14:32 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 20:20 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 20:20 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424684 WW  Group No. 1102389**

**PZ-503 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 PZ-503**

Collected:07/25/2008 08:15  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR503

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 50. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 50. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 62. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 51. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 13. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 6. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 3. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424684 WW  Group No. 1102389**

**PZ-503 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 PZ-503**

Collected:07/25/2008 08:15  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR503

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 10:52 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 15:18 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 14:55 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 20:46 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 20:46 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424685 WW  Group No. 1102389**

**N-61 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-61**

Collected:07/25/2008 08:40  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR061

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 24. | 24. | 5. | ug/l | 5 |
| 03956 | Fluorene | 86-73-7 | < 24. | 24. | 5. | ug/l | 5 |
| 03963 | Phenanthrene | 85-01-8 | < 24. | 24. | 5. | ug/l | 5 |
| 03967 | Pyrene | 129-00-0 | < 24. | 24. | 5. | ug/l | 5 |
| 03971 | Chrysene | 218-01-9 | < 24. | 24. | 5. | ug/l | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05401 | Benzene | 71-43-2 | 8,700. | 50. | 25. | ug/l | 50 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05407 | Toluene | 108-88-3 | < 10. | 10. | 5. | ug/l | 10 |
| 05415 | Ethylbenzene | 100-41-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05420 | Isopropylbenzene | 98-82-8 | < 20. | 20. | 5. | ug/l | 10 |
| 06310 | Xylene (Total) | 1330-20-7 | 23. | 10. | 5. | ug/l | 10 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424685 WW  Group No. 1102389**

**N-61 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-61**

Collected:07/25/2008 08:40  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 16:46  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR061

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 10:55 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 16:19 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 00:25 | Gregory J Drahovsky | 5 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 21:13 | Anita M Dale | 10 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 21:40 | Anita M Dale | 50 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 21:13 | Anita M Dale | 10 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 2 | 08/04/2008 21:40 | Anita M Dale | 50 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/30/2008 00:35 | David V Hershey Jr | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424686 WW  Group No. 1102389**

**RW-500 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 RW-500**

Collected:07/25/2008 09:30  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR500

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05401 | Benzene | 71-43-2 | 300. | 5. | 3. | ug/l | 5 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 5. | 5. | 3. | ug/l | 5 |
| 05407 | Toluene | 108-88-3 | < 5. | 5. | 3. | ug/l | 5 |
| 05415 | Ethylbenzene | 100-41-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05420 | Isopropylbenzene | 98-82-8 | < 10. | 10. | 3. | ug/l | 5 |
| 06310 | Xylene (Total) | 1330-20-7 | < 5. | 5. | 3. | ug/l | 5 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424686 WW  Group No. 1102389**

**RW-500 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 RW-500**

Collected:07/25/2008 09:30  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR500

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 10:57 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 16:49 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 00:49 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 22:07 | Anita M Dale | 5 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 22:07 | Anita M Dale | 5 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/30/2008 00:35 | David V Hershey Jr | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424687 WW  Group No. 1102389**

**N-73 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-73**

Collected:07/25/2008 10:55  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR073

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 4. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424687 WW  Group No. 1102389**

**N-73 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-73**

Collected:07/25/2008 10:55  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 16:46  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR073

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 10:59 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 17:19 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 01:13 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 22:33 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 22:33 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/30/2008 00:35 | David V Hershey Jr | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424688 WW  Group No. 1102389**

**N-58 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-58**

Collected:07/25/2008 11:30  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR058

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05401 | Benzene | 71-43-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05407 | Toluene | 108-88-3 | < 10. | 10. | 5. | ug/l | 10 |
| 05415 | Ethylbenzene | 100-41-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05420 | Isopropylbenzene | 98-82-8 | < 20. | 20. | 5. | ug/l | 10 |
| 06310 | Xylene (Total) | 1330-20-7 | 100. | 10. | 5. | ug/l | 10 |

The reporting limits for the GC/MS volatile compounds were raised due to sample foaming.

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424688 WW  Group No. 1102389**

**N-58 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-58**

Collected:07/25/2008 11:30  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 16:46  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR058

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 11:02 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 17:49 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 01:37 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/05/2008 12:26 | Daniel H Heller | 10 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/05/2008 12:26 | Daniel H Heller | 10 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/30/2008 00:35 | David V Hershey Jr | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424689 WW  Group No. 1102389**

**N-57 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-57**

Collected:07/25/2008 12:00  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR057

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 24. | 24. | 5. | ug/l | 5 |
| 03956 | Fluorene | 86-73-7 | < 24. | 24. | 5. | ug/l | 5 |
| 03963 | Phenanthrene | 85-01-8 | < 24. | 24. | 5. | ug/l | 5 |
| 03967 | Pyrene | 129-00-0 | < 24. | 24. | 5. | ug/l | 5 |
| 03971 | Chrysene | 218-01-9 | < 24. | 24. | 5. | ug/l | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05401 | Benzene | 71-43-2 | < 5. | 5. | 3. | ug/l | 5 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 5. | 5. | 3. | ug/l | 5 |
| 05407 | Toluene | 108-88-3 | < 5. | 5. | 3. | ug/l | 5 |
| 05415 | Ethylbenzene | 100-41-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05420 | Isopropylbenzene | 98-82-8 | < 10. | 10. | 3. | ug/l | 5 |
| 06310 | Xylene (Total) | 1330-20-7 | 120. | 5. | 3. | ug/l | 5 |
| | The reporting limits for the GC/MS volatile compounds were raised due to sample foaming. | | | | | | |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424689 WW  Group No. 1102389**

**N-57 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-57**

Collected:07/25/2008 12:00  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR057

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 11:04 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 18:19 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 02:01 | Gregory J Drahovsky | 5 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/05/2008 12:51 | Daniel H Heller | 5 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/05/2008 12:51 | Daniel H Heller | 5 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/30/2008 00:35 | David V Hershey Jr | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424690 WW  Group No. 1102389**

**N-136 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-136**

Collected:07/25/2008 12:15  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR136

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 24. | 24. | 5. | ug/l | 5 |
| 03956 | Fluorene | 86-73-7 | < 24. | 24. | 5. | ug/l | 5 |
| 03963 | Phenanthrene | 85-01-8 | < 24. | 24. | 5. | ug/l | 5 |
| 03967 | Pyrene | 129-00-0 | < 24. | 24. | 5. | ug/l | 5 |
| 03971 | Chrysene | 218-01-9 | < 24. | 24. | 5. | ug/l | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05401 | Benzene | 71-43-2 | 110. | 5. | 3. | ug/l | 5 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 5. | 5. | 3. | ug/l | 5 |
| 05407 | Toluene | 108-88-3 | < 5. | 5. | 3. | ug/l | 5 |
| 05415 | Ethylbenzene | 100-41-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05420 | Isopropylbenzene | 98-82-8 | < 10. | 10. | 3. | ug/l | 5 |
| 06310 | Xylene (Total) | 1330-20-7 | < 5. | 5. | 3. | ug/l | 5 |
| | The reporting limits for the GC/MS volatile compounds were raised due to sample foaming. | | | | | | |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424690 WW  Group No. 1102389**

**N-136 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-136**

Collected:07/25/2008 12:15  by MH  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR136

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 11:06 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 18:49 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 02:25 | Gregory J Drahovsky | 5 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/05/2008 13:11 | Daniel H Heller | 5 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/05/2008 13:11 | Daniel H Heller | 5 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/30/2008 00:35 | David V Hershey Jr | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424691 WW  Group No. 1102389**

**RW-308 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 RW-308**

Collected:07/25/2008 09:30  by SS  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR308

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.016 | 0.016 | 0.0054 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 46. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 5. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424691 WW  Group No. 1102389**

**RW-308 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 RW-308**

Collected:07/25/2008 09:30  by SS  Account Number: 10132

Submitted: 07/25/2008 14:40  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 16:46  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR308

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 11:09 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 19:19 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 02:49 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/05/2008 11:08 | Daniel H Heller | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/05/2008 11:08 | Daniel H Heller | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/30/2008 00:35 | David V Hershey Jr | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5424692 WW  Group No. 1102389**

**RW-303 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 RW-303**

Collected:07/25/2008 10:00  by SS  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR303

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 14. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 13. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 16. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 21. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424692 WW  Group No. 1102389**

**RW-303 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 RW-303**

Collected:07/25/2008 10:00  by SS  Account Number: 10132

Submitted: 07/25/2008 14:40  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 16:46  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR303

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 11:11 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 19:49 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 03:12 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/05/2008 11:27 | Daniel H Heller | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/05/2008 11:27 | Daniel H Heller | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/30/2008 00:35 | David V Hershey Jr | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5424693 WW  Group No. 1102389**

**N-36 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-36**

Collected:07/25/2008 10:45  by SS  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR036

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 120. | 120. | 24. | ug/l | 5 |
| 03956 | Fluorene | 86-73-7 | < 120. | 120. | 24. | ug/l | 5 |
| 03963 | Phenanthrene | 85-01-8 | < 120. | 120. | 24. | ug/l | 5 |
| 03967 | Pyrene | 129-00-0 | < 120. | 120. | 24. | ug/l | 5 |
| 03971 | Chrysene | 218-01-9 | < 120. | 120. | 24. | ug/l | 5 |

Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained.

Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5424693 WW  Group No. 1102389**

**N-36 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-36**

Collected:07/25/2008 10:45  by SS  Account Number: 10132

Submitted: 07/25/2008 14:40  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 16:46  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR036

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 11:13 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 20:49 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 03:36 | Gregory J Drahovsky | 5 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/05/2008 11:47 | Daniel H Heller | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/05/2008 11:47 | Daniel H Heller | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/30/2008 00:35 | David V Hershey Jr | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424694 WW  Group No. 1102389**

**N-40 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-40**

Collected:07/25/2008 11:30  by SS  Account Number: 10132

Submitted: 07/25/2008 14:40
Reported: 08/06/2008 at 16:46
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR040

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.010 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 24. | 24. | 5. | ug/l | 5 |
| 03956 | Fluorene | 86-73-7 | < 24. | 24. | 5. | ug/l | 5 |
| 03963 | Phenanthrene | 85-01-8 | < 24. | 24. | 5. | ug/l | 5 |
| 03967 | Pyrene | 129-00-0 | < 24. | 24. | 5. | ug/l | 5 |
| 03971 | Chrysene | 218-01-9 | < 24. | 24. | 5. | ug/l | 5 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 7. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424694 WW  Group No. 1102389**

**N-40 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187465 N-40**

Collected:07/25/2008 11:30  by SS  Account Number: 10132

Submitted: 07/25/2008 14:40  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 16:46  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR040

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/01/2008 11:20 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 21:19 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 04:00 | Gregory J Drahovsky | 5 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/05/2008 17:16 | Daniel H Heller | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/05/2008 17:16 | Daniel H Heller | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/31/2008 19:02 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/30/2008 00:35 | David V Hershey Jr | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1102389
Reported: 08/06/08 at 04:46 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: 082100028A | Sample number(s): 5424682 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 88 | 88 | 60-140 | 0 | 20 |
| Batch number: 082110017A | Sample number(s): 5424683-5424694 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 88 | 92 | 60-140 | 5 | 20 |
| Batch number: 08211WAC026 | Sample number(s): 5424682-5424684 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 98 | 97 | 77-107 | 1 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 97 | 99 | 82-113 | 2 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 104 | 105 | 83-112 | 1 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 109 | 105 | 80-115 | 3 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 100 | 99 | 82-112 | 1 | 30 |
| Batch number: 08211WAE026 | Sample number(s): 5424685-5424694 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 99 | 104 | 77-107 | 4 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 103 | 105 | 82-113 | 2 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 106 | 109 | 83-112 | 3 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 107 | 107 | 80-115 | 0 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 102 | 106 | 82-112 | 4 | 30 |
| Batch number: 082136050003A | Sample number(s): 5424682-5424694 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 103 | | 90-115 | | |
| Batch number: P082171AA | Sample number(s): 5424682-5424687 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 105 | 106 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 105 | 101 | 78-119 | 4 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 107 | 106 | 69-135 | 1 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 94 | 93 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 94 | 92 | 82-119 | 2 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 94 | 92 | 80-113 | 3 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 95 | 93 | 83-113 | 2 | 30 |
| Batch number: P082182AA | Sample number(s): 5424688-5424694 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 102 | 103 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 98 | 97 | 78-119 | 0 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 98 | 97 | 69-135 | 0 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 97 | 97 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 98 | 97 | 82-119 | 1 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 98 | 98 | 80-113 | 0 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 99 | 99 | 83-113 | 0 | 30 |

## Sample Matrix Quality Control

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1102389
Reported: 08/06/08 at 04:46 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: 082100028A | Sample number(s): 5424682 UNSPK: P424695 BKG: P424696 | | | | | | | | |
| Ethylene dibromide | 83 | | 65-135 | | | < 0.029 | < 0.030 | 0 (1) | 30 |
| Batch number: 082110017A | Sample number(s): 5424683-5424694 UNSPK: 5424683 BKG: 5424684 | | | | | | | | |
| Ethylene dibromide | 87 | | 65-135 | | | < 0.029 | < 0.029 | 0 (1) | 30 |
| Batch number: 082136050003A | Sample number(s): 5424682-5424694 UNSPK: P425860 BKG: P425860 | | | | | | | | |
| Lead | 99 | 129* | 75-125 | 12 | 20 | 0.0209 | 0.0184 | 13 | 20 |
| Batch number: P082171AA | Sample number(s): 5424682-5424687 UNSPK: P424700 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 108 | | 69-127 | | | | | | |
| Benzene | 112 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 108 | | 70-143 | | | | | | |
| Toluene | 100 | | 83-127 | | | | | | |
| Ethylbenzene | 98 | | 82-129 | | | | | | |
| Isopropylbenzene | 99 | | 81-130 | | | | | | |
| Xylene (Total) | 98 | | 82-130 | | | | | | |
| Batch number: P082182AA | Sample number(s): 5424688-5424694 UNSPK: 5424693 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 99 | | 69-127 | | | | | | |
| Benzene | 101 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 100 | | 70-143 | | | | | | |
| Toluene | 98 | | 83-127 | | | | | | |
| Ethylbenzene | 95 | | 82-129 | | | | | | |
| Isopropylbenzene | 92 | | 81-130 | | | | | | |
| Xylene (Total) | 95 | | 82-130 | | | | | | |

## Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: EDB in Wastewater
Batch number: 082100028A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5424682 | 103 |
| Blank | 98 |
| DUP | 59 |
| LCS | 97 |
| LCSD | 98 |
| MS | 73 |
| Limits: | 46-136 |

Analysis Name: EDB in Wastewater
Batch number: 082110017A

| | 1,1,2,2-Tetrachloroethane |
|---|---|

*- 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: 1102389
Reported: 08/06/08 at 04:46 PM

## Surrogate Quality Control

| | |
|---|---|
| 5424683 | 133 |
| 5424684 | 76 |
| 5424685 | 114 |
| 5424686 | 111 |
| 5424687 | 70 |
| 5424688 | 147* |
| 5424689 | 136 |
| 5424690 | 97 |
| 5424691 | 151* |
| 5424692 | 155* |
| 5424693 | 80 |
| 5424694 | 122 |
| Blank | 96 |
| DUP | 77 |
| LCS | 103 |
| LCSD | 102 |
| MS | 135 |
| Limits: | 46-136 |

Analysis Name: PAHs in Water by GC/MS
Batch number: 08211WAC026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5424682 | 93 | 93 | 97 |
| 5424683 | 89 | 94 | 95 |
| 5424684 | 95 | 99 | 100 |
| Blank | 97 | 97 | 108 |
| LCS | 99 | 101 | 109 |
| LCSD | 98 | 103 | 104 |
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: PAHs in Water by GC/MS
Batch number: 08211WAE026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5424685 | 109 | 100 | 106 |
| 5424686 | 100 | 98 | 112 |
| 5424687 | 100 | 92 | 112 |
| 5424688 | 100 | 99 | 107 |
| 5424689 | 92 | 91 | 91 |
| 5424690 | 102 | 97 | 98 |
| 5424691 | 102 | 100 | 109 |
| 5424692 | 101 | 99 | 112 |
| 5424693 | 129* | 116* | 127* |
| 5424694 | 95 | 98 | 106 |
| Blank | 112 | 114 | 119 |
| LCS | 103 | 104 | 108 |
| LCSD | 104 | 106 | 110 |
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: UST-Waters by 8260B
Batch number: P082171AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5424682 | 91 | 83 | 86 | 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: 1102389
Reported: 08/06/08 at 04:46 PM

## Surrogate Quality Control

| | | | | |
|---|---|---|---|---|
| 5424683 | 93 | 86 | 86 | 93 |
| 5424684 | 93 | 85 | 87 | 95 |
| 5424685 | 93 | 86 | 87 | 93 |
| 5424686 | 94 | 85 | 86 | 93 |
| 5424687 | 94 | 85 | 85 | 93 |
| Blank | 94 | 85 | 86 | 93 |
| LCS | 94 | 88 | 85 | 93 |
| LCSD | 93 | 88 | 87 | 93 |
| MS | 95 | 89 | 86 | 93 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

Analysis Name: UST-Waters by 8260B
Batch number: P082182AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5424688 | 98 | 98 | 96 | 90 |
| 5424689 | 97 | 97 | 97 | 92 |
| 5424690 | 97 | 98 | 97 | 92 |
| 5424691 | 98 | 95 | 96 | 96 |
| 5424692 | 98 | 98 | 99 | 95 |
| 5424693 | 97 | 93 | 97 | 94 |
| 5424694 | 97 | 96 | 95 | 93 |
| Blank | 99 | 96 | 97 | 91 |
| LCS | 98 | 98 | 98 | 92 |
| LCSD | 99 | 98 | 97 | 92 |
| MS | 97 | 98 | 98 | 93 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only
Acct. # 10132 Group# 1102389 Sample # 5424682-94

**COC # 187465**

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 1.1-4.0°C

For Lab Use Only
FSC:
SCR#:

(1) Client: Sunoco, Aquaterra Acct. #:
Project Name/#: A01-8 philly Refinery PWSID #:
Project Manager: Tiffani Doerr P.O.#:
Sampler: Mike Hinderling Quote #:
Name of state where samples were collected: PA

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water (☐ Potable ☐ NPDES Check if Ammonia) | Other | Total # of Containers | (5) Analyses Requested: Preservation Codes: 8260 | 8011 | PAHs 8270 | Pb | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PZ-504 | 7/25/08 | 730 | X | | | X | | 8 | X | X | X | X | |
| N-74 | 7/25/08 | 745 | X | | | X | | 8 | X | X | X | X | |
| PZ-503 | 7/25/08 | 815 | X | | | X | | 8 | X | X | X | X | |
| N-61 | 7/25/08 | 840 | X | | | X | | 8 | X | X | X | X | |
| RW-500 | 7/25/08 | 930 | X | | | X | | 8 | X | X | X | X | |
| ~~PZ-501~~ N-73 | 7/25/08 | 1055 | X | | | X | | 8 | X | X | X | X | |
| N-58 | 7/25/08 | 1130 | X | | | X | | 8 | X | X | X | X | |
| N-57 | 7/25/08 | 1200 | X | | | X | | 8 | X | X | X | X | |
| N-136 | 7/25/08 | 1215 | X | | | X | | 8 | X | X | X | X | |

**Preservation Codes**
H=HCl T=Thiosulfate
N=$HNO_3$ B=NaOH
S=$H_2SO_4$ O=Other

(6) Temperature of samples upon receipt (if requested)

(7) **Turnaround Time Requested** (TAT) (please circle): (Normal) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
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 |
|---|---|---|---|---|---|
| Steve Lee / AQUATERRA | 7/25/08 | 1440 | | | |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Relinquished by: | Date | Time | Received by: | 7/29/08 | 1440 |

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1102389 Sample # 5424682-94

**COC # 187457**

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 1.1-4.0°C

(1) Client: SUN- AQUATERRA Acct. #:

Project Name/#: PHILA REF AOI-8 PWSID #:

Project Manager: T. DOERR P.O.#:

Sampler: S. SYKES Quote #:

Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

**Preservation Codes**
H=HCl T=Thiosulfate
N=$HNO_3$ B=NaOH
S=$H_2SO_4$ O=Other

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water (☐ Potable ☐ Non-Potable) | Other | Total # of Containers | (5) Analyses Requested: PA unleaded 8260 | Lead | PAHs by GC/MS 8270 | EDB | Remarks | (6) Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RW-308 | 7/25/08 | 930 | X | | | X | | 8 | 3 | 1 | 2 | 2 | | |
| RW-303 | " | 1000 | " | | | " | | " | " | " | " | " | | |
| N-36 | " | 1045 | " | | | " | | " | " | " | " | " | | |
| N-40 | " | 1130 | " | | | " | | " | " | " | " | " | | |

(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] / AQUATERRA | 7/25/08 | 1440 | | | |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Relinquished by: | Date | Time | Received by: [signature] | 7/25/08 | 1440 |

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

*The following defines common symbols and abbreviations used in reporting technical data:*

| | | | |
|---|---|---|---|
| **N.D.** | none detected | **BMQL** | Below Minimum Quantitation Level |
| **TNTC** | Too Numerous To Count | **MPN** | Most Probable Number |
| **IU** | International Units | **CP Units** | cobalt-chloroplatinate units |
| **umhos/cm** | micromhos/cm | **NTU** | nephelometric turbidity units |
| **C** | degrees Celsius | **F** | degrees Fahrenheit |
| **Cal** | (diet) calories | **lb.** | pound(s) |
| **meq** | milliequivalents | **kg** | kilogram(s) |
| **g** | gram(s) | **mg** | milligram(s) |
| **ug** | microgram(s) | **l** | liter(s) |
| **ml** | milliliter(s) | **ul** | microliter(s) |
| **m3** | cubic meter(s) | **fib >5 um/ml** | fibers greater than 5 microns in length per ml |

**<** less than – The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

**>** greater than

**ppm** parts per million – One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

**ppb** parts per billion

**Dry weight basis** Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture.

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

| | |
|---|---|
| **A** | TIC is a possible aldol-condensation product |
| **B** | Analyte was also detected in the blank |
| **C** | Pesticide result confirmed by GC/MS |
| **D** | Compound quatitated on a diluted sample |
| **E** | Concentration exceeds the calibration range of the instrument |
| **J** | Estimated value |
| **N** | Presumptive evidence of a compound (TICs only) |
| **P** | Concentration difference between primary and confirmation columns >25% |
| **U** | Compound was not detected |
| **X,Y,Z** | Defined in case narrative |

**Inorganic Qualifiers**

| | |
|---|---|
| **B** | Value is <CRDL, but ≥IDL |
| **E** | Estimated due to interference |
| **M** | Duplicate injection precision not met |
| **N** | Spike amount not within control limits |
| **S** | Method of standard additions (MSA) used for calculation |
| **U** | Compound was not detected |
| **W** | Post digestion spike out of control limits |
| ***** | Duplicate analysis not within control limits |
| **+** | Correlation coefficient for MSA <0.995 |

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

**WARRANTY AND LIMITS OF LIABILITY –** In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL LANCASTER LABORATORIES BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF LANCASTER LABORATORIES AND (B) WHETHER LANCASTER LABORATORIES HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Lancaster Laboratories which includes any conditions that vary from the Standard Terms and Conditions of Lancaster Laboratories and we hereby object to any conflicting terms contained in any acceptance or order submitted by client.

Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

## SAMPLE GROUP

The sample group for this submittal is 1102390. Samples arrived at the laboratory on Thursday, July 24, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-21 Grab Water | 5424695 |
| N-20 Grab Water | 5424696 |
| N-103 Grab Water | 5424697 |
| N-105 Grab Water | 5424698 |
| N-104 Grab Water | 5424699 |
| N-99 Grab Water | 5424700 |
| N-13 Grab Water | 5424701 |
| N-12 Grab Water | 5424702 |
| N-307 Grab Water | 5424703 |
| N-302 Grab Water | 5424704 |
| N-128 Grab Water | 5424705 |
| N-50D Grab Water | 5424706 |
| RW-200 Grab Water | 5424707 |
| N-64 Grab Water | 5424708 |
| PZ-507 Grab Water | 5424709 |
| PZ-506 Grab Water | 5424710 |
| RW-501 Grab Water | 5424711 |
| PZ-505 Grab Water | 5424712 |
| N-133 Grab Water | 5424713 |

ELECTRONIC COPY TO SUN: Aquaterra Tech. Attn: Kevin Martin

Lancaster Laboratories

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# Analysis Report

| | | |
|---|---|---|
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | LLI | Attn: EDD Group |

Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

Respectfully Submitted,



Marla S. Lord
Senior Specialist

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5424695 WW  Group No. 1102390**

**N-21 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-21**

Collected:07/23/2008 08:45  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR021

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 16. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 190. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 3. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424695 WW  Group No. 1102390**

**N-21 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-21**

Collected:07/23/2008 08:45  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 19:53  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR021

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:17 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 00:47 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 08:03 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 14:05 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 14:05 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424696 WW  Group No. 1102390**

**N-20 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-20**

Collected:07/23/2008 09:00  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR020

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 66. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 50. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 90. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 70. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 42. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424696 WW  Group No. 1102390**

**N-20 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-20**

Collected:07/23/2008 09:00  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR020

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:19 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 02:17 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 08:26 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 14:32 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 14:32 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424697 WW  Group No. 1102390**

**N-103 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-103**

Collected:07/23/2008 09:30 by SS

Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR103

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 740. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 2,500. | 250. | 50. | ug/l | 5 |
| 03967 | Pyrene | 129-00-0 | 390. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 360. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05401 | Benzene | 71-43-2 | 16. | 5. | 3. | ug/l | 5 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 5. | 5. | 3. | ug/l | 5 |
| 05407 | Toluene | 108-88-3 | 22. | 5. | 3. | ug/l | 5 |
| 05415 | Ethylbenzene | 100-41-4 | < 5. | 5. | 3. | ug/l | 5 |
| 05420 | Isopropylbenzene | 98-82-8 | 360. | 10. | 3. | ug/l | 5 |
| 06310 | Xylene (Total) | 1330-20-7 | 47. | 5. | 3. | ug/l | 5 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424697 WW  Group No. 1102390**

**N-103 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-103**

Collected:07/23/2008 09:30  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR103

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:21 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 02:47 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 08:49 | Brian K Graham | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 21:35 | William T Parker | 5 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 14:59 | Anita M Dale | 5 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 14:59 | Anita M Dale | 5 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424698 WW  Group No. 1102390**

**N-105 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-105**

Collected:07/23/2008 10:00  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR105

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 72. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 100. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 50. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 50. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 3. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 9. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 7. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424698 WW  Group No. 1102390**

**N-105 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-105**

Collected:07/23/2008 10:00  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR105

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:22 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 03:17 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 09:13 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/05/2008 16:18 | Daniel H Heller | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/05/2008 16:18 | Daniel H Heller | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424699 WW  Group No. 1102390**

**N-104 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-104**

Collected:07/23/2008 10:25  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR104

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 310. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 740. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 150. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 85. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 7. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 13. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 2. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 44. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 30. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424699 WW  Group No. 1102390**

**N-104 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-104**

Collected:07/23/2008 10:25  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR104

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:24 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 04:17 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 09:37 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/05/2008 16:37 | Daniel H Heller | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/05/2008 16:37 | Daniel H Heller | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424700 WW  Group No. 1102390**

**N-99 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-99**

Collected:07/23/2008 11:05  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR099

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 50. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 50. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 50. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 50. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424700 WW  Group No. 1102390**

**N-99 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-99**

Collected:07/23/2008 11:05  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR099

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:26 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 04:47 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 10:00 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 16:19 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 16:19 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424701 WW  Group No. 1102390**

**N-13 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-13**

Collected:07/23/2008 11:45  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR013

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | 2. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424701 WW  Group No. 1102390**

**N-13 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-13**

Collected:07/23/2008 11:45  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR013

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:28 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 05:17 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 10:24 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 17:12 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 17:12 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424702 WW  Group No. 1102390**

**N-12 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-12**

Collected:07/23/2008 12:00  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR012

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 1,600. | 500. | 100. | ug/l | 10 |
| 03963 | Phenanthrene | 85-01-8 | 5,500. | 500. | 100. | ug/l | 10 |
| 03967 | Pyrene | 129-00-0 | 870. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 470. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 6. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 10. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 15. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 14. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424702 WW  Group No. 1102390**

**N-12 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-12**

Collected:07/23/2008 12:00  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR012

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:33 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 05:47 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 10:47 | Brian K Graham | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 21:59 | William T Parker | 10 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 17:39 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 17:39 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424703 WW  Group No. 1102390**

**N-307 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-307**

Collected:07/23/2008 13:00  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR307

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 52. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 30. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 3. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 30. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 34. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424703 WW  Group No. 1102390**

**N-307 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-307**

Collected:07/23/2008 13:00  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR307

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:35 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 06:17 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 11:11 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 18:06 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 18:06 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5424704 WW  Group No. 1102390**

**N-302 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-302**

Collected:07/23/2008 14:10  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR302

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 8. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 3. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 2. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 17. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 4. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424704 WW  Group No. 1102390**

**N-302 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-302**

Collected:07/23/2008 14:10  by SS  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR302

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:36 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 06:47 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 11:34 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 18:33 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 18:33 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424705 WW  Group No. 1102390**

**N-128 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-128**

Collected:07/23/2008 08:15  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR128

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 100. | 100. | 20. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 100. | 100. | 20. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 4,300. | 500. | 100. | ug/l | 5 |
| 03967 | Pyrene | 129-00-0 | 940. | 100. | 20. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 470. | 100. | 20. | ug/l | 1 |

Due to sample matrix interferences observed during the extraction, the normal reporting limits were not attained.

Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 30. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424705 WW  Group No. 1102390**

**N-128 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-128**

Collected:07/23/2008 08:15  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR128

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:38 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 07:17 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 11:57 | Brian K Graham | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 22:22 | William T Parker | 5 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 18:59 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 18:59 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424706 WW  Group No. 1102390**

**N-50D Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-50D**

Collected:07/23/2008 09:15  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR50D

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424706 WW  Group No. 1102390**

**N-50D Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-50D**

Collected:07/23/2008 09:15  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR50D

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:40 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 07:47 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 12:21 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 14:18 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 14:18 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424707 WW  Group No. 1102390**

**RW-200 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 RW-200**

Collected:07/23/2008 10:20  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR200

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 72. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 100. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 300. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 97. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424707 WW  Group No. 1102390**

**RW-200 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 RW-200**

Collected:07/23/2008 10:20  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR200

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:42 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 08:17 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 12:44 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 14:45 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 14:45 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424708 WW  Group No. 1102390**

**N-64 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-64**

Collected:07/23/2008 10:45  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR064

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424708 WW  Group No. 1102390**

**N-64 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-64**

Collected:07/23/2008 10:45  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR064

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 07:43 | David K Beck | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 08:47 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 13:07 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 15:11 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 15:11 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 18:45 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5424709 WW  Group No. 1102390**

**PZ-507 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 PZ-507**

Collected:07/23/2008 11:10  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR507

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 50. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 50. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 120. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 120. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424709 WW  Group No. 1102390**

**PZ-507 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 PZ-507**

Collected:07/23/2008 11:10  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 19:53  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR507

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:18 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 09:47 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 13:31 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 16:05 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 16:05 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424710 WW  Group No. 1102390**

**PZ-506 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 PZ-506**

Collected:07/23/2008 11:40  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR506

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 11. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 8. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05401 | Benzene | 71-43-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05407 | Toluene | 108-88-3 | < 10. | 10. | 5. | ug/l | 10 |
| 05415 | Ethylbenzene | 100-41-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05420 | Isopropylbenzene | 98-82-8 | < 20. | 20. | 5. | ug/l | 10 |
| 06310 | Xylene (Total) | 1330-20-7 | < 10. | 10. | 5. | ug/l | 10 |

The usual reporting limits were not attained due to the matrix of the sample in the GC/MS volatile analysis.

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424710 WW  Group No. 1102390**

**PZ-506 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 PZ-506**

Collected:07/23/2008 11:40  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10  SUN: Aquaterra Tech.
Reported: 08/06/2008 at 19:53  PO Box 744
Discard: 10/06/2008  West Chester PA 19381

PR506

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:19 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 10:17 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 13:55 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 16:32 | Anita M Dale | 10 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 16:32 | Anita M Dale | 10 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424711 WW  Group No. 1102390**

**RW-501 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 RW-501**

Collected:07/23/2008 12:45  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR501

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0095 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 3. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424711 WW  Group No. 1102390**

**RW-501 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 RW-501**

Collected:07/23/2008 12:45  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR501

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:21 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 10:47 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 14:18 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 16:58 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 16:58 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424712 WW  Group No. 1102390**

**PZ-505 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 PZ-505**

Collected:07/23/2008 13:00  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR505

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 10. | 10. | 2. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 11. | 10. | 2. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 10. | 10. | 2. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 61. | 10. | 2. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 41. | 10. | 2. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 160. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 3. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 2. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424712 WW  Group No. 1102390**

**PZ-505 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 PZ-505**

Collected:07/23/2008 13:00  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR505

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:23 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 11:17 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/29/2008 14:41 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 17:25 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 17:25 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/28/2008 10:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424713 WW  Group No. 1102390**

**N-133 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-133**

Collected:07/23/2008 13:20  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR133

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | 31. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 9. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 6. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05401 | Benzene | 71-43-2 | 10,000. | 100. | 50. | ug/l | 100 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05407 | Toluene | 108-88-3 | < 10. | 10. | 5. | ug/l | 10 |
| 05415 | Ethylbenzene | 100-41-4 | 11. | 10. | 5. | ug/l | 10 |
| 05420 | Isopropylbenzene | 98-82-8 | < 20. | 20. | 5. | ug/l | 10 |
| 05439 | Naphthalene | 91-20-3 | < 40. | 40. | 10. | ug/l | 10 |
| 06310 | Xylene (Total) | 1330-20-7 | 17. | 10. | 5. | ug/l | 10 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424713 WW  Group No. 1102390**

**N-133 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187467 N-133**

Collected:07/23/2008 13:20  by MH  Account Number: 10132

Submitted: 07/24/2008 17:10
Reported: 08/06/2008 at 19:53
Discard: 10/06/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR133

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:24 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 11:48 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 09:33 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 17:52 | Anita M Dale | 10 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/06/2008 12:06 | Daniel H Heller | 100 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 17:52 | Anita M Dale | 10 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 2 | 08/06/2008 12:06 | Daniel H Heller | 100 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 10:45 | Deborah M Zimmerman | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 04:30 | Tracy L Schickel | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1102390
Reported: 08/06/08 at 07:53 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: 08208WAH026 | Sample number(s): 5424695-5424712 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 93 | 87 | 77-107 | 6 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 99 | 94 | 82-113 | 5 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 104 | 97 | 83-112 | 7 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 102 | 94 | 80-115 | 9 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 101 | 95 | 82-112 | 7 | 30 |
| Batch number: 082100028A | Sample number(s): 5424695-5424713 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 88 | 88 | 60-140 | 0 | 20 |
| Batch number: 08210WAH026 | Sample number(s): 5424713 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 92 | 100 | 77-107 | 9 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 95 | 102 | 82-113 | 7 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 99 | 106 | 83-112 | 7 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 95 | 99 | 80-115 | 4 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 92 | 99 | 82-112 | 7 | 30 |
| Batch number: 082116050002A | Sample number(s): 5424695-5424708 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 105 | | 90-115 | | |
| Batch number: 082126050001A | Sample number(s): 5424709-5424713 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 102 | | 90-115 | | |
| Batch number: P082171AA | Sample number(s): 5424695-5424697,5424700-5424705 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 105 | 106 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 105 | 101 | 78-119 | 4 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 107 | 106 | 69-135 | 1 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 94 | 93 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 94 | 92 | 82-119 | 2 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 94 | 92 | 80-113 | 3 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 95 | 93 | 83-113 | 2 | 30 |
| Batch number: P082172AA | Sample number(s): 5424706-5424713 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 98 | 98 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 95 | 96 | 78-119 | 1 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 99 | 97 | 69-135 | 2 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 96 | 99 | 85-115 | 4 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 96 | 99 | 82-119 | 3 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 96 | 100 | 80-113 | 4 | 30 |
| Naphthalene | < 4. | 4. | 1. | ug/l | 93 | 96 | 61-116 | 3 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 97 | 100 | 83-113 | 3 | 30 |
| Batch number: P082182AA | Sample number(s): 5424698-5424699 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 102 | 103 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 98 | 97 | 78-119 | 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: 1102390
Reported: 08/06/08 at 07:53 PM

### Laboratory Compliance Quality Control

| Analysis Name | Blank Result | Blank LOQ** | Blank MDL | Report Units | LCS %REC | LCSD %REC | LCS/LCSD Limits | RPD | RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 98 | 97 | 69-135 | 0 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 97 | 97 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 98 | 97 | 82-119 | 1 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 98 | 98 | 80-113 | 0 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 99 | 99 | 83-113 | 0 | 30 |
| Batch number: P082191AA | Sample number(s): 5424713 | | | | | | | | |
| Benzene | < 1. | 1. | 0.5 | ug/l | 91 | 89 | 78-119 | 2 | 30 |

### Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 082100028A | Sample number(s): 5424695-5424713 UNSPK: 5424695 BKG: 5424696 | | | | | | | | |
| Ethylene dibromide | 83 | | 65-135 | | | < 0.029 | < 0.030 | 0 (1) | 30 |
| Batch number: 082116050002A | Sample number(s): 5424695-5424708 UNSPK: P422562 BKG: P422562 | | | | | | | | |
| Lead | 98 | 96 | 75-125 | 2 | 20 | < 0.0010 | < 0.0010 | 0 (1) | 20 |
| Batch number: 082126050001A | Sample number(s): 5424709-5424713 UNSPK: P425132 BKG: P425132 | | | | | | | | |
| Lead | 122 | 119 | 75-125 | 1 | 20 | 0.0424 | 0.0441 | 4 | 20 |
| Batch number: P082171AA | Sample number(s): 5424695-5424697,5424700-5424705 UNSPK: 5424700 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 108 | | 69-127 | | | | | | |
| Benzene | 112 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 108 | | 70-143 | | | | | | |
| Toluene | 100 | | 83-127 | | | | | | |
| Ethylbenzene | 98 | | 82-129 | | | | | | |
| Isopropylbenzene | 99 | | 81-130 | | | | | | |
| Xylene (Total) | 98 | | 82-130 | | | | | | |
| Batch number: P082172AA | Sample number(s): 5424706-5424713 UNSPK: 5424708 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 102 | | 69-127 | | | | | | |
| Benzene | 104 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 101 | | 70-143 | | | | | | |
| Toluene | 104 | | 83-127 | | | | | | |
| Ethylbenzene | 103 | | 82-129 | | | | | | |
| Isopropylbenzene | 106 | | 81-130 | | | | | | |
| Naphthalene | 108 | | 57-125 | | | | | | |
| Xylene (Total) | 104 | | 82-130 | | | | | | |
| Batch number: P082182AA | Sample number(s): 5424698-5424699 UNSPK: P424693 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 99 | | 69-127 | | | | | | |
| Benzene | 101 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 100 | | 70-143 | | | | | | |
| Toluene | 98 | | 83-127 | | | | | | |
| Ethylbenzene | 95 | | 82-129 | | | | | | |
| Isopropylbenzene | 92 | | 81-130 | | | | | | |
| Xylene (Total) | 95 | | 82-130 | | | | | | |

*- 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: 1102390
Reported: 08/06/08 at 07:53 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 |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: P082191AA | Sample number(s): 5424713 | | | UNSPK: P432328 | | | | | |
| Benzene | 89 | | 83-128 | | | | | | |

### 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: PAHs in Water by GC/MS
Batch number: 08208WAH026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5424695 | 105 | 95 | 93 |
| 5424696 | 105 | 96 | 90 |
| 5424697 | 126 | 91 | 67 |
| 5424698 | 111 | 90 | 86 |
| 5424699 | 110 | 86 | 71 |
| 5424700 | 102 | 92 | 64 |
| 5424701 | 102 | 94 | 88 |
| 5424702 | 141* | 88 | 83 |
| 5424703 | 104 | 98 | 93 |
| 5424704 | 109 | 94 | 90 |
| 5424705 | 276* | 101 | 87 |
| 5424706 | 104 | 97 | 97 |
| 5424707 | 95 | 89 | 88 |
| 5424708 | 99 | 99 | 88 |
| 5424709 | 96 | 91 | 87 |
| 5424710 | 101 | 97 | 87 |
| 5424711 | 93 | 89 | 88 |
| 5424712 | 102 | 97 | 89 |
| Blank | 102 | 96 | 93 |
| LCS | 103 | 94 | 95 |
| LCSD | 93 | 89 | 86 |
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: EDB in Wastewater
Batch number: 082100028A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5424695 | 70 |
| 5424696 | 57 |
| 5424697 | 58 |
| 5424698 | 89 |
| 5424699 | 80 |
| 5424700 | 90 |
| 5424701 | 129 |
| 5424702 | 69 |
| 5424703 | 127 |

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1102390
Reported: 08/06/08 at 07:53 PM

### Surrogate Quality Control

| | |
|---|---|
| 5424704 | 79 |
| 5424705 | 85 |
| 5424706 | 93 |
| 5424707 | 95 |
| 5424708 | 108 |
| 5424709 | 96 |
| 5424710 | 99 |
| 5424711 | 127 |
| 5424712 | 104 |
| 5424713 | 154* |
| Blank | 98 |
| DUP | 59 |
| LCS | 97 |
| LCSD | 98 |
| MS | 73 |
| Limits: | 46-136 |

Analysis Name: PAHs in Water by GC/MS
Batch number: 08210WAH026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5424713 | 107 | 96 | 91 |
| Blank | 104 | 100 | 91 |
| LCS | 97 | 90 | 89 |
| LCSD | 105 | 99 | 92 |
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: UST-Waters by 8260B
Batch number: P082171AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5424695 | 92 | 85 | 85 | 108 |
| 5424696 | 94 | 86 | 87 | 95 |
| 5424697 | 94 | 88 | 88 | 95 |
| 5424700 | 94 | 85 | 87 | 93 |
| 5424701 | 94 | 87 | 86 | 94 |
| 5424702 | 95 | 87 | 89 | 98 |
| 5424703 | 94 | 85 | 88 | 95 |
| 5424704 | 93 | 85 | 87 | 93 |
| 5424705 | 94 | 85 | 84 | 92 |
| Blank | 94 | 85 | 86 | 93 |
| LCS | 94 | 88 | 85 | 93 |
| LCSD | 93 | 88 | 87 | 93 |
| MS | 95 | 89 | 86 | 93 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

Analysis Name: UST-Waters by 8260B
Batch number: P082172AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5424706 | 97 | 96 | 98 | 91 |
| 5424707 | 98 | 96 | 97 | 94 |
| 5424708 | 98 | 98 | 97 | 92 |
| 5424709 | 98 | 97 | 97 | 92 |
| 5424710 | 97 | 98 | 98 | 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: 1102390
Reported: 08/06/08 at 07:53 PM

### Surrogate Quality Control

| | | | | |
|---|---|---|---|---|
| 5424711 | 97 | 97 | 98 | 91 |
| 5424712 | 97 | 96 | 97 | 94 |
| 5424713 | 97 | 95 | 97 | 92 |
| Blank | 99 | 98 | 98 | 93 |
| LCS | 99 | 100 | 98 | 93 |
| LCSD | 98 | 100 | 98 | 92 |
| MS | 100 | 99 | 97 | 92 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

Analysis Name: UST-Waters by 8260B
Batch number: P082182AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5424698 | 99 | 98 | 96 | 101 |
| 5424699 | 98 | 95 | 99 | 107 |
| Blank | 99 | 96 | 97 | 91 |
| LCS | 98 | 98 | 98 | 92 |
| LCSD | 99 | 98 | 97 | 92 |
| MS | 97 | 98 | 98 | 93 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

Analysis Name: 8260 Master Scan (water)
Batch number: P082191AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| Blank | 90 | 84 | 93 | 91 |
| LCS | 91 | 88 | 91 | 90 |
| LCSD | 91 | 85 | 92 | 91 |
| MS | 93 | 87 | 92 | 91 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only
Acct. # 10132 Group# 1102390 Sample # 5424695-713

**COC # 187467**

Please print. Instructions on reverse side correspond with circled numbers. Cooler temp 1.5-5.6°C

(1) Client: SUN-AQUATERRA Acct. #:
Project Name/#: PHILA REF AOT-8 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#:

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Water | Other | Potable / NPDES (Check if Applicable) | Total # of Containers | (5) Analyses Requested / Preservation Codes: PA Unbodied 82606 | Lead | PAHs by 4ms 8270 | EDB | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-21 | 7/23/08 | 845 | X | | | X | | | 8 | 3 | 1 | 2 | 2 | |
| N-20 | | 900 | | | | | | | | | | | | |
| N-103 | | 930 | | | | | | | | | | | | |
| N-105 | | 1000 | | | | | | | | | | | | |
| N-104 | | 1025 | | | | | | | | | | | | |
| N-99 | | 1105 | | | | | | | | | | | | |
| N-13 | | 1145 | | | | | | | | | | | | |
| N-12 | | 1200 | | | | | | | | | | | | |
| N-307 | | 1300 | | | | | | | | | | | | |
| N-302 | | 1410 | | | | | | | | | | | | |

**Preservation Codes**
H=HCl T=Thiosulfate
N=$HNO_3$ B=NaOH
S=$H_2SO_4$ O=Other

(6) Temperature of samples upon receipt (if requested)

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed:
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| Steve Sr / AQUATERRA | 7/23/08 | 1600 | Bill DeLong | 7-24-08 | 11:35 |
| Bill DeLong | 7-24-08 | 17:10 | | | |
| | | | | | |
| | | | | | |
| | | | Katie Hoffine | 7/24/08 | 7:10 |

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1102390 Sample # 5424695-713

**COC # 187463**

Please print. Instructions on reverse side correspond with circled numbers. cooler temp 1.5-5.6°C

(1) Client: Sunoco, Aquaterra Acct. #:

Project Name/#: A01-8 philly Refinery PWSID #:

Project Manager: Tiffani Doerr P.O.#:

Sampler: Mike 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: 8260 | PAHs 8270 | 8011 | Pb | Remarks | (6) Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-128 | 7/23/08 | 815 | X | | | X | | 8 | X | X | X | X | | |
| N-50D | 7/23/08 | 915 | X | | | X | | 8 | X | X | X | X | | |
| RW-200 | 7/23/08 | 1020 | X | | | X | | 8 | X | X | X | X | | |
| N-64 | 7/23/08 | 1045 | X | | | X | | 8 | X | X | X | X | | |
| PZ-507 | 7/23/08 | 1110 | X | | | X | | 8 | X | X | X | X | | |
| PZ-506 | 7/23/08 | 1140 | X | | | X | | 8 | X | X | X | X | | |
| RW-501 | 7/23/08 | 1245 | X | | | X | | 8 | X | X | X | X | | |
| PZ-505 | 7/23/08 | 1300 | X | | | X | | 8 | X | X | X | X | | |
| N-133 | 7/23/08 | 1320 | X | | | X | | 8 | 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

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| [signature] | 7/23/08 | 1345 | Bill DeLong | 7-24-08 | 11:45 |
| Bill DeLong | 7-24-08 | 17:10 | | | |
| | | | | | |
| | | | | | |
| | | | Katie Hartline | 7/24/08 | 17:10 |

(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.

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

*The following defines common symbols and abbreviations used in reporting technical data:*

| | | | |
|---|---|---|---|
| **N.D.** | none detected | **BMQL** | Below Minimum Quantitation Level |
| **TNTC** | Too Numerous To Count | **MPN** | Most Probable Number |
| **IU** | International Units | **CP Units** | cobalt-chloroplatinate units |
| **umhos/cm** | micromhos/cm | **NTU** | nephelometric turbidity units |
| **C** | degrees Celsius | **F** | degrees Fahrenheit |
| **Cal** | (diet) calories | **lb.** | pound(s) |
| **meq** | milliequivalents | **kg** | kilogram(s) |
| **g** | gram(s) | **mg** | milligram(s) |
| **ug** | microgram(s) | **l** | liter(s) |
| **ml** | milliliter(s) | **ul** | microliter(s) |
| **m3** | cubic meter(s) | **fib >5 um/ml** | fibers greater than 5 microns in length per ml |

**<** less than – The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

**>** greater than

**ppm** parts per million – One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

**ppb** parts per billion

**Dry weight basis** Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture.

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

| | |
|---|---|
| **A** | TIC is a possible aldol-condensation product |
| **B** | Analyte was also detected in the blank |
| **C** | Pesticide result confirmed by GC/MS |
| **D** | Compound quatitated on a diluted sample |
| **E** | Concentration exceeds the calibration range of the instrument |
| **J** | Estimated value |
| **N** | Presumptive evidence of a compound (TICs only) |
| **P** | Concentration difference between primary and confirmation columns >25% |
| **U** | Compound was not detected |
| **X,Y,Z** | Defined in case narrative |

**Inorganic Qualifiers**

| | |
|---|---|
| **B** | Value is <CRDL, but ≥IDL |
| **E** | Estimated due to interference |
| **M** | Duplicate injection precision not met |
| **N** | Spike amount not within control limits |
| **S** | Method of standard additions (MSA) used for calculation |
| **U** | Compound was not detected |
| **W** | Post digestion spike out of control limits |
| ***** | Duplicate analysis not within control limits |
| **+** | Correlation coefficient for MSA <0.995 |

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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Lancaster Laboratories

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

## SAMPLE GROUP

The sample group for this submittal is 1102391. Samples arrived at the laboratory on Friday, July 25, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-34 Grab Water | 5424714 |
| N-35 Grab Water | 5424715 |
| N-109 Grab Water | 5424716 |
| N-37 Grab Water | 5424717 |
| N-38 Grab Water | 5424718 |
| N-38D Grab Water | 5424719 |
| N-111 Grab Water | 5424720 |
| N-110 Grab Water | 5424721 |
| N-112 Grab Water | 5424722 |
| N-114 Grab Water | 5424723 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | LLI | Attn: EDD Group |

Lancaster Laboratories

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# Analysis Report

Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

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



**Lancaster Laboratories Sample No. 5424714 WW  Group No. 1102391**

**N-34 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-34**

Collected:07/24/2008 09:05  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR034

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.028 | 0.028 | 0.0093 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 200. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 200. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 610. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 290. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05401 | Benzene | 71-43-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05407 | Toluene | 108-88-3 | < 10. | 10. | 5. | ug/l | 10 |
| 05415 | Ethylbenzene | 100-41-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05420 | Isopropylbenzene | 98-82-8 | < 20. | 20. | 5. | ug/l | 10 |
| 06310 | Xylene (Total) | 1330-20-7 | < 10. | 10. | 5. | ug/l | 10 |
| | The usual reporting limits were not attained due to the matrix of the sample in the GC/MS volatile analysis. | | | | | | |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424714 WW  Group No. 1102391**

**N-34 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-34**

Collected:07/24/2008 09:05  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR034

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:28 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 21:49 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 15:19 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 18:45 | Anita M Dale | 10 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 18:45 | Anita M Dale | 10 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424715 WW  Group No. 1102391**

**N-35 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-35**

Collected:07/24/2008 09:40  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR035

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 47. | 47. | 9. | ug/l | 10 |
| 03956 | Fluorene | 86-73-7 | < 47. | 47. | 9. | ug/l | 10 |
| 03963 | Phenanthrene | 85-01-8 | < 47. | 47. | 9. | ug/l | 10 |
| 03967 | Pyrene | 129-00-0 | 70. | 47. | 9. | ug/l | 10 |
| 03971 | Chrysene | 218-01-9 | 61. | 47. | 9. | ug/l | 10 |
| | Due to the sample matrix an initial dilution was necessary to perform the analysis. Therefore, the reporting limits for the GC/MS semivolatile compounds were raised. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05401 | Benzene | 71-43-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 10. | 10. | 5. | ug/l | 10 |
| 05407 | Toluene | 108-88-3 | < 10. | 10. | 5. | ug/l | 10 |
| 05415 | Ethylbenzene | 100-41-4 | < 10. | 10. | 5. | ug/l | 10 |
| 05420 | Isopropylbenzene | 98-82-8 | < 20. | 20. | 5. | ug/l | 10 |
| 06310 | Xylene (Total) | 1330-20-7 | < 10. | 10. | 5. | ug/l | 10 |
| | The usual reporting limits were not attained due to the matrix of the sample in the GC/MS volatile analysis. | | | | | | |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424715 WW  Group No. 1102391**

**N-35 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-35**

Collected:07/24/2008 09:40  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR035

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:30 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 22:19 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 15:44 | Joseph M Gambler | 10 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 19:12 | Anita M Dale | 10 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 19:12 | Anita M Dale | 10 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424716 WW  Group No. 1102391**

**N-109 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-109**

Collected:07/24/2008 10:10  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10  SUN: Aquaterra Tech.
Reported: 08/05/2008 at 16:22  PO Box 744
Discard: 10/05/2008  West Chester PA 19381

PR109

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 140. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 230. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 63. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 50. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 11. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424716 WW  Group No. 1102391**

**N-109 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-109**

Collected:07/24/2008 10:10  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR109

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:31 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 22:49 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 16:08 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 19:39 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 19:39 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424717 WW  Group No. 1102391**

**N-37 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-37**

Collected:07/24/2008 10:35  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR037

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424717 WW  Group No. 1102391**

**N-37 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-37**

Collected:07/24/2008 10:35  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR037

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:37 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 23:20 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 16:32 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 20:06 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 20:06 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424718 WW  Group No. 1102391**

**N-38 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-38**

Collected:07/24/2008 11:15  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR038

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424718 WW  Group No. 1102391**

**N-38 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-38**

Collected:07/24/2008 11:15  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10  SUN: Aquaterra Tech.
Reported: 08/05/2008 at 16:22  PO Box 744
Discard: 10/05/2008  West Chester PA 19381

PR038

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:38 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/30/2008 23:50 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 16:56 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 20:32 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 20:32 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424719 WW  Group No. 1102391**

**N-38D Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-38D**

Collected:07/24/2008 11:50  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR38D

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424719 WW  Group No. 1102391**

**N-38D Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-38D**

Collected:07/24/2008 11:50  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR38D

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:40 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/31/2008 00:20 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 17:21 | Joseph M Gambler | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 20:59 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 20:59 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424720 WW  Group No. 1102391**

**N-111 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-111**

Collected:07/24/2008 13:00  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR111

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 170. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 380. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 160. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 110. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 8. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424720 WW  Group No. 1102391**

**N-111 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-111**

Collected:07/24/2008 13:00  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR111

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:42 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/31/2008 00:50 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 20:01 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 21:26 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 21:26 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424721 WW  Group No. 1102391**

**N-110 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-110**

Collected:07/24/2008 13:40  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR110

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 50. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 50. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 50. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 50. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424721 WW  Group No. 1102391**

**N-110 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-110**

Collected:07/24/2008 13:40  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR110

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:44 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 07/31/2008 01:20 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 20:25 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 21:53 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 21:53 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/29/2008 13:30 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424722 WW  Group No. 1102391**

**N-112 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-112**

Collected:07/24/2008 14:15  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR112

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0095 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 380. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 1,400. | 250. | 50. | ug/l | 5 |
| 03967 | Pyrene | 129-00-0 | 760. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 290. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 22. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5424722 WW  Group No. 1102391**

**N-112 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-112**

Collected:07/24/2008 14:15  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR112

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:45 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 15:03 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 20:49 | Gregory J Drahovsky | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/31/2008 04:44 | Gregory J Drahovsky | 5 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 22:46 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 22:46 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/30/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424723 WW  Group No. 1102391**

**N-114 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-114**

Collected:07/24/2008 14:45  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10
Reported: 08/05/2008 at 16:22
Discard: 10/05/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR114

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 9. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 7. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 24. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 3. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5424723 WW  Group No. 1102391**

**N-114 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 188249 N-114**

Collected:07/24/2008 14:45  by SS  Account Number: 10132

Submitted: 07/25/2008 14:10  SUN: Aquaterra Tech.
Reported: 08/05/2008 at 16:22  PO Box 744
Discard: 10/05/2008  West Chester PA 19381

PR114

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 07/31/2008 10:47 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 16:03 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 07/30/2008 21:12 | Gregory J Drahovsky | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/04/2008 23:13 | Anita M Dale | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/04/2008 23:13 | Anita M Dale | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 07/30/2008 19:05 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/30/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 07/29/2008 14:00 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1102391
Reported: 08/05/08 at 04:22 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: 082110017A | Sample number(s): 5424714-5424721 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 88 | 92 | 60-140 | 5 | 20 |
| Batch number: 08211WAC026 | Sample number(s): 5424714-5424723 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 98 | 97 | 77-107 | 1 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 97 | 99 | 82-113 | 2 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 104 | 105 | 83-112 | 1 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 109 | 105 | 80-115 | 3 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 100 | 99 | 82-112 | 1 | 30 |
| Batch number: 082120007A | Sample number(s): 5424722-5424723 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 96 | 96 | 60-140 | 0 | 20 |
| Batch number: 082126050001A | Sample number(s): 5424714-5424723 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 102 | | 90-115 | | |
| Batch number: P082172AA | Sample number(s): 5424714-5424723 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 98 | 98 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 95 | 96 | 78-119 | 1 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 99 | 97 | 69-135 | 2 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 96 | 99 | 85-115 | 4 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 96 | 99 | 82-119 | 3 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 96 | 100 | 80-113 | 4 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 97 | 100 | 83-113 | 3 | 30 |

## Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 082110017A | Sample number(s): 5424714-5424721 UNSPK: P424683 BKG: P424684 | | | | | | | | |
| Ethylene dibromide | 87 | | 65-135 | | | < 0.029 | < 0.029 | 0 (1) | 30 |
| Batch number: 082120007A | Sample number(s): 5424722-5424723 UNSPK: 5424722 BKG: P425132 | | | | | | | | |
| Ethylene dibromide | 70 | | 65-135 | | | < 0.029 | < 0.030 | 0 (1) | 30 |
| Batch number: 082126050001A | Sample number(s): 5424714-5424723 UNSPK: P425132 BKG: P425132 | | | | | | | | |
| Lead | 122 | 119 | 75-125 | 1 | 20 | 0.0424 | 0.0441 | 4 | 20 |
| Batch number: P082172AA | Sample number(s): 5424714-5424723 UNSPK: P424708 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 102 | | 69-127 | | | | | | |
| Benzene | 104 | | 83-128 | | | | | | |

*- 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: 1102391
Reported: 08/05/08 at 04:22 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 |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dichloroethane | 101 | | 70-143 | | | | | | |
| Toluene | 104 | | 83-127 | | | | | | |
| Ethylbenzene | 103 | | 82-129 | | | | | | |
| Isopropylbenzene | 106 | | 81-130 | | | | | | |
| Xylene (Total) | 104 | | 82-130 | | | | | | |

## Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: EDB in Wastewater
Batch number: 082110017A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5424714 | 52 |
| 5424715 | 68 |
| 5424716 | 86 |
| 5424717 | 93 |
| 5424718 | 102 |
| 5424719 | 96 |
| 5424720 | 86 |
| 5424721 | 92 |
| Blank | 96 |
| DUP | 77 |
| LCS | 103 |
| LCSD | 102 |
| MS | 135 |
| Limits: | 46-136 |

Analysis Name: PAHs in Water by GC/MS
Batch number: 08211WAC026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5424714 | 92 | 89 | 95 |
| 5424715 | 61 | 66 | 66 |
| 5424716 | 91 | 95 | 85 |
| 5424717 | 88 | 95 | 89 |
| 5424718 | 91 | 100 | 96 |
| 5424719 | 82 | 87 | 86 |
| 5424720 | 98 | 96 | 107 |
| 5424721 | 94 | 92 | 101 |
| 5424722 | 85 | 84 | 97 |
| 5424723 | 92 | 97 | 109 |
| Blank | 97 | 97 | 108 |
| LCS | 99 | 101 | 109 |
| LCSD | 98 | 103 | 104 |

*- 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: 1102391
Reported: 08/05/08 at 04:22 PM

## Surrogate Quality Control

| | | | |
|---|---|---|---|
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: EDB in Wastewater
Batch number: 082120007A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5424722 | 67 |
| 5424723 | 132 |
| Blank | 109 |
| DUP | 102 |
| LCS | 109 |
| LCSD | 108 |
| MS | 59 |
| Limits: | 46-136 |

Analysis Name: UST-Waters by 8260B
Batch number: P082172AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5424714 | 99 | 97 | 96 | 92 |
| 5424715 | 97 | 96 | 98 | 92 |
| 5424716 | 98 | 94 | 96 | 102 |
| 5424717 | 99 | 99 | 96 | 94 |
| 5424718 | 97 | 96 | 97 | 94 |
| 5424719 | 98 | 95 | 97 | 92 |
| 5424720 | 98 | 97 | 97 | 93 |
| 5424721 | 98 | 97 | 97 | 91 |
| 5424722 | 98 | 97 | 96 | 93 |
| 5424723 | 99 | 97 | 98 | 91 |
| Blank | 99 | 98 | 98 | 93 |
| LCS | 99 | 100 | 98 | 93 |
| LCSD | 98 | 100 | 98 | 92 |
| MS | 100 | 99 | 97 | 92 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1102391 Sample # 5424714-23

**COC # 188249**

Please print. Instructions on reverse side correspond with circled numbers.

(1) Client: SUN-AQUATERRA Acct. #:

Project Name/#: PHILA REF AOI-8 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: PAHs 8260 Unleaded | Lead | PAHs 625/ms 8270 | EDB | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-34 | 7/24/08 | 905 | X | | | X | | 8 | 3 | 1 | 2 | 2 | 2.5-4.5 °C |
| N-35 | | 940 | | | | | | | | | | | |
| N-109 | | 1010 | | | | | | | | | | | |
| N-37 | | 1035 | | | | | | | | | | | |
| N-38 | | 1115 | | | | | | | | | | | |
| N-38D | | 1150 | | | | | | | | | | | |
| N-[redacted]111 | | 1300 | | | | | | | | | | | |
| N-110 | | 1340 | | | | | | | | | | | |
| N-112 | | 1415 | | | | | | | | | | | |
| N-114 | | 1445 | | | | | | | | | | | |

(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 |
|---|---|---|---|---|---|
| Steve / AQUATERRA | 7/24/08 | 1600 | Aquaterra Fridge | 7/24/08 | 1600 |
| from Fridge | 7/25/08 | 0855 | Erma Allman | 7/25/08 | 9:55 |
| Erma Allman | 7/25/08 | 1410 | | | |
| | | | | | |
| | | | Deborah Nesel | 7/25/08 | 1410 |

(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.

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.

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

## SAMPLE GROUP

The sample group for this submittal is 1103058. Samples arrived at the laboratory on Wednesday, July 30, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-60 Grab Water | 5428282 |
| N-44D Grab Water | 5428283 |
| N-115 Grab Water | 5428284 |
| N-41 Grab Water | 5428285 |
| N-53 Grab Water | 5428286 |
| N-55 Grab Water | 5428287 |
| N-132 Grab Water | 5428288 |
| N-131 Grab Water | 5428289 |
| N-39 Grab Water | 5428290 |
| RW-202 Grab Water | 5428291 |
| PZ-300 Grab Water | 5428292 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | LLI | Attn: EDD Group |

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# Analysis Report

Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

Respectfully Submitted,



Christine Dulaney
Senior Specialist

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5428282 WW  Group No. 1103058**

**N-60 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-60**

Collected:07/25/2008 12:55  by MH  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR060

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 12. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 14. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5428282 WW  Group No. 1103058**

**N-60 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-60**

Collected:07/25/2008 12:55  by MH  Account Number: 10132

Submitted: 07/30/2008 15:55  SUN: Aquaterra Tech.
Reported: 08/08/2008 at 16:31  PO Box 744
Discard: 10/08/2008  West Chester PA 19381

PR060

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/05/2008 14:18 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 06:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 09:29 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/07/2008 00:04 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/07/2008 00:04 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/04/2008 09:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428283 WW  Group No. 1103058**

**N-44D Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-44D**

Collected:07/25/2008 13:45  by MH  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR44D

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 6. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 5. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 4. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428283 WW  Group No. 1103058**

**N-44D Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-44D**

Collected:07/25/2008 13:45  by MH  Account Number: 10132

Submitted: 07/30/2008 15:55  SUN: Aquaterra Tech.
Reported: 08/08/2008 at 16:31  PO Box 744
Discard: 10/08/2008  West Chester PA 19381

PR44D

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/05/2008 14:22 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 07:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 09:52 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/07/2008 00:31 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/07/2008 00:31 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/04/2008 09:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428284 WW  Group No. 1103058**

**N-115 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-115**

Collected:07/28/2008 08:50  by MH  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR115

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0096 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 10. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 8. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 7. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 6. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428284 WW  Group No. 1103058**

**N-115 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-115**

Collected:07/28/2008 08:50  by MH  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR115

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/05/2008 14:25 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 08:32 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 10:16 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/07/2008 01:24 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/07/2008 01:24 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/04/2008 09:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5428285 WW  Group No. 1103058**

**N-41 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-41**

Collected:07/28/2008 09:30  by MH  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR041

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | 0.0017 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 450. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 1,100. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 390. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 280. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 8. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5428285 WW  Group No. 1103058**

**N-41 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-41**

Collected:07/28/2008 09:30  by MH  Account Number: 10132

Submitted: 07/30/2008 15:55  SUN: Aquaterra Tech.
Reported: 08/08/2008 at 16:31  PO Box 744
Discard: 10/08/2008  West Chester PA 19381

PR041

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/05/2008 14:29 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 09:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 10:40 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/08/2008 01:30 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/08/2008 01:30 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/04/2008 09:40 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5428286 WW  Group No. 1103058**

**N-53 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-53**

Collected:07/28/2008 09:30  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR053

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 360. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 610. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 220. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 180. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 17. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 11. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5428286 WW  Group No. 1103058**

**N-53 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-53**

Collected:07/28/2008 09:30  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55  SUN: Aquaterra Tech.
Reported: 08/08/2008 at 16:31  PO Box 744
Discard: 10/08/2008  West Chester PA 19381

PR053

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/07/2008 15:02 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 09:32 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 11:03 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/08/2008 01:56 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/08/2008 01:56 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/06/2008 09:20 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428287 WW  Group No. 1103058**

**N-55 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-55**

Collected:07/28/2008 10:00  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR055

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428287 WW  Group No. 1103058**

**N-55 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-55**

Collected:07/28/2008 10:00  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR055

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/07/2008 15:05 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 10:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 11:27 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/07/2008 03:38 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/07/2008 03:38 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/06/2008 09:20 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428288 WW  Group No. 1103058**

**N-132 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-132**

Collected:07/28/2008 10:30  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR132

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | < 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 4. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428288 WW  Group No. 1103058**

**N-132 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-132**

Collected:07/28/2008 10:30  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR132

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/07/2008 15:13 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 10:32 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 11:50 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/07/2008 04:05 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/07/2008 04:05 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/06/2008 09:20 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428289 WW  Group No. 1103058**

**N-131 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-131**

Collected:07/28/2008 11:00  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR131

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 50. | 50. | 10. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 50. | 50. | 10. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 50. | 50. | 10. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 50. | 50. | 10. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 86. | 50. | 10. | ug/l | 1 |
| | Due to the nature of the sample matrix, a reduced aliquot was used for analysis. The reporting limits were raised accordingly. | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 2. | 2. | 1. | ug/l | 2 |
| 05401 | Benzene | 71-43-2 | 3. | 2. | 1. | ug/l | 2 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 2. | 2. | 1. | ug/l | 2 |
| 05407 | Toluene | 108-88-3 | < 2. | 2. | 1. | ug/l | 2 |
| 05415 | Ethylbenzene | 100-41-4 | < 2. | 2. | 1. | ug/l | 2 |
| 05420 | Isopropylbenzene | 98-82-8 | 370. | 4. | 1. | ug/l | 2 |
| 06310 | Xylene (Total) | 1330-20-7 | < 2. | 2. | 1. | ug/l | 2 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5428289 WW  Group No. 1103058**

**N-131 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-131**

Collected:07/28/2008 11:00  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR131

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/07/2008 15:16 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 11:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 12:13 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/07/2008 04:31 | Kelly E Brickley | 2 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/07/2008 04:31 | Kelly E Brickley | 2 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/06/2008 09:20 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428290 WW  Group No. 1103058**

**N-39 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-39**

Collected:07/28/2008 11:45  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR039

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 9. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 7. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 25. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 41. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 24. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 3. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

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# Analysis Report



**Lancaster Laboratories Sample No. 5428290 WW  Group No. 1103058**

**N-39 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 N-39**

Collected:07/28/2008 11:45  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR039

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/07/2008 15:19 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 11:32 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 12:37 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/07/2008 04:58 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/07/2008 04:58 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/06/2008 09:20 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5428291 WW  Group No. 1103058**

**RW-202 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 RW-202**

Collected:07/29/2008 11:00  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR202

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0098 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 0.9 | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 19. | 5. | 0.9 | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 33. | 5. | 0.9 | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 36. | 5. | 0.9 | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 17. | 5. | 0.9 | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | 2. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 17. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=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



**Lancaster Laboratories Sample No. 5428291 WW  Group No. 1103058**

**RW-202 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 RW-202**

Collected:07/29/2008 11:00  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR202

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/07/2008 15:22 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 12:02 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 13:01 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/08/2008 02:23 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/08/2008 02:23 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/06/2008 09:20 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 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



**Lancaster Laboratories Sample No. 5428292 WW  Group No. 1103058**

**PZ-300 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 PZ-300**

Collected:07/29/2008 11:50  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55
Reported: 08/08/2008 at 16:31
Discard: 10/08/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

PR300

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.0099 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 6. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 110. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 9. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 6. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 9. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5428292 WW  Group No. 1103058**

**PZ-300 Grab Water**
**Philadelphia Refinery AOI-8**
**COC: 187464 PZ-300**

Collected:07/29/2008 11:50  by SS  Account Number: 10132

Submitted: 07/30/2008 15:55  SUN: Aquaterra Tech.
Reported: 08/08/2008 at 16:31  PO Box 744
Discard: 10/08/2008  West Chester PA 19381

PR300

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/07/2008 15:25 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/01/2008 12:32 | Jamie L Brillhart | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/04/2008 13:25 | Brian K Graham | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/07/2008 05:52 | Kelly E Brickley | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/07/2008 05:52 | Kelly E Brickley | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/06/2008 09:20 | Denise K Conners | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 07/31/2008 14:00 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/01/2008 09:30 | Cynthia J Stoltzfus | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1103058
Reported: 08/08/08 at 04:31 PM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

## Laboratory Compliance Quality Control

| Analysis Name | Blank Result | Blank LOQ** | Blank MDL | Report Units | LCS %REC | LCSD %REC | LCS/LCSD Limits | RPD | RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 082130022A | Sample number(s): 5428282-5428292 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 92 | 92 | 60-140 | 0 | 20 |
| Batch number: 08213WAG026 | Sample number(s): 5428282-5428292 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 96 | 97 | 77-107 | 1 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 96 | 101 | 82-113 | 5 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 101 | 104 | 83-112 | 3 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 100 | 106 | 80-115 | 6 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 95 | 101 | 82-112 | 6 | 30 |
| Batch number: 082146050002A | Sample number(s): 5428282-5428285 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 102 | | 90-115 | | |
| Batch number: 082186050001A | Sample number(s): 5428286-5428292 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 102 | | 90-115 | | |
| Batch number: P082193AA | Sample number(s): 5428282-5428284,5428287-5428290,5428292 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 91 | 91 | 73-119 | 0 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 91 | 90 | 78-119 | 1 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 92 | 93 | 69-135 | 1 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 94 | 93 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 93 | 92 | 82-119 | 1 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 94 | 93 | 80-113 | 1 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 95 | 94 | 83-113 | 1 | 30 |
| Batch number: P082204AA | Sample number(s): 5428285-5428286,5428291 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 98 | | 73-119 | | |
| Benzene | < 1. | 1. | 0.5 | ug/l | 96 | | 78-119 | | |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 95 | | 69-135 | | |
| Toluene | < 1. | 1. | 0.5 | ug/l | 98 | | 85-115 | | |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 97 | | 82-119 | | |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 97 | | 80-113 | | |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 98 | | 83-113 | | |

## 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: 082130022A | Sample number(s): 5428282-5428292 UNSPK: 5428282 BKG: 5428283 | | | | | | | | |
| Ethylene dibromide | 96 | | 65-135 | | | < 0.029 | < 0.029 | 0 (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: 1103058
Reported: 08/08/08 at 04:31 PM

### Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 082146050002A | Sample number(s): 5428282-5428285 UNSPK: P427002 BKG: P427002 | | | | | | | | |
| Lead | 102 | 191* | 75-125 | 50* | 20 | 0.0046 | 0.0048 | 3 (1) | 20 |
| Batch number: 082186050001A | Sample number(s): 5428286-5428292 UNSPK: P430633 BKG: P430633 | | | | | | | | |
| Lead | 102 | 101 | 75-125 | 1 | 20 | < 0.0010 | < 0.0010 | 6 (1) | 20 |
| Batch number: P082193AA | Sample number(s): 5428282-5428284,5428287-5428290,5428292 UNSPK: 5428283 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 96 | | 69-127 | | | | | | |
| Benzene | 100 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 97 | | 70-143 | | | | | | |
| Toluene | 103 | | 83-127 | | | | | | |
| Ethylbenzene | 101 | | 82-129 | | | | | | |
| Isopropylbenzene | 99 | | 81-130 | | | | | | |
| Xylene (Total) | 102 | | 82-130 | | | | | | |
| Batch number: P082204AA | Sample number(s): 5428285-5428286,5428291 UNSPK: P427882 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 113 (2) | 106 (2) | 69-127 | 1 | 30 | | | | |
| Benzene | 109 | 107 | 83-128 | 1 | 30 | | | | |
| 1,2-Dichloroethane | 108 | 105 | 70-143 | 3 | 30 | | | | |
| Toluene | 109 | 108 | 83-127 | 1 | 30 | | | | |
| Ethylbenzene | 111 | 108 | 82-129 | 3 | 30 | | | | |
| Isopropylbenzene | 110 | 107 | 81-130 | 3 | 30 | | | | |
| Xylene (Total) | 110 | 108 | 82-130 | 2 | 30 | | | | |

### 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: EDB in Wastewater
Batch number: 082130022A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5428282 | 86 |
| 5428283 | 162* |
| 5428284 | 137* |
| 5428285 | 88 |
| 5428286 | 93 |
| 5428287 | 99 |
| 5428288 | 137* |
| 5428289 | 116 |
| 5428290 | 117 |
| 5428291 | 89 |
| 5428292 | 138* |
| Blank | 105 |
| DUP | 160* |
| LCS | 103 |
| LCSD | 104 |

*- 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: 1103058
Reported: 08/08/08 at 04:31 PM

## Surrogate Quality Control

MS 87

Limits: 46-136

Analysis Name: PAHs in Water by GC/MS
Batch number: 08213WAG026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5428282 | 93 | 90 | 91 |
| 5428283 | 100 | 99 | 95 |
| 5428284 | 99 | 95 | 81 |
| 5428285 | 129* | 94 | 89 |
| 5428286 | 136* | 94 | 87 |
| 5428287 | 95 | 98 | 95 |
| 5428288 | 102 | 63 | 95 |
| 5428289 | 98 | 91 | 90 |
| 5428290 | 103 | 96 | 90 |
| 5428291 | 128* | 88 | 88 |
| 5428292 | 106 | 94 | 92 |
| Blank | 100 | 97 | 90 |
| LCS | 102 | 98 | 89 |
| LCSD | 104 | 100 | 94 |
| Limits: | 44-127 | 63-114 | 30-126 |

Analysis Name: UST-Waters by 8260B
Batch number: P082193AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5428282 | 89 | 84 | 92 | 92 |
| 5428283 | 89 | 84 | 89 | 89 |
| 5428284 | 91 | 84 | 91 | 90 |
| 5428287 | 90 | 85 | 91 | 91 |
| 5428288 | 91 | 85 | 93 | 94 |
| 5428289 | 92 | 87 | 91 | 91 |
| 5428290 | 92 | 85 | 90 | 94 |
| 5428292 | 91 | 86 | 93 | 103 |
| Blank | 91 | 85 | 92 | 90 |
| LCS | 90 | 87 | 92 | 91 |
| LCSD | 90 | 88 | 92 | 90 |
| MS | 90 | 87 | 90 | 93 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

Analysis Name: UST-Waters by 8260B
Batch number: P082204AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5428285 | 98 | 98 | 97 | 90 |
| 5428286 | 99 | 95 | 96 | 93 |
| 5428291 | 99 | 98 | 98 | 91 |
| Blank | 98 | 96 | 98 | 88 |
| LCS | 99 | 99 | 97 | 91 |
| MS | 99 | 101 | 95 | 92 |
| MSD | 98 | 98 | 96 | 91 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

# Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1103058
Reported: 08/08/08 at 04:31 PM

## Surrogate 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.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1103058 Sample # H28282-92

**COC #** 187464

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: Sunoco, Aquaterra Acct. #:
Project Name/#: A01-8 Philly Refinery PWSID #:
Project Manager: Tiffani Doerr P.O.#:
Sampler: Mike 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 | Matrix (4): Soil | Water (☐ Potable ☐ NPDES) | Other | Total # of Containers | (5) Analyses Requested: VOC 8260 | Pb | PAHs 8270 | 8011 | Remarks | (6) Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-60 | 7/25/08 | 1255 | X | | | X | | 8 | X | X | X | X | | |
| N-44D | 7/25/08 | 1345 | X | | | X | | 8 | X | X | X | X | | |
| N-115 | 7/28/08 | 850 | X | | | X | | 8 | X | X | X | X | | |
| N-41 | 7/28/08 | 930 | X | | | X | | 8 | X | X | X | X | | |
| | | | | | | | | | | | | | 2.7-3.3°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) 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

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| [signature] | 7/30/08 | 1400 | AT PRIDE | 7/30/08 | 1400 |
| AT PRIDE | 7/30/08 | 1215 | [signature] | 7/30/08 | 1215 |
| [signature] | 7/30/08 | 1215 | T. Lefever | 7/30/08 | 1215 |
| T. Lefever | 7/30/08 | 1555 | | | |
| | | | Wesley Miller | 7/31/08 | 1555 |

(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.

2102.03

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1103058 Sample # 5428282-92 **COC #** 187466

Please print. Instructions on reverse side correspond with circled numbers.

**For Lab Use Only**
FSC:
SCR#:

(1) Client: SUN- AQUATERRA Acct. #:
Project Name/#: PHILA REF AOI-8 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES 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

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | Matrix: Soil | Water (☐ Potable ☐ NPDES Check if Applicable) | Other | (4) Total # of Containers | PA Unleaded 82606 | Lead | PAHs by 6C/ms 8270 | EDB | | | | | Remarks | (6) Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-53 | 7/28/08 | 930 | X | | | X | | 8 | 3 | 1 | 2 | 2 | | | | | | 2.7-3.3°C |
| N-55 | | 1000 | | | | | | | | | | | | | | | | |
| N-132 | | 1030 | | | | | | | | | | | | | | | | |
| N-131 | | 1100 | | | | | | | | | | | | | | | | |
| N-39 | | 1145 | | | | | | | | | | | | | | | | |

(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] / AQUATERRA | 7/28/08 | 1400 | AT PRIDGE | 7/28/08 | 1400 |
| AT PRIDGE | 7/30/08 | 1215 | [signature] | 7/30/08 | 1215 |
| [signature] | 7/30/08 | 1215 | P. Lefever | 7/30/08 | 1215 |
| P. Lefever | 7/30/08 | 1555 | | | |
| | | | [signature] Miller | 7/30/08 | 1555 |

Lancaster Laboratories, Inc., 2425 New Holland Pike, Lancaster, PA 17601 (717) 656-2300 Fax: (717) 656-6766
Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

2102.03

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1103058 Sample # 5428282-92

**COC # 187461**

Please print. Instructions on reverse side correspond with circled numbers.

(1) Client: SUN-AQUATERRA Acct. #:

Project Name/#: PHILA REF AOI-8 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: PA Unleaded 8260 | Lead | PAHs by 624/625 | EDB | Remarks | (6) Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RW-202 | 7/29/08 | 1100 | X | | | X | | 8 | 3 | 1 | 2 | 2 | | 2.7-3.3°C |
| PZ-300 | 7/29/08 | 1150 | X | | | X | | 8 | 3 | 1 | 2 | 2 | | ↓ |

(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 |
|---|---|---|---|---|---|
| S. Sykes / AQUATERRA | 7/29/08 | 1400 | AT PRIDGE | 7/29/08 | 1400 |
| AT PRIDGE | 7/30/08 | 1215 | [signature] | 7/30/08 | 1215 |
| [signature] | 7/30/08 | 1215 | P. Lefever | 7/30/08 | 1215 |
| P. Lefever | 7/30/08 | 1555 | | | |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| | | | Mebley Miller | 7/30/08 | 1555 |

(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.

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.

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

## SAMPLE GROUP

The sample group for this submittal is 1104406. Samples arrived at the laboratory on Thursday, August 07, 2008. The PO# for this group is SUNOCO PHILLY REFINER.

| Client Description | Lancaster Labs Number |
|---|---|
| S-117 Grab Water | 5435926 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | LLI | Attn: EDD Group |

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# Analysis Report

Questions? Contact your Client Services Representative
Jessica A Oknefski at (717) 656-2300

Respectfully Submitted,

Christine Dulaney
Senior Specialist

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5435926 WW  Group No. 1104406**

**S-117 Grab Water**
**Philadelphia Refinery AOI-1**
**DUNS# COC: 188637 S-117**

Collected:08/06/2008 11:45  by SS  Account Number: 10132

Submitted: 08/07/2008 16:15
Reported: 08/15/2008 at 18:58
Discard: 10/15/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

S-117

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 02300 | UST-Unleaded Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | 89. | 10. | 5. | ug/l | 10 |
| 05401 | Benzene | 71-43-2 | 7,400. | 50. | 25. | ug/l | 50 |
| 05407 | Toluene | 108-88-3 | 43. | 10. | 5. | ug/l | 10 |
| 05415 | Ethylbenzene | 100-41-4 | 900. | 10. | 5. | ug/l | 10 |
| 06310 | Xylene (Total) | 1330-20-7 | 69. | 10. | 5. | ug/l | 10 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
Trip blank vials were not received by the laboratory for this sample group.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 02300 | UST-Unleaded Waters by 8260B | SW-846 8260B | 1 | 08/15/2008 04:48 | Kathrine K Muramatsu | 10 |
| 02300 | UST-Unleaded Waters by 8260B | SW-846 8260B | 1 | 08/15/2008 05:15 | Kathrine K Muramatsu | 50 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/15/2008 04:48 | Kathrine K Muramatsu | 10 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 2 | 08/15/2008 05:15 | Kathrine K Muramatsu | 50 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



## Quality Control Summary

Client Name: SUN: Aquaterra Tech. Group Number: 1104406
Reported: 08/15/08 at 06:58 PM

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

## Laboratory Compliance Quality Control

| Analysis Name | Blank Result | Blank LOQ** | Blank MDL | Report Units | LCS %REC | LCSD %REC | LCS/LCSD Limits | RPD | RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: P082273AA | Sample number(s): 5435926 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 94 | 93 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 94 | 91 | 78-119 | 3 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 92 | 91 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 91 | 88 | 82-119 | 3 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 93 | 93 | 83-113 | 0 | 30 |

## Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: P082273AA | Sample number(s): 5435926 UNSPK: P438031 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 96 | | 69-127 | | | | | | |
| Benzene | 99 | | 83-128 | | | | | | |
| Toluene | 101 | | 83-127 | | | | | | |
| Ethylbenzene | 98 | | 82-129 | | | | | | |
| Xylene (Total) | 101 | | 82-130 | | | | | | |

## Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: UST-Unleaded Waters by 8260B
Batch number: P082273AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5435926 | 93 | 86 | 89 | 88 |
| Blank | 91 | 86 | 89 | 88 |
| LCS | 93 | 85 | 88 | 88 |
| LCSD | 91 | 88 | 88 | 87 |
| MS | 93 | 90 | 88 | 90 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1104406 Sample # 5435926

**COC #** 188637

Please print. Instructions on reverse side correspond with circled numbers.

(1)
Client: SUN- AQUATERRA Acct. #:
Project Name/#: PHREF AOI-1 PWSID #:
Project Manager: T. DOERR P.O.#:
Sampler: S. SYKES Quote #:
Name of state where samples were collected: PA

For Lab Use Only
FSC:
SCR#:

**Preservation Codes**
H=HCl T=Thiosulfate
N=$HNO_3$ B=NaOH
S=$H_2SO_4$ O=Other

| (2) Sample Identification | Date Collected | Time Collected | (3) Grab | Composite | (4) Matrix: Soil | Potable / Non-Potable Water | Other | Total # of Containers | (5) Analyses Requested: Preservation Codes — BTEX MTBE PAH 8260b | Remarks | (6) Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S-117 | 8/6/08 | 1145 | X | | | X | | 3 | X | temp 1.2°C | |

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed: No Rush
Rush results requested by (please circle): Phone Fax E-mail
Phone #: Fax #:
E-mail address:

(8) **Data Package Options** (please circle if required)
Type I (validation/NJ Reg)
Type II (Tier II)
Type III (Reduced NJ)
Type IV (CLP SOW)
Type VI (Raw Data Only)
TX TRRP-13
MA MCP CT RCP
SDG Complete? Yes No
Site-specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate volume.)
Internal COC Required? Yes / No

(9)

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| [illegible] AQUATERRA | 8/6/08 | 1530 | AQUATERRA FRIDGE | 8/6/08 | 1530 |
| AT FRIDGE | 8/7/08 | 0930 | [illegible] | 8/7/08 | 0930 |
| [illegible] | 8/7/08 | 0930 | P. Lefever | 8/7/08 | 950 |
| P. Lefever | 8/7/08 | 1615 | | | |
| [illegible] | | | Mary Miller | 8/7/08 | 1615 |

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Copies: White and yellow should accompany samples to Lancaster Laboratories. The pink copy should be retained by the client.

2102.03

# Lancaster Laboratories
# Explanation of Symbols and Abbreviations

*The following defines common symbols and abbreviations used in reporting technical data:*

| | | | |
|---|---|---|---|
| **N.D.** | none detected | **BMQL** | Below Minimum Quantitation Level |
| **TNTC** | Too Numerous To Count | **MPN** | Most Probable Number |
| **IU** | International Units | **CP Units** | cobalt-chloroplatinate units |
| **umhos/cm** | micromhos/cm | **NTU** | nephelometric turbidity units |
| **C** | degrees Celsius | **F** | degrees Fahrenheit |
| **Cal** | (diet) calories | **lb.** | pound(s) |
| **meq** | milliequivalents | **kg** | kilogram(s) |
| **g** | gram(s) | **mg** | milligram(s) |
| **ug** | microgram(s) | **l** | liter(s) |
| **ml** | milliliter(s) | **ul** | microliter(s) |
| **m3** | cubic meter(s) | **fib >5 um/ml** | fibers greater than 5 microns in length per ml |

**<** less than – The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

**>** greater than

**ppm** parts per million – One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.

**ppb** parts per billion

**Dry weight basis** Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture.

*U.S. EPA data qualifiers:*

**Organic Qualifiers**

| | |
|---|---|
| **A** | TIC is a possible aldol-condensation product |
| **B** | Analyte was also detected in the blank |
| **C** | Pesticide result confirmed by GC/MS |
| **D** | Compound quatitated on a diluted sample |
| **E** | Concentration exceeds the calibration range of the instrument |
| **J** | Estimated value |
| **N** | Presumptive evidence of a compound (TICs only) |
| **P** | Concentration difference between primary and confirmation columns >25% |
| **U** | Compound was not detected |
| **X,Y,Z** | Defined in case narrative |

**Inorganic Qualifiers**

| | |
|---|---|
| **B** | Value is <CRDL, but ≥IDL |
| **E** | Estimated due to interference |
| **M** | Duplicate injection precision not met |
| **N** | Spike amount not within control limits |
| **S** | Method of standard additions (MSA) used for calculation |
| **U** | Compound was not detected |
| **W** | Post digestion spike out of control limits |
| ***** | Duplicate analysis not within control limits |
| **+** | Correlation coefficient for MSA <0.995 |

Analytical test results for methods listed on the laboratories' accreditation scope meet all requirements of NELAC unless otherwise noted under the individual analysis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

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# Analysis Report

ANALYTICAL RESULTS

Prepared for:

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

610-431-5733

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

## SAMPLE GROUP

The sample group for this submittal is 1104407. Samples arrived at the laboratory on Thursday, August 07, 2008. The PO# for this group is PHILADELPHIA.

| Client Description | Lancaster Labs Number |
|---|---|
| N-59 Grab Water | 5435927 |
| N-97 Grab Water | 5435928 |

| | | |
|---|---|---|
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Kevin Martin |
| ELECTRONIC COPY TO | Langan | Attn: Joseph Catricks |
| ELECTRONIC COPY TO | SUN: Aquaterra Tech. | Attn: Tiffani Doerr |
| ELECTRONIC COPY TO | LLI | Attn: EDD Group |

Lancaster Laboratories

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# Analysis Report

Questions? Contact your Client Services Representative
Jessica A Heun at (717) 656-2300

Respectfully Submitted,

Chad A. Moline
Group Leader

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5435927 WW  Group No. 1104407**

**N-59 Grab Water**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 187350 N-59**

Collected:08/06/2008 13:00  by SS  Account Number: 10132

Submitted: 08/07/2008 16:15
Reported: 08/12/2008 at 14:27
Discard: 10/12/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

N59--

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.030 | 0.030 | 0.010 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | < 5. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | < 5. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | < 5. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | < 5. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | < 5. | 5. | 1. | ug/l | 1 |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 98. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | 3. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 2. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | 4. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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 Chronicle

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5435927 WW  Group No. 1104407**

**N-59 Grab Water**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 187350 N-59**

Collected:08/06/2008 13:00  by SS  Account Number: 10132

Submitted: 08/07/2008 16:15  SUN: Aquaterra Tech.
Reported: 08/12/2008 at 14:27  PO Box 744
Discard: 10/12/2008  West Chester PA 19381

N59--

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/12/2008 11:35 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/09/2008 09:22 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/08/2008 17:17 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/11/2008 12:52 | Daniel H Heller | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/11/2008 12:52 | Daniel H Heller | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/10/2008 19:40 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 08/08/2008 14:45 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/08/2008 09:15 | Kevin P Love | 1 |

*=This limit was used in the evaluation of the final result

Lancaster Laboratories

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# Analysis Report



**Lancaster Laboratories Sample No. 5435928 WW  Group No. 1104407**

**N-97 Grab Water**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 187350 N-97**

Collected:08/06/2008 14:00  by SS  Account Number: 10132

Submitted: 08/07/2008 16:15
Reported: 08/12/2008 at 14:27
Discard: 10/12/2008

SUN: Aquaterra Tech.
PO Box 744
West Chester PA 19381

N97--

| CAT No. | Analysis Name | CAS Number | As Received Result | As Received Limit of Quantitation* | As Received Method Detection Limit | Units | Dilution Factor |
|---|---|---|---|---|---|---|---|
| 06035 | Lead | 7439-92-1 | < 0.0010 | 0.0010 | 0.000050 | mg/l | 1 |
| 07879 | EDB in Wastewater | | | | | | |
| 01087 | Ethylene dibromide | 106-93-4 | < 0.029 | 0.029 | 0.0097 | ug/l | 1 |
| 07805 | PAHs in Water by GC/MS | | | | | | |
| 03947 | Naphthalene | 91-20-3 | 50. | 5. | 1. | ug/l | 1 |
| 03956 | Fluorene | 86-73-7 | 13. | 5. | 1. | ug/l | 1 |
| 03963 | Phenanthrene | 85-01-8 | 45. | 5. | 1. | ug/l | 1 |
| 03967 | Pyrene | 129-00-0 | 10. | 5. | 1. | ug/l | 1 |
| 03971 | Chrysene | 218-01-9 | 6. | 5. | 1. | ug/l | 1 |
| | The LCS recovery is 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: phenanthrene | | | | | | |
| 02302 | UST-Waters by 8260B | | | | | | |
| 02010 | Methyl Tertiary Butyl Ether | 1634-04-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05401 | Benzene | 71-43-2 | 2. | 1. | 0.5 | ug/l | 1 |
| 05402 | 1,2-Dichloroethane | 107-06-2 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05407 | Toluene | 108-88-3 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05415 | Ethylbenzene | 100-41-4 | < 1. | 1. | 0.5 | ug/l | 1 |
| 05420 | Isopropylbenzene | 98-82-8 | 140. | 2. | 0.5 | ug/l | 1 |
| 06310 | Xylene (Total) | 1330-20-7 | < 1. | 1. | 0.5 | ug/l | 1 |

PA DEP Lab Certification ID 36-00037, Expiration Date: 1/31/09
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.

*=This limit was used in the evaluation of the final result

**Lancaster Laboratories Sample No. 5435928 WW  Group No. 1104407**

**N-97 Grab Water**
**Philadelphia Refinery AOI-8**
**DUNS# COC: 187350 N-97**

Collected:08/06/2008 14:00  by SS  Account Number: 10132

Submitted: 08/07/2008 16:15  SUN: Aquaterra Tech.
Reported: 08/12/2008 at 14:27  PO Box 744
Discard: 10/12/2008  West Chester PA 19381

N97--

## Laboratory Chronicle

| CAT No. | Analysis Name | Method | Trial# | Analysis Date and Time | Analyst | Dilution Factor |
|---|---|---|---|---|---|---|
| 06035 | Lead | SW-846 6020 | 1 | 08/12/2008 11:37 | James R Williams II | 1 |
| 07879 | EDB in Wastewater | SW-846 8011 | 1 | 08/09/2008 10:22 | Mark E McNulty | 1 |
| 07805 | PAHs in Water by GC/MS | SW-846 8270C | 1 | 08/08/2008 17:40 | Linda M Hartenstine | 1 |
| 02302 | UST-Waters by 8260B | SW-846 8260B | 1 | 08/12/2008 11:29 | Daniel H Heller | 1 |
| 01163 | GC/MS VOA Water Prep | SW-846 5030B | 1 | 08/12/2008 11:29 | Daniel H Heller | 1 |
| 06050 | ICP/MS SW-846 Water | SW-846 3010A modified | 1 | 08/10/2008 19:40 | James L Mertz | 1 |
| 07786 | EDB Extraction | SW-846 8011 | 1 | 08/08/2008 14:45 | Kelli M Barto | 1 |
| 07807 | BNA Water Extraction | SW-846 3510C | 1 | 08/08/2008 09:15 | Kevin P Love | 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: 1104407
Reported: 08/12/08 at 02:27 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: 082210007A | Sample number(s): 5435927-5435928 | | | | | | | | |
| Ethylene dibromide | < 0.030 | 0.030 | 0.010 | ug/l | 92 | 88 | 60-140 | 5 | 20 |
| Batch number: 082216050001A | Sample number(s): 5435927-5435928 | | | | | | | | |
| Lead | < 0.0010 | 0.0010 | 0.00005 0 | mg/l | 103 | | 90-115 | | |
| Batch number: 08221WAA026 | Sample number(s): 5435927-5435928 | | | | | | | | |
| Naphthalene | < 5. | 5. | 1. | ug/l | 93 | 100 | 77-107 | 7 | 30 |
| Fluorene | < 5. | 5. | 1. | ug/l | 99 | 103 | 82-113 | 4 | 30 |
| Phenanthrene | < 5. | 5. | 1. | ug/l | 110 | 113* | 83-112 | 3 | 30 |
| Pyrene | < 5. | 5. | 1. | ug/l | 109 | 115 | 80-115 | 5 | 30 |
| Chrysene | < 5. | 5. | 1. | ug/l | 101 | 105 | 82-112 | 4 | 30 |
| Batch number: P082241AA | Sample number(s): 5435927 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 95 | 94 | 73-119 | 1 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 94 | 95 | 78-119 | 1 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 94 | 95 | 69-135 | 1 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 92 | 93 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 90 | 91 | 82-119 | 1 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 91 | 92 | 80-113 | 1 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 92 | 94 | 83-113 | 2 | 30 |
| Batch number: P082252AA | Sample number(s): 5435928 | | | | | | | | |
| Methyl Tertiary Butyl Ether | < 1. | 1. | 0.5 | ug/l | 100 | 100 | 73-119 | 0 | 30 |
| Benzene | < 1. | 1. | 0.5 | ug/l | 99 | 98 | 78-119 | 1 | 30 |
| 1,2-Dichloroethane | < 1. | 1. | 0.5 | ug/l | 99 | 97 | 69-135 | 3 | 30 |
| Toluene | < 1. | 1. | 0.5 | ug/l | 99 | 98 | 85-115 | 1 | 30 |
| Ethylbenzene | < 1. | 1. | 0.5 | ug/l | 98 | 98 | 82-119 | 0 | 30 |
| Isopropylbenzene | < 2. | 2. | 0.5 | ug/l | 101 | 99 | 80-113 | 1 | 30 |
| Xylene (Total) | < 1. | 1. | 0.5 | ug/l | 102 | 100 | 83-113 | 2 | 30 |

## Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

| Analysis Name | MS %REC | MSD %REC | MS/MSD Limits | RPD | RPD MAX | BKG Conc | DUP Conc | DUP RPD | Dup RPD Max |
|---|---|---|---|---|---|---|---|---|---|
| Batch number: 082210007A | Sample number(s): 5435927-5435928 UNSPK: 5435927 BKG: 5435928 | | | | | | | | |
| Ethylene dibromide | 100 | | 65-135 | | | < 0.029 | < 0.029 | 0 (1) | 30 |
| Batch number: 082216050001A | Sample number(s): 5435927-5435928 UNSPK: P435033 BKG: P435033 | | | | | | | | |
| Lead | 100 | 100 | 75-125 | 0 | 20 | < 0.0010 | < 0.0010 | 7 (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: 1104407
Reported: 08/12/08 at 02:27 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: P082241AA | Sample number(s): 5435927 UNSPK: P433219 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 98 | | 69-127 | | | | | | |
| Benzene | 103 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 100 | | 70-143 | | | | | | |
| Toluene | 98 | | 83-127 | | | | | | |
| Ethylbenzene | 98 | | 82-129 | | | | | | |
| Isopropylbenzene | 100 | | 81-130 | | | | | | |
| Xylene (Total) | 99 | | 82-130 | | | | | | |
| Batch number: P082252AA | Sample number(s): 5435928 UNSPK: P433695 | | | | | | | | |
| Methyl Tertiary Butyl Ether | 100 | | 69-127 | | | | | | |
| Benzene | 103 | | 83-128 | | | | | | |
| 1,2-Dichloroethane | 100 | | 70-143 | | | | | | |
| Toluene | 106 | | 83-127 | | | | | | |
| Ethylbenzene | 105 | | 82-129 | | | | | | |
| Isopropylbenzene | 108 | | 81-130 | | | | | | |
| Xylene (Total) | 107 | | 82-130 | | | | | | |

### Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: EDB in Wastewater
Batch number: 082210007A

| | 1,1,2,2-Tetrachloroethane |
|---|---|
| 5435927 | 104 |
| 5435928 | 93 |
| Blank | 106 |
| DUP | 78 |
| LCS | 107 |
| LCSD | 104 |
| MS | 100 |
| Limits: | 46-136 |

Analysis Name: PAHs in Water by GC/MS
Batch number: 08221WAA026

| | Nitrobenzene-d5 | 2-Fluorobiphenyl | Terphenyl-d14 |
|---|---|---|---|
| 5435927 | 68 | 77 | 86 |
| 5435928 | 86 | 95 | 90 |
| Blank | 86 | 101 | 112 |
| LCS | 82 | 97 | 104 |
| LCSD | 86 | 102 | 109 |
| Limits: | 44-127 | 63-114 | 30-126 |

*- 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: 1104407
Reported: 08/12/08 at 02:27 PM

### Surrogate Quality Control

Analysis Name: UST-Waters by 8260B
Batch number: P082241AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5435927 | 90 | 82 | 89 | 89 |
| Blank | 93 | 85 | 87 | 90 |
| LCS | 94 | 87 | 88 | 89 |
| LCSD | 93 | 87 | 88 | 90 |
| MS | 93 | 88 | 88 | 90 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

Analysis Name: UST-Waters by 8260B
Batch number: P082252AA

| | Dibromofluoromethane | 1,2-Dichloroethane-d4 | Toluene-d8 | 4-Bromofluorobenzene |
|---|---|---|---|---|
| 5435928 | 97 | 98 | 100 | 100 |
| Blank | 99 | 98 | 96 | 88 |
| LCS | 100 | 100 | 96 | 88 |
| LCSD | 97 | 99 | 97 | 88 |
| MS | 99 | 100 | 96 | 89 |
| Limits: | 80-116 | 77-113 | 80-113 | 78-113 |

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

# Analysis Request/ Environmental Services Chain of Custody

Lancaster Laboratories

For Lancaster Laboratories use only

Acct. # 10132 Group# 1104407 Sample # 5435927-28

**COC #** 187350

Please print. Instructions on reverse side correspond with circled numbers.

(1) Client: SUN-AQUATERRA Acct. #:

Project Name/#: PH REF AOI-8 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: PAV6 8260 6 | Lead | PAHs by 6C/MS | EDB | Remarks | (6) Temperature of samples upon receipt (if requested) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N-59 | 8/6/08 | 1300 | X | | | X | | 8 | 3 | 1 | 2 | 2 | * See table per analyses | |
| N-97 | 8/6/08 | 1400 | X | | | X | | 8 | 3 | 1 | 2 | 2 | | |
| | | | | | | | | | | | | | * Pls copy Kevin Martin + Jason @ Langan | |
| | | | | | | | | | | | | | temp 1.2°C | |

(7) **Turnaround Time Requested** (TAT) (please circle): Normal (Rush)
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)
Date results are needed: ASAP as discussed (4-5 day)
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 |
|---|---|---|---|---|---|
| Steve Syke / AQUATERRA | 8/6/08 | 1530 | AQUATERRA FRIDGE | 8/6/08 | 1530 |
| AQUATERRA FRIDGE | 8/7/08 | 0930 | | 8/7/08 | 0930 |
| | 8/7/08 | 0930 | T. Lefever | 8/7/08 | 950 |
| T. Lefever | 8/7/08 | 1615 | | | |
| | | | Wesley Miller | 8/7/08 | 1615 |

# 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 D

# Field Sampling Reports

APPENDIX D
GROUNDWATER SAMPLING SUMMARY
SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

| Well ID | Sample Date | Depth to Product | Depth to Water | Product Thickness | Total Depth of Well | Conversion Factor (Well Diameter) | Well Volume (gallons) | Purge Volume (gallons) |
|---|---|---|---|---|---|---|---|---|
| N-1 | 7/15/2008 | | 14.53 | | 22.00 | 0.65 | 4.9 | 14.6 |
| N-10 | 7/15/2008 | | 4.77 | | 10.00 | 0.65 | 3.4 | 10.2 |
| N-11 | 7/15/2008 | | 18.26 | | 23.50 | 0.65 | 3.4 | 10.2 |
| N-12 | 7/23/2008 | | 15.89 | | 20.70 | 0.65 | 3.1 | 9.4 |
| N-13 | 7/23/2008 | | 22.34 | | 52.00 | 0.65 | 19.3 | 57.8 |
| N-14 | NS | 21.21 | 21.22 | 0.01 | - | 0.65 | - | - |
| N-15 | 7/15/2008 | | 20.83 | | 25.00 | 0.65 | 2.7 | 8.1 |
| N-16 | 7/16/2008 | | 21.91 | | 26.80 | 0.65 | 3.2 | 9.5 |
| N-17 | 7/16/2008 | | 23.39 | | 25.70 | 0.65 | 1.5 | 4.5 |
| N-18 | 7/16/2008 | | 22.11 | | 25.50 | 0.65 | 2.2 | 6.6 |
| N-19 | 7/16/2008 | | 30.16 | | 59.40 | 0.65 | 19.0 | 57.0 |
| N-2 | NS | - | - | | - | 0.65 | - | - |
| N-20 | 7/23/2008 | | 17.49 | | 22.70 | 0.65 | 3.4 | 10.2 |
| N-21 | 7/23/2008 | | 20.97 | | 55.00 | 0.65 | 22.1 | 66.4 |
| N-22 | NS | - | - | | - | 0.65 | - | - |
| N-23 | 7/22/2008 | | 10.17 | | 18.00 | 0.65 | 5.1 | 15.3 |
| N-24 | 7/18/2008 | | 11.54 | | 16.60 | 0.65 | 3.3 | 9.9 |
| N-25 | NS | 2.78 | 3.3 | 0.52 | - | 0.65 | - | - |
| N-26 | 7/17/2008 | | 5.74 | | 9.60 | 0.65 | 2.5 | 7.5 |
| N-27 | 7/17/2008 | | 21.03 | | 62.00 | 0.65 | 26.6 | 79.9 |
| N-28 | 7/16/2008 | | 9.77 | | 16.80 | 0.65 | 4.6 | 13.7 |
| N-29 | 7/22/2008 | | 30.50 | | 33.00 | 0.65 | 1.6 | 4.9 |
| N-3 | 7/15/2008 | | 16.24 | | 22.80 | 0.65 | 4.3 | 12.8 |
| N-30 | 7/22/2008 | | 37.47 | | - | 0.65 | - | NA |
| N-31 | NS | 14.87 | 15.15 | 0.28 | - | 0.65 | - | - |
| N-32 | 7/22/2008 | | 8.26 | | 22.50 | 0.65 | 9.3 | 27.8 |
| N-33 | NS | - | - | | - | 0.65 | - | - |
| N-34 | 7/24/2008 | | 6.23 | | 15.00 | 0.65 | 5.7 | 17.1 |
| N-35 | 7/24/2008 | | 9.33 | | 14.60 | 0.65 | 3.4 | 10.3 |
| N-36 | 7/25/2008 | | 8.29 | | 14.00 | 0.65 | 3.7 | 11.1 |
| N-37 | 7/24/2008 | | 11.90 | | 17.80 | 0.65 | 3.8 | 11.5 |
| N-38 | 7/24/2008 | | 5.76 | | 18.00 | 0.65 | 8.0 | 23.9 |
| N-38D | 7/24/2008 | | 9.91 | | 84.00 | 0.16 | 11.9 | 35.6 |
| N-39 | 7/28/2008 | | 3.69 | | 13.40 | 0.65 | 6.3 | 18.9 |
| N-4 | 7/15/2008 | | 19.37 | | 47.00 | 0.65 | 18.0 | 53.9 |
| N-40 | 7/25/2008 | | 5.94 | | 15.00 | 0.65 | 5.9 | 17.7 |
| N-41 | 7/28/208 | | 4.29 | | 12.00 | 0.65 | 5.0 | 15.0 |
| N-42 | NS | 7.37 | 8.18 | 0.81 | - | 0.65 | - | - |
| N-43 | Dry | | 20.07 | | 21.00 | 0.65 | 0.6 | 1.8 |
| N-44D | 7/25/2008 | | 26.34 | | 58.00 | 0.65 | 20.6 | 61.7 |
| N-45 | NS | 13.05 | 13.27 | 0.22 | - | 0.65 | - | - |
| N-46D | NS | - | - | | - | 0.65 | - | - |
| N-47 | NS | 19.69 | 20.57 | 0.88 | - | 0.65 | - | - |
| N-48 | NS | 21.4 | 21.65 | 0.25 | - | 0.65 | - | - |
| N-49 | NS | 24.41 | 26.42 | 2.01 | - | 0.65 | - | - |
| N-5 | 7/15/2008 | | 9.12 | | 15.00 | 0.65 | 3.8 | 11.5 |
| N-503 | NS | 7.84 | 8.61 | 0.77 | - | 0.65 | - | - |
| N-504 | NS | 8.21 | 8.21 | <0.01 | 23.20 | 0.65 | - | - |
| N-50D | 7/23/2008 | | 28.56 | | 58.00 | 0.65 | 19.1 | 57.4 |
| N-51 | NS | 22.25 | 23.65 | 1.4 | - | 0.65 | - | - |
| N-52 | NS | 24.48 | 24.5 | 0.02 | - | 0.65 | - | - |
| N-53 | 7/28/2008 | | 20.08 | | 26.60 | 0.65 | 4.2 | 12.7 |
| N-54 | NS | | | | | 0.65 | - | - |
| N-55 | 7/28/208 | | 2.65 | | 9.60 | 0.65 | 4.5 | 13.6 |
| N-56 | NS | | 6.87 | | 15.00 | 0.65 | - | - |
| N-57 | 7/25/2008 | | 4.74 | | 12.00 | 0.65 | 4.7 | 14.2 |
| N-58 | 7/25/2008 | | 3.21 | | 18.60 | 0.65 | 10.0 | 30.0 |
| N-59 | 8/6/2008 | | 1.29 | | 20.00 | 0.65 | 12.2 | 36.5 |
| N-6 | NS | - | - | | - | 0.65 | - | - |
| N-60 | 7/25/2008 | | 4.30 | | 15.00 | 0.65 | 7.0 | 20.9 |
| N-61 | 7/25/2008 | | 3.72 | | 19.50 | 0.65 | 10.3 | 30.8 |
| N-64 | 7/23/2008 | | 6.55 | | 16.00 | 0.65 | 6.1 | 18.4 |

APPENDIX D
GROUNDWATER SAMPLING SUMMARY
SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

| Well ID | Sample Date | Depth to Product | Depth to Water | Product Thickness | Total Depth of Well | Conversion Factor (Well Diameter) | Well Volume (gallons) | Purge Volume (gallons) |
|---|---|---|---|---|---|---|---|---|
| N-65 | 7/16/2008 | | 12.59 | | 14.00 | 0.65 | 0.9 | 2.7 |
| N-66 | 7/22/2008 | | 8.05 | | 16.00 | 0.65 | 5.2 | 15.5 |
| N-67 | 7/18/2008 | | 5.63 | | 25.40 | 0.16 | 3.2 | 9.5 |
| N-68 | NS | 11.33 | 11.59 | 0.26 | - | 0.65 | - | - |
| N-69 | 7/18/2008 | | 15.42 | | 42.00 | 5.875 | 156.2 | 468.5 |
| N-7 | NS | - | - | | - | 0.65 | - | - |
| N-70 | 7/18/2008 | | 14.91 | | 38.00 | 5.875 | | 407.0 |
| N-71 | NS | - | - | | - | 0.65 | - | - |
| N-72 | NS | | 8.21 | | - | 0.65 | - | - |
| N-73 | 7/25/2008 | | 7.62 | | 45.60 | 0.16 | 6.1 | 18.2 |
| N-73D | NS | - | - | | - | 0.65 | - | - |
| N-74 | 7/25/2008 | | 6.17 | | 35.40 | 0.65 | 19.0 | 57.0 |
| N-75 | NS | 6.14 | 6.21 | 0.07 | - | 0.16 | - | - |
| N-76 | NS | 24.85 | 26.93 | 2.08 | - | 2.56 | - | - |
| N-77 | 7/18/2008 | | | | 31.00 | 0.65 | 20.2 | 60.5 |
| N-78 | NS | | - | | 10.40 | 0.65 | - | - |
| N-79 | NS | 11.1 | 11.13 | 0.03 | 28.00 | 0.65 | - | - |
| N-8 | 7/16/2008 | | 25.85 | | 32.50 | 0.65 | 4.3 | 13.0 |
| N-81 | NS | 18.17 | 18.18 | 0.01 | - | 0.65 | - | - |
| N-82 | NS | 23.29 | 23.91 | 0.62 | - | 0.65 | - | - |
| N-83 | NS | | 15.39 | 15.39 | 30.00 | 0.65 | - | - |
| N-84 | 7/16/2008 | | 6.52 | | 25.00 | 0.65 | 12.0 | 36.0 |
| N-85 | 7/16/2008 | | 14.5 | | 24.00 | 0.65 | 6.2 | 18.5 |
| N-86 | 7/17/2008 | | 14.87 | | 20.30 | 0.65 | 3.5 | 10.6 |
| N-87 | 7/17/2008 | | 15.31 | | 20.30 | 0.65 | 3.2 | 9.7 |
| N-88 | NS | - | - | | - | 0.65 | - | - |
| N-89 | 7/22/2008 | | 14.01 | | 23.40 | 0.65 | 6.1 | 18.3 |
| N-9 | 7/16/2008 | | 35.24 | | 65.00 | 0.65 | 19.3 | 58.0 |
| N-90 | 7/22/2008 | | 15.01 | | 25.00 | 0.65 | 6.5 | 19.5 |
| N-91 | NS | 8.21 | 10.79 | 2.58 | - | 0.65 | - | - |
| N-92 | 7/17/2008 | | 7.38 | | 18.00 | 0.65 | 6.9 | 20.7 |
| N-93 | 7/17/2008 | | 14.66 | | 20.20 | 0.65 | 3.6 | 10.8 |
| N-94 | 7/18/2008 | | 5.61 | | 23.40 | 0.65 | 11.6 | 34.7 |
| N-95 | NS | - | - | | - | 0.65 | - | - |
| N-97 | 8/6/2008 | | 13.8 | | 17.10 | 0.16 | 0.5 | 1.6 |
| P-30 | NS | 20.11 | 21.18 | 1.07 | - | 0.16 | - | - |
| P-42 | NS | | 12.14 | | 35.35 | 0.16 | - | - |
| P-44 | NS | | 21.65 | | 24.70 | 0.16 | - | - |
| P-45 | NS | | 23.59 | | 34.85 | 0.16 | - | - |
| PZ-201 | NS | 22.2 | 22.21 | 0.01 | 23.00 | 0.16 | - | - |
| PZ-202 | NS | | 22.15 | | 23.00 | 0.16 | - | - |
| PZ-203 | NS | | 19.93 | | 20.70 | 0.16 | - | - |
| PZ-204 | NS | 19.96 | 21.01 | 1.05 | - | 0.16 | - | - |
| PZ-300 | 7/29/2008 | | 17.13 | | 26.80 | 0.04 | 0.4 | 1.2 |
| PZ-500 | NS | | 2.01 | | 10.00 | 0.16 | - | - |
| PZ-501 | NS | | 2.88 | | 9.50 | 0.16 | - | - |
| PZ-502 | NS | 1.91 | 4.31 | 2.4 | - | 0.16 | - | - |
| PZ-503 | 7/25/2008 | | 3.65 | | 9.00 | 0.16 | 0.9 | 2.6 |
| PZ-504 | 7/25/2008 | | 2.64 | | 6.00 | 0.16 | 0.5 | 1.6 |
| PZ-505 | 7/23/2008 | | 3.44 | | 8.50 | 0.16 | 0.8 | 2.4 |
| PZ-506 | 7/23/2008 | | 6.23 | | 10.30 | 0.16 | 0.7 | 2.0 |
| PZ-507 | 7/23/2008 | | 7.89 | | 9.60 | 0.16 | 0.3 | 0.8 |
| RW-200 | 7/23/2008 | | 5.57 | | 20.50 | 1.46 | 21.8 | 65.4 |
| RW-201 | NS | 22.9 | 23.02 | 0.12 | - | 1.46 | - | - |
| RW-202 | 7/29/2008 | | 20.13 | | 35.00 | 1.46 | 21.7 | 65.1 |
| RW-203 | NS | 22.67 | 22.69 | 0.02 | - | 1.46 | - | - |
| RW-204 | NS | 19.32 | 19.91 | 0.59 | - | 1.46 | - | - |
| RW-205 | NS | 19.45 | 23.43 | 3.98 | - | 1.46 | - | - |
| RW-206 | NS | | 21.38 | | - | 1.46 | - | - |
| RW-300 | NS | 14.6 | 15.46 | 0.86 | - | 0.65 | - | - |
| RW-301 | 7/22/2008 | | 12.02 | | 25.30 | 1.46 | 19.4 | 58.2 |
| RW-302 | 7/23/2008 | | 13.39 | | 28.40 | 1.46 | 21.9 | 65.7 |

APPENDIX D
GROUNDWATER SAMPLING SUMMARY
SUNOCO PHILADELPHIA REFINERY
PHILADELPHIA, PENNSYLVANIA

| Well ID | Sample Date | Depth to Product | Depth to Water | Product Thickness | Total Depth of Well | Conversion Factor (Well Diameter) | Well Volume (gallons) | Purge Volume (gallons) |
|---|---|---|---|---|---|---|---|---|
| RW-303 | 7/25/2008 | | 14.17 | | 17.00 | 1.46 | 4.1 | 12.4 |
| RW-304 | 7/22/2008 | | 14.86 | | 29.60 | 1.46 | 21.5 | 64.6 |
| RW-305 | 7/22/2008 | | 14.91 | | 25.00 | 1.46 | 14.7 | 44.2 |
| RW-306 | NS | 13.02 | 13.14 | 0.12 | 26.00 | 1.46 | - | - |
| RW-307 | 7/23/2008 | | 14.60 | | 28.00 | 1.46 | 19.6 | 58.7 |
| RW-308 | 7/25/2008 | | 16.72 | | 25.00 | 1.46 | 12.1 | 36.3 |
| RW-309 | NS | | 15.55 | | 15.80 | 1.46 | - | - |
| RW-500 | 7/25/2008 | | 2.01 | | - | 1.46 | - | NA |
| RW-501 | 7/23/2008 | | 4.58 | | - | 1.46 | - | NA |
| RW-502 | NS | 8.22 | 8.23 | 0.01 | - | 1.46 | - | - |
| N-98 | 7/14/2008 | | 23.33 | | 30 | 0.16 | 1.1 | 3.2 |
| N-99 | 7/23/2008 | | 20.07 | | 28 | 0.16 | 1.3 | 3.8 |
| N-100 | 7/14/2008 | | 18.84 | | 20 | 0.16 | 0.2 | 0.6 |
| N-101 | 7/15/2008 | | 15.69 | | 23 | 0.16 | 1.2 | 3.5 |
| N-102 | 7/15/2008 | | 22.22 | | 30 | 0.16 | 1.2 | 3.7 |
| N-103 | 7/23/2008 | | 18.37 | | 27 | 0.16 | 1.4 | 4.1 |
| N-104 | 7/23/2008 | | 16.70 | | 25 | 0.16 | 1.3 | 4.0 |
| N-105 | 7/23/2008 | | 17.25 | | 25 | 0.16 | 1.2 | 3.7 |
| N-106 | 7/14/2008 | | 10.62 | | 19 | 0.16 | 1.3 | 4.0 |
| N-107 | NS | 15.44 | 16.27 | 0.83 | 22 | 0.16 | - | - |
| N-108 | 7/22/2008 | | 14.03 | | 18 | 0.16 | 0.6 | 1.9 |
| N-109 | 7/24/2008 | | 11.65 | | 20 | 0.16 | 1.3 | 4.0 |
| N-110 | 7/24/2008 | | 7.41 | | 15 | 0.16 | 1.2 | 3.6 |
| N-111 | 7/24/2008 | | 6.00 | | 15 | 0.16 | 1.4 | 4.3 |
| N-112 | 7/24/2008 | | 9.06 | | 20 | 0.16 | 1.8 | 5.3 |
| N-113 | NS | | 7.86 | | 15 | 0.16 | - | - |
| N-114 | 7/24/2008 | | 8.01 | | 25 | 0.16 | 2.7 | 8.2 |
| N-115 | 7/28/2008 | | 7.44 | | 14 | 0.16 | 1.0 | 3.1 |
| N-116 | NS | 5.29 | 6.02 | 0.73 | 12 | 0.16 | - | - |
| N-117 | 7/17/2008 | | 14.65 | | 20 | 0.16 | 0.9 | 2.6 |
| N-118 | 7/22/2008 | | 14.36 | | 20 | 0.16 | 0.9 | 2.7 |
| N-119 | 7/17/2008 | | 9.17 | | 18 | 0.16 | 1.4 | 4.2 |
| N-120 | 7/17/2008 | | 11.15 | | 18 | 0.16 | 1.1 | 3.3 |
| N-121 | 7/17/2008 | | 11.13 | | 20 | 0.16 | 1.4 | 4.3 |
| N-122 | 7/22/2008 | | 9.83 | | 18 | 0.16 | 1.3 | 3.9 |
| N-123 | 7/22/2008 | | 11.82 | | 20 | 0.16 | 1.3 | 3.9 |
| N-124 | 7/22/2008 | | 15.08 | | 25 | 0.16 | 1.6 | 4.8 |
| N-125 | NS | 16.46 | 16.72 | 0.26 | 25 | 0.16 | - | - |
| N-126 | 7/22/2008 | | 5.09 | | 14 | 0.16 | 1.4 | 4.3 |
| N-127 | NS | 24.30 | 24.86 | 0.56 | 34 | 0.16 | - | - |
| N-128 | 7/23/2008 | | 18.82 | | 25 | 0.16 | 1.0 | 3.0 |
| N-129 | NS | 19.46 | 20.49 | 1.03 | 30 | 0.16 | - | - |
| N-130 | NS | 22.53 | 23.25 | 0.72 | 30 | 0.16 | - | - |
| N-131 | 7/28/2008 | | 2.75 | | 15 | 0.16 | 2.0 | 5.9 |
| N-132 | 7/28/2008 | | 4.54 | | 25 | 0.16 | 3.3 | 9.8 |
| N-133 | 7/23/2008 | | 3.93 | | 12 | 0.16 | 1.3 | 3.9 |
| N-134 | 7/16/2008 | | 18.04 | | 20 | 0.16 | 0.3 | 0.9 |
| N-135 | NS | 4.35 | 4.98 | 0.63 | 12 | 0.16 | - | - |
| N-136 | 7/25/2008 | | 4.09 | | 12 | 0.16 | 1.3 | 3.8 |

All Gauging Info provided by Secor (gauged on 7/14 & 7/15/2008)
NA = Information not available
NS = Not Sampled

# APPENDIX E

## Fate and Transport Analysis

# APPENDIX E
# FATE AND TRANSPORT MODELING PROCEDURES
# AOI 8: SUNOCO PHILADELPHIA REFINERY
# PHILADELPHIA, PENNSYLVANIA

## QUICK DOMENICO MODELING

## E.1 INTRODUCTION

Fate and transport calculations were completed for groundwater in AOI 8 to evaluate potential migration pathways/potential impacts to receptors. The Quick Domenico Version 2 (QD) spreadsheet model, developed by the PADEP, and site-specific data was used to complete the fate and transport calculations.

## E.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.

## E.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.

## E.4 MODEL INPUT PARAMETERS

In preparation of this report, input values for the QD model were compiled from available site data. When no site data was available, estimated input values from the PADEP spreadsheet "Number Please!" which is based on PA Code, Chapter 250, Appendix A, Table 5, or other acceptable literature source were utilized. The input parameters are discussed in greater detail in the sections that follow, and are summarized in the input/output table E.1 preceding the model in this appendix.

### E.4.1 Source Concentration

Results of the July 2008 groundwater sampling indicate that benzene is detected at N-9 above its groundwater MSC. Due to the proximity of N-9 to the northeast boundary of the property (about 25 ft separation) the potential for off-site migration was addressed by fate and transport modeling using the QD model. Benzene was not detected above the groundwater MSC for benzene in any other wells along the eastern site property boundary.

### E.4.2 Distance to Location of Concern (x)

Distance to the Location of Concern (distance) for the current simulations is the down-gradient point in the aquifer where the concentration of the COC of interest reaches its respective MSC under steady-state plume conditions. The distance is iteratively entered in the QD model until the location where the COC concentration reaches the MSC is identified. This step is performed using a simulation time of $1 \times 10^{99}$ days to ensure that the plume has reached steady-state.

### E.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).

Since N-9 has no plume associated with it a conservative estimate for $A_x$ was borrowed from prior fate and transport modeling for well N-7 in the 2004 Current Conditions Report (CCR). This is appropriate because N-7 is located approximately 500 ft north of N-9 and is also screened in the surficial fill and alluvium. In the CCR N-7 has a plume length of 2,000 ft. This length of 2,000 ft was used for the current fate and transport modeling at N-9. 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 $A_z$.

### E.4.4 Lambda

Lambda is the first order decay constant. It is determined by dividing 0.693 by the half-life of the compound (in days). 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 was obtained from the PADEP spreadsheet "Number Please!" which is based on PA Code, Chapter 250, Appendix A, Table 5.

### E.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 plume has been delineated in the vicinity of N-9 a source with of 100 ft was used. The source thickness used is 15 ft which is the average thickness of the upper unconfined aquifer.

### E.4.6 Hydraulic Conductivity (k)

The hydraulic conductivity of a geologic material is a measure of its ability to transmit water. The same value used in the CCR report for N-7, 4.64 ft/d, was used in the current QD simulation for N-9

### E.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. A round of groundwater gauging was completed in July 2008 which included N-9. However, due to the distance between monitoring wells in this region and the flatness of the water table near N-9 a realistic hydraulic gradient estimate could not be derived. Instead a conservative value of 0.003 (also used in the CCR QD modeling for well N-7) was used.

### E.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. Porosity values used in the fate and transport modeling for AOI 8 were based on historical geotechnical analysis.

### E.4.9 Soil Bulk Density ($p_b$)

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

$$P_b = 2.65 * (1 - \text{porosity}).$$

Soil bulk density values used in the fate and transport modeling were based on historical geotechnical analysis.

### E.4.10 Organic Carbon Partition Coefficient ($K_{OC}$)

The organic carbon partition coefficient is chemical specific and is provided in the PADEP spreadsheet "Number Please!" which is based on PA Code, Chapter 250, Appendix A, Table 5. These values were used in the fate and transport modeling.

### E.4.11 Fraction Organic Carbon ($f_{oc}$)

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.

### E.4.12 Plume Coordinates ('y' and 'z')

The plume coordinates, 'y' and 'z', define the horizontal and vertical extent of the impacted area, respectfully. For a solution on the centerline of the plume down gradient from the source, 'y' was set equal to zero. Additionally, to yield the highest concentration, which is located at the water table, 'z' was also set equal to zero.

### E.4.13 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 used corresponds to the duration in which it takes the plume to reach steady-state at the location where the groundwater concentration equals the compounds MSC.

### E.4.14 Grid Dimensions

The grid dimensions form the window through which the plume is viewed and the locations where concentrations are calculated. The grid is determined by user specified length and width measurements from the source of the plume.

## E.5 OUTPUT DATA AND RESULTS

The results of the QD Fate and Transport modeling task were used to predict the potential down-gradient distance where the benzene concentration at the perimeter monitoring well N-9 attains its groundwater MSC of 5 ug/L. The N-9 QD model simulation spreadsheet is included at the end of this appendix.

Simulation results indicate benzene at N-9 will quickly fall below its MSC in the fill/alluvium. This is likely due to a benzene starting concentration of 8 ug/L, which is not much higher than the groundwater MSC for benzene. The predicted, steady-state transport distance at which benzene would reach its MSC is 20 feet. The closest property boundary to N-9 is approximately 25 feet away. Based on this simulation benzene has low potential to be transported off-site in this part of AOI 8.

## PENTOXSD GROUNDWATER TO SURFACE WATER DISCHARGE MODELING

## E.6 INTRODUCTION

To evaluate the potential contribution of dissolved phase benzene to the Schuylkill River adjacent to the wood bulkhead in AOI 8, an acceptable groundwater concentration of benzene that will not exceed surface water quality standards was calculated using the mass-balance water quality model PA Single Discharge Wasteload Allocation Program for Toxics v2.0 (PENTOXSD) created by Pennsylvania Department of Environmental Protection. Input parameters for PENTOXSD include:

- Groundwater discharge into surface water,
- Estimated volumetric river flow
- River width, depth, distance from mouth
- Area of drainage basin

PENTOXSD is used to calculate maximum groundwater concentrations (wasteload allocations) below which groundwater discharged to a stream or river will not exceed surface water quality criteria after complete mixing. The four water quality criteria from Chapter 16 of the PA Code for benzene are 640 ug/L (Acute Fish Criterion), 130 ug/L (Chronic Fish Criterion), and 1.2 ug/L

(Cancer Risk Level). The fourth surface water quality criterion, Target Human Health, does not have a PA Chapter 16 value.

## E.7 MODEL INPUT PARAMETERS

PENTOXSD modeling was completed for benzene concentrations found above the MCL in the unconfined aquifer (fill/alluvium) in AOI 8. All seven wells included in this evaluation are located within one hundred feet of the wood bulkhead along the Schuylkill River. Model input parameters are summarized in Table E.2. The wells evaluated in this investigation are N-59 (with benzene at a concentration of 98 ug/L), RW-500 (300 ug/L), N-61 (8,700 ug/L), PZ-503 (13 ug/L), N-133 (10,000 ug/L), PZ-504 (2,400 ug/L) and PZ-505 (160 ug/L).

## E.8 MODEL RESULTS

Based on PENTOXSD calculations the maximum acceptable groundwater concentrations for benzene are 2,150,000 ug/L (Acute Fish Criterion), 3,030,000 ug/L (Chronic Fish Criterion), and 50,061.08 ug/L (Cancer Risk Level). The maximum detected benzene groundwater concentration during the July 2008 sampling event is 10,000 ug/L at N-133, which is less than all three wasteload allocations. Based on this analysis benzene in groundwater will not exceed surface water quality standards if it should discharge to the Schuylkill river near the wooden bulkhead in AOI 8.

**Table E.1**

## Quick Domenico
## Fate and Transport Model Input and Output
## AOI 8 Sunoco Philadelphia Refinery
## Philadelphia, Pennsylvania

| | |
|---|---|
| Project | 2574601 - AOI 8 Sunoco Philadelphia Refinery |
| Prepared by | Terrance Stanley |
| Date Prepared | 9/29/2008 |

| **Generic Input Parameters** | | | | **Data Source** |
|---|---|---|---|---|
| Source Identification (or Well ID) | | | N-9 | |
| Sample Date | | | | |
| Source Width | | ft | 100 | Delineated LNAPL (100' default if no plume is present) |
| Source Thickness | | ft | 15 | URS, 2002 (average thickness of the UUA) |
| Distance to Location of Concern | x | ft | NA | Model used to determine distance from well at which benzene concentration reaches GW MSC |
| Perpendicular Distance to Location of Concern | y | ft | 0 | |
| Vertical Axis Perpendicular to x and y | z | ft | 0 | |
| Longitudinal Dispersivity | $A_x$ | ft | 200 | N-7 QD Simulation CCR |
| 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 | Secor, 2002b (average based on site wide slug tests) |
| Hydraulic Gradient | | ft/ft | 0.003 | Measured using GW contours (default if no contours are available is 0.003) |
| Porosity | | decimal fraction | 0.35 | Determined based on site specific data |
| 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 | |
| Length of Grid Dimension | | ft | 48.6 | |
| Width of Grid Dimension | | ft | 20 | |

| **Chemical Specific Input Parmaters** | | | | **Data Source** |
|---|---|---|---|---|
| **Sim 1** | | | | |
| Contaminant | | | Benzene | |
| Source Concentration (mg/l) | | mg/l | 0.0080 | August 2008 Sampling |
| Lambda (per day) | | $day^{-1}$ | 9.589E-04 | PADEP Number Please! Spreadsheet |
| KOC | | | 58 | PADEP Number Please! Spreadsheet |

**Output (Concentration at the Downgradient Property Boundary in 30-years)**

| Contaminant | GW MSC[1] Residential (mg/l) | GW MSC[2] Non-Residential (mg/l) | Concentration at Property Boundary (mg/l) | Distance to Property Boundary (ft) | Distance to Meet Residential GW MSC (ft) |
|---|---|---|---|---|---|
| Sim 1 - Benzene | 0.005 | 0.005 | NA | NA | 20 |

[1] ACT 2 TGM, Appendix A, Table 1 MSC for a Residential Used Aquifer with Total Dissolved Solids less than or equal to 2500.

[2] 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 E.2**
**Groundwater to Surface Water Pathway Analysis PENTOXSD Input Parameters and Output Results**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| PENTOXSD MODEL INPUT | | | |
|---|---|---|---|
| **Parameter** | **Unit** | **Value** | **Source** |
| River Mile Index (at discharge point) | mile | 3.9 | Measured using GIS |
| River Stage Elevation (at discharge point) | ft | 1.00 | Water Resources Investigation Report 01-4218 (2001)(1) |
| Stream Flow $Q_{7-10}$ | $ft^3/s$ | 507 | stimated as 50% of the Lowest Average Flow 1932 through 2007 - USG |
| Stream Flow Harminic Mean | | 1,014 | Estimated as Lowest Average Flow 1932 through 2007 - USGS |
| Reach Width | ft | 432.00 | USGS Topographic Map |
| Average Reach Depth | ft | 4.28 | Water Resources Investigation Report 01-4218 (2001) |
| River Mile Index (at confluence) | mile | 0.001 | Measured using GIS |
| River Stage Elevation (at confluence) | ft | 0.50 | Water Resources Investigation Report 01-4218 (2001) |
| Reach Width | ft | 1,000.00 | USGS Topographic Map |
| Avergae Reach Depth | ft | 46.40 | Water Resources Investigation Report 01-4218 (2001) |
| Diffuse Groundwater Flow ((2)) | million gallons per day | 0.004934982 | Calculated |
| Hydraulic Conductivity (K) | ft/d | 4.6400 | CCR QD Simulation for N-57 |
| Hydraulic Gradient (i) | ft/ft | 0.007 | Gradient between N-133 and PZ-504 July 2008 gauging |
| Area of groundwater flux (A) | $ft^2$ | 21,000.00 | 15 ft x 1,400 ft(3) |

| PENTOXSD MODEL OUTPUT | |
|---|---|
| **Screening Levels** | **Wasteload Allocation (ug/L)** |
| Acute Fish Criterion | 2,150,000.00 |
| Chronic Fish Criterion | 3,030,000.00 |
| Threshold Human Health | not applicable |
| Cancer Risk Level | 50,061.08 |

NOTES:
(1) Simulation of Ground-Water Flow in the Potomac-Raritain-Magothy Aquifer System Near the Defense Supply Center Philadelphia, and the Point Breeze Refinery, Southern Philadelphia County, Pennsylvania.
(2) Diffuse Groundwater Flow (in Million Gallons per Day) = ((Hydraulic Conductivity x Hydraulic Gradient x Area of Groundwater Flux) x 7.481) / (1,000,000).
(3) Source thickness of 14 ft is from Quick Domenico simulations run for the Current Conditions Report; 1,400 ft is the length of the relieving platform adjacent to the wells with detected benzene concentrations.
(3) Maximum detected benzene concentration in groundwater adjacent to the wooden relieving platform in AOI 8 is 10,000 ug/L at N-133.

# PENTOXSD

## Modeling Input Data

| Stream Code | RMI | Elevation (ft) | Drainage Area (sq mi) | Slope | PWS With (mgd) | Apply FC |
|---|---|---|---|---|---|---|
| 833 | 3.86 | 1.00 | 1910.00 | 0.00000 | 0.00 | ☑ |

### Stream Data

| | LFY (cfsm) | Trib Flow (cfs) | Stream Flow (cfs) | WD Ratio | Rch Width (ft) | Rch Depth (ft) | Rch Velocity (fps) | Rch Trav Time (days) | Tributary Hard (mg/L) | Tributary pH | Stream Hard (mg/L) | Stream pH | Analysis Hard (mg/L) | Analysis pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Q7-10** | 0.1 | 0 | 507 | 0 | 432 | 4.28 | 0 | 0 | 100 | 7 | 0 | 0 | 0 | 0 |
| **Qh** | | 0 | 1014 | 0 | 432 | 4.28 | 0 | 0 | 100 | 7 | 0 | 0 | 0 | 0 |

### Discharge Data

| Name | Permit Number | Existing Disc Flow (mgd) | Permitted Disc Flow (mgd) | Design Disc Flow (mgd) | Reserve Factor | AFC PMF | CFC PMF | THH PMF | CRL PMF | Disc Hard (mg/L) | Disc pH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Base Model Aug | 2574601 | 0.00493 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 7 |

### Parameter Data

| Parameter Name | Disc Conc (µg/L) | Trib Conc (µg/L) | Disc Daily CV | Disc Hourly CV | Steam Conc (µg/L) | Stream CV | Fate Coef | FOS | Crit Mod | Max Disc Conc (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| BENZENE | 10000 | 0 | 0.5 | 0.5 | 0 | 0 | 0 | 0 | 1 | 0 |

| Stream Code | RMI | Elevation (ft) | Drainage Area (sq mi) | Slope | PWS With (mgd) | Apply FC |
|---|---|---|---|---|---|---|
| 833 | 0.00 | 0.50 | 1912.00 | 0.00000 | 0.00 | ☑ |

### Stream Data

| | LFY (cfsm) | Trib Flow (cfs) | Stream Flow (cfs) | WD Ratio | Rch Width (ft) | Rch Depth (ft) | Rch Velocity (fps) | Rch Trav Time (days) | Tributary Hard (mg/L) | Tributary pH | Stream Hard (mg/L) | Stream pH | Analysis Hard (mg/L) | Analysis pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Q7-10** | 0.1 | 0 | 507 | 0 | 1000 | 46.4 | 0 | 0 | 100 | 7 | 0 | 0 | 0 | 0 |
| **Qh** | | 0 | 1014 | 0 | 1000 | 46.4 | 0 | 0 | 100 | 7 | 0 | 0 | 0 | 0 |

### Discharge Data

| Name | Permit Number | Existing Disc Flow (mgd) | Permitted Disc Flow (mgd) | Design Disc Flow (mgd) | Reserve Factor | AFC PMF | CFC PMF | THH PMF | CRL PMF | Disc Hard (mg/L) | Disc pH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 7 |

### Parameter Data

| Parameter Name | Disc Conc (µg/L) | Trib Conc (µg/L) | Disc Daily CV | Disc Hourly CV | Steam Conc (µg/L) | Stream CV | Fate Coef | FOS | Crit Mod | Max Disc Conc (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| BENZENE | 0 | 0 | 0.5 | 0.5 | 0 | 0 | 0 | 0 | 1 | 0 |

# PENTOXSD Analysis Results

## Wasteload Allocations

| RMI | Name | Permit Number |
|---|---|---|
| **3.86** | **Base Model Aug** | **2574601** |

**AFC**

**Q7-10:** **CCT (min)** 15 **PMF** 0.05 **Analysis pH** 7 **Analysis Hardness** 100

| Parameter | Stream Conc (µg/L) | Stream CV | Trib Conc (µg/L) | Fate Coef | WQC (µg/L) | WQ Obj (µg/L) | WLA (µg/L) |
|---|---|---|---|---|---|---|---|
| BENZENE | 0 | 0 | 0 | 0 | 640 | 640 | 2150000 |

**CFC**

**Q7-10:** **CCT (min)** 720 **PMF** 0.351 **Analysis pH** 7 **Analysis Hardness** 100

| Parameter | Stream Conc. (µg/L) | Stream CV | Trib Conc. (µg/L) | Fate Coef | WQC (µg/L) | WQ Obj (µg/L) | WLA (µg/L) |
|---|---|---|---|---|---|---|---|
| BENZENE | 0 | 0 | 0 | 0 | 130 | 130 | 3030000 |

**THH**

**Q7-10:** **CCT (min)** 720 **PMF** NA **Analysis pH** NA **Analysis Hardness** NA

| Parameter | Stream Conc (µg/L) | Stream CV | Trib Conc (µg/L) | Fate Coef | WQC (µg/L) | WQ Obj (µg/L) | WLA (µg/L) |
|---|---|---|---|---|---|---|---|
| BENZENE | 0 | 0 | 0 | 0 | NA | NA | NA |

**CRL**

**Qh:** **CCT (min)** 720 **PMF** 0.351

| Parameter | Stream Conc (µg/L) | Stream CV | Trib Conc (µg/L) | Fate Coef | WQC (µg/L) | WQ Obj (µg/L) | WLA (µg/L) |
|---|---|---|---|---|---|---|---|
| BENZENE | 0 | 0 | 0 | 0 | 1.2 | 1.2 | 56061.08 |

# APPENDIX F

## Development of Site-Specific Standards and

## Risk Assessment

# Appendix F

## Development of Site-Specific Standards and Risk Assessment

Because lead risk values are calculated differently than the other compounds, additional steps were conducted in order to assess the acceptable risk level for lead. Because the IEUBK model is applicable only to young residential children for a minimum exposure time of three months, the site specific screening level was calculated according to the method developed by the SEGH and used by the Pennsylvania Department of Environmental Protection (PADEP) to develop their respective non-residential soil screening values. The model developed by SEGH was used to calculate a site specific risk based criterion for soil dependent upon the target blood lead concentration and the slope of the empirical relationship between blood lead concentration and soil lead concentration ($\delta$). Based on the SEGH model and Pennsylvania default parameters, PADEP's non-residential MSC for lead in soil is 1,000 mg/kg. Based on the method developed by SEGH, PADEP assumes the target blood level (T) is 20 ug/dL blood and the slope of blood lead to soil lead ($\delta$) is 7.5 ug/dL.

To calculate an acceptable risk level for lead at the Sunoco Philadelphia Refinery, PADEP's default blood lead to soil lead slope value ($\delta$) was adjusted based on site specific information and recommendations by the U.K. Environment Agency and SEGH (Ref 1). SEGH considered that the reasonable range of $\delta$ values was 2 – 5 ug/dL per 1000 ug/g and should be selected based on site specific information. As stated by the U.K. Environment Agency, low values of $\delta$ relate primarily to groups of older children, well maintained (dense) vegetative cover, low bioavailability, heavier textured soils, and good personal grooming habits. Higher values of $\delta$ tend to be found in groups of children between the ages of 18 and 24 months, sparse vegetation, soluble lead salts, light textured or soils with low organic matter, and poor personal grooming habits.

Because access to the target area at the Sunoco Refinery is secured, and PPE is required the PADEP default blood lead to soil lead slope value ($\delta$) was adjusted from 7.5 ug/dL to 5.0 ug/dL. Based on the discussion above this value is considered highly

conservative. As presented in Table 1, the SSSL for lead, based on the above outlined parameters, is 1,500 mg/kg. As presented in Table 4, the maximum exposure concentration is 1380 mg/kg, below the SSSL.

1. UKEA 2002. Soil Guideline Values for Lead Contamination, Department for Environment, Food, and Rural Affairs. The Environment Agency, March 2002.

**Table F-1**
**Derivation of Site-Specific Soil Value**
**for Benzene[1]**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Parameter | Abbreviation | Assumption | Units | Source |
|---|---|---|---|---|
| Transport Factor | TF | 13100 | mg/kg / $mg/m^3$ | 25 Pa. Code § 250, Appendix A Table 5 |
| Absorption | Abs | 1 | unitless | 25 Pa. Code § 250.307(d) |
| Exposure Time | ET | 8 | hr/day | 25 Pa. Code § 250.307(d) |
| Exposure Frequency | EF | 180 | d/yr | 25 Pa. Code § 250.307(d) |
| Target Risk[2] | TR | 0.0001 | mg/kg | |
| Inhalation Cancer Slope Factor | $CSF_I$ | 0.027 | $mg/kg\text{-}day^{-1}$ | 25 Pa. Code § 250, Appendix A Table 5 |
| Averaging Time for Carcinogens | $AT_C$ | 70 | yr | 25 Pa. Code § 250.307(d) |
| Inhalation Factor | $IF_{ADJ}$ | 0.4 | unitless | 25 Pa. Code § 250.307(d) |

**Site-Specific, Non-Residential (Onsite Worker) Screening Value** **2152** **mg/kg**

Notes:

1. The site specific screening value was calculated for inhalation based on the calculation specified in 25 Pa. Code 250.307(b)(1)

$$MSC\ (mg/kg) = \frac{TR \times AT_C \times 365\ days/year \times TF}{CSF_I \times Abs \times ET \times EF \times IF_{ADJ}}$$

2. The target risk level was modified from PADEP's default (1E-5) to 1E-4.

**Table F-2**
**Derivation of Site-Specific Soil Value**
**for Naphthalene[1]**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Parameter | Abbreviation | Assumption | Units | Source |
|---|---|---|---|---|
| Target Health Quotient | TR | 1 | | 25 Pa. Code § 250.306(d) |
| Oral Reference Dose | $RfD_o$ | 0.02 | $mg/kg\text{-}day^{-1}$ | 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** **56,778** **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 F-3**
**Derivation of Site-Specific Soil Value**
**for Benzo(a)pyrene[1]**
**AOI 8 Site Characterization 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 F-4**
**Derivation of Site-Specific Soil Value**
**for Lead[1]**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| Parameter | Abbreviation | Assumption | Units | Source |
|---|---|---|---|---|
| Blood lead target concentration | T | 20 | ug/dL | 25 Pa. Code § 250, Appendix A Table 7 |
| 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 | 4 | ug/dL | 25 Pa. Code § 250, Appendix A Table 7 |
| 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 | $\delta$ | 5 | ug/dL blood / ug/g soil | Soil Guideline Values for Lead Conatmination (U.K.E.A., 2002) |

**Site-Specific, Non-Residential (Onsite Worker) Screening Value** **1500** **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)

$$MSC\ (mg/kg) = \frac{[(T/G^{n}) - B] \times 1000}{\delta}$$

**Table F-5**
**Summary of Site Specific Cumulative Risk Evaluation**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| | | | | Benzene (71-43-2) | | Benzo(a)pyrene (50-32-8) | | Naphthalene (91-20-3) | |
|---|---|---|---|---|---|---|---|---|---|
| Location ID | Sample ID | Sample Interval | Sample Date | Reported Result (mg/kg) | Calculated Risk | Reported Result (mg/kg) | Calculated Risk | Reported Result (mg/kg) | Calculated Hazard Quotient |
| BH-08-01 | BH-08-01_1.0-2.0 | 1.0-2.0 | 6/17/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-02 | BH-08-02_1.0-2.0 | 1.0-2.0 | 5/7/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-03 | BH-08-03_1.0-2.0 | 1.0-2.0 | 5/7/2008 | 0.58 | 2.69E-08 | ND | -- | ND | -- |
| BH-08-04 | BH-08-04_1.0-2.0 | 1.0-2.0 | 5/8/2008 | 3.3 | 1.53E-07 | ND | -- | 12 | 0.00021 |
| BH-08-07 | BH-08-07_1.0-2.0 | 1.0-2.0 | 5/8/2008 | 1.4 | 6.51E-08 | ND | -- | 15 | 0.00026 |
| BH-08-08 | BH-08-08_1.0-2.0 | 1.0-2.0 | 5/7/2008 | 1.9 | 8.83E-08 | ND | -- | ND | -- |
| BH-08-09 | BH-08-09_1.0-2.0 | 1.0-2.0 | 5/7/2008 | 3.2 | 1.49E-07 | ND | -- | 5.9 | 0.00010 |
| BH-08-10 | BH-08-10_1.0-2.0 | 1.0-2.0 | 5/7/2008 | ND | -- | 2.6 | 2.39E-06 | ND | -- |
| BH-08-11 | BH-08-11_1.0-2.0 | 1.0-2.0 | 5/7/2008 | 0.31 | 1.44E-08 | ND | -- | ND | -- |
| BH-08-12 | BH-08-12_1.0-2.0 | 1.0-2.0 | 5/6/2008 | 3.1 | 1.44E-07 | ND | -- | 2.7 | 0.00005 |
| BH-08-13 | BH-08-13_1.0-2.0 | 1.0-2.0 | 5/6/2008 | ND | -- | 1.3 | 1.20E-06 | ND | -- |
| BH-08-14 | BH-08-14_1.0-2.0 | 1.0-2.0 | 5/6/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-15 | BH-08-15_1.0-2.0 | 1.0-2.0 | 5/6/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-16 | BH-08-16_1.0-2.0 | 1.0-2.0 | 5/7/2008 | 3.1 | 1.44E-07 | ND | -- | 18 | 0.00032 |
| BH-08-17 | BH-08-17_1.0-2.0 | 1.0-2.0 | 5/7/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-18 | BH-08-18_1.0-2.0 | 1.0-2.0 | 5/7/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-21 | BH-08-21_1.0-2.0 | 1.0-2.0 | 5/7/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-22 | BH-08-22_1.0-2.0 | 1.0-2.0 | 5/7/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-23 | BH-08-23_1.0-2.0 | 1.0-2.0 | 5/7/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-24 | BH-08-24_1.0-2.0 | 1.0-2.0 | 5/7/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-25 | BH-08-25_1.0-2.0 | 1.0-2.0 | 5/7/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-26 | BH-08-26_1.0-2.0 | 1.0-2.0 | 5/8/2008 | 9 | **4.18E-07** | ND | -- | ND | -- |
| BH-08-27 | BH-08-27_1.0-2.0 | 1.0-2.0 | 5/6/2008 | ND | -- | 0.4 | 3.68E-07 | ND | -- |
| BH-08-28 | BH-08-28_1.0-2.0 | 1.0-2.0 | 5/6/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-29 | BH-08-29_1.0-2.0 | 1.0-2.0 | 5/6/2008 | ND | -- | ND | -- | ND | -- |
| BH-08-31 | BH-08-31_1.0-2.0 | 1.0-2.0 | 5/6/2008 | ND | -- | 11 | 1.01E-05 | ND | -- |
| BH-08-32 | BH-08-32_0.0-2.0 | 0-2.0 | 7/3/2008 | ND | -- | 0.9 | 8.29E-07 | ND | -- |
| BH-08-33 | BH-08-33_1.5-2.0 | 1.5-2.0 | 5/6/2008 | ND | -- | 3.6 | 3.31E-06 | 0.36 | 0.00001 |
| BH-08-34 | BH-08-34_1.5-2.0 | 1.5-2.0 | 5/6/2008 | ND | -- | 29 | 2.67E-05 | ND | -- |
| BH-08-35 | BH-08-35_1.0-2.0 | 1.0-2.0 | 5/6/2008 | ND | -- | ND | -- | ND | -- |
| N-98 | N-98_1.0-2.0 | 1.0-2.0 | 6/2/2008 | ND | -- | ND | -- | 1 | 0.00002 |
| N-99 | N-99_1.0-2.0 | 1.0-2.0 | 6/17/2008 | ND | -- | 61 | **5.62E-05** | 53 | **0.00093** |
| N-100 | N-100_0.0-2.0 | 0.0-2.0 | 6/11/2008 | ND | -- | ND | -- | ND | -- |
| N-101 | N-101_1.0-2.0 | 1.0-2.0 | 6/16/2008 | ND | -- | ND | -- | ND | -- |
| N-102 | N-102_1.0-2.0 | 1.0-2.0 | 6/5/2008 | ND | -- | 0.2 | 1.84E-07 | ND | -- |
| N-103 | N-103_1.0-2.0 | 1.0-2.0 | 6/6/2008 | ND | -- | ND | -- | ND | -- |
| N-104 | N-104_1.0-2.0 | 1.0-2.0 | 6/17/2008 | ND | -- | ND | -- | ND | -- |
| N-105 | N-105_1.0-2.0 | 1.0-2.0 | 6/17/2008 | ND | -- | ND | -- | ND | -- |
| N-106 | N-106_1.0-2.0 | 1.0-2.0 | 6/5/2008 | ND | -- | 0.19 | 1.75E-07 | ND | -- |
| N-107 | N-107_1.0-2.0 | 1.0-2.0 | 6/17/2008 | 0.74 | 3.44E-08 | ND | -- | ND | -- |
| N-108 | N-108_1.0-2.0 | 1.0-2.0 | 5/29/2008 | ND | -- | 5.4 | 4.97E-06 | ND | -- |
| N-109 | N-109_1.0-2.0 | 1.0-2.0 | 6/17/2008 | ND | -- | ND | -- | ND | -- |
| N-110 | N-110_1.0-2.0 | 1.0-2.0 | 5/14/2008 | ND | -- | ND | -- | ND | -- |
| N-111 | N-111_1.0-2.0 | 1.0-2.0 | 5/14/2008 | ND | -- | ND | -- | ND | -- |
| N-112 | N-112_1.0-2.0 | 1.0-2.0 | 5/8/2008 | ND | -- | ND | -- | ND | -- |
| N-113 | N-113_1.0-2.0 | 1.0-2.0 | 5/15/2008 | ND | -- | ND | -- | ND | -- |
| N-114 | N-114_1.0-2.0 | 1.0-2.0 | 5/8/2008 | 0.51 | 2.37E-08 | ND | -- | ND | -- |

**Table F-5**
**Summary of Site Specific Cumulative Risk Evaluation**
**AOI 8 Site Characterization Report**
**Sunoco Philadelphia Refinery**
**Philadelphia, Pennsylvania**

| | | | | Benzene (71-43-2) | | Benzo(a)pyrene (50-32-8) | | Naphthalene (91-20-3) | |
|---|---|---|---|---|---|---|---|---|---|
| Location ID | Sample ID | Sample Interval | Sample Date | Reported Result (mg/kg) | Calculated Risk | Reported Result (mg/kg) | Calculated Risk | Reported Result (mg/kg) | Calculated Hazard Quotient |
| N-115 | N-115_0.0-2.0 | 0.0-2.0 | 5/28/2008 | ND | -- | 6.5 | 5.98E-06 | ND | -- |
| N-116 | N-116_1.0-2.0 | 1.0-2.0 | 5/20/2008 | ND | -- | ND | -- | ND | -- |
| N-117 | N-117_1.0-2.0 | 1.0-2.0 | 6/4/2008 | ND | -- | 0.63 | 5.80E-07 | ND | -- |
| N-118 | N-118_1.0-2.0 | 1.0-2.0 | 5/23/2008 | ND | -- | ND | -- | ND | -- |
| N-119 | N-119_1.0-2.0 | 1.0-2.0 | 6/17/2008 | ND | -- | 0.43 | 3.96E-07 | ND | -- |
| N-120 | N-120_1.0-2.0 | 1.0-2.0 | 5/22/2008 | ND | -- | ND | -- | ND | -- |
| N-121 | N-121_1.0-2.0 | 1.0-2.0 | 6/9/2008 | ND | -- | ND | -- | ND | -- |
| N-122 | N-122_1.0-2.0 | 1.0-2.0 | 5/7/2008 | ND | -- | ND | -- | ND | -- |
| N-123 | N-123_1.0-2.0 | 1.0-2.0 | 5/20/2008 | ND | -- | 13 | 1.20E-05 | ND | -- |
| N-124 | N-124_1.0-2.0 | 1.0-2.0 | 5/21/2008 | ND | -- | ND | -- | ND | -- |
| N-125 | N-125_1.0-2.0 | 1.0-2.0 | 6/17/2008 | ND | -- | 1.5 | 1.38E-06 | ND | -- |
| N-126 | N-126_1.0-2.0 | 1.0-2.0 | 6/17/2008 | ND | -- | ND | -- | ND | -- |
| N-127 | N-127_1.0-2.0 | 1.0-2.0 | 5/22/2008 | ND | -- | ND | -- | ND | -- |
| N-128 | N-128_1.0-2.0 | 1.0-2.0 | 5/20/2008 | 1.9 | 8.83E-08 | 6 | 5.52E-06 | 2.2 | 0.00004 |
| N-129 | N-129_1.0-2.0 | 1.0-2.0 | 6/17/2008 | ND | -- | ND | -- | ND | -- |
| N-130 | N-130_0.0-2.0 | 0.0-2.0 | 5/16/2008 | ND | -- | ND | -- | ND | -- |
| N-131 | N-131_1.0-2.0 | 1.0-2.0 | 6/17/2008 | ND | -- | ND | -- | ND | -- |
| N-132 | N-132_1.0-2.0 | 1.0-2.0 | 5/13/2008 | ND | -- | ND | -- | ND | -- |
| N-133 | N-133_1.0-2.0 | 1.0-2.0 | 5/15/2008 | 3.7 | 1.72E-07 | ND | -- | ND | -- |
| N-134 | N-134_1.0-2.0 | 1.0-2.0 | 5/22/2008 | ND | -- | 37 | 3.41E-05 | 4.7 | 0.00008 |
| N-135 | N-135_1.0-2.0 | 1.0-2.0 | 5/15/2008 | ND | -- | 1.5 | 1.38E-06 | 2.1 | 0.00004 |
| N-136 | N-136_1.0-2.0 | 1.0-2.0 | 5/15/2008 | 0.7 | 3.25E-08 | ND | -- | ND | -- |

**Maximum Total Cumulative Risk for Carcinogens:** **5.66E-05**
**Maximum Hazard Index for Non-Carcinogens:** **0.0009**

**Notes:**
ND - Not Detected
**BOLD** - Indicates the location posing the maximum risk of exposure.
(1) All soil samples collected and analyzed were unsaturated.
(2) all samples are located outside SWMU areas.
(3) Maximum Total Cumulative Risk is the combined risk of exposure to the maximum concentrations of carcinogenic compounds benzene and BaP and should be less than 1 in 10,000.

# APPENDIX G

## LNAPL Characterization Data

Appendix G
LNAPL Characterization Data

| Characterization Results Compiled for Current Conditions Report<br>Interpretation of Product Type(s), Proportion, Weathering | | | | | |
|---|---|---|---|---|---|
| **Well ID** | **Density gm/ml (60°F)** | **LNAPL Type(s)** | **Torkelson LNAPL Type(s)** | **Proportion (%)** | **Weathering** |
| N-14 | 0.9299 | Residual Oil | ?Gasoline | 2 | Extreme |
| | | | Residual Oil | 98 | Extreme |
| N-25 | 0.9402 | Residual Oil | Aviation Gasoline | 3 | Extreme |
| | | | Residual Oil | 97 | Extreme |
| N-31 | NS | Lube Oil | Lube Oil | 100 | Extreme |
| N-35 | 0.9205 | Lube Oil | Lube Oil | 90 | Extreme |
| | | | Residual Oil | 10 | Extreme |
| N-48 | 0.9049 | Lube Oil | Lube Oil | 95 | Extreme |
| | | | Unknown Light Material | 5 | High |
| N-52 | 0.8613 | Residual Oil | ? Gasoline | 5 | Extreme |
| | | | Residual Oil | 95 | Extreme |
| N-68 | 0.9211 | Lube Oil/ Middle Distillate | Lube Oil | 50 | Extreme |
| | | | Middle Distillate | 50 | Extreme |
| N-78 | NS | Residual Oil | Residual Oil | 100 | Extreme |
| N-79 | 0.8169 | Middle Distillate | ?Gasoline | 60 | Extreme |
| | | | Middle Distillate | 40 | Severe |
| PZ-204 | 0.9016 | Lube Oil | Lube Oil | 100 | Severe |
| PZ-502 | 0.9155 | Residual Oil | 2-3 unknown products | unknown | unknown |
| | | | Residual Oil | 50 | Extreme |
| **Characterization Results Compiled for AOI 8 Work Plan<br>Interpretation of Product Type(s), Proportion, Weathering** | | | | | |
| N-42 | 0.89 | Residual Oil/Middle Distillate | Middle Distillate | 50 | Extreme |
| | | | Heavier Material | 50 | Extreme |
| N-47 | 0.8834 | Residual Oil | Heavier Material | 80 | Extreme |
| | | | Light Material | 20 | ? |
| N-51 | 0.8995 | Residual Oil | Heavier Material | 65 | Extreme |
| | | | Lube Oil | 20 | Extreme |
| | | | Light Material | 15 | ? |
| N-75 | 0.9371 | Residual Oil | Heavier Material | 75 | Extreme |
| | | | Lube Oil | 25 | Extreme |
| N-76 | 0.8899 | Residual Oil | Heavier Material | 80 | Extreme |
| | | | Light Material | 20 | ? |
| N-82 | 0.9132 | Residual Oil | Heavier Material | 70 | Extreme |
| | | | Aromatics | 30 | ? |
| N-91 | 0.9471 | Residual Oil | Heavier Material | 100 | Extreme |
| N-503 | 0.9065 | Residual Oil | Heavier Material | 75 | Extreme |
| | | | Middle Distillate | 25 | Extreme |
| RW-205 | 0.9112 | Lube Oil/ Middle Distillate | Heavier Material | 50 | Extreme |
| | | | Lube Oil | 50 | Extreme |
| RW-300 | 0.8358 | Residual Oil | Heavier Material | 60 | Extreme |
| | | | Light Material | 30 | ? |
| | | | Stoddard Solvent | 10 | Extreme |
| RW-305 | 0.9186 | Residual Oil | Heavier Material | 100 | Extreme |
| **Characterization Results Compiled for AOI 8 Site Characterization<br>Interpretation of Product Type(s), Proportion, Weathering** | | | | | |
| **Well ID** | **Density gm/ml (60°F)** | **LNAPL Type(s)** | **Torkelson LNAPL Type(s)** | **Proportion (%)** | **Weathering** |
| N-107 | 0.9033 | Middle Distillate | Aviation Gasoline | 5 | Severe |
| | | | Middle Distillate | 70 | Extreme |
| | | | Heavier Material | 25 | Extreme |
| N-113 | 0.9167 | Residual Oil | Unknown Light Mateial | 10 | Extreme |
| | | | ? Middle Distillate | unknown | Extreme |
| | | | Heavier Material | 90 | Extreme |
| N-116 | 0.8985 | Middle Distillate | Unknown Light Mateial | 2 | Severe |
| | | | Middle Distillate | 79 | Extreme |
| | | | Heavier Material | 19 | Extreme |
| N-125 | 0.8922 | Residual Oil | Heavy Virgin Naphtha | 15 | Extreme |
| | | | Heavier Material | 85 | Extreme |
| N-127 | 0.8785 | Residual Oil | Heavy Virgin Naphtha | 20 | Extreme |
| | | | Middle Distillate | 30 | Extreme |
| | | | Heavier Material | 50 | Extreme |
| N-129 | 0.9017 | Residual Oil | Heavy Virgin Naphtha | 5 | Extreme |
| | | | ? Middle Distillate | unknown | Extreme |
| | | | Heavier Material | 95 | Extreme |
| N-130 | 0.7893 | Residual Oil | Heavy Virgin Naphtha | 10 | Extreme |
| | | | ? Middle Distillate | unknown | Extreme |
| | | | Heavier Material | 90 | Extreme |
| N-135 | 0.9148 | Residual Oil | Unknown Light Mateial | 1 | Extreme |
| | | | ? Middle Distillate | unknown | Extreme |
| | | | Heavier Material | 99 | Extreme |

NOTES:
Torkelson notes that "heavier material" could either be crude oil or residual oil. Residual oil was selected due to abundance of residual oil identified in CCR.
? = Tentative identification.

| Sunoco Refinery - Philadelphia | | | | | | |
|---|---|---|---|---|---|---|
| TGI Job 08018 | | | | | | |
| **Interpretation of Product Type(s), Proportions and Weathering** | | | | **Similarities to Other Samples in this Study** | | |
| **Sample** | **Product Type(s)** | **Proportions** | **Weathering** | **Quite Similar to** | **Fairly Similar to** | **Somewhat Similar to** |
| N-42 LNAPL | Middle Distillate | 50 | Extreme | Unique | | |
| | Heavier Material | 50 | Extreme | | RW-300 | N-503 |
| | | | | | | |
| N-47 LNAPL | Heavier Material | 80 | Extreme | N-76 | | |
| | Light Material | 20 | ? | N-76 | | RW-300 |
| | | | | | | |
| N-51 LNAPL | Heavier Material | 65 | Extreme | | RW-205 | |
| | Lube Oil | 20 | Extreme | RW-205 | N-75 | |
| | Light Material | 15 | ? | | RW-300 | |
| | | | | | | |
| N-75 LNAPL | Heavier Material | 75 | Extreme | Unique | | |
| | Lube Oil | 25 | Extreme | | N-51, RW-205 | |
| | | | | | | |
| N-76 LNAPL | Heavier Material | 80 | Extreme | N-47 | | |
| | Light Material | 20 | ? | N-47 | | RW-300 |
| | | | | | | |
| N-82 LNAPL | Heavier Material | 70 | Extreme | Unique | | |
| | Aromatics | 30 | ? | Unique | | |
| | | | | | | |
| N-91 LNAPL | Heavier Material | 100 | Extreme | Unique | | |
| | | | | | | |
| N-503 LNAPL | Heavier Material | 75 | Extreme | | | N-42, RW-300 |
| | Middle Distillate | 25 | Extreme | Unique | | |
| | | | | | | |
| RW-205 LNAPL | Heavier Material | 50 | Extreme | | N-51 | |
| | Lube Oil | 50 | Extreme | N-51 | N-75 | |
| | | | | | | |
| RW-300 LNAPL | Heavier Material | 60 | Extreme | | N-42 | N-503 |
| | Light Material | 30 | ? | | N-51 | N-47, N-76 |
| | Stoddard Solvent | 10 | Extreme | Unique | | |
| | | | | | | |
| RW-305 LNAPL | Heavier Material | 100 | Extreme | Unique | | |
| | | | | | | |
| | Note: Heavier material could be either crude oil or residual oil | | | | | |

# Torkelson Geochemistry, Inc.

2528 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: Sunoco Philadelphia Refinery
Location: Philadelphia, PA

Proj. No.: 2574601
P.O.: 2574601
Sampled By: T. DOERR

Report/Bill To: Joseph Catricks-Langan Engineering
Address:
PO Box 1569, Doylestown, PA 18901-0219

Phone: 215-491-6500
Fax: 215-491-6501
e-mail: jcatricks@langan.com

**Additional Instructions**

Samples to be analyzed for Fingerprint (GC Characterization) and Density . Please include a 'Brief Description' of LNAPL, to be consistent with existing LNAPL types for the project.
Contact Joe Catricks at 215-491-6540 with questions.

Requested Turn-Around Time: Standard

| 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 | RW-305_LNAPL | 2/4/08 | | | 1 | X | X | X | | | | | | | Sampled 1000 |
| 2 | RW-300_LNAPL | 2/4/08 | | | 1 | X | | | | | | | | | Sampled 1040 |
| 3 | N-91_LNAPL | 2/4/08 | | | 1 | X | | | | | | | | | Sampled 1120 |
| 4 | N-51_LNAPL | 2/4/08 | | | 1 | X | | | | | | | | | Sampled 1205 |
| 5 | RW-205_LNAPL | 2/4/08 | | | 1 | X | | | | | | | | | Sampled 1235 |
| 6 | N-76_LNAPL | 2/4/08 | | | 1 | X | | | | | | | | | Sampled 1300 |
| 7 | N-47_LNAPL | 2/4/08 | | | 1 | X | | | | | | | | | Sampled 1315 |
| 8 | N-82_LNAPL | 2/4/08 | | | 1 | X | | | | | | | | | Sampled 1345 |
| 9 | N-42_LNAPL | 2/5/08 | | | 1 | X | | | | | | | | | Sampled 1200 |
| 10 | N-503_LNAPL | 2/5/08 | | | 1 | X | | | | | | | | | Sampled 1240 |

| RELINQUISHED BY | DATE | TIME | ACCEPTED BY | DATE | TIME |
|---|---|---|---|---|---|
| [signature] | 2/7/08 | 0900 | Fed-Ex Box | 2/7/08 | 0900 |
| [signature] | | | [signature] | 2-8-08 | 1310 |
| | | | | | |

# Torkelson Geochemistry, Inc.

2528 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: | Sunoco Philadelphia Refinery |
| Location: | Philadelphia, PA |
| Proj. No.: | 2574601 |
| P.O.: | 2574601 |
| Sampled By: | T. DOEBLER |

| | |
|---|---|
| Report/Bill To: | Joseph Catricks-Langan Engineering |
| Address: | PO Box 1569, Doylestown, PA 18901-0219 |
| Phone: | 215-491-6500 |
| Fax: | 215-491-6501 |
| e-mail: | jcatricks@langan.com |

**Additional Instructions**

Samples to be analyzed for Fingerprint (GC Characterization) and Density . Please include a 'Brief Description' of LNAPL, to be consistent with existing LNAPL types for the project.
Contact Joe Catricks at 215-491-6540 with questions.

Requested Turn-Around Time: Standard

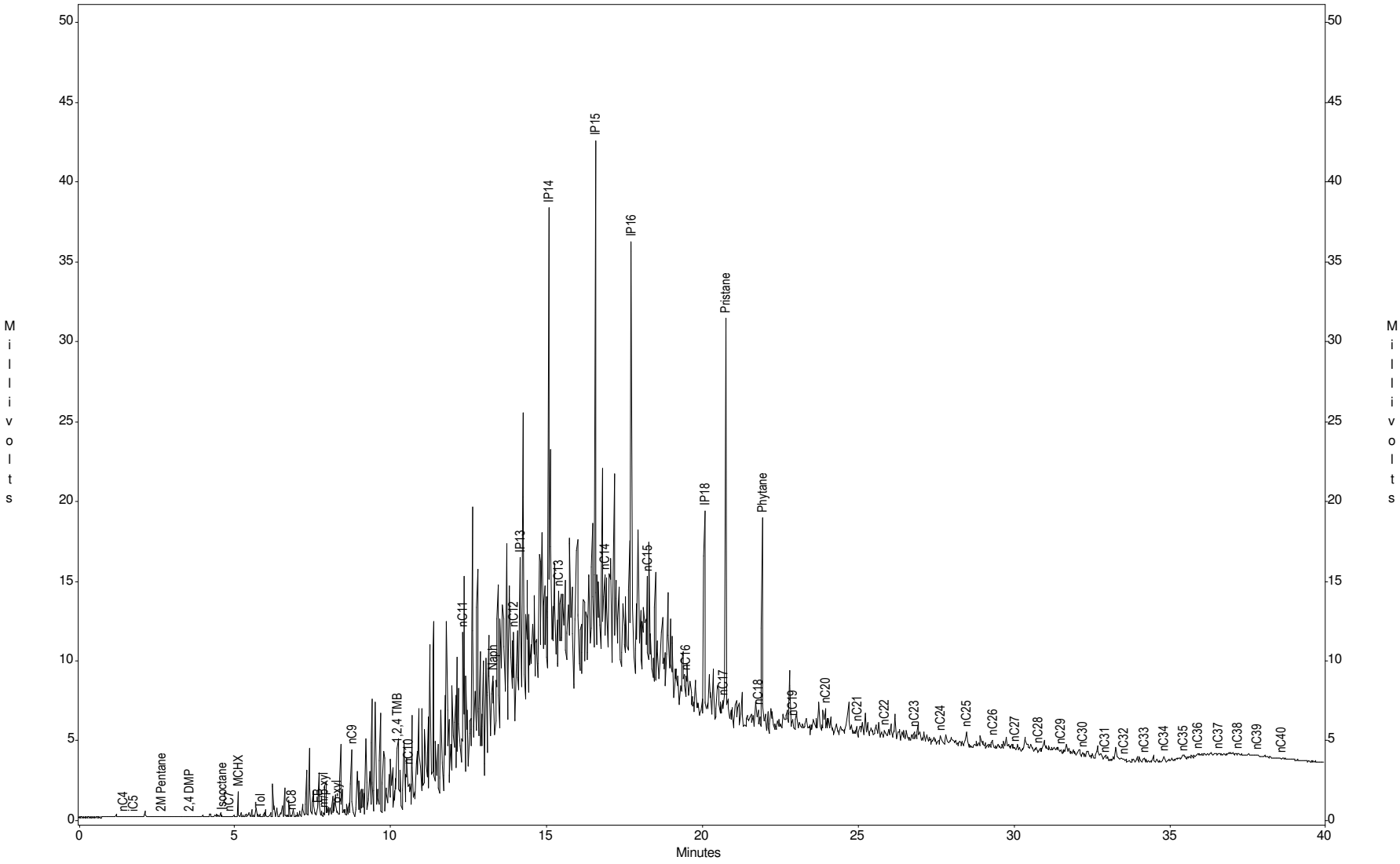
| ITEM NO. | SAMPLE DESCRIPTION | DATE | MATRIX | LAB NO. | Total # OF Vials | PRESERVATIVES: None | GC Characterization | Density | Viscosity | Water Surface Tension | NAPL Surface Tension | NAPL/Water Interfac. Tens. | Lead | Sulfur | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N-75_LNAPL | 2/5/03 | | | 1 | X | x | x | | | | | | | Sampled 1320 |
| 2 | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |

| RELINQUISHED BY | DATE | TIME | ACCEPTED BY | DATE | TIME |
|---|---|---|---|---|---|
| [signature] | 2/7/03 | 0900 | Fed-Ex Box | 2/7/03 | 0900 |
| | | | [signature] | 2-8-03 | 1310 |

# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-42 LNAPL
Acquired : Feb 12, 2008 12:43:00

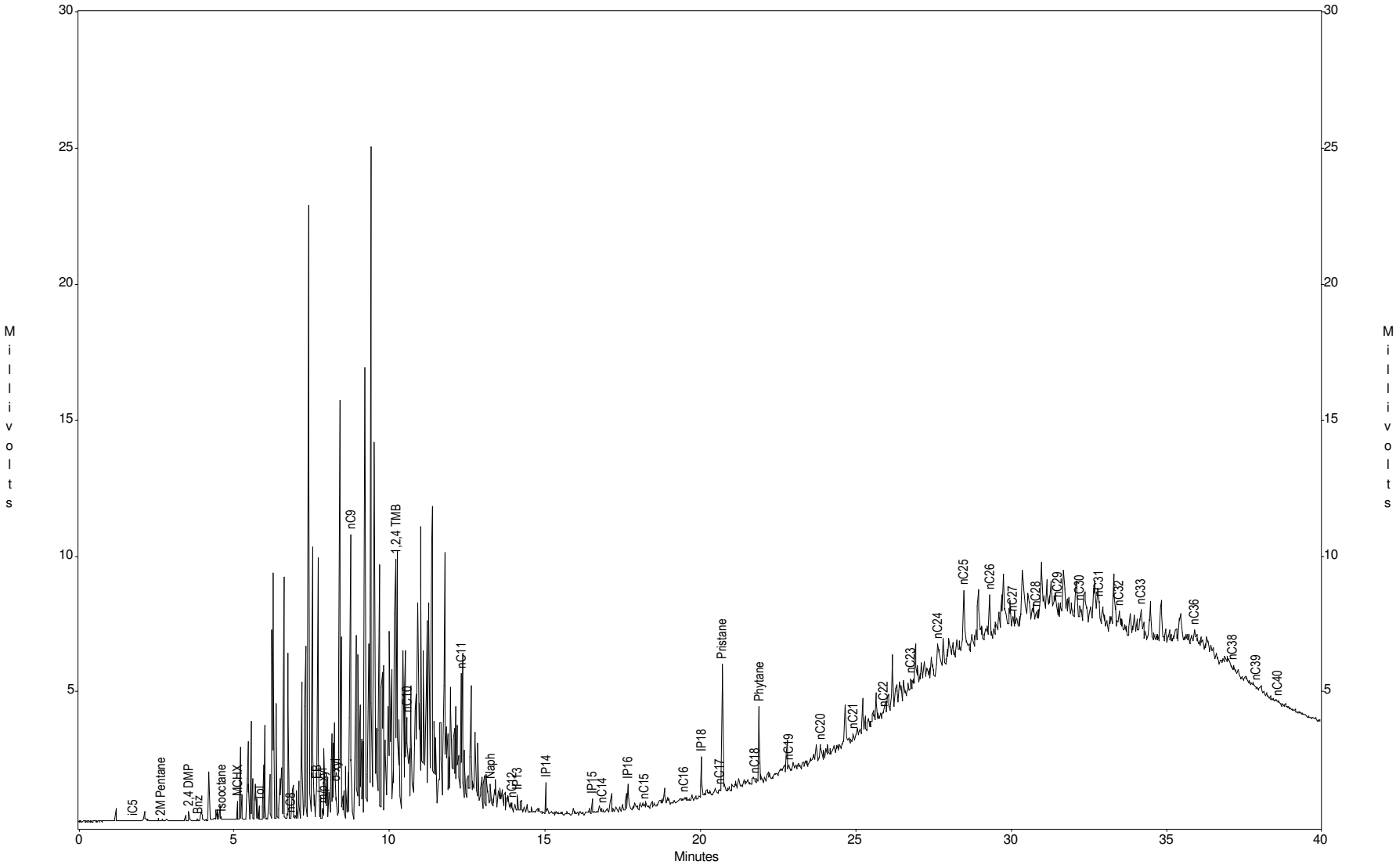
c:\ezchrom\chrom\08018\n-42 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-47 LNAPL
Acquired : Feb 12, 2008 13:32:10

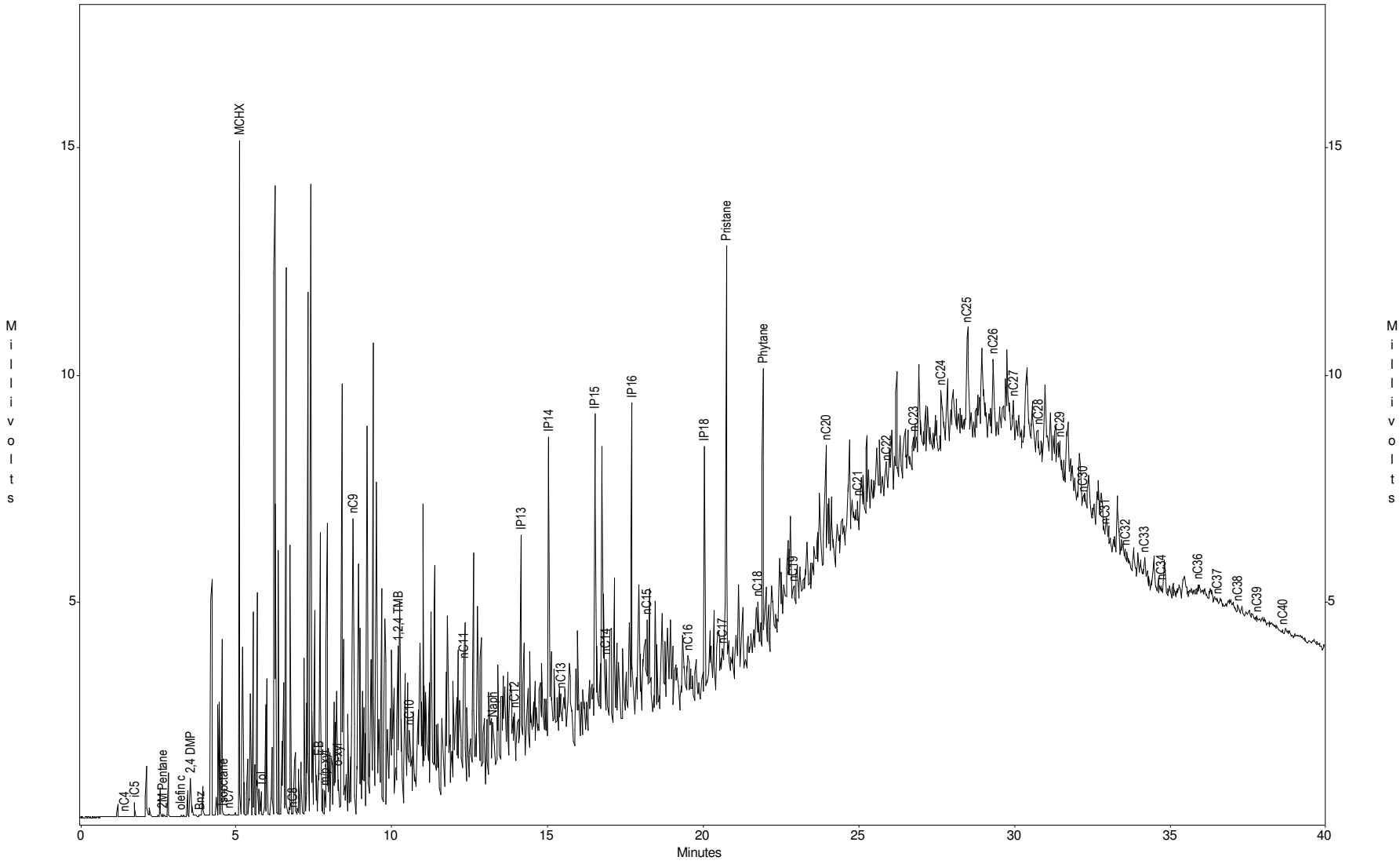
c:\ezchrom\chrom\08018\n-47 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-51 LNAPL
Acquired : Feb 12, 2008 10:07:28

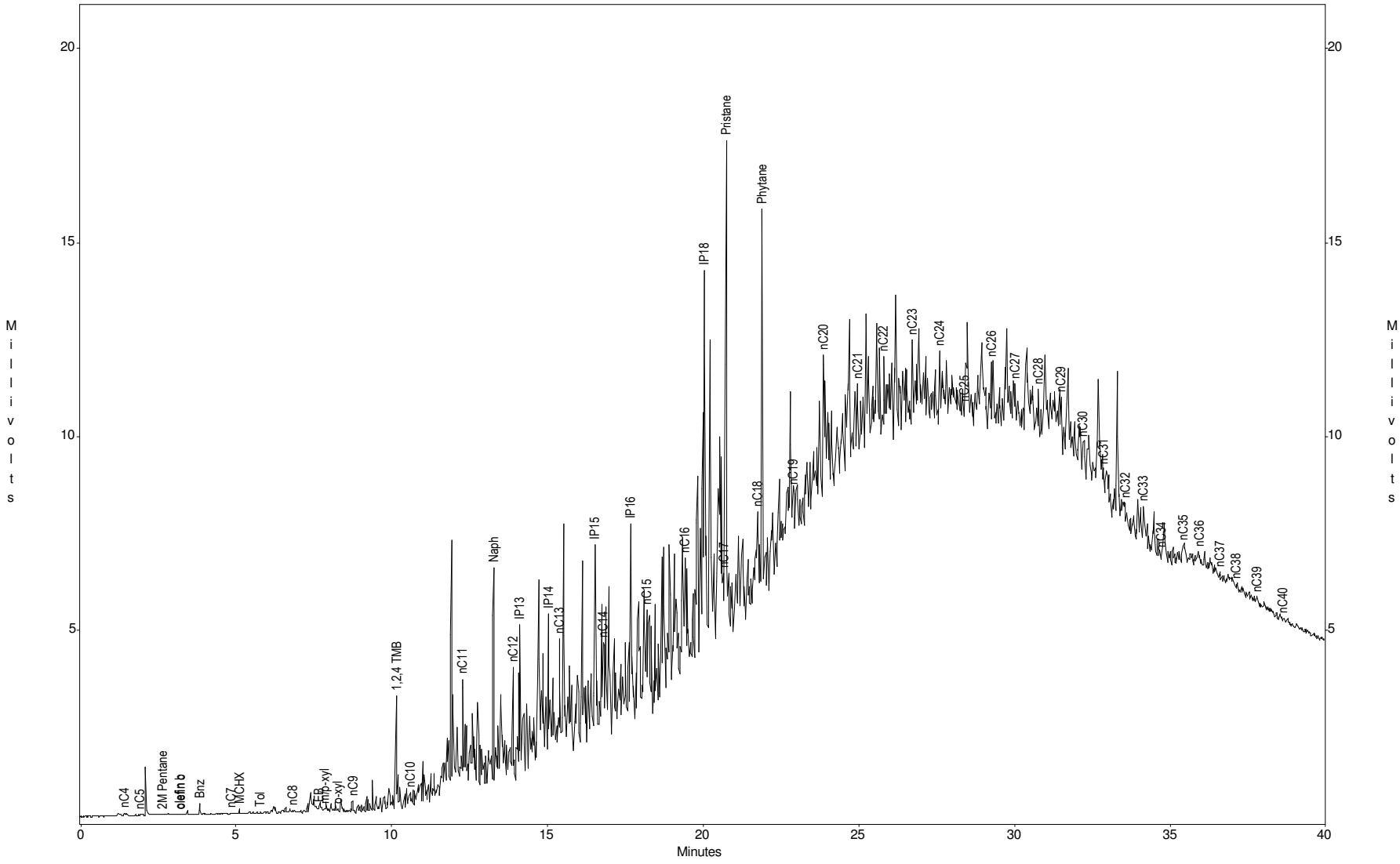
c:\ezchrom\chrom\08018\n-51 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-75 LNAPL
Acquired : Feb 12, 2008 17:47:22

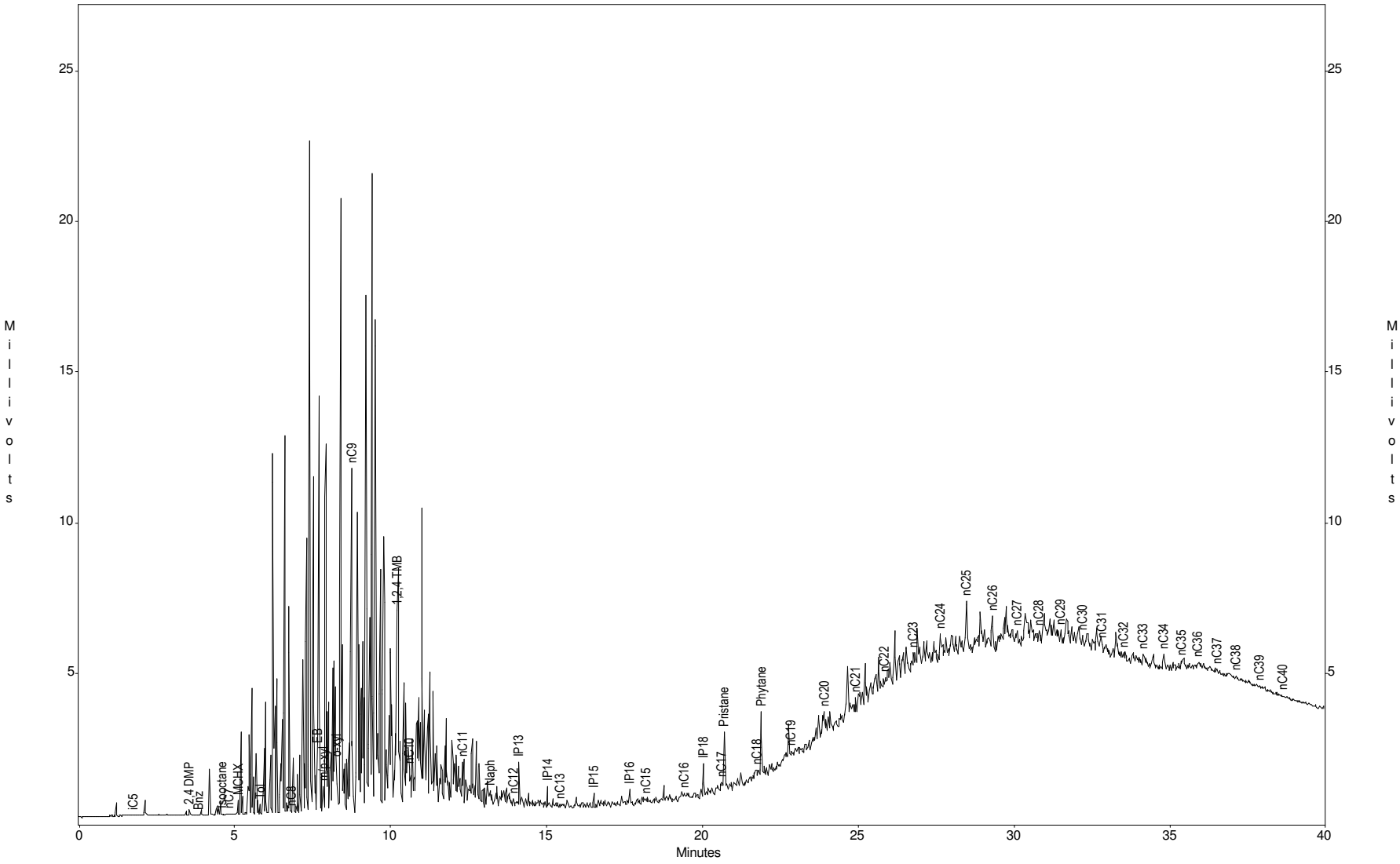
c:\ezchrom\chrom\08018\n-75 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-76 LNAPL
Acquired : Feb 12, 2008 15:14:12

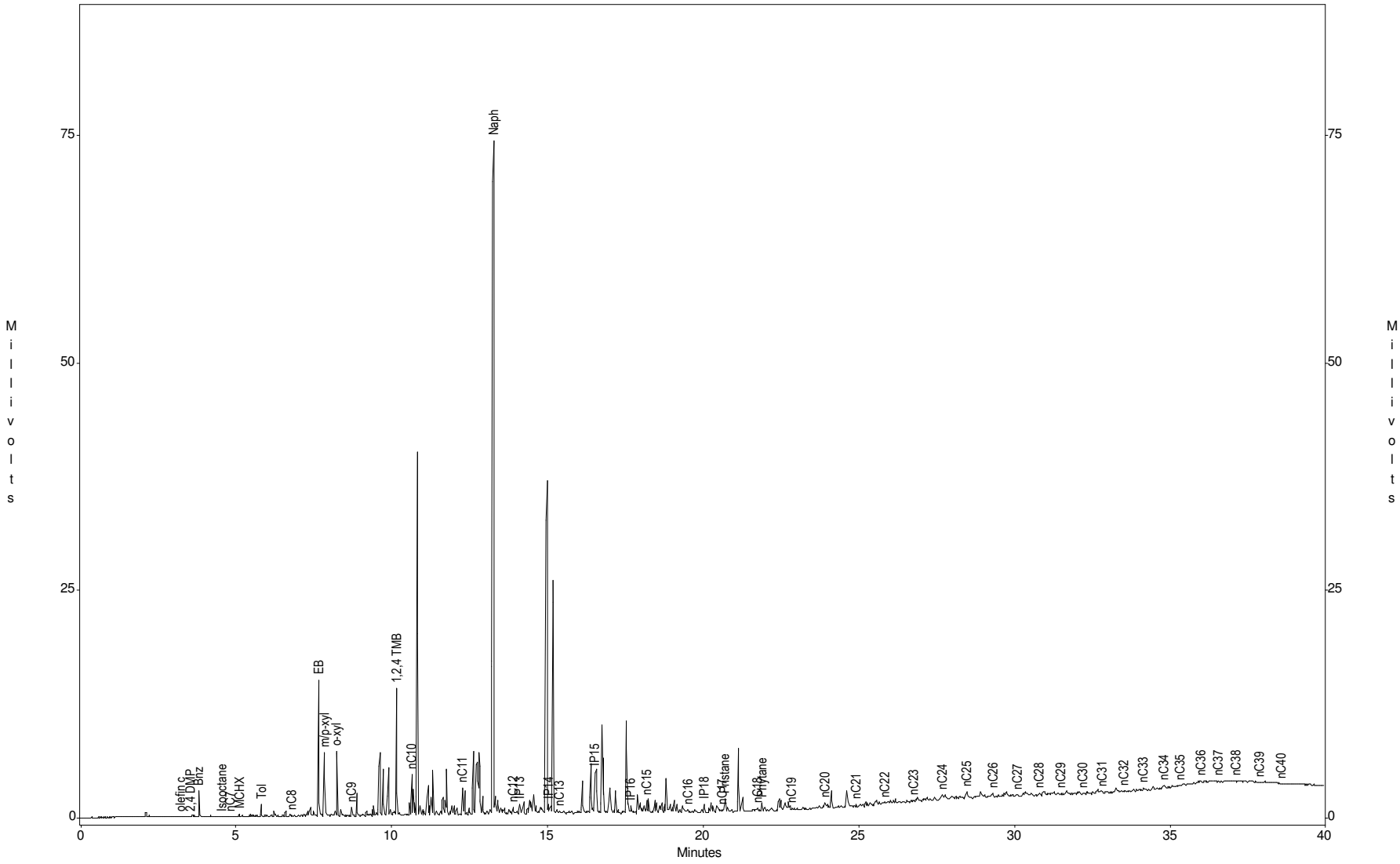
c:\ezchrom\chrom\08018\n-76 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-82 LNAPL
Acquired : Feb 12, 2008 18:57:06

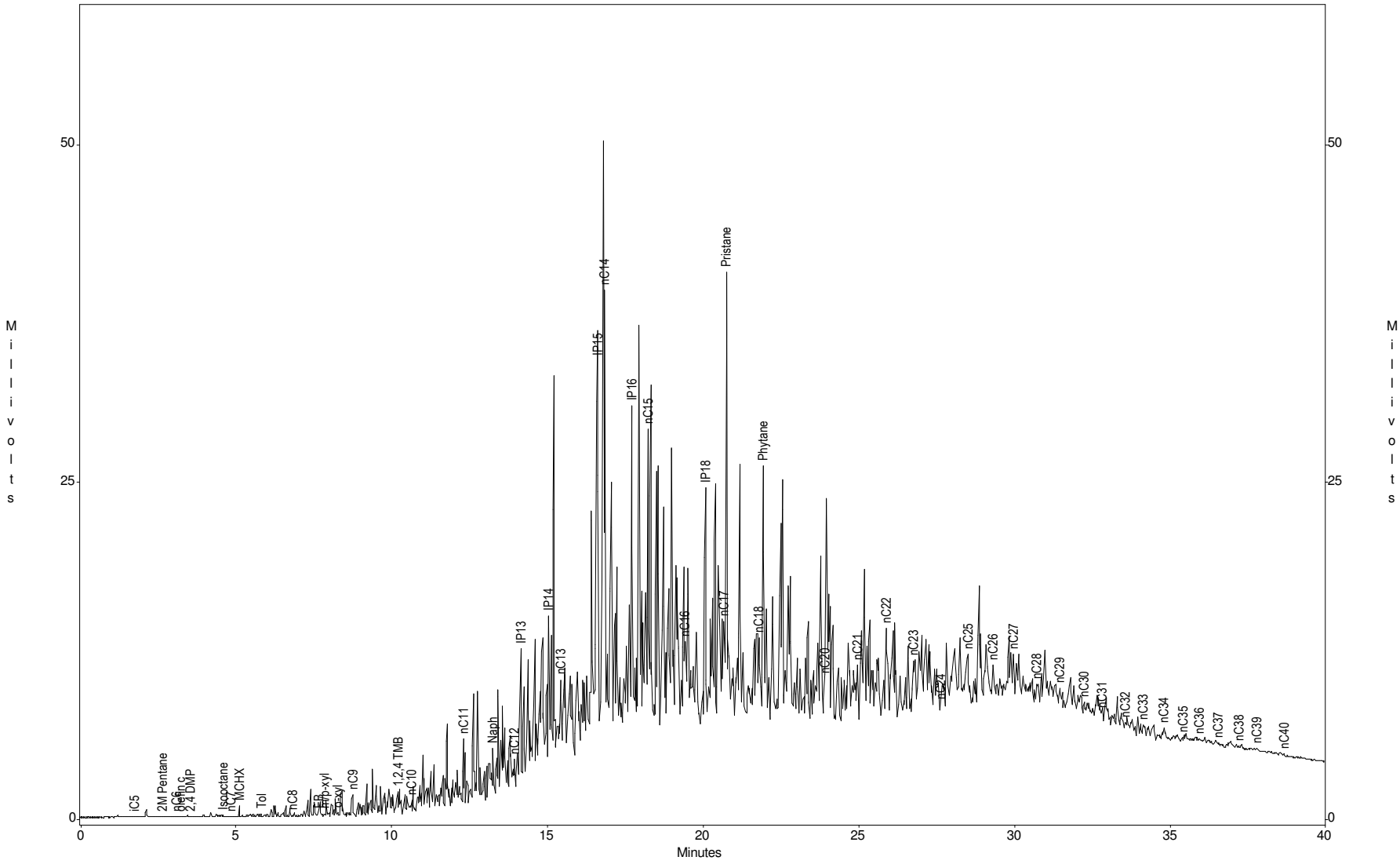
c:\ezchrom\chrom\08018\n-82.2 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-91 LNAPL
Acquired : Feb 12, 2008 16:03:11

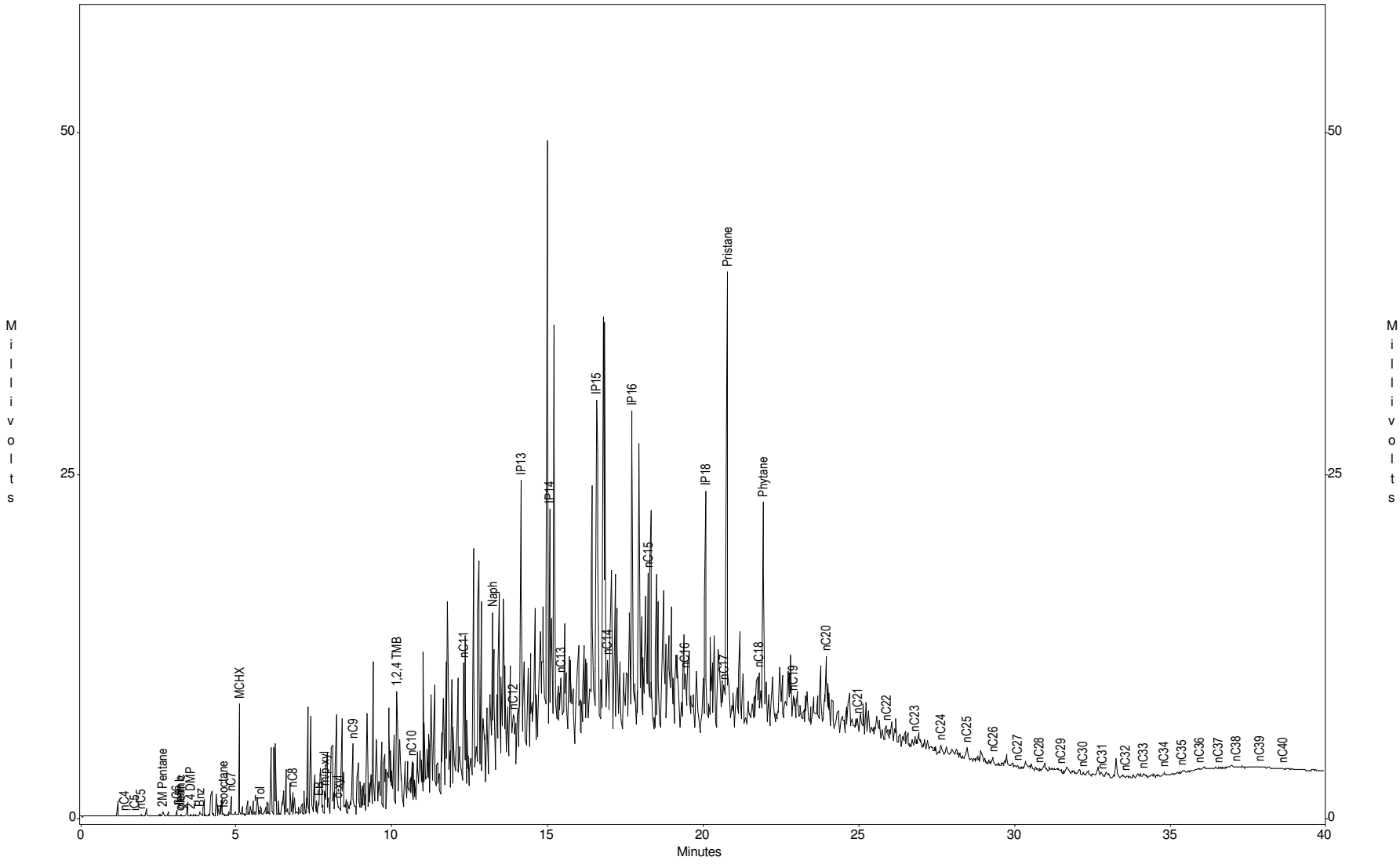
c:\ezchrom\chrom\08018\n-91 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-503 LNAPL
Acquired : Feb 12, 2008 10:55:46

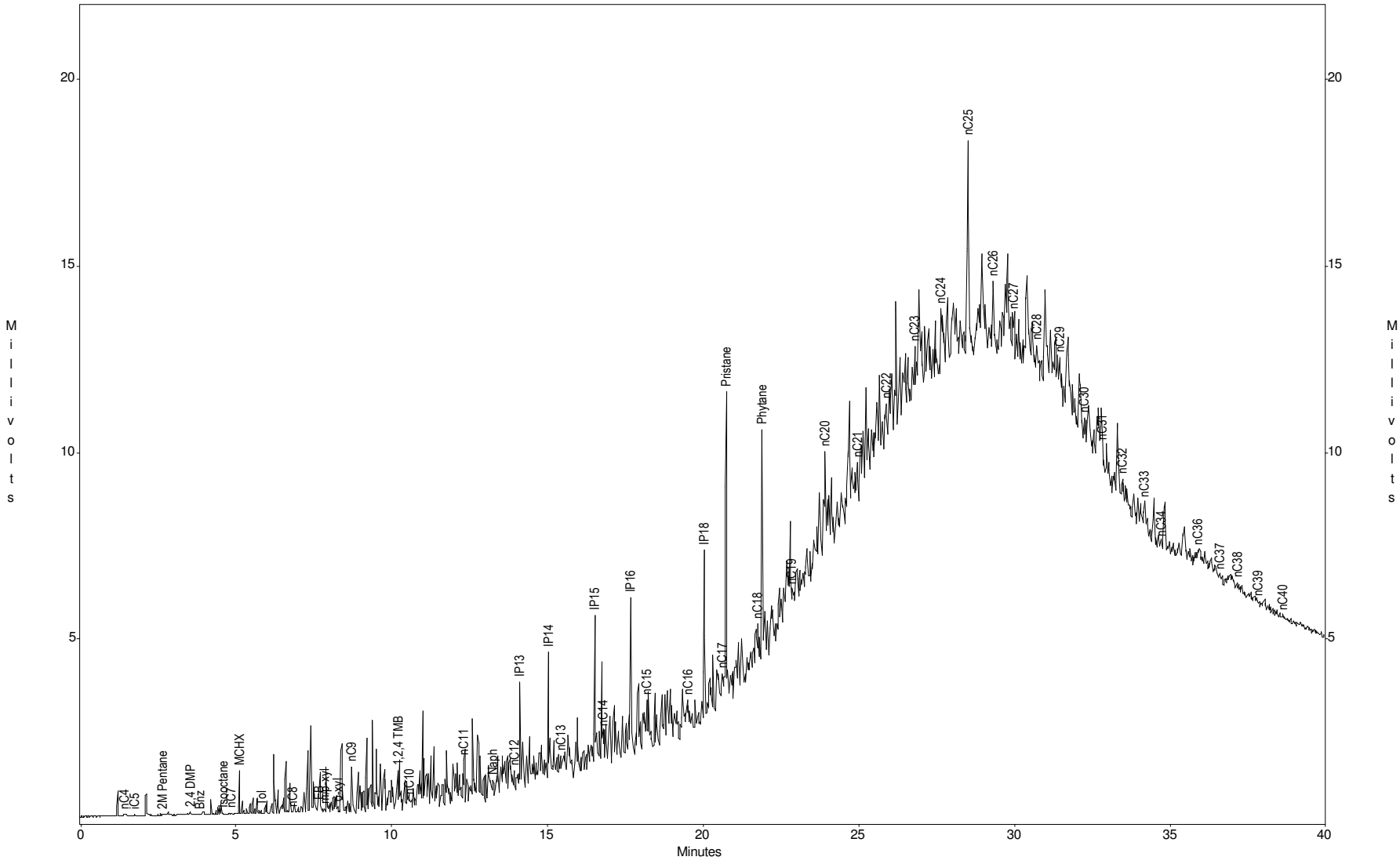
c:\ezchrom\chrom\08018\n-503 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : RW-205 LNAPL
Acquired : Feb 12, 2008 16:51:50

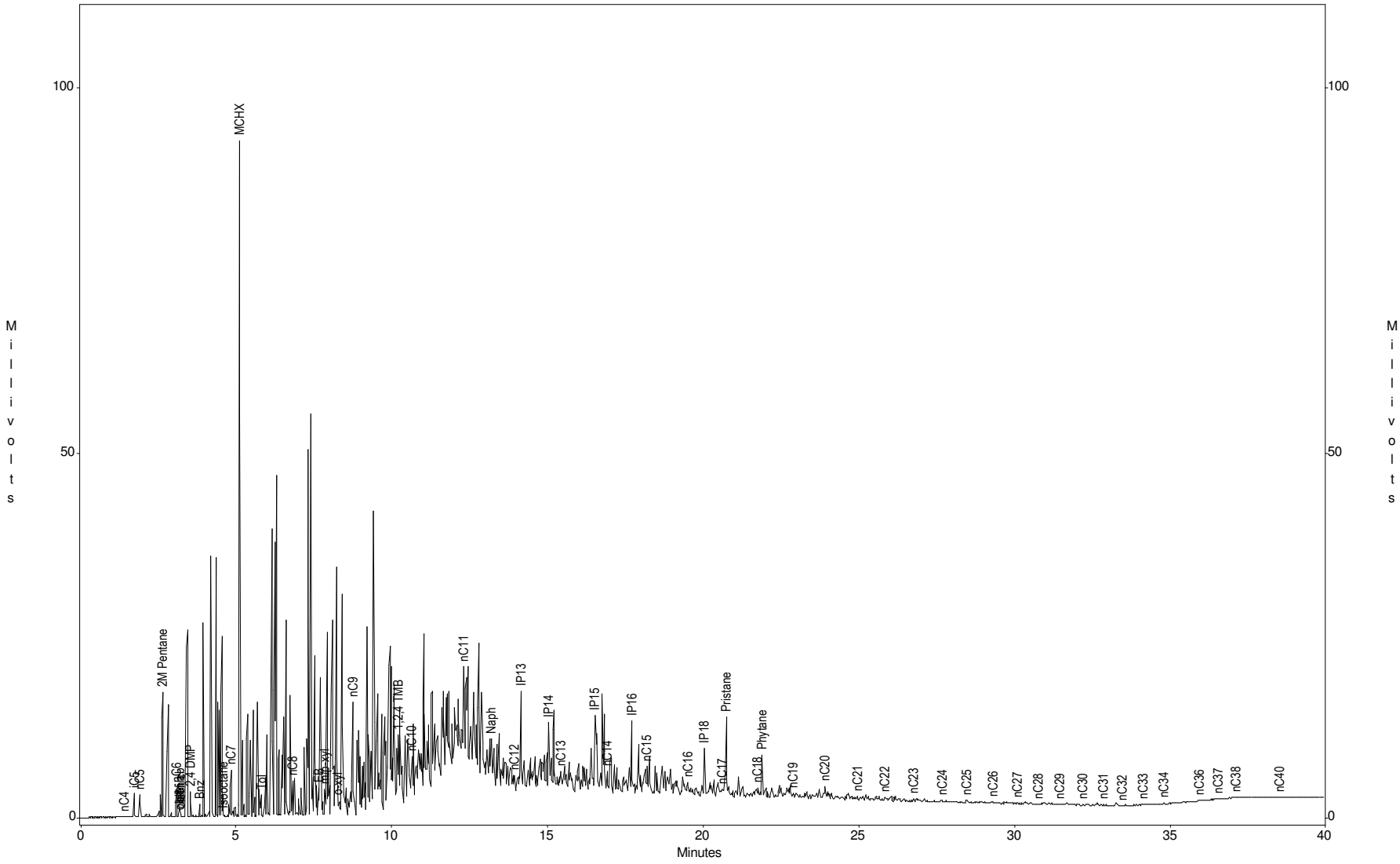
c:\ezchrom\chrom\08018\rw-205 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : RW-300 LNAPL
Acquired : Feb 12, 2008 08:30:15

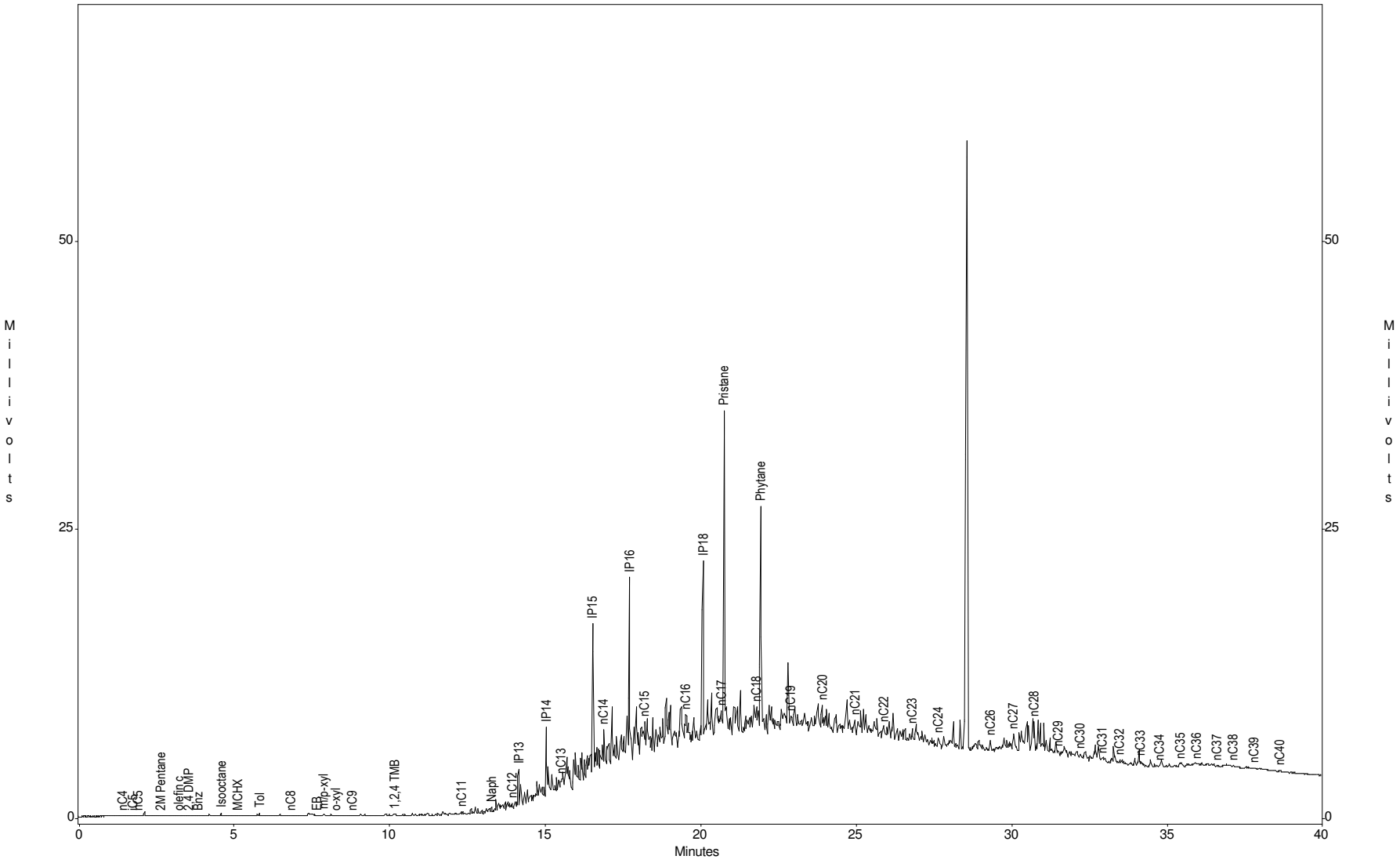
c:\ezchrom\chrom\08018\rw-300 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : RW-305 LNAPL
Acquired : Feb 12, 2008 14:25:40

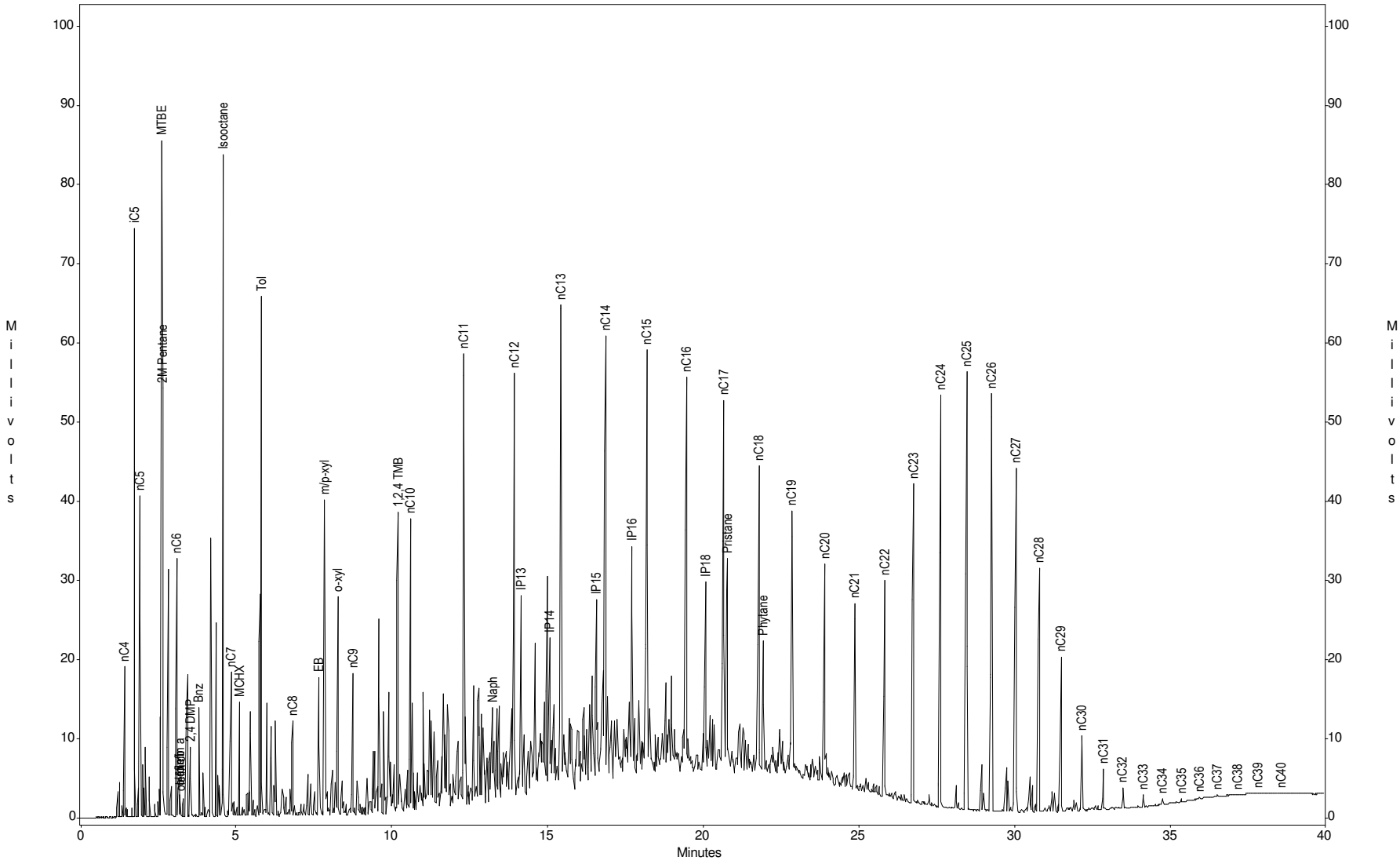
c:\ezchrom\chrom\08018\rw-305 -- Channel A



# Torkelson Geochemistry, Inc.

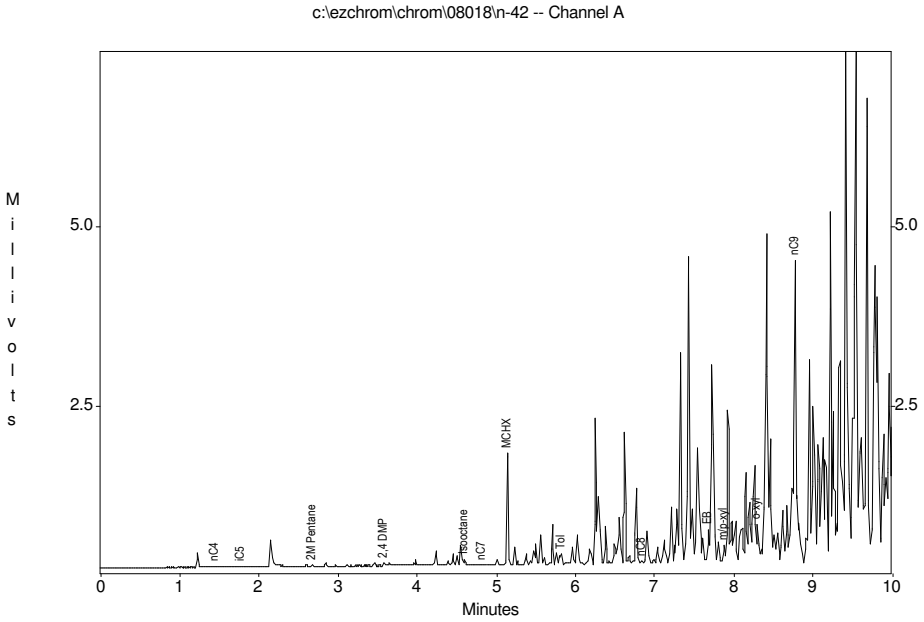
Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : Gas/Dies/Wax std
Acquired : Feb 12, 2008 11:48:01

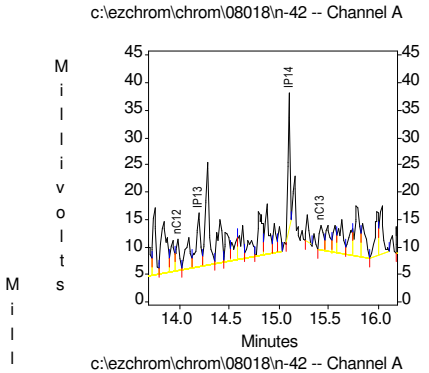
c:\ezchrom\chrom\08018\gadiwax2 -- Channel A

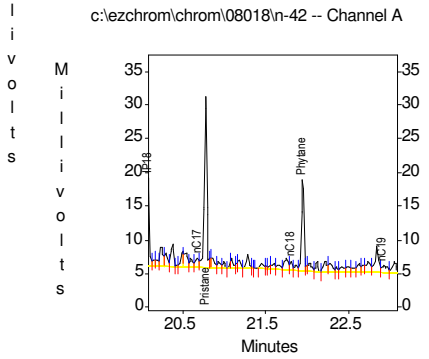


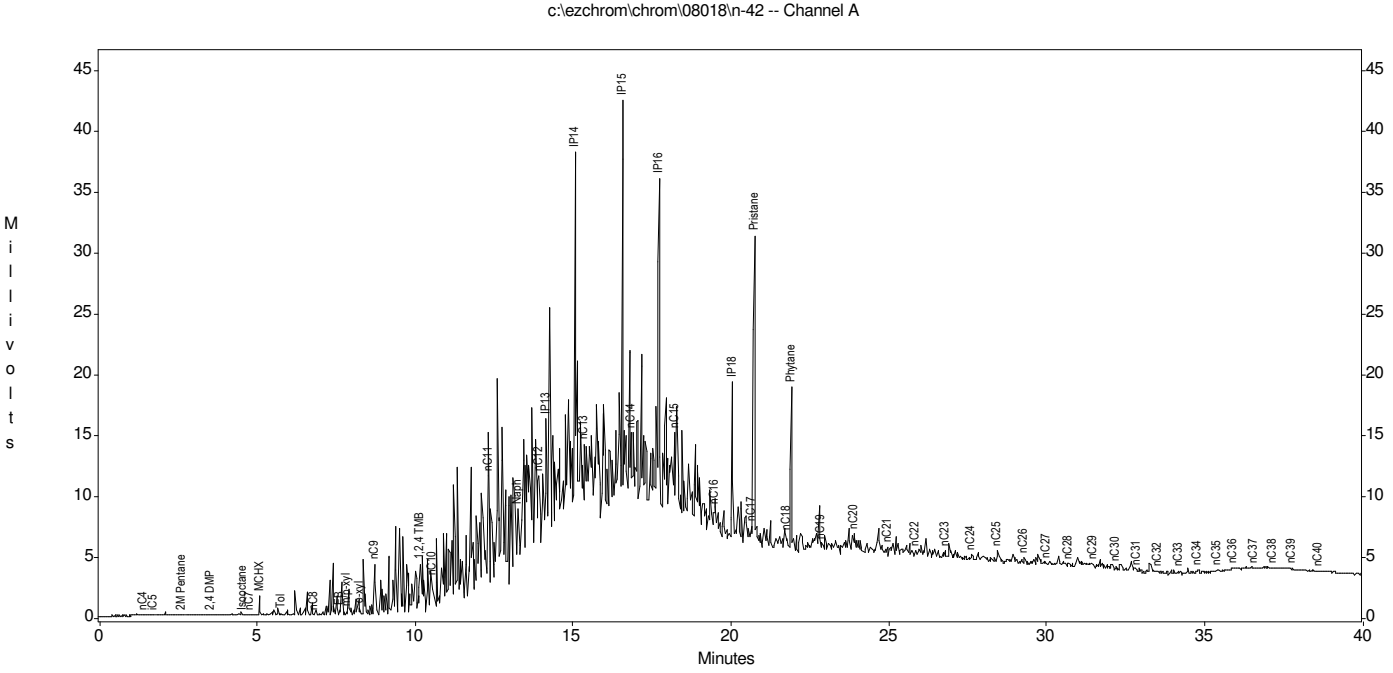
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-42 LNAPL
Acquired : Feb 12, 2008 12:43:00



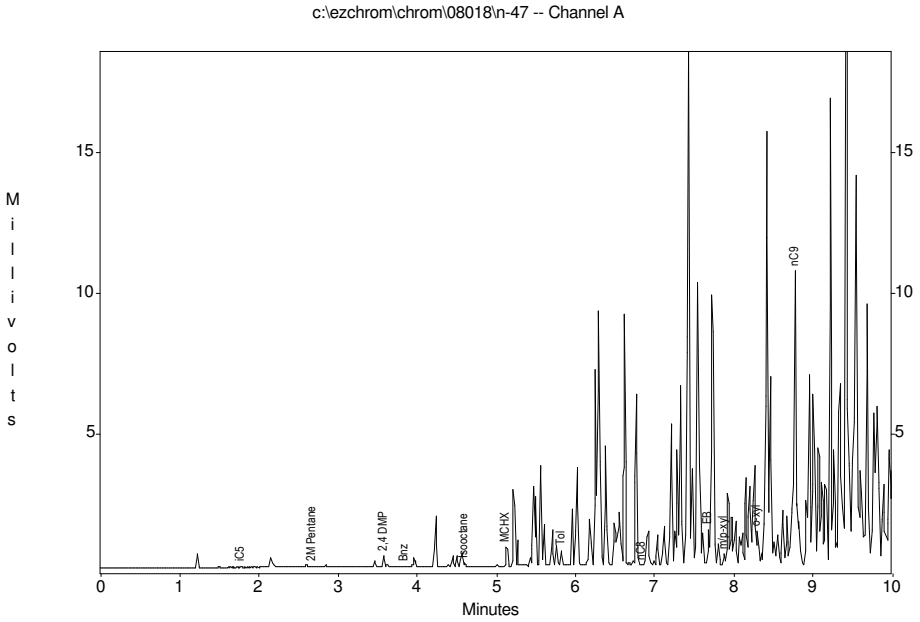



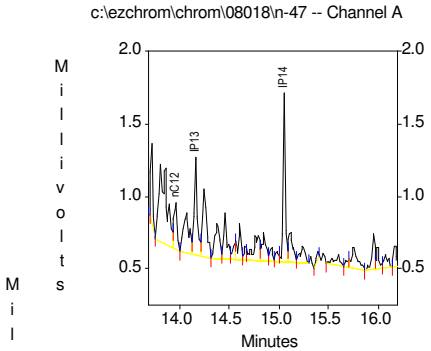

Channel A Results

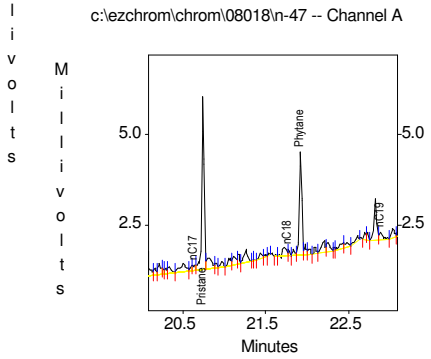
| Peak | Area | Height |
|---|---|---|
| nC4 | 21 | 10 |
| iC5 | 14 | 14 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 16 | 14 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 0 | 0 |
| 2,4 DMP | 54 | 45 |
| Bnz | 0 | 0 |
| Isooctane | 97 | 74 |
| nC7 | 16 | 14 |
| MCHX | 1843 | 1541 |
| Tol | 192 | 148 |
| nC8 | 52 | 34 |
| EB | 693 | 457 |
| m/p-xyl | 442 | 246 |
| o-xyl | 1021 | 524 |
| nC9 | 7723 | 4177 |
| 1,2,4 TMB | 11845 | 3905 |
| nC10 | 3714 | 2390 |
| nC11 | 20500 | 9507 |
| Naph | 25628 | 5399 |
| nC12 | 14996 | 5800 |
| IP13 | 27934 | 9796 |
| IP14 | 33392 | 24802 |
| nC13 | 12922 | 4799 |
| IP15 | 51389 | 31731 |
| nC14 | 14669 | 4894 |
| IP16 | 62858 | 26941 |
| nC15 | 7860 | 4741 |
| nC16 | 3635 | 2046 |
| IP18 | 30794 | 12965 |
| nC17 | 4005 | 1475 |
| Pristane | 57135 | 25486 |
| nC18 | 2650 | 1276 |
| Phytane | 28533 | 13392 |
| nC19 | 4736 | 834 |
| nC20 | 4102 | 1761 |
| nC21 | 1888 | 780 |
| nC22 | 3473 | 648 |
| nC23 | 1810 | 680 |
| nC24 | 1669 | 567 |
| nC25 | 4331 | 898 |
| nC26 | 1727 | 452 |
| nC27 | 288 | 182 |
| nC28 | 279 | 185 |
| nC29 | 479 | 275 |
| nC30 | 157 | 130 |
| nC31 | 65 | 82 |
| nC32 | 174 | 103 |
| nC33 | 135 | 91 |
| nC34 | 292 | 147 |
| nC35 | 167 | 62 |
| nC36 | 362 | 120 |
| nC37 | 266 | 81 |
| nC38 | 272 | 67 |
| nC39 | 180 | 65 |
| nC40 | 31 | 18 |

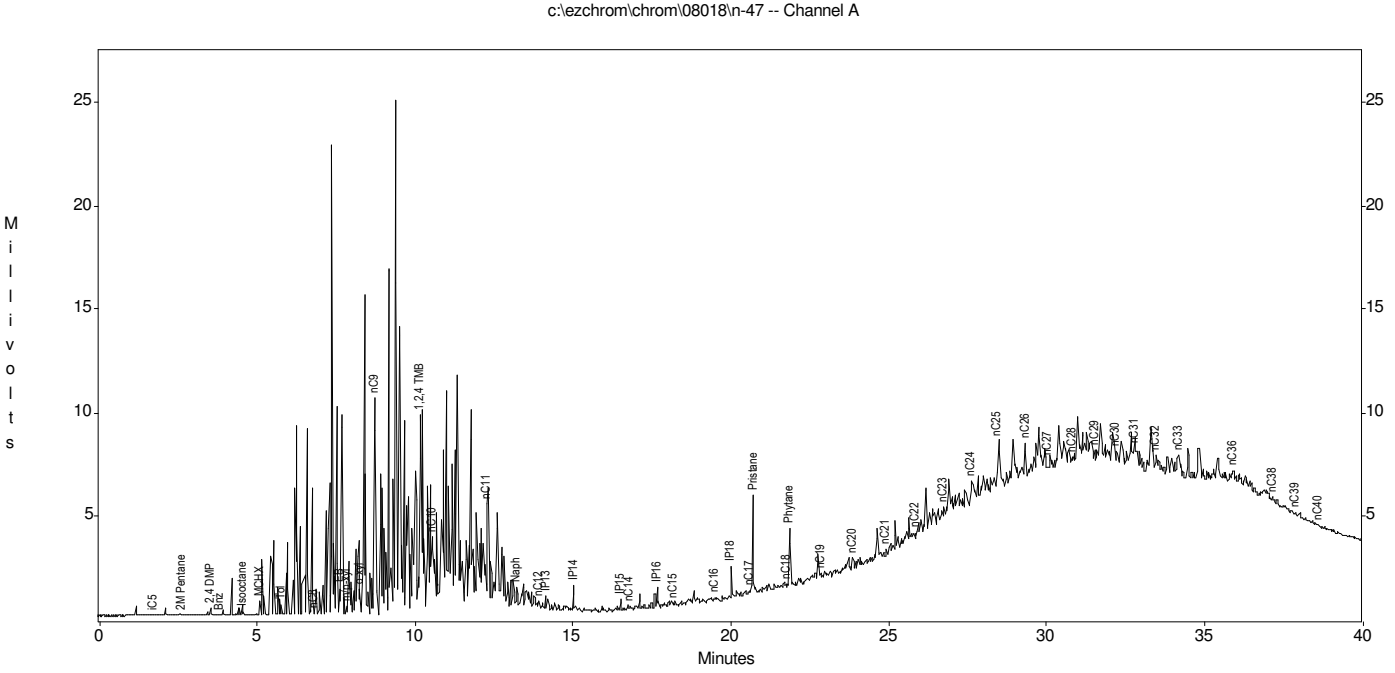
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-47 LNAPL
Acquired : Feb 12, 2008 13:32:10



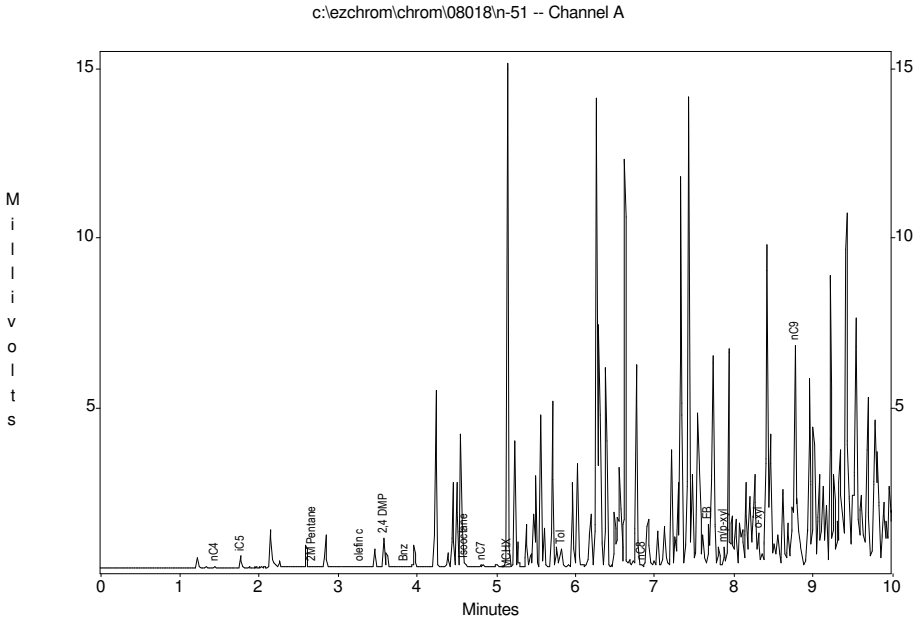



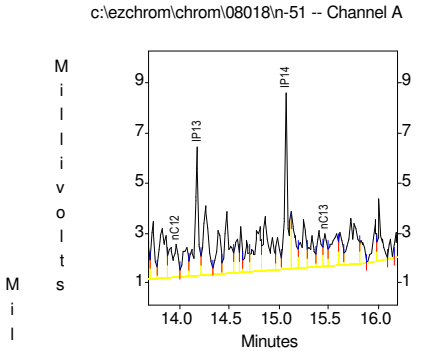

Channel A Results

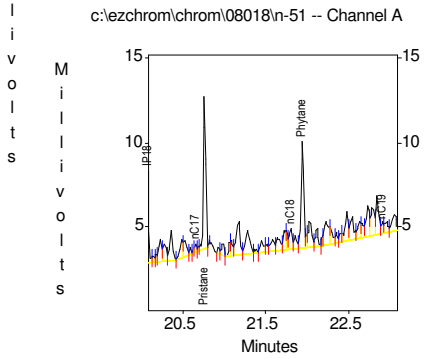
| Peak | Area | Height |
|---|---|---|
| nC4 | 0 | 0 |
| iC5 | 31 | 28 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 21 | 10 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 0 | 0 |
| 2,4 DMP | 381 | 346 |
| Bnz | 12 | 11 |
| Isooctane | 140 | 116 |
| nC7 | 0 | 0 |
| MCHX | 827 | 648 |
| Tol | 653 | 505 |
| nC8 | 90 | 58 |
| EB | 1816 | 1281 |
| m/p-xyl | 664 | 418 |
| o-xyl | 2443 | 1199 |
| nC9 | 20971 | 10457 |
| 1,2,4 TMB | 13818 | 9436 |
| nC10 | 7862 | 3583 |
| nC11 | 10140 | 5022 |
| Naph | 2618 | 858 |
| nC12 | 885 | 321 |
| IP13 | 1413 | 667 |
| IP14 | 1671 | 1167 |
| nC13 | 0 | 0 |
| IP15 | 757 | 523 |
| nC14 | 490 | 161 |
| IP16 | 2062 | 968 |
| nC15 | 443 | 157 |
| nC16 | 470 | 158 |
| IP18 | 4054 | 1522 |
| nC17 | 299 | 178 |
| Pristane | 9856 | 4763 |
| nC18 | 202 | 158 |
| Phytane | 5441 | 2822 |
| nC19 | 727 | 250 |
| nC20 | 1321 | 594 |
| nC21 | 636 | 247 |
| nC22 | 310 | 248 |
| nC23 | 529 | 391 |
| nC24 | 2911 | 1032 |
| nC25 | 10755 | 2250 |
| nC26 | 4959 | 1693 |
| nC27 | 479 | 338 |
| nC28 | 618 | 243 |
| nC29 | 883 | 494 |
| nC30 | 518 | 332 |
| nC31 | 62 | 0 |
| nC32 | 1070 | 493 |
| nC33 | 772 | 333 |
| nC34 | 0 | 0 |
| nC35 | 0 | 0 |
| nC36 | 202 | 191 |
| nC37 | 0 | 0 |
| nC38 | 224 | 111 |
| nC39 | 61 | 81 |
| nC40 | 199 | 45 |

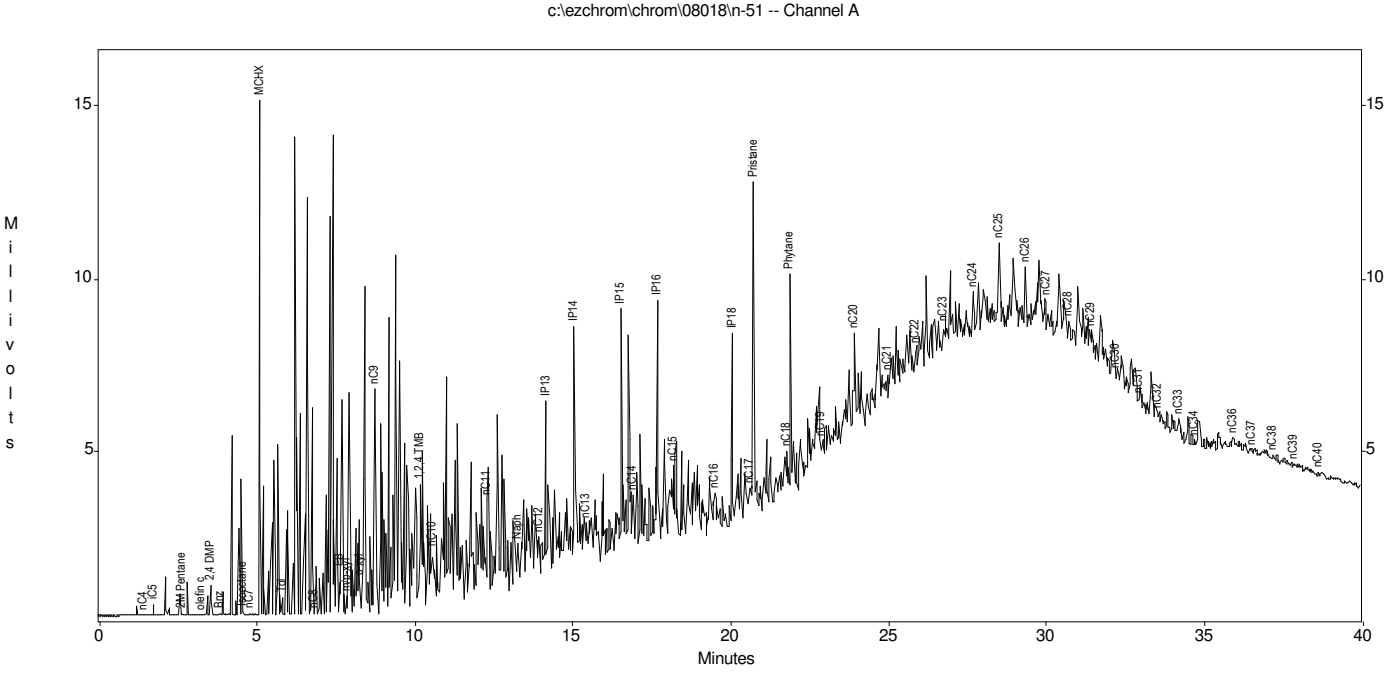
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-51 LNAPL
Acquired : Feb 12, 2008 10:07:28



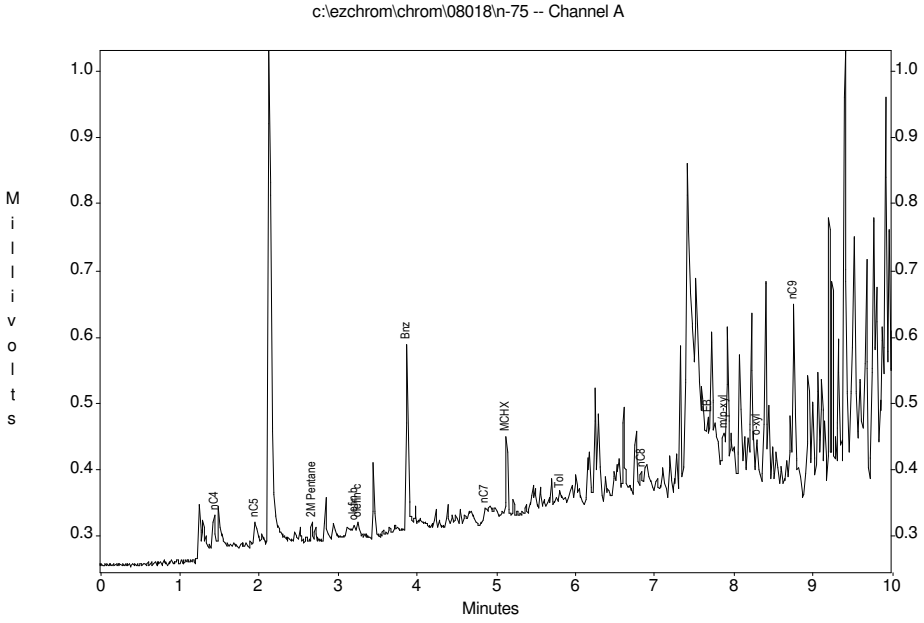

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 15 | 11 |
| iC5 | 293 | 314 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 50 | 41 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 36 | 17 |
| 2,4 DMP | 865 | 830 |
| Bnz | 37 | 27 |
| Isooctane | 125 | 110 |
| nC7 | 57 | 47 |
| MCHX | 17263 | 14823 |
| Tol | 646 | 490 |
| nC8 | 32 | 27 |
| EB | 1619 | 1177 |
| m/p-xyl | 728 | 487 |
| o-xyl | 1354 | 773 |
| nC9 | 11288 | 6441 |
| 1,2,4 TMB | 10062 | 3489 |
| nC10 | 3357 | 1552 |
| nC11 | 5890 | 2739 |
| Naph | 6141 | 1264 |
| nC12 | 6582 | 1283 |
| IP13 | 11907 | 5108 |
| IP14 | 13429 | 7005 |
| nC13 | 3225 | 1265 |
| IP15 | 9666 | 6597 |
| nC14 | 2233 | 1147 |
| IP16 | 13915 | 6905 |
| nC15 | 4776 | 2018 |
| nC16 | 2470 | 1101 |
| IP18 | 12742 | 5478 |
| nC17 | 881 | 436 |
| Pristane | 17031 | 9037 |
| nC18 | 2702 | 1264 |
| Phytane | 14057 | 6326 |
| nC19 | 1544 | 635 |
| nC20 | 6017 | 2656 |
| nC21 | 2138 | 920 |
| nC22 | 4522 | 1016 |
| nC23 | 3340 | 997 |
| nC24 | 4086 | 1342 |
| nC25 | 9484 | 2278 |
| nC26 | 5780 | 1817 |
| nC27 | 2663 | 992 |
| nC28 | 437 | 290 |
| nC29 | 3101 | 748 |
| nC30 | 129 | 90 |
| nC31 | 91 | 87 |
| nC32 | 445 | 163 |
| nC33 | 1282 | 406 |
| nC34 | 228 | 142 |
| nC35 | 0 | 0 |
| nC36 | 226 | 175 |
| nC37 | 78 | 65 |
| nC38 | 155 | 92 |
| nC39 | 50 | 50 |
| nC40 | 150 | 70 |

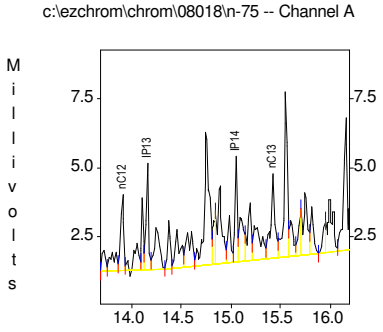
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-75 LNAPL
Acquired : Feb 12, 2008 17:47:22

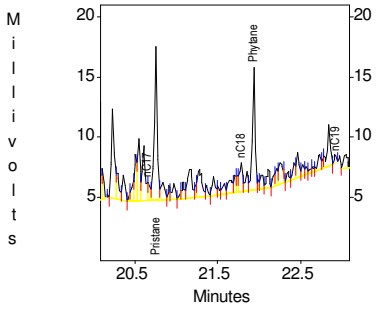
c:\ezchrom\chrom\08018\n-75 -- Channel A



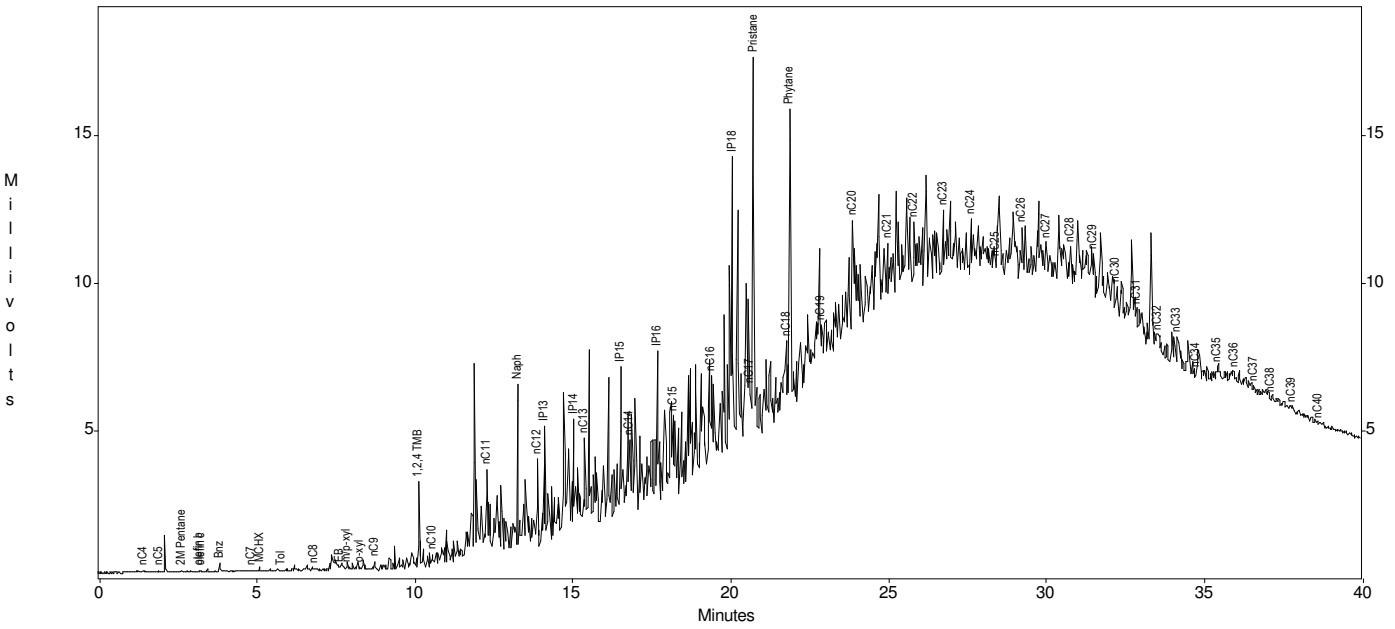

c:\ezchrom\chrom\08018\n-75 -- Channel A




c:\ezchrom\chrom\08018\n-75 -- Channel A




c:\ezchrom\chrom\08018\n-75 -- Channel A

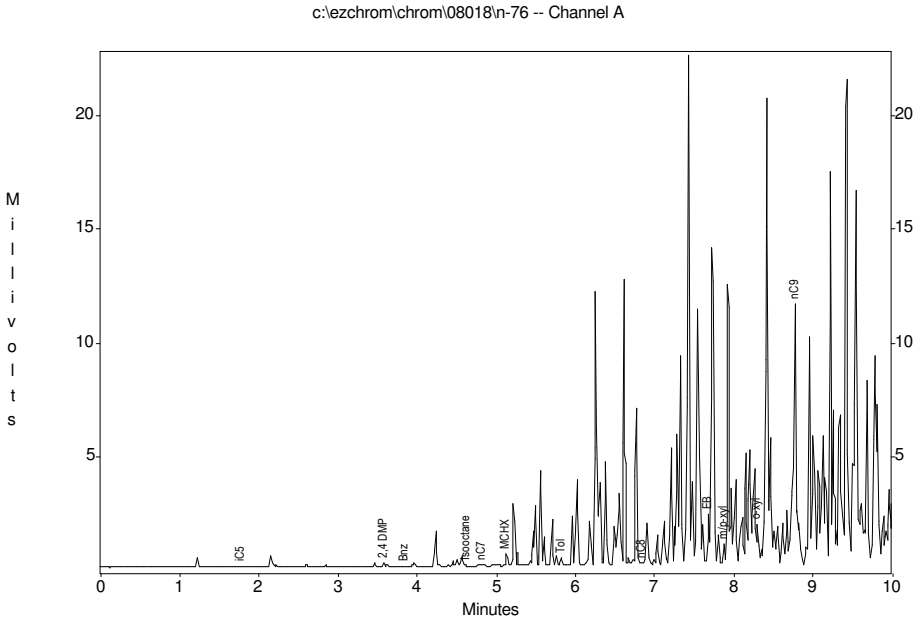


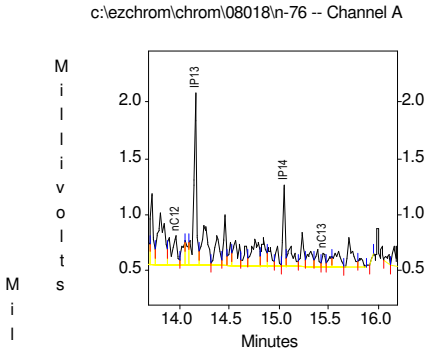

Channel A Results

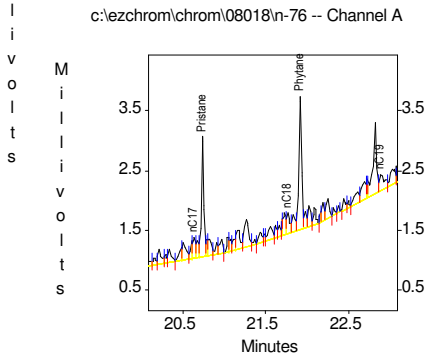
| Peak | Area | Height |
|---|---|---|
| nC4 | 120 | 57 |
| iC5 | 0 | 0 |
| nC5 | 114 | 37 |
| MTBE | 0 | 0 |
| 2M Pentane | 35 | 28 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 11 | 9 |
| olefin c | 36 | 17 |
| 2,4 DMP | 0 | 0 |
| Bnz | 471 | 278 |
| Isooctane | 0 | 0 |
| nC7 | 35 | 14 |
| MCHX | 175 | 120 |
| Tol | 93 | 32 |
| nC8 | 135 | 54 |
| EB | 244 | 129 |
| m/p-xyl | 299 | 104 |
| o-xyl | 272 | 90 |
| nC9 | 659 | 291 |
| 1,2,4 TMB | 4658 | 2913 |
| nC10 | 684 | 373 |
| nC11 | 5838 | 2872 |
| Naph | 8742 | 5477 |
| nC12 | 4869 | 2716 |
| IP13 | 5861 | 3801 |
| IP14 | 6222 | 3806 |
| nC13 | 8486 | 3016 |
| IP15 | 8599 | 4788 |
| nC14 | 7533 | 1933 |
| IP16 | 12324 | 5070 |
| nC15 | 2534 | 1722 |
| nC16 | 8721 | 2885 |
| IP18 | 20344 | 9386 |
| nC17 | 3451 | 1606 |
| Pristane | 32928 | 12733 |
| nC18 | 5938 | 2391 |
| Phytane | 22697 | 10055 |
| nC19 | 1162 | 607 |
| nC20 | 7400 | 3707 |
| nC21 | 4479 | 2097 |
| nC22 | 4811 | 2437 |
| nC23 | 6507 | 2498 |
| nC24 | 2977 | 1686 |
| nC25 | 242 | 258 |
| nC26 | 3499 | 1690 |
| nC27 | 1410 | 965 |
| nC28 | 2367 | 1212 |
| nC29 | 3815 | 1203 |
| nC30 | 1431 | 519 |
| nC31 | 640 | 427 |
| nC32 | 299 | 163 |
| nC33 | 2179 | 796 |
| nC34 | 89 | 112 |
| nC35 | 80 | 102 |
| nC36 | 339 | 177 |
| nC37 | 284 | 159 |
| nC38 | 58 | 101 |
| nC39 | 238 | 107 |
| nC40 | 45 | 55 |

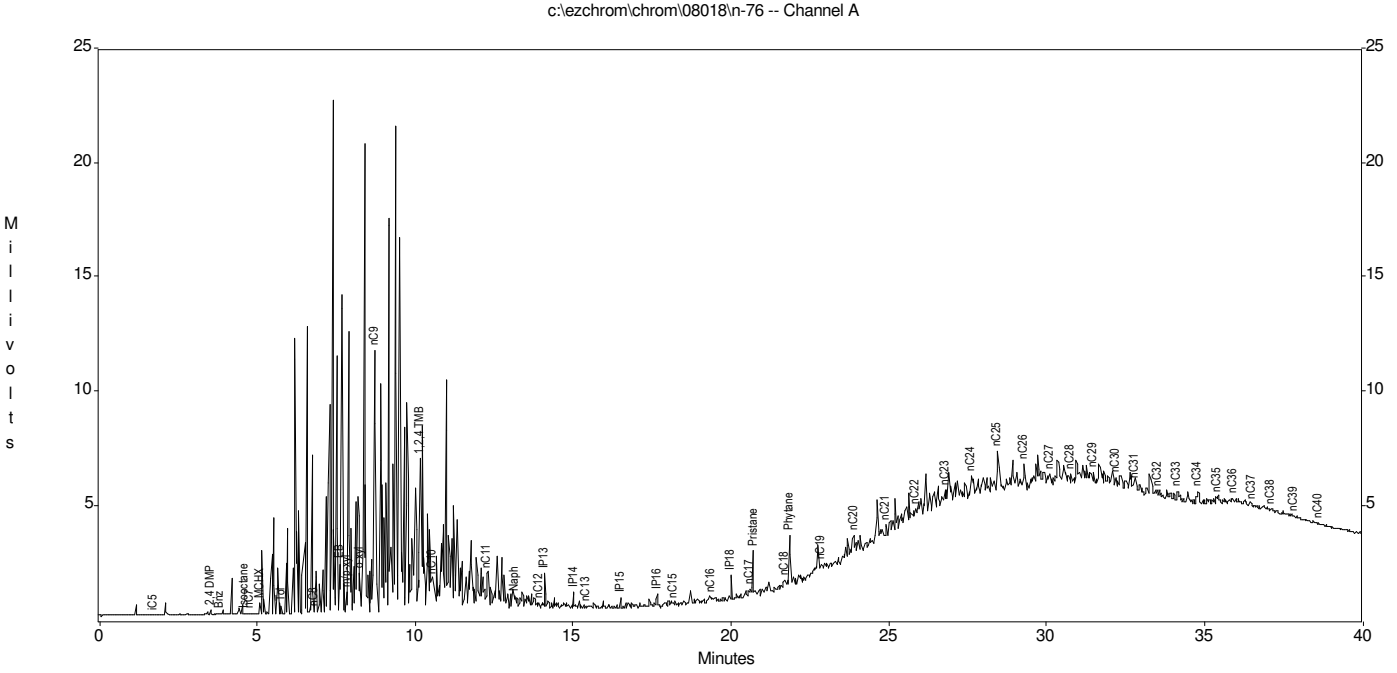
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-76 LNAPL
Acquired : Feb 12, 2008 15:14:12



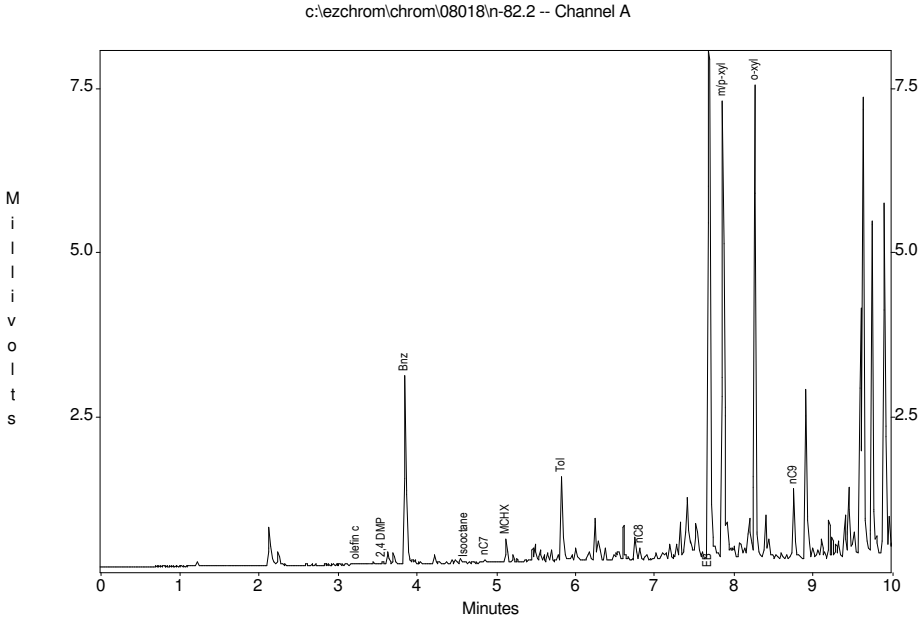

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 0 | 0 |
| iC5 | 15 | 10 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 0 | 0 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 0 | 0 |
| 2,4 DMP | 189 | 168 |
| Bnz | 13 | 7 |
| Isooctane | 12 | 10 |
| nC7 | 82 | 18 |
| MCHX | 615 | 460 |
| Tol | 524 | 334 |
| nC8 | 156 | 100 |
| EB | 3059 | 2173 |
| m/p-xyl | 1457 | 872 |
| o-xyl | 3419 | 1710 |
| nC9 | 21237 | 11428 |
| 1,2,4 TMB | 16615 | 6559 |
| nC10 | 2632 | 1215 |
| nC11 | 2821 | 1361 |
| Naph | 1863 | 547 |
| nC12 | 1235 | 264 |
| IP13 | 2778 | 1532 |
| IP14 | 1081 | 722 |
| nC13 | 256 | 122 |
| IP15 | 715 | 478 |
| nC14 | 0 | 0 |
| IP16 | 1382 | 548 |
| nC15 | 407 | 174 |
| nC16 | 526 | 233 |
| IP18 | 3015 | 1120 |
| nC17 | 720 | 356 |
| Pristane | 4321 | 2018 |
| nC18 | 727 | 346 |
| Phytane | 4804 | 2226 |
| nC19 | 1080 | 268 |
| nC20 | 2588 | 954 |
| nC21 | 2250 | 697 |
| nC22 | 2422 | 726 |
| nC23 | 2431 | 901 |
| nC24 | 2840 | 919 |
| nC25 | 7298 | 1752 |
| nC26 | 3877 | 1124 |
| nC27 | 281 | 130 |
| nC28 | 601 | 412 |
| nC29 | 795 | 411 |
| nC30 | 185 | 201 |
| nC31 | 103 | 89 |
| nC32 | 403 | 154 |
| nC33 | 1035 | 300 |
| nC34 | 945 | 229 |
| nC35 | 241 | 147 |
| nC36 | 416 | 137 |
| nC37 | 188 | 103 |
| nC38 | 247 | 75 |
| nC39 | 63 | 51 |
| nC40 | 51 | 42 |

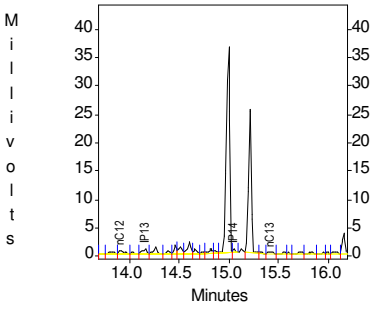
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-82 LNAPL
Acquired : Feb 12, 2008 18:57:06

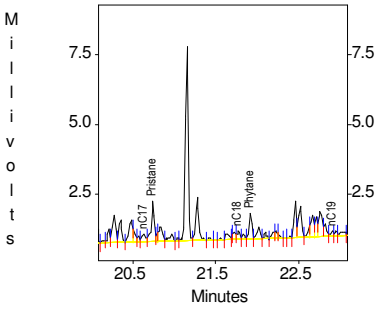
c:\ezchrom\chrom\08018\n-82.2 -- Channel A



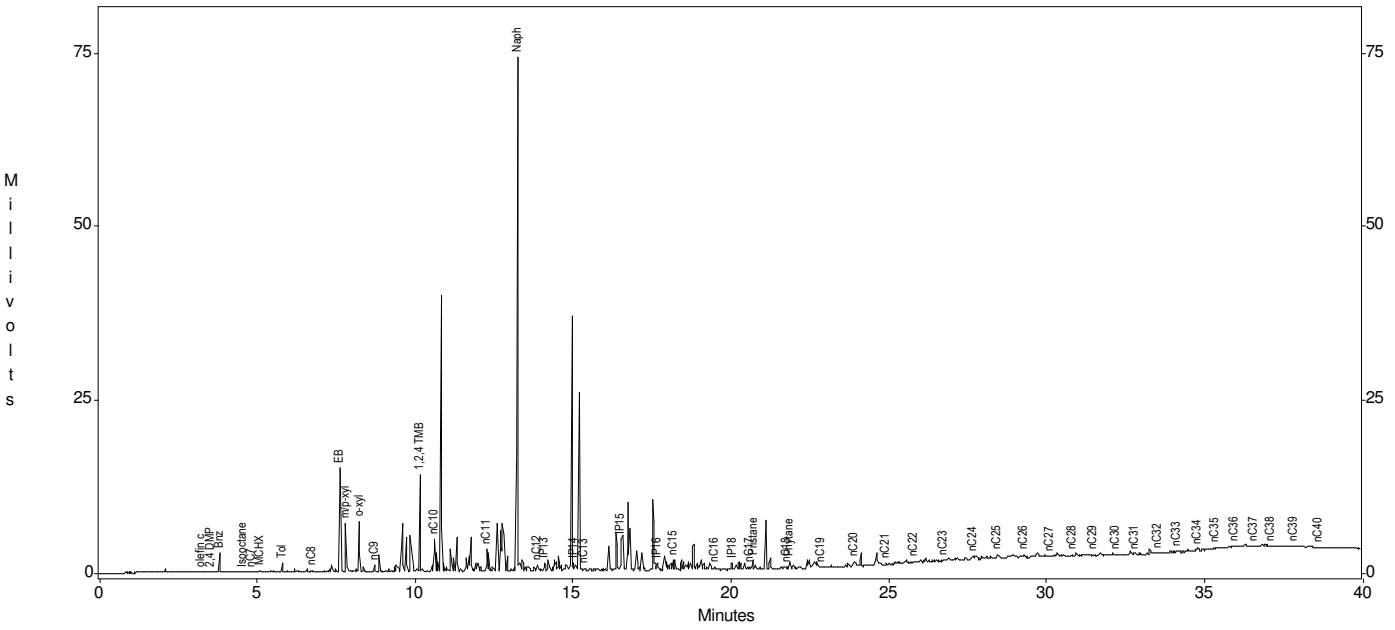

c:\ezchrom\chrom\08018\n-82.2 -- Channel A




c:\ezchrom\chrom\08018\n-82.2 -- Channel A




c:\ezchrom\chrom\08018\n-82.2 -- Channel A

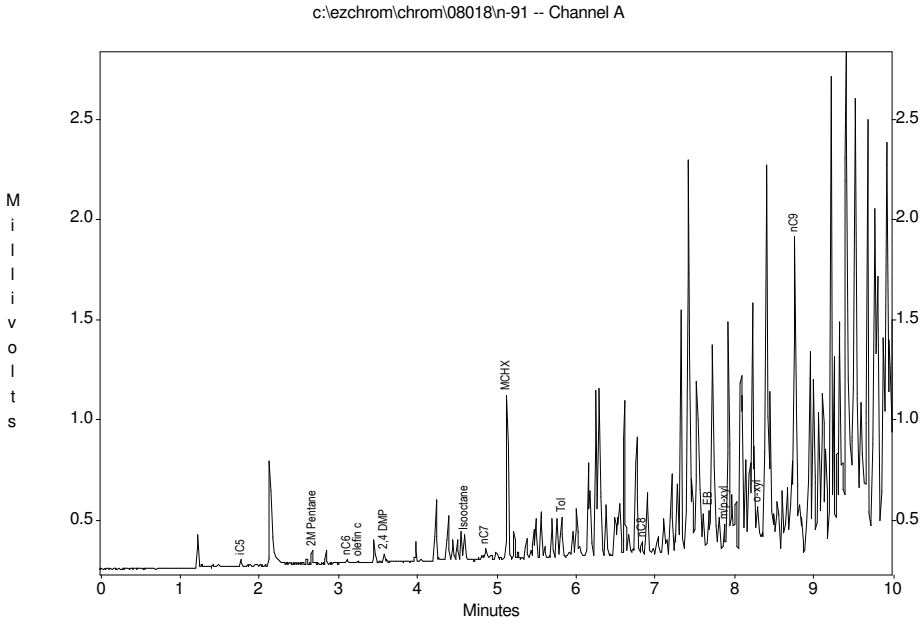


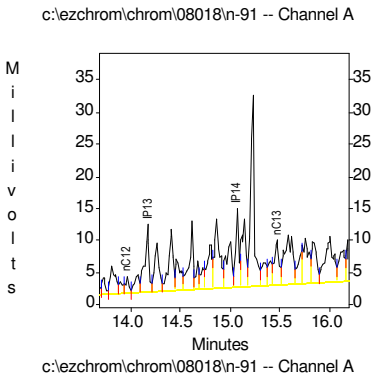

Channel A Results

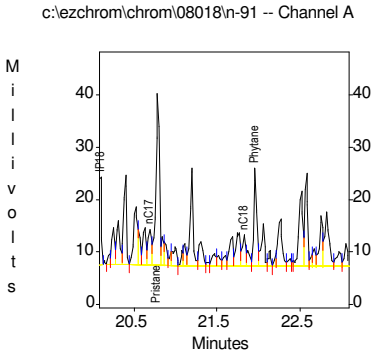
| Peak | Area | Height |
|---|---|---|
| nC4 | 0 | 0 |
| iC5 | 0 | 0 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 0 | 0 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 12 | 7 |
| 2,4 DMP | 42 | 34 |
| Bnz | 3883 | 2869 |
| Isooctane | 12 | 12 |
| nC7 | 91 | 35 |
| MCHX | 486 | 353 |
| Tol | 2186 | 1307 |
| nC8 | 297 | 194 |
| EB | 20013 | 15003 |
| m/p-xyl | 14551 | 6972 |
| o-xyl | 10711 | 7225 |
| nC9 | 1792 | 1057 |
| 1,2,4 TMB | 21422 | 13928 |
| nC10 | 6918 | 4578 |
| nC11 | 5415 | 3012 |
| Naph | 187952 | 73349 |
| nC12 | 2468 | 778 |
| IP13 | 3225 | 1097 |
| IP14 | 1124 | 700 |
| nC13 | 678 | 244 |
| IP15 | 17557 | 4486 |
| nC14 | 0 | 0 |
| IP16 | 3091 | 922 |
| nC15 | 2823 | 1425 |
| nC16 | 1291 | 422 |
| IP18 | 2570 | 997 |
| nC17 | 962 | 272 |
| Pristane | 3817 | 1451 |
| nC18 | 673 | 327 |
| Phytane | 2071 | 923 |
| nC19 | 411 | 177 |
| nC20 | 1966 | 711 |
| nC21 | 478 | 196 |
| nC22 | 1228 | 257 |
| nC23 | 599 | 239 |
| nC24 | 2391 | 529 |
| nC25 | 3136 | 619 |
| nC26 | 1982 | 491 |
| nC27 | 634 | 188 |
| nC28 | 378 | 222 |
| nC29 | 349 | 132 |
| nC30 | 248 | 98 |
| nC31 | 59 | 56 |
| nC32 | 161 | 84 |
| nC33 | 500 | 156 |
| nC34 | 408 | 151 |
| nC35 | 71 | 51 |
| nC36 | 102 | 72 |
| nC37 | 59 | 39 |
| nC38 | 87 | 43 |
| nC39 | 104 | 35 |
| nC40 | 92 | 35 |

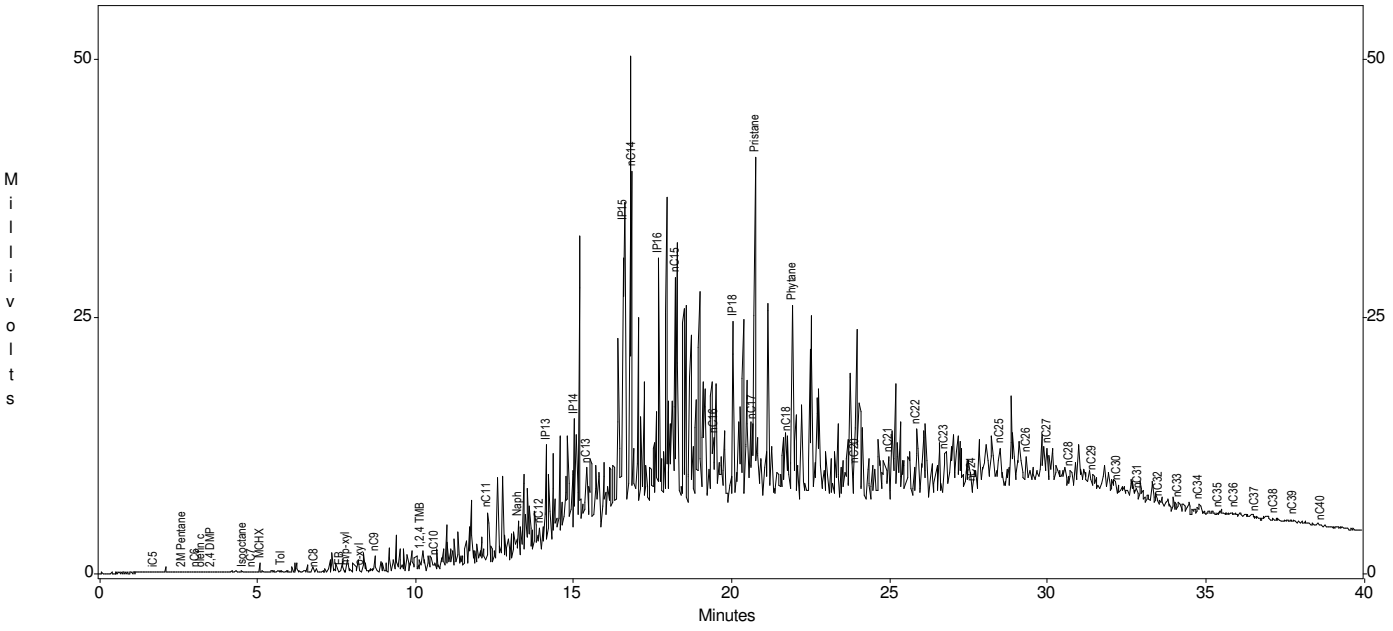
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-91 LNAPL
Acquired : Feb 12, 2008 16:03:11



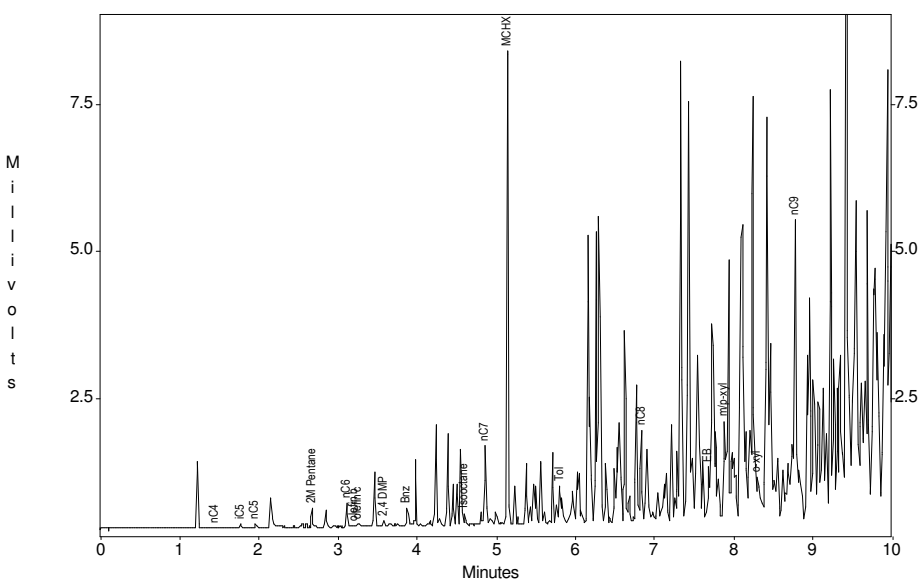

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 0 | 0 |
| iC5 | 26 | 31 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 69 | 64 |
| nC6 | 23 | 19 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 16 | 8 |
| 2,4 DMP | 42 | 37 |
| Bnz | 0 | 0 |
| Isooctane | 148 | 123 |
| nC7 | 97 | 54 |
| MCHX | 1014 | 815 |
| Tol | 378 | 203 |
| nC8 | 102 | 67 |
| EB | 397 | 216 |
| m/p-xyl | 264 | 144 |
| o-xyl | 526 | 232 |
| nC9 | 2921 | 1569 |
| 1,2,4 TMB | 2423 | 1602 |
| nC10 | 788 | 614 |
| nC11 | 8067 | 4743 |
| Naph | 9500 | 3595 |
| nC12 | 6025 | 2284 |
| IP13 | 29603 | 10288 |
| IP14 | 23496 | 12019 |
| nC13 | 19453 | 6923 |
| IP15 | 175043 | 29660 |
| nC14 | 66687 | 34679 |
| IP16 | 80041 | 25407 |
| nC15 | 58839 | 23217 |
| nC16 | 20949 | 6496 |
| IP18 | 44063 | 16745 |
| nC17 | 20303 | 6900 |
| Pristane | 80294 | 32866 |
| nC18 | 14499 | 5930 |
| Phytane | 45712 | 18702 |
| nC19 | 0 | 0 |
| nC20 | 6953 | 3129 |
| nC21 | 10330 | 4076 |
| nC22 | 19220 | 6616 |
| nC23 | 13510 | 4029 |
| nC24 | 364 | 451 |
| nC25 | 21576 | 3747 |
| nC26 | 8164 | 2458 |
| nC27 | 7662 | 2898 |
| nC28 | 3624 | 1311 |
| nC29 | 4517 | 1379 |
| nC30 | 1825 | 694 |
| nC31 | 62 | 0 |
| nC32 | 545 | 353 |
| nC33 | 1020 | 347 |
| nC34 | 992 | 418 |
| nC35 | 359 | 187 |
| nC36 | 447 | 121 |
| nC37 | 117 | 73 |
| nC38 | 119 | 76 |
| nC39 | 483 | 174 |
| nC40 | 257 | 86 |

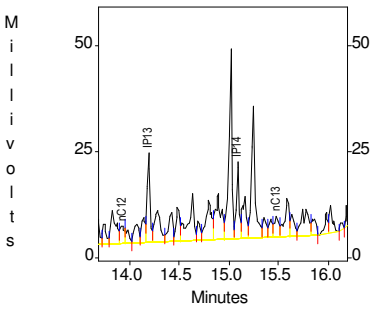
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : N-503 LNAPL
Acquired : Feb 12, 2008 10:55:46

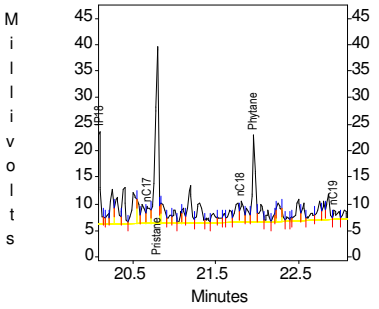
c:\ezchrom\chrom\08018\n-503 -- Channel A



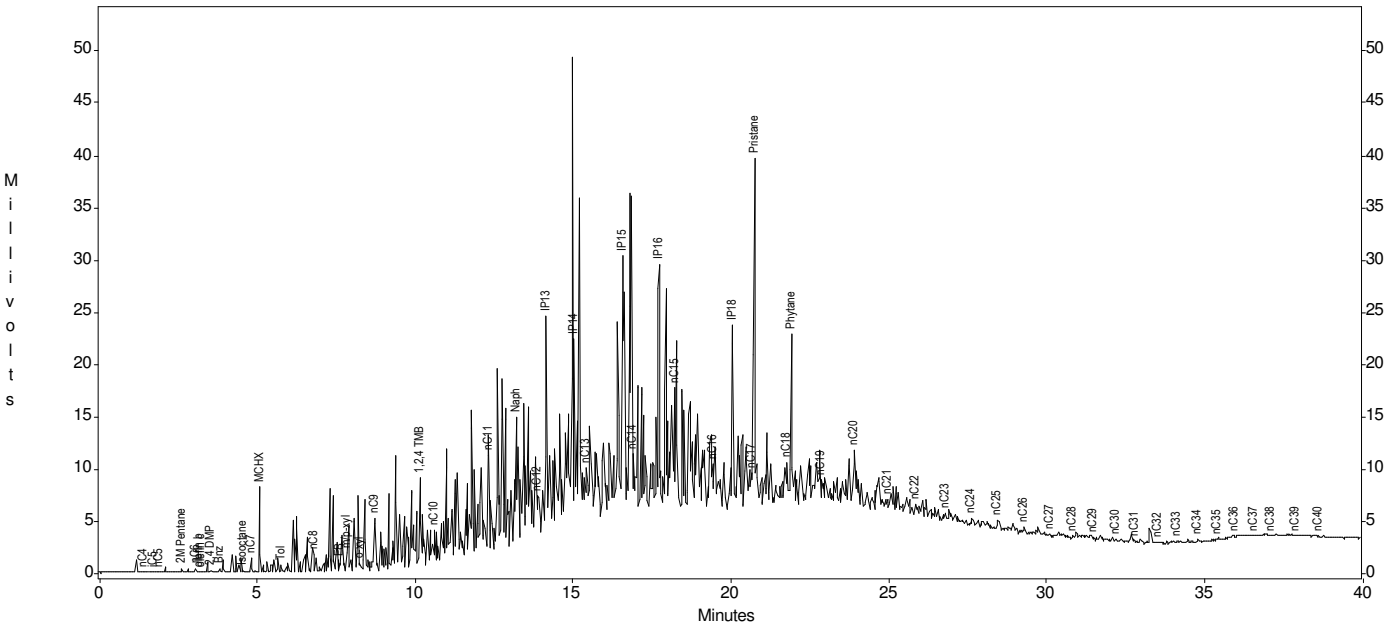

c:\ezchrom\chrom\08018\n-503 -- Channel A




c:\ezchrom\chrom\08018\n-503 -- Channel A




c:\ezchrom\chrom\08018\n-503 -- Channel A



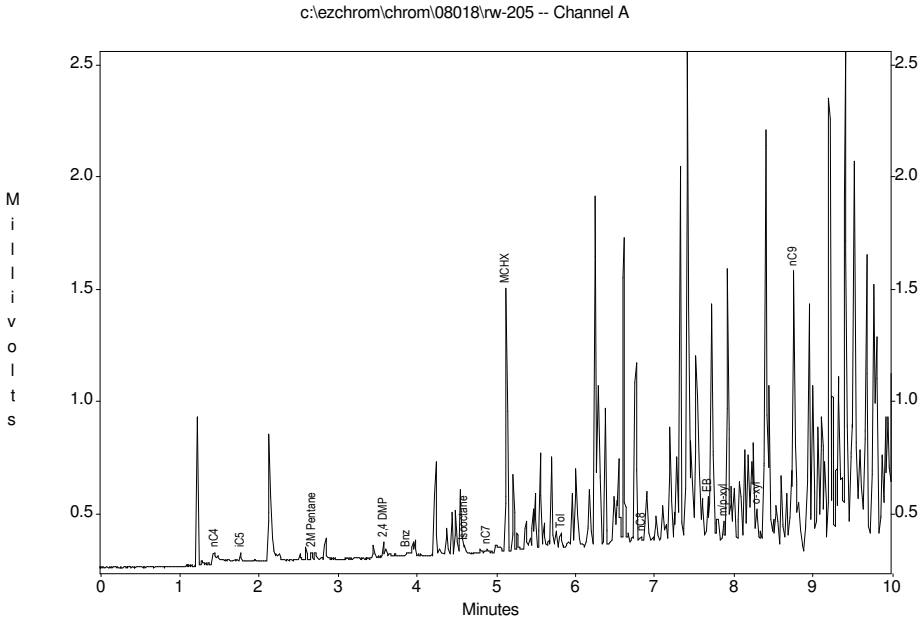

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 25 | 15 |
| iC5 | 48 | 49 |
| nC5 | 71 | 65 |
| MTBE | 0 | 0 |
| 2M Pentane | 319 | 314 |
| nC6 | 464 | 406 |
| olefin a | 0 | 0 |
| olefin b | 36 | 25 |
| olefin c | 105 | 44 |
| 2,4 DMP | 117 | 108 |
| Bnz | 458 | 281 |
| Isooctane | 273 | 197 |
| nC7 | 1606 | 1344 |
| MCHX | 9442 | 8086 |
| Tol | 822 | 649 |
| nC8 | 2062 | 1573 |
| EB | 1481 | 880 |
| m/p-xyl | 2654 | 1629 |
| o-xyl | 1312 | 522 |
| nC9 | 9263 | 5085 |
| 1,2,4 TMB | 16986 | 8425 |
| nC10 | 4534 | 2938 |
| nC11 | 17877 | 9055 |
| Naph | 24963 | 12164 |
| nC12 | 12993 | 4069 |
| IP13 | 40125 | 20878 |
| IP14 | 33242 | 17865 |
| nC13 | 15524 | 5176 |
| IP15 | 96067 | 23235 |
| nC14 | 5500 | 3531 |
| IP16 | 51498 | 23146 |
| nC15 | 24853 | 11401 |
| nC16 | 8259 | 4145 |
| IP18 | 45467 | 17473 |
| nC17 | 11151 | 3244 |
| Pristane | 82400 | 33381 |
| nC18 | 8991 | 4010 |
| Phytane | 39516 | 16387 |
| nC19 | 7518 | 1844 |
| nC20 | 13625 | 5292 |
| nC21 | 3754 | 1235 |
| nC22 | 3814 | 1206 |
| nC23 | 2504 | 858 |
| nC24 | 1721 | 699 |
| nC25 | 5300 | 943 |
| nC26 | 1921 | 577 |
| nC27 | 365 | 201 |
| nC28 | 303 | 205 |
| nC29 | 928 | 243 |
| nC30 | 163 | 87 |
| nC31 | 32 | 0 |
| nC32 | 73 | 49 |
| nC33 | 593 | 199 |
| nC34 | 1175 | 238 |
| nC35 | 86 | 79 |
| nC36 | 79 | 58 |
| nC37 | 74 | 28 |
| nC38 | 56 | 27 |
| nC39 | 104 | 26 |
| nC40 | 71 | 39 |

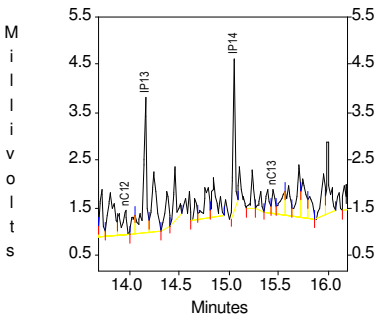
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : RW-205 LNAPL
Acquired : Feb 12, 2008 16:51:50

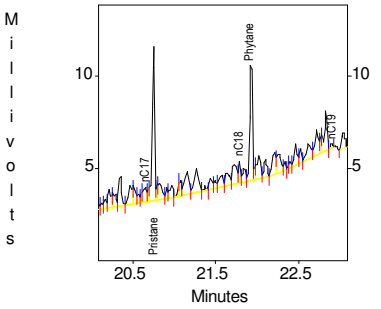
c:\ezchrom\chrom\08018\rw-205 -- Channel A



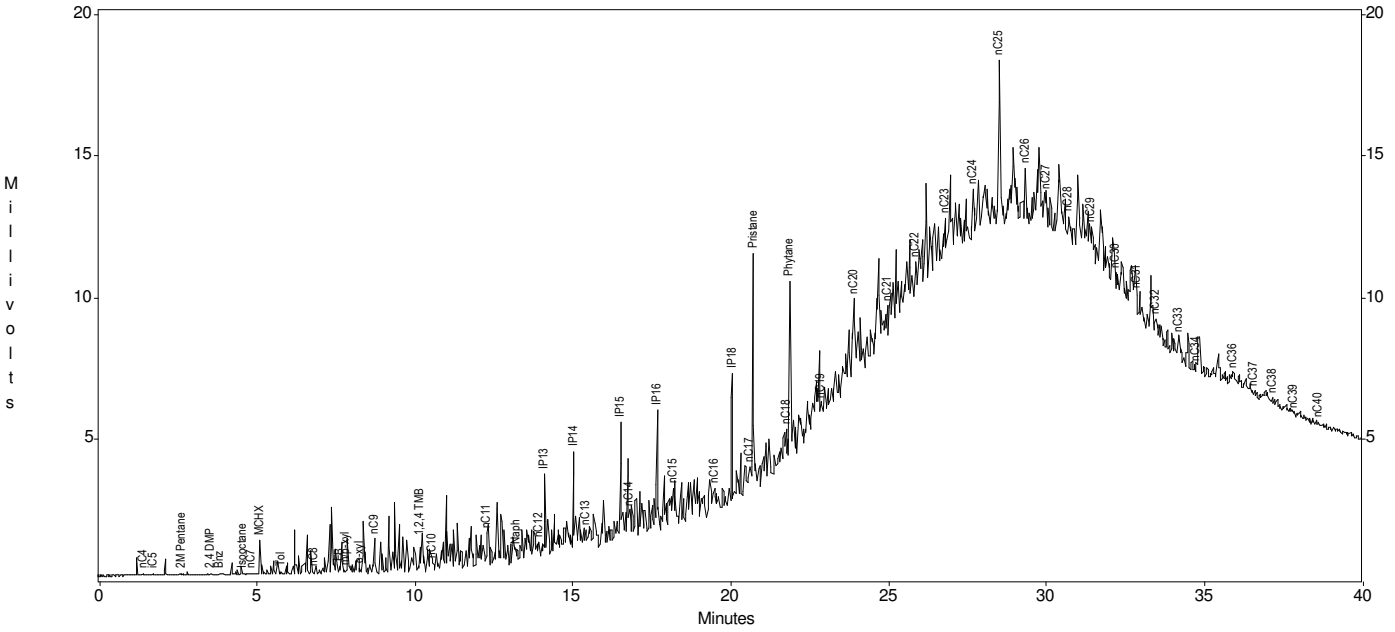

c:\ezchrom\chrom\08018\rw-205 -- Channel A




c:\ezchrom\chrom\08018\rw-205 -- Channel A




c:\ezchrom\chrom\08018\rw-205 -- Channel A



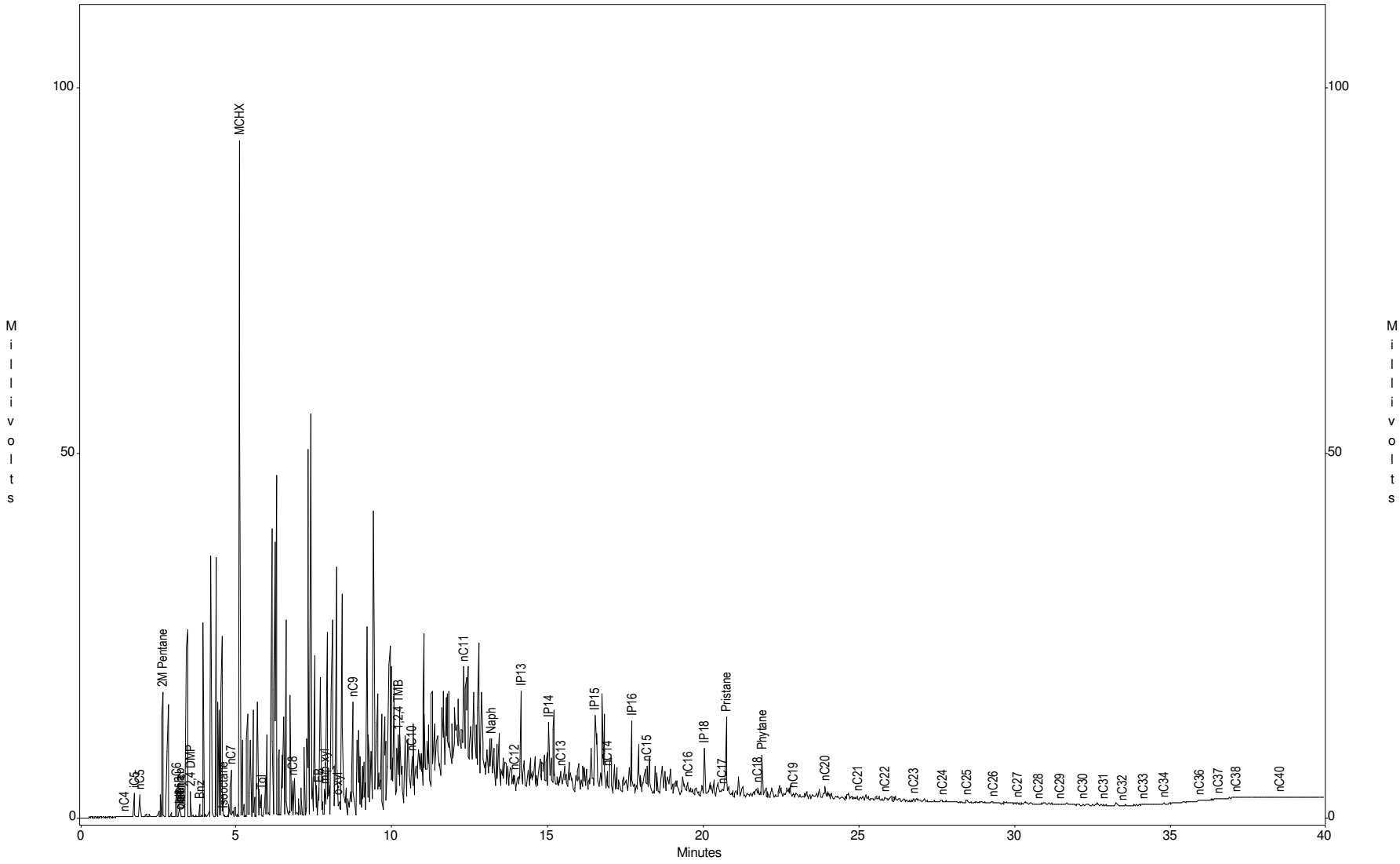

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 125 | 50 |
| iC5 | 35 | 40 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 39 | 31 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 0 | 0 |
| 2,4 DMP | 75 | 69 |
| Bnz | 81 | 22 |
| Isooctane | 61 | 33 |
| nC7 | 48 | 14 |
| MCHX | 1410 | 1173 |
| Tol | 242 | 80 |
| nC8 | 166 | 63 |
| EB | 442 | 243 |
| m/p-xyl | 265 | 134 |
| o-xyl | 370 | 181 |
| nC9 | 2376 | 1243 |
| 1,2,4 TMB | 2809 | 1073 |
| nC10 | 649 | 283 |
| nC11 | 2247 | 1149 |
| Naph | 896 | 294 |
| nC12 | 2221 | 525 |
| IP13 | 6179 | 2858 |
| IP14 | 4041 | 3080 |
| nC13 | 931 | 473 |
| IP15 | 6354 | 3921 |
| nC14 | 1959 | 750 |
| IP16 | 9015 | 4248 |
| nC15 | 3453 | 1356 |
| nC16 | 1403 | 717 |
| IP18 | 10942 | 4619 |
| nC17 | 2235 | 882 |
| Pristane | 17054 | 8376 |
| nC18 | 2340 | 1207 |
| Phytane | 13907 | 6265 |
| nC19 | 486 | 201 |
| nC20 | 7095 | 2855 |
| nC21 | 2776 | 1114 |
| nC22 | 3019 | 1167 |
| nC23 | 3433 | 1348 |
| nC24 | 4773 | 1855 |
| nC25 | 21118 | 5825 |
| nC26 | 6168 | 1906 |
| nC27 | 2827 | 1186 |
| nC28 | 1358 | 762 |
| nC29 | 2771 | 898 |
| nC30 | 899 | 509 |
| nC31 | 248 | 89 |
| nC32 | 310 | 274 |
| nC33 | 200 | 188 |
| nC34 | 133 | 118 |
| nC35 | 0 | 0 |
| nC36 | 151 | 94 |
| nC37 | 259 | 25 |
| nC38 | 201 | 130 |
| nC39 | 114 | 53 |
| nC40 | 72 | 27 |

# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : RW-300 LNAPL
Acquired : Feb 12, 2008 08:30:15

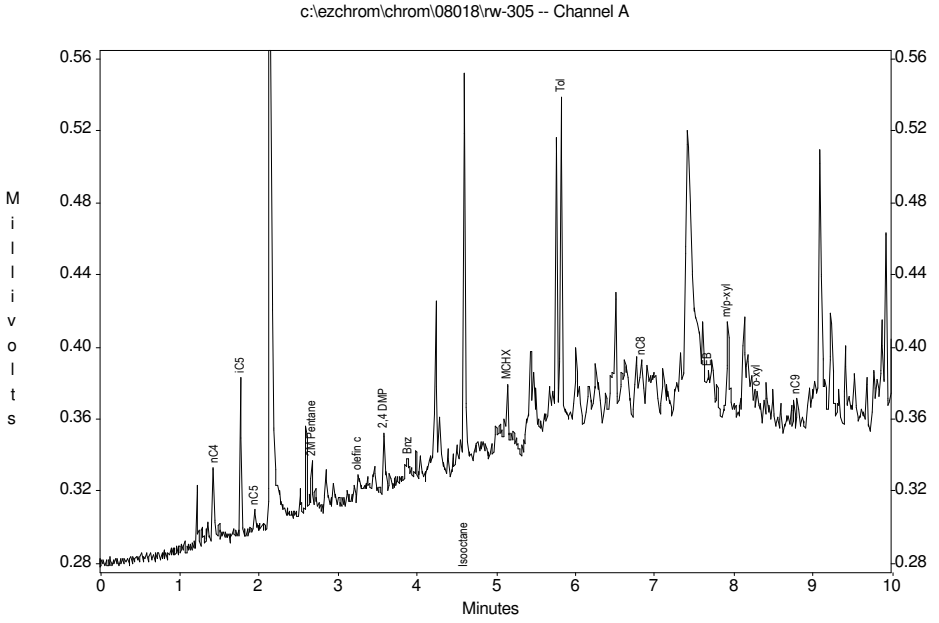
c:\ezchrom\chrom\08018\rw-300 -- Channel A



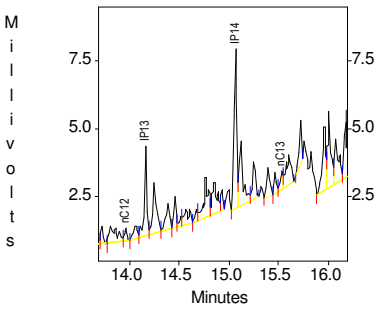
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : RW-305 LNAPL
Acquired : Feb 12, 2008 14:25:40

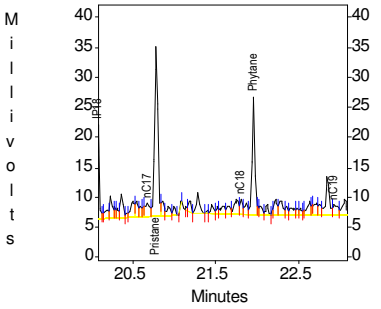
c:\ezchrom\chrom\08018\rw-305 -- Channel A



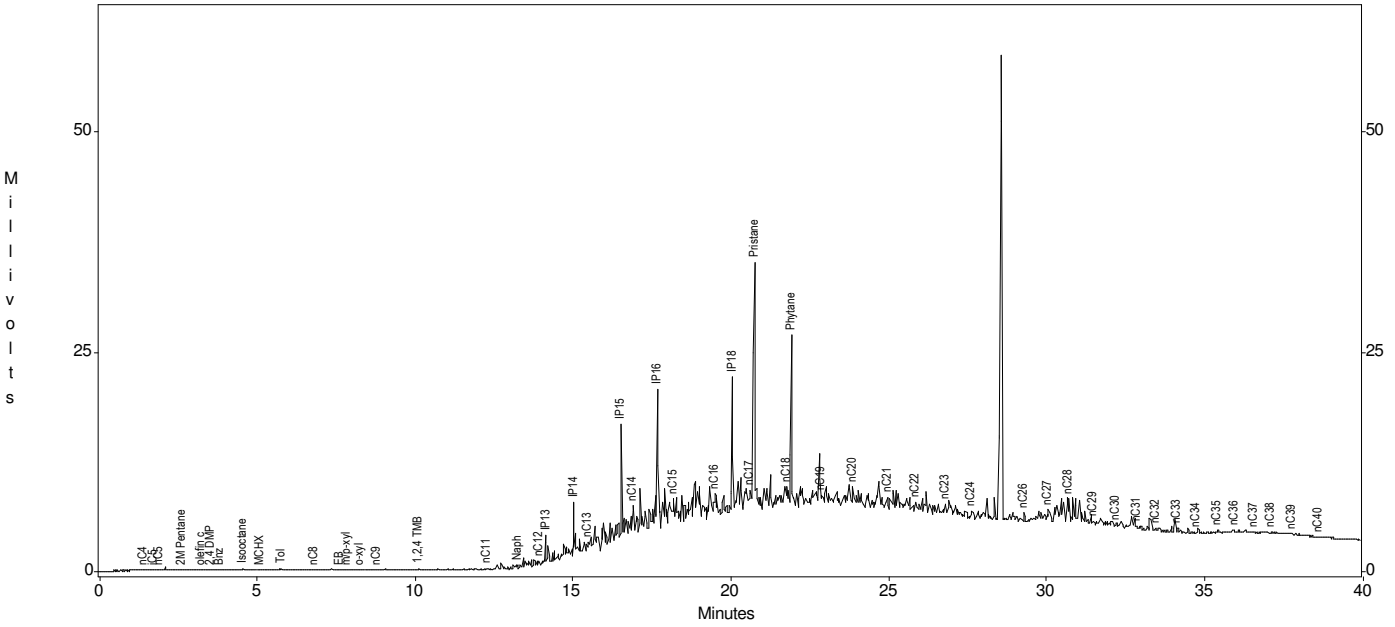

c:\ezchrom\chrom\08018\rw-305 -- Channel A




c:\ezchrom\chrom\08018\rw-305 -- Channel A




c:\ezchrom\chrom\08018\rw-305 -- Channel A

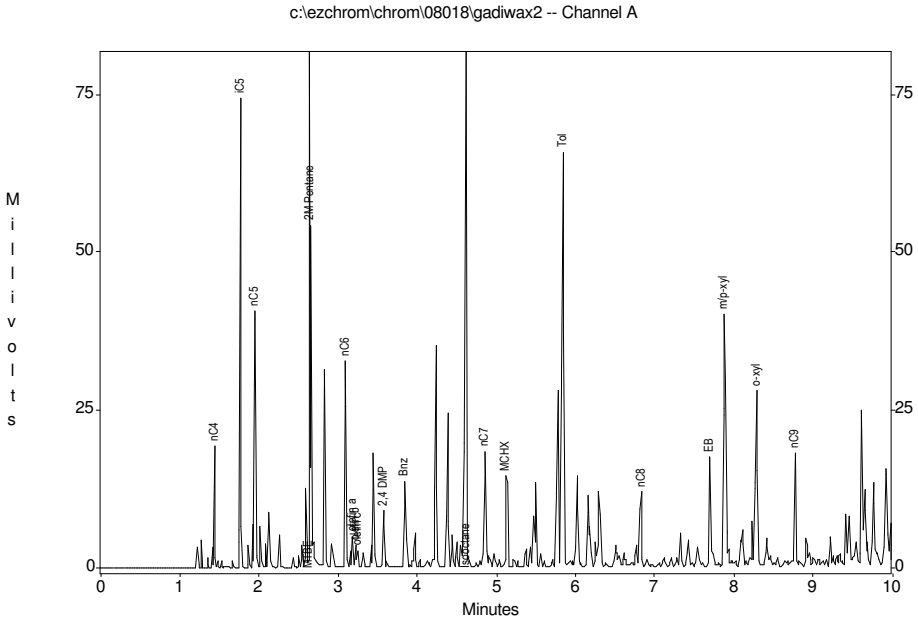


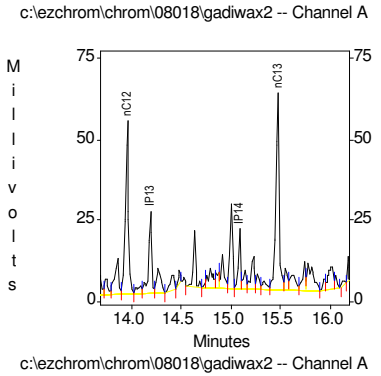

Channel A Results

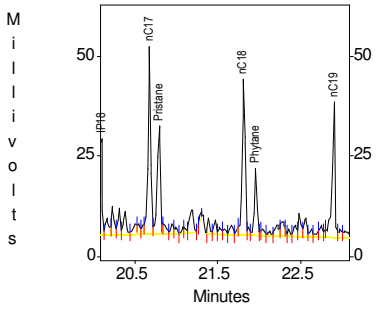
| Peak | Area | Height |
|---|---|---|
| nC4 | 70 | 41 |
| iC5 | 81 | 88 |
| nC5 | 21 | 12 |
| MTBE | 0 | 0 |
| 2M Pentane | 48 | 27 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 32 | 13 |
| 2,4 DMP | 54 | 33 |
| Bnz | 33 | 11 |
| Isooctane | 277 | 215 |
| nC7 | 0 | 0 |
| MCHX | 41 | 28 |
| Tol | 246 | 178 |
| nC8 | 69 | 26 |
| EB | 69 | 28 |
| m/p-xyl | 175 | 57 |
| o-xyl | 76 | 21 |
| nC9 | 32 | 20 |
| 1,2,4 TMB | 365 | 156 |
| nC10 | 0 | 0 |
| nC11 | 496 | 239 |
| Naph | 1155 | 401 |
| nC12 | 1036 | 462 |
| IP13 | 6075 | 3299 |
| IP14 | 8956 | 5935 |
| nC13 | 1365 | 674 |
| IP15 | 19171 | 12690 |
| nC14 | 5151 | 2788 |
| IP16 | 35097 | 15949 |
| nC15 | 8689 | 3084 |
| nC16 | 6511 | 2817 |
| IP18 | 37249 | 15725 |
| nC17 | 7757 | 2318 |
| Pristane | 70366 | 28317 |
| nC18 | 5036 | 2360 |
| Phytane | 45421 | 19670 |
| nC19 | 7099 | 1521 |
| nC20 | 5818 | 2419 |
| nC21 | 3706 | 1289 |
| nC22 | 2769 | 958 |
| nC23 | 3638 | 1266 |
| nC24 | 2506 | 878 |
| nC25 | 0 | 0 |
| nC26 | 2340 | 922 |
| nC27 | 4177 | 1374 |
| nC28 | 5520 | 2609 |
| nC29 | 344 | 121 |
| nC30 | 118 | 79 |
| nC31 | 73 | 74 |
| nC32 | 369 | 225 |
| nC33 | 531 | 242 |
| nC34 | 79 | 93 |
| nC35 | 209 | 107 |
| nC36 | 157 | 48 |
| nC37 | 298 | 112 |
| nC38 | 172 | 76 |
| nC39 | 91 | 78 |
| nC40 | 124 | 44 |

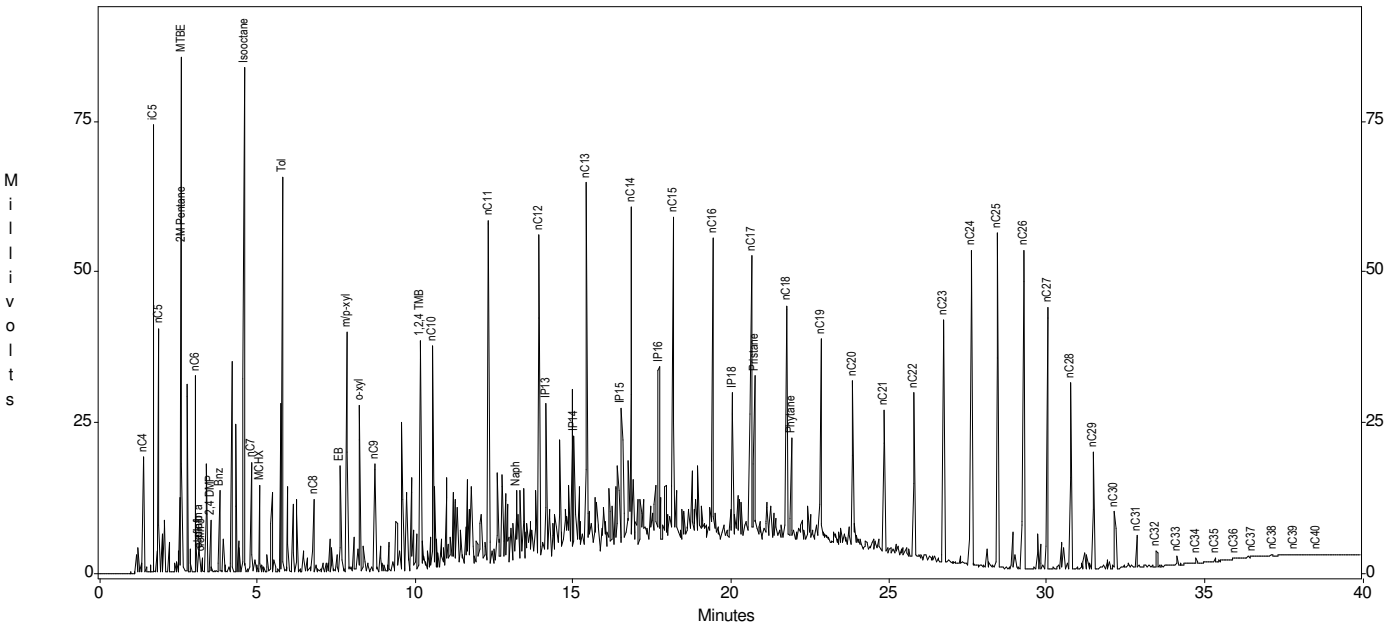
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery, Philadelphia, PA
Sample ID : Gas/Dies/Wax std
Acquired : Feb 12, 2008 11:48:01




Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 10953 | 19102 |
| iC5 | 51604 | 74396 |
| nC5 | 30361 | 40645 |
| MTBE | 69425 | 85376 |
| 2M Pentane | 51469 | 54127 |
| nC6 | 30726 | 32577 |
| olefin a | 5020 | 4812 |
| olefin b | 3273 | 3277 |
| olefin c | 3009 | 2620 |
| 2,4 DMP | 8865 | 8806 |
| Bnz | 17732 | 13724 |
| Isooctane | 115797 | 83648 |
| nC7 | 24195 | 18277 |
| MCHX | 17960 | 14428 |
| Tol | 90969 | 65565 |
| nC8 | 14305 | 12008 |
| EB | 24171 | 17414 |
| m/p-xyl | 83914 | 39875 |
| o-xyl | 40237 | 27687 |
| nC9 | 24927 | 17925 |
| 1,2,4 TMB | 67448 | 37915 |
| nC10 | 57588 | 36880 |
| nC11 | 110778 | 56916 |
| Naph | 29084 | 11889 |
| nC12 | 116024 | 53659 |
| IP13 | 49003 | 25350 |
| IP14 | 29193 | 18507 |
| nC13 | 148522 | 60802 |
| IP15 | 43017 | 22669 |
| nC14 | 130476 | 55988 |
| IP16 | 61019 | 29259 |
| nC15 | 135279 | 54003 |
| nC16 | 117334 | 50283 |
| IP18 | 54476 | 24326 |
| nC17 | 105162 | 47136 |
| Pristane | 61949 | 27129 |
| nC18 | 82464 | 38707 |
| Phytane | 35962 | 16783 |
| nC19 | 80606 | 33629 |
| nC20 | 54289 | 27711 |
| nC21 | 45872 | 23603 |
| nC22 | 57487 | 27448 |
| nC23 | 90749 | 40367 |
| nC24 | 133557 | 52182 |
| nC25 | 154936 | 55446 |
| nC26 | 153087 | 52881 |
| nC27 | 112487 | 43335 |
| nC28 | 68439 | 30838 |
| nC29 | 36953 | 19475 |
| nC30 | 17394 | 9385 |
| nC31 | 7931 | 4954 |
| nC32 | 4708 | 2538 |
| nC33 | 2485 | 1455 |
| nC34 | 1394 | 746 |
| nC35 | 886 | 434 |
| nC36 | 407 | 239 |
| nC37 | 611 | 160 |
| nC38 | 211 | 74 |
| nC39 | 226 | 62 |
| nC40 | 148 | 43 |

| Torkelson Geochemistry, Inc. | | | |
|---|---|---|---|
| Density Measurements | | | |
| Paar DMA 512 / DMA 60 | | ASTM Method 4052 | |
| Sample | Density gm/ml @ 60F | Job Number | Date |
| N-42 | 0.8900 | 08018 | 2/12/08 |
| N-47 | 0.8834 | 08018 | 2/12/08 |
| N-51 | 0.8995 | 08018 | 2/12/08 |
| N-75 | 0.9371 | 08018 | 2/12/08 |
| N-76 | 0.8899 | 08018 | 2/12/08 |
| N-82 | 0.9132 | 08018 | 2/12/08 |
| N-91 | 0.9471 | 08018 | 2/12/08 |
| N-503 | 0.9065 | 08018 | 2/12/08 |
| RW-205 | 0.9112 | 08018 | 2/12/08 |
| RW-300 | 0.8358 | 08018 | 2/12/08 |
| RW-305 | 0.9186 | 08018 | 2/12/08 |

# Torkelson Geochemistry, Inc.

2528 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: Sunoco Philadelphia Refinery - AOI 8 SCR
Location: Philadelphia, PA

Proj. No.: 2574601
P.O.:
Sampled By:

Report/Bill To: Joseph Catricks
Address:
PO Box 1569, Doylestown PA 18901

Phone: 215-491.6540
Fax: 215.491.6501
e-mail: jcatricks@langan.com

**Additional Instructions**
Please include a brief interpretation of product type constant other samples from this project

Requested Turn-Around Time: Standard

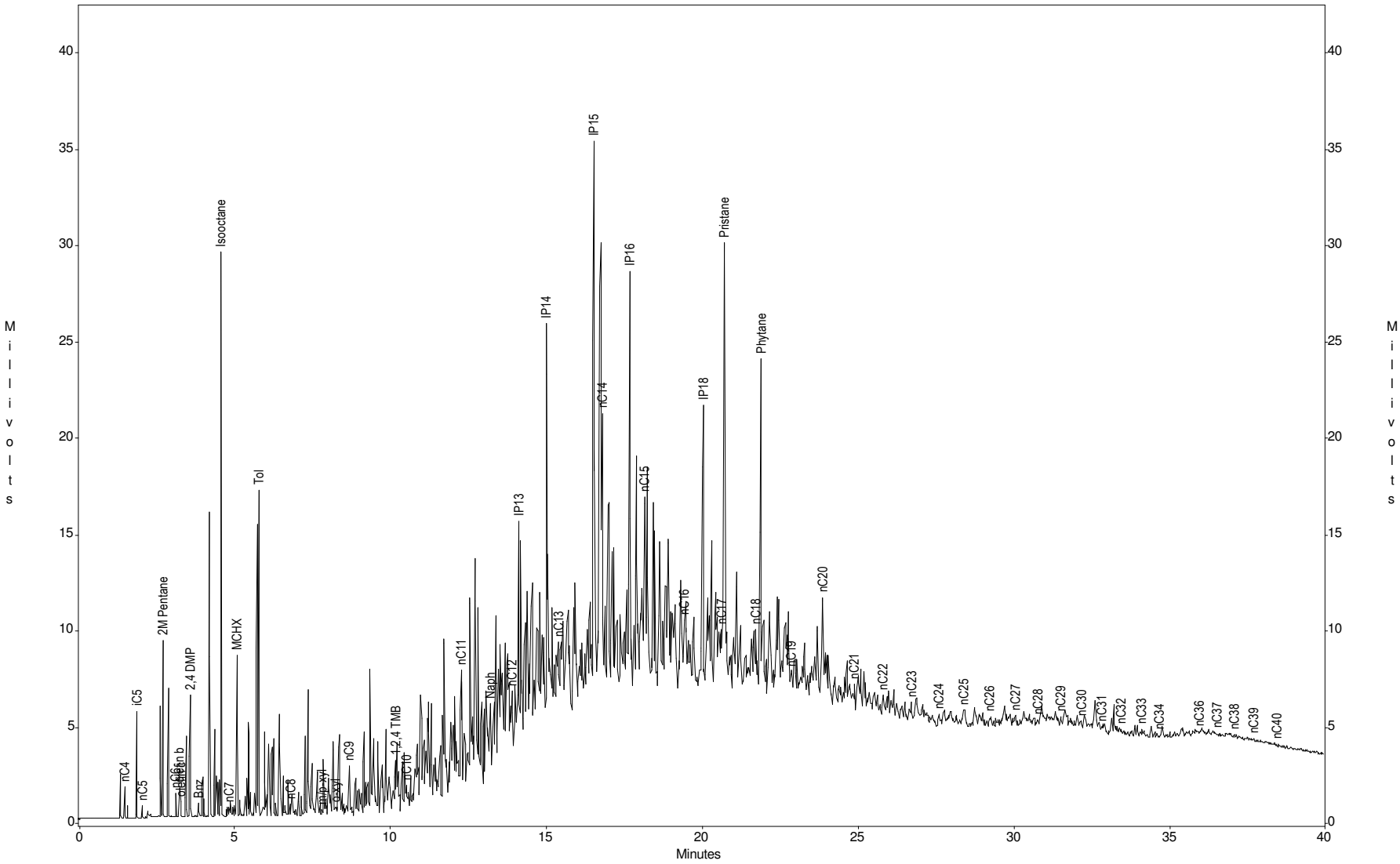
| ITEM NO. | SAMPLE DESCRIPTION | DATE | MATRIX | LAB NO. | Total # OF Vials | PRESERVATIVES: None | ANALYSES REQUESTED: GC Characterization | Density | Viscosity | Water Surface Tension | NAPL Surface Tension | NAPL/Water Interfac. Tens. | Lead | Sulfur | TIME | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N-107 | 7/28/08 | | | 1 | X | x | x | | | | | | | | 1320 |
| 2 | N-116 | 7/28/08 | | | 1 | X | x | x | | | | | | | | 1235 |
| 3 | N-125 | 7/28/08 | | | 1 | X | x | x | | | | | | | | 1240 |
| 4 | N-127 | 7/28/08 | | | 1 | X | x | x | | | | | | | | 1220 |
| 5 | N-129 | 7/28/08 | | | 1 | X | x | x | | | | | | | | 1230 |
| 6 | N-130 | 7/28/08 | | | 1 | X | x | x | | | | | | | | 1215 |
| 7 | N-135 | 7/28/08 | | | 1 | X | x | x | | | | | | | | 1200 |
| 8 | N-113 | 7-28-08 | | | 1 | X | X | X | | | | | | | | 1130 |
| 9 | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | |

| RELINQUISHED BY | DATE | TIME | ACCEPTED BY | DATE | TIME |
|---|---|---|---|---|---|
| | | | | | |
| | | | | 7-30-08 | |
| | | | | | |

# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-107
Acquired : Jul 31, 2008 12:21:28

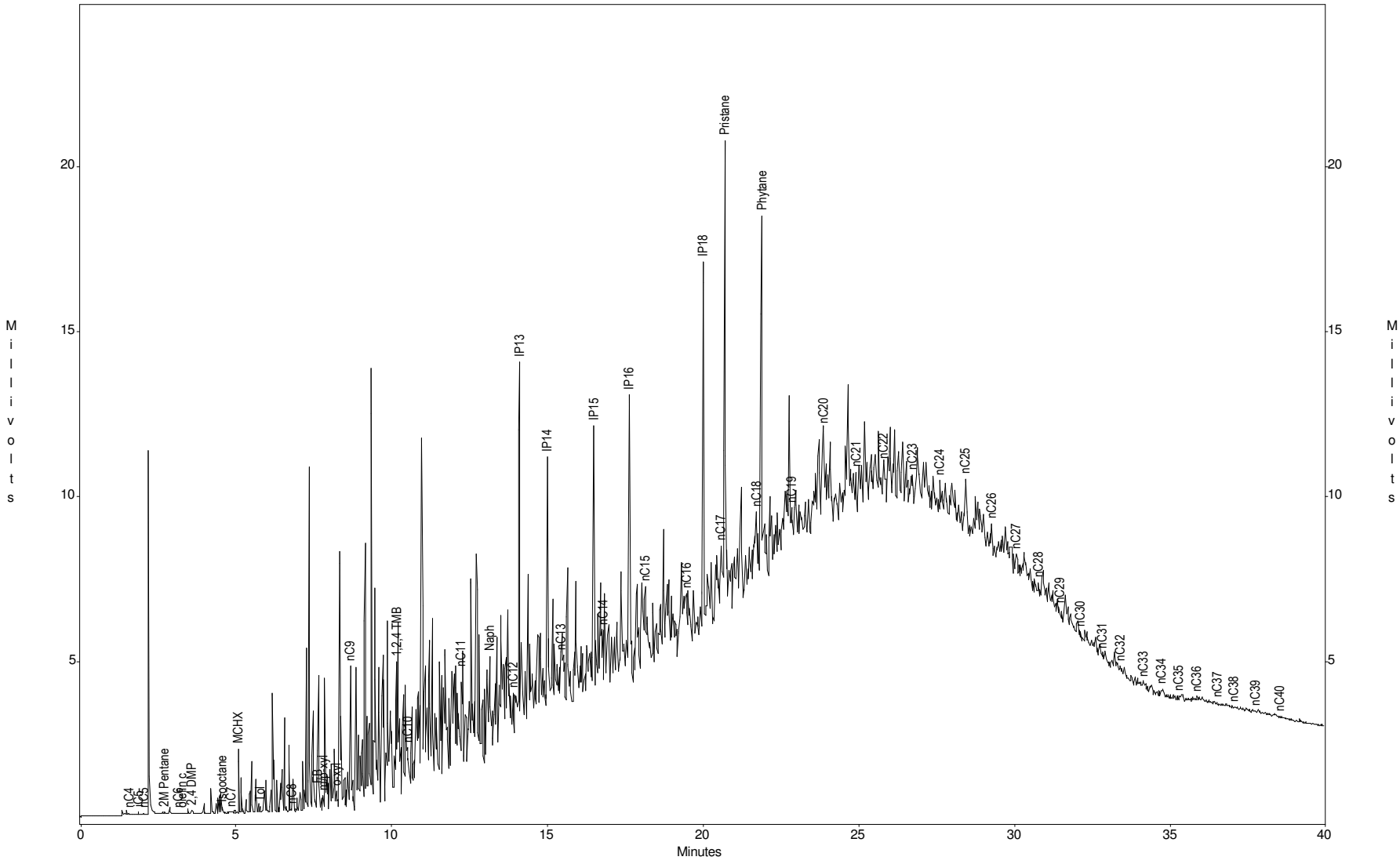
c:\ezchrom\chrom\08134\n-107 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-113
Acquired : Jul 31, 2008 14:27:34

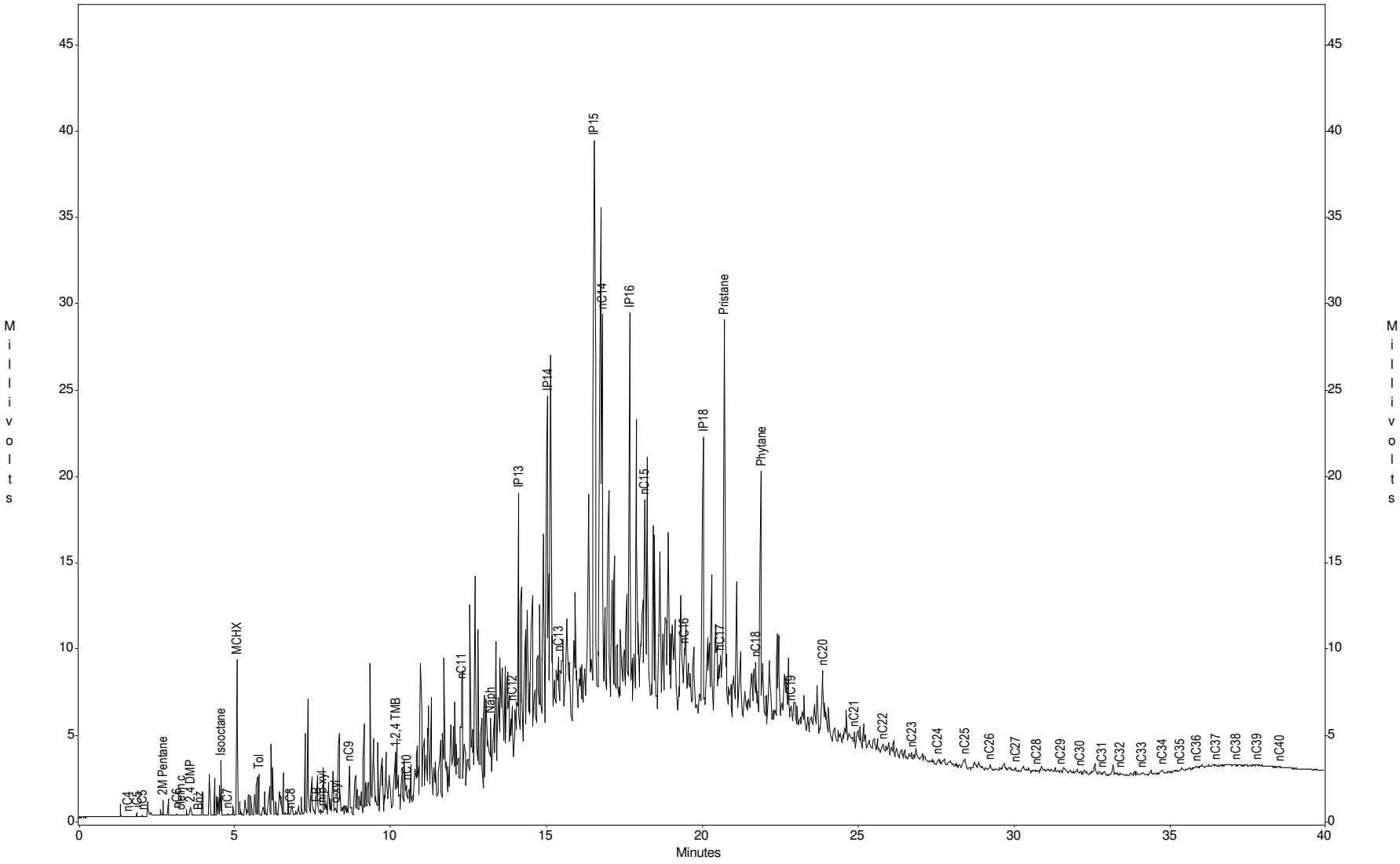
c:\ezchrom\chrom\08134\n-113 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-116
Acquired : Jul 31, 2008 15:18:40

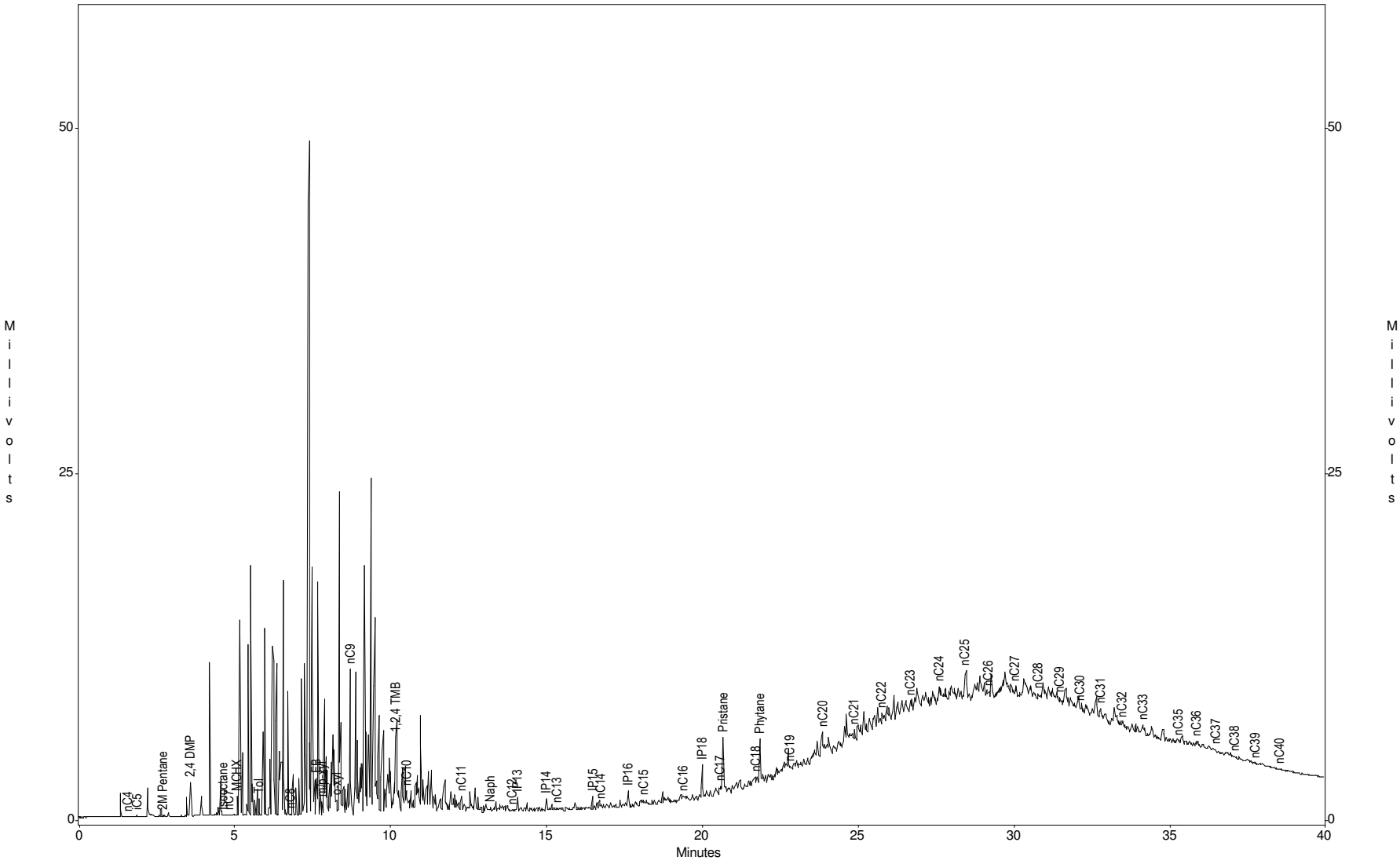
c:\ezchrom\chrom\08134\n-116 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-125
Acquired : Jul 31, 2008 09:41:17

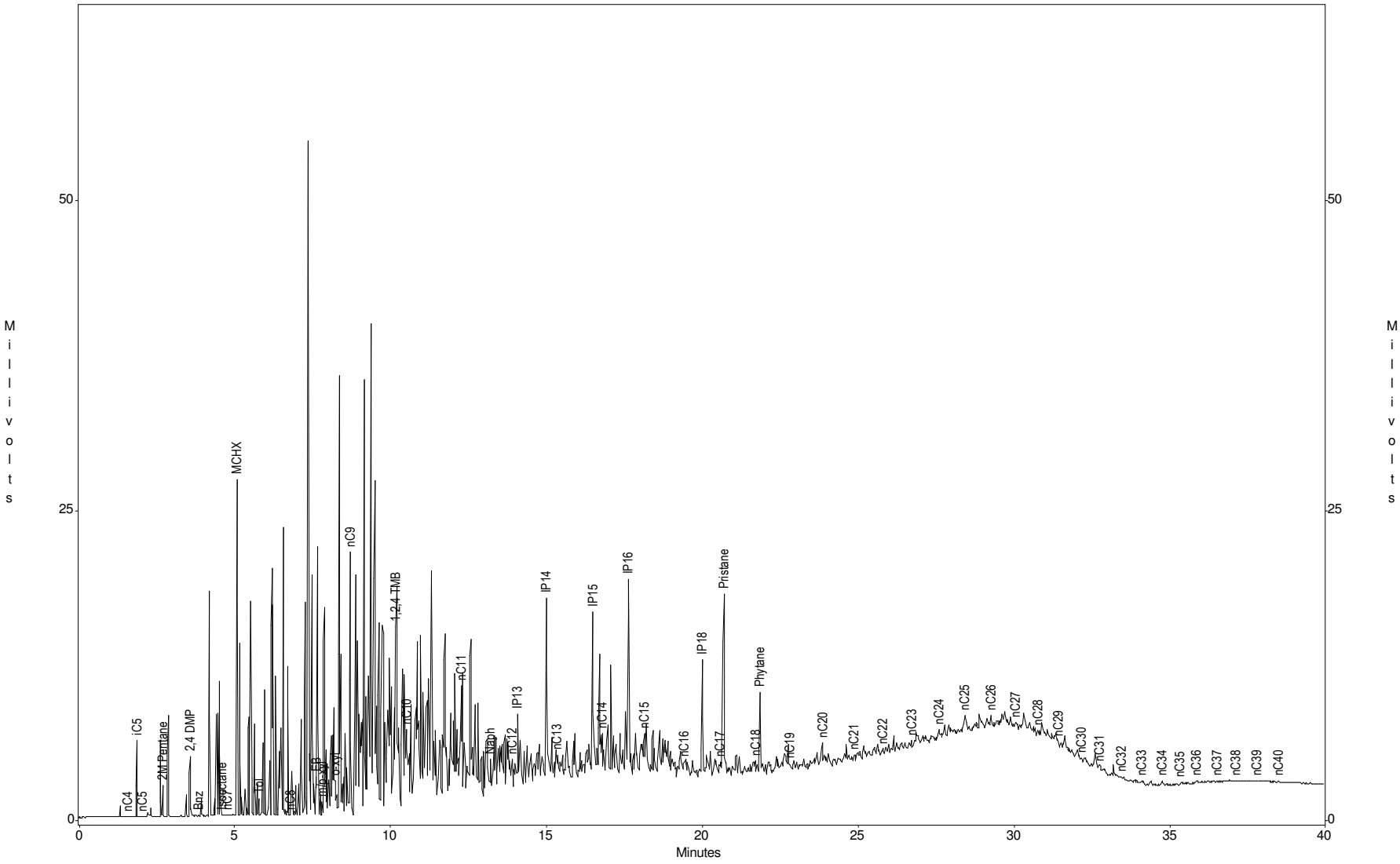
c:\ezchrom\chrom\08134\n-125 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-127
Acquired : Jul 31, 2008 11:29:45

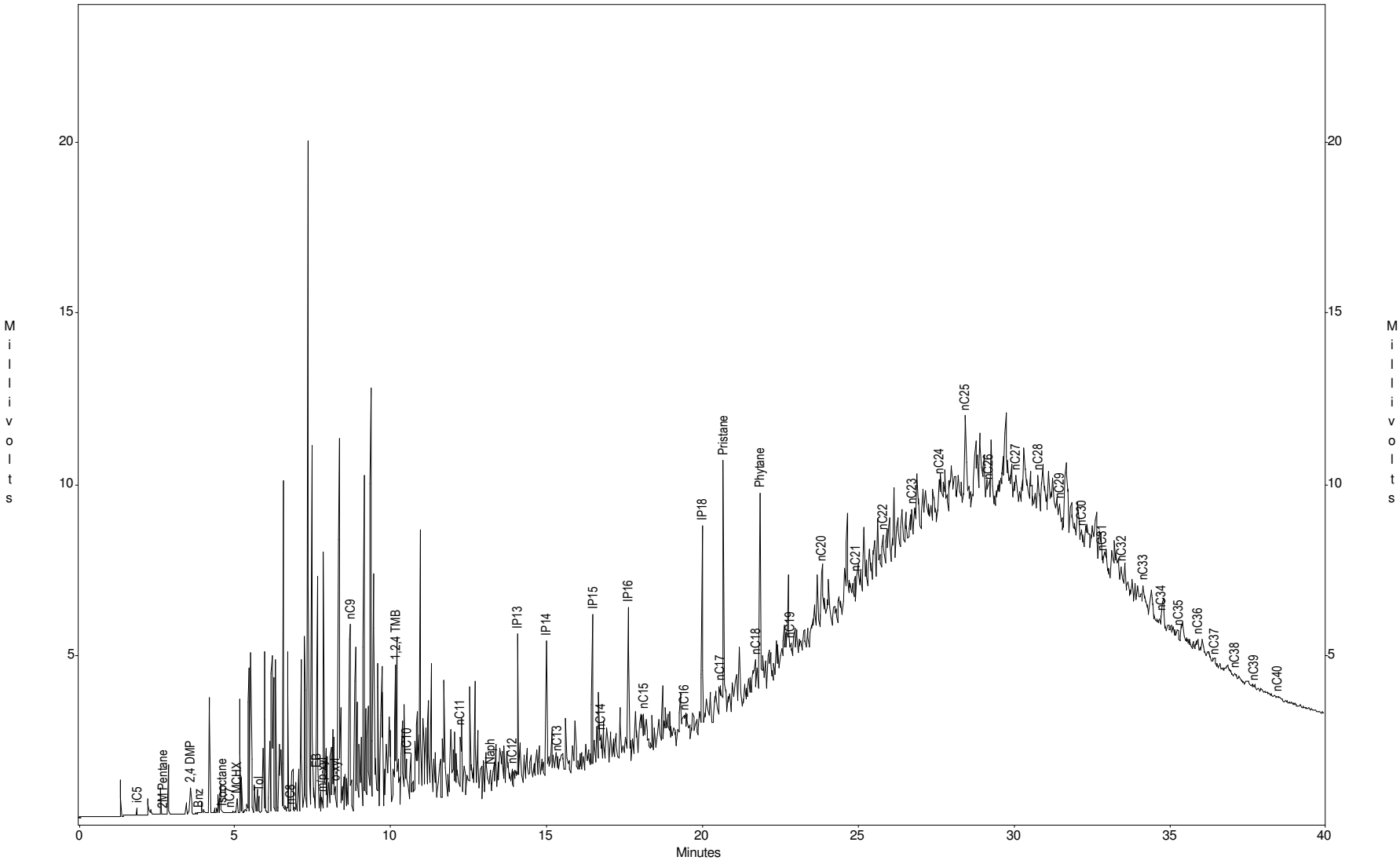
c:\ezchrom\chrom\08134\n-127 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-129
Acquired : Jul 31, 2008 16:09:46

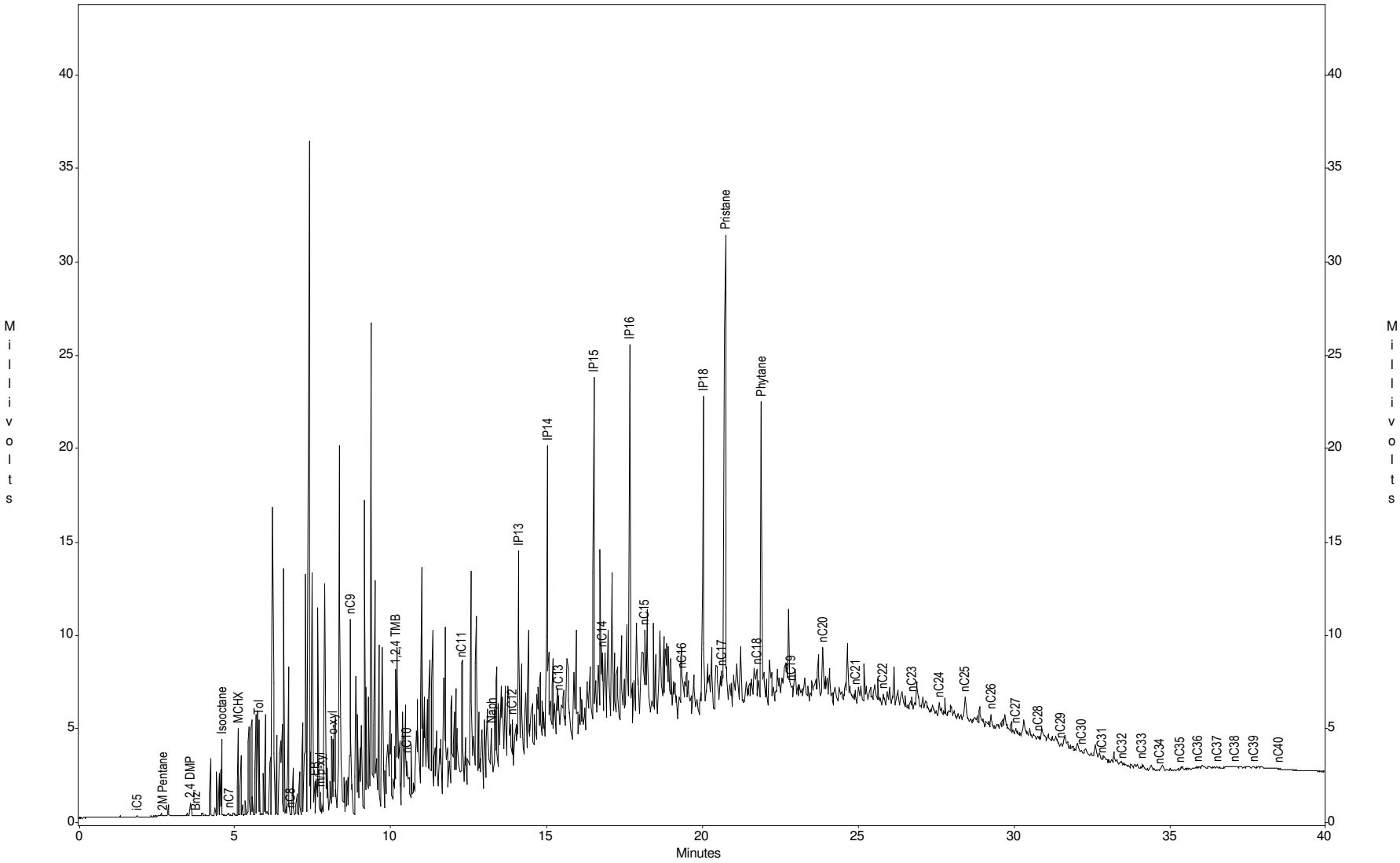
c:\ezchrom\chrom\08134\n-129 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-130
Acquired : Jul 31, 2008 08:50:57

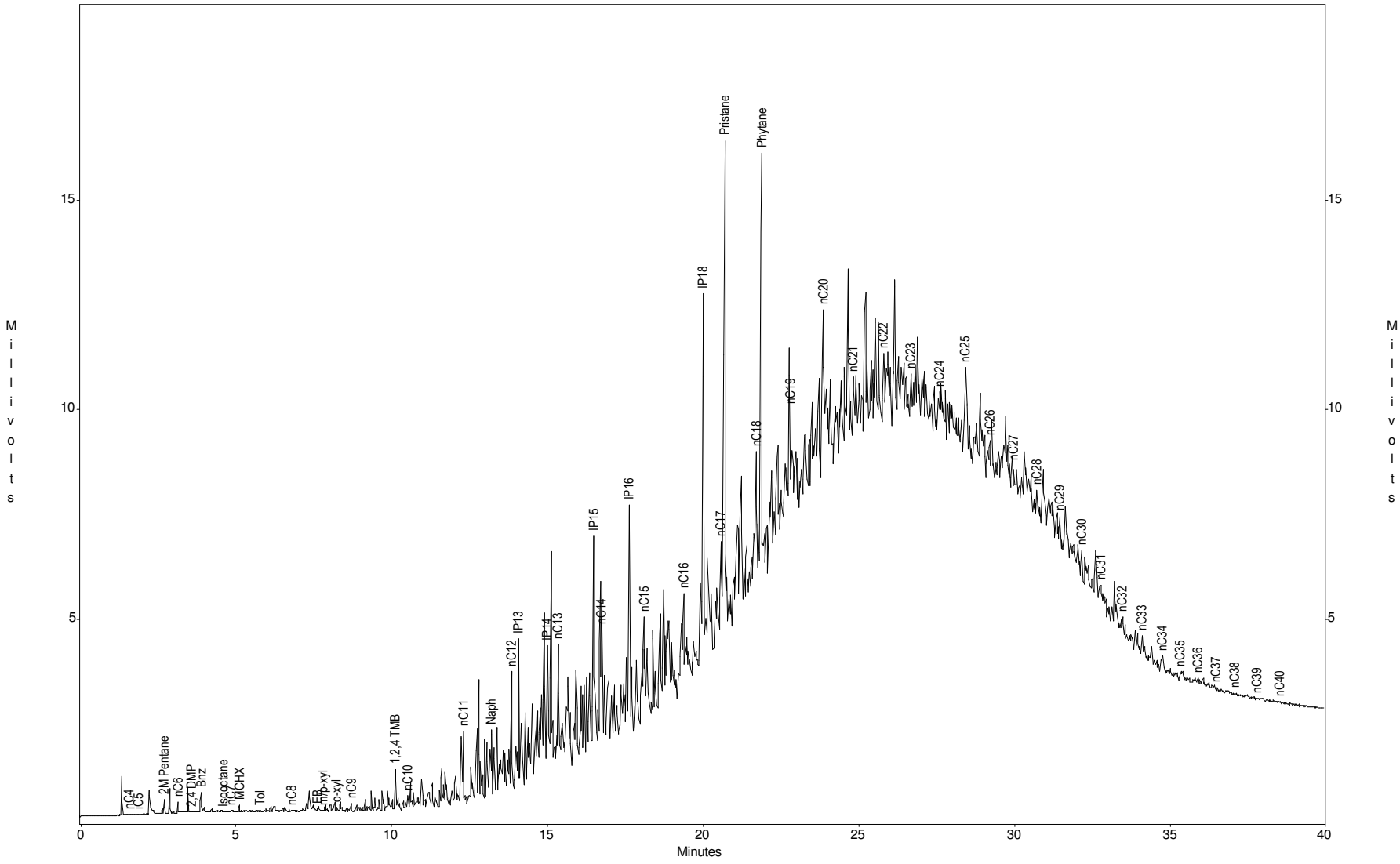
c:\ezchrom\chrom\08134\n-130 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-135
Acquired : Jul 31, 2008 10:35:35

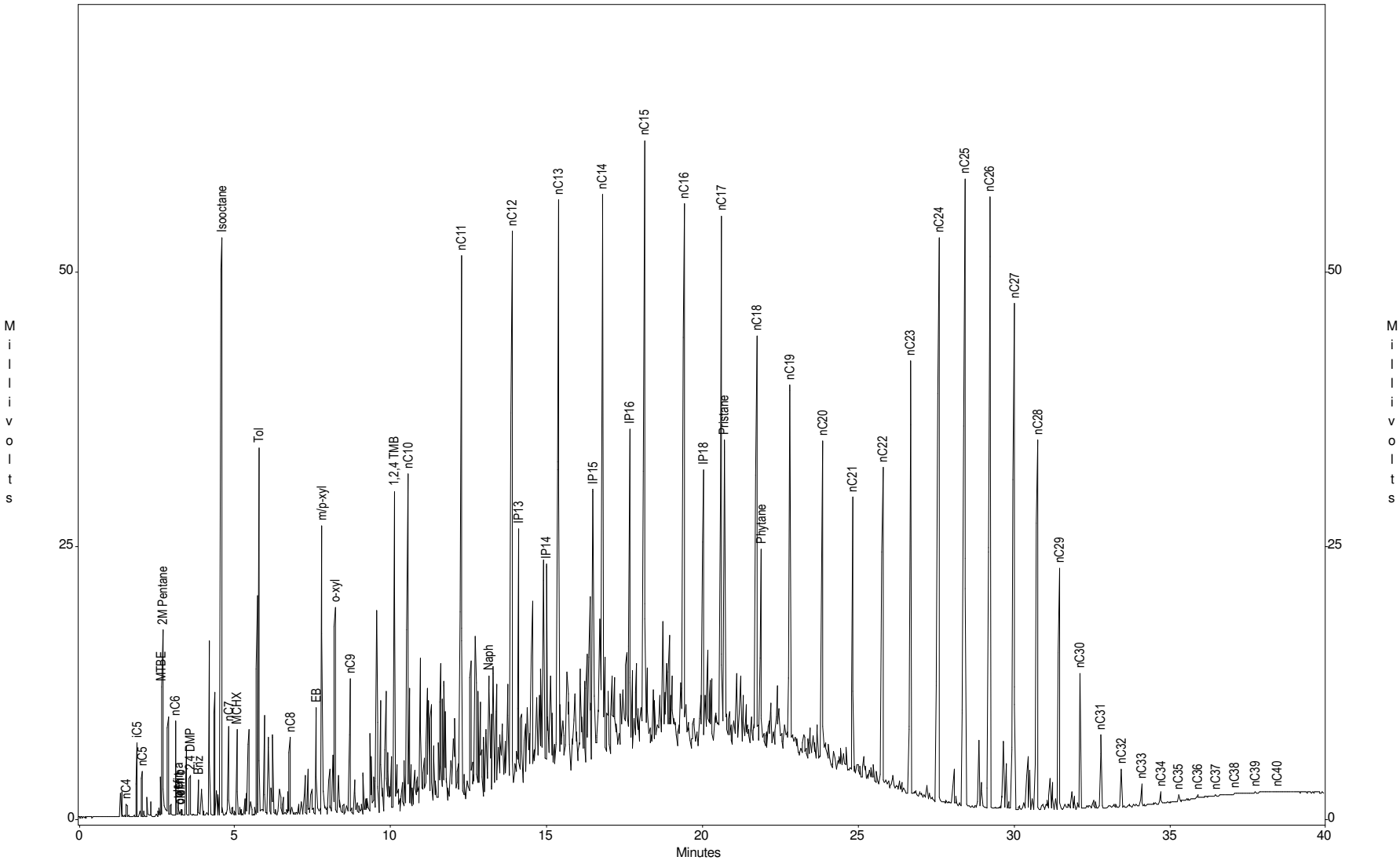
c:\ezchrom\chrom\08134\n-135 -- Channel A



# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : Gas/Dies/Wax std
Acquired : Jul 31, 2008 13:18:39

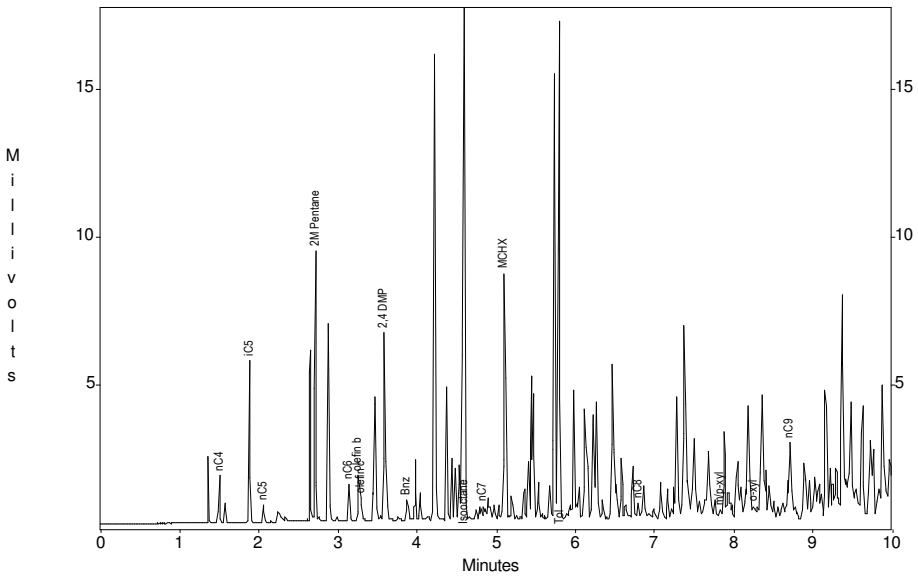
c:\ezchrom\chrom\08134\gadiwax2 -- Channel A



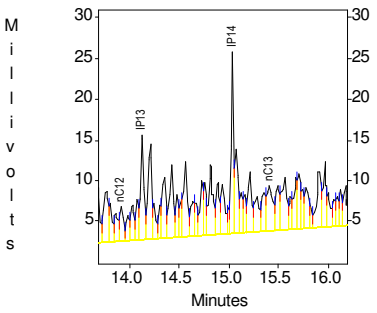
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-107
Acquired : Jul 31, 2008 12:21:28

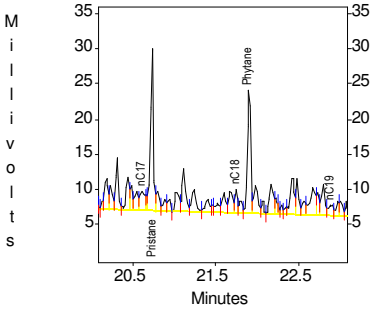
c:\ezchrom\chrom\08134\n-107 -- Channel A



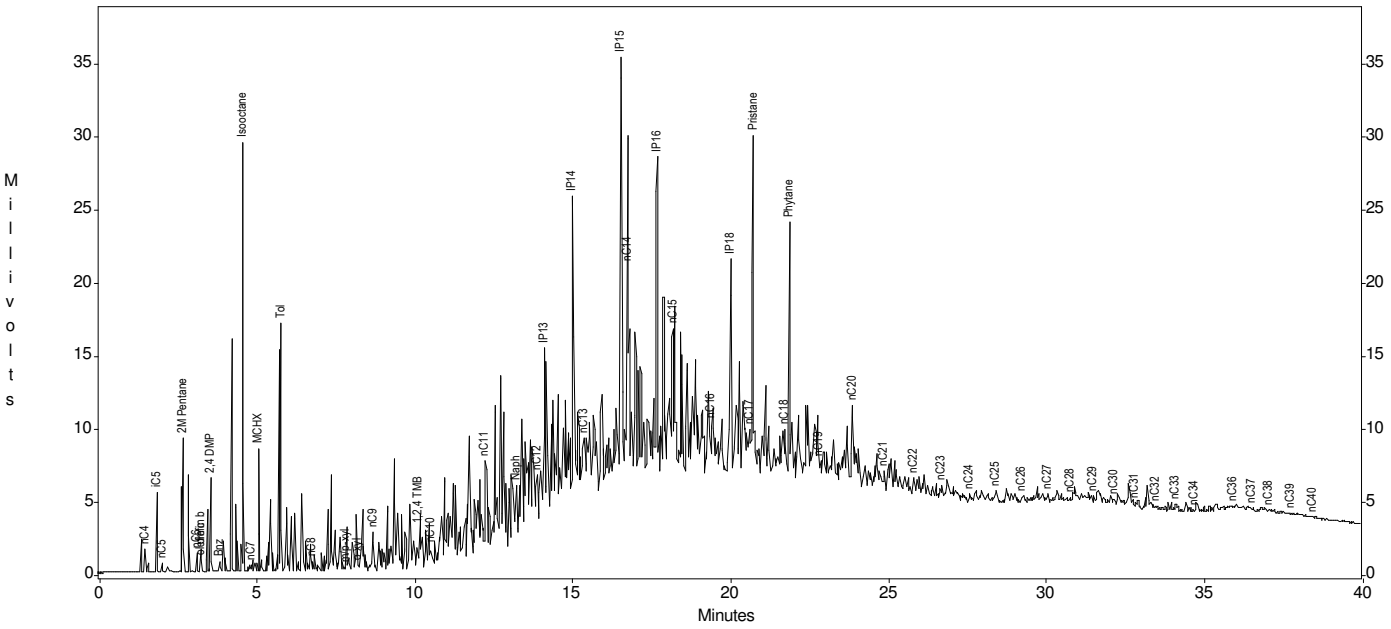

c:\ezchrom\chrom\08134\n-107 -- Channel A




c:\ezchrom\chrom\08134\n-107 -- Channel A




c:\ezchrom\chrom\08134\n-107 -- Channel A



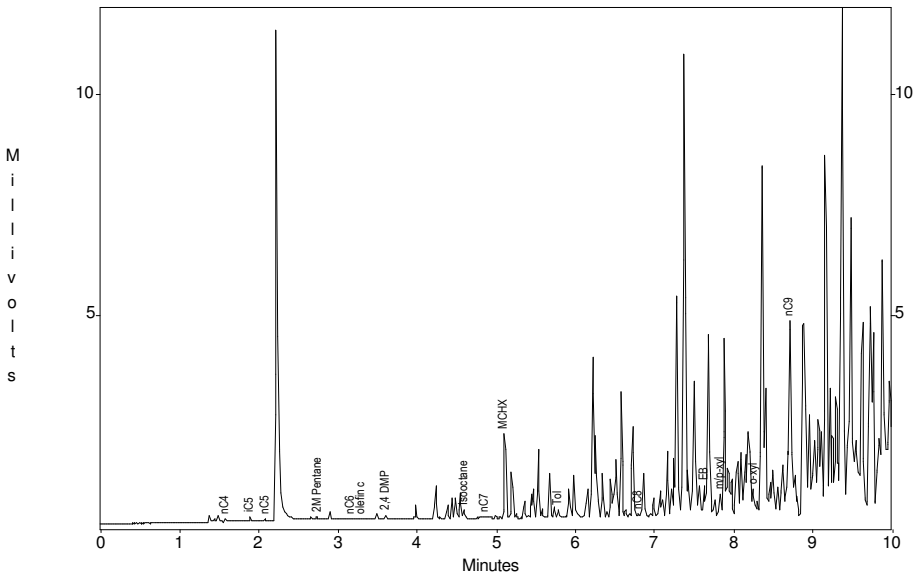

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 1153 | 1612 |
| iC5 | 4452 | 5495 |
| nC5 | 610 | 591 |
| MTBE | 0 | 0 |
| 2M Pentane | 8642 | 9154 |
| nC6 | 1397 | 1248 |
| olefin a | 0 | 0 |
| olefin b | 1551 | 1515 |
| olefin c | 1255 | 799 |
| 2,4 DMP | 7271 | 6348 |
| Bnz | 1127 | 678 |
| Isooctane | 34028 | 29254 |
| nC7 | 539 | 475 |
| MCHX | 10500 | 8371 |
| Tol | 21556 | 16899 |
| nC8 | 881 | 577 |
| EB | 0 | 0 |
| m/p-xyl | 503 | 316 |
| o-xyl | 1037 | 430 |
| nC9 | 4787 | 2568 |
| 1,2,4 TMB | 4347 | 2628 |
| nC10 | 3886 | 1219 |
| nC11 | 10664 | 6269 |
| Naph | 9487 | 3959 |
| nC12 | 10964 | 4102 |
| IP13 | 27169 | 12681 |
| IP14 | 41097 | 22236 |
| nC13 | 22626 | 5466 |
| IP15 | 60426 | 30505 |
| nC14 | 43212 | 16163 |
| IP16 | 57337 | 22844 |
| nC15 | 28028 | 10722 |
| nC16 | 4024 | 2672 |
| IP18 | 33209 | 14421 |
| nC17 | 10338 | 2922 |
| Pristane | 59900 | 23039 |
| nC18 | 7717 | 3278 |
| Phytane | 40808 | 17385 |
| nC19 | 6018 | 1449 |
| nC20 | 15122 | 5548 |
| nC21 | 3818 | 1414 |
| nC22 | 4207 | 1144 |
| nC23 | 2683 | 1008 |
| nC24 | 3409 | 634 |
| nC25 | 4634 | 880 |
| nC26 | 2738 | 474 |
| nC27 | 2064 | 559 |
| nC28 | 1336 | 360 |
| nC29 | 1255 | 479 |
| nC30 | 154 | 163 |
| nC31 | 49 | 62 |
| nC32 | 358 | 158 |
| nC33 | 614 | 263 |
| nC34 | 50 | 67 |
| nC35 | 0 | 0 |
| nC36 | 94 | 67 |
| nC37 | 115 | 72 |
| nC38 | 130 | 82 |
| nC39 | 96 | 83 |
| nC40 | 100 | 69 |

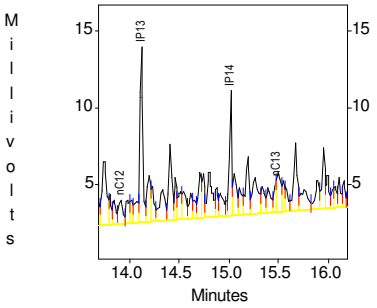
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-113
Acquired : Jul 31, 2008 14:27:34

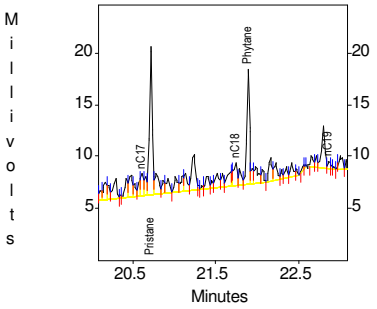
c:\ezchrom\chrom\08134\n-113 -- Channel A



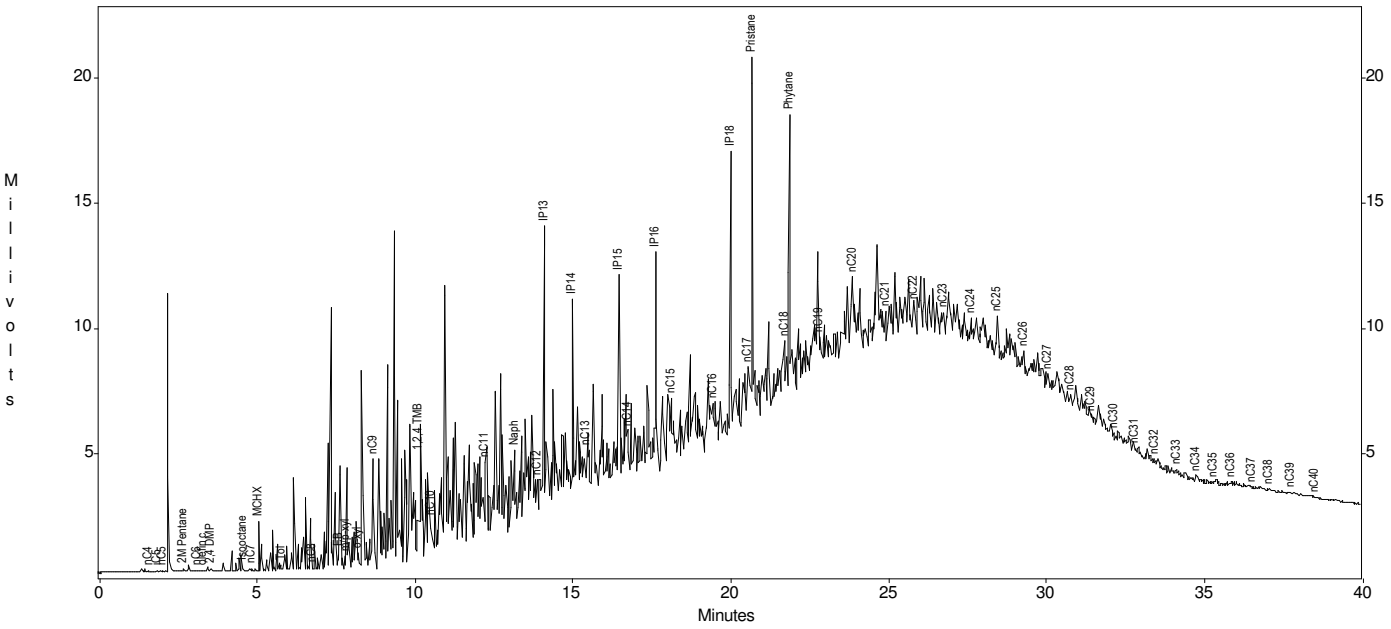

c:\ezchrom\chrom\08134\n-113 -- Channel A




c:\ezchrom\chrom\08134\n-113 -- Channel A




c:\ezchrom\chrom\08134\n-113 -- Channel A



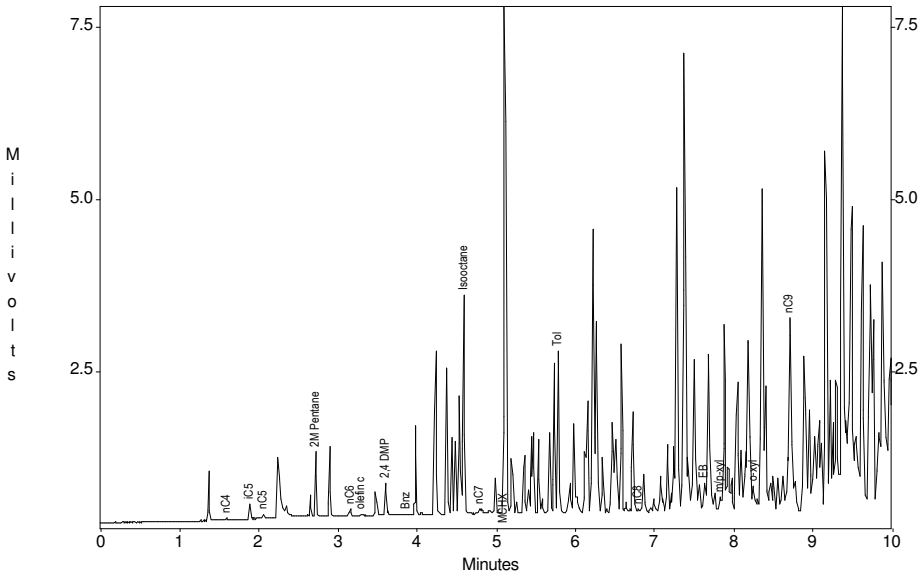

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 96 | 47 |
| iC5 | 88 | 75 |
| nC5 | 58 | 27 |
| MTBE | 0 | 0 |
| 2M Pentane | 65 | 53 |
| nC6 | 24 | 13 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 47 | 11 |
| 2,4 DMP | 101 | 89 |
| Bnz | 0 | 0 |
| Isooctane | 247 | 170 |
| nC7 | 94 | 35 |
| MCHX | 2466 | 1925 |
| Tol | 281 | 164 |
| nC8 | 89 | 63 |
| EB | 845 | 655 |
| m/p-xyl | 749 | 450 |
| o-xyl | 783 | 438 |
| nC9 | 9190 | 4356 |
| 1,2,4 TMB | 6441 | 4085 |
| nC10 | 2461 | 1341 |
| nC11 | 4529 | 2797 |
| Naph | 8212 | 3129 |
| nC12 | 4306 | 1625 |
| IP13 | 20618 | 11585 |
| IP14 | 12990 | 8231 |
| nC13 | 3413 | 2007 |
| IP15 | 14668 | 8424 |
| nC14 | 3595 | 2054 |
| IP16 | 21613 | 8783 |
| nC15 | 5909 | 2543 |
| nC16 | 3409 | 1686 |
| IP18 | 25856 | 11281 |
| nC17 | 5286 | 2208 |
| Pristane | 34964 | 14413 |
| nC18 | 5356 | 2276 |
| Phytane | 26199 | 11107 |
| nC19 | 1227 | 746 |
| nC20 | 14203 | 2996 |
| nC21 | 4008 | 1382 |
| nC22 | 7849 | 1593 |
| nC23 | 3848 | 1216 |
| nC24 | 3766 | 976 |
| nC25 | 7977 | 1657 |
| nC26 | 3576 | 939 |
| nC27 | 1508 | 624 |
| nC28 | 1184 | 443 |
| nC29 | 547 | 295 |
| nC30 | 433 | 214 |
| nC31 | 152 | 93 |
| nC32 | 104 | 129 |
| nC33 | 143 | 85 |
| nC34 | 90 | 91 |
| nC35 | 58 | 84 |
| nC36 | 392 | 100 |
| nC37 | 51 | 30 |
| nC38 | 178 | 53 |
| nC39 | 64 | 22 |
| nC40 | 50 | 38 |

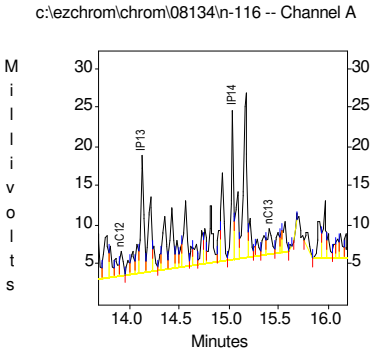
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-116
Acquired : Jul 31, 2008 15:18:40

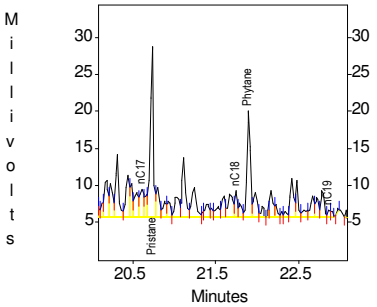
c:\ezchrom\chrom\08134\n-116 -- Channel A



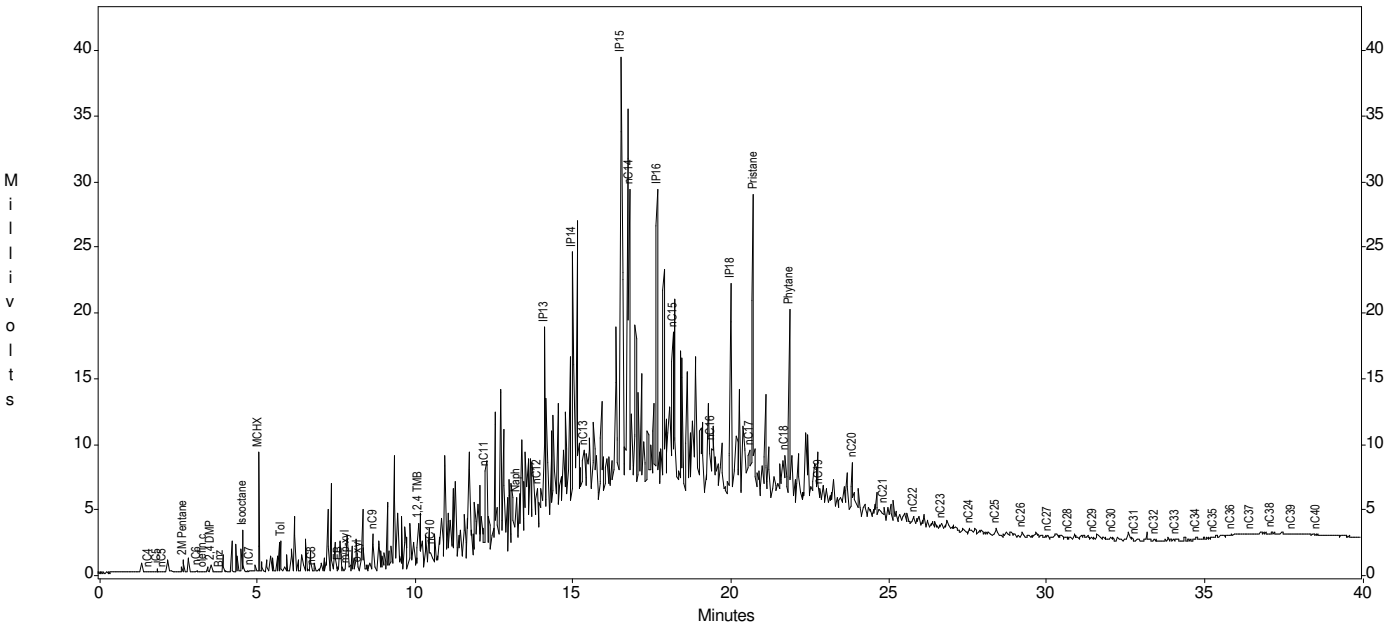

c:\ezchrom\chrom\08134\n-116 -- Channel A




c:\ezchrom\chrom\08134\n-116 -- Channel A




c:\ezchrom\chrom\08134\n-116 -- Channel A



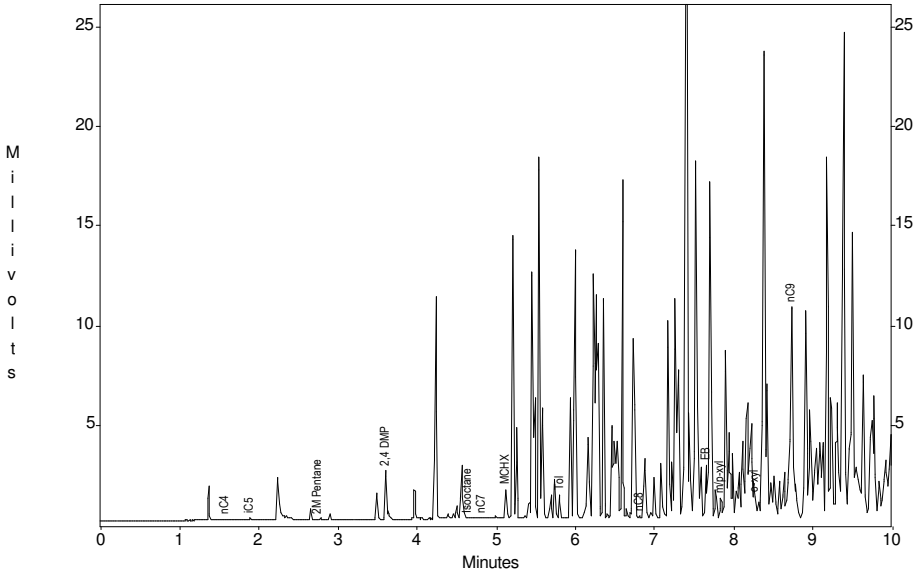

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 24 | 18 |
| iC5 | 203 | 220 |
| nC5 | 63 | 60 |
| MTBE | 0 | 0 |
| 2M Pentane | 1031 | 929 |
| nC6 | 142 | 105 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 62 | 23 |
| 2,4 DMP | 530 | 467 |
| Bnz | 51 | 19 |
| Isooctane | 3757 | 3174 |
| nC7 | 129 | 92 |
| MCHX | 10954 | 9024 |
| Tol | 3214 | 2361 |
| nC8 | 95 | 59 |
| EB | 678 | 420 |
| m/p-xyl | 405 | 225 |
| o-xyl | 858 | 371 |
| nC9 | 5856 | 2819 |
| 1,2,4 TMB | 8619 | 3341 |
| nC10 | 3987 | 1308 |
| nC11 | 8664 | 5497 |
| Naph | 7554 | 3596 |
| nC12 | 6831 | 3065 |
| IP13 | 27662 | 14984 |
| IP14 | 32887 | 18936 |
| nC13 | 9414 | 3196 |
| IP15 | 69957 | 33635 |
| nC14 | 55327 | 23571 |
| IP16 | 59594 | 23657 |
| nC15 | 33902 | 12830 |
| nC16 | 7528 | 4284 |
| IP18 | 43536 | 16526 |
| nC17 | 15083 | 3913 |
| Pristane | 61927 | 23342 |
| nC18 | 7827 | 3552 |
| Phytane | 36350 | 14647 |
| nC19 | 1726 | 841 |
| nC20 | 11339 | 3871 |
| nC21 | 1321 | 663 |
| nC22 | 2242 | 599 |
| nC23 | 1187 | 384 |
| nC24 | 946 | 358 |
| nC25 | 3080 | 564 |
| nC26 | 1353 | 367 |
| nC27 | 442 | 217 |
| nC28 | 379 | 142 |
| nC29 | 282 | 125 |
| nC30 | 35 | 66 |
| nC31 | 111 | 62 |
| nC32 | 281 | 94 |
| nC33 | 282 | 102 |
| nC34 | 166 | 80 |
| nC35 | 27 | 22 |
| nC36 | 176 | 59 |
| nC37 | 109 | 33 |
| nC38 | 116 | 53 |
| nC39 | 90 | 35 |
| nC40 | 55 | 33 |

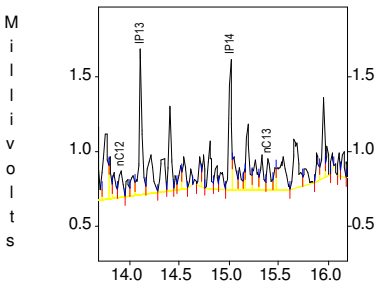
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-125
Acquired : Jul 31, 2008 09:41:17

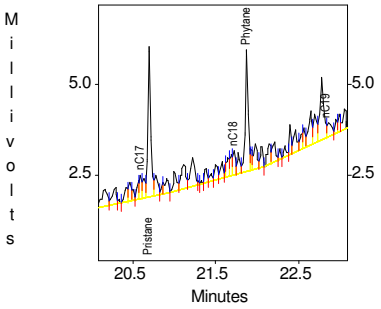
c:\ezchrom\chrom\08134\n-125 -- Channel A



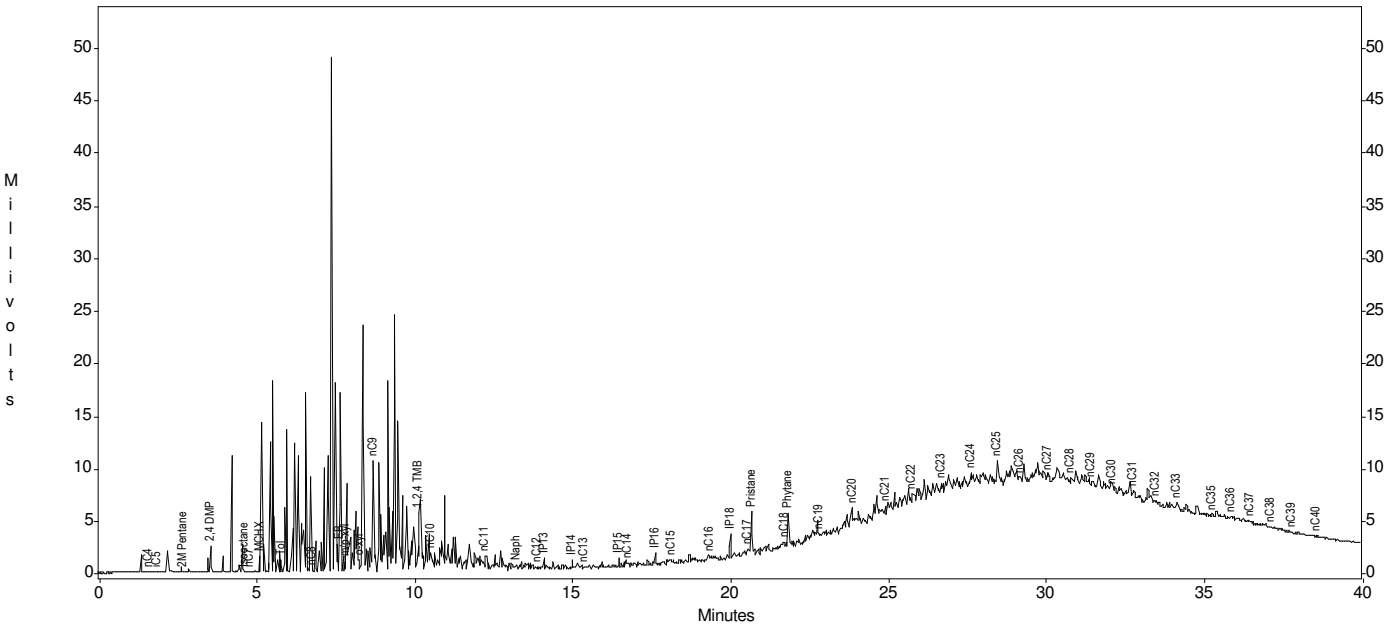

c:\ezchrom\chrom\08134\n-125 -- Channel A




c:\ezchrom\chrom\08134\n-125 -- Channel A




c:\ezchrom\chrom\08134\n-125 -- Channel A

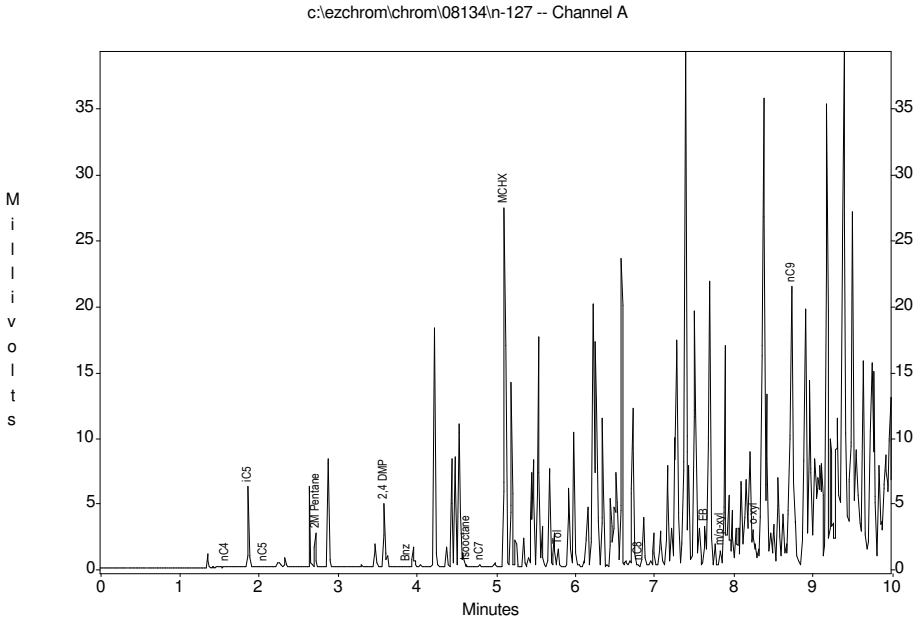


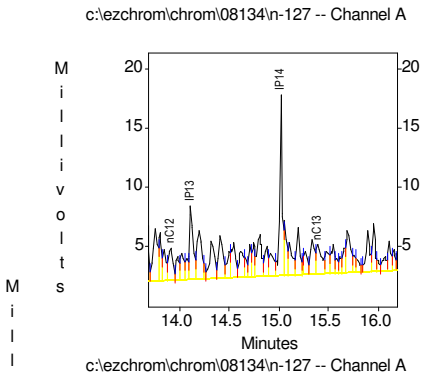

Channel A Results

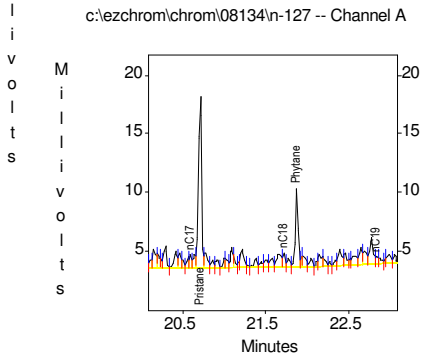
| Peak | Area | Height |
|---|---|---|
| nC4 | 47 | 23 |
| iC5 | 72 | 66 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 53 | 28 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 0 | 0 |
| 2,4 DMP | 2577 | 2388 |
| Bnz | 0 | 0 |
| Isooctane | 44 | 26 |
| nC7 | 23 | 10 |
| MCHX | 1879 | 1427 |
| Tol | 1507 | 1180 |
| nC8 | 120 | 100 |
| EB | 3613 | 2617 |
| m/p-xyl | 1348 | 893 |
| o-xyl | 205 | 235 |
| nC9 | 20447 | 10514 |
| 1,2,4 TMB | 13310 | 5561 |
| nC10 | 6239 | 1696 |
| nC11 | 2903 | 1266 |
| Naph | 1086 | 359 |
| nC12 | 432 | 177 |
| IP13 | 1890 | 974 |
| IP14 | 1363 | 863 |
| nC13 | 531 | 207 |
| IP15 | 1322 | 930 |
| nC14 | 663 | 366 |
| IP16 | 3054 | 1223 |
| nC15 | 1387 | 367 |
| nC16 | 738 | 405 |
| IP18 | 5649 | 2477 |
| nC17 | 1339 | 672 |
| Pristane | 9295 | 4167 |
| nC18 | 1327 | 704 |
| Phytane | 7858 | 3377 |
| nC19 | 1333 | 386 |
| nC20 | 7370 | 1926 |
| nC21 | 2465 | 888 |
| nC22 | 3395 | 1024 |
| nC23 | 1679 | 842 |
| nC24 | 4216 | 1263 |
| nC25 | 10649 | 2239 |
| nC26 | 1169 | 488 |
| nC27 | 1381 | 681 |
| nC28 | 902 | 396 |
| nC29 | 998 | 495 |
| nC30 | 70 | 0 |
| nC31 | 2175 | 578 |
| nC32 | 794 | 281 |
| nC33 | 1238 | 404 |
| nC34 | 0 | 0 |
| nC35 | 228 | 136 |
| nC36 | 338 | 219 |
| nC37 | 314 | 82 |
| nC38 | 142 | 82 |
| nC39 | 96 | 63 |
| nC40 | 85 | 46 |

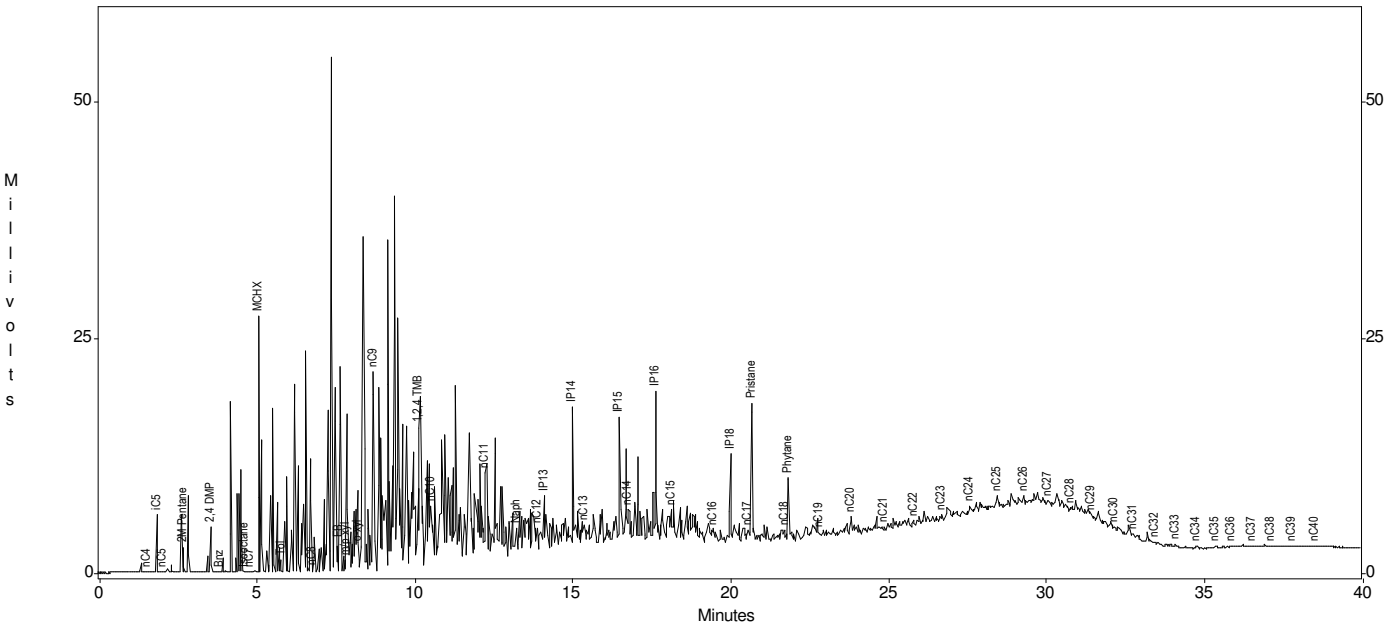
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-127
Acquired : Jul 31, 2008 11:29:45



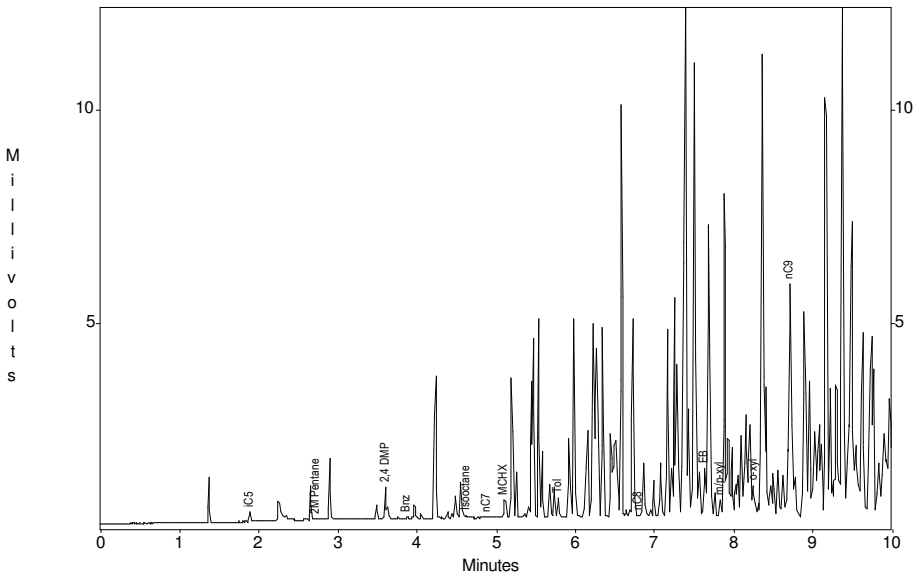

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 17 | 19 |
| iC5 | 4910 | 6189 |
| nC5 | 84 | 56 |
| MTBE | 0 | 0 |
| 2M Pentane | 2592 | 2549 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 0 | 0 |
| 2,4 DMP | 5025 | 4777 |
| Bnz | 75 | 41 |
| Isooctane | 113 | 67 |
| nC7 | 96 | 72 |
| MCHX | 33032 | 27162 |
| Tol | 2092 | 1325 |
| nC8 | 59 | 52 |
| EB | 4401 | 3021 |
| m/p-xyl | 1642 | 1134 |
| o-xyl | 3858 | 2738 |
| nC9 | 51916 | 21180 |
| 1,2,4 TMB | 25429 | 14507 |
| nC10 | 23403 | 6181 |
| nC11 | 15784 | 9213 |
| Naph | 5722 | 2876 |
| nC12 | 8124 | 2743 |
| IP13 | 14502 | 6235 |
| IP14 | 27677 | 15257 |
| nC13 | 9689 | 2541 |
| IP15 | 24550 | 13698 |
| nC14 | 8141 | 3810 |
| IP16 | 33304 | 15891 |
| nC15 | 7509 | 3278 |
| nC16 | 1761 | 1194 |
| IP18 | 21967 | 9405 |
| nC17 | 2647 | 1123 |
| Pristane | 35352 | 14653 |
| nC18 | 2594 | 1163 |
| Phytane | 15046 | 6635 |
| nC19 | 1147 | 583 |
| nC20 | 6929 | 1967 |
| nC21 | 1326 | 451 |
| nC22 | 1356 | 447 |
| nC23 | 1331 | 526 |
| nC24 | 2317 | 776 |
| nC25 | 7779 | 1337 |
| nC26 | 2200 | 872 |
| nC27 | 809 | 415 |
| nC28 | 1713 | 563 |
| nC29 | 905 | 477 |
| nC30 | 140 | 88 |
| nC31 | 185 | 44 |
| nC32 | 53 | 21 |
| nC33 | 330 | 147 |
| nC34 | 1550 | 311 |
| nC35 | 55 | 52 |
| nC36 | 198 | 66 |
| nC37 | 86 | 41 |
| nC38 | 87 | 30 |
| nC39 | 32 | 41 |
| nC40 | 64 | 34 |

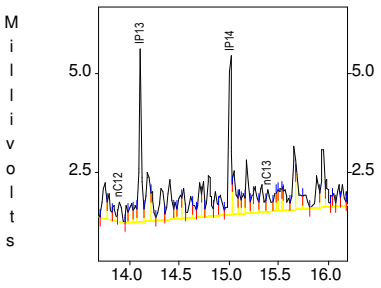
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-129
Acquired : Jul 31, 2008 16:09:46

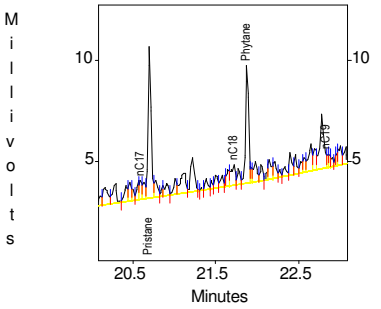
c:\ezchrom\chrom\08134\n-129 -- Channel A



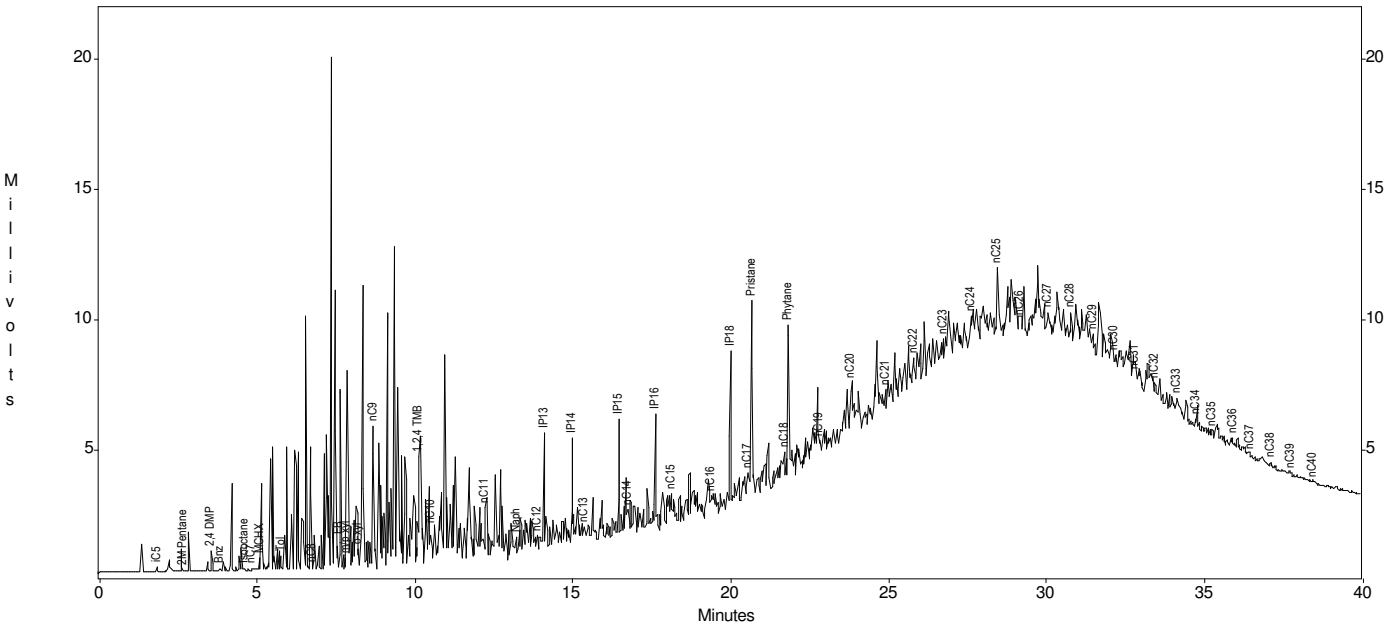

c:\ezchrom\chrom\08134\n-129 -- Channel A




c:\ezchrom\chrom\08134\n-129 -- Channel A




c:\ezchrom\chrom\08134\n-129 -- Channel A

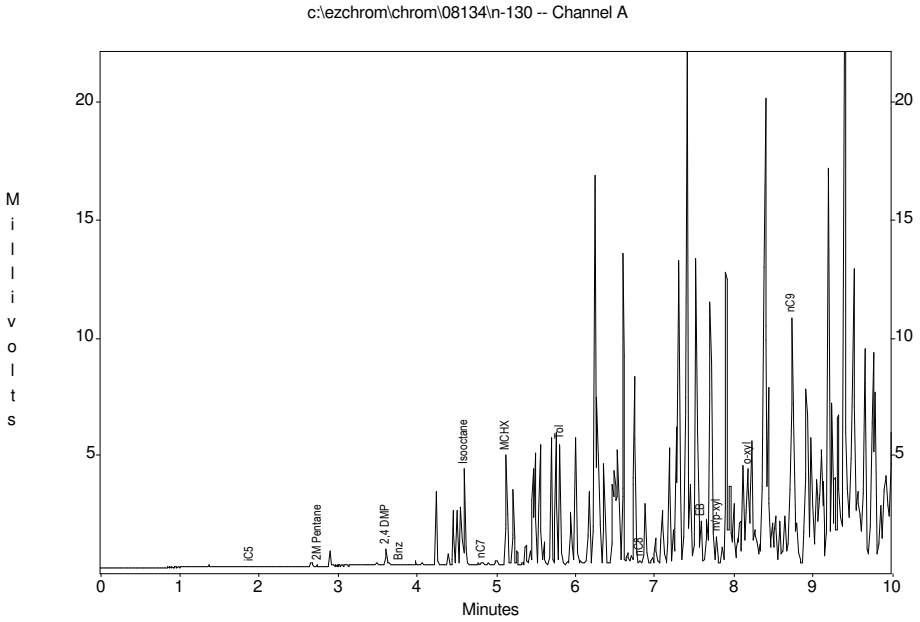


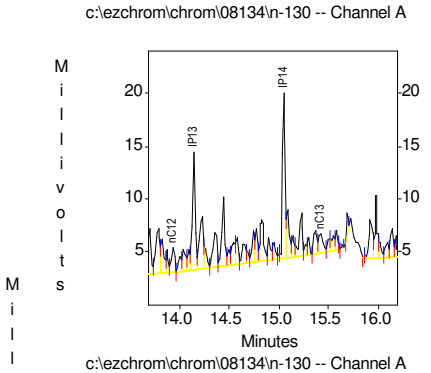

Channel A Results

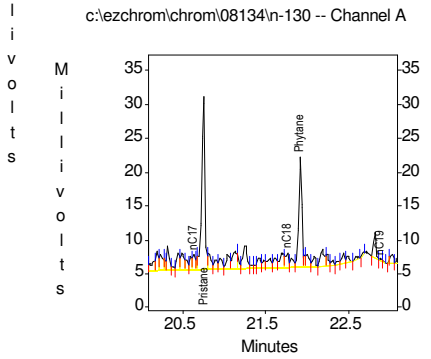
| Peak | Area | Height |
|---|---|---|
| nC4 | 0 | 0 |
| iC5 | 250 | 209 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 40 | 26 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 0 | 0 |
| 2,4 DMP | 831 | 730 |
| Bnz | 41 | 26 |
| Isooctane | 178 | 66 |
| nC7 | 50 | 28 |
| MCHX | 680 | 416 |
| Tol | 700 | 481 |
| nC8 | 106 | 58 |
| EB | 1613 | 1136 |
| m/p-xyl | 706 | 426 |
| o-xyl | 1606 | 725 |
| nC9 | 11446 | 5488 |
| 1,2,4 TMB | 6591 | 4176 |
| nC10 | 5000 | 1382 |
| nC11 | 3476 | 2067 |
| Naph | 1980 | 652 |
| nC12 | 1194 | 494 |
| IP13 | 7380 | 4428 |
| IP14 | 6374 | 4060 |
| nC13 | 1634 | 583 |
| IP15 | 7102 | 4500 |
| nC14 | 1776 | 956 |
| IP16 | 9984 | 4496 |
| nC15 | 3719 | 1178 |
| nC16 | 1849 | 754 |
| IP18 | 13462 | 5994 |
| nC17 | 2353 | 1001 |
| Pristane | 17045 | 7517 |
| nC18 | 3993 | 1090 |
| Phytane | 14275 | 5857 |
| nC19 | 835 | 668 |
| nC20 | 7842 | 2026 |
| nC21 | 1965 | 770 |
| nC22 | 2875 | 1116 |
| nC23 | 2499 | 937 |
| nC24 | 3370 | 1157 |
| nC25 | 11460 | 2579 |
| nC26 | 2233 | 579 |
| nC27 | 1884 | 723 |
| nC28 | 3158 | 1007 |
| nC29 | 1503 | 540 |
| nC30 | 340 | 210 |
| nC31 | 180 | 178 |
| nC32 | 134 | 181 |
| nC33 | 1200 | 418 |
| nC34 | 50 | 125 |
| nC35 | 232 | 150 |
| nC36 | 466 | 212 |
| nC37 | 72 | 0 |
| nC38 | 150 | 92 |
| nC39 | 69 | 31 |
| nC40 | 121 | 48 |

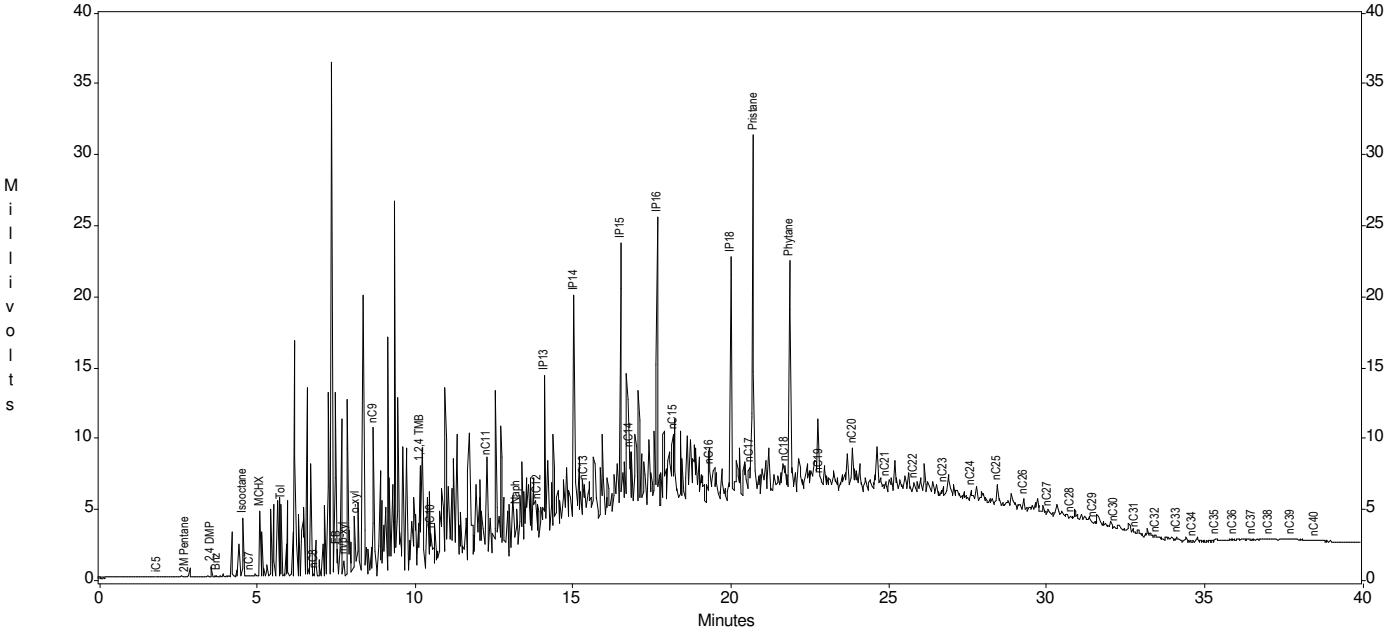
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-130
Acquired : Jul 31, 2008 08:50:57



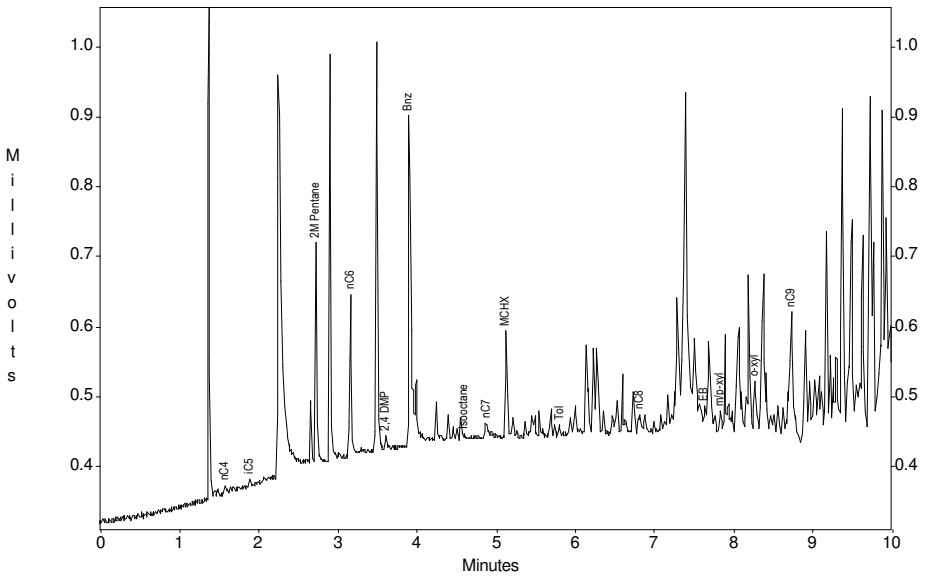

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 0 | 0 |
| iC5 | 21 | 24 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 20 | 16 |
| nC6 | 0 | 0 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 0 | 0 |
| 2,4 DMP | 745 | 673 |
| Bnz | 101 | 33 |
| Isooctane | 4886 | 4099 |
| nC7 | 133 | 102 |
| MCHX | 5987 | 4646 |
| Tol | 6686 | 5092 |
| nC8 | 151 | 115 |
| EB | 2496 | 1799 |
| m/p-xyl | 1741 | 1158 |
| o-xyl | 7722 | 4000 |
| nC9 | 22010 | 10445 |
| 1,2,4 TMB | 11786 | 7315 |
| nC10 | 8611 | 2412 |
| nC11 | 10853 | 6609 |
| Naph | 3337 | 2083 |
| nC12 | 5473 | 2392 |
| IP13 | 21152 | 11274 |
| IP14 | 26304 | 15793 |
| nC13 | 5854 | 1915 |
| IP15 | 34853 | 19196 |
| nC14 | 9002 | 4341 |
| IP16 | 44924 | 20594 |
| nC15 | 13951 | 5179 |
| nC16 | 3292 | 2434 |
| IP18 | 40549 | 17120 |
| nC17 | 5048 | 2220 |
| Pristane | 68880 | 25557 |
| nC18 | 4922 | 1996 |
| Phytane | 38404 | 16319 |
| nC19 | 363 | 193 |
| nC20 | 11336 | 2984 |
| nC21 | 954 | 615 |
| nC22 | 1280 | 770 |
| nC23 | 2101 | 831 |
| nC24 | 2145 | 762 |
| nC25 | 6705 | 1339 |
| nC26 | 1532 | 721 |
| nC27 | 731 | 280 |
| nC28 | 562 | 215 |
| nC29 | 569 | 227 |
| nC30 | 353 | 141 |
| nC31 | 54 | 32 |
| nC32 | 45 | 47 |
| nC33 | 373 | 154 |
| nC34 | 77 | 94 |
| nC35 | 102 | 71 |
| nC36 | 160 | 75 |
| nC37 | 109 | 42 |
| nC38 | 125 | 25 |
| nC39 | 36 | 28 |
| nC40 | 140 | 15 |

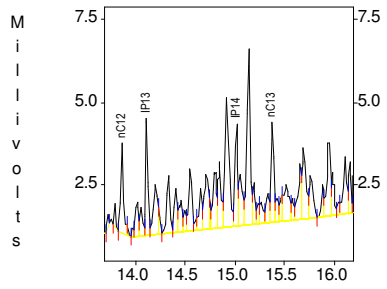
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : N-135
Acquired : Jul 31, 2008 10:35:35

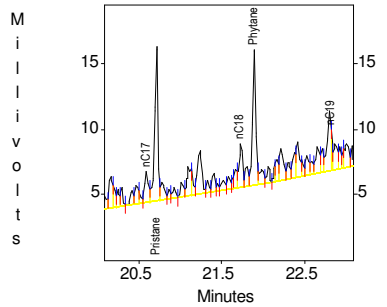
c:\ezchrom\chrom\08134\n-135 -- Channel A



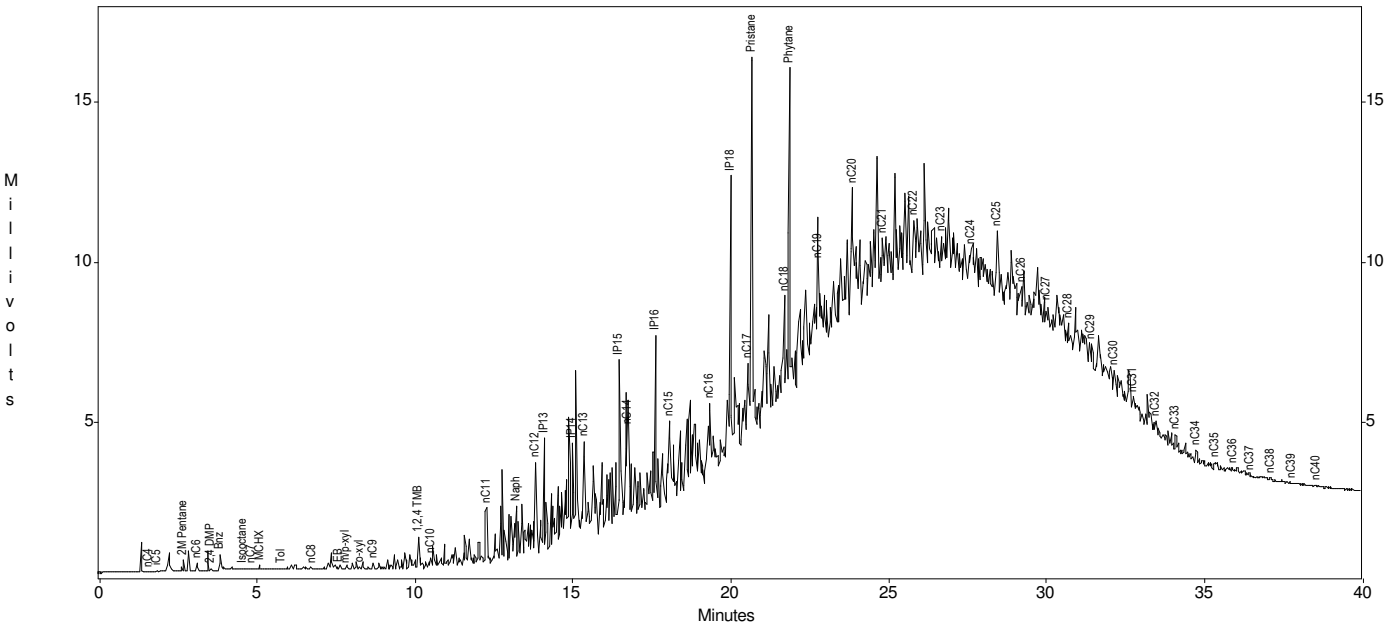

c:\ezchrom\chrom\08134\n-135 -- Channel A




c:\ezchrom\chrom\08134\n-135 -- Channel A




c:\ezchrom\chrom\08134\n-135 -- Channel A



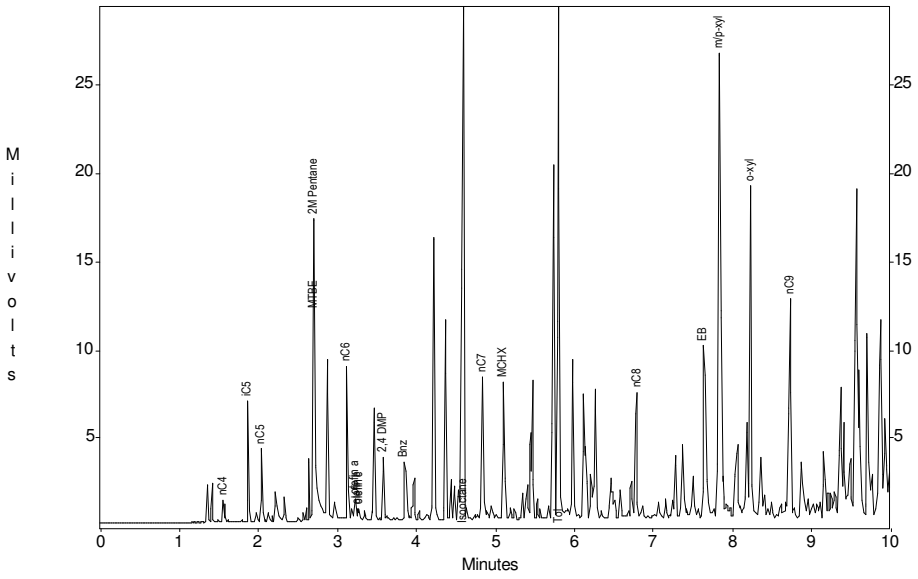

Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 21 | 11 |
| iC5 | 15 | 11 |
| nC5 | 0 | 0 |
| MTBE | 0 | 0 |
| 2M Pentane | 404 | 312 |
| nC6 | 338 | 232 |
| olefin a | 0 | 0 |
| olefin b | 0 | 0 |
| olefin c | 0 | 0 |
| 2,4 DMP | 29 | 19 |
| Bnz | 1035 | 472 |
| Isooctane | 10 | 9 |
| nC7 | 43 | 20 |
| MCHX | 218 | 151 |
| Tol | 26 | 16 |
| nC8 | 81 | 31 |
| EB | 78 | 46 |
| m/p-xyl | 90 | 40 |
| o-xyl | 234 | 84 |
| nC9 | 622 | 184 |
| 1,2,4 TMB | 2108 | 964 |
| nC10 | 716 | 322 |
| nC11 | 3298 | 1712 |
| Naph | 3965 | 1567 |
| nC12 | 5283 | 2733 |
| IP13 | 6040 | 3539 |
| IP14 | 4922 | 3110 |
| nC13 | 5957 | 3018 |
| IP15 | 12047 | 5182 |
| nC14 | 5226 | 2861 |
| IP16 | 11626 | 5427 |
| nC15 | 6778 | 2541 |
| nC16 | 4795 | 2342 |
| IP18 | 20954 | 8867 |
| nC17 | 8105 | 2385 |
| Pristane | 31107 | 11857 |
| nC18 | 8680 | 3296 |
| Phytane | 25947 | 10264 |
| nC19 | 4190 | 3021 |
| nC20 | 14032 | 4097 |
| nC21 | 4009 | 1395 |
| nC22 | 4643 | 1979 |
| nC23 | 5304 | 1541 |
| nC24 | 4841 | 1156 |
| nC25 | 10876 | 2105 |
| nC26 | 2637 | 965 |
| nC27 | 2851 | 842 |
| nC28 | 1489 | 720 |
| nC29 | 1881 | 719 |
| nC30 | 1037 | 497 |
| nC31 | 360 | 208 |
| nC32 | 753 | 326 |
| nC33 | 801 | 386 |
| nC34 | 589 | 160 |
| nC35 | 101 | 67 |
| nC36 | 367 | 110 |
| nC37 | 63 | 46 |
| nC38 | 114 | 42 |
| nC39 | 48 | 30 |
| nC40 | 60 | 33 |

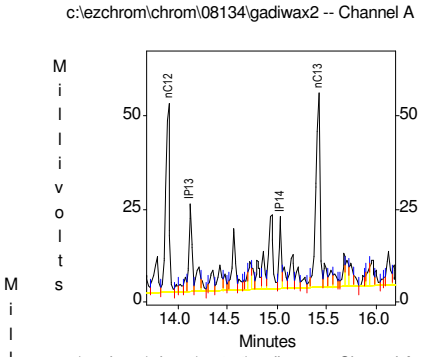
# Torkelson Geochemistry, Inc.

Sunoco Philadelphia Refinery - AOI 8 SCR
Sample ID : Gas/Dies/Wax std
Acquired : Jul 31, 2008 13:18:39

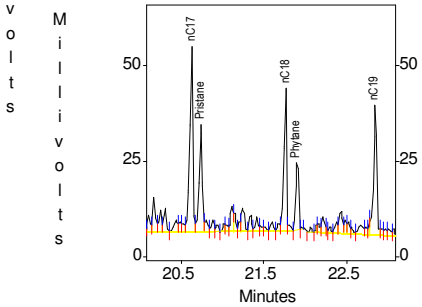
c:\ezchrom\chrom\08134\gadiwax2 -- Channel A



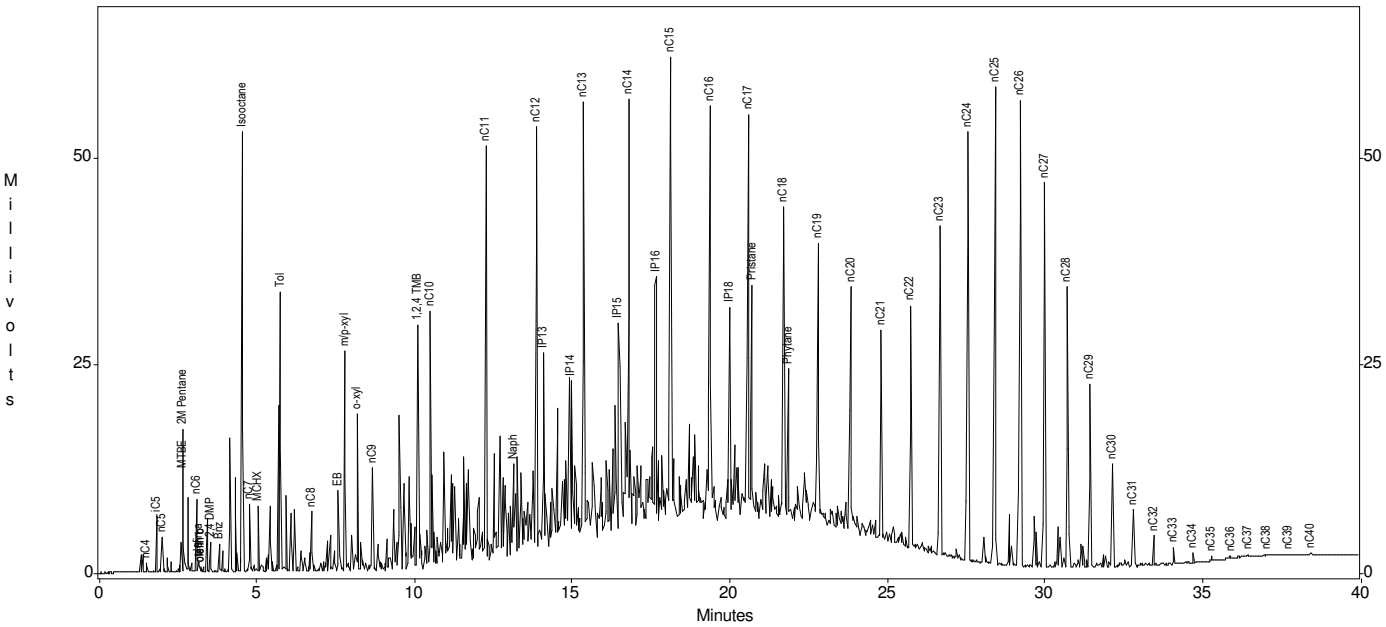

c:\ezchrom\chrom\08134\gadiwax2 -- Channel A




c:\ezchrom\chrom\08134\gadiwax2 -- Channel A




c:\ezchrom\chrom\08134\gadiwax2 -- Channel A




Channel A Results

| Peak | Area | Height |
|---|---|---|
| nC4 | 844 | 1197 |
| iC5 | 5237 | 6801 |
| nC5 | 3556 | 4178 |
| MTBE | 7110 | 11744 |
| 2M Pentane | 19226 | 17013 |
| nC6 | 8381 | 8568 |
| olefin a | 1201 | 1097 |
| olefin b | 589 | 523 |
| olefin c | 640 | 522 |
| 2,4 DMP | 3628 | 3584 |
| Bnz | 4616 | 3202 |
| Isooctane | 67342 | 52743 |
| nC7 | 10732 | 8058 |
| MCHX | 9891 | 7788 |
| Tol | 46099 | 33546 |
| nC8 | 8895 | 7111 |
| EB | 15060 | 9784 |
| m/p-xyl | 52242 | 26351 |
| o-xyl | 28562 | 18847 |
| nC9 | 19381 | 12387 |
| 1,2,4 TMB | 54430 | 29156 |
| nC10 | 50580 | 30692 |
| nC11 | 125205 | 49772 |
| Naph | 26419 | 10838 |
| nC12 | 111988 | 50866 |
| IP13 | 42314 | 23440 |
| IP14 | 33440 | 19534 |
| nC13 | 148615 | 52467 |
| IP15 | 46608 | 24865 |
| nC14 | 138215 | 51455 |
| IP16 | 61655 | 29152 |
| nC15 | 144672 | 55541 |
| nC16 | 129943 | 49763 |
| IP18 | 61028 | 25394 |
| nC17 | 120104 | 48415 |
| Pristane | 72271 | 27954 |
| nC18 | 88772 | 37001 |
| Phytane | 36788 | 17273 |
| nC19 | 85744 | 33847 |
| nC20 | 70856 | 29690 |
| nC21 | 52259 | 25456 |
| nC22 | 66568 | 29140 |
| nC23 | 103851 | 39616 |
| nC24 | 156908 | 51563 |
| nC25 | 187403 | 57282 |
| nC26 | 193674 | 55832 |
| nC27 | 149116 | 46256 |
| nC28 | 94360 | 33770 |
| nC29 | 52340 | 22034 |
| nC30 | 25143 | 12289 |
| nC31 | 11594 | 6435 |
| nC32 | 6824 | 3513 |
| nC33 | 3654 | 2051 |
| nC34 | 2023 | 1098 |
| nC35 | 1190 | 603 |
| nC36 | 665 | 329 |
| nC37 | 376 | 162 |
| nC38 | 277 | 105 |
| nC39 | 221 | 68 |
| nC40 | 142 | 45 |

| Torkelson Geochemistry, Inc. | | | | | | | |
|---|---|---|---|---|---|---|---|
| Physical Properties Measurements | | | | | | | |
| Sample | TGI Job | Density (gm/ml) | Viscosity (centipoise) | Surface Tension Air/Water (dynes/cm) | Interfacial Tension NAPL/Water (dynes/cm) | Surface Tension Air/NAPL (dynes/cm) | Temperature of Measurements |
| N-107 | 08134 | 0.9033 | NA | NA | NA | NA | 60F |
| N-113 | 08134 | 0.9167 | NA | NA | NA | NA | 60F |
| N-116 | 08134 | 0.8985 | NA | NA | NA | NA | 60F |
| N-125 | 08134 | 0.8922 | NA | NA | NA | NA | 60F |
| N-127 | 08134 | 0.8785 | NA | NA | NA | NA | 60F |
| N-129 | 08134 | 0.9017 | NA | NA | NA | NA | 60F |
| N-130 | 08134 | 0.7893 | NA | NA | NA | NA | 60F |
| N-135 | 08134 | 0.9148 | NA | NA | NA | NA | 60F |

NA = Not Analyzed

| Sunoco Refinery - Philadelphia | | | | | | |
|---|---|---|---|---|---|---|
| TGI Job 08134 | | | | | | |
| **Interpretation of Product Type(s), Proportions and Weathering** | | | | **Similarities to Other Samples in this Study** | | |
| **Sample** | **Product Type(s)** | **Proportions** | **Weathering** | **Quite Similar to** | **Fairly Similar to** | **Somewhat Similar to** |
| N-107 | Aviation Gasoline | 5 | Severe | Unique | | |
| | Middle Distillate | 70 | Extreme | | | |
| | Heavier Material | 25 | Extreme | | | |
| | | | | | | |
| N-113 | Unknown Light Mateial | 10 | Extreme | Unique | | |
| | ? Middle Distillate | ? | Extreme | | | |
| | Heavier Material | 90 | Extreme | | | |
| | | | | | | |
| N-116 | Unknown Light Mateial | 2 | Severe | Unique | | |
| | Middle Distillate | 79 | Extreme | | | |
| | Heavier Material | 19 | Extreme | | | |
| | | | | | | |
| N-125 | Heavy Virgin Naphtha | 15 | Extreme | Unique | | |
| | Heavier Material | 85 | Extreme | | | |
| | | | | | | |
| N-127 | Heavy Virgin Naphtha | 20 | Extreme | Unique | | |
| | Middle Distillate | 30 | Extreme | | | |
| | Heavier Material | 50 | Extreme | | | |
| | | | | | | |
| N-129 | Heavy Virgin Naphtha | 5 | Extreme | Unique | | |
| | ? Middle Distillate | ? | Extreme | | | |
| | Heavier Material | 95 | Extreme | | | |
| | | | | | | |
| N-130 | Heavy Virgin Naphtha | 10 | Extreme | Unique | | |
| | ? Middle Distillate | ? | Extreme | | | |
| | Heavier Material | 90 | Extreme | | | |
| | | | | | | |
| N-135 | Unknown Light Mateial | 1 | Extreme | Unique | | |
| | ? Middle Distillate | ? | Extreme | | | |
| | Heavier Material | 99 | Extreme | | | |
| | | | | | | |
| | | | | | | |
| | Note: Heavier material could be either crude oil or residual oil | | | | | |