West Virginia Department of Environmental Protection
Office of Environmental Remediation
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Charleston, WV 25304
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VRP NO.	04506
SITE NAME	PQS #5117-Etowah
LOCATION	Barlow Road-Charleston

Additional Site Characterization

November 2003 (Revision 1)

Volume 1 of 2

Shaw™ Shaw Environmental, Inc.

Project No. 845335
PQS Tax ID No. 76-0200625

ADDITIONAL SITE CHARACTERIZATION
FORMER PENNZOIL-QUAKER STATE
ETOWAH TERMINAL
1015 BARLOW DRIVE
CHARLESTON, WEST VIRGINIA
VCP No. 04505

Prepared for:

Pennzoil-Quaker State dba SOPUS Products
700 Milam
Houston, Texas 77002

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1.0 Introduction

The former Pennzoil-Quaker State (PQS) Etowah Terminal is located in Kanawha County at 1015 Barlow Drive in Charleston, West Virginia **(Figure 1)**. The property (hereafter referred to as the Site) is bordered to the north by woodland. An Allegheny Power natural gas pipeline crosses the northern end of the Site. A former Columbia Natural Gas (CNG) pipeline station facility is located approximately 0.5 mile north of the Site. The Site is bordered to the east by a railroad corridor and Barlow Drive beyond. A steep, wooded slope is located beyond Barlow Drive, east of the Site. Residences are located immediately south and the Elk River is located along the western border of the Site.

On November 16, 2001, PQS submitted an application to the West Virginia Department of Environmental Protection (WVDEP)-Division of Land Restoration (DLR), Office of Environmental Remediation (OER) to Participate in Voluntary Remediation Program (VRP). The VRP is established in W.V. Code 22-22-3 and 14 W.V. Reg. 452.60-34. The VRP application was approved on January 3, 2002. A VRP Agreement to investigate and remediate the property was executed on April 15, 2002 and modified for schedule changes on September 23, 2002, and March 4, 2003. Shaw Environmental, Inc. (Shaw Environmental) developed an Additional Site Characterization Sampling and Analysis Plan (SAP) approved by the WVDEP-OER on July 10, 2003.

1.1 Purpose and Objectives

The goals of this Additional Site Characterization Report (ASCR) are to identify contaminants of potential concern (COPS) and contaminants of concern (COCs), to develop a conceptual site model and present the necessary data in a concise and understandable manner for use in developing risk-based closure standards (including no action) for cleanup of such site-related constituents. COPCs are possible contaminants that could reasonably be expected based on Site history. COCs are contaminants that have been detected or not eliminated from concern. The COPC's and COC's were determined based on known site operational history and information contained in previous environmental site assessments (ESA's), which were included as part of the VRP Application.

The overall quality assurance (QA) objective is to provide data and data reporting that is representative of Site conditions. The ASCR meets this objective by providing details on the following subjects:

- The Data Quality Objectives for the project:
- Specific Quality Control (QC) procedures that were implemented to achieve these objectives; and
- Staff organization and responsibility.

1.2 Project Background

1.2.1 Facility History

Prior to the construction of the Site, the subject property was used for agricultural purposes. On December 28, 1938, Elk Refining Company purchased a 1.56-acre tract of land (identified as Plot 32 on Elk District Map 44L) from Edith Bowers Bailey and Homer Bailey. The first ASTs were constructed on-site during 1938 and additional ASTs were added as the petroleum bulk storage terminal expanded **(Table 1)**. On August 30, 1941, Elk Refining Company purchased a 1.3-acre tract of land (identified as Plot 31 on Elk District Map 44L) from Delia Bowers and James C. Bowers. On July 30, 1947, Elk Refining Company purchased a 1.0-acre tract of and (identified as Plot 30 on Elk District Map 44L) from Ambrose C. Smith and his wife. On January 9, 1948, Elk Refining Company purchased a 1.01 tract of land including the former one-story "Bower's School" building (identified as Plot 33 on Elk District Map 44L) from the Board of Education of the County of Kanawha. The warehouse/office and garage/storage buildings were constructed during 1950.

On January 1, 1970, Elk Refining Company was merged with Pennzoil United, Inc. (now PQS). On November 30, 2001, PQS sold the subject property to Etowah River Terminal, LLC.

The Site consists of a two-story warehouse/office building, a garage/storage building, asphalt, parking lots, a grave yard, a fire (pump) house, a flair, a fuel loading rack, an oil loading rack, an oil/water separator, a dock, two former fire houses, a former pump house, a former loading rack, 19 aboveground storage tanks (AST's) and associated aboveground product piping **(Figure 2)**. The 14 main ASTs (numbered ASTs) are located inside of the diked areas and are summarized in **Table 1**. The four non-numbered ASTs include the following:

- A 275-gallon diesel additive AST installed during 1999 inside the diked area adjacent to the fuel loading rack;
- A 275-gallon drip oil AST installed during 1999 inside the diked area adjacent to the oil loading rack;
- A 320-gallon kerosene heating oil AST located on a concrete floor inside the garage/storage building; and
- A 30-gallon hydraulic oil AST located on a concrete floor in the garage/storage building.

The fuel loading rack is constructed on bermed concrete near the center of the site. The inactive oil loading rack is constructed on gravel near the north end of the site.

Stormwater drains located in the diked area and on the asphalt parking lot on the northern end of the site flow into an oil/water separator located on the eastern side of the site **(Figure 2)**. Treated stormwater from the oil/water separator discharges into the Elk River in accordance with national Pollution Discharge Elimination System (NPDES) Permit No. WV0045225. Stormwater that falls on the asphalt parking lot located on the southern end of the site flows into catch basins along the western edge of the facility and is discharged into the Elk River.

1.2.2 Current Property use

Currently the Etowah River Terminal LLC operates the Site as bulk storage terminal for freeze conditioning agents including ethylene glycol and calcium chloride solutions. Calcium chloride is stored in ASTs 403, 404 and 405. Ethylene glycol mixtures are stored in ASTs 393 and 398 through 402. The Site is zoned for industrial use. Current land surface completion is shown on **Figure 3.**

1.3 Regional Geology and Hydrogeological Setting

The Site is located in Charleston, West Virginia on a steep sided fluvial terrace adjacent to the Elk River **(Figure 1)**. The Elk River is a southwest flowing tributary of the Kanawha River. The unconfined groundwater table ranges from approximately 15 to 38 feet below ground surface (b.g.s). The area lies within the unglaciated portion of the Appalachian Plateau physiographic province, which is generally characterized by relatively flat lying gently folded Upper Paleozoic sedimentary rocks. Quaternary fluvial and colluvial deposits greater than approximately 40 feet thick underlie the site. Udorthents Smoothed-Urban Land complex soils are developed at the surface of the Site (Van Houten, et. al., 1981). The Udorthents Smoothed-Urban Land complex typically consists of areas of heterogeneous fill material that has been leveled by cutting the higher parts and filling the lower parts. Based on boring logs, fill materials at the Site range from approximately 4 to 12 feet thick. The fill appears to be underlain by a fining upward sequence of Quaternary alluvial deposits generally comprised of silty sand with occasional gravel overlain by clayey silt and silty clay. The Quaternary alluvium is disconformably underlain by the Pennsylvania Allegheny Formation, which is generally comprised of cyclic sequences of sandstone, siltstone and shale with occasional thin limestone and coal strata (Cardwell, et. al., 1986).

The normal pool elevation of the Elk River is approximately 566 feet above mean sea level (MSL). The unconfined groundwater table ranges from approximately 14 feet to 40 b.g.s. (estimated to be approximately 572-587 feet MSL). Based on boring logs, the unconfined aquifer appears to be characterized by gray to orangish brown sandy clay, sand silt and fine to coarse sand. Based on historical gauging data, groundwater in the unconfined aquifer appears to flow westward toward the Elk River with an average hydraulic gradient of approximately 0.07 feet/foot. The unconfined aquifer appears to be in hydraulic communication with the Elk River.

1.4 Summary of Previous Environmental Assessments

From 1938 until 2001, the Site was a bulk storage terminal for petroleum products including gasoline, diesel, kerosene, bulk oil and additives. Additionally, an Allegheny Power natural gas pipeline crosses the northern end of the site **(Figure 2)**.

Prior to the establishment of WVDEP regulations for underground storage tanks (USTs), a 2,000-gallon gasoline UST and a 2,000-gallon diesel UST were removed from a single basin in the southeast side of the Site. Additionally, a 550-gallon used oil UST was removed from a basin located near the southwest corner of the property **(Figure 2)**.

On February 3, 1988, approximately 120 gallons of diesel fuel was released during truck loading operations. The product spilled onto the ground and flowed into a ditch where it was recovered. Notes were not available to document where the ditch was located or the manner in which the fuel was recovered. Former PQS personnel indicated that the ditch was located adjacent to the fuel loading rack near the oil/water separator. The spill incident was reported to the WVDEP and the National Spill Release Center. No enforcement actions were taken by the WVDEP.

On November 1, 1989, approximately one quart of diesel fuel was released during transfer operations from a barge hose into the Elk River. A boom and absorbent pad were used to contain and remove the spilled product.

Lead based paint was used on 12 of the ASTs located in the diked areas. On August 19, 1997, paint chip samples were collected from AST No. 398 and AST No. 401 through AST No. 404 for the analysis of total lead. Analytical results indicated total lead concentrations ranging from 260 milligrams per kilogram (mg/kg) to 34, 000 mg/kg.

During April 2000, PQS personnel observed stained soil and stressed vegetation caused by a subsurface release from the Allegheny Power (Former Mountaineer Gas) pressurized natural gas line that extends beneath the north end of the site immediately north of AST No. 393. Natural gas line repair was completed by Allegheny Power on July 2, 2003. In a telephone communication on July 24, 2003, Mr. Robert Bostic of Allegheny Power stated that oils have not been used in the natural gas line and that there would be no reason to suspect polychlorinated biphenyls or other oil born substances in the line. On July 23, 2003, Shaw Environmental collected a soil sample from the excavated material in the location of the natural gas line repair. The soil sample was submitted to REI Consultants (REIC) in Beaver, West Virginia for analyses of volatile organic compounds (VOC) plus mercaptan (a compound added to natural gas that imparts a distinct odor). Sampling procedures are included in Section 2.1.3 and analytical results are presented in Section 2.4.1. VOC compounds and mercaptan were not detected in the soil sample collected from the natural gas repair site.

On September 20, 2000, IT Corporation (now Shaw Environmental) conducted a Phase I Environmental Investigation. Oil staining was noted only on the ground surface adjacent to the oil loading rack at the northern end of the Site. No other staining or visual signs of a release from the ASTs were observed at the time of the site inspection.

During November 2000, IT Corporation (now Shaw Environmental) conducted a Phase II Environmental Investigation at the Site. In order to determine if the shallow subsurface had been impacted by petroleum hydrocarbons, soil samples were collected from five (5) hand auger borings (HA-1 through HA-5) advanced in the diked areas to depths ranging from approximately 1.5 to 4.5 b.g.s. On November 3, 2000 **(Figure 2)**. Soil samples were submitted to SPL, Inc. (SPL) in Scott, Louisiana for analyses of benzene, toluene, ethylbenzene and xylenes (BTEX) according to EPA Method 8021B, total petroleum hydrocarbons (TPH) gasoline range organics (GRO), diesel range organics (DRO), and oil range organics (ORO) in accordance with EPA Method 8015B, and total lead and toxicity characteristic leaching procedure (TCLP) lead in accordance with EPA Method 6010B. Groundwater was not encountered in the

hand auger borings. Analytical results are summarized in **Table 2**. A benzene concentration above the WVDEP action level of 0.05 mg/kg and a total BTEX concentration above the WVDEP action level of 10 mg/kg were detected in the soil sample collected from the 3.0-3.5 feet b.g.s. soil sample from HA-2. One (1) TPH-GRO concentration was detected above the WVDEP action level of 1,900 mg/kg in the 3.0-3.5 feet b.g.s. soil sample from HA-2.

In order to determine the ground surface had been impacted by lead from lead-based paint used on the ASTs, IT Corporation (now Shaw Environmental) collected three (3) composite soil samples (C-1, C-2 and C-3) from inside the diked area surrounding the ASTs on November 3, 2000 for the analysis of TCLP lead. A TCLP lead concentration exceeding the Resource Conservation and Recovery Act (RCRA) maximum concentration level (MCL) of 5.0 milligrams per liter (mg/L) was detected in the composite soil sample collected from the area around ASTs No. 398 through No. 402 **(Table 2 and Figure 2)**.

Further delineation of the area impacted by lead was accomplished by collecting five (5) discrete soil samples (C2-A through C2-E) from 0 to 0.5 feet b.g.s. inside the diked area between AST No. 398 through AST No. 402. Total lead concentrations in soil samples C2-A (1,590 mg/kg) and C2-C (3,050 mg/kg) were detected above the Table 60-3B Industrial De Minimis level of 1,000 mg/kg. Analytical results indicated TCLP lead concentrations above the RCRA MCL of 5.0 mg/L in two (2) soil samples collected near AST No. 399 **(Table 2)**. Based on total lead and TCLP lead analytical results, lead impacted soil was identified and additional surface soil sampling was recommended to further delineate the areal extent of adsorbed-phase lead in surface soil.

In order to further determine if the subsurface soil at the Site had been impacted by potential releases of petroleum hydrocarbons or lead, IT Corporation (now Shaw Environmental) supervised the completion of ten (10) Geoprobe® borings (GP-1 through GP-10) ranging from 16-43 feet b.g.s. on November 16-17, 2000 **(Figure 2)**. Soil samples were submitted to SPL in Scott, Louisiana for analyses of BTEX according to EPA Method 8021B, TPH GRO, DRO and ORO according to EPA Method 8015B and total lead according to EPA Method 6010B. Groundwater samples were not collected. Analytical results for soil samples collected from Geoprobe® borings are summarized in **Table 2**. Benzene concentrations above the WVDEP Action Level of 0.05 mg/kg were detected in six (6) soil samples. A TPH DRO concentration in one (1) soil sample exceeded the WVDEP Action Level of 2,600 mg/kg.

In order to determine if releases of petroleum hydrocarbons had impacted groundwater at the Site, IT Corporation (now Shaw Environmental) supervised the drilling/installation of monitoring wells MW-1 through MW-6 during June 2001. Total depths ranged from 20 to 44 feet b.g.s. at the locations that appeared most likely to be impacted **(Figure 2)**. MW-1 through MW-3 was installed along the topographic bench adjacent to the Elk River. MW-4 was installed in the west side of the former UST basin near the southeastern corner of the site. MW-5 was installed near the fuel loading rack near the center of the site. MW-6 was installed adjacent to the oil landing rack at the north end of the facility. Soil and groundwater samples were submitted to SPL in Scott, Louisiana for analyses of BTEX and methyl tertiary butyl ether (MTBE) according to EPA Method 8021B, and TPH GRO, DRO and ORO according to EPA Method 8015B.

Analytical results for soil and groundwater samples collected from the six (6) soil boring/monitoring wells are summarized in **Tables 2 and 3**. Absorbed-phase benzene and total BTEX concentrations exceeded the WVDEP action levels in the 18 to 20 feet b.g.s. soil sample from MW-5. Analytical results for groundwater samples collected from the six (6) monitoring wells indicated dissolved-phase petroleum hydrocarbons did not exceed the West Virginia Groundwater Standards (WVGS) as referenced in Title 46 CFR Series 12, **Appendix A**.

As part of a site investigation for a property purchase by Etowah River Terminal LLC, CTL Engineering, Inc. (CTL) drilled/installed monitoring well MW-7 on September 27, 2001. CTL collected soil samples from the MW-7 boring and groundwater samples from MW-1 through MW-5 and MW-7. Soil and groundwater samples were submitted to Test America in Nashville, Tennessee for analyses of BTEX according to EPA Method 8021B and TPH GRO and DRO according to EPA Method 8015B. Analytical results are summarized in **Tables 2 and 3**. Dissolved-phase BTEX, TPH GRO and TPH DRO concentrations were not detected above WVDEP action levels.

1.5 Site Health and Safety Program

Shaw Environmental developed and followed a site-specific Health and Safety Plan (HASP) for the Site. The HASP documents policies and procedures that protect workers and the public from potential hazards posed by site work. Shaw Environmental considers safety the highest priority and has established a zero incident goal. Fieldwork was conducted in accordance with the HASP in a manner minimizing the probability of near misses, equipment/property damage and personal injury. The HASP was reviewed prior to initiating each task and as often as necessary to provide for the health and safety of each site worker. Each site worker reviewed the HASP and signed the HASP Certification.

2.0 Site Characterization

2.1 Procedures and Methodologies

The standard sampling procedures and field methods used by Shaw Environmental for the Additional Site Characterization are described in this section. Details are provided for equipment cleaning and decontamination, soil sampling collection from direct-push borings, sample storage, handling and field documentation.

2.1.1 Decontamination

Prior to field use and between each use, sample equipment was decontaminated to remove possible residual chemical contamination. Field equipment was pre-cleaned at the equipment maintenance area and wrapped in aluminum foil or plastic. Field decontamination was performed using the following steps:

1. Post-Sample Collection Cleanup - Residual visible soil was removed as much as possible by scraping and shaking. Residue was handled as investigation derived waste (IDW).

2. Gross Wash and Water Rinse - The equipment underwent a vigorous brushing with laboratory-grade, phosphate-free detergent in water and was rinsed with tap water to remove visible particulate. Stainless-steel sprayer or equivalent device provided potable water rinse.

3. Dilute Acid Rinse - Interior and exterior surfaces of glass and stainless steel sampling equipment were rinsed with 10% nitric acid (HNO_3) solution. The 10% dilute nitric acid was applied using a labeled laboratory-grade Nalgene spray bottle. The dilute acid rinse releases metals from the surface of the sampling equipment.

4. Analyte-Free Water Rinse - Decontaminated equipment was rinsed with deionized (DI) certified analyte-free water supplied by REIC. Analyte-free water was applied using labeled laboratory-grade Nalgene® spray bottles.

5. Solvent Rinse - The sample equipment was rinsed with reagent grade isopropanol and allowed to air dry. Isopropanol was applied using labeled laboratory-grade Nalgene® spray bottles.

6. Second Analyte-Free Rinse - The equipment was rinsed again using analyte-free water. Analyte-free water for this rinse was drawn from a squeeze bottle.

7. Equipment was air-dried.

8. Protective Wrap - Decontamination equipment was prepared for storage by draining residual DI water from the equipment and allowing it to air dry. The sampling surfaces were wrapped in layers of aluminum foil and stored in a designated storage location, free from sources or potential sources of contamination.

2.1.2 Soil Sample Collection

Directed surface and subsurface soil samples were collected from 28 soil boring and /or temporary monitoring well locations **(Figure 2)**. Soil samples were collected from the 0-2 foot depth interval b.g.s. to evaluate the risk of dermal contact, inhalation of soil particles, vapors and incidental ingestion. Soil samples were collected from the 2-8 foot depth interval b.g.s. to evaluate the risk of incidental ingestion to construction and utility workers. In order to evaluate the potential soil to groundwater migration pathway, soil samples were collected from the two-foot interval immediately above the saturated zone.

The ground surface at each sample location was covered with 4.0-millimeter (mil) plastic sheeting. Atmospheric VOC concentrations were monitored using an organic vapor analyzer (OVA) to assess potential health and safety hazards. A decontaminated stainless steel hand-auger was used to collect the surface soil sample from the 0-2 foot depth interval b.g.s. Subsurface soil samples were collected from soil borings using a Geoprobe® unit employing direct-push techniques. The direct-push vehicle was positioned at each soil boring location and the drive unit was hydraulically raised on its base so that the weight of the vehicle and a hydraulically powered percussion hammer pushed the probe with an attached 2-inch outside diameter (OD) core barrel into the ground. Direct-push soil samples were collected using a specially designed stainless steel sample tube or core barrel with an inner polyvinyl chloride (PVC) sleeve. Following the retrieval of the PVC sleeve, each soil sample was removed from the core barrel and the sleeve spit open using a decontaminated knife equipped with a stainless steel blade. Surface and subsurface soil samples were collected after removing non-representative debris such as rocks and vegetative material. Immediately upon retrieval, a representative soil sample was collected across each sample interval using a 5.0-gram Terra Core™ sampler in compliance with EPA Method 5035.

Following the collection of soil samples for VOCs analysis, each sample interval was screened using an OVA and soil was collected directly into a resalable 4.0-mil plastic bag for headspace analysis using the ambient temperature headspace (ATH) method. Soil was allowed to equilibrate for approximately 15 minutes to reach ambient temperature. Following equilibration, the tip of the OVA probe was inserted in to the bag and the OVA reading was recorded on the boring log and field activity daily log (FADL). Equilibration and soil headspace screening were performed outdoors, since temperatures below 55 degrees Fahrenheit (F) were not encountered and special procedures were not required. Following the collection of the soil headspace samples, each sample was described in the field and classified according to the Unified Soils Classification system (USCS) in accordance with ASTM Method D-2488-90. Soil sample

descriptions, sample depth intervals and sample identification names were recorded on boring logs **(Appendix A)**.

Following the collection of samples for VOC and headspace analysis, the remaining soil from each sample interval was homogenized as thoroughly as possible by coning and quartering using a stainless steel spatula in a stainless steel bowl. Excess vegetation and rock was removed during sample mixing. Each sample was formed into a cone (coned) and then divided into approximately equal quarters. Each quarter was mixed thoroughly and then recombined with the other quarters using a stainless steel spatula. The coning and quartering process was repeated until the sample was homogenized as much as possible. Samples collected for chemical analysis were placed in the appropriate sample containers with required preservatives, labeled for proper identification, packed in a cooler with ice and shipped to Test America in Nashville, Tennessee. The sample collection location and process were recorded on a FADL. Equipment used for sample collection, transfer and homogenization was properly decontaminated before collecting samples and between sampling locations as previously described.

2.1.3 Surface Soil Sampling

In order to delineate lead concentrations detected in soil adjacent to AST No. 399, six (6) surface soil samples (SS-1 through SS-6) were collected using a decontamination stainless steel hand auger from the 0 - 0.5 foot depth interval at locations shown on **Figure 2**. Soil from each sample location was homogenized as thoroughly as possible by coning and quartering using a stainless steel spatula in a stainless steel bowl. Excess vegetation and rock was removed during sample mixing. Each sample was formed into a cone (coned) and then divided into approximately equal quarters. Each quarter was mixed thoroughly and then recombined with the other quarters using a stainless steel spatula. The coning and quartering process was repeated until the sample was homogenized as much as possible. Surface soil samples were collected in the appropriate sample containers, labeled for proper identification, packed in a cooler with ice and shipped to Test America in Nashville, Tennessee for TCLP lead according to EPA Method 6010B/1311. The sample collection location and process were recorded on a FADL. Equipment used for sample collection, transfer and homogenization was properly decontaminated before collecting samples and between sampling locations as previously described.

2.1.4 Temporary Monitoring Well Installation

Drilling and temporary monitoring well installation were conducted by Roy Fox of EnviroProbe, Inc. in accordance with West Virginia Title 47 Code of State Regulations (CSR) Series 60. Mr. Fox is West Virginia certified driller No. 00174. Sampling equipment was decontaminated prior to and between each use as described above. Direct-push temporary monitoring wells were installed by advancing 2.0-inch inside-diameter (ID) (2.125-inch OD) casing rods to the desired depth using a hydraulic drive unit. Once the casing rods were set at the desired depth, a 1.0-inch diameter well screen was lowered through the 2.0-ID of the casing rods as additional 1.0-inch diameter Schedule 40 PVC well riser was added to the well assembly. The well screen and riser

assembly was lowered until reaching an expendable drive point at the bottom of the casing. After disconnecting the drive point and setting the screen in place, the casing rods were retracted. As the casing rods were retracted above the screen, either the natural formation collapsed or fine-grade sand, was installed by gravity through the rod annulus to between two (2) to five (5) feet above the top of the screened interval. Bentonite chips were installed above the sand filter pack to ground surface to form a barrier to vertical migration of fluids along the well annulus. Temporary monitoring well construction details are summarized on logs included in **Appendix A.**

Following installation, each temporary monitoring well was developed using new 3/8-inch or ¾-inch diameter single-use disposable polyethylene bailers. Temperature, pH, conductivity and dissolved oxygen were measured using a calibrated water quality meter. Development and calibration logs are included in **Appendix B.**

2.1.5 Groundwater Sample Collection

Groundwater samples were collected from 15 out of 18 temporary monitoring wells/soil borings (TMW/SBs): (TMW/SB-2S, TMW/SSB-3S, TMW/SB-3D, TMW/SB-7S, TMW/SB-11, TMW/SB-12, TMW/SB-13, TMW/SB-14, TMW/SB-16, TMW/SB-17, TMW/SB-20, TMW/SB-22, TMW/SB-23, TMW/BG-1, TMW/BG-2) and seven (7) monitoring wells (MW-1 through MW-7) on August 15, 2003.

Due to the presence of liquid-phase hydrocarbons (LPH), a groundwater sample was not collected from TMW/SB-7D. As described in Section 2.4.5, TMW/SB-7 was abandoned and replaced with a four (4) inch diameter monitoring well (MW-8) and LPH was remediated using dual-phase high vacuum recovery technology. Following the remediation of LPH, a groundwater sample was collected from MW-8 on December 2, 2003. Analytical results for the groundwater sample collected from MW-8 on December 2, 2003 were reported in the Groundwater Monitoring Report for the fourth quarter 2003.

Due to insufficient groundwater recharge within 24 hours following purging, groundwater samples could not be collected from TMW/SB-18 and TMW/SB-26. Due to insufficient groundwater recharge within 24 hours following purging, a groundwater sample could not be collected for analysis of PAHs from TMW/SB-23, a groundwater sample could not be collected for analysis of metals, TPH-DRO and TPH-ORO from TMW/SB-11, a sample could not be collected for analysis of metals, TPH-GRO, TPH-DRO and TPH-ORO from TMW/SB-3S and a groundwater sample could not be collected for PAHs from TMW/SB-7S. Based on analytical results from temporary monitoring wells and permanent monitoring wells, COC delineation is sufficient (see Section 7.2). The need for additional groundwater analytical data (if any) will be considered prior to the preparation of a Baseline Human Health and Ecological Risk Assessment (BHHERA).

Groundwater samples were collected to give an indication of the nature and extent of COCs in groundwater, and provide data on groundwater quality. The following sampling methods were

used to collect groundwater samples from the referenced direct-push temporary monitoring wells and permanent monitoring wells.

Liquid levels were gauged in the temporary monitoring wells after waiting at least seven (7) days following development. Each temporary or permanent monitoring well was purged by bailing using new 3/8-inch or ¾-inch diameter disposable polyethylene bailers with new polypropylene rope. Purge water was collected in a polyethylene vessel and temperature, pH, conductivity and dissolved oxygen were measured using a calibrated water quality meter. Purging was considered complete when water quality parameters stabilized over two (2) successive well volumes. At a minimum, three (3) well volumes were removed. Purging data were recorded on FADLs and groundwater sample collection logs. Copies of groundwater sample collection and instrument calibration logs are included in **Appendix B.**

Within 24-hours following purging, groundwater samples were collected from each temporary or permanent monitoring well using new disposable bailers as described above. Sample containers were prepared by Test America with the proper labels. VOC samples were collected first, followed by metals, SVOCs, PAH and TPH. Samples for dissolved metals were processed through 0.45 micron filters in the field to remove suspended particles. Upon collection, the samples were properly labeled and placed in clean cooler containing ice and cooled to a temperature of 4 degrees centigrade (C). The sample identification number, matrix, preservation method, sampling date, sampling time and analysis requested were recorded on a chain-of-custody form. The samples and chain-of-custody form were shipped via Federal Express to Test America in Nashville, Tennessee. Sample collection data were recorded on FADLs and groundwater sampling logs.

2.1.6 Field Variances

The following variances from the work plan were followed during direct-push drilling, soil sample collection and temporary monitoring well installation:

1. Groundwater was encountered within eight (8) feet b.g.s. and collection of a separate soil sample from the two (2) foot interval immediately above groundwater was not possible in TMW/SB-2S, SB-9 and SB-19.

2. Due to perched or shallow groundwater, it was not possible to collect the full 2-8 feet b.g.s. depth interval soil sample for laboratory analysis in TMW/SB-2S, TMW/SB-3S, TMW/SB-7S, SB-9 and SB-19. In each case a soil sample was collected from the depth interval above the top of the saturated zone.

3. Perched groundwater conditions were suspected in TMW/SB-2, TMW/SB-3 and TMW/SB-7, so shallow and deep borings with temporary monitoring wells were installed. Shallow TMWs, designated by the suffix "S" was installed with a screened interval placed to straddle shallow perched groundwater encountered in each boring. Deep TMWs, designated by the suffix "D",

were installed with a screened interval placed to straddle the unconfined groundwater aquifer. Monitoring well MW-5 serves as the deep well for TMW/SB-2S. Soil samples were collected from the 0-2 and 2-8 foot depth intervals in TMW/SB-2S, TMW/SB-3S and TMW/SB-7S. Soil samples were collected from the two (2) foot depth interval immediately above the saturated zone in TMW/SB-3D and TMW/SB-7D.

4. Direct-push methods were necessary at this site to facilitate delineation in difficult access locations and to improve time efficiency and to minimize subsurface disturbance. The diameter of direct-push borings was smaller than the boring diameter required under West Virginia Title 47 CSR Series 60. A variance was approved by the WVDEP-Division of Water Resources (DWR).

5. Bentonite was installed from the top of the sand filter pack around the temporary monitoring wells casing to the ground surface. Grout was not used. These variances from West Virginia Title 47 Series 60 requirements made it possible to remove each temporary monitoring well without over-drilling. Additionally, the installation of bentonite in the annular space improved the boring seal at the time of abandonment. A variance was approved by the WVDEP-DWR.

6. In order to confirm that Level III analytical requirements were met, the temporary monitoring wells were required for ore than 120 days. Upon satisfactory validation of laboratory results for groundwater analysis, each temporary monitoring well will be abandoned. Since the temporary monitoring wells were required for more than 120 days, a variance for extended use was approved by the WVDEP-DWR.

2.1.7 Near Shore Sediment and Surface Water Sampling

In order to evaluate potential risk to the surface water habitat, five (5) near shore water and sediment samples (NS-1 through NW-5) were collected and 15 additional surface water samples (E-1 through E-15) were collected in accordance with Appendix J of the West Virginia Voluntary Remediation and Redevelopment Act Guidance Manual **(Figure 2)**. Near surface water and sediment samples (N-1 through NS-5) were collected at locations most likely to be impacted. The near shore water and sediment samples were collected from location downstream of site. Near shore samples were collected within two (2) feet of the edge of the Elk River. Near shore surface water samples were collected when the Elk River was within 10 percent of the normal pool level and at least 48 hours after the last storm event. Near shore sediment samples were collected in the 0.0 - 0.5 foot depth interval within the sediment of the Elk River.

2.1.8 Waste Material Handling

Decontamination of IDW including general garbage, soil cuttings, soil stained direct-push PVC liners, soil stained plastic sheeting, decontamination fluids and purge water were handled in accordance with the following procedures:

General Garbage

General garbage including packaging material, unused sample jars and other non-contaminated garbage were separated from potential contaminated garbage and disposed of in a general trash bin.

IDW

Soil and soil impacted IDW including PVC liners and plastic sheeting was collected in properly labeled, Department of Transportation (DOT) approved 55-gallon drums and stored on pavement on the west side of the Office/Warehouse Building **(Figure 2)**. Containers were labeled to show the date filled and the source of the waste. Purge water was allowed to evaporate and disposal was not necessary. Soil and soil impacted IDW were subsequently disposed off-site in accordance with local, state and federal regulations.

2.2 Sample Locations and Purpose

2.2.1 Surface and Subsurface Samples

Directed surface and subsurface soil samples and groundwater samples were collected from 28 locations **(Figure 2)**. The purpose and details of each sample location are described as follows:

- Soil boring (SB) SB-1 was advanced in the stained area along the eastern side of the Oil Loading Rack. This boring provided field and analytical data for assessing the risk associated with possible petroleum releases associated with the Oil Loading Rack near the north end of the Site. This boring was terminated at the top of the saturated zone approximately 20 feet b.g.s. Soil samples were collected from 0-2 feet, 2-8 feet and 18-20 feet depth intervals.

- TMW/SB-2S was advanced on the western (downgradient) side of the Fuel Loading Rack. A temporary monitoring well was installed with the screened interval from approximately 3-8 feet b.g.s. in accordance with Variance 3 in Section 2.1.6. In accordance with Variance 2 in Section 2.1.6, soil samples were collected from the 0-2 feet and 2-4 feet depth intervals. A groundwater sample was collected from the adjacent MW-5. This boring provided field and analytical data for use in assessing the risk associated with possible petroleum releases associated with the Fuel Loading Rack.

- TMW/SB-3 was located on the western (downgradient) side of the oil/water separator. This boring location was selected to provide field and analytical data for use in assessing the risk associated with possible petroleum releases from the oil/water separator. Perched groundwater was encountered approximately 7.5 feet b.g.s. In accordance with Variance 3 in Section 2.1.6, a shallow temporary monitoring well (TMW/SB-3S) was installed to a total

depth of 12 feet b.g.s. with a screened interval from 7-12 feet b.g.s. Soil samples were collected from the 0-2 feet and 2-7.5 feet depth intervals. A deep boring (TMW/SB-3D) was advanced adjacent to TMW/SB-3S and encountered the saturated zone associated with the top of unconfined groundwater at approximately 28 feet b.g.s. A soil sample was collected from the 26-28 feet depth interval. TMW/SB-3D was installed to a total depth of 32 feet b.g.s. with the screened interval from 22-32 feet in accordance with Variance 3 in Section 2.1.6.

- SB-4 was advanced on the western (downgradient) side of the former USTs near the southeast corner of the former PQS Etowah Terminal. This boring provided field and analytical data for use in assessing the risk associated with possible petroleum releases from the former USTs. The top of the saturated zone was encountered at approximately 24 feet b.g.s. Soil samples were collected from the 0-2 feet, 2-8 feet and 22-24 feet depth intervals. A groundwater sample was collected from the adjacent MW-4.
- SB-5 was advanced adjacent to the eastern half of the Garage/Storage Building. There was no record of previous assessment at this location. This boring location was selected to determine if soil has been affected by potential impact resulting from the petroleum hydrocarbons associated with the Garage/Storage Building. This boring was terminated approximately eight (8) feet b.g.s. Soil samples were collected from the 0-2 feet and 2-8 feet depth intervals.

- SB-6 is located adjacent to the eastern half of the Garage/Storage Building. There was no record of previous assessment at this location. This boring location was selected to determine if soil has been affected by potential impact resulting from the petroleum hydrocarbons associated with the Garage/Storage Building. This boring was terminated approximately eight (8) feet b.g.s. Soil samples were collected from the 0-2 feet and 2-8 feet depth intervals.

- TMW/SB-7 was located on the western (downgradient) side of the former waste oil UST. This boring was selected to provide field and analytical data for use in assessing the risk associated with possible petroleum releases associated with the former waste oil UST. Perched groundwater was encountered approximately eight (8) feet b.g.s. In accordance with Variance 3 in Section 2.1.6, a shallow temporary monitoring well (TMW/SB-7S) was installed to a total depth of 12 feet b.g.s. with the screened interval from 7-12 feet b.g.s. Soil samples were collected from the 0-2 feet and 2-8 feet depth intervals. A deep boring (TMW/SB-7D) was advanced adjacent to TMW/SB-7S and encountered the top of the saturated zone associated with unconfined groundwater at approximately 36 feet b.g.s. A soil sample was collected from the 34-36 feet depth interval. TMW/SB-7D was installed to a total depth of 42 feet b.g.s. with the screened interval from 32-42 feet depth interval in accordance with Variance 3 in Section 2.1.6.

- SB-8 is located on the western side of the Warehouse/Office Building. There is no record of previous assessment at this location. This boring location was selected to determine if soil

has been affected by potential impact resulting from the petroleum hydrocarbons associated with the Garage/Storage Building. This boring was terminated approximately eight (8) feet b.g.s. Soil samples were collected from the 0-2 feet and 2-8 feet depth intervals.

- SB-9 was advanced between ASTs No. 403, No. 404 and No. 405 near the southern end of the diked AST area at the former PQS Etowah Terminal. This boring location provided field and analytical data necessary to determine if soil and groundwater have been impacted by petroleum hydrocarbons associated with the ASTs No. 403, No. 404 and No. 405. Perched groundwater was encountered approximately four (4) feet b.g.s. and soil samples were collected from the 0-2 feet and 2-8 feet depth intervals in accordance with Variance 2 in Section 2.1.6.

- SB-10 was advanced along the western (downgradient) property boundary adjacent to MW-1. This boring location was selected to provide field and analytical data for use in assessing the risk associated with possible petroleum hydrocarbons from the southern side of the site. The top of the saturated zone was encountered at approximately 12 feet b.g.s. Soil samples were collected from the 0-2 feet, 2-8 feet and 10-12 feet depth intervals.

- TMW/SB-11 was advanced along the western (downgradient) property boundary adjacent to the septic tanks. This boring location was selected to provide field and analytical data for use in assessing possible petroleum hydrocarbon migration downgradient from the former facility. The saturated zone was encountered at approximately four (4) feet b.g.s. and a soil sample was collected from 2-4 feet depth interval. A sheen was observed in soil from the saturated zone. In accordance with the SAP dated December 2002, a temporary monitoring well was installed. TMWSB-11 was installed to a total depth of approximately 12 feet b.g.s. with the screened interval from 2-12 feet b.g.s.

- TMW/SB-12 was advanced along the western property boundary downgradient from the diked AST areas. This boring provided field and analytical data for use in assessing possible petroleum hydrocarbon migration pathways downgradient from the former facility. The saturated zone was encountered at approximately four (4) feet b.g.s. and a soil sample was collected from the 2-4 feet depth interval. A sheen was observed in soil from the saturated zone. In accordance with the SAP dated December 2002, a temporary monitoring well was installed. TMW/SB-12 was installed to a total depth of approximately eight (8) feet b.g.s. with the screened interval from 3-8 feet b.g.s.

- TMW/SB-13 was advanced along the western property boundary downgradient from the diked AST areas. This boring provided field and analytical data for use in accessing possible petroleum hydrocarbon migration pathways downgradient from the former facility. The saturated zone was encountered at approximately 12 feet b.g.s. and a soil sample was collected from the 10-12 feet depth interval. An OVA reading above 50 ppm was detected in the soil sample immediately above the saturated zone. In accordance with the SAP

dated December 2002, a temporary monitoring well was installed. TMW/SB-13 was installed to a total depth of approximately 16 feet b.g.s. with the screened interval from 6-16 feet b.g.s.

- TMW/SB-14 was advanced along the western property boundary downgradient from the diked AST areas. This boring provided field and analytical data for use in assessing possible petroleum hydrocarbon migration pathways downgradient from the former facility. The saturated zone was encountered at approximately 10 feet b.g.s. and a soil sample was collected from the 8-10 feet depth interval.

- TMW/SB-15 was advanced along the western (downgradient) property boundary adjacent to MW-2. This boring location was selected to provide field and analytical data for assessing the risk associated with possible petroleum hydrocarbons from the central area of the site. This boring was terminated at the top of the saturated zone approximately 12 feet b.g.s. Soil Samples were collected from 0-2 feet, 2-8 feet and 10-12 feet depth intervals.

- TMW/SB-16 was advanced along the western property boundary downgradient from the diked AST areas. This boring was selected to provide field and analytical data for assessing possible petroleum hydrocarbon migration pathways downgradient from the former facility. The saturated zone was encountered at approximately 16 feet b.g.s. and a soil sample was collected from the 14-16 feet depth interval. An OVA reading above 50 ppm was detected in the soil sample immediately above the saturated zone. In accordance with the SAP dated December 2002, a temporary monitoring well was installed. TMW/SB-16 was installed to total depth of approximately 20 feet b.g.s. with the screened interval form 10-20 feet b.g.s.

- TMW/SB-17 was advanced along the western property boundary downgradient from the former pump house and ASTs. This boring location was selected to provide field and analytical data to assess possible petroleum hydrocarbon migration pathways downgradient from the former facility. The saturated zone was encountered at approximately 12 feet b.g.s. and a soil sample was collected from the 10-12 feet depth interval. An OVA reading above 50 ppm was detected in the soil sample immediately above the saturated zone. In accordance with the SAP dated December 2002, a temporary monitoring well was installed. TMW/SB-17 was installed to a total depth of approximately 17 feet b.g.s with the screened interval from 7-17 feet b.g.s.

- TMW/SB-18 was advanced along the western property boundary downgradient from the diked AST areas. This boring location was selected to provide field and analytical data for assessing possible petroleum hydrocarbon migration pathways downgradient from the former facility. The saturated zone was encountered at approximately eight (8) feet b.g.s. and a soil sample was collected from the 6-8 feet depth interval. A sheen was observed in soil from the saturated zone. In accordance with the SAP dated December 2002, a

temporary monitoring well was installed. TMW/SB-18 was installed to a total depth of approximately 12 feet b.g.s. with the screened interval from 7-12 feet b.g.s.

- SB-19 was advanced along the western (downgradient) property boundary adjacent to MW-3. This boring location was selected to provide field and analytical data for assessing the risk association with possible petroleum hydrocarbons associated with the northern side of the site. The saturated zone was encountered at approximately six (6) feet b.g.s. Soil samples were collected from the 0-2 feet and 2-6 feet depth intervals in accordance with Variance 2 in Section 2.1.6. In accordance with Variance 1 in Section 2.1.6, a soil sample was not collected from the two (2) foot interval immediately above the saturated zone.

- SB-20 was advanced along the western property boundary downgradient from the diked AST areas. This boring location was selected to provide field and analytical data for assessing possible petroleum hydrocarbon migration pathways downgradient from the former facility. The saturated zone was encountered at approximately 16 feet b.g.s. and a soil sample was collected from the 14-16 feet depth interval. An OVA reading above 50 ppm was detected in the soil sample immediately above the saturated zone. In accordance with the SAP dated December 2002, a temporary monitoring well was installed. TMW/SB-20 was installed to a depth approximately 19.4 feet b.g.s. with the screened interval from 9.4-19.4 feet b.g.s.

- SB-21 was advanced at the former Loading Rack near the northern end of the former PQS Etowah Terminal. This boring location was selected to provide field and analytical data for assessing the risk associated with possible petroleum releases associated with former loading rack. Soil samples were collected from 0-2 feet and 2-8 feet depth intervals.

- TMW/SB-22 was advanced west (downgradient) of ASTs No. 393 and No. 394. This boring location was selected to provide field and analytical data to determine if soil and groundwater have been impacted by possible petroleum hydrocarbons associated with ASTs No. 393 and No. 394. OVA readings above 50 ppm were detected in soil samples from 2.0 feet b.g.s. to the top of the saturated zone. In accordance with the SAP dated December 2002, the boring was continued and groundwater was encountered at approximately 22 feet b.g.s. TMW/SB-22 was advanced to a total depth of approximately 26 feet b.g.s. and the temporary monitoring well was installed with the screened interval from 14-24 feet b.g.s. Soil samples were collected from 0-2 feet, 2-8 feet and 20-22 feet depth intervals.

- TMW/SB-23 was advanced west (downgradient) of ASTs No. 395, No. 396 and No. 397. This boring location was selected to provide field and analytical data to determine if soil and groundwater have been impacted by possible petroleum hydrocarbons associated with ASTs No. 395, No. 396 and No. 397. Groundwater was encountered at approximately 23.5 feet b.g.s. Soil samples were collected from the 0-2 feet, 2-8 feet and

22-23.5 feet depth intervals. A temporary monitoring well was installed to a total depth of 26 feet b.g.s. with the screened interval from 16-26 feet b.g.s. Soil samples were collected from the 0-2 feet, 2-8 feet and 22-23.5 feet depth intervals.

- SB-24 was advanced between the former Pump House and AST No. 392. This boring location was selected to provide field and analytical data necessary to determine if soil and groundwater have been impacted by possible petroleum hydrocarbons associated with the former Pump House or AST No. 392. OVA readings above 50 ppm were detected from approximately 2-10 feet b.g.s. In accordance with the SAP dated December 2002, the boring was continued until OVA readings were below 50 ppm. Soil samples were collected from the 0-2 feet, 2-8 feet and 10-12 feet depth intervals.
- SB-25 was advanced between ASTs No. 399 and No. 400 near the center of the former PQS Etowah Terminal. This boring location was selected to provide field and analytical data necessary to determine if soil and groundwater have been impacted by petroleum hydrocarbons associated with the ASTs No. 399 and No. 400. Soil samples were collected from the 0-2 feet, 2-8 feet depth intervals.

- TMW/SB-26 was advanced between ASTs No. 401 and No. 402 near the center of the former PQS Etowah Terminal. This boring location was selected to provide field and analytical data necessary to determine if soil and groundwater have been impacted by petroleum hydrocarbons associated with the ASTs No. 401 and No. 402. Groundwater was encountered approximately 22 feet b.g.s. TMW/SB-26 was advanced to a total depth of approximately 24.5 feet b.g.s. A temporary monitoring well was installed to a depth of approximately 24.5 feet b.g.s. with the screened interval from 14.5-24.5 feet b.g.s.

- Background (BG) soil boring TMW/BG-1 was advanced at the southeast corner of the former PQS Etowah Terminal. This location appeared to be up-gradient from the former petroleum bulk storage operations. Potential sources for off-site impact include stormwater runoff or groundwater migration from the CSX railroad corridor. Groundwater was encountered approximately 12 feet b.g.s. and the boring was advanced to a total depth approximately 17 feet b.g.s. TMW/BG-1 was installed with a screened interval from 7-17 feet b.g.s. Soil samples were collected from the 0-2 feet and 10-12 feet depth intervals.

- TMW/BG-2 was advanced along the eastern side of the Former PQS Etowah Terminal. This location appeared to be up-gradient from the former petroleum bulk storage operations. Potential sources for off-site impact include stormwater runoff or groundwater migration from the CSX railroad corridor. Groundwater was encountered approximately 16 feet b.g.s. and the boring was advanced to a total depth approximately 20 feet b.g.s. TMW/BG-2 was installed with a screened interval from 10-20 feet b.g.s. Soil samples were collected from the 0-2 feet, 2-8 feet and 14-16 feet depth intervals.

2.3 Analytical Program

2.3.1 COPCs

The COPCs include the following: BTEX, MTBE, TPH-GRO, TPH-DRO, TPH-oil range organics (ORO), lead, cadmium, chromium III, chromium VI, ethylene glycol, solvents and PAH. A list of COPCs and reasons for eliminating or including COPCs from the sampling program appears in **Table 4**.

2.3.2 COCs

COCs include the COPCs listed above. The proposed analytical program includes BTEX, MTBE, metals (cadmium, chromium III, chromium VI and lead), TPH-GRO, TPH-DRO, TPH-ORO, ethylene glycol, solvents and PAH. A list of COCs with the respective analytical methods is included as **Table 5.**

2.3.3 Laboratory Analyses

The specific analytical program was chosen to target potential sources identified by a historical review of Site records and based on previous Site investigations. The analytical parameters and corresponding analytical methods for each type of media to be sampled as part of the Additional Site Characterization are presented in **Tables 6 and 7**. The referenced tables also provide information concerning container types and preservation and holding time requirements.

Samples collected as part of the ASCR were submitted to Test America, Inc. (Test America) in Nashville, Tennessee. Test America is WVDEP certified laboratory No. 219. A copy of Test America's West Virginia Laboratory Certificate is included at the end of **Appendix B**. Samples were analyzed in accordance with U.S. EPA approved procedures such as those set forth by SW-846, Methods of Chemical Analysis for Water and Wastes (U.S. EPA 600/4-79-020, 1983 revision). The quality of data collected during the Additional Site Characterization met level III validation and 10 percent of the analytical data validated.

2.4 Analytical Results

2.4.1 Soil Analytical Results

BTEX, MTBE, TPH-GRO/DRO/ORO, ethylene glycol, metals, solvents and PAH concentrations were not detected above the Table 60-3B Industrial De Minimis levels or WVDEP Draft Industrial De Minimis levels **(Tables 8–10).** Soil analytical data are summarized in **Tables 8, 9 and 10.** Chain-of-custody and certificate-of-analysis copies are included as **Appendix C.**

2.4.2 Surface Soil Samples

TCLP lead concentrations ranged from below the method detection limit of 0.500 mg/kg in SS-1, SS-3, SS-5 and SS-6 to 3.05 mg/kg in SS-4 **(Table 11).** Soil sample locations are shown on Figure 2. Based on these data the area of TCLP lead concentrations exceeding 5.0 mg/kg near AST No. 399 has been delineated. PQS will consider remedial options for lead impacted soil in the vicinity of AST No. 399 and communicate any remedial actions under separate cover. Chain-of-custody and certificate-of-analysis copies are included as **Appendix C**.

VOCs including mercaptan were not detected in a soil sample collected from the 2–3 feet depth interval in SB-27. This soil sample was collected in the excavation for repair of the Allegheny Power natural gas line **(Figure 2)**. Based on these data, no further investigation of the Allegheny Power natural gas leak and line repair is necessary. Chain-of-custody and certificate-of-analysis copies are included as **Appendix C**.

2.4.3 Groundwater Analytical Results

Benzene concentrations of 0.322 mg/L, 0.07 mg/L, and 0.0608 mg/L were detected in groundwater samples collected from TMW/SB-3S, TMW/SB-7S and TMW/SB-23, respectively **(Table 12 and Figure 4)**. No other benzene concentrations were detected above the Table 60-3B Groundwater De Minimis level of 0.005 mg/L. Ethylbenzene concentrations were not detected above the Table 60-3B Groundwater De Minimis level of 1.300 mg/L. Toluene concentrations were not detected above the Table 60-3B Groundwater De Minimis level of 1.000 mg/L. Total xylenes concentrations were not detected above the Table 60-3B Groundwater De Minimis level of 10.000 mg/L. An MTBE concentration of 1.230 mg/L was detected above the WVDEP Draft Groundwater De Minimis level of 0.020 mg/L in the groundwater sample collected from TMW/SB-7S. Chain-of-custody and certificate-of-analysis copies are included as **Appendix D**.

Dissolved lead concentrations of 0.05 mg/L and 0.04 mg/L were detected in groundwater samples collected from TMW/SB-16 and TMW/SB-17, respectively. No other dissolved lead concentrations were detected above the Table 60-3B Groundwater De Minimis level of 0.015 mg/L.

TPH-GRO concentrations were detected above the WVDEP Draft Groundwater De Minimis level of 1.500 mg/L in TMW/SB-7S (1.51 mg/L) and TMW/SB-23 (2.83 mg/L). TPH-DRO concentrations were detected above the WVDEP Draft Groundwater De Minimis level of 0.330 mg/L in TMW/SB-2S, TMW/SB-7S, TMW/SB-12, TMW/SB-13, TMW/SB-14, TMW/SB-16, TMW/SB-17, MW-3, TMW/SB-20, TMW/SB-22, TMW/SB-23 and MW-7. TPH-DRO concentrations exceeding the referenced De Minimis level ranged from 0.647 mg/L in TMW/SB-13 to 30.0 mg/L in TMW/SB-23. TPH-ORO concentrations were detected above the WVDEP Draft Groundwater De Minimis level of 0.610 mg/L in TMW/SB-7S (5.92 mg/L), TMW/SB-12 (10.8 mg/L), TMW/SB-16 (5.80 mg/L) and TMW/SB-17 (2.10 mg/L). No other TPH concentrations were

detected above WVDEP Draft Groundwater De Minimis levels. PAH parameters were not detected above Table 60-3B Groundwater De Minimis levels in groundwater samples.

Groundwater samples were collected from seven (7) temporary monitoring wells (TMW/SB-11, TMW/SB-12, TMW/SB-13, TMW/SB-14, TMW/SB-16, TMW/SB-17 and TMW/SB-20) and three (3) monitoring wells (MW-1, MW-2 and MW-3) located adjacent to the Elk River. Due to the close proximity to the Elk River, COC concentrations were compared with Surface Water Quality Standards (SWQS), as referenced in 46 CSR 1, Appendix E, Table 1. Benzene concentrations were not detected above the SWQS of 0.071 mg/L **(Table 12)**. Toluene concentrations were not detected above SWQS of 0.2 mg/L. Fluoroanthene concentrations were not detected above the SWQS of 0.370 mg/L. Concentrations of other PAH COCs were detected in groundwater samples collected from TMW/SB-12, TMW/SB-17 and TMW/SB-20 above the SWQS of 0.000031 mg/L. SWQSs for ethylbenzene, xylenes, MTBE, lead, TPH-GRO, TPH-DRO and TPH-ORO are not established.

2.4.4 Near Shore Sediment and Surface Water Analytical Results

BTEX, MTBE, lead, TPH-GRO, TPH-DRO and TPH-ORO concentrations were not detected above Table 60-3B Industrial De Minimis or WVDEP Draft Industrial De Minimis levels in near shore sediment samples **(Table 8)**.

COCs were not detected above SWQSs in near shore surface water samples (NS-1 through NS-4) or surface water samples (E-1 through E-15) **(Table 12 and Figure 4)**. A TPH-DRO concentration of 0.785 mg/L was detected in surface water sample E-5 above the Table 60-3B Groundwater De Minimis level of 0.330 mg/L. Surface water sample E-5 was the third sample location away from the shoreline within the second transect from the upstream boundary of the Site **(Figure 4)**. Surface water sample E-5 was located approximately 77 feet from the shoreline. No other COCs were detected above Table 60-3B Groundwater De Minimis levels in surface water samples.

2.4.5 Liquid-Phase Hydrocarbons

During direct-push soil boring advancement (July 14 – 23, 2003), petroleum odors and sheens were observed in TMW/SB-3S, TMW/SB-7S, TMW/SB-7D, SB-9, TMW/SB-16, SB-19, TMW/SB-22 and TMW/SB-23. In accordance with the SAP, temporary monitoring wells were not installed in SB-9 or SB-19. SB-9 is surrounded by TMW/SB-2S, MW-5 and MW-7. SB-19 is surrounded by MW-3, TMW/SB-18 and TMW/SB-23. In accordance with the SAP, temporary monitoring wells were installed in TMW/SB-3S, TMW/SB-7S, TMW/SB-7D, TMW/SB-16, TMW/SB-22 and TMW/SB-23. LPH was not detected in TMW/SB-3S, TMW/SB-7S, TMW/SB-16, TMW/SB-22 and TMW/SB-23. As described below, a LPH thickness was detected in TMW/SB-7D.

On August 14, 2003, a 0.69 foot liquid-phase hydrocarbons (LPH) thickness was detected in TMW/SB-7D. LPH was not detected in any other temporary monitoring well or monitoring well

(Table 13). Following the discovery of LPH, liquid level gauging was conducted in TMW/SB-7S and TMW/SB-7D on August 29 and September 4, 2003 **(Table 14 and Figure 5).** A total of 0.06 gallon of LPH was recovered by manual bailing on August 29 and September 4, 2003.

On September 12, 2003, an eight (8) hour high vacuum recovery event utilizing a mobile treatment unit (MTU) equipped with a liquid ring blower was conducted in TMW/SB-7D. Liquid levels were gauged in TMW/SB-7S and TMW/SB-7D. Vapor recovery rates ranged from 4.3 standard cubic feet per minute (scfm) to 5.3 scfm. Vacuum influence was detected in MW-1 and MW-7. An estimated 0.13 gallons of LPH was volatilized and recovered from TMW/SB-7D. Due to the small diameter (1-inch) of TMW/SB-7D and the depth (approximately 39 feet below top of casing), liquids were not recovered during the MTU event.

On October 15, 2003, Shaw Environmental abandoned TMW/SB-7D and installed a four (4) inch diameter monitoring well (MW-8) in the same location. MW-8 was installed using hollow stem auger methods by Roy Fox of EnviroProbe, Inc. in accordance with West Virginia Title 47 Code of State Regulations (CSR) Series 60. Mr. Fox is West Virginia certified driller No. 00174. Drilling equipment was decontaminated prior to and following use. Groundwater was encountered approximately 38 feet b.g.s. and the monitoring well was installed with the screened interval from 29.58 – 49.58 feet b.g.s. LPH was not encountered during drilling or installation activities. Soil boring and monitoring well installation logs are included in **Appendix A**.

On October 16, 2003, Shaw Environmental developed MW-8 by pumping. Temperature, pH, conductivity and dissolved oxygen were measured using a calibrated water quality meter. Development logs are included in **Appendix B**. LPH were not detected during well development.

On October 21, 2003, Shaw Environmental conducted an eight (8) hour high vacuum recovery event utilizing a mobile treatment unit (MTU) equipped with a liquid ring blower in MW-8. Liquid levels were gauged in MW-8 and TMW/SB-7S and LPH was not detected. Vapor recovery rates ranged from 3.5 standard cubic feet per minute (scfm) to 6.2 scfm. Vacuum influence was detected in MW-1 and MW-7 **(Appendix E)**. Approximately 2,700 gallons of groundwater was recovered from MW-8, treated through carbon and broadcast onto the site surface. BTEX constituents were not detected in liquid sample collected from the carbon effluent **(Appendix D)**.

On October 31, 2003, Shaw Environmental gauged liquid levels in MW-8 and TMW-7S. LPH were not detected. LPH removal is considered complete and will be verified by quarterly monitoring of liquid levels in MW-8 and the seven (7) other monitoring wells on-site.

3.0 QA / QC Procedures and Protocols

3.1 QA/QC Analytical Results

The precision and accuracy of the field sampling procedures were checked through the preparation, collection, submission and analysis of duplicate samples, trip blanks, and rinsate blanks. The following QA/QC samples were collected and submitted for laboratory analysis.

Sample Type	Quantity
Trip Blanks	8
Equipment Rinsate Blanks	5
Split Samples	4
Duplicate Samples	3

Trip blank samples consisted of a set of sample containers filled with analyte-free water prepared by and obtained from the analytical laboratory. Blank water was comprised of the same water used by the lab for method blanks. Trip blanks were submitted at a frequency of one per sample shipment containing samples to be analyzed for VOCs. Trip blanks were analyzed for the same VOCs as media samples included in each particular shipment. Eight (8) trip blank samples were submitted to the analytical laboratory. VOCs were not detected in trip blank samples **(Table 15)**. Analytical results of the trip blank samples indicate that the sample packaging and shipping methods were effective and appropriate to prevent cross-contamination between sample containers. Copies of the laboratory analytical reports and sample chain of custody records are included in **Appendices C and D**.

Equipment rinsate blanks were collected from the final anaylte-free DI water rinse of the equipment decontamination process during soil sampling activities. Once a piece of sampling equipment was fully decontaminated, analyte-free water was poured over, across and through the sample collection surfaces and the water was collected directly into appropriate water matrix sample containers. One rinsate blank was submitted per 20 samples. Five (5) equipment rinsate blank samples were submitted to the analytical laboratory. Rinsate blanks were analyzed for the same parameters as those analyzed in matrix samples included in each particular shipment. Benzene, ethlybenzene, total xylenes, MTBE, lead and TPH-GRO were not detected in rinsate blanks **(Table 10)**. An estimated toluene concentration of 0.0011 mg/L was detected in the rinsate blank for the 18 – 20 foot soil sample from SB-1. TPH-DRO concentrations were detected slightly above the laboratory method detection limit (MDL) in four (4) out of five (5) TPH DRO blanks. Only one (1) TPH-DRO concentration (0.210 mg/L in the rinsate blank for NS-5) was detected slightly above two times the MDL of 0.100 mg/L in rinse blank samples. TPH-ORO concentrations were detected slightly above the laboratory MDL in two (2) out of five (5) rinsate blanks. None of the TPH-ORO rinsate blank concentrations were detected at or above two times the MDL of 0.100 mg/L. PAHs were detected at or slightly above laboratory method detection levels in three (3) out of 54 analyses for PAHs in rinsate blanks. Analytical results of the equipment rinsate blank samples indicate that the equipment decontamination procedures were effective in eliminating potential cross-contamination between sample locations.

Soil splits were used to assess sample representativeness and analytical precision. Split samples were prepared by dividing a single sample into two equal aliquots for separate analyses. Split samples were collected at a frequency of one per 20 samples per analytical method. Four (4) split samples were submitted to the analytical laboratory. Each split sample was analyzed for the same parameters as the corresponding regular sample. Soil split sample analytical results for VOCs, lead, TPHs, PAHs and solvents were within typical analytical precision expectations **(Appendix F, Table A, B and C)**. Results for soil sample precision are discussed in Section 3.3.

Groundwater duplicates were used to assess sample representativeness and analytical precision. Duplicates were prepared by collecting two (2) samples independently at the same location during a single act of sampling. Duplicate samples was collected at a frequency of one per 20 samples per analytical method. Each duplicate sample was analyzed for the same parameters as the corresponding regular sample. Three (3) duplicate samples were submitted to the analytical laboratory. Groundwater duplicate sample analytical results were within typical analytical precision expectations **(Appendix F, Table D)**. Results for groundwater sample precision are discussed in Section 3.3.

Matrix spike (MS) and matrix spike duplicate (MSD) sample pairs were collected at a frequency of one per 20 environmental samples per matrix sampled (See Section 3.3). Results of the MS/MSD were used by the laboratory to evaluate the analytical precision of the method given the matrix analyzed. The analytical laboratory followed internal quality control procedures specified in the SW-846 organic and inorganic methods. MS and MSD samples were required as part of the SW-846 quality control procedures.

Temperature blanks prepared provided by the laboratory were included in each sample shuttle for more accurate measurement of sample shuttle temperatures taken upon receipt at the laboratory (See Section 3.3). Results of temperature blanks were noted by the laboratory sample custodian upon receipt.

3.2 Level III Data Validation

Prior to releasing data for use by project staff, 10 percent of the total data packages underwent a formal validation procedure to examine laboratory compliance with QA requirements and other factors, which determined the quality of the data. Level III data validation was performed by Shaw Environmental Senior Chemist, Richard W. McCracken. Mr. McCracken validated data for VOC, PAH, lead and TPH analytical results for 10 percent of the soil and groundwater samples collected during the Additional Site Characterization. Test America in Nashville, Tennessee analyzed the samples using SW-846 methods. Level III data validation was performed in accordance with the Region III Modifications to National Functional Guidelines (Organics – 9/94, and Inorganics – 4/93), as applied to SW-846 methodology. The full report of Level III data validation is included as **Appendix F**.

3.2.1 VOC

Adsorbed-phase VOC results were acceptable as reported with J qualifiers noted for compounds in seven (7) soil samples. A J qualifier indicates that the associated numerical value was an estimated quantity. Toluene results in soil samples from the 2 – 8 feet depth interval in SB-1, the 0

– 2 feet depth interval in TMW/SB-25 and the 2 – 8 feet depth interval in TMW/SB-25 were qualified BJ due to an estimated concentration detected in the associated rinse blank sample. Dissolved-phase VOC results were acceptable as reported with no J qualifiers in four (4) groundwater samples.

3.2.2 PAH

Adsorbed-phase and dissolved-phase PAH results were acceptable as reported with no qualifiers.

3.2.3 Metals

Adsorbed-phase and dissolved-phase lead, cadmium, chromium III and chromium VI results were acceptable as reported with no qualifiers.

3.2.4 TPH

Adsorbed-phase TPH results were acceptable as reported with no qualifiers. Dissolved-phase TPH-GRO results were acceptable as reported with one J qualifier. Dissolved-phase TPH-DRO results were acceptable as reported with J qualifiers for all groundwater samples. Dissolved-phase TPH-ORO results were acceptable as reported.

3.3 Precision of Data Analyzed

The analytical laboratory followed the internal quality control procedures specified in the SW-846 organic and inorganic methods. A MS and MSD were required as part of the SW-846 quality control procedures. The investigation team coordinated with the lab ensuring that extra samples were collected as needed for the MS/MSD. A temperature blank consisting of a sample container filled with potable water, accompanied each cooler shipped to the laboratory. Temperature blanks were provided by the laboratory for a more accurate measurement of sample shuttle temperatures taken upon receipt at the laboratory. Additionally, the precision and accuracy of the field sampling procedures was checked through the preparation, collection, submission and analysis of QA/QC samples, field audits and review of field documents.

3.3.1 Precision

Precision refers to the level of agreement among repeated measurements of the same parameter. It is usually stated in terms of standard deviation, relative standard deviation, relative percent difference, range, or relative range. The overall precision of a piece of data is a mixture of sampling and analytical factors. The analytical precision is much easier to control and quantify because the laboratory is a controlled, and therefore, measurable environment. Sampling precision is unique to each site, making it much harder to control and quantify. The goals for each factor are addressed here separately.

Sampling precision was checked by obtaining a duplicate sample for every 20 samples collected for each type of media. Precision was evaluated by calculating the relative percent difference (RPD) as follows:

$$RPD = \frac{\text{difference between the two measured values}}{\text{Average of the two measured values}} \times 100$$

Soil split sample RPD results indicate that 95 percent of analytical results for VOCs, metals and TPHs, and 94 percent of PAHs and solvents were within typical precision expectations. Split soil samples are not duplicate samples and variation in RPD results is not uncommon. On-site subsurface conditions such as micro-stratigraphic changes, laminated fill or other soil characteristics that can not be eliminated through homogenization increase the possibility of wide variation in split soil sample analytical results. Additionally, relatively minor variation in low COC (close to method detection limits) concentrations may cause relatively large RPD percentages.

Groundwater duplicate sample RPD results indicate that 98 percent of the analytical results for VOCs, lead, TPHs and PAHs are within typical analytical precision expectations. Minor variations in concentrations caused the RPD in one (1) out of 45 analyses to vary more than 35 percent.

3.3.2 Accuracy

Accuracy refers to the difference between a measured value for a parameter and the true value for the parameter. It is an indicator of the bias in the measurement system. Sources of error measured by this parameter include the sampling process, field contamination, preservation, handling, sample matrix, sample preparation and analytical technique.

The sampling accuracy was assessed by collecting and submitting one rinsate blank per 20 samples and one trip blank for each sample shipment that contains samples to be analyzed for volatile organics. The accuracy goal for the trip and rinsate blanks is to contain less variation than the method detection limit for each analytical parameter. No variation was found in VOCs, lead, TPH-GRO and TPH-ORO analyses for rinsate blanks **(Table 15)**. Analytical results for 80 percent of TPH-DRO analyses varied by less than the method detection limit. Analytical results for 94 percent of PAH parameters varied by less than the method detection limit. No variation was found in VOCs analyses for trip blanks. Analytical results of the equipment rinsate and trip blank samples indicate that the equipment decontamination procedures were effective in eliminating potential cross-contamination between sample locations.

Laboratory accuracy was evaluated by the analysis of one method blank per sample batch and one spiked sample per sample batch. For samples analyzed using SW846 methods, the spike acceptance criteria specified in the method were adopted. Volatile and semi-volatile method blanks contained no more than the detection limit for target compounds and no more than five times the detection limit of common lab contaminants including methylene chloride, acetone, 2-butanone, and phthalate esters. Inorganic method blanks contained less than the detection limit for each analyte.

3.3.3 Representativeness

Representativeness is a measure of the degree to which the measured results accurately reflect the medium being sampled and overall site conditions. Representativeness is a qualitative parameter that is addressed through the proper design of the sampling program in terms of sample location, number of samples and actual material collected as a sample of the whole.

Sampling protocols were followed to assure that samples collected are representative of the media. Field handling protocols (e.g., storage, handling in the field, and shipping) were also followed to preserve the integrity of the collected samples. Proper field documentation and data validation were used to establish that protocols were followed and that sample identification and integrity were maintained.

3.3.4 Comparability

Comparability expresses the confidence with which one data set can be compared to another. When comparing data, it is important to compare data collected under the same set of conditions. Seasonal trends, depth of sample collection, analytical protocol, method detection limits, and any other sampling/analytical variables were taken into account when comparing data sets. This was accomplished using established USEPA methods for collecting and analyzing the samples, and documenting the methods used.

3.3.5 Completeness

Completeness is a measure of the amount of information that must be collected during the field investigation to allow successful achievement of the project objectives. The overall objective of the Additional Site Characterization is to characterize the nature and extent of contamination at the site, so that a preliminary risk assessment can be performed. The completeness goal for the activities was 90% for the field sampling and 90% for the laboratory analyses. Based on field and laboratory documentation and data validation, the data completeness goal was met. Field and laboratory data are usable.

4.0 Geology, Hydrogeology and Hydrology

4.1 Topography, Geology and Hydrogeology

The Site is located in Charleston, West Virginia on a steep sided Quaternary fluvial terrace remnant adjacent to the Elk River **(Figure 1)**. The Elk River is a southwest flowing tributary of the Kanawha River with a normal pool elevation approximately 566 feet above mean sea level (MSL). Topography slopes westward toward the Elk River. Approximately 40 percent of the ground surface is covered by asphalt and concrete pavement and buildings **(Figure 3)**. The remaining area is covered by grass, gravel and soil.

Based on liquid level gauging data recorded on August 14, 2003, the unconfined groundwater table ranges from approximately 13.86 feet to 39.74 feet b.g.s. The average depth to groundwater was approximately 18.65 feet b.g.s. **(Table 13)**. Lithologic descriptions included on boring logs indicated the unconfined aquifer is generally characterized by gray to orangish brown silty, clayey fine to medium grained sand with occasional gravel and occasional intercalated silty clay and clayey silt. Using liquid level gauging data recorded on August 14, 2003, a potentiometric surface map was constructed for the Site **(Figure 6)**. Groundwater in the unconfined aquifer appears to flow westward toward the Elk River with an average hydraulic gradient of 0.12 feet/foot.

The area lies within the unglaciated portion of the Appalachian Plateau physiographic province, which is generally characterized by relatively flat lying gently folded Upper Paleozoic sedimentary rocks. Fill and Quaternary fluvial and colluvial deposits greater than approximately 40 feet thick underlie the site. Udorthents Smoothed-Urban Land complex soils are developed at the surface of the Site (Van Houten, et. al., 1981). The Udorthents Smoothed-Urban Land complex typically consists of areas of heterogeneous fill material that has been leveled by cutting the higher parts and filling the lower parts.

Based on boring logs, fill materials at the Site range from approximately 4 to 12 feet thick. The fill appears to be underlain by a fining upward sequence of Quaternary alluvial deposits generally comprised of silty clayey fine to medium grained sand with occasional gravel overlain by clayey silt and silty clay. The Quaternary alluvium is disconformably underlain by the Pennsylvanian Allegheny Formation, which is generally comprised of cyclic sequences of sandstone, siltstone and shale with occasional thin limestone and coal strata (Cardwell, et. al., 1986). Depth to bedrock is unknown. Hydrogeological cross-sections A-A' and B-B' show west to east and north to south subsurface views of the site **(Figure 7)**.

4.2 Surface Water Hydrology

Surface water runoff flows westward to the adjacent Elk River **(Figure 2)**. Stormwater drains located in the diked area and on the asphalt parking lot on the northern end of the site flow into an oil/water separator located on the eastern side of the site **(Figure 2)**. Treated stormwater from the oil/water separator discharges into the Elk River in accordance with National Pollution Discharge Elimination System (NPDES) Permit No. WV0045225. Stormwater from the asphalt parking lot located on the southern end of the Site flows into catch basins along the western edge of the facility and is discharged into the Elk River.

5.0 Sensitive Receptor Survey

Based on known site operational history and information contained in previous environmental site assessments (ESA's) included in the VRP application, this section summarizes sensitive receptor information for the Site. The Site consists of a two-story Warehouse/Office building, a Garage/Storage building, asphalt parking lots, a grave yard, a fire (pump) house, a flair, a fuel loading rack, an oil loading rack, an oil/water separator, a dock, two former fire houses, a former pump house, a former loading rack, 19 ASTs and associated aboveground product piping **(Figure 2)**. No wetlands or vernal pools are located on-site. The Site is bordered to the north by woodland, to the east by a railroad corridor and Barlow Drive beyond, to the south by residences and to the west by the Elk River. A steep, wooded slope is located beyond the railroad corridor and Barlow Drive, east of the Site. An Allegheny Power natural gas pipeline crosses the northern end of the Site. A former Columbia Natural Gas (CNG) pipeline station facility is located approximately 0.5 mile north of the Site. The Site has been designated an industrial zone.

Drinking water wells do not appear to exist within 2,000 feet of the facility. The closest water supply wells are located west of the Site on the opposite side of the Elk River. No commercial groundwater irrigation activity is known in the vicinity of the Site. Groundwater is not used as a local drinking water source and depth to the unconfined groundwater aquifer ranges from approximately 14 to 40 feet b.g.s. Drinking water in the area is supplied by the West Virginia American Water Company, which obtains potable water from an intake along the Elk River located approximately 1.3 miles southwest (downstream) of the Site.

Basements are reported in residential buildings located approximately 200 feet south of the Site. The Office/Warehouse and Garage/Storage buildings at the Site are constructed on concrete slabs and foundations. This bottom floor of the Office/Warehouse is approximately 50% below grade.

6.0 Discussion of Analytical Data

6.1 Surface Soil (0-2 feet b.g.s.)

BTEX, MTBE, TPH-GRO/DRO/ORO, ethylene glycol, metals, solvents and PAH concentrations were not detected above the Table 60-3B Industrial De Minimis levels or WVDEP Draft Industrial De Minimis levels in soil samples collected from the 0 – 2 feet depth interval **(Tables 8 – 10)**.

6.2 Subsurface Soil (2-8 Feet b.g.s.)

BTEX, MTBE, TPH-GRO/DRO/ORO, ethylene glycol, metals, solvents and PAH concentrations were not detected above the Table 60-3B Industrial De Minimis levels or WVDEP Draft Industrial De Minimis levels in soil samples collected from the 2 – 8 feet depth interval **(Tables 8 – 10)**.

6.3 Subsurface Soil (2-Foot Depth Interval Immediately Above Groundwater)

BTEX, MTBE, TPH-GRO/DRO/ORO, ethylene glycol, metals, solvents and PAH concentrations were not detected above the Table 60-3B Industrial De Minimis levels or WVDEP Draft Industrial De Minimis levels in soil samples collected from the two (2) foot depth interval immediately above the saturated zone **(Tables 8 – 10)**.

6.4 Near Shore Sediment

BTEX, MTBE, lead and TPH-GRO/DRO/ORO concentrations were not detected above Table 60-3B Industrial De Minimis or WVDEP Draft Industrial De Minimis levels in near shore sediment samples **(Table 8)**. Since TPH-DRO was not detected in near shore sediment samples, PAHs and solvents analyses were not performed.

6.5 Groundwater Analytical Results

Two (2) benzene concentrations (0.322 mg/L in TMW/SB-3S and 0.07 mg/L in TMW/SB-7S) were detected above the Table 60-3B De Minimis level of 0.005 mg/L in perched groundwater on the southern side of the Site **(Table 12 and Figure 4)**. TMW/SB-3S is located between the loading rack and oil/water separator. TMW/SB-7S is located adjacent to the northwest corner of the Garage/Storage Building at the south end of the Site. One (1) benzene concentration (0.0608 mg/L in TMW/SB-23) was detected above the referenced Groundwater De Minimis level in unconfined groundwater near the north end of the Site. No other benzene concentrations were detected above the Table 60-3B Groundwater De Minimis level of 0.005 mg/L.

Ethylbenzene concentrations were not detected above the Table 60-3B Groundwater De Minimis level of 1.300 mg/L. Toluene concentrations were not detected above the Table 60-3B Groundwater De Minimis level of 1.000 mg/L. Total xylenes concentrations were not detected above the Table 60-3B Groundwater De Minimis level of 10.000 mg/L.

One (1) MTBE concentration (1.230 mg/L in TMW/SB-7S) was detected above the WVDEP Draft Groundwater De Minimis level of 0.020 mg/L in perched groundwater. TMW/SB-7S is located adjacent to the northwest corner of the Garage/Storage Building in the southwest area of the Site.

Two (2) dissolved-phase lead concentrations (0.05 mg/L in TMW/SB-16 and 0.04 mg/L in TMW/SB-17) were detected above the Table 60-3B Groundwater De Minimis level of 0.015 mg/L in groundwater west of the former pumphouse in the northern area of the Site. No other dissolved lead concentrations were detected above the Table 60-3B Groundwater De Minimis level of 0.015 mg/L.

One (1) TPH-GRO concentration (2.83 mg/L in TMW/SB-23) was detected above the WVDEP Draft Groundwater De Minimis level of 1.500 mg/L in unconfined groundwater. TMW/SB-23 is located adjacent to former bulk oil ASTs in the northern area of the Site. One (1) TPH-GRO concentration (1.51 mg/L in TMW/SB-7S) was detected above the Table 60-3B De Minimis level in perched groundwater. TMW/SB-7S is located adjacent to the northwest corner of the Garage/Storage Building in the southwest area of the Site. No other TPH-GRO concentrations were detected above the WVDEP Draft Groundwater De Minimis level of 1.500 mg/L.

Two (2) TPH-DRO concentrations (1.56 mg/L in TMW/SB-2S and 8.90 mg/L in TMW/SB-7S) were detected above the WVDEP Draft Groundwater De Minimis level of 0.330 mg/L in perched groundwater on the southern half of the Site. TMW/SB-2S is located adjacent to the loading rack. TMW/SB-7S is located adjacent to the northwest corner of the Garage/Storage Building in the southwestern area of the Site. Four (4) TPH-DRO concentrations (0.705 mg/L in MW-7, 21.0 mg/L in TMW/SB-12, 0.647 mg/L in TMW/SB-13 and 0.853 mg/L in TMW/SB-14) were detected above the referenced De Minimis level in unconfined groundwater in the western area of the Site. Six (6) TPH-DRO concentrations (16.4 mg/L in TMW/SB-16, 17.7 mg/L in TMW/SB-17, 1.54 mg/L in MW-3, 2.89 mg/L in TMW/SB-20, 2.04 mg/L in TMW/SB-22 and 30.0 mg/L in TMW/SB-23) were detected above the referenced De Minimis level in unconfined groundwater in the northern area of the Site. No other TPH-DRO concentrations were detected above WVDEP Draft Groundwater De Minimis level of 0.330 mg/L.

Two (2) TPH-ORO concentrations (5.80 mg/L in TMW/SB-16 and 2.10 mg/L in TMW/SB-17) were detected above the WVDEP Draft Groundwater De Minimis level of 0.610 mg/L in the northern area of the Site. One (1) TPH-ORO concentration (10.8 mg/L in TMW/SB-12) was detected above the referenced Groundwater De Minimis level in unconfined groundwater in the western area of the Site. One (1) TPH-ORO concentration (5.92 mg/L in TMW/SB-7S)) was detected above the referenced De Minimis level in perched groundwater. TMW/SB-7S is located adjacent to the northwestern corner of the Garage/Storage Building in the southwestern area of the Site. No other TPH-ORO concentrations were detected above WVDEP Draft Groundwater De Minimis level of 0.610 mg/L.

PAH parameters were not detected above Table 60-3B Groundwater De Minimis levels in groundwater samples.

Groundwater concentrations discussed above occur in the following four (4) areas **(Figure 4)**:

Fuel Loading Rack Area – A benzene concentration in TMW/SB-3S and a TPH-DRO concentration in TMW/SB-2S were detected above referenced De Minimis levels in perched groundwater adjacent to the Fuel Loading Rack.

Southwestern Area – Benzene, MTBE and TPH-GRO/DRO/ORO concentrations were detected above referenced Groundwater De Minimis levels in TMW/SB-7S located in perched groundwater in the southwestern area of the Site near a former waste oil UST. Due to LPH in TMW/SB-7D, an unconfined groundwater sample could not be collected in this area. TMW/SB-7D was abandoned and replaced by MW-8. LPH has been removed and it should be possible to collect a groundwater sample from MW-8 during quarterly monitoring scheduled for December 2003.

Western Area – A TPH-ORO concentration in TMW/SB-12 and TPH-DRO concentrations in MW-7, TMW/SB-12, TMW/SB-13 and TMW/SB-14 were above the referenced Groundwater De Minimis level in unconfined groundwater located in this area. Former diesel ASTs No. 403, No. 404 and No. 405 are located along the upgradient eastern edge of this area.

Northern Area – Benzene, dissolved lead, TPH-GRO, TPH-DRO and TPH-ORO concentrations were detected above the referenced Groundwater De Minimis levels in this area. TPH-DRO concentrations were detected above the referenced Groundwater De Minimis level in the unconfined groundwater in MW-3, TMW/SB-16, TMW/SB-17, TMW/SB-20, TMW/SB-22 and TMW/SB-22. Dissolved lead and TPH-ORO concentrations were detected above the referenced Groundwater De Minimis levels in TMW/SB-16 and TMW/SB-17. Benzene and TPH-GRO concentrations were detected above the referenced De Minimis levels in TMW/SB-23. The former pump house, bulk oil ASTs No. 395, No. 396 and No. 397 and kerosene ASTs No. 393 and No. 394 are located along the upgradient eastern margin of this area.

6.6 Near Shore and Off-Shore Surface Water

BTEX, MTBE, lead, TPH-GRO and TPH-ORO concentrations were not detected above Table 60-3B Groundwater De Minimis levels or WVDEP Draft Groundwater De Minimis levels in near shore or off-shore surface water samples **(Table 12).**

A TPH-DRO concentration of 0.785 mg/L was detected in the off-shore surface water sample collected at location E-5 in the Elk River **(Table 12 and Figure 4).** TPH-DRO concentrations were not detected above the WVDEP draft Groundwater De Minimis level of 0.330 mg/L in other off-shore or near shore surface water samples. The TPH-DRO concentration appears to be part of normal background in the Elk River for the following reasons:

Only one (1) out of 20 surface water samples exceeded the referenced De Minimis level. Near-shore surface water samples were collected in the most likely location to be impacted by COCs from the Site. TPH-DRO concentrations were not detected above the referenced De Minimis level in near-shore surface water samples (NS- 1 through NS-5) or in the off-shore surface water sample in the same transect nearer to the Site (E-4).

Possible COC sources are present in the Elk River (ships and other water craft operating in the Elk River).

Upstream facilities that store or have stored petroleum hydrocarbons exist.

6.7 Preliminary Site Conceptual Model

Bulk storage of petroleum products including gasoline, diesel, bulk oil and additives began at the Site in 1938 and continued until 2001. During the course of operations, 19 ASTs and three USTs were utilized. It is possible that petroleum hydrocarbon liquids stored in the ASTs and USTs leaked product containing VOCs, SVOCs (TPHs) and lead into the subsurface. Historical field and analytical data and findings from an Additional Site Characterization performed during July and August 2003 indicate the following:

- Surface soil is not impacted above Table 60-3B Industrial De Minimis levels or WVDEP Draft De Minimis Levels and exposure pathways are not complete. Thus, risk for on-site industrial/commercial workers via particulate inhalation, ingestion and dermal contact with surface soil does not exist.

- Subsurface soil media is not impacted above Table 60-3B Industrial De Minimis levels or WVDEP Draft De Minimis Levels and exposure pathways are not complete. Thus, possible risk for on-site construction and utility workers via inhalation of VOCs from subsurface soil, ingestion of subsurface soil and dermal contact with subsurface soil does not exist.

- Dissolved-phase COC concentrations in groundwater media indicate that a risk of exposure for on-site workers via inhalation of VOCs from groundwater is possible.

- Dissolved-phase COC concentrations are present at shallow depths in perched groundwater near the fuel loading rack and southwestern corner of the Site. Ingestion, dermal contact and inhalation exposure pathways are possible for on-site construction and utility workers encountering perched groundwater in the two referenced areas.

Surface pavement and buildings appear to cover approximately 33 percent of the site surface. Based on historical data, groundwater flows westward toward the Elk River. A Site Conceptual Model form is included as **Appendix G.**

6.8 Exposure Pathways of Concern

Exposure pathways of concern appear to include inhalation of volatilized COCs from groundwater **(Appendix G).**

6.9 Future Exposure Pathways of Potential Concern

Possible future construction projects across the subject site could pose a potential concern for construction or utility workers digging in the subsurface. COCs in perched groundwater located in the

vicinity of the fuel loading rack and southwest corner of the Site could be of potential concern to construction and utility workers digging in the subsurface. Exposure pathways of potential concern include ingestion, dermal contact and inhalation.

6.10 Preliminary Ecological Standard Determination

The Elk River is located along the western border of the Site. There are no known incidents of impact to wildlife related to the Site. Based on analytical data, near shore sediments are not impacted by COCs above Table 60-3B Industrial De Minimis levels or WVDEP Draft Industrial De Minimis levels. A preliminary checklist to determine the applicable ecological standard is included as **Appendix H.**

7.0 Delineation of Impact

7.1 Delineation of Impacted Soil

VOCs, lead, TPHs and PAHs were not detected above Table 60-3B Industrial De Minimis levels or WVDEP Draft Industrial De Minimis Levels in soil samples collected on-Site **(Tables 8, 9 and 10).**

7.2 Delineation of Impacted Groundwater

Benzene, MTBE, lead, TPH-GRO, TPH-DRO and TPH-ORO were detected above Table 60-3B Groundwater De Minimis Levels and WVDEP Draft Industrial De Minimis Levels for TPH **(Table 12 and Figure 4)**. COC concentrations were detected above Table 60-3B Groundwater De Minimis levels and/or WVDEP Draft De Minimis Levels for TPH in the following four (4) areas **(Figure 4)**:

Fuel Loading Rack Area - A benzene concentration and a TPH-DRO concentration were detected above referenced Groundwater De Minimis levels in perched groundwater in TMW/SB-3S and TMW/SB-2S located adjacent to the Fuel Loading Rack. Since COCs were not detected above the referenced De Minimis levels in the unconfined groundwater sample collected from MW-5, vertical delineation is complete. Based on boring logs, a perched zone was encountered in TMW/SB-2S, TMW/SB-3S, MW-7 and SB-9, but not in SB-4, SB-8 or TMW/SB-26. Thus, the limits of the perched zone have been horizontally defined.

Southwestern Area - Benzene, MTBE and TPH-GRO/DRO/ORO concentrations were detected above referenced Groundwater De Minimis levels in TMW/SB-7S located in perched groundwater in the southwestern corner of the Site near a former waste oil UST. Due to LPH in TMW/SB-7D, an unconfined groundwater sample could not be collected in this area. TMW/SB-7D was abandoned and replaced by MW-8. LPH has been removed and a groundwater sample should be collected from MW-8 during quarterly monitoring scheduled for December 2003. Based on analytical results of the groundwater sample to be collected from MW-8, vertical delineation of dissolved-phase COCs may be determined. Based on boring logs, the horizontal limits of the perched zone appears to be confined to the immediate vicinity of TMW/SB-7S.

Western Area - A TPH-ORO concentration in TMW/SB-12 and TPH-DRO concentrations in MW-7, TMW/SB-12, TMW/SB-13 and TMW/SB-14 were detected above the referenced Groundwater De Minimis level in unconfined groundwater located in this area. Former diesel ASTs No. 403, No. 404 and No. 405 are located along the upgradient eastern edge of this area. Dissolved-phase COCs were not detected above the referenced Groundwater De Minimis levels in groundwater samples collected from MW-2 (located cross-gradient to the north), MW-5 (located upgradient to the east) and TMW/SB-11 (located cross-gradient to the south). Delineation of TPH-DRO concentrations above the referenced Groundwater De Minimis level in the western area is complete.

Northern Area - Benzene, dissolved lead, TPH-GRO, TPH-DRO and TPH-ORO concentrations were detected above the referenced Groundwater De Minimis levels in this area. TPH-DRO concentrations were

detected above the referenced De Minimis level in the unconfined groundwater in MW-3, TMW/SB-16, TMW/SB-17, TMW/SB-20, TMW/SB-22 and TMW/SB-22. Dissolved lead and TPH-ORO concentrations were detected above the referenced Groundwater De Minimis levels in TMW/SB-16 and TMW/SB-17. Benzene and TPH-GRO concentrations were detected above the referenced Groundwater De Minimis levels in TMW/SB-23. The former pump house, bulk oil ASTs No. 395, No. 396 and No. 397 and kerosene ASTs No. 393 and No. 394 are located along the upgradient eastern margin of this area. Since COCs were not detected in groundwater samples collected from MW-2 and MW-6, upgradient (eastward) and cross-gradient (southward) delineation are complete. Depending on the results of a future risk assessment, cross-gradient delineation in the northward direction may not be necessary.

7.3 Additional Site Characterization Recommendation

Groundwater samples will be collected from MW-8 and the seven (7) other on-Site monitoring wells during quarterly monitoring scheduled for December 2003. Single aquifer tests are needed to determine average hydraulic conductivities for risk assessment purposes.

8.0 References

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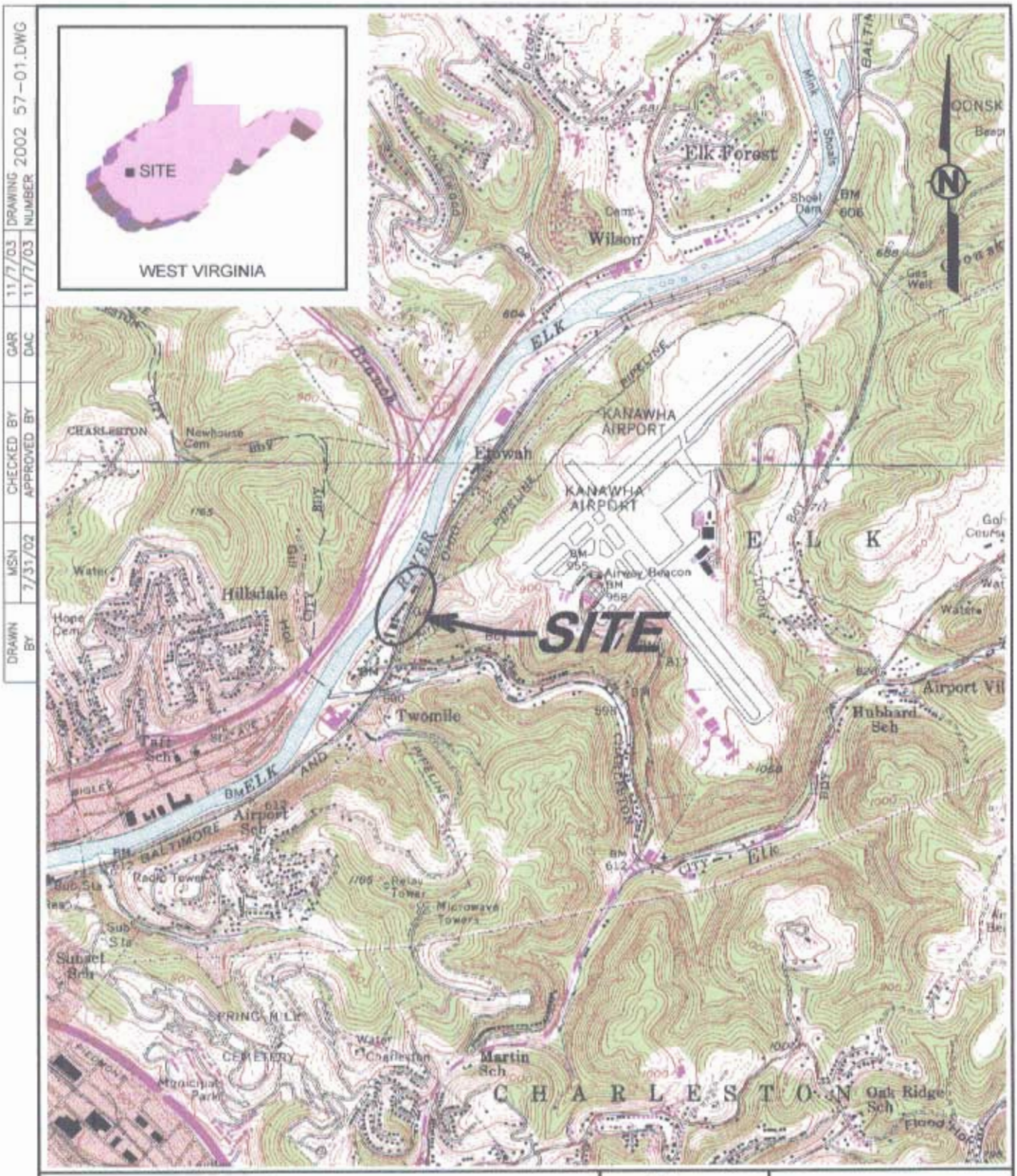
FIGURES

Large maps not scanned



DRAWN BY: MSN 7/31/02 | CHECKED BY: GAR 11/7/03 | APPROVED BY: DAC 11/7/03 | DRAWING NUMBER: 2002 57-01.DWG

REFERENCE:

U.S.G.S. 7.5 MIN. TOPOGRAPHIC MAP OF CHARLESTON EAST WEST VIRGINIA, DATED 1958, PHOTOREVISED 1968; SCALE: 1"=2000'

Shaw Environmental, Inc.

PENNZOIL–QUAKER STATE COMPANY

FIGURE 1
SITE LOCATION MAP

FORMER PQS ETOWAH TERMINAL
1015 BARLOW DRIVE
CHARLESTON, WEST VIRGINIA

M. Major - FILE NAME: 2002 57-01.DWG CLOSED 11/7/03 AT 10:31 AM

TABLES

Shaw Environmental, Inc.
PQS Tax ID No. 76-0200625

Table 1
Aboveground Storage Tank Information
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

STORAGE TANK NUMBER OR NAME	TYPE	YEAR INSTALLED	CAPACITY	CONTENTS
Aboveground Storage Tank No. 392	Aboveground Storage Tank	1991	8,000	Additive
Aboveground Storage Tank No. 393	Aboveground Storage Tank	1951	420,000	Kerosene
Aboveground Storage Tank No. 394	Aboveground Storage Tank	1951	420,000	Kerosene
Aboveground Storage Tank No. 395	Aboveground Storage Tank	1938	18,700	Bulk Oil
Aboveground Storage Tank No. 396	Aboveground Storage Tank	1938	18,700	Bulk Oil
Aboveground Storage Tank No. 397	Aboveground Storage Tank	1938	420,000	Bulk Oil
Aboveground Storage Tank No. 398	Aboveground Storage Tank	1945	420,000	Gasoline
Aboveground Storage Tank No. 399	Aboveground Storage Tank	1940	420,000	Gasoline
Aboveground Storage Tank No. 400	Aboveground Storage Tank	1940	420,000	Gasoline
Aboveground Storage Tank No. 401	Aboveground Storage Tank	1940	420,000	Gasoline
Aboveground Storage Tank No. 402	Aboveground Storage Tank	1940	420,000	Gasoline
Aboveground Storage Tank No. 403	Aboveground Storage Tank	1950	420,000	Diesel
Aboveground Storage Tank No. 404	Aboveground Storage Tank	1950	420,000	Diesel
Aboveground Storage Tank No. 405	Aboveground Storage Tank	1951	420,000	Diesel

Shaw Environmental, Inc.
PQS Tax ID No. 76-0200625

Table 2
Historical Soil Analytical Data
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Location	Date	Depth (Feet)	Benzene (mg/kg)	Total BTEX (mg/kg)	MTBE (mg/kg)	Lead		TPH		
						Total (mg/kg)	TCLP (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	ORO (mg/kg)
WVDEP action levels			**0.05**	**10**	**NE**	**1,000**	**5**	**1,900**	**2,600**	**6,100**
C-1	11/3/00	0 – 0.5	0.0031	0.0244	NS	2.13	0.07	NS	NS	NS
C-2	11/3/00	0 – 0.0	<0.0011	<0.0011	NS	2220	8.2	NS	NS	NS
C-3	11/3/00	0 – 0.5	<0.0012	<0.0012	NS	545	1.2	NS	NS	NS
HA-1	11/3/00	0 –1.5	<0.0012	<0.0012	NS	245	0.15	0.98	1700	1600
HA-2	11/3/00	3 – 3.5	**<0.120**	**746**	NS	23.2	0.13	**6300**	1200	190
HA-3	11/3/00	0 – 1.0	<0.0012	<0.0012	NS	139	<0.04	<0.12	170	230
HA-4	11/3/00	2 – 3	0.0036	0.0149	NS	23.8	<0.04	5.1	25	37
HA-5	11/3/00	2 – 3	0.0160	0.0160	NS	53.3	0.06	0.74	240	260
GP-1	11/16/00	4 – 8	**0.5300**	3.5900	NS	59.6	NS	190	**4,500**	1,800
GP-1	11/16/00	12 – 16	<0.0012	<0.0012	NS	6.8	NS	<0.12	38	25
GP-2	11/16/00	4 – 8	<0.0013	<0.0013	NS	13.9	NS	<0.13	13	19
GP-2	11/16/00	12 – 16	<0.0011	<0.0011	NS	5.6	NS	<0.11	3.7	4.4
GP-3	11/16/00	8 – 12	**0.2500**	8.3500	NS	17.9	NS	900	150	13
GP-3	11/16/00	12 – 16	<0.0012	<0.0012	NS	5.7	NS	<0.12	7.4	7.1
GP-4	11/16/00	8 – 12	<0.0014	<0.0014	NS	12	NS	<0.14	4.8	9.2
GP-4	11/16/00	12 – 16	**0.0660**	0.6160	NS	8.4	NS	6.3	30	6.4
GP-5	11/16/00	8 – 12	<0.0011	<0.0011	NS	6.7	NS	0.17	200	450
GP-5	11/16/00	12 – 16	<0.0012	<0.0012	NS	8.5	NS	<0.12	<3.7	4.5
GP-6	11/16/00	4 – 8	**0.5000**	5.9500	NS	14.6	NS	80	1,000	320
GP-6	11/16/00	16 – 20	0.0470	0.5410	NS	14.1	NS	33	4.2	7
GP-6	11/16/00	36 - 40	<0.0012	<0.0012	NS	5.8	NS	<0.12	<3.9	<3.9
GP-7	11/16/00	8 – 12	<0.0012	<0.0012	NS	11.2	NS	0.15	5.1	5.5
GP-7	11/16/00	40 – 43	<0.0012	<0.0012	NS	15	NS	<0.12	<3.8	<3.8
GP-8	11/17/00	12 – 16	**0.3000**	1.0200	NS	12.8	NS	37	310	40
GP-8	11/17/00	24 – 28	0.0200	0.0200	NS	10.4	NS	0.13	4.6	8.2
GP-9	11/17/00	16 – 20	**0.3700**	1.9500	NS	10.2	NS	100	300	68
GP-9	11/17/00	28 – 32	<0.0011	<0.0011	NS	5.7	NS	<0.11	<3.7	4.1
GP-10	11/17/00	12 – 16	0.0130	0.2456	NS	10.2	NS	150	5.4	<4.0
GP-10	11/17/00	20 – 24	<0.0012	<0.0012	NS	8.1	NS	<0.12	<4.1	5.6
C2-A	5/30/01	0 - 0.5	NS	NS	NS	**1,590**	3	NS	NS	NS
C2-B	5/30/01	0 - 0.5	NS	NS	NS	658	3.2	NS	NS	NS
C2-C	5/30/01	0 - 0.5	NS	NS	NS	**3,050**	**75.2**	NS	NS	NS
C2-D	5/30/01	0 - 0.5	NS	NS	NS	949	**6.49**	NS	NS	NS
C2-E	5/30/01	0 - 0.5	NS	NS	NS	151	0.228	NS	NS	NS
MW-1	6/14/01	8 - 10	<0.0012	<0.0012	<0.0098	NS	NS	<4.0	6.1	6
MW-1	6/14/01	10 - 12	<0.0011	<0.0011	<0.0091	NS	NS	<0.11	9.5	12
MW-2	6/13/01	0 - 2	<0.0012	<0.0012	<0.0099	NS	NS	<0.12	53	43
MW-2	6/13/01	10 - 12	<0.0012	<0.0012	<0.0092	NS	NS	<0.12	7.1	11
MW-3	6/14/01	4 - 6	<0.0013	<0.0013	<0.010	NS	NS	5.6	160	80
MW-3	6/14/01	12 - 14	<0.0011	<0.0011	<0.0088	NS	NS	<0.11	8.3	11

Shaw Environmental, Inc.
PQS Tax ID No. 76-0200625

Table 2 (Continued)
Historical Soil Analytical Data
Former PQS Etowah Terminal
1015 Barlow Road
Charleston, West Virginia

Location	Date	Depth (Feet)	Benzene (mg/kg)	Total BTEX (mg/kg)	MTBE (mg/kg)	Lead		TPH		
						Total (mg/kg)	TCLP (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	ORO (mg/kg)
WVDEP action levels			**0.0500**	**10.0000**	**NE**	**1,000**	**5**	**100**	**100**	**NE**
MW-4	6/4/01	22 - 24	<0.001	<0.001	<0.008	NS	NS	<0.1	<3.7	<3.7
MW-5	6/4/01	18 - 20	**0.1800**	**10.9100**	0.1500	NS	NS	<100	130	43
MW-5	6/4/01	20 - 22	<0.001	<0.001	<0.008	NS	NS	<0.100	19	4.8
MW-6	6/4/01	2 - 4	<0.001	<0.001	<0.008	NS	NS	<0.100	4.9	6.6
MW-6	6/5/01	12 - 14	<0.001	<0.001	<0.008	NS	NS	0.17	<4.0	<4.0
MW-7	9/27/01	14 - 16	<0.005	0.2490	NS	NS	NS	21	1,210	NS

mg/kg - milligrams per kilogram
BTEX - benzene, toluene, ethylbenzene and xylenes
MTBE - methyl tertiary butyl ether
TCLP - toxicity characteristic leaching procedure
TPH - total petroleum hydrocarbons
GRO - gasoline range organics (C_6 - C_{10})
DRO - diesel range organics (C_{10} - C_{28})
ORO - oil range organics (C_{28} - C_{35})
WVDEP- West Virginia Department of Environmental Protection
NE - not established
NS - not sampled
< - not detected at the following method detection limit
Concentrations exceeding the WVDEP action levels are bolded and shaded.

Table 3
Historical Groundwater Analytical Data
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Shaw Environmental, Inc.
PQS Tax ID No. 76-0200625

Location	Date	Benzene (ug/L)	Toluene (ug/L)	Ethyl-benzene (ug/L)	Total Xylenes (ug/L)	MTBE (ug/L)	TPH		
							GRO (ug/L)	DRO (mg/L)	ORO (mg/L)
WVGS	NA	5	1,000	700	10,000	NE	NE	NE	NE
MW-1	08/15/03	<1	<1	<1	<1	<1	<100	0.129	0.387
	06/4/03	<1	<1	<1	<1	<1	<100	0.562	0.566
	03/13/03	<1	<1	<1	<1	<1	<100	0.149	<0.100
	12/9/02	<1	<1	<1	<1	<1	<100	0.197	0.342
	9/23/02	<1	<1	<1	<1	<1	<100	0.204	0.293
	6/25/02	<1	<1	<1	<1	<1	<100	0.181	0.323
	3/18/02	<1	<1	<1	<1	<1	<100	0.179	0.24
	12/12/01	<1	<1	<1	<1	<8	<100	<0.10	0.11
	10/2/01	<1	<1	<1	<1	<1	<100	0.136	NS
	9/11/01	<1	<1	<1	<2	<10	<500	<0.15	<0.40
	6/20/01	<1	<1	<1	<2	<8	<100	<0.10	<0.10
MW-2	08/15/03	<1	<1	<1	<1	1.2	<100	<0.10	0.143
	06/4/03	<1	<1	<1	<1	<1	<100	0.104	0.130
	03/13/03	1.6	<1	<1	<1	<1	<100	<0.10	<0.10
	12/9/02	<1	<1	<1	<1	<1	<100	<0.10	0.106
	9/23/02	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	6/25/02	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	3/18/02	<1	<1	<1	<1	<1	<100	<0.10	0.11
	12/12/01	<1	1	<1	<1	<8	<100	<0.10	0.12
	10/2/01	<1	<1	<1	<1	<1	<100	0.128	NS
	9/11/01	<1	<1	<1	<2	<10	<500	<0.12	<0.30
	6/20/01	<1	<1	<1	<2	<8	<100	<0.10	<0.10
MW-3	08/15/03	<1	<1	<1	<1	<1	<100	1.540	0.248
	06/4/03	<1	<1	<1	1.9	<1	<100	0.546	0.140
	03/13/03	<1	<1	<1	<1	<1	<100	0.204	0.140
	12/9/02	<1	<1	<1	<1	<1	<100	1.350	<100
	9/23/02	<1	<1	1	5.8	<1	108	1.44	<0.10
	6/25/02	<1	<1	<1	4.9	<1	179	1.15	<0.10
	3/18/02	<1	1.1	1.2	9.4	1.3	244	1.03	0.47
	12/12/01	2.7	1.1	<1	2.4	<8	300	0.37	0.23
	10/2/01	<1	1.4	1.9	8.5	<1	346	0.642	NS
	9/11/01	<1	<1	<1	<2	<10	<500	0.83	<0.30
	6/20/01	<1	<1	<1	<2	<8	190	0.63	0.15
MW-4	08/15/03	<1	<1	<1	<1	<10	<100	<0.10	0.145
	06/4/03	<1	<1	<1	<1	<1	<100	<0.10	0.141
	03/13/03	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	12/9/02	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	9/23/02	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	6/25/02	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	3/18/02	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	12/12/01	<1	<1	<1	<1	<8	<100	<0.10	<0.10

Table 3 (Continued)
Historical Groundwater Analytical Data
Former PQS Etowah Terminal
1015 Barlow Road
Charleston, West Virginia

Shaw Environmental, Inc.
PQS Tax ID No. 76-0200625

Location	Date	Benzene (ug/L)	Toluene (ug/L)	Ethyl-benzene (ug/L)	Total Xylenes (ug/L)	MTBE (ug/L)	TPH		
							GRO (ug/L)	DRO (mg/L)	ORO (mg/L)
WVGS	NA	5	1,000	700	10,000	NE	NE	NE	NE
MW-4	10/2/01	<1	<1	<1	<1	<1	<100	<0.10	NS
	9/11/01	<1	<1	<1	<2	<10	<500	<0.12	<0.30
	6/20/01	<1	<1	<1	<2	<8	<100	<0.10	<0.10
MW-5	08/15/03	<1	<1	<1	<1	<10	<100	<0.10	0.121
	06/4/03	<1	<1	<1	<1	<1	<100	0.117	0.182
	03/13/03	<1	<1	<1	<1	<1	<100	<0.10	0.120
	12/9/02	<1	<1	<1	<1	<1	<100	0.490	1.290
	9/23/02	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	6/25/02	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	3/18/02	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	12/12/01	<1	<1	<1	<1	<8	<100	<0.10	<0.10
	10/2/01	<1	<1	<1	<1	<1	<100	<0.10	NS
	9/11/01	<1	<1	<1	<2	<10	<500	<0.13	<0.30
	6/20/01	<1	<1	<1	<2	<8	<100	<0.11	<0.11
MW-6	08/15/03	<1	<1	<1	<1	<10	117	0.121	0.106
	06/4/03	<1	<1	<1	<1	<1	<100	0.170	0.176
	03/13/03	1.3	<1	<1	<1	<1	106	0.202	0.115
	12/9/02	1	<1	<1	<1	<1	120	0.290	0.631
	9/23/02	<1	<1	<1	1.4	<1	<100	<0.100	<0.100
	6/25/02	<1	<1	<1	2.4	<1	<100	<0.10	<0.10
	3/18/02	<1	<1	<1	<1	<1	<100	<0.10	<0.10
	12/12/01	4.8	1.4	<1	2.8	<8	200	0.13	0.29
	10/2/01	NS	NS	NS	NS	NS	NS	NS	NS
	9/11/01	<1	2	<1	<2	<10	<500	<0.13	<0.30
	6/20/01	<1	<1	<1	<2	<8	160	0.16	<0.10
MW-7	08/15/03	<1	<1	<1	<1	<10	<100	0.705	0.140
	06/4/03	<1	<1	<1	<1	<1	<100	1.47	0.344
	03/13/03	<1	<1	<1	<1	<1	<100	5.51	<0.100
	12/9/02	<1	<1	<1	<1	1.3	<100	1.2	1.16
	9/23/02	<1	<1	<1	<1	1.7	<100	0.775	0.139
	6/25/02	<1	<1	<1	1.9	2.1	<100	0.719	<0.10
	3/18/02	<1	<1	<1	<1	2.5	<100	0.841	0.48
	12/12/01	<1	<1	<1	<1	<8	110	0.39	0.27
	10/2/01	<1	<1	<1	<1	1.3	<100	0.607	NS

TPH - total petroleum hydrocarbons
DRO - diesel range organics
GRO - gasoline range organics
ORO - oil range organics
< - analyte was not detected at the referenced method detection limit
WVGS - West Virginia Groundwater Standard (Title 46 CFR Series 12, Appendix A)
ug/L - micrograms per liter
mg/L - milligrams per liter
MTBE - methyl tertiary butyl ether
NE - not established
NS - not sampled

Table 4
List of Contaminants of Potential Concern
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

COPC	Media	CAS Number	Included in Table 60-3B	Use/Occurrence	Decision Notes	To be sampled		Analysis
						Yes	No	
benzene	soil/water	71432	yes	constituent of gasoline fuel stored in ASTs	delineate full extent on-site	X		BTEX
cadmium	soil/water	7440439	yes	possible waste oil constituent	investigate near waste oil UST	X		Cadmium
chromium III	soil/water	16065831	yes	possible waste oil constituent	investigate near waste oil UST	X		Chromium III
chromium VI	soil/water	18540299	yes	possible waste oil constituent	investigate near waste oil UST	X		Chromium VI
diesel range organics	soil/water	none	no*	fuel stored in ASTs	delineate full extent on-site	X		DRO
ethylbenzene	soil/water	100-41-4	yes	constituent of gasoline fuel stored in ASTs	delineate full extent on-site	X		BTEX
ethylene glycol	soil/water	107211	yes	possible constituent in waste oil UST	investigate near waste oil UST	X		SVOC
gasoline range organics	soil/water	8006-61-9	no*	fuel stored in ASTs	delineate full extent on-site	X		GRO
lead	soil/water	7439921	yes	possible in paint on ASTs and petroleum product additive	delineate full extent on-site	X		Lead
lead tetraethyl	soil/water	78002	yes	possible gasoline additive for "knocking"	included with lead	X		Lead
methyl tertiary butyl ether	soil/water	none	no*	possible gasoline additive	delineate full extent on-site	X		MTBE
oil range organics	soil/water	none	no*	fuel stored in ASTs	delineate full extent on-site	X		ORO
PAH	soil/water	various	yes	constituentsof diesel fuel stored in ASTs	delineate full extent on-site	X		PAH
Solvents	soil/water	various	yes	possible constituents in waste oil UST	investigate near waste oil UST	X		Solvent Screen
toluene	soil/water	108883	yes	constituent of gasoline fuel stored in ASTs	delineate full extent on-site	X		BTEX
xylenes	soil/water	1330207	yes	constituent of gasoline fuel stored in ASTs	delineate full extent on-site	X		BTEX

COPC - contaminant of potential concern

BTEX - benzene, toluene, ethylbenzene and xylenes

MTBE - methyl tertiary butyl ether

* - The WVDEP has established draft de minimis levels for MTBE and TPHs.

TPH - total petroleum hydrocarbons

GRO - gasoline range organics

DRO - diesel range organics

ORO - oil range organics

PAH - polynuclear aromatic hydrocarbons

No. - number

AST - aboveground storage tank

Some overlapping of analytical results is possible between GRO, DRO, KRO and ORO.

Table 5
List of Contaminants of Concern
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

COC	Media	CAS Number	Included in Table 60-3B	Analytical Method	SW 846 Method
benzene	soil/water	71432	yes	BTEX	8260B
cadmium	soil/water	7440439	yes	Cacmium	6010B
chromium III	soil/water	16065831	yes	Chromium III	6010B
chromium VI	soil/water	18540299	yes	Chromium VI	7196A
diesel range organics	soil/water	none	no*	DRO	8015B
ethylbenzene	soil/water	100-41-4	yes	BTEX	8260B
ethylene glycol	soil/water	107211	yes	Ethylene Glycol	8015B
gasoline range organics	soil/water	8006-61-9	no*	GRO	8260B
lead	soil/water	7439921	yes	Lead	6010B
lead tetraethyl	soil/water	78002	yes	Lead	6010B
methyl tertiary butyl ether	soil/water	none	no*	MTBE	8260B
oil range organics	soil/water	none	no*	ORO	8015B
PAH	soil/water	various	yes	PAH	8270C SIMS
Solvents	soil/water	various	yes	Solvent Screen	8270C
toluene	soil/water	108883	yes	BTEX	8260B
xylenes	soil/water	1330207	yes	BTEX	8260B

COC - contaminant of concern

SW 846 - test Methods for Evaluation of Solid Wastes: Physical/Chemical Methods, Third Edition

* - The West Virginia Department of Environmental Protection has established draft de minimis levels for methyl tertiary butyl ether and TPH.

BTEX - benzene, toluene, ethylbenzene and total xylenes

MTBE - methyl tertiary butyl ether

TPH - total petroleum hydrocarbons

GRO - gasoline range organics

DRO - diesel range organics

ORO - oil range organics

PAH - polynuclear aromatic hydrocarbons

No. - number

AST - aboveground storage tank

Some overlapping of analytical results is possible between GRO, DRO, KRO and ORO.

Table 6
Summary of Soil and Sediment Analytical Program
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Matrix	Analysis	SW 846 Method	Parameter	CAS Number	Table 60-3B De Minimis Level (mg/kg)	Maximum Detection Limit (a) (mg/kg)	Sample Container	Preservation	Holding Time
Soil and Sediment	VOCs Solvents	8260B	Benzene	71-43-2	15	8			
			Toluene	108-88-3	2,000	1,000		using Terra Core sampler	
			Ethylbenzene	100-41-4	6,000	3,000	3-40ml glass	Cool to 4 deg. C	14
			Xylenes	1330-20-7	4,500	2,250	VOA viles	(2 viles)$HNaSO_4$	days
			Methyl tertiary butyl ether	none	800 (b)	400	4 oz. Glass	(1 vial) CH_4O	
			Acetone	67641	6,200	3,100	SW-846	(1 Glass) none	
			n-Butanol (1-Butanol)	71-36-3	88,000	44,000			
			Carbon disulfide	75150	1,200	600			
			Carbon tetrachloride	56235	5.3	3		using En Core sampler	
			Chlorobenzene	108907	540	270	3-En Cores	Cool to 4 deg. C	48
			Cyclohexanone	108941	1,000,000	500,000		no headspace	hours
			1,2-Dichlorobenzene	95501	3,300	1,650			
			Isobutanol	78831	77,000	38,500			
			1,1,2-Trichloroethane	79005	19	10			
			Trichloroethene	79016	61	31			
			Methylene chloride	75-92	210	105			
			Methyl ethyl ketone (MEK)	78933	28,000	14,000			
			Methyl isobutyl ketone (MIBK)	108101	2,900	1,450			
			Tetrachloroethene	127184	190	95			
			1,1,1-Trichloroethane (TCA)	71556	3,200	1,600			
			Trichlorofluoromethane	75694	1,300	650			
	SVOCs Solvents and PAH	8270C SIMS	o-Cresol (2-Methylphenol)	95487	44,000	22,000	4 oz. Glass	Cool to 4 deg. C	14 days
			m-cresol (3-Methylphenol)	108394	44,000	22,000			
			p-Cresol (4-Methylphenol)	106445	4,400	2,200			
			Pyridine	110861	880	440			
			Nitrobenzene	98953	110	55			
			Acenaphthene	83-32-9	38,000	19,000			
			Anthracene	120-12-7	390,000	195,000			
			Benzo(a)anthracene	56-55-3	29	15			
			Benzo(a)pyrene	50328	2.9	1			
			Benzo(b)fluoranthene	205992	29	15			
			Benzo(k)fluroanthene	207089	290	145			
			Chrysene	218-01-9	2,900	1,450			
			Dibenzo(ah)anthracene	53703	2.9	1			
			Fluoranthene	206-44-0	30,000	15,000			
			Fluorene	86-73-7	33,000	16,500			
			Indeno(1,2,3-cd)pyrene	193395	29	15			
			Naphthalene	91-20-3	190	95			
			Pyrene	129-00-0	54,000	27,000			
	TPH	8015B	2-Ethoxyethanol	110805	350,000	175,000	4 oz. Glass	Cool to 4 deg. C	14 days
			Ethylene glycol	107211	1,000,000	500,000			
			Methanol	67561	440,000	220,000			
			Diesel range organics C_{10}-C_{28}	none	8,300 (b)	4,150			
			Gasoline range organics C_6-C_{10}	8006-61-9	6,600 (b)	3,300			
			Oil range organics C_{28}-C_{35}	none	9,000 (b)	4,500			

Table 6 (Continued)
Summary of Soil and Sediment Analytical Program
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Matrix	Analysis	SW 846 Method	Parameter	CAS Number	Table 60-3B De Minimis Level (mg/kg)	Maximum Detection Limit (a) (mg/kg)	Sample Container	Preservation	Holding Time
	Inorganics	6010B	Cadmium	7440439	811	406	4 oz. Plastic	Cool to 4 deg. C	28 days
		6010B	Chromium III	16065831	1,000,000	500,000			
		7196A	Chromium VI	18540299	660	330			
		6010B	Lead (TCLP lead as per Table 9)	7439-92-1	1,000	500			

VOC - volatile organic compound
SVOC - semi-volatile organic compound
VOA - volatile organic analysis
TPH - total petroleum hydrocarbons
PAH - polynuclear aromatic hydrocarbons
SIMS - single ion monitoring spectrometry
MIBK - methylisobutyl ketone, also 4-methyl-2-pentanone
$HNaSO_4$ - sodium bisulfate
CH_4O - methanol
deg. C - degrees celsius
oz - ounce
mg/kg - milligrams per kilogram
NE - not established
MEK - methyl ethyl ketone, also 2-butanone

SW 846 - Test Methods for Evaluation of Solid Wastes: Physical/Chemical Methods, Third Edition
Table 60-3B De Minimis Level - West Virginia de minimis levels for industrial soil (revised January 2002)
(a) - maximum detection limit is half of the above-referenced De Minimis level or the standard laboratory method detection limit, whichever is lower
(b) - West Virginia Table 2. draft De Minimis level for industrial soil (revised January 2002)
For PAH and solvents samples, extract and hold pending results of TPH-DRO (analyze if TPH-DRO is equal to or greater than 100 mg/kg).
Where laboratory method detection limits are above the De Minimis Level, the laboratory will achieve the lowest practical J value (anticipated problem analytes are highlighted).

Shaw Environmental, Inc.
PQS Tax ID No. 76-0200625

Table 7
Summary of Groundwater and Surface Water Analytical Program
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Matrix	Analysis	SW 846 Method	Parameter	CAS Number	Table 60-3B De Minimis (mg/L)	Detection Limit (a) (mg/L)	Sample Container	Preservation	Holding Time
Water	VOCs Solvents	8260B (10mL Purge when solvents are included)	Benzene	71-43-2	0.005	0.0025	3-40ml glass VOA viles	Cool to 4 deg. C HCl to pH <2	14 days
			Toluene	108-88-3	1	0.5			
			Ethylbenzene	100-41-4	1.3	0.65			
			Xylenes	1330-20-7	10	5			
			Methyl tertiary butyl ether	none	0.020 (b)	0.01			
			Acetone	67641	0.61	0.305			
			n-Butanol (1-Butanol)	71-36-3	3.7	1.85			
			Carbon disulfide	75150	1	0.5			
			Carbon tetrachloride	56235	0.005	0.0025			
			Chlorobenzene	108907	0.11	0.055			
			Cyclohexanone	108941	180,000	90000			
			1,2-Dichlorobenzene	95501	0.6	0.3			
			Isobutanol	78831	1.8	0.9			
			1,1,2-Trichloroethane	79005	0.005	0.0025			
			Trichloroethene	79016	0.005	0.0025			
			Methylene chloride	75-92	0.005	0.0025			
			Methyl ethyl ketone (MEK)	78933	1.9	0.95			
			Methyl isobutyl ketone (MIBK)	108101	0.16	0.08			
			Tetrachloroethene	127184	0.005	0.0025			
			1,1,1-Trichloroethane (TCA)	71556	0.54	0.27			
			Trichlorofluoromethane	75694	1.3	0.65			
	VOCs Solvents and PAH	8270C SIMS	o-Cresol (2-Methylphenol)	95487	1.8	0.9	1 L a-glass	Cool to 4 deg. C	14 days
			m-cresol (3-Methylphenol)	108394	1.8	0.9			
			p-Cresol (4-Methylphenol)	106445	0.18	0.09			
			Pyridine	110861	0.037	0.0185			
			Nitrobenzene	98953	0.0034	0.0017			
			Acenaphthene	83-32-9	0.37	0.185			
			Anthracene	120-12-7	1.8	0.9			
			Benzo(a)anthracene	56-55-3	0.000091	0.0000455			
			Benzo(a)pyrene	50328	0.0002	0.0001			
			Benzo(b)fluoranthene	205992	0.000091	0.0000455			
			Benzo(k)fluroanthene	207089	0.00091	0.000455			
			Chrysene	218-01-9	0.0091	0.00455			
			Dibenzo(a,h)anthracene	53703	0.0000091	0.00000455			

Table 7 (Continued)
Summary of Groundwater and Surface Water Analytical Program
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Matrix	Analysis	SW 846 Method	Parameter	CAS Number	Table 60-3B De Minimis (mg/L)	Detection Limit (a) (mg/L)	Sample Container	Preservation	Holding Time
	Solvents and PAH (Continued)	8270C SIMS	Fluoranthene	206-44-0	1.5	0.75	(continued)	(continued)	(continued)
			Fluorene	86-73-7	0.24	0.12			
			Indeno(1,2,3-cd)pyrene	193395	0.000091	0.0000455			
			Naphthalene	91-20-3	0.0062	0.0031			
			Pyrene	129-00-0	0.18	0.09			
	TPH	8015B	2-Ethoxyethanol	110805	15	7.5	3-40mL a-glass VOAs	Cool to 4 deg. C	14 days
			Ethylene glycol	107211	73	36.5	3-40mL a-glass VOAs	Cool to 4 deg. C	14 days
			Methanol	67561	18	9	3-40mL a-glass VOAs	Cool to 4 deg. C	14 days
			Diesel range organics C_{10}-C_{28}	none	0.33 (b)	0.16	1 L a-glass	Cool to 4 deg. C, HCl	7 days to extract
			Oil range organics C_{28}-C_{35}	none	0.16 (b)	0.08	1 L a-glass	Cool to 4 deg. C, HCl	7 days to extract
			Gasoline range organics C_6-C_{10}	800-61-9	1.5 (b)	0.75	3-40ml glass VOA viles	Cool to 4 deg. C, HCl	14 days
	Inorganics	6010B	Cadmium	7440439	0.018	0.009	250 ml plastic (filtered)	Cool to 4 deg. C,HNO_3	180 days
		6010B	Chromium III	16065831	55	27.5	250 ml plastic (filtered)	Cool to 4 deg. C,HNO_3	180 days
		6010B	Lead	7439-82-1	0.015	0.0075	250 ml plastic (filtered)	Cool to 4 deg. C,HNO_3	180 days
		7196A	Chromium VI	18540299	0.11	0.055	125 ml plastic (filtered)	Cool to 4 deg. C	24 hour-alert lab

VOC - volatile organic compound
SVOC - Solvents (solvent screen)
VOA - volatile organic analysis
SW 846 - Methods Eval. Solid Wastes: Phys./Chem. Methods, 3rd Ed.
MIBK - methylisobutyl ketone, also 4-methyl-2-pentanone
TPH - total petroleum hydrocarbons
PAH - polynuclear aromatic hydrocarbons
SIMS - single ion monitoring spectrometry
MEK - methyl ethyl ketone, also 2-butanone
HNO_3 - nitric acid
NE - not established
oz - ounce
a - amber
ug/L - micrograms per liter
HCl - hydrochloric acid
deg. C - degrees celsius

Table 60-3B De Minimis Level - West Virginia de minimis levels for groundwater (revised January 2002)
(a) - maximum detection limit is half of the De Minimis level or the standard laboratory method detection limit, whichever is lower (exceptions are explained in footnotes).
(b) - West Virginia Table 2. draft De Minimis level for groundwater (revised January 2002)
For PAH and solvents samples, extract and hold pending results of TPH-DRO (analyze if TPH-DRO is equal to or greater than 330 ug/L).
Where laboratory method detection limits are above De Minimis Level, the laboratory will achieve the lowest practical J value.

TABLE 8
SOIL ANALYTICAL RESULTS FOR VOC, LEAD AND TPH
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Shaw Environmental, Inc.
PQS Tax ID No. 75-0200625

Sample Identification			Volatile Organic Compound Parameters					Lead	Total Petroleum Hydrocarbons		
Sample Location	Depth (Feet)	Date	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Total Xylenes (mg/kg)	Methyl Tertieary Butyl Ether (mg/kg)	Lead (mg/kg)	Gasoline Range Organics (mg/kg)	Diesel Range Organics (mg/kg)	Oil Range Organics (mg/kg)
Table 60-3B - Industrial			15	6,000	2,000	4,500	800 (a)	1,000	8,800 (a)	8,300 (a)	9,000 (a)
SB-1 (adjacent to MW-6)	0 - 2	7/17/03	<0.0017	<0.0017	<0.0017	<0.0017	0.0427	58.3	<5.78	331.0	339.0
	2 - 8	7/17/03	0.0366	0.0077	0.0013 J	0.0386	0.0023	13.1	<6.12	8.46	<6.12
	18 - 20	7/17/03	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	10.6	<6.10	<6.10	<6.10
TMW/SB-2S (adjacent to MW-5)	0 - 2	7/16/03	<0.0019	<0.0019	0.0014 J	<0.0019	0.0129	15.9	<6.20	<6.20	<6.20
	2 - 4	7/16/03	0.0030	<0.0016	0.0012 J	0.0021	0.0192	15.9	6.40	61.7	<6.17
TMW/SB-3 S & D	0 - 2	7/16/03	0.375	0.0074	0.0081	0.0098	0.0015 J	20.3	<6.15	21.6	20.8
	2 - 7.5	7/16/03	0.102	0.0166	0.0060	0.0105	0.0021	19.6	67.0	188.0	<31.1
	26 - 28	7/17/03	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	14.2	<6.49	<6.49	27.1
SB-4 (adjacent to MW-4)	0 - 2	7/16/03	0.0012 J	<0.0018	0.0014 J	<0.0018	<0.0018	29.3	<5.86	50.9	100.0
	2 - 8	7/16/03	<0.0017	<0.0017	0.0015 J	<0.0017	<0.0017	15.1	<6.20	<6.20	<6.20
	22 - 24	7/16/03	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	14.2	<6.39	<6.39	<6.39
SB-5	0 - 2	7/15/03	0.0093	<0.0020	0.0013 J	<0.0020	<0.0020	21.0	<6.53	10.8	
	2 - 8	7/15/03	0.0020	<0.0017	0.0013 J	<0.0017	<0.0017	19.7	<6.65	<6.65	<6.65
SB-6	0 - 2	7/15/03	0.0020	0.0012 J	0.0018	0.0030	<0.0018	11.7	<5.59	320.0	<112.0
	2 - 8	7/15/03	<0.0021	<0.0021	0.0013 J	<0.0021	<0.0021	17.2	<6.99	<6.99	<6.99
TMW/SB-7 S & D	0 - 2	7/15/03	0.0011 J	<0.0017	0.0011 J	<0.0017	<0.0017	195.0	<5.90	327.0	1060.0
	2 - 4	7/15/03	0.128	0.0139	0.0136	0.353	0.625	26.5	15.9	257.0	834.0
	34 - 36	7/23/03	0.0021	<0.0019	<0.0019	<0.0019	0.0017 J	7.36	<5.61	34.8	55.0
SB-8	0 - 2	7/16/03	0.0027	<0.0015	<0.0015	<0.0015	<0.0015	15.4	<5.86	11.5	22.8
	2 - 8	7/16/03	<0.0016	<0.0016	<0.0008 J	<0.0016	<0.0016	17.2	<6.00	<6.00	<6.00
SB-9	0 - 2	7/17/03	0.0007 J	0.0009 J	0.0009 J	0.0040	0.0011 J	15.6	144.0	129.0	<12.4
	2 - 4	7/17/03	<0.0017	<0.0017	0.0010 J	<0.0017	0.0014 J	13.6	<6.19	95.4	<12.4
SB-10 (adjacent to MW-1)	0 - 2	7/14/03	<0.0017	<0.0017	<0.0017	<0.0017	<0.0017	50.8	<5.82	16.6	31.4
	2 - 8	7/14/03	<0.0019	<0.0019	0.0010 J	<0.0019	<0.0019	15.5	<5.41	9.77	17.2
	10 - 12	7/14/03	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	10.9	<6.02	<6.02	<6.02
TMW/SB-11	2 - 4	7/14/03	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	20.2	<5.84	18.7	18.7
TMW/SB-12	2 - 4	7/14/03	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	32.5	<6.02	10.0	16.9
TMW/SB-13	10 - 12	7/15/03	<0.0020	0.0019 J	0.0019 J	<0.002 J	<0.0020	13.2	<6.64	<6.64	<6.64
TMW/SB-14	8 - 10	7/15/03	0.0347	1.96	0.0628	1.48	<0.0021	25.4	2,590	76.3	<13.0
SB-15 (adjacent to MW-2)	0 - 2	7/15/03	0.0011 J	<0.0017	0.0012 J	<0.0017	<0.0017	19.4	<6.05	<6.05	<6.05
	2 - 8	7/15/03	0.0019 J	<0.0023	0.005	0.0061	<0.0023	48.1	24.4	85.8	<12.9
	10 - 12	7/15/03	0.0123	0.442	0.0332	0.294	<0.0023	23.5	531.0	207.0	<56.3
TMW/SB-16	14 - 16	7/15/03	0.0015 J	0.0086	0.0063	0.0364	<0.0020	6.81	673.0	2,310	<564.0
TMW/SB-17	10 - 12	7/14/03	0.0008 J	<0.0018	0.0014 J	<0.001 J	<0.0018	7.02	<5.41	321	<108
TMW/SB-18	6 - 8	7/14/03	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	20.1	<6.01	<6.01	<6.01
SB-19 (adjacent to MW-3)	0 - 2	7/14/03	<0.0018	<0.0018	<0.0018	<0.0018	<0.0018	28.0	<5.92	8.36	13.7
	2 - 8	7/14/03	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	15.6	<6.60	<6.60	<6.60
TMW/SB-20	14 - 16	7/21/03	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	8.02	132	977	<298
SB-21	0 - 2	7/22/03	0.0079	0.0010 J	0.0010 J	0.0099	<0.0018	29.2	<6.11	26.0	<6.01
	2 - 8	7/22/03	0.0043	<0.0018	0.0010 J	0.0015 J	<0.0018	11.9	<6.11	8.07	<6.19
TMW/SB-22	0 - 2	7/21/03	0.0043	<0.0018	0.0058	<0.0018	<0.0018	16.1	729	3010	<639
	2 - 8	7/21/03	0.0020	<0.0019	<0.0019	<0.0019	<0.0019	12.9	26.2	138	<62.7
	20 - 22	7/22/03	0.0040	0.0026	0.0024	0.0104	<0.0018	10.2	21.9	205	<59.6
TMW/SB-23	0 - 2	7/22/03	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	14.8	<6.33	8.84	<6.28
	2 - 8	7/22/03	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	15.6	<6.19	328	<125
	22 - 23.5	7/22/03	0.0037	0.0019 J	0.0019 J	0.0087	<0.0021	7.94	51.8	815	<295
SB-24	0 - 2	7/21/03	0.0017	<0.0017	0.0020	<0.0017	<0.0017	16.3	<6.23	117	<12.5
	2 - 8	7/21/03	0.0045	0.0581	0.0025	0.0292	<0.0017	13.4	54.8	59.7	<6.24
	10 - 12	7/21/03	0.0011 J	<0.0016	<0.0016	<0.0016	<0.0016	13.8	<6.18	<6.18	<6.18
SB-25	0 - 2	7/21/03	0.0106	0.0018	0.0031	0.0067	0.0037	52.9	<6.36	20.4	6.41
	2 - 8	7/21/03	0.0037	0.0052	0.0011 J	<0.0016	0.0157	12.1	<6.20	51.7	<6.20
TMW/SB-26	0 - 2	7/17/03	0.228	0.867	0.0095	0.274	0.180	15.9	231.0	961.0	<125.0
	2 - 8	7/17/03	0.133	0.0376	0.0030	0.0392	0.296	15.3	<6.01	82.7	<6.01
	20 - 22	7/23/03	0.0025	0.0090	0.0010 J	0.0195	0.0022	8.92	8.37	28.7	<5.74
TMW/BG-1	0 - 2	7/16/03	0.0219	<0.0017	0.0012 J	0.0042	<0.0017	16.0	<6.15	<6.15	<6.15
	2 - 8	7/16/03	<0.0017	<0.0017	0.0012 J	<0.0017	<0.0017	16.0	<6.14	<6.14	<6.14
	10 - 12	7/16/03	<0.0017	<0.0017	0.0009 J	<0.0017	<0.0017	14.4	<6.09	<6.09	<6.09
TMW/BG-2	0 - 2	7/16/03	0.0016 J	<0.0020	0.0023	<0.0020	<0.0020	33.9	24.7	<6.50	54.9
	2 - 8	7/16/03	<0.0017	<0.0017	0.0009 J	<0.0017	<0.0017	14.6	<6.19	134.0	<30.9
	14 - 16	7/16/03	<0.0017	<0.0017	0.0008 J	<0.0017	<0.0017	11.6	<6.00	12.0	<6.00
NS-1	0 - 0.5	9/11/03	<0.0043	<0.0043	<0.0043	<0.0043	<0.0043	26.0	<10.7	<10.7	87.2
NS-2	0 - 0.5	9/11/03	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031	19.8	<7.66	<7.66	27.1
NS-3	0 - 0.5	9/11/03	<0.005	<0.005	<0.005	<0.005	<0.005	30.5	<9.71	<9.71	58.8
NS-4	0 - 0.5	9/11/03	<0.0023	<0.0023	<0.0023	<0.0023	<0.0023	22.2	<7.16	<7.16	28.7
NS-5	0 - 0.5	9/11/03	<0.0035	<0.0035	<0.0035	<0.0035	<0.0035	26.6	<9.24	<9.24	84.1
NS-2 FS	0 - 0.5	9/11/03	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031	22.1	<7.73	<7.73	26.1
SB-6 FS	2 - 8	7/15/03	<0.0019	<0.0019	0.0013 J	<0.0019	<0.0019	14.3	<6.02	<6.02	<6.02
TMW/SB-16 FS	14 - 16	7/15/03	0.0019 J	0.0145	0.0114	0.0278	<0.0020	6.74	592.0	2,020	<561
SB-21 FS	2 - 8	7/22/03	0.0042	<0.0019	0.0010 J	0.0013 J	<0.0019	15.2	<6.39	9.72	<6.50

NS - analyte was not analyzed
FS - field split
mg/kg - milligrams per kilogram

< - less than the following laboratory method detection limit
J - analyte below practical quantitation limit
Table 60-3B De Minimis - De Minimus Levels from West Virginia De Minimis Levels for Soil and Groundwater (revised January, 2002)
(a) - West Virginia Department of Environmental Protection Draft De Minimis Levles in Soil and Groundwater for TPH

TABLE 9
SOIL ANALYTICAL RESULTS FOR PAH
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Sample Identification			PAH Parameters																	
Sample Location	Depth (Feet)	Date	Acenaph-thene (mg/kg)	Acenaph-thylene (mg/kg)	Anthra-cene (mg/kg)	Benzo(a) anthracene (mg/kg)	Benzo(a) pyrene (mg/kg)	Benzo(b)flu-oranthene (mg/kg)	Benzo(ghi) perylene (mg/kg)	Benzo(k)flu-oranthene (mg/kg)	Chry-sene (mg/kg)	Dibenz(ah)-anthracene (mg/kg)	Fluoro-anthene (mg/kg)	Fluorene (mg/kg)	Indeno(123-cd)pyrene (mg/kg)	2-Methyl-naphthalene (mg/kg)	Naph-thalene (mg/kg)	Phenan-threne (mg/kg)	Pyrene (mg/kg)	1-Methyl naphthalene (mg/kg)
Table 60-3B - Industrial			38,000	NE	390,000	29	2.9	29	NE	290	2,900	2.9	30,000	33,000	29	NE	190	NE	54,000	NE
SB-1 (adjacent to MW-6)	0 - 2	7/17/03	0.01380	0.02750	0.02590	0.04960	0.06290	0.06450	0.08970	0.06450	0.06220	0.02590	0.09690	0.02250	0.05950	0.29400	0.09190	0.06400	0.07930	0.37600
	2 - 8	7/17/03	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	<0.00404	0.0097	0.00367 J	<0.00404	<0.00404
	18 - 20	7/17/03	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402
SB-2 (adjacent to MW-5)	0 - 2	7/16/03	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409
	2 - 4	7/16/03	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	<0.00407	0.02640	0.01380	<0.00407	<0.00407	0.02030
TMW/SB-3 S & D	0 - 2	7/16/03	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	0.00246 J	<0.00406	<0.00406
	2 - 7.5	7/16/03	0.01970	0.00904	0.00740	<0.00411	<0.00411	<0.00411	<0.00411	<0.00411	<0.00411	<0.00411	<0.00411	0.04810	<0.00411	0.81700	0.08060	0.05920	<0.00411	0.55500
	26 - 28	7/17/03	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429
SB-4 (adjacent to MW-4)	0 - 2	7/16/03	0.00234 J	0.01430	0.01400	0.09400	0.08630	0.08160	0.07080	0.07550	0.09940	0.02560	0.15000	0.00658	0.06190	0.02050	0.00928	0.03790	0.13200	0.01970
	2 - 8	7/16/03	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409
	22 - 24	7/16/03	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	<0.00421	0.00345 J	<0.00421	<0.00421
SB-6	0 - 2	7/15/03	<0.00369	<0.00369	0.0716	0.0801	0.0428	0.0403	0.0324	0.0513	0.0642	0.0192	0.285	0.103	0.0321	0.114	0.0255	0.313	0.178	0.130
TMW/SB-7 S	0 - 2	7/15/03	0.0335	0.0152	0.0939	0.220	0.171	0.165	0.137	0.155	0.203	0.0491	0.564	0.0491	0.117	0.0230	0.0179	0.353	0.372	0.0249
	2 - 4	7/15/03	<0.00403	0.0101	0.0279	0.0291	<0.00403	<0.00403	0.0267	<0.00403	0.0738	<0.00403	0.0775	0.0642	0.0198	0.101	0.0205	0.137	0.0919	0.176
SB-8	0 - 2	7/16/03	<0.00387	0.00387	0.00812	0.00619	0.02470	0.01820	0.02740	0.00928	0.00812	0.01200	0.01120	<0.00387	0.02130	<0.00387	<0.00387	0.00735	0.00851	<0.00387
	2 - 8	7/16/03	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396
SB-9	0 - 2	7/17/03	0.02330	<0.00408	0.01230	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00406	<0.00408	<0.00408	0.04280	0.00899	<0.00408	<0.00408	0.07310	0.00899	0.23600
	2 - 4	7/17/03	0.00858	<0.00408	0.00653	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	0.01510	0.00899	<0.00408	<0.00408	0.02410	0.00408	0.06660
SB-15 (adjacent to MW-2)	0 - 2	7/15/03	<0.00400	<0.00400	0.00999	0.0268	0.0240	0.0280	0.0255	0.0203	0.0308	0.0144	0.0556	<0.00400	0.0220	0.0831	0.0511	0.0516	0.0387	0.0703
	2 - 8	7/15/03	<0.00425	0.00510	0.00638	0.0179	0.0166	0.0251	0.0242	0.0149	0.0285	0.0140	0.0349	0.00595	0.0191	0.398	0.171	0.0745	0.0272	0.531
	10 - 12	7/15/03	<0.00438	<0.00438	<0.00438	<0.00438	<0.00438	0.00700	0.00675	<0.00436	<0.00438	<0.00438	0.00354J	<0.00438	0.0101	3.22	0.761	0.00788	<0.00438	1.80
TMW/SB-16	14 - 16	7/15/03	<0.00372	<0.00372	0.0536	<0.00372	<0.00372	<0.00372	<0.00372	<0.00372	0.0198	<0.00372	<0.00372	0.267	<0.00372	<0.00372	<0.00372	0.274	0.0178	2.18
TMW/SB-20	14 - 16	7/21/03	0.13400	0.05410	0.08660	<0.00378	<0.00378	<0.00378	<0.00378	<0.00378	<0.00378	<0.00376	<0.00378	0.06010	<0.00378	<0.00378	0.01970	0.03630	0.02380	0.04190
SB-21	0 - 2	7/22/03	<0.00403	<0.00403	0.00484	0.01370	0.01610	0.01290	0.01250	0.01330	0.01610	<0.00403	0.03060	<0.00403	0.01330	<0.00403	<0.00403	0.01330	0.02420	<0.00403
	2 - 8	7/22/03	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403	<0.00403
TMW/SB-22	0 - 2	7/21/03	<0.00422	<0.00422	0.01890	0.00464	<0.00422	0.00549	0.00760	0.00422	0.00422	<0.00422	<0.00422	0.19200	<0.00422	<0.00422	<0.00422	0.13700	0.00675	1.38000
	2 - 8	7/21/03	<0.00414	<0.00414	0.00662	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	0.02990	<0.00414	<0.00414	<0.00414	0.01240	<0.00414	0.28500
	20 - 22	7/22/03	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391	<0.00391
TMW/SB-23	0 - 2	7/22/03	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418	<0.00418
	2 - 8	7/22/03	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408
	22 - 23.5	7/22/03	<0.00384	<0.00384	0.01150	<0.00384	<0.00384	<0.00384	<0.00384	<0.00384	<0.00384	<0.00384	<0.00384	0.07870	<0.00384	<0.00384	0.00730	0.06030	<0.00384	0.59600
SB-24	0 - 2	7/21/03	<0.00411	<0.00411	<0.00411	0.00535	0.01030	0.00617	0.00823	0.00494	0.00299 J	<0.00411	<0.00411	<0.00411	0.00988	<0.00411	<0.00411	<0.00411	<0.00411	<0.00411
	2 - 8	7/21/03	<0.00412	<0.00412	0.00577	<0.00412	<0.00412	<0.00412	<0.00412	<0.00412	<0.00412	<0.00412	<0.00412	0.01490	<0.00412	0.05970	0.03050	0.01070	<0.00412	0.11500
	10 - 12	7/21/03	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	0.00530	0.03350	<0.00408	<0.00408	0.00205 J
SB-25	0 - 2	7/21/03	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420	<0.00420
	2 - 8	7/21/03	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	<0.00409	0.00409	<0.00409	<0.00409	0.03680
TMW/SB-26	0 - 2	7/17/03	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	<0.00414	0.02770	<0.00414	0.20900	0.11200	0.02730	<0.00414	0.25200
	2 - 8	7/17/03	<0.00397	<0.00397	<0.00397	<0.00397	<0.00397	<0.00397	<0.00397	<0.00397	<0.00397	<0.00397	<0.00397	<0.00397	<0.00397	0.05910	0.02860	0.00555	<0.00397	0.04680

TABLE 9 (Continued)
SOIL ANALYTICAL RESULTS FOR PAH
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Sample Identification			PAH Parameters																
Sample Location	Depth (Feet)	Date	Acenaph-thene (mg/kg)	Acenaph-thylene (mg/kg)	Anthra-cene (mg/kg)	Benzo(a) anthracene (mg/kg)	Benzo(a) pyrene (mg/kg)	Benzo(b)flu-oranthene (mg/kg)	Benzo(ghi) perylene (mg/kg)	Benzo(k)flu-oranthene (mg/kg)	Chry-sene (mg/kg)	Dibenz(ah)-anthracene (mg/kg)	Fluoro-anthene (mg/kg)	Fluorene (mg/kg)	Indeno(123-cd)pyrene (mg/kg)	2-Methyl-naphthalene (mg/kg)	Naph-thalene (mg/kg)	Phenan-threne (mg/kg)	Pyrene (mg/kg)	1-Methyl naphthalene (mg/kg)
Table 60-3B - Industrial			38,000	NE	390,000	29	2.9	29	NE	290	2,900	2.9	30,000	33,000	29	NE	190	NE	54,000	NE
TMW/BG-1	0 - 2	7/16/03	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406	<0.00406
	2 - 8	7/16/03	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405	<0.00405
	10 - 12	7/16/03	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402	<0.00402
TMW/BG-2	0 - 2	7/16/03	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429	<0.00429
	2 - 8	7/16/03	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	0.01060	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408	<0.00408
	14 - 16	7/16/03	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396	<0.00396
TMW/SB-16 FS	14 - 16	7/15/03	<0.00370	<0.00370	0.0555	<0.00370	<0.00370	<0.00370	<0.00370	<0.00370	0.0193	<0.00370	<0.00370	0.271	<0.00370	<0.00370	<0.00370	.279	0.0193	2.22
SB-21 FS	2 - 8	7/22/03	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422	<0.00422

VOC - volatile organic compounds
SVOC - semivolatile organic compounds
TPH - total petroleum hydrocarbons
DRO - diesel range organics
GRO - gasoline range organics
ORO - oil range organics
PAH - polynuclear aromatic hydrocarbons

mg/kg - milligrams per kilogram
NE - not established
NS - analyte was not analyzed
FS - field split
J - analyte below practical quantitation limit
< - less than the following laboratory method detection limit
Table 60-3B De Minimis - De Minimus Levels from West Virginia De Minimis Levels for Soil and Groundwater (revised January, 2002)
(a) - West Virginia Department of Environmental Protection Draft De Minimis Levles in Soil and Groundwater for TPH

TABLE 10
SOIL ANALYTICAL RESULTS FOR SOLVENTS AND METALS
Former PQS Etowah Terminal
Barlow Drive
Charleston, West Virginia

Sample Identification			Metals				Solvents																
					Chromium																		
Sample Location	Depth (Feet)	Date	Cadmium (mg/kg)	Lead (mg/kg)	hexavalent (mg/kg)	trivalent (mg/kg)	Acetone (mg/kg)	2-Butanone (mg/kg)	Carbon disulfide (mg/kg)	Carbon tetrachloride (mg/kg)	Chlorobenzene (mg/kg)	1,2-Dichlorobenzene (mg/kg)	Isobutyl alcohol (mg/kg)	Methylene chloride (mg/kg)	Tetrachloroethene (mg/kg)	1,1,1-Trichloroethane (mg/kg)	1,1,2-Trichloroethane (mg/kg)	Trichloroethene (mg/kg)	Cyclohexanone (mg/kg)	Trichlorofluoromethane (mg/kg)	n-Butanol (mg/kg)	Methanol (mg/kg)	2-Ethoxyethanol (mg/kg)
Table 60-3B - Industrial			810	1,000	660	1,000,000	6,200	28,000.0	1,200.0	5.300	540	3,300	77,000.0	210.0	190.0	3,200	19.00	61.0	1,000,000	1,300	88,000	440,000	350,000
SB-5	0 - 2	7/15/03	<1.25	21.0	<2.61	27.0	0.0356 J	<0.0490	0.00411	<0.0020	<0.0020	<0.0020	<0.0131	0.0027 J	<0.0020	<0.0020	<0.0020	<0.0020	<0.00653	<0.0020	<0.00980	<13.1	<26.1
	2 - 8	7/15/03	<1.30	19.7	<2.66	45.6	0.0219 J	<0.0447	0.00483	<0.0017	<0.0017	<0.0017	<0.0133	0.0036 J	<0.0017	<0.0017	<0.0017	<0.0017	<0.00665	<0.0017	<0.00894	<13.3	<26.6
SB-6	0 - 2	7/15/03	<1.06	11.7	<2.24	18.1	0.04680	<0.0404	0.00460	<0.0016	<0.0016	<0.0016	<0.0112	0.0031 J	<0.0016	<0.0016	<0.0016	<0.0016	<0.00559	<0.0016	<0.00808	<11.2	<22.4
	2 - 8	7/15/03	<1.37	17.2	<2.80	37.2	0.08130	<0.0538	<0.00215	<0.0021	<0.0021	<0.0021	<0.0140	0.0046 J	<0.0021	<0.0021	<0.0021	<0.0021	<0.00699	<0.0021	<0.0108	<14.0	<28.0
TMW/SB-7 S & D	0 - 2	7/15/03	<1.16	195	<2.36	32.6	0.21500	0.0406 J	0.00393	<0.0017	<0.0017	<0.0017	<0.0118	0.0024 J	<0.0017	<0.0017	<0.0017	<0.0017	<0.00590	<0.0017	<0.00855	<11.8	<23.6
	2 - 4	7/15/03	<1.20	26.5	<2.44	34.8	0.10300	0.0211 J	0.00648	<0.0020	<0.0020	<0.0020	<0.0122	<0.0048	<0.0020	<0.0020	<0.0020	<0.0020	<0.00611	<0.0020	<0.00954	<12.2	<24.4
	34 - 36	7/23/03	<1.11	7.36	3.14	7.34	0.0226 J	<0.0476	<0.00190	<0.0019	<0.0019	<0.0019	<0.0112	<0.0047	<0.0019	<0.0019	<0.0019	<0.0019	<0.00561	<0.0019	<0.00951	<11.2	<22.4
SB-6 FS	2 - 8	7/15/03	<1.16	14.3	<2.41	31.8	0.07970	<0.0473	<0.00189	<0.0019	<0.0019	<0.0019	<0.0120	0.0041 J	<0.0019	<0.0019	<0.0019	<0.0019	<0.00602	<0.0019	<0.00946	<12.0	<24.1

mg/kg - milligrams per kilogram

J - analyte below practical quantitation limit

Table 60-3B De Minimis - De Minimus Levels from West Virginia De Minimis Levels for Soil and Groundwater (revised January, 2002)

< - less than the following laboratory method detection limit.

NE - not established

NS - analyte was not analyzed

Dup - Duplicate

S - spike recovery outside accepted recovery limits

* - Resample for broken bottle for TPH DRO and ORO analyses collected on 8/27/02.

TABLE 11
SURFACE SOIL ANALYTICAL RESULTS FOR TCLP LEAD
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Shaw Environmental, Inc.
PQS Tax ID No. 76-0200625

Sample Identification			TCLP Lead (mg/kg)
Sample Location	Depth (Feet)	Date	
SS-1	0 - 0.5	7/18/03	<0.500
SS-2	0 - 0.5	7/18/03	0.570
SS-3	0 - 0.5	7/18/03	<0.500
SS-4	0 - 0.5	7/18/03	3.05
SS-5	0 - 0.5	7/18/03	<0.500
SS-6	0 - 0.5	7/18/03	<0.500
SS-4 Field Split	0 - 0.5	7/18/03	2.94

TCLP - toxicity characteristic leaching procedure.
SS - surface soil sample
mg/kg - milligrams per kilogram

TABLE 12
GROUNDWATER AND SURFACE WATER ANALYTICAL RESULTS
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Sample Identification		VOC Parameters					Metals		TPH			PAH Parameters														
Sample Location	Date	Benzene (mg/L)	Ethyl-benzene (mg/L)	Toluene (mg/L)	Total Xylenes (mg/L)	MTBE (mg/L)	Total Lead (mg/L)	Dissolved Lead (mg/L)	GRO (mg/L)	DRO (mg/L)	ORO (mg/L)	Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Anthracene (mg/L)	Benzo(a) anthracene (mg/L)	Benzo(a) pyrene (mg/L)	Benzo(b)flu-oranthene (mg/L)	Benzo(ghi) perylene (mg/L)	Benzo(k)flu-oranthene (mg/L)	Chrysene (mg/L)	Dibenz(ah)-anthracene (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	Indeno(123-cd)pyrene (mg/L)	Naphthalene (mg/L)	Phenanthrene (mg/L)	Pyrene (mg/L)
Table 60-3B - De Minimis		0.005	1.300	1.000	10.000	0.020 (b)	NE	0.015	1.500 (a)	0.330 (a)	0.610 (a)	0.370	0.370 (b)	1.800	0.000091	0.0002	0.000091	0.180 (b)	0.00091	0.0091	0.0000091	1.500	0.240	0.000091	0.0062	1.800 (b)	0.180
SB-1/MW-6	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.01	NS	<0.005	0.117	0.121	0.106	Not analyzed for PAH Parameters														
TMW/SB-2S	8/15/03	0.0012	<0.001	<0.001	0.0056	0.0137	NS	NS	0.159	1.56	0.260	0.00088	0.00027	0.00032	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00132	<0.00010	0.00348	0.00189	0.00011
SB-2/MW-5	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.01	NS	<0.005	<0.100	<0.100	0.121	Not analyzed for PAH Parameters														
SB-2/MW-5 DUP	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	<0.005	<0.100	0.108	<0.100	Not analyzed for PAH Parameters														
TMW/SB-3S	8/15/03	0.222	0.150	0.003	0.282	0.014	NS		Due to insufficient recovery within 24 hours following purging, analysis of parameters besides VOCs was not possible.																	
TMW/SB-3D	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	NS	<0.100	<0.100	0.157	Not analyzed for PAH Parameters														
SB-4/MW-4	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.01	NS	<0.005	<0.100	<0.100	0.145	Not analyzed for PAH Parameters														
TMW/SB-7S	8/15/03	0.07	0.0051	0.006	0.0496	1.230	NS	NS	1.51	8.90	5.93	Due to insufficient recharge within 24 hours following purging, analysis for PAH parameters was not possible.														
TMW/SB-7D		Due to the presence of liquid-phase hydrocarbons, a groundwater sample was not collected.																								
SB-10/MW-1	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	<0.005	<0.100	0.129	0.387	Not analyzed for PAH Parameters														
TMW/SB-11	8/15/03	<0.001	<0.001	<0.001	<0.001	0.0106	NS	NS	0.153	Due to insufficient recovery within 24 hours following purging, analysis of parameters besides VOCs and TPH-GRO was not possible.																
TMW/SB-12	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	<0.005	<0.100	21.0	10.8	0.00110	0.00028	0.00025	<0.00010	<0.00010	<0.00010	0.00021	<0.00010	0.00027	<0.00010	<0.00010	0.00129	0.00021	0.00037	0.00033	0.00118
TMW/SB-13	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	<0.005	<0.100	0.647	0.353	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
TMW/SB-14	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	<0.005	<0.100	0.653	0.402	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
SS-15/MW-2	8/15/03	<0.001	<0.001	<0.001	<0.001	0.0012	NS	<0.005	<0.100	<0.100	0.143	Not analyzed for PAH Parameters														
TMW/SB-16	8/15/03	0.001	0.0015	0.0017	0.0043	0.001	NS	0.05	1.38	16.4	8.80	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
TMW/SB-17	8/15/03	0.0035	<0.001	0.0014	<0.001	<0.001	NS	0.04	1.28	17.7	2.10	<0.00010	0.00067	0.00026	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00180	<0.00010	<0.00010	0.00134	<0.00010
TMW/SB-18		Due to insufficient recharge within 24 hours following purging, a groundwater sample could not be collected.																								
SB-19/MW-3	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	<0.005	<0.100	1.54	0.246	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
TMW/SB-20	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	<0.005	<0.100	2.88	<0.500	0.00045	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010
TMW/SB-22	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	<0.005	0.877	2.04	<0.200	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
TMW/SB-22 DUP	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.01	NS	<0.005	0.822	3.70	<0.500	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	<0.00010
TMW/SB-23	8/15/03	0.0936	0.0038	0.0041	0.0044	0.0023	NS	NS	2.83	30.0	<2.50	Due to insufficient recharge within 24 hours following purging, analysis for PAH parameters was not possible.														
TMW/SB-26		Due to insufficient recharge within 24 hours following purging, a groundwater sample could not be collected.																								
MW-7	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.01	NS	<0.005	<0.100	0.706	0.14	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
TMW/BG-1	8/15/03	<0.001	<0.001	<0.001	<0.001	0.0081	NS	NS	<0.100	Due to insufficient recovery within 24 hours following purging, analysis of other parameters (besides VOCs and TPH-GRO) was not possible.																
TMW/BG-2	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.01	NS	<0.005	<0.100	0.325	0.268	Not analyzed for PAH Parameters														

Sample Identification		VOC Parameters					Metals		TPH			PAH Parameters														
Sample Location	Date	Benzene (mg/L)	Ethyl-benzene (mg/L)	Toluene (mg/L)	Total Xylenes (mg/L)	MTBE (mg/L)	Total Lead (mg/L)	Dissolved Lead (mg/L)	GRO (mg/L)	DRO (mg/L)	ORO (mg/L)	Acenaphthene (mg/L)	Acenaphthylene (mg/L)	Anthracene (mg/L)	Benzo(a) anthracene (mg/L)	Benzo(a) pyrene (mg/L)	Benzo(b)flu-oranthene (mg/L)	Benzo(ghi) perylene (mg/L)	Benzo(k)flu-oranthene (mg/L)	Chrysene (mg/L)	Dibenz(ah)-anthracene (mg/L)	Fluoranthene (mg/L)	Fluorene (mg/L)	Indeno(123-cd)pyrene (mg/L)	Naphthalene (mg/L)	Phenanthrene (mg/L)	Pyrene (mg/L)
Table 60-3B - De Minimis		0.005	1.300	1.000	10.000	0.020 (b)	NE	0.015	1.500 (a)	0.330 (a)	0.610 (a)	0.370	0.370 (b)	1.800	0.000091	0.0002	0.000091	0.180 (b)	0.00091	0.0091	0.0000091	1.500	0.240	0.000091	0.0062	1.800 (b)	0.180
Water Quality Standards		0.071	NE	0.2	NE	NE	NE	NE	NE	NE	NE	Surface Water Quality Standard for PAH = 0.000031										0.370	Surface Water Quality Standard for PAH = 0.000021				
NS-1	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	0.118	Not analyzed for PAH Parameters														
NS-2	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
NS-3	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
NS-4	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
NS-4 DUP	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	0.206	Not analyzed for PAH Parameters														
NS-5	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-1	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-2	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-3	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0060	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-4	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	0.0030 J	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-5	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	0.786	1.40	Not analyzed for PAH Parameters														
E-6	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-7	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	0.118	0.235	Not analyzed for PAH Parameters														
E-8	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-9	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-10	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-11	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	0.0040 J	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-12	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-13	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-14	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0032 J	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														
E-15	9/11/03	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.100	<0.100	<0.100	Not analyzed for PAH Parameters														

VOC - volatile organic compounds
PAH - polynuclear aromatic hydrocarbons
TPH - total petroleum hydrocarbons
DRO - diesel range organics
GRO - gasoline range organics
ORO - oil range organics
Table 60-3B De Minimis - De Minimus Levels from West Virginia De Minimis Levels for Soil and Groundwater (revised January, 2002)
(a) - West Virginia Department of Environmental Protection Draft De Minimis Levels in Soil and Groundwater for TPH
(b) - West Virginia Supplemental Guidance on PAHs (surrogates for acenaphthylene, benzo(g,h,i)perylene and phenanthrene).
Analytes detected above the Table 60-3B Groundwater De Minimis levels are shaded.

< - less than the following laboratory method detection limit
NE - not established
NS - analysis was not analyzed
Dup - Duplicate
mg/L - milligrams per liter
J - analyte below practical quantitation limit
S - spike recovery outside accepted recovery limits
* - Resample for broken bottle for TPH DRO and ORO analyses collected on 8/27/02.
Water Quality Standards - Surface Water Quality Standards from 46 CSR 1 - Appendix E Table 1

Table 13
Liquid Level Gauging Data (August 14, 2003)
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Location	Casing Diameter (Inches)	TOC Elevation (Feet)	Depth to Product (Feet)	Depth to Water (Feet)	LPH Thickness (Feet)	Corrected Groundwater Elevation (Feet)
MW-1	2	79.27	ND	15.84	<0.01	63.43
MW-2	2	79.84	ND	16.36	<0.01	63.48
MW-3	2	80.93	ND	17.37	<0.01	63.56
MW-4	2	100.16	ND	25.64	<0.01	74.52
MW-5	2	100.89	ND	37.47	<0.01	63.42
MW-6	2	102.14	ND	15.82	<0.01	86.32
MW-7	2	99.40	ND	35.82	<0.01	63.58
TMW/SB-2S	1	103.27	ND	3.03	<1.00	100.24
TMW/SB-3S	1	100.94	ND	11.28	<1.00	89.66
TMW/SB-3D	1	100.86	ND	28.20	<1.00	72.66
TMW/SB-7S	1	102.44	ND	7.54	<1.00	94.90
TMW/SB-7D	1	102.41	39.05	39.74	0.69	62.15
TMW/SB-11	1	78.35	ND	13.91	<1.00	64.44
TMW/SB-12	1	76.90	ND	4.40	<1.00	72.50
TMW/SB-13	1	78.47	ND	15.09	<1.00	63.38
TMW/SB-14	1	77.27	ND	13.86	<1.00	63.41
TMW/SB-16	1	79.84	ND	16.41	<1.00	63.43
TMW/SB-17	1	79.81	ND	16.32	<1.00	63.49
TMW/SB-18	1	80.02	ND	15.00	<1.00	65.02
TMW/SB-20	1	77.67	ND	14.20	<1.00	63.47
TMW/SB-22	1	101.37	ND	20.52	<1.00	80.85
TMW/SB-23	1	105.09	ND	27.05	<1.00	78.04
TMW/SB-26	1	100.38	ND	23.35	<1.00	77.03
TMW/BG-1	1	102.47	ND	15.71	<1.00	86.76
TMW/BG-2	1	104.48	ND	16.38	<1.00	88.10

TOC - top of casing

LPH - liquid-phase hydrocarbons

MW - monitoring well

ND - not detected

NM - not measured

Notes:

1. Elevations are in feet based on an arbitrary on-site datum of 100.00 feet.
2. The elevation of MW-7 has not been surveyed. The total depth of MW-7 is 40.00 feet with 10.00 feet of screen.
3. Unconfined groundwater aquifer data are unshaded and perched groundwater data are shown in blue.
4. Average depth to water below TOC: 18.65 Feet

Table 14
Liquid-Phase Hydrocarbons Recovery
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Monitoring Well	Date	Depth to LPH (Feet)	Depth to Water (Feet)	LPH Thickness (Feet)	LPH Recovery (Gallons)
TMW/SB-7D	8/14/03	39.05	39.74	0.69	0.00
	8/29/02	39.72	40.41	0.69	0.02
	9/4/03	39.35	40.41	1.06	0.04
	9/12/03	39.00	40.72	1.72	0.13*
	Abandoned TMW/SB-7D and replaced with 4-inch diameter MW-8 on 10/15/03				
	Total Gallons LPH Recovered From TMW/SB-7D:				0.19
MW-8 (Replaced TMW/SB-7D)	10/16/03	NA	39.57	NA	0.00
	10/21/03	NA	39.41	NA	0.00*
	10/31/03	NA	39.37	NA	0.00
	Total Gallons LPH Recovered To Date:				0.00
Total Gallons LPH Recovered Sitewide:					0.19

LPH - Liquid-Phase Hydrocarbons
NA - not applicable (LPH not detected)
TMW/SB - temporary monitoring well/soil boring
LPH was first observed in TMW/SB-7D on 8/14/03.
* Estimated recovery during high vacuum mobile treatment unit event.

TABLE 15
ANALYTICAL RESULTS FOR EQUIPMENT AND TRIP BLANKS
Former PQS Etowah Terminal
1015 Barlow Drive
Charleston, West Virginia

Shaw Environmental, Inc.
PQS Tax ID No. 75-0200525

Sample Identification			VOC Parameters					Metals	TPH			PAH Parameters															
Sample Location	Depth (Feet)	Date	Benzene (mg/L)	Ethyl-benzene (mg/L)	Toluene (mg/L)	Total Xylenes (mg/L)	MTBE (mg/L)	Lead (mg/L)	GRO (mg/L)	DRO (mg/L)	ORO (mg/L)	Acenaph-thene (mg/L)	Acenaph-thylene (mg/L)	Anthra-cene (mg/L)	Benzo(a) anthracene (mg/L)	Benzo(a) pyrene (mg/L)	Benzo(b)flu-oranthene (mg/L)	Benzo(ghi) perylene (mg/L)	Benzo(k)flu-oranthene (mg/L)	Chry-sene (mg/L)	Dibenz(ah)-anthracene (mg/L)	Fluoro-anthene (mg/L)	Fluorene (mg/L)	Indeno(123-cd)pyrene (mg/L)	2-Methyl-naphthalene (mg/L)	Naph-thalene (mg/L)	Phenan-threne (mg/L)	Pyrene (mg/L)	1-Methyl naphthalene (mg/L)
SB-1 EB	18 - 20	7/17/03	<0.0020	<0.0020	0.0011 J	<0.0020	<0.0020	<0.0030	<0.100	0.117	<0.100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00026	<0.00010	<0.00010	<0.00010
SB-20 EB	14 - 16	7/21/03	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0030	<0.100	0.125	0.108	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00025	0.00035	<0.00010	<0.00010	0.00016
SB-23 EB	22 - 23.5	7/22/03	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	<0.100	<0.131	<0.100	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
SB-26 EB	20 - 22	7/23/03	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	<0.100	0.118	<0.100	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
NS-5 EB	0 - 0.5	9/11/03	<0.001	<0.001	0.0007 J	<0.001	<0.001	<0.0050	<0.100	0.210	0.149	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
TB-1	NA	7/14/03	<0.001	<0.001	0.0009 J	<0.001	<0.001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
TB-2	NA	7/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
TB-3	NA	7/16/03	<0.001	<0.001	0.0009 J	<0.001	<0.001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
TB-4	NA	7/17/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
TB-5	NA	7/21/03	<0.002	<0.002	<0.002	<0.002	<0.002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
TB-6	NA	7/22/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
TB-7	NA	7/23/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
TB-8	NA	8/15/03	<0.001	<0.001	<0.001	<0.001	<0.001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

VOC - volatile organic compounds
PAH - polynuclear aromatic hydrocarbons
TPH - total petroleum hydrocarbons
NE - not established
NS - analyte was not analyzed
FS - field spill
NA - not applicable
mg/kg - milligrams per kilogram
GRO - gasoline range organics
DRO - diesel range organics
ORO - oil range organics
MTBE - methyl tertiary butyl ether
mg/kg - milligrams per kilogram
B - detected in method blank
< - analyte was not detected at the referenced method detection limit
Analytes detected at more than one times the method detection limit above the method detection limit are shaded.

APPENDIX A

SOIL BORING LOGS

Soil Boring Logs

Soil Boring ID: SB-1

Page: 1 of 1

Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: 20'
Total Hole Depth: 24'
Logged by: KEC
Checked by: GAR
Date: 07/17/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
0-1	GW		GRAVEL AND BRICK, little silt. Fill.	1	0-2'	24"/24"	1110	24.8	*
1-4	ML		Gray SILT, little clay, trace sand, moist, medium stiff, petroleum odor.						
4-8	ML		Brown, Mottled, Gray, Clayey SILT, moist, very stiff, petroleum odor.	2	2-8'	72"/24"	1120	86.4	*
8-12	ML		Brown, Mottled, Gray SILT, little clay, trace sand, moist, medium stiff, petroleum odor.	3	8-10'	12"/24"	1130	105	
				4	10-12'	12"/24"	1131	183	
12-15	CL		Brown, Mottled, Gray, Silty CLAY, trace sand, moist, medium stiff, petroleum odor.	5	12-14'	14"/24"	1140	616	
15-19	SM		Gray, Silty, Fine to Medium SAND, moist, soft, petroleum odor.	6	14-16'	14"/24"	1141	1547	
				7	16-18'	16"/24"	1150	1285	
				8	18-20'	16"/24"	1151	68.4	*
19-20	SP								
20-24	SP		Brown, Mottled, Gray, Fine to Medium SAND, some silt, very moist, dense, petroleum odor. Brown, Mottled, Gray, Fine to Medium SAND, with sandstone gravel, little silt, wet, dense, petroleum odor.						
24	CL		Gray, Sandy CLAY, moist, very stiff, petroleum odor. TD=24'						
25-27			End of Borehole						

TMW/SB ID: TMW/SB-2S

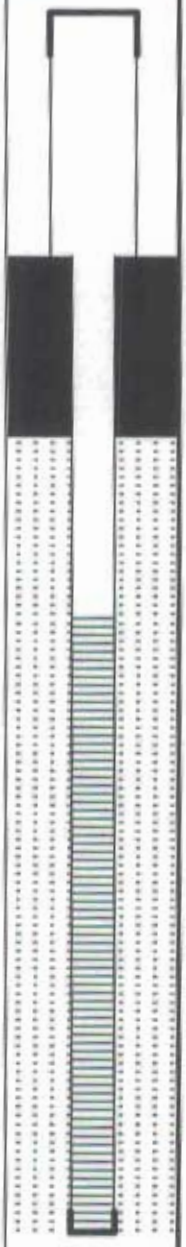
Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 4'
Total Hole Depth: 8'
Logged by: KEC
Checked by: GAR
Date: 07/16/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
			ASPHALT and CONCRETE pavement.						
1	CL		Brown, mottled, gray, silty CLAY, some silt, moist, medium stiff, petroleum odor.	1	0-2'	24"/24"	1235	38.2*	
2	CL		Dark brown, silty CLAY, some silt, very moist, medium stiff, petroleum odor.	2	2-4'	24"/24"	1243	74.2*	
3									
4	CL		Brown, mottled, gray, silty CLAY, some silt, wet, medium stiff, petroleum odor.						
5									
6									
7									
8			TD=8'						
			End of Borehole						
9									



TMW/SB ID: TMW/SB-3S

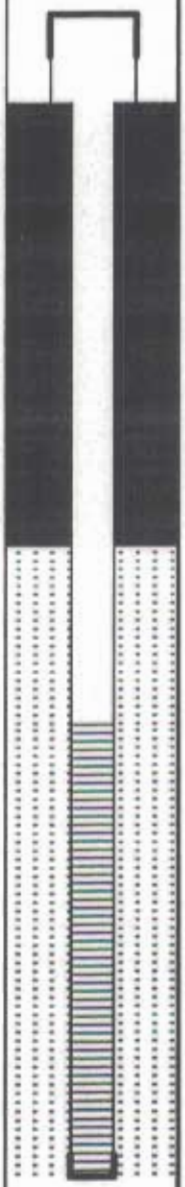
Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 7.5'
Total Hole Depth: 12'
Logged by: KEC
Checked by: GAR
Date: 07/16/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0			ASPHALT and CONCRETE pavement.						
1	CL		Dark brown, silty CLAY, some silt, some gravel, moist, medium stiff, petroleum odor.	1	0-2'	24"/24"	1100	36.7*	
3	CL		Brown, mottled, gray, silty CLAY, some silt, moist, medium stiff, petroleum odor.	2	2-7.5'	66"/66"	1110	1113*	
7	CL		Brown, mottled, gray, silty CLAY, some silt, wet, medium stiff, sheen, petroleum odor.						
11	ML		Brown, mottled, gray, clayey SILT, some clay, little sand, wet, medium stiff, sheen, petroleum odor.						
12			TD=12'						
12			End of Borehole						



TMW/SB ID: TMW/SB-3D

Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 28'
Total Hole Depth: 32'
Logged by: KEC
Checked by: GAR
Date: 07/17/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)
0			Ground Surface					
1			ASPHALT and CONCRETE pavement.					
1-2	CL		Dark brown, silty CLAY, some silt, some gravel, moist, medium stiff, petroleum odor.	1	0-2'	12"/24"	0750	31.8
3-4	CL		Brown, mottled, gray, silty CLAY, some silt, moist, medium stiff, petroleum odor.	2	2-8'	60"/72"	0800	663
5-8	CL		Brown, mottled, gray, silty CLAY, some silt, wet, medium stiff, petroleum odor, sheen.	3	8-10'	24"/24"	0812	501
9-10	ML		Brown, mottled, gray, clayey SILT, some clay, little sand, very moist, soft, petroleum odor.	4	10-12'	24"/24"	0814	906
11-12	ML		Brown, clayey SILT, some clay, some sand, very moist, soft, petroleum odor.	5	12-14'	14"/24"	0821	990
13-14	ML		Brown, clayey SILT, some clay, some sand, moist, medium stiff, petroleum odor.	6	14-16'	14"/24"	0822	1718
15-16	SP		Gray, fine to medium SAND, some silt, moist, dense, petroleum odor.	7	16-18'	12"/24"	0833	996
17-18	SP		Gray, fine to medium SAND with some sandstone gravel, trace silt, moist, dense, petroleum odor.	8	18-20'	12"/24"	0834	2260
19-20	SP		Gray, silty, fine to medium SAND, little silt, very moist, medium stiff, petroleum odor.	9	20-22'	18"/24"	0906	55.3
21-22	SP		Gray, silty, fine to medium SAND, little silt, damp, medium stiff, slight petroleum odor.	10	22-24'	18"/24"	0908	51.5
23-24	SP		Gray, fine to medium SAND, trace silt, wet, loose.	11	24-26'	20"/24"	0934	19.9
25-26				12	26-28'	20"/24"	0936	12.6*
27-28			TD=32'					
29-32			End of Borehole					

TMW Details

Soil Boring Logs

Soil Boring ID: SB-4

Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: 24'
Total Hole Depth: 26'
Logged by: KEC
Checked by: GAR
Date: 07/16/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
1	CL		ASPHALT and CONCRETE Pavement.						
2			Gray, Silty CLAY, some silt, some gravel, moist, medium stiff, slight petroleum odor. Fill.	1	0-2'	18"/24"	0830	11.8	*
3	CL		Brown, Mottled, Gray, Silty CLAY, trace sandstone gravel, moist, medium stiff.						
4									
5				2	2-8'	60"/72"	0842	11.1	*
6									
7									
8									
9				3	8-10'	22"/24"	0857	11.3	
10									
11				4	10-12'	22"/24"	0900	11.7	
12									
13	CL		Brown, Silty CLAY, some silt, little sand, moist, medium stiff.	5	12-14'	22"/24"	0911	12.3	
14									
15				6	14-16'	22"/24"	0912	11.2	
16	SM		Brown, Fine to Medium SAND, some silt, moist.						
17				7	16-18'	24"/24"	0929	8.4	
18									
19				8	18-20'	24"/24"	0931	10.1	
20									
21	ML		Gray, Clayey SILT, some clay, moist, soft.	9	20-22'	24"/24"	0958	12.1	
22									
23				10	22-24'	24"/24"	1000	13.4	*
24	ML		Gray, Clayey SILT, some clay, wet, soft.						
25	SM		Brown, Fine to Medium SAND, some silt, wet, dense.						
26			TD=26'						
27			End of Borehole						
28									
29									

Soil Boring Logs

Soil Boring ID: SB-5

Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: N/A
Total Hole Depth: 8.0'
Logged by: KEC
Checked by: GAR
Date: 07/15/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
			ASPHALT and CONCRETE Pavement.						
1	ML		Brown, Sandy SILT, some gravel, moist, dense.	1	0-2'	18"/24"	1318	5.2	*
2	ML		Gray, Sandy SILT, some sand, trace gravel, very moist, soft, slight petroleum odor.						
3	ML		Brown, Sandy SILT, moist, medium stiff, some sand.						
4									
5				2	2-8'	64"/72"	1327	4.7	*
6	ML		Brown, Mottled, Gray, Clayey SILT, little sand, little organic matter, moist, medium stiff.						
7									
8			End of Borehole						
9									
10									

Soil Boring Logs

Soil Boring ID: SB-6

Page: 1 of 1

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: N/A
Total Hole Depth: 8'
Logged by: KEC
Checked by: GAR
Date: 07/15/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
			Ground Surface						
0			ASPHALT, CONCRETE, and Rebar PAVEMENT.						
1	SM		Gray, Silty, Fine to Medium SAND, some silt, some gravel, moist, dense, petroleum odor.	1	0-2'	20"/24"	1517	18.6	*
2	CL		Gray, Silty CLAY, little sand, moist, medium stiff, petroleum odor.						
3	ML		Brown, Sandy SILT, some sand, moist, medium stiff.						
4									
5				2	2-8'	64"/72"	1527	3.7	*
6									
7									
8			End of Borehole						
9									

TMW/SB ID: TMW/SB-7S

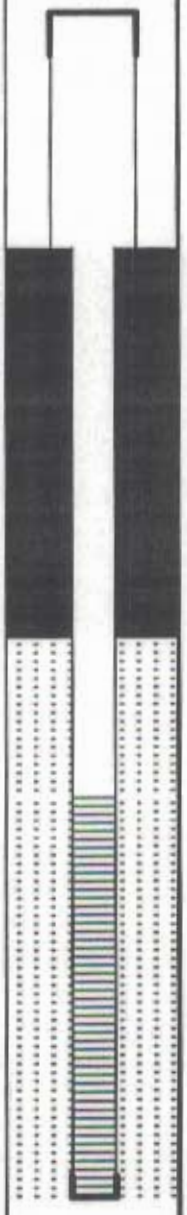
Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 8'
Total Hole Depth: 12'
Logged by: KEC
Checked by: GAR
Date: 07/15/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0–1	ML		Brown, sandy SILT, some sand, trace gravel, moist, medium stiff, slight petroleum odor.	1	0-2'	18"/24'	1613	1.7*	
3–5	ML		Brown, sandy SILT, some sand, little clay, little gravel, moist, medium stiff, petroleum odor.	2	2-8'	64"/72"	1622	124*	
6–7	CL		Brown, mottled, gray, silty CLAY, some silt, trace sand, moist, medium stiff, petroleum odor.						
8–12	CL		Brown, mottled, gray, silty CLAY, some silt, trace sand, wet, medium stiff, sheen, petroleum odor.						
12			TD=12'						
			End of Borehole						



TMW/SB ID: TMW/SB-7D

Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 36'
Total Hole Depth: 42'
Logged by: KEC
Checked by: GAR
Date: 07/23/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0-6	ML		Brown, sandy SILT, some sand, trace gravel, moist, medium stiff, slight petroleum odor.	1	0-2'	18"/24"	1433	2.0	
2-6	ML		Brown, sandy SILT, some sand, little clay, little gravel, moist, medium stiff, petroleum odor.	2	2-4'	18"/24"	1435	117	
				3	4-6'	22"/24"	1442	142	
6-8	CL		Brown, mottled, gray, silty CLAY, some silt, trace sand, moist, medium stiff, petroleum odor.	4	6-8'	22"/24"	1444	138	
8-12	CL		Brown, mottled, gray, silty CLAY, some silt, trace sand, very damp, medium stiff, sheen, petroleum odor.	5	8-10'	24"/24"	1451	241	
				6	10-12'	24"/24"	1453	281	
12-19	CL		Brown, mottled, gray, silty CLAY, some silt, little sand, moist, medium stiff, petroleum odor.	7	12-14'	20"/24"	1503	309	
				8	14-16'	20"/24"	1505	448	
				9	16-18'	24"/24"	1520	193	
19-20	CL			10	18-20'	24"/24"	1522	252	
20-24	SP		Brown, mottled, gray, silty CLAY, some silt, little sand, little sandstone gravel, moist, medium stiff, petroleum odor.	11	20-22'	10"/24"	1550	111	
				12	22-24'	10"/24"	1551	117	
24-26	SP		Brown, fine to medium SAND with trace sandstone gravel, moist, medium stiff, petroleum odor.	13	24-26'	12"/24"	1615	71.1	
26-28	SP		Brown, mottled, gray, silty, fine to medium SAND, little silt, moist, medium stiff.	14	26-28'	12"/24"	1617	15.1	
28-32	SP		Brown, fine to medium SAND, trace silt, moist, loose.	15	28-30'	8"/24"	1630	20.2	
				16	30-32'	10"/24"	1715	14.1	
			Brown, fine to medium SAND, moist, dense.	17	32-34'	18"/24"	1742	9.8	
				18	34-36'	18"/24"	1745	8.4*	
36-40	SP		Brown, fine to medium SAND, wet, loose.						
40-42	SP		Brown, silty SAND, little silt, wet, soft.						
42			TD=42'						
			End of Borehole						

Soil Boring Logs

Soil Boring ID: SB-8

Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: N/A
Total Hole Depth: 8.0'
Logged by: KEC
Checked by: GAR
Date: 07/16/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
			ASPHALT and GRAVEL PAVEMENT.						
1	CL		Brown, mottled, gray, silty CLAY, some silt, some gravel, moist, medium stiff.	1	0-2'	24"/24"	1338	13.0	*
2	CL		Brown SILT, little clay, little organic matter, moist, medium stiff.						
3									
4	ML		Brown SILT, little clay, trace sand, moist, medium stiff.						
5				2	2-8'	68"/72"	1348	13.8	*
6									
7									
8			TD=8'						
			End of Borehole						
9									

Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: 4'
Total Hole Depth: 8'
Logged by: KEC
Checked by: GAR
Date: 07/17/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
			COAL and GRAVEL with sand, moist, loose. Fill.						
1				1	0-2'	20"/24"	1415	24.2	*
	CL		Brown, mottled, gray, silty CLAY, some silt, some gravel, very moist, medium stiff, petroleum odor.						
2	CL		Brown, mottled, gray, silty CLAY, some silt, very moist, medium stiff, petroleum odor, sheen.						
3				2	2-4'	20"/24"	1425	57.1	*
4	CL		Brown, mottled, gray, silty CLAY, some silt, wet, medium stiff, sheen, petroleum odor.						
5									
6									
7									
8			TD=8'						
			End of Borehole						
9									

Soil Boring Logs

Soil Boring ID: SB-10

Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: 12'
Total Hole Depth: 16'
Logged by: KEC
Checked by: GAR
Date: 07/14/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
0	ML		Brown, sandy SILT, some sand, some gravel, some organic matter, moist, medium stiff.						
1	ML		Brown, sandy SILT, little sand, moist, medium stiff.	1	0-2'	24"/24"	0948	3.3	*
2									
3			CONCRETE fragments.						
3	SP		Brown, fine to medium SAND, little silt, moist, loose.						
4									
5				2	2-8'	20"/72"	1020	1.9	*
6									
7									
8									
9				3	8-10'	12"/24"	1025	2.1	
10	CL		Brown, silty CLAY, some silt, little sand, moist, medium stiff.						
11				4	10-12'	12"/24"	1027	1.1	*
12	SP		Brown, fine to medium SAND, little silt, very moist, loose.						
13	SP		Brown, fine to medium SAND, wet, dense.						
13			Gray, fine to medium SAND, wet, dense, petroleum odor.						
14	SP		Brown, fine to medium SAND, wet, dense.						
15									
16			TD=16'						
17			End of Borehole						
18									

TMW/SB ID: TMW/SB-11

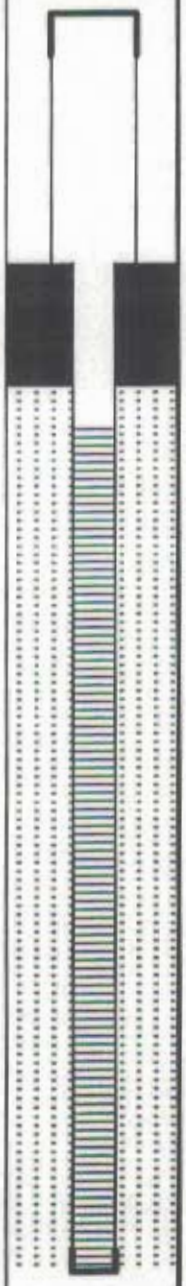
Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 4'
Total Hole Depth: 12'
Logged by: KEC
Checked by: GAR
Date: 07/14/03
**Samples submitted to lab*

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0-1	ML		Brown, sandy SILT, some sand, trace gravel, some organic matter, moist, medium dense.						
1-2	ML		Brown, sandy SILT, some sand, moist, medium stiff.	1	0-2'	16"/24"	1055	2.2	
2-3				2	2-4'	20"/24"	1057	8.5*	
3-4	ML		Brown, sandy SILT, some sand, trace gravel, moist, medium stiff.						
4-5	ML		Brown, sandy SILT, some sand, wet, soft.	3	4-6'	12"/24"	1110		
6-7				4	6-8'	12"/24"	1111		
8-9	ML		Gray, sandy SILT, some sand, wet, soft, sheen, petroleum odor.	5	8-10'	12"/24"	1117		
10-11	CL		Gray, sandy CLAY, some sand, some silt, very moist, medium stiff.	6	10-12'	12"/24"	1119		
12			TD=12'						
13			End of Borehole						



TMW/SB ID: TMW/SB-12

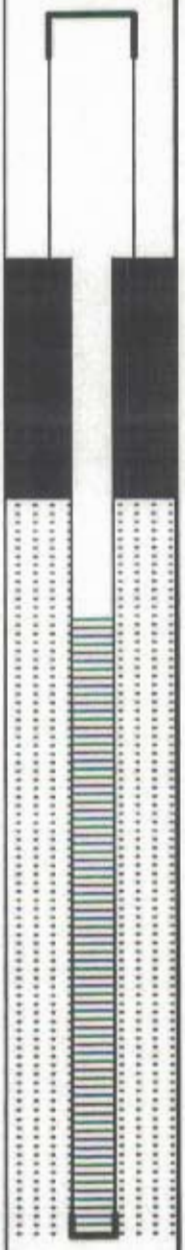
Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 4'
Total Hole Depth: 8'
Logged by: KEC
Checked by: GAR
Date: 07/14/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
			Ground Surface						
0	ML		Brown, sandy SILT, some sand, trace gravel, some organic matter, moist, medium stiff.						
1	ML		Brown, sandy SILT, some sand, moist, medium stiff.	1	0-2'	16"/24"	1152	3.2	
2	SP		GRAVEL, little sand, little silt, moist, dense.	2	2-4'	16"/24"	1154	2.4*	
3	ML		Brown, sandy SILT, very moist, medium stiff.						
4	ML		Gray, sandy SILT, some sand, wet, soft, sheen, petroleum odor.						
5									
6									
7									
8			TD=8'						
9			End of Borehole						



TMW/SB ID: TMW/SB-13

Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 12'
Total Hole Depth: 16'
Logged by: KEC
Checked by: GAR
Date: 07/15/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0-1	ML		Brown, sandy SILT, some sand, some gravel, moist, medium stiff. (Fill).	1	0-2'	18"/24"	1045	7.2	
2-4	SM		Brown, silty, fine to medium SAND, some silt, with gravel (including coal fragments), moist, loose. (Fill).	2	2-4'	18"/24"	1047	6.3	
4-5	ML		Gray, sandy SILT, some sand, trace brick fragments and gravel, moist, soft, petroleum odor. (Fill).	3	4-6'	12"/24"	1053	9.8	
6-7				4	6-8'	12"/24"	1055	45.2	
8-10	ML		Gray, sandy SILT, some sand, very moist, soft, petroleum odor.	5	8-10'	16"/24"	1105	9.8	
10-11				6	10-12'	16"/24"	1107	68*	
12-13	ML		Gray, sandy SILT, some sand, wet, soft, petroleum odor.						
13-14	SP		Brown, fine to medium SAND, trace silt, wet, dense.						
16			TD=16'						
17			End of Borehole						

TMW/SB ID: TMW/SB-14

Soil Boring-TMW Log

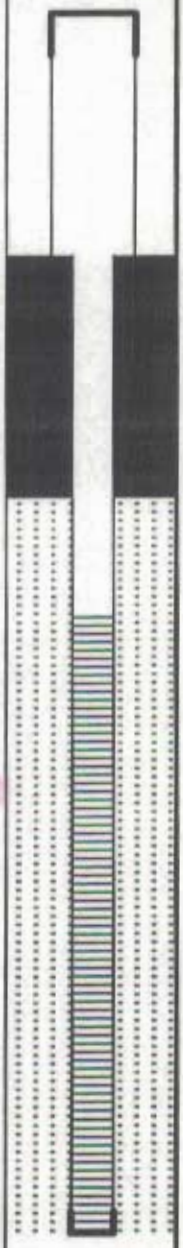
Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 10'
Total Hole Depth: 16'
Logged by: KEC
Checked by: GAR
Date: 07/15/03
Samples submitted to lab

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)
			Ground Surface					
0	ML		Brown, sandy SILT, some sand, little gravel and brick, moist, medium stiff. (Fill).	1	0-2'	18"/24"	0945	3.1
3	SM		Brown, silty, fine to medium SAND, some silt, moist, soft. (Fill).	2	2-4'	18"/24"	0946	2.3
4	GW		BRICK fragments. (Fill).	3	4-6'	8"/24"	0953	3.0
5	ML		Gray, sandy SILT, some sand, moist, soft, petroleum odor.	4	6-8'	8"/24"	0955	870
8				5	8-10'	16"/24"	1005	1514*
10	ML		Gray, sandy SILT, some sand, wet, soft, petroleum odor.					
11	SP		Orangish-brown, fine to medium SAND, trace silt, wet, dense, petroleum odor.					
16			TD=16'					
17			End of Borehole					

TMW Details



Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: 12'
Total Hole Depth: 16'
Logged by: KEC
Checked by: GAR
Date: 07/15/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
0–3	ML		Brown, sandy SILT, some sand, trace gravel, moist, medium stiff.	1	0-2'	20"/24"	0842	3.0	*
3–5	SM		Brown, silty, fine to medium SAND, some silt, trace sandstone, moist, soft.	2	2-8'	64"/72"	0852	2.8	*
5–7	ML		Brown, sandy SILT, some sand, moist, soft.						
7–11	ML		Gray, sandy SILT, some sand, very moist, soft, petroleum odor.	3	8-10'	20"/24"	0900	875	
				4	10-12'	20"/24"	0903	820	*
11–12	SP		Brown, fine to medium SAND, trace silt, moist, dense, petroleum odor.						
12–16	SP		Orangish-brown, fine to medium SAND, wet, dense, petroleum odor.						
16			TD=16'						
16–18			End of Borehole						

TMW/SB ID: TMW/SB-16

Soil Boring-TMW Log

Shaw Environmental & Infrastructure, Inc.

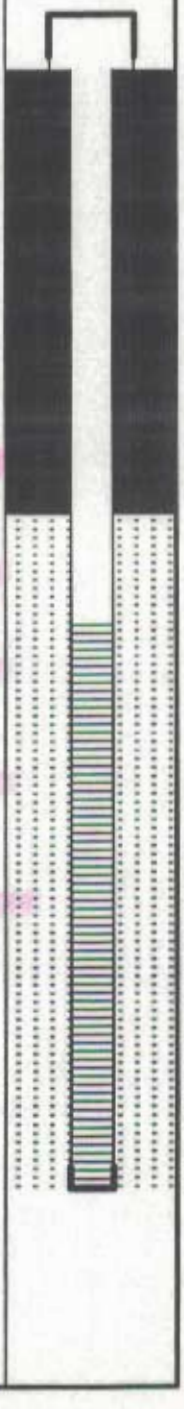
Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 16'
Total Hole Depth: 20'
Logged by: KEC
Checked by: GAR
Date: 07/15/03
Samples submitted to lab

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)
0			Ground Surface					
0-4	ML		Brown, sandy SILT, some sand, trace organic matter, trace gravel, moist, medium stiff.	1	0-2'	22"/24"	0735	1.0
				2	2-4'	22"/24"	0737	0.7
4-5	SM		Brown, silty, fine to medium SAND, some silt, moist, loose.					
5-10	ML		Gray, sandy SILT, some sand, very moist, soft, petroleum odor.	3	4-6'	20"/24"	0745	88.2
				4	6-8'	20"/24"	0747	466
				5	8-10'	20"/24"	0753	399
10-14	SP		Brown, fine to medium SAND, trace silt, moist, dense, petroleum odor.	6	10-12'	20"/24"	0754	588
				7	12-14'	18"/24"	0803	376
14-16	SP		Gray, fine to medium SAND, trace silt, very moist, dense, petroleum odor.	8	14-16'	18"/24"	0805	802*
16-20	SP		Gray, fine to medium SAND, trace silt, wet, dense, sheen, petroleum odor.	9	16-20'	18"/24"	0809	----
20			TD=20'					
			End of Borehole					

TMW Details



TMW/SB ID: TMW/SB-17

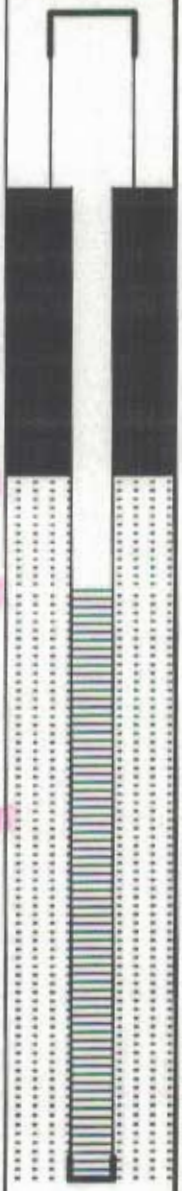
Soil Boring-TMW Log

Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 12'
Total Hole Depth: 17'
Logged by: KEC
Checked by: GAR
Date: 07/14/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0-1	ML		Brown, sandy SILT, some sand, trace gravel, moist, medium stiff.	1	0-2'	20"/24"	1505	3.3	
2-3				2	2-4'	20"/24"	1507	2.9	
4-5	ML		Brown, sandy SILT, some sand, moist, soft, iron-staining.	3	4-6'	20"/24"	1513	268	
6-7	ML		Gray, sandy SILT, some sand, moist, soft, petroleum odor.	4	6-8'	20"/24"	1515	239	
8-9				5	8-10'	20"/24"	1521	38.7	
10	SM		Gray, fine to medium SAND, some silt, very moist, dense, petroleum odor.	6	10-12'	20"/24"	1522	449*	
11-12	SM SP		Gray to brown, fine to medium SAND, some silt, very moist, dense, petroleum odor.						
13-16			Gray to brown, fine to medium SAND, little silt, wet, dense.	7	12-16'	20"/24"	1526	----	
17			TD=17'						
18-20			End of Borehole						

TMW/SB ID: TMW/SB-18

Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 8'
Total Hole Depth: 12'
Logged by: KEC
Checked by: GAR
Date: 07/14/03
Samples submitted to lab

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0-4	ML		Brown, sandy SILT, some sand, little gravel, moist, medium stiff.	1	0-2'	16"/24"	1415	2.5	
				2	2-4'	16"/24"	1417	2.1	
4-7	SP		Brown, fine to medium SAND, little gravel, trace silt, moist, loose.	3	4-6'	14"/24"	1424	1.7	
				4	6-8'	14"/24"	1425	1.9*	
7-8	ML		Brown, sandy SILT, some sand, little gravel, moist, soft.						
8-12	SP		Gray, silty, fine to medium SAND, little silt, wet, loose, petroleum odor.	5	8-12'	18"/24"	1428	-----	
12			TD=12'						
			End of Borehole						

Soil Boring Logs

Soil Boring ID: SB-19

Shaw
Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: 6'
Total Hole Depth: 12'
Logged by: KEC
Checked by: GAR
Date: 07/14/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
			Ground Surface						
0–1	ML		Brown, sandy SILT, some sand, moist, medium stiff.	1	0-2'	18"/24"	1330	1.3	*
2–4	SP		Brown, silty, fine to medium SAND, little silt, moist, soft.	2	2-6'	38"/48"	1344	1.2	*
6	SP		Brown, silty, fine to medium SAND, little silt, wet, soft.						
7–9	SP		Gray, silty, fine to medium SAND, little silt, wet, soft, sheen, petroleum odor.						
10–11	SP		Brown, fine to medium SAND, trace silt, wet, dense.						
12			TD=12'						
			End of Borehole						
13									

TMW/SB ID: TMW/SB-20

Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 16'
Total Hole Depth: 20'
Logged by: KEC
Checked by: GAR
Date: 07/21/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
1	ML		Brown, sandy SILT, some sand, little gravel, moist, medium stiff.	1	0-2'	24"/24"	1150	1.7	
2	ML		Brown, sandy SILT, some sand, moist, medium stiff.	2	2-4'	24"/24"	1152	77.2	
3	ML		Gray, sandy SILT, some sand, trace gravel, moist, soft, petroleum odor.	3	4-6'	19"/24"	1207	474	
4				4	6-8'	19"/24"	1209	378	
8	SP		Gray, silty, fine to medium SAND, little silt, very moist, soft, petroleum odor.	5	8-10'	14"/24"	1220	821	
10	SP		Brown to light gray, fine to medium SAND, little silt, moist, medium stiff, petroleum odor.	6	10-12'	14"/24"	1222	458	
12				7	12-14'	20"/24"	1240	232	
14				8	14-16'	20"/24"	1242	180*	
16	SP		Brown to gray, fine to medium SAND, trace silt, wet, medium dense, sheen, petroleum odor.	9	16-20'	20"/24"	1248	-----	
20			TD=20'						
			End of Borehole						

Shaw

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: N/A
Total Hole Depth: 8'
Logged by: KEC
Checked by: GAR
Date: 07/22/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
			CONCRETE.						
	ML		Brown, mottled, gray, clayey SILT, little sand, little sandstone gravel, moist, medium stiff.						
1				1	0-2'	18"/24"	0948	4.5	*
2									
3									
4									
5				2	2-8'	70"/72"	1005	6.7	*
6									
7									
8			TD=8'						
			End of Borehole						
9									

TMW/SB ID: TMW/SB-22

Soil Boring-TMW Log

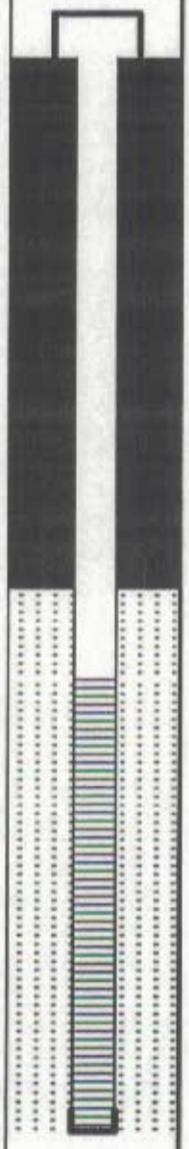
Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 22'
Total Hole Depth: 26'
Logged by: KEC
Checked by: GAR
Date: 07/21/03-07/22/03
Samples submitted to lab

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0-1	ML		CONCRETE pavement.						
1-2			Brown, clayey SILT, some clay, some gravel, moist, medium stiff, petroleum odor.	1	0-2'	24"/24"	1620	24.9*	
2-5	ML		Brown, mottled, gray, clayey SILT, some clay, moist, medium stiff, petroleum odor.						
5-8	ML		Brown, mottled, gray, clayey SILT, some clay, trace sand, moist, medium stiff, petroleum odor.	2	2-8'	60"/72"	1629	221*	
8-9				3	8-10'	20"/24"	1648	123	
10-11				4	10-12'	20"/24"	1650	121	
12-13				5	12-14'	24"/24"	1715	353	
14-15				6	14-16'	22"/24"	1745	688	
16-17				7	16-18'	24"/24"	1747	1068	
18-20	SW		Gray, fine to coarse SAND, with trace sandstone gravel, moist, very dense, petroleum odor.	8	18-20'	18"/24"	0820	258	
20-22				9	20-22'	20"/24"	0822	929*	
22-23	SW		Gray, fine to coarse SAND, little sandstone gravel, wet, loose, sheen, petroleum odor.						
23-26	ML		Brown, clayey SILT, some clay, very moist, medium stiff.						
26			TD=26'						
27-29			End of Borehole						



TMW/SB ID: TMW/SB-23

Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 2
Depth to Water: 23.5'
Total Hole Depth: 26'
Logged by: KEC
Checked by: GAR
Date: 07/22/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
-4									
-3									
-2									
-1									
0			Ground Surface						
			CONCRETE pavement.						
1	ML		Brown, clayey SILT, some clay, moist, medium stiff.	1	0-2'	18"/24"	1035	1.0*	
2									
3	ML		Gray, clayey SILT, some clay, moist, medium stiff, petroleum odor.						
4	ML		Brown, mottled, gray, clayey SILT, some clay, moist, medium stiff, petroleum odor.						
5				2	2-8'	72"/72"	1042	40.4*	
6	GW								
	ML		SANDSTONE gravel.						
7			Brown, mottled, gray, clayey SILT, some clay, moist, medium stiff, iron-staining, petroleum odor.						
8	ML		Brown, mottled, gray, clayey SILT, some clay, little sand, very moist, medium stiff.	3	8-10'	24"/24"	1108	24.9	
9									
10	ML		Brown, mottled, gray, clayey SILT, some clay, some sand, damp, soft, sheen, petroleum odor.	4	10-12'	24"/24"	1110	66.3	
11									
12									

TMW/SB ID: TMW/SB-23

Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 2 of 2
Depth to Water: 23.5'
Total Hole Depth: 26'
Logged by: KEC
Checked by: GAR
Date: 07/22/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
13				5	12-14'	24"/24"	1127	256	
14	ML		Brown, mottled, gray, clayey SILT, some clay, some sand, moist, medium stiff, petroleum odor.						
15				6	14-16'	24"/24"	1235	495	
16	SM		Brown to gray, silty, fine to medium SAND, some silt, moist, medium dense, petroleum odor.						
17	SP		Gray, fine to medium SAND, with sandstone gravel, moist, very dense, petroleum odor.	7	16-18'	20"/24"	1250	68.3	
18									
19				8	18-20'	16"/24"	1327	14.6	
20	SP		Gray, fine to medium SAND, with sandstone gravel, very moist, dense, petroleum odor.						
21				9	20-22'	16"/24"	1329	871	
22									
23				10	22-23.5'	12"/12"	1350	936*	
24	SP		Gray, fine to medium SAND, with trace sandstone gravel, wet, dense, petroleum odor.	11	23.5-26'	30"/30"	1355	----	
25	ML		Reddish-brown to gray, clayey SILT, some clay, little sand, very moist, medium stiff.						
26			TD=26'						
27			End of Borehole						
28									

Soil Boring Logs

Soil Boring ID: SB-24

Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: N/A
Total Hole Depth: 12'
Logged by: KEC
Checked by: GAR
Date: 07/21/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
0	ML		Brown, mottled, gray, clayey SILT, some clay with trace gravel, moist, soft, petroleum odor.						
1	ML		Brown, mottled, gray, clayey SILT, little clay, trace sand, moist, medium stiff, petroleum odor, iron-staining.	1	0-2'	24"/24"	1005	5.8	*
5				2	2-8'	70"/72"	1025	619	*
9				3	8-10'	17"/24"	1050	71.4	
10	ML		Brown, sandy SILT, some sand, moist, medium stiff.						
11				4	10-12'	17"/24"	1055	12.2	*
12			TD=12'						
			End of Borehole						
13									

Soil Boring Logs

Soil Boring ID: SB-25

Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Diameter: 2"

Depth to Water: N/A
Total Hole Depth: 8'
Logged by: KEC
Checked by: GAR
Date: 07/21/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
	ML		GRAVEL. Fill.						
	GP		Brown, clayey SILT, some clay, trace gravel, very moist, soft, petroleum odor.						
1	ML		Black, fine SAND and COAL fragments, moist, loose.	1	0-2'	20"/24"	0915	13.8	*
			Brown, clayey SILT, some clay, very moist, soft, petroleum odor.						
2	ML		Brown, mottled, gray, clayey SILT, moist, medium stiff, petroleum odor.						
3									
4									
5				2	2-8'	48"/72"	0940	41.7	*
6									
7									
8			TD=8'						
			End of Borehole						
9									

TMW/SB ID: TMW/SB-26

Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 2
Depth to Water: 22'
Total Hole Depth: 26'
Logged by: KEC
Checked by: GAR
Date: 07/17/03-07/22/03-07/23/03
Samples submitted to lab

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0	CL		Brown, silty CLAY, some silt, trace gravel, moist, medium stiff, petroleum odor. (Fill).						
1	ML		Brown, mottled, gray, clayey SILT, trace sand, moist, stiff, petroleum odor.	1	0-2'	24"/24"	1530		
2									
3									
4									
5				2	2-8'	72"72"	1545		
6									
7									
8	ML		Brown, clayey SILT, some clay, little sand, moist, medium stiff, petroleum odor.						
9				3	8-10'	24"/24"	1614		
10	SP		Brown, silty, fine to medium SAND, moist, medium stiff.						
11				4	10-12'	24"/24"	1615		
12									
13				5	12-14'	24"/24"	1010		
14									

TMW/SB ID: TMW/SB-26

Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 2 of 2
Depth to Water: 22'
Total Hole Depth: 26'
Logged by: KEC
Checked by: GAR
Date: 07/17/03-07/22/03-07/23/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
15				6	14-16'	24"/24"	1012		
16	SP		Brown, fine to medium SAND, with sandstone gravel, moist, very dense, slight petroleum odor.						
17				7	16-18'	24"/24"	1039		
18									
19				8	18-20'	24"/24"	1140		
20									
21				9	20-22'	24"/24"	1303		
22	SP								
	CL		Gray, fine to medium SAND, some sandstone gravel, wet, dense.						
23			Brown, mottled, gray, silty CLAY, some silt, moist, medium stiff.						
24	SP		Brown, fine to medium SAND, moist, medium dense.	10	22-26'	48"48"	1309		
25									
	CL								
26			Brown, silty CLAY, some silt, moist, medium stiff.						
			TD=26'						
27			End of Borehole						
28									
29									

Soil Boring Logs

Soil Boring ID: SB-27

Shaw Environmental & Infrastructure, Inc.

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: N/A
Driller: N/A
Drilling Method: Hand Auger
Rig Type: N/A
Diameter: 4"

Depth to Water: N/A
Total Hole Depth: 3'
Logged by: KEC
Checked by: GAR
Date: 07/23/03

Depth	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	PID	* Samples Collected
0			Ground Surface						
	ML		Brown, clayey SILT, some clay, little gravel, moist, medium stiff.						
	ML		Gray, clayey SILT, some clay, little sand, little organic matter, very damp, soft.	1	0-1'	12"/12"	1705	1.7	
1				2	1-2'	12"/12"	1710	1.0	
2				3	2-3'	12"/12"	1715	1.0	*
3			TD=3'						
			End of Borehole						
4									

TMW/SB ID: TMW/BG-1

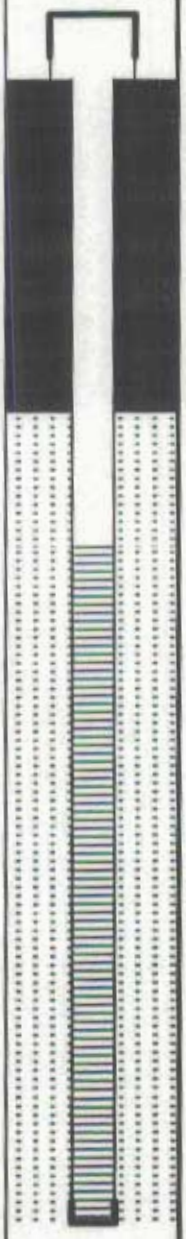
Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 12'
Total Hole Depth: 17'
Logged by: KEC
Checked by: GAR
Date: 07/16/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0-1			ASPHALT, GRAVEL, and ORGANIC MATTER.						
1-2	CL		Brown, mottled, gray, silty CLAY, some silt, moist, medium stiff.	1	0-2'	20"/24"	1435	20.3*	
4-8	ML		Brown, mottled, gray SILT, some clay, moist, medium stiff.	2	2-8'	70"/72"	1449	13.4*	
8-10				3	8-10'	20"/24"	1500	11.3	
10-12	ML		Brown, mottled, gray, sandy SILT, some sand, very moist, medium stiff.	4	10-12'	20"/24"	1503	9.7*	
12-17	SP		Brown, silty, fine to medium SAND, little silt, wet, soft.	5	12-17'	50"/60"	1508	-----	
17			TD=17'						
17-19			End of Borehole						



TMW/SB ID: TMW/BG-2

Soil Boring-TMW Log

Project: PQS#5117-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845335
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: Direct Push
Rig Type: Geoprobe
Well Diameter: 2"

Page: 1 of 1
Depth to Water: 16'
Total Hole Depth: 20'
Logged by: KEC
Checked by: GAR
Date: 07/16/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	TMW Details
0			Ground Surface						
0-2	CL		Brown, silty CLAY, some silt, little gravel, little organic matter, moist, medium stiff.	1	0-2'	20"/24"	1600	3.0*	
2-4	CL		Brown, mottled, gray, silty CLAY, some silt, moist, medium stiff, petroleum odor.	2	2-8'	70"/72"	1613	22.2*	
4-8	ML		Brown, mottled, gray, clayey SILT, moist, medium stiff, petroleum odor.						
8-10	CL		Brown, mottled, gray, silty CLAY, some silt, little sand, moist, medium stiff, petroleum odor.	3	8-10'	22"/24"	1625	17.4	
10-12				4	10-12'	22"/24"	1627	11.2	
12-14				5	12-14'	24"/24"	1637	14.7	
14-16	ML		Brown, sandy SILT, some clay, moist, medium stiff, slight petroleum odor.	6	14-16'	24"/24"	1639	16.5*	
16-20	SP		Brown, silty, fine to medium SAND, wet, loose.	7	16-20'	72"/72"	1645	——	
20			TD=20'						
21			End of Borehole						

Monitoring Well ID: MW-8

Drilling Log-MW Installation

Project: PQS-Etowah Terminal
Client: Pennzoil-Quaker State Company
Project No: 845137.03
Site Location: 1015 Barlow Drive, Chas, WV
License No.: WV-00174

Drill Co.: Enviroprobe, Inc.
Driller: Roy Fox
Drilling Method: HSA
Rig Type: Auger
Well Diameter: 4"

Page: 1 of 1
Depth to Water: 38'
Total Hole Depth: 52'
Logged by: DTC
Checked by: GAR
Date: 10/15/03
***Samples submitted to lab**

Depth (feet)	USCS Class.	Graphic Log	Description	Sample Number	Sample Interval	Sample Recovery	Sample Time	FID/PID (ppm-v/v)	MW Details
-3 to 56			Ground Surface						
			NO SAMPLES COLLECTED FROM 0' TO 33' BELOW GROUND SURFACE (b.g.s.). SEE SOIL BORING LOG FOR TMW/SB-7D FOR LITHOLOGICAL DESCRIPTIONS.						
33-35	SP		Light brown, fine to medium SAND with little silt, moist, loose, trace muscovite.	1	33-35'	1.3'	1315	-----	
			NOTE: DUE TO MECHANICAL DIFFICULTY, COLLECTION OF SPLIT-SPOON SAMPLES WAS SUSPENDED.						
52			TD=52'						
			End of Borehole						

Image:
//IMAGENAME

Xref:
//XREFNAME

ELK RIVER

INLET

NS-6 NS-5 NS-4 NS-3 NS-2 NS-1

E-14 E-13 E-12 E-11 E-10 E-9 E-8 E-7 E-6 E-5 E-4 E-3 E-2 E-1

50' 267' 75' 247' 125'

DOCK

INTAKE

MW-1 MW-2 MW-3 MW-4 MW-5 MW-6 MW-7

TMW/SB-7D TMW/SB-7S TMW/SB-11 TMW/SB-12 TMW/SB-13 TMW/SB-14 TMW/SB-16 TMW/SB-17 TMW/SB-18 TMW/SB-20 TMW/SB-23 TMW/SB-22 TMW/SB-26 TMW/SB-2S TMW/SB-3S TMW/SB-3D TMW/BG-1 TMW/BG-2

SB-1 SB-4 SB-5 SB-6 SB-8 SB-9 SB-10 SB-15 SB-19 SB-21 SB-22A SB-22B SB-24 SB-27

SS-1 SS-2 SS-3 SS-4 SS-5 SS-6

C2-A C2-B C2-C C2-D C2-E

FIRE HOUSE (PUMP)
GRASS
SEPTIC TANKS
GRAVE YARD
FLAIR
STEEP SLOPE
FORMER WASTE OIL UST
HOUSE
GARAGE/ STORAGE BUILDING
ASPHALT
STEAM LINE
SHED (EMERGENCY SUPPLIES)
GRAVEL ROAD
PRODUCT PIPING
RAMP
WAREHOUSE/ OFFICE BUILDING (TWO STORY)
404 403 402 401 400 399 398 405
GRAVEL & SOIL
DIKE WALL
FUEL LOADING RACK
CONCRE
FORMER USTs (GASOLINE & DIESEL)
OIL/WATER SEPARATOR SYSTEM
GRASS
OIL LOADING RACK
FORMER PUMP HOUSE
FORMER FIRE HOUSE
CONCRETE
397 396 395 394 393 392
ABANDONED FIRE HOUSE PUMP
FORMER LOADING RACK
WOODS
BARLOW ROAD
STEEP SLOPE

LEGEND:

MW-#	MONITORING WELL LOCATION	C2-_	FORMER SURFACE SOIL SAMPLE LOCATION
TMW/SB-#	TEMPORARY MONITORING WELL LOCATION		SURFACE WATER FLOW
SB-#	SOIL BORING LOCATION		RAILROAD TRACKS
SS-#	SURFACE SOIL SAMPLE LOCATION	G	NATURAL GAS PIPELINE
NS-#	NEAR-SHORE SEDIMENT AND WATER SAMPLE LOCATION		FENCE LINE
E-#	FORMER ELK RIVER WATER SAMPLE LOCATION AT THE VERTICAL MID-POINT OF THE WATER COLUMN	S	STORM SEWER
E-#	ELK RIVER WATER SAMPLE LOCATION AT THE VERTICAL MID-POINT OF THE WATER COLUMN		DRAIN
			BENCH (TERRACED AREA)

SCALE: 1"=30'
0 10 20 30 60

Shaw Environmental, Inc.

PENNZOIL-QUAKER STATE COMPANY

FIGURE 1
SURFACE WATER SAMPLE LOCATIONS
JUNE 15, 2004
FORMER PQS ETOWAH TERMINAL
1015 BARLOW DRIVE
CHARLESTON, WEST VIRGINIA

DATE	DESIGNED BY	---	CHECKED BY	G. Robertson	7/14/04	FIGURE NO.
4/13/04	DRAWN BY	M. Najar	APPROVED BY	D. Carpenter	7/14/04	1
SCALE: 1" = 30'	PROJECT NO. 845335	DRAWING NO. 2002 57-16	REVISION NO. 0			

Image:
#IMAGENAME

Xref:
#XREFNAME

LEGEND:

- MW-# — MONITORING WELL LOCATION
- TMW/SB-# — TEMPORARY MONITORING WELL LOCATION
- SB-# — SOIL BORING LOCATION
- SS-# — SURFACE SOIL SAMPLE LOCATION
- NS-# — NEAR-SHORE SEDIMENT AND WATER SAMPLE LOCATION
- E-# — ELK RIVER WATER SAMPLE LOCATION AT THE VERTICAL MID-POINT OF THE WATER COLUMN
- C2-... — FORMER SURFACE SOIL SAMPLE LOCATION
- SURFACE WATER FLOW
- RAILROAD TRACKS
- G — NATURAL GAS PIPELINE
- FENCE LINE
- S — STORM SEWER
- DRAIN
- BENCH (TERRACED AREA)

ELK RIVER
INLET
E-16
E-14
E-13
E-12
E-11
E-10
E-9
E-8
E-7
E-6
E-5
E-4
E-3
E-2
E-1
NS-5
NS-4
NS-3
NS-2
NS-1
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
SB-1
SB-4
SB-5
SB-6
SB-8
SB-9
SB-10
SB-15
SB-19
SB-21
SB-22A
SB-22B
SB-24
SB-25
SB-27
TMW/SB-7D
TMW/SB-7S
TMW/SB-11
TMW/SB-12
TMW/SB-13
TMW/SB-14
TMW/SB-16
TMW/SB-17
TMW/SB-18
TMW/SB-20
TMW/SB-22
TMW/SB-23
TMW/SB-26
TMW/SB-2S
TMW/SB-3S
TMW/SB-3D
TMW/BG-1
TMW/BG-2
SS-1
SS-2
SS-3
SS-4
SS-5
SS-6
C2-A
C2-B
C2-C
C2-D
C2-E
FIRE HOUSE (PUMP)
GRAVE YARD
FLAIR
GRASS
STEEP SLOPE
SEPTIC TANKS
DOCK
PRODUCT PIPING
SHED (EMERGENCY SUPPLIES)
GRAVEL ROAD
FORMER WASTE OIL UST
ASPHALT
HOUSE
GARAGE/ STORAGE BUILDING
STEAM LINE
WAREHOUSE/ OFFICE BUILDING (TWO STORY)
RAMP
404
403
402
401
400
399
398
397
396
395
394
393
392
GRAVEL & SOIL
DIKE WALL
FUEL LOADING RACK
CONCRETE
FORMER USTs (GASOLINE & DIESEL)
OIL/WATER SEPARATOR SYSTEM
OIL LOADING RACK
FORMER PUMP HOUSE
FORMER FIRE HOUSE
ABANDONED FIRE HOUSE PUMP
INTAKE
BARLOW ROAD
WOODS

SCALE: 1"=30'
0 10 20 30 60

PENNZOIL-QUAKER STATE COMPANY

FIGURE 2
SITE PLAN
FORMER PQS ETOWAH TERMINAL
1015 BARLOW DRIVE
CHARLESTON, WEST VIRGINIA

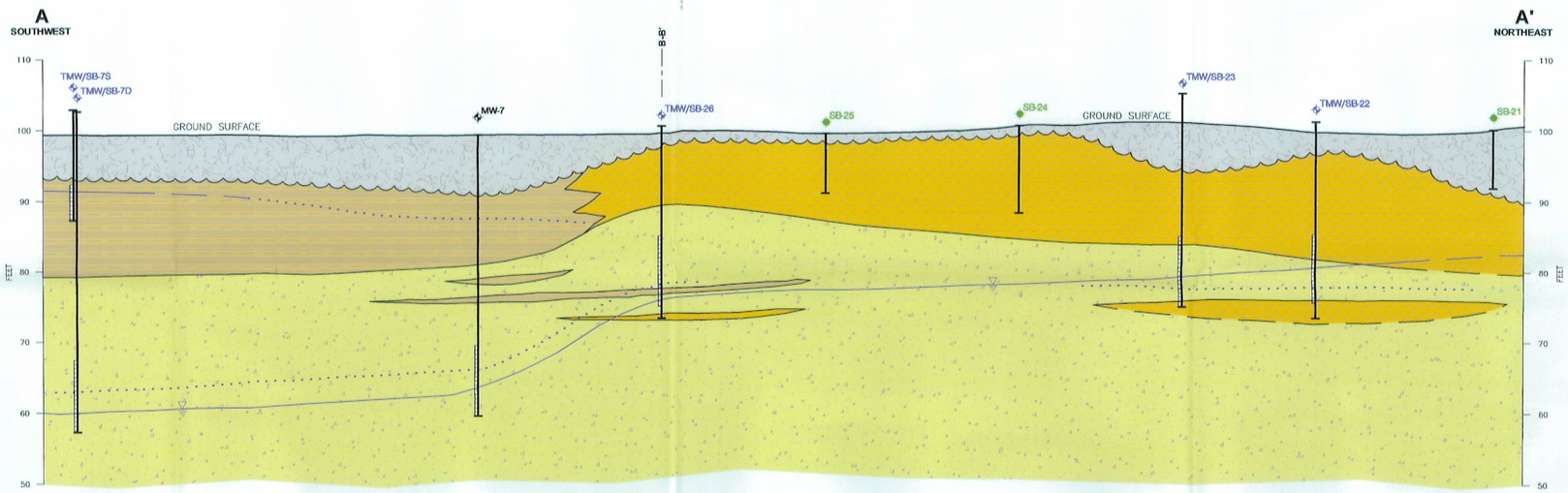
Shaw™ Environmental, Inc.

DATE	DESIGNED BY	----	CHECKED BY	G. Robertson	11/17/03	FIGURE NO.
11/7/03	DRAWN BY	M. Najar	APPROVED BY	D. Carpenter	11/17/03	2
SCALE: 1" = 30'	PROJECT NO. 845335	DRAWING NO. 2002 57-09	REVISION NO. 0			

M. Najar — FILE NAME: 2002 57-09.DWG CLOSED: 11/17/03 AT 12:45 PM

Image:
#IMAGENAME

Xref:
#XREFNAME



HYDROGEOLOGICAL CROSS-SECTION A-A'

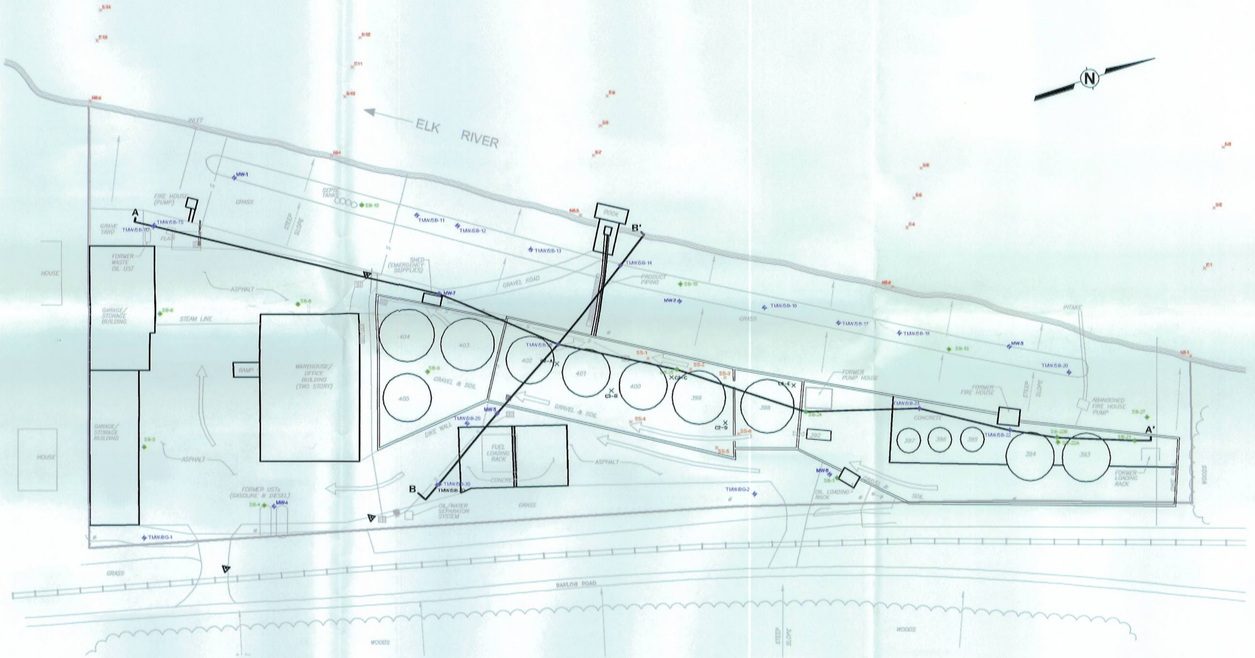
HORIZONTAL SCALE
0 20 40 60 120

HYDROGEOLOGICAL CROSS-SECTION B-B'

HORIZONTAL SCALE
0 20 40 60 120

LEGEND:

- MW-1 MONITORING WELL
- BEDROCK
- CLAY, SILT AND GRAVEL FILL
- CLAYEY SILT
- SILTY CLAY
- SILTY SAND AND GRAVEL
- POTENTIOMETRIC SURFACE
- TOP OF FIRST GROUND WATER ENCOUNTERED IN BORING
- SCREENED INTERVAL



HYDROGEOLOGICAL CROSS-SECTION LOCATIONS

SCALE: 1"=60'
0 20 40 60 120

Shaw™ Environmental, Inc.

PENNZOIL–QUAKER STATE COMPANY

FIGURE 7
HYDROGEOLOGICAL CROSS-SECTIONS A-A' AND B-B'
AUGUST 14, 2003
FORMER POS ETOWAH TERMINAL
1015 BARLOW DRIVE
CHARLESTON, WEST VIRGINIA

DATE	DESIGNED BY	---	CHECKED BY	G. Robertson	11/17/03	FIGURE NO.
11/9/03	DRAWN BY	M. Najar	APPROVED BY	D. Carpenter	11/17/03	7
SCALE: NOTED	PROJECT NO. 845335		DRAWING NO. 2002 57-13		REVISION NO. 0	

M. Najar – FILE NAME: 2002 57-13.DWG CLOSED: 11/17/03 AT 1:07 PM

Image:
#IMAGENAME

Xref:
#XREFNAME

LEGEND:

- MW-# — MONITORING WELL LOCATION
- TMW/SB-# — TEMPORARY MONITORING WELL LOCATION
- SB-# — SOIL BORING LOCATION
- SS-# — SURFACE SOIL SAMPLE LOCATION
- NS-# — NEAR-SHORE SEDIMENT AND WATER SAMPLE LOCATION
- E-# — ELK RIVER WATER SAMPLE LOCATION AT THE VERTICAL MID-POINT OF THE WATER COLUMN
- C2-... — FORMER SURFACE SOIL SAMPLE LOCATION
- (63.43) — POTENTIOMETRIC SURFACE ELEVATION (FEET)
- 80 — POTENTIOMETRIC SURFACE CONTOUR (FEET)
- (PERCHED) — PERCHED GROUNDWATER–NOT INCLUDED IN CONTOURING
- RAILROAD TRACKS
- BENCH (TERRACED AREA)

ELK RIVER

BARLOW ROAD

SCALE: 1"=30'
0 10 20 30 60

Shaw™ Environmental, Inc.

PENNZOIL–QUAKER STATE COMPANY

FIGURE 6
POTENTIOMETRIC SURFACE MAP
AUGUST 14,2003
FORMER PQS ETOWAH TERMINAL
1015 BARLOW DRIVE
CHARLESTON, WEST VIRGINIA

DATE	DESIGNED BY	---	CHECKED BY	G. Robertson	11/17/03	FIGURE NO.
11/8/03	DRAWN BY	M. Najar	APPROVED BY	D. Carpenter	11/17/03	6
SCALE: 1" = 30'	PROJECT NO. 845335		DRAWING NO. 2002 57-12		REVISION NO. 0	

M. Najar – FILE NAME: 2002 57-12.DWG CLOSED: 11/17/03 AT 1:03 PM

Image:
#IMAGENAME

Xref:
#XREFNAME

LEGEND:

- MW-# — MONITORING WELL LOCATION
- TMW/SB-# — TEMPORARY MONITORING WELL LOCATION
- SB-# — SOIL BORING LOCATION
- SS-# — SURFACE SOIL SAMPLE LOCATION
- NS-# — NEAR-SHORE SEDIMENT AND WATER SAMPLE LOCATION
- E-# — ELK RIVER WATER SAMPLE LOCATION AT THE VERTICAL MID-POINT OF THE WATER COLUMN
- LPH — LIQUID-PHASE HYDROCARBONS
- C2-_ — FORMER SURFACE SOIL SAMPLE LOCATION
- SURFACE WATER FLOW
- RAILROAD TRACKS
- G — NATURAL GAS PIPELINE
- X — FENCE LINE
- S — STORM SEWER
- DRAIN
- BENCH (TERRACED AREA)

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-7D	8/14/03	0.69
	8/29/02	0.63
	9/4/03	1.95
	9/12/03	1.72
Abandoned TMW/SB-7D on 10/15/03		
MW-8 replaced TMW/SB-7D on 10/15/03		
MW-8	10/15/03	0.00
	10/21/03	0.00
	10/31/03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
MW-8	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-7S	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
MW-1	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-11	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
MW-7	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-12	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-13	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-14	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
MW-2	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-16	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-17	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-18	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
MW-3	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-20	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-25	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
MW-5	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-2S	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-3S	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-3D	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
MW-4	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/BG-1	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/BG-2	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
MW-6	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-23	8/14.03	0.00

Monitoring Well	Date	LPH Thickness (Feet)
TMW/SB-22	8/14.03	0.00

ELK RIVER
INLET
GRASS
SEPTIC TANKS
FIRE HOUSE (PUMP)
GRAVE YARD
FLAIR
STEEP SLOPE
SHED (EMERGENCY SUPPLIES)
GRAVEL ROAD
ASPHALT
FORMER WASTE OIL UST
HOUSE
GARAGE/ STORAGE BUILDING
STEAM LINE
RAMP
WAREHOUSE/ OFFICE BUILDING (TWO STORY)
GRAVEL & SOIL
DIKE WALL
FUEL LOADING RACK
CONCRETE
WATER SEPARATOR
FORMER USTs (GASOLINE & DIESEL)
DOCK
PRODUCT PIPING
FORMER PUMP HOUSE
FORMER FIRE HOUSE
ABANDONED FIRE HOUSE PUMP
FORMER LOADING RACK
BARLOW ROAD
WOODS
404
403
402
401
400
399
398
397
396
395
394
393
392
405
NS-1 NS-2 NS-3 NS-4 NS-5
E-1 E-2 E-3 E-4 E-5 E-6 E-7 E-8 E-9 E-10 E-11 E-12 E-13 E-14 E-16
MW-1 MW-2 MW-3 MW-4 MW-5 MW-6 MW-7 MW-8
TMW/SB-7S TMW/SB-11 TMW/SB-12 TMW/SB-13 TMW/SB-14 TMW/SB-16 TMW/SB-17 TMW/SB-18 TMW/SB-20 TMW/SB-22 TMW/SB-23 TMW/SB-25 TMW/SB-26 TMW/SB-2S TMW/SB-3S TMW/SB-3D TMW/BG-1 TMW/BG-2
SB-1 SB-4 SB-5 SB-6 SB-8 SB-9 SB-10 SB-15 SB-19 SB-21 SB-22A SB-22B SB-24 SB-25 SB-27
SS-1 SS-2 SS-3 SS-4 SS-5 SS-6
C2-A C2-B C2-C C2-D C2-E

SCALE: 1"=30'
0 10 20 30 60

Shaw Environmental, Inc.

PENNZOIL–QUAKER STATE COMPANY

FIGURE 5
LIQUID PHASE HYDROCARBON THICKNESS
AUGUST 14, 2003
FORMER PQS ETOWAH TERMINAL
1015 BARLOW DRIVE
CHARLESTON, WEST VIRGINIA

DATE	DESIGNED BY		CHECKED BY		FIGURE NO.
11/7/03	DRAWN BY	M. Najar	APPROVED BY	D. Carpenter	11/17/03	5
SCALE: 1" = 30'	PROJECT NO. 845335	DRAWING NO. 2002 57-11	REVISION NO. 0		

M. Najar – FILE NAME: 2002 57-11.DWG CLOSED: 11/17/03 AT 12:59 PM

Image:
#IMAGENAME

Xref:
#XREFNAME

LEGEND:

- MW-# — MONITORING WELL LOCATION
- TMW/SB-# — TEMPORARY MONITORING WELL LOCATION
- SB-# — SOIL BORING LOCATION
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- RAILROAD TRACKS
- G — NATURAL GAS PIPELINE
- X — FENCE LINE
- S — STORM SEWER
- DRAIN
- BENCH (TERRACED AREA)
- ASPHALT
- CONCRETE
- GRASS
- GRAVEL & SOIL

ELK RIVER
INLET
NS-5
NS-4
NS-3
NS-2
NS-1
E-16
E-14
E-13
E-12
E-11
E-10
E-9
E-8
E-7
E-6
E-5
E-4
E-3
E-2
E-1
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
SB-4
SB-5
SB-6
SB-8
SB-9
SB-10
SB-15
SB-19
SB-21
SB-22A
SB-22B
SB-24
SB-25
SB-27
SS-1
SS-2
SS-3
SS-4
SS-5
SS-6
TMW/SB-1D
TMW/SB-1S
TMW/SB-2D
TMW/SB-2S
TMW/SB-3D
TMW/SB-3S
TMW/SB-11
TMW/SB-12
TMW/SB-13
TMW/SB-14
TMW/SB-16
TMW/SB-17
TMW/SB-18
TMW/SB-20
TMW/SB-22
TMW/SB-23
TMW/SB-26
TMW/BG-1
TMW/BG-2
FIRE HOUSE (PUMP)
GRAVE YARD
FLAIR
GRASS
STEEP SLOPE
SEPTIC TANKS
SHED (EMERGENCY SUPPLIES)
GRAVEL ROAD
DOCK
PRODUCT PIPING
INTAKE
FORMER WASTE OIL UST
GARAGE/ STORAGE BUILDING
ASPHALT
STEAM LINE
RAMP
WAREHOUSE/ OFFICE BUILDING (TWO STORY)
HOUSE
404
403
402
401
400
399
398
405
GRAVEL & SOIL
DIKE WALL
FUEL LOADING RACK
CONCRETE
FORMER USTs (GASOLINE & DIESEL)
OIL/WATER SEPARATOR SYSTEM
FORMER PUMP HOUSE
OIL LOADING RACK
FORMER FIRE HOUSE
ABANDONED FIRE HOUSE PUMP
FORMER LOADING RACK
397
396
395
394
393
392
WOODS
BARLOW ROAD

SCALE: 1"=30'
0 10 20 30 60

PENNZOIL-QUAKER STATE COMPANY

FIGURE 3
LAND SURFACE PLAN
FORMER PQS ETOWAH TERMINAL
1015 BARLOW DRIVE
CHARLESTON, WEST VIRGINIA

Shaw™ Environmental, Inc.

DATE	DESIGNED BY	---	CHECKED BY	G. Robertson	11/17/03	FIGURE NO.
11/11/03	DRAWN BY	M. Najar	APPROVED BY	D. Carpenter	11/17/03	3
SCALE: 1" = 30'	PROJECT NO. 845335		DRAWING NO. 2002 57-15		REVISION NO. 0	

M. Najar – FILE NAME: 2002 57-15.DWG CLOSED: 11/17/03 AT 1:21 PM