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1.0 INTRODUCTION

The City of Norfolk and Virginia Power Company (Virginia Power) have been jointly investigating environmental conditions in the vicinity of a former manufactured gas plant (MGP) located in Norfolk, Virginia, as shown on Figure 1. The site consists of a 13.4-acre property bounded by Virginia Beach Boulevard and Monticello Avenue on the south and west, respectively, and by Princess Anne Road and Salter Street on the north and east, respectively. . Residential apartments that are owned by the City of Norfolk are present to the south of Virginia Beach Boulevard. Land use along the western side of Monticello Avenue is primarily commercial. Adjacent land to the north and east of the site are part of the Elmwood and Cedar Grove Cemeteries, respectively. The site is currently owned by the City of Norfolk and is partially used as a storage yard for road maintenance supplies. Construction of an asphalt parking lot over the entire former MGP site has been initiated.

1.1 SITE HISTORY

The 13.4-acre site, currently owned by the City of Norfolk, was created through the consolidation of several smaller parcels historically used for various purposes. The southern half of the site was an industrial property before the City of Norfolk purchased it in 1971 from Virginia Power (formerly VEPCO). An MGP began operations at the site around 1853 to supply illuminating gas to residents of the City of Norfolk. The MGP was operated continuously from 1853 until 1950 by either Virginia Power or its corporate predecessors. In 1950, the facility was converted to a natural gas storage facility. From 1950 through 1964, manufactured gas was reportedly produced only during peak periods. The site was closed and dismantled around 1968, and the property subsequently was sold to the City of Norfolk in 1971. Numerous foundations and structures remained in the subsurface at the site following dismantlement.

A review of historic information was completed to assemble data regarding former structures and operations associated with the MGP. A summary of the structures related to the former MGP is shown on Figure 2. This map was developed from the following sources: city road and tax maps;

Sanborn Fire Insurance maps from 1887, 1898, 1910, and 1927; a 1937 aerial photograph; and plant drawings from 1910 and 1927.

Historically, a tidal stream, identified as Smiths Creek, formed the northern border of the MGP. The approximate location of the former creek channel and tidal marshes was developed from an 1887 Norfolk City map and is shown on Figure 2. Smiths Creek was considered a nuisance to the northward expansion of the City of Norfolk and thus an effort was made to backfill the creek in the early-1900s. The portion of the creek within the current site boundaries and westward to a natural constriction at Armistead Bridge Road (Figure 2) was backfilled around 1910. The City of Norfolk developed a right-of-way within the former creek channel to install a 42-inch diameter storm sewer line that transected the current site property. The former creek channel was backfilled westward to the present day location of Granby Street by 1916, and the area assumed its present day appearance when backfilling of the segment of Smiths Creek from The Hague to Granby Street was completed in 1921 (Figure 1).

The northern portion of the site created by backfilling Smiths Creek has been owned and used by the City of Norfolk for various municipal and commercial purposes. These include operating a garage, auto repair shop, armory, and dog pound. An abandoned underground gasoline storage tank reportedly exists to the west of the former armory (Figure 2). The city operation with the greatest potential to affect environmental conditions is a municipal waste incinerator that operated from around approximately 1910 until the mid-1970s. The location of the former city incinerator is shown on Figure 2.

The City of Norfolk purchased the southern portion of the site in 1971 with the intention of developing the entire 13.4-acre property. Various site improvement plans have been prepared but have not been implemented due to either environmental concerns or economic viability. Two recently completed projects, the expansion of the Virginia Opera located one block to the west of the site and the construction of a minor league baseball stadium approximately 1/2 mile to the south of the site, and the planned expansion of the Tidewater Community College on Granby Street have increased the need

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for parking in the vicinity of the former MGP site. As a result, the site has been classified for the foreseeable future as a parking facility by the City of Norfolk Development Department. The parking lot has been designed based on the evaluation of environmental conditions described in this report and will serve as an effective cover system to reduce the potential for exposure to MGP- related constituents present in the subsurface at the site. The target date for completion of the cover system is late 1994.

1.2 CHEMICALS OF INTEREST

The review of site historical activity indicates that the primary chemicals of concern are associated with the former MGP operations because of the nature of the process and the long period in which the Norfolk MGP plant operated.

The manufactured gas process was introduced to the United States from England in the early-1800s. The first MGP in the United States began operation in Baltimore, Maryland in 1816. Manufactured gas was used for indoor and street lamp illumination in most large cities by the late-1800s. The most concentrated period of growth for the manufactured gas industry was during the first half of the twentieth century. Manufactured gas operations began to be phased out of service by natural gas pipelines in the 1950s.

Manufactured gas was produced by passing steam over a bed of incandescent coal or coke to produce a mixture of carbon monoxide and hydrogen with a heating value of approximately 300 British Thermal Units (BTU) per cubic foot (ERT, 1984). At some plants, including the Norfolk plant, the BTU value was enriched by cracking oil in the presence of the gas.

The gas was produced in the retort house (Figure 2) then passed through various stages of cleanup before being stored in gas holders prior to distribution. By-products such as coal tar, ammonia, light oils, and naphthalene were produced as the gas cooled during cleanup. These by-products were of no particular use during the nineteenth century and were disposed in any convenient

manner. The proximity of Smiths Creek and the presence of drain lines throughout the plant suggest that by-products were discharged to the creek during the 1800s. Sufficient markets had developed for coal tar and other by-products by the early-1900s so that much of these materials were sold for use by other industries such as wood preserving and ship building. Constituents associated with the by-products and wastes generated by the manufactured gas process include volatile organics such as benzene, toluene, ethylbenzene, and xylene (BTEX); polynuclear aromatic hydrocarbons (PAHs) that are associated with coal tar; cyanide, iron, and sulfate which are generated during the cleanup phase; and possibly metals associated with the coal ash.

The former creekbed was reportedly used as a domestic refuse dump and was backfilled within the site borders around 1900 to 1910. It is not known if ash from the former City Incinerator was disposed at the site. The sequence of historical events suggests that the majority of Smiths Creek was backfilled prior to operation of the City Incinerator, thereby decreasing the likelihood that the creek was a receptor for the resulting incinerator ash.

The potential sources for site contaminants identified above were considered in developing the sampling and analysis program for the site investigation. Several other potential sources exist such as auto repair operations, but these sources are likely masked by similar contaminants as those resulting from the manufactured gas operations.

1.3 INVESTIGATIVE HISTORY

Environmental degradation was discovered at the former Norfolk MGP site in 1985 by the City of Norfolk while conducting a soil boring investigation along Monticello Avenue and Princess Anne Road (Figure 3). C.E. Maguire, Inc. (Maguire) was retained by the City of Norfolk to design a storm sewer upgrade, referred to as the Monticello Trunk Storm Sewer Alignment. The proposed Monticello Trunk Storm Sewer Alignment would replace an existing undersized storm sewer (circa 1910) which transected the site within the former creek channel. The proposed storm sewer was to originate near the corner of Princess Anne Road and Salter Street, continue west to the corner of

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Princess Anne Road and Monticello Avenue, and south to the intersection of Monticello Avenue and Ninth Street, where it would reconnect to the existing storm sewer (Figure 3).

To support the alignment design, Maguire completed a total of ten soil borings along Princess Anne Road and Monticello Avenue. Oil odors and stained soils were encountered in two borings located on the western border of the site near the intersection of Ninth Street and Monticello Avenue. In response, the City suspended further design and construction of the storm sewer pending an environmental review.

The City of Norfolk retained Industrial Marine Services, Inc. (IMS) to conduct a preliminary site investigation to assess the source of the soil-quality degradation observed by Maguire. IMS completed soil and groundwater sampling at 16 locations across the former MGP site using hollow-stem augers. Visual observations of soils collected during the drilling suggested soil-and groundwater-quality degradation existed at several locations from the ground surface to depths as great as 17 feet below grade.

In response to the IMS findings, the City of Norfolk revised the proposed storm sewer alignment so that it avoided Monticello Avenue by moving north one block to 13th Street and west one block to Granby Street (Figure 1). Maguire completed soil borings for engineering design along this revised alignment and found similar soil degradation at the intersection of Ninth and Granby Streets as was observed along Monticello Avenue.

The City of Norfolk retained Geraghty & Miller, Inc. in 1988 to assess the extent of subsurface degradation along Granby Street and propose options for completing the storm sewer replacement project. Geraghty & Miller completed ten soil borings and installed three groundwater monitor wells along Granby Street. These investigative tasks indicated that the extent of impact was limited to a 100-foot segment north of Ninth Street that was within the former Smiths Creek channel. The data further indicated that the degradation was coal-tar related and most likely associated with the former MGP site. A summary of the investigative findings and proposed implementation work plan is contained in

the Geraghty & Miller report, "Summary of Soil and Groundwater Quality Conditions Related to The Monticello Trunk Project" (Geraghty & Miller, Inc. 1989). Geraghty & Miller developed a work plan to treat groundwater removed from this segment during construction dewatering using on-site carbon filtration and to stockpile impacted soils for use as backfill in the storm sewer excavation. The work plan was approved for implementation by the former Virginia Department of Hazardous Waste Management in a correspondence dated May 2, 1989. However, the construction of the storm sewer was postponed until further investigation of the source of the coal-tar degradation within the creek channel could be conducted.

A detailed environmental assessment and risk analysis of the former Norfolk MGP site was completed by Geraghty & Miller in 1990 on behalf of the City of Norfolk and Virginia Power to characterize site conditions and evaluate the health risks associated with environmental degradation at the site. The investigation was completed in two phases and included development of extensive on-site historic, geologic, hydrogeologic, soil-quality, and groundwater-quality data for use in estimating human health risks associated with both current site conditions and hypothetical site conditions under potential site development scenarios. The results of the assessment were presented in the investigative report, "A Site Assessment and Risk Evaluation of the Norfolk Gas Plant Site" (Geraghty & Miller, Inc. 1990).

Results from Phase I and II of this investigation indicated that MGP-related constituents were present in shallow groundwater beneath the site. A supplemental off-site, Phase III groundwater-quality investigation was completed by Geraghty & Miller in 1991 to define the lateral and vertical extent of groundwater-quality degradation observed during the initial on-site investigation. This was accomplished through the installation of nine off-site and three on-site monitor wells within the shallow water-table aquifer and deeper lower sand aquifer. Two rounds of groundwater sampling and analysis of selected wells were also conducted as part of the Phase III investigation. The results of the Phase III investigation were presented in the Geraghty & Miller report, "An Off-Site Ground-Water Quality Investigation for the Norfolk Gas Plan" (Geraghty & Miller, Inc. 1991). The results indicated that groundwater quality had been degraded by MGP-related constituents to depths as great as 70 feet

within the borders of the site. However, no evidence of groundwater-quality degradation beyond the site border within either the water-table or lower sand aquifers was identified.

In response to the findings of the site investigation, the Monticello Trunk Storm Sewer project was redesigned by the City of Norfolk for installation in the original alignment along the northern and western borders of the site. The site investigation indicated that the existing storm sewer was in poor condition and served as a discharge point for site groundwater because it was installed below the water-table. Therefore, replacement of the existing storm sewer would improve storm-water drainage as well as eliminate a pathway for off-site migration of MGP-degraded groundwater. Geraghty & Miller modified the plan that was developed and approved for implementation in 1989 for managing MGP-degraded soils and groundwater to reflect conditions at the site perimeter. The plan was approved for implementation by the former Virginia Department of Hazardous Waste Management in a correspondence dated May 2, 1989 and was incorporated into the bid specifications for the contractor. Same approval?

The construction specifications identified two segments comprising approximately 400 linear feet of the Monticello Trunk Storm Sewer project that were determined to be areas of groundwater-quality degradation. These areas were designated as contaminated zones and coincided with locations where the former Smiths Creek channel intersected the storm-sewer alignment. In addition, soils from below the water table were also degraded by MGP constituents and required appropriate management. The contaminated zones were defined using sheet piling that was driven to a depth of approximately 18 feet on both sides of the excavation. Construction dewatering was completed from a sump located within the contaminated zone by discharging to the Hampton Roads Sanitation District (HRSD) under temporary construction Permit No. 0029. Soils from above the water table were managed as clean fill material by the contractor, and soils located below the static water table were temporarily staged for use as backfill material over the storm sewer pipes. Oversized rubble was appropriately disposed at a landfill upon completion of the project.

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A preliminary feasibility study (PFS) was completed by Geraghty & Miller, Inc. in 1992 to establish remedial objectives for the former MGP site that would be protective of human health and the environment. The PFS was conducted to screen a wide range of potential remedial actions at the site and identify appropriate remedial alternatives for further in-depth evaluation. The PFS eliminated a large number of remedial technologies based on site conditions and effectiveness at addressing MGP-related degradation. The PFS recommended collection of additional data to further screen the remedial alternatives (Geraghty & Miller, Inc. 1992).

A focused feasibility study (FFS) has been completed to further evaluate groundwater and soil remedial alternatives identified by the PFS and provide site data necessary to develop a conceptual corrective action plan. For reporting purposes, the FFS is termed the Phase IV investigation. The Phase IV investigation included completion of an aquifer testing program, a soil-vapor extraction testing program, a bioremediation treatability study, and a confirmatory round of groundwater sampling. The results of the Phase IV investigation are presented in this document and have not been previously reported.

In a September 15, 1993 correspondence to the City of Norfolk and Virginia Power, the Waste Division of the Virginia Department of Environmental Quality (VDEQ) requested that a summary document be developed that incorporated a summary of the assessment activities completed during the Phase I, II and III site investigations as well as provided the results of the Phase IV investigation. This document provides the information requested by the VDEQ as well as a recommended remedial alternative for the site. Section 2.0 of this report summarizes the investigative methods employed during the various data collection programs. An evaluation of the pertinent data collected, including a description of the physical hydrogeology and environmental quality conditions at the site, is presented in Section 3.0. The human health risks associated with site environmental conditions at the site upon completion of the storm sewer improvements and parking lot are presented in Section 4.0. In Sections 5.0, 6.0, and 7.0, conceptual remedial alternatives are developed and evaluated based on the findings presented in Sections 3.0 and 4.0. Finally, the recommended risk-based remedial alternative is presented in Section 7.4.

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2.0 INVESTIGATIVE ACTIVITIES

This section describes the data collection methodologies employed during investigation of environmental site conditions at the former Norfolk MGP site. It incorporates field activities completed during the Phase I and Phase II Site Assessment and Risk Evaluation (Geraghty & Miller, Inc. 1990), the Phase III Off-Site Groundwater Quality Investigation (Geraghty & Miller, Inc. 1991), the Phase IV investigation of remedial alternatives, and supplemental groundwater sampling that was completed since 1991. This section discusses the following: soil-quality investigation, monitor well installation, groundwater monitoring and sampling, aquifer testing, soil-vapor extraction (SVE) testing and biotreatability testing.

This section presents an overview of the field activities completed to date during environmental investigations at the site and includes all pertinent site data; however, the above reports should be referenced for a more detailed discussion of historical investigative activities..

2.1 SOIL-QUALITY INVESTIGATION

The purpose of the soil-quality investigation was to characterize soil-quality conditions in the unsaturated zone beneath the site and provide data necessary to support the health risk analysis. The relatively large area of the site and the uncertainty about the presence of subsurface structures associated with former MGP operations warranted completion of an initial reconnaissance level investigation. Therefore, the soil-quality investigation was completed in two phases with Phase I serving primarily as a screening assessment used to select locations for subsequent soil-quality sampling and monitor well installation that was completed during the Phase II investigation (Geraghty & Miller, Inc. 1990).

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2.1.1 Test Pits

As part of the Phase I reconnaissance level soil investigation, 30 test pits (TP-1 through TP-30) were excavated in July 1989. The location, orientation and dimension of each test pit is shown on Figure 4.

Test pits were completed for three primary objectives: 1) to investigate the source of surficial tar seeps; 2) to locate and identify subsurface structures such as cement pads and gas holder foundations; and 3) to visually characterize soil-quality conditions within the former creek channel.

The test pits were excavated to depths of approximately 10 feet. The soil profile in each test pit was described and photographed by a Geraghty & Miller representative, with special attention given to any visible or odoriferous evidence of contamination. Geologic logs for each test pit are presented in Appendix A. Photographs taken during the test pit investigation are retained by the City of Norfolk, Virginia Power, and Geraghty & Miller and are available for review. Soil samples were not collected for laboratory analysis during the test pit investigation.

2.1.2 Soil Borings

An evaluation of soil-quality along the proposed Monticello Trunk Storm Sewer Alignment was also completed during the Phase I field program. A soil boring investigation conducted for engineering design by Maguire in 1985 consisted of a total of 10 soil borings (MB-1 through MB-10). The locations of these borings are shown on Figure 5. Soil-quality appeared degraded by oily materials at locations MB-1 and MB-7 completed by Maguire and delineation of the affected area was necessary to complete final design of the storm sewer. Soil borings were completed by Geraghty & Miller at nine Phase I locations (SB-1 through SB-9) shown on Figure 5 to supplement the existing database by further defining the limits of the former creek channel and any soil-and/or groundwater-quality degradation.

The soil borings were completed using hollow-stem augers to a minimum depth of 14 feet, corresponding to the bottom of the former creek channel in the site vicinity. Soil samples were collected continuously in each boring from the ground surface to the termination depth using a 2-inch diameter split-spoon sampler. The soil samples were field classified by the Geraghty & Miller representative and placed in plastic bags for storage. Geologic logs for the nine soil borings are presented in Appendix B. An organic vapor analyzer (OVA) meter was used to field screen the soil samples for volatile organics; however, interference from naturally high levels of methane gas in the site soils rendered this technique ineffective. No soil samples were submitted for laboratory analysis.

In September 1989, a focused Phase II soil boring program was completed to provide soil-quality data to support the risk analysis. Ten additional soil borings (B-1 through B-10) and 14 boreholes utilized for groundwater monitor well installation (MW-1 through MW-14) were completed at locations selected based on subsurface conditions observed during the Phase I investigation. The soil boring and monitor well locations are shown on Figures 5 and 6, respectively. The soil borings and monitor well boreholes were also completed using hollow-stem augers, and split-spoon soil samples were collected continuously from the ground surface to the termination depth. The Phase II soil borings ranged in depth from 2 to 16 feet with the exception of Borings B-7, MW-1, MW-3, MW-6, M2-9 and M2-13, which were extended to a depth of 42 feet to collect deeper stratigraphic data at those locations. Geologic logs for the Phase II soil borings are presented in Appendix B. The geologic logs associated with the monitor wells are included in Appendix C.

The split-spoon sampler was decontaminated between samples using a soapy water wash and distilled water rinse. It was necessary at times to prewash the spoon using methanol to remove oily materials. The soil samples were placed into plastic bags for storage; except for selected samples which were placed directly into laboratory prepared glass jars for subsequent analysis. The soil sample collected from the 0 to 2 foot and 4 to 6 foot depths in each Phase II soil boring were submitted for laboratory analysis.

Soil samples were submitted for analysis to characterize surficial soil-quality (0 to 2-foot depth) as this was identified as the primary exposure point for characterization and inclusion in the health risk analysis. Soil samples from the 4 to 6 foot depth were also analyzed to provide soil-quality data pertinent to estimating health risks associated with future excavations at the site. Two visibly impacted soil samples (B-4, 4 to 6 feet and B-10, 4 to 6 feet) were analyzed using the Toxicity Characteristic Leaching Procedures (TCLP) to provide information regarding the leachability of organic compounds from the soils. Ten soil samples were selected for total and Extraction Procedure (EP) Toxicity metals analysis. A summary of the soil sample locations, depths, and analytes is provided in Table 1.

Selected samples of the three basic geologic units encountered (fill, sand, and silty clay) were submitted to Hardin-Knight Associates, Inc. of Baltimore, Maryland for geotechnical testing. A sieve analysis and moisture content were performed for each sample, and Atterberg Limits were determined for the four clay samples. Geotechnical test results are presented in Appendix D.

2.2 MONITOR WELL INSTALLATION

Twenty-six groundwater monitor wells and four aquifer test wells were installed between September 1989 and March 1993 to facilitate characterization of groundwater-flow conditions and groundwater quality in the site vicinity. The locations of these wells are depicted on Figure 6. A discussion of well construction methods, geologic logs, and final as-built diagrams of each monitor well and aquifer test well are contained in Appendix C. Table 2 presents a summary of well construction information for each well.

The installation of the present monitor well network was completed in three distinct phases. Initially, 14 monitor wells (MW-1 through MW-14) were installed on the site during the Phase II investigation in September 1989. These wells were installed in the shallow water-table aquifer to depths of approximately 15 feet to characterize groundwater flow and groundwater quality in the surficial aquifer. The locations of the Phase II monitor wells were selected based on information collected during the Phase I soil investigation and were intended to provide data regarding the

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presence/absence of any separate-phase product in the water-table aquifer, groundwater elevations, and groundwater quality both upgradient and downgradient of potential source areas within the limits of the site.

During the Phase III investigation between September 1990 and February 1992, three additional on-site and nine off-site monitor wells were installed to further delineate the lateral and vertical extent of MGP-related constituents in groundwater. Because the site is located in a highly developed urban setting, all off-site Phase III monitor wells were installed on property owned by the City of Norfolk (i.e., city streets) to reduce access complications. Six shallow (MW-16 through MW-21) and three intermediate depth (B-Series) monitor wells (MW-19B, MW-20B, and MW-21B) were installed to the west and south to define the off-site migration of MGP-related constituents. Two intermediate (B-Series) Monitor Wells (MW-4B and MW-13B) and one deep (C-Series) monitor well (MW-13C) was installed on-site to assess the vertical extent of MGP-related constituents at the site border. The B-Series and C-Series monitor wells were installed using a two-stage drilling process with the installation of surface casing to isolate the shallow water-bearing unit from the borehole to restrict contaminant migration through the borehole from the water-table aquifer to the lower sand aquifer. The B-Series and C-Series monitor wells were installed adjacent to a shallow monitor well to create a nest at those locations with discrete screened intervals for evaluating groundwater quality and hydraulic head differences with depth. An exploratory boring, EB-1, located adjacent to monitor well MW-13 was completed to a depth of 82 feet prior to installation of any wells below the surficial aquifer to determine stratigraphic conditions and select appropriate depths of the B-Series and C-Series monitor wells.

As part of the Phase IV investigation, four aquifer test wells were constructed near the southwestern border of the site in March 1993 to facilitate aquifer testing in both the shallow water-table and lower sand aquifers. Well RW-23 was completed to a depth of 14 feet to provide a pumping well in the water-table aquifer for aquifer testing. A second shallow well, MW-22, was completed to the same depth to serve as a water-level observation point in the vicinity of the pumping well, RW-23.

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To facilitate aquifer testing in the lower aquifer, test wells (RW-24 and RW-25) were completed to depths of 53 feet using the two-stage drilling process to restrict contaminant migration from the shallow aquifer to the lower sand aquifer. A description of the installation and development procedures used for both shallow and deeper wells is contained in Appendix C.

2.3 GROUNDWATER-ELEVATION MONITORING

Upon completion of each phase of monitor well installation, the location and elevation of all monitor wells were determined by Rouse-Sirine Associates, Ltd. of Virginia Beach, Virginia, a licensed surveyor. The top-of-casing elevation at all monitor wells were surveyed most recently on March 27, 1993 to a vertical accuracy of 0.01 foot and the well locations were plotted on the base map provided on Figure 6.

The depth to water was measured in each monitor well using a calibrated electronic oil/water interface probe on March 22, 1993 and January 31, 1994. The water-level data were collected over a short time period to minimize any influence that natural barometric fluctuation or precipitation recharge might have on groundwater levels at the site. A summary of the groundwater elevation data is presented in Table 3.

2.4 GROUNDWATER SAMPLING

Groundwater samples were collected from 13 on-site monitor wells during the Phase II investigation and analyzed for various organic and inorganic constituents associated with MGP residuals. The Phase II analytical results (Geraghty & Miller, Inc. 1989) indicated that the water-table aquifer was degraded by MGP-related constituents.

To define the lateral and vertical extent of groundwater-quality degradation observed during the initial on-site investigation, groundwater samples were collected on two occasions during the Phase III investigation. The first Phase III sampling event on October 24 through 26, 1990 was limited to the

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Phase III monitor wells and selected Phase II monitor wells along the western border of the site. Monitor Well MW-13C was sampled on November 25, 1990 because this well was being replaced concurrent with the October sampling round. The second Phase III groundwater sampling was completed during March 5 and 6, 1991 for selected monitor wells including newly installed off-site monitor wells MW-21 and MW-21B. Groundwater samples collected during the Phase III investigation were shipped to Spectralytix Environmental Analytical Services for analysis of BTEX by United States Environmental Protection Agency (USEPA) Method 8020; semivolatile organics by USEPA Method 625; total and free cyanide by USEPA Method 335.3, and lead, arsenic, and chromium by USEPA Method 7060. The samples collected for metals analysis during the Phase III sampling events were field filtered using a 0.45 micron acetate membrane filter. 3 years

Selected monitor wells were sampled again during the Phase IV investigation on February 2, 1994 to provide more recent supplemental water-quality information for both the shallow water-table and lower sand aquifers. The Phase IV groundwater samples were shipped to American Environmental Network, Inc. for analysis of BTEX by USEPA Method 8020, semivolatile organics by USEPA Method 8270, Resource Conservation and Recovery Act (RCRA) metals by USEPA Method SW-846, and total and free cyanide by USEPA Method 335.2. Samples for metals analysis were not field filtered during the February 2, 1994 sampling event.

A summary of the monitor wells included in the three most recent groundwater sampling events is provided in Table 4. These sampling events are emphasized in this report because the groundwater-quality data represents the most complete characterization of site conditions available. The field methods employed during each round of groundwater sampling followed the Geraghty & Miller Standard Operating Procedures described below.

Prior to sampling, each well was purged by bailing or pumping approximately three casing volumes of groundwater. When bailed, decontaminated Teflon or disposable bailers were used. If pumped, centrifugal pumps with new disposable polyethylene piping and new foot-valves were used.

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Field parameters (pH, specific conductance, temperature, and physical descriptions) were monitored during purging activities and recorded on the Water Sampling Logs. These parameters were monitored in the field due to the difficulties encountered in preserving these physical and chemical properties during storage. The groundwater removed during purging activities was containerized in Department of Transportation (DOT)-approved 55-gallon drums and centrally staged pending characterization and disposal.

After the wells were purged, the appropriate sample containers were filled and preserved. Each sample container label contained the following information: the date and time; sample identification number; sample matrix and preservative type; analyses requested; project name and number; and sampler identification. This information was also recorded on the Water Sampling Logs included in Appendix E.

After collection, the samples were packed on ice in coolers for transportation to the laboratory. Each cooler was inventoried with chain-of-custody forms and sealed with chain-of-custody labels. The samples were then express shipped overnight to the laboratory by common carrier.

2.5 AQUIFER TESTING

To determine the site-specific hydraulic characteristics and water quality within both the water-table aquifer and the lower sand aquifer, several aquifer tests were conducted during the week of March 22, 1993. Aquifer testing at the site was concentrated at the southwestern border of the site to evaluate hydraulic control alternatives in the downgradient area of groundwater-quality impact.

Prior to the start of aquifer testing, the water-level responsiveness of each observation well was tested by withdrawing a volume of water from the well and making sure that the water-level recharged back to the initial static level. This brief testing, in all cases, confirmed that each observation well was hydraulically connected to the aquifer in which it was screened.

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2.5.1 Water-Table Aquifer

2.5.1.1 Pumping Test

A constant rate discharge test was attempted in the shallow water-table aquifer on March 24, 1993. Well RW-23 was pumped at a rate of approximately 20 gallons per minute (gpm), and water-level changes were measured manually in the pumping well and in Observation Wells MW-13, MW-21 and MW-22. Due to the limited amount of available drawdown and higher than expected pumping rate, difficulties were encountered in creating measurable drawdown in the observation wells. Thus, the aquifer test was terminated after 220 minutes of pumping. No further analysis was performed on the water-level data collected during the water-table aquifer test. A discussion of the observations and conclusions from the water-table aquifer test is provided in Section 3.0 of this report.

Water-quality samples were collected from the pumping discharge stream at 15 and 210 minutes after the start of pumping. The samples were delivered to a certified laboratory and analyzed for MGP-related constituents and selected inorganic constituents that might affect groundwater treatment. Aquifer test discharge sampling logs are included in Appendix F.

2.5.1.1 Slug Tests

In lieu of the constant-rate drawdown test in the water-table aquifer, rising head slug tests were performed in Monitor Wells MW-10, MW-13, MW-14, and MW-22 to determine the hydraulic conductivity of the water-table aquifer in the southwestern portion of the site. These rising head slug tests serve to supplement slug tests conducted in shallow water-table Monitor Wells MW-1, MW-2, MW-4, MW-8, MW-12, and MW-15 in October 1989 by the same method. The test procedure involved rapidly lowering the static water-level within each well casing by removing one bailer of water. The resultant water level rise was monitored using a calibrated pressure transducer and digital data logger.

2.5.2 Lower Sand Aquifer

A constant-rate discharge pumping test was conducted in the lower sand aquifer beginning on March 23, 1993. Well RW-24B was pumped continuously at an approximate rate of 2 gpm for 1,314 minutes. The flow rate was measured at regular intervals using a 5-gallon container and a timer. No precipitation was observed during the pumping period. Drawdown in the pumping well and Observation Wells RW-25B, MW-13B, MW-13C, and MW-21B were measured and recorded manually at regular intervals using dedicated electronic water-level indicators. Water levels in the overlying water-table aquifer were also measured in Wells MW-13, MW-14, and MW-22. The lower aquifer pumping test data are included in Appendix G.

Water-quality samples were collected from the discharge stream at 60, 300, 720, and 1,200 minutes after the start of pumping. The samples were delivered to a certified laboratory and analyzed for MGP-related constituents and selected inorganic constituents that affect groundwater treatment design. Aquifer test discharge logs are included in Appendix H.

2.6 SOIL-VAPOR EXTRACTION TESTING

SVE testing was completed to collect information necessary to evaluate the feasibility of employing extraction technologies to enhance the degradation of MGP-constituents in the subsurface. To facilitate SVE testing, three SVE test wells, VM-1A, VM-2A, and VM-3A, and eight soil-vapor monitoring points were installed on March 2 and 3, 1993 at the locations depicted on Figure 7. The SVE wells were installed at three locations where extensive soil-quality degradation was observed during previous investigations to provide data necessary to evaluate SVE as a remedial technology for the site.

Each SVE borehole was advanced to the water-table using hollow-stem augers. The SVE test wells were constructed of Schedule 40, flush-joint polyvinyl chloride (PVC) casing and a 5-foot long section of machine-slotted screen with 0.010-inch openings. The vapor monitoring points were constructed of 2-inch diameter Schedule 40, flush-joint PVC casing and screen. Following casing

installation, a filter pack consisting of clean silica sand was emplaced around the screen to approximately 1-foot above the screened interval. The remainder of the well annulus was filled with palletized bentonite that was wetted to ensure hydration of the seal.

SVE tests were conducted at the site on March 8, 1993. Three SVE tests were conducted by extracting subsurface vapors from SVE Wells VM-1A; VM-2A, and VM-3A, using a 1-1/2 horsepower (HP) regenerative blower (Rotron Model 454). The volumetric rate of vapor extraction was controlled using an in-line valve located between the wellhead and the blower and measured using an in-line manometer. The vacuum at the blower inlet was measured and converted to a volumetric extraction rate using the manufacturer's performance curves. The induced vacuum was measured in selected vapor monitoring points installed and various distances from the SVE test well. The vapor effluent was screened for volatile organic compounds (VOCs) at regular intervals during vapor extraction using a Total Ionizables Present (TIP) meter. The SVE test data collected during SVE tests from Wells VM-1A, VM-2A, and VM-3A are summarized in Tables 5, 6, and 7, respectively.

2.7 BIOREMEDIATION TREATABILITY TESTING

A treatability study was conducted to evaluate soil samples collected during the installation of VES wells at the site. The evaluation was conducted to determine if the soils contained a natural microbial population capable of degrading MGP-constituents present in the subsurface at the site and to evaluate the potential for enhancing the population to remediate the subsurface MGP-degraded source material.

The objectives of the study were as follows: (1) determine if aerobic microbes are present in representative soils, (2) determine if the microbes have adapted to degrade selected organic compounds, (3) determine if the environmental conditions (pH and moisture content) are conducive to support microbes, and (4) determine if the soluble inorganic nutrients (ammonia and ortho-phosphate) are present in sufficient quantities for bioremediation of the constituents.

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Representative soil samples were collected from the drill cuttings during the installation of the SVE wells on March 2, 1993. The samples were collected using a clean trowel from depths of 0 to 1 foot, 2 to 3 feet, and 3 to 5 feet from Wells VM-1A, VM-2A, and VM-3A, respectively. In addition, a sample of heavily degraded soil was collected from Well VM-3A from an approximate depth of three feet and designated as "VM-3A Dirty." The soil samples were shipped on ice to Geraghty & Miller's Treatability Laboratory in Tampa, Florida for analysis.

Total heterotrophic aerobic microbes were determined using Standard Methods Procedures 9215 C (1989) sprayed plate procedure. The samples were serially diluted in a mineral nutrient buffer solution, and 0.1 milliliter (mL) of the diluted sample plated in a duplicate on Standard Plate Count (SPC) agar plates. The plates were incubated in the dark at ambient temperature. The number of colony forming units (CFU) were determined after 5 days of incubation.

The heterotrophic aerobic microbes capable of degrading MGP-constituents at the site were determined using a modification of the above procedure. The samples were serially diluted in a mineral nutrient buffer solution, and 0.1 mL of the diluted sample was plated in duplicate onto Noble agar plates containing 100 milligrams (mg) of MGP-degraded soil from the site. The plates were incubated in the dark at ambient temperature in a desiccator, and the were counted after 14 days of incubation.

Soil respiration was determined using a Micro Oxymax respirometer. The procedure was based on recommendations from the manufacturer. Approximately 100 grams of sample as received was placed in a closed chamber. The concentration of oxygen and carbon dioxide in the chamber headspace was measured every hour for a period of 24 hours. The difference in oxygen and carbon dioxide concentrations were graphed and may be correlated with the rate of respiration.

The soil pH was determined using USEPA SW846 Method 9045 (1986). The soil moisture was determined using Standard Methods Procedure 2540 G (1989). The total petroleum hydrocarbons (TPH) were determined using a modified USEPA Method 418.1.

The soluble ammonia and ortho-phosphate concentrations were determined using an aliquot from the sample extract used to determine pH. Ammonia was analyzed using Hach Inc. Method 490 which is based on USEPA Method 365.2, colorimetric ascorbic acid, single reagent.

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3.0 GEOLOGY AND HYDROGEOLOGY

3.1 REGIONAL GEOLOGY AND HYDROGEOLOGY

The Tidewater Region of southeastern Virginia is located within the Atlantic Coastal Plain Province and is underlain with approximately 2,000 feet of unconsolidated deposits of gravel, sand, silt, and clay ranging in age from Lower Cretaceous to Holocene. These unconsolidated units overlie a bedrock basement of massive crystalline igneous and metamorphic rock of Precambrian and Triassic/Jurassic age. These sediments, deposited during several transgression-regression sequences, dip gently eastward at 20 to 80 feet per mile to form a gradually thickening wedge. Six formations have been identified beneath the site from the surface to bedrock as follows: Columbia Group, Yorktown Formation, Calvert Formation, Mattaponi Formation, Transitional beds, and the Patapsco/Patuxent Formation (Virginia Department of Mineral Resources (VDMR 1973).

The Patapsco/Patuxent Formation of Lower Cretaceous age lies unconformable over much older granitic and metamorphic "basement" rocks and semi-consolidated red silts and clays at a depth of 2,400 feet. The Patapsco/Patuxent Formation is approximately 1,700 feet thick and consists of fine to very coarse quartz sands and gravels interspersed with light green to gray-green silts and clays (VDMR 1973). It is considered the Lower Cretaceous aquifer and is extensively utilized by private, industrial, and municipal wells. The majority of wells drilled in the Lower Cretaceous aquifer are found in northwestern Chesapeake, in Portsmouth, and in western Norfolk where the aquifer contains fresh or slightly brackish water (Siudyla 1981).

Immediately overlying the Patapsco/Patuxent Formation at a depth of approximately 700 feet is a 40-foot thick sequence of brightly colored clay beds and sands of Upper Cretaceous age. The fine particle content increases over that found in the Patapsco/Patuxent Formation, and thus, these deposits are termed "transitional beds." The transitional beds represent a change in depositional environment from the relatively coarse-grained deposits of the Patapsco/Patuxent Formation to the finer grained deposits of the overlying Mattaponi Formation (VDMR 1973).

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The Mattaponi Formation is of Late Cretaceous, Paleocene, and Eocene age. This formation of marine origin is characterized by beds of quartz-glauconite sand, glauconitic clay, and shells. The Mattaponi Formation is first encountered at a depth of approximately 500 feet and is 160 to 180 feet thick (VDMR 1973). Together with the basal sand member of the overlying Calvert Formation, the Mattaponi Formation is considered the Eocene-Upper Cretaceous aquifer. Because the Lower Cretaceous aquifer is more productive, few wells utilize the Eocene-Upper Cretaceous aquifer (Siudyla 1981).

The Calvert Formation of Miocene age consists largely of clay and silty clay and is first encountered at a depth of 400 feet. Unlike the basal sand member mentioned previously, the 100-foot thick upper portion of the Calvert Formation is a confining unit, retarding the vertical flow of groundwater between the underlying formations and the younger Yorktown Formation (Siudyla 1981).

The upper boundary of the Yorktown Formation is highly variable but is estimated to be at a depth of approximately 35 feet in the site vicinity. This Pliocene-aged formation consists of more abundant and markedly coarser sand and gravel beds and more abundant and thicker shell beds than the underlying Calvert Formation interspersed with light gray and bluish gray clayey strata (VDMR 1973). Three major water-bearing zones exist in the Yorktown Formation, referred to as the upper, middle, and lower units, which are collectively termed the Yorktown aquifer. These three sand units are generally found in only the upper 50 to 100 feet of the formation and are composed of beds of fine-to coarse-grained sand, gravel, and shells generally 5 to 20 feet thick, which are separated from each other by silt and clay beds. The Yorktown aquifer generally is separated from the overlying water-table aquifer by beds of silt, clay, and sandy clay about 20 to 30 feet thick and from the underlying Eocene-Upper Cretaceous aquifer by several hundred feet of silt and clay, including the Calvert Formation. The Yorktown aquifer system is extensively used by both domestic and public distribution systems. Reportedly, over 10 million gallons per day are withdrawn from this aquifer in the Tidewater area, with future use expected to rise (Siudyla 1981).

The uppermost geologic unit is of Quaternary age and is collectively termed the Columbia Group. It is characterized by light-colored clay beds interspersed with oxidized fine to medium quartz sands and silt. The coarse-grained water-bearing units of the Columbia Group form the "water-table" aquifer. The water-table aquifer consists of beds and lenses of sand, gravel, shells, silt, sandy clay, and clay. The major water-bearing strata are very heterogeneous and discontinuous due to the complex marine estuarine environments in which they were deposited (VDMR 1973). In the 1930s and 1940s, a number of well fields consisting of clusters of small diameter wells obtained water from the water-table aquifer. These systems have been shut down due to increasing urbanization and substitution of city water. Due to groundwater-quality limitations and low well yield potential, the water-table aquifer is used generally for small-scale irrigation such as residential and commercial lawn watering. The Virginia State Health Department does not permit using the water-table aquifer for public water supplies. Occasionally, the water-table aquifer is used for domestic water supplies (Siudyla 1981).

The area immediately surrounding the site is serviced by Norfolk City Water, which derives its supply from a system of reservoirs. As a result, it is not anticipated that groundwater in the area is used as a potable water source. To investigate potential use of groundwater in the site vicinity, a preliminary review of Virginia State Water Control Board well records was completed for wells in the area. Water well completion reports were available for a total of eight wells located between 3,500 and 8,000 feet from the site and north of the Elizabeth River.

Four of the wells (217-66, 217-55, 217-50, 217-08) are screened in the Lower Cretaceous aquifer at depths greater than 700 feet. Two wells (217-39, 217-02) are screened in the Yorktown aquifer at depths of 63 and 108 feet, respectively. Only one cluster of wells (217-37) is know to be screened in the water-table aquifer in the vicinity of the site. These wells are screened at depths no greater than 50 feet. The screened depth of the eighth well is unknown. The locations of the eight off-site wells are presented on Figure 8. A summary of the available information concerning each well is presented in Table 8.

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The well records were completed at the time of installation for seven of the eight wells, so that the current usage and condition of the wells are unknown. The distance of these wells from the site (Figure 8) indicates that field confirmation of the condition of the wells is not warranted at this time.

3.2 SITE GEOLOGY

Available regional geologic data suggest that the Columbia Group and the Yorktown Formation are present in the site vicinity (VDMR 1973). The shallow sand and silty clay units encountered during the on-site investigation are thought to be part of the Columbia Group, which regionally consists of fine to medium sand with trace amounts of silt and clay. The Columbia Group deposits are approximately 50 feet thick in the site vicinity (VDMR 1973). The underlying Yorktown Formation is comprised of thin beds of coarse sand and gravel within thicker deposits of fine sand with little silt and clay. The coarser sand and gravel beds are the major water-bearing zones in the Yorktown Formation.

Site-specific geologic data collected during the completion of on-site and off-site investigative borings are included in Appendices B and C. The site-specific geologic data were used to develop Geologic Cross Sections A-A', B-B', and C-C' presented as Figures 9, 10, and 11, respectively, and depict geologic conditions in the site vicinity to a maximum depth of 82 feet below grade. The plan location of these geologic cross sections are shown on Figure 6. Investigations have not been conducted below a depth of 82 feet at the site.

A mantle of fill material is present in the shallow subsurface across the former Norfolk MGP site. Fill material present in the former manufacturing area is generally less than five feet thick and is composed largely of cinders, concrete rubble, and brick fragments. This fill is likely associated with land modifications at the time of MGP demolition in the late 1960s. Fill material is present within the former Smiths Creek channel in thicknesses to 15 feet. The channel fill consists of rubble, gravel, wood, and domestic refuse and is associated with municipal backfilling of Smiths Creek in the early 1900s.

Three distinct natural stratographic units have been encountered within the upper 82 feet of the subsurface. A shallow, fine-to medium-grained sand to silty sand underlies the surficial fill materials in the former manufacturing area of the site and extends to an approximate depth of 15 feet. Visible evidence of MGP-degradation, such as staining, was observed within this unit in the southern portion of the site. The shallow monitor wells are screened across the water table that is present in the native sands in the southern portion of the site and the fill material in the creek channel in the northern portion of the site.

A silty clay unit underlies the upper sand and fill materials. The silty clay unit was encountered at all monitor well and soil boring locations at relatively consistent elevations. The thickness of the silty clay ranged from 15 feet in Monitor Well MW-1 to 30 feet in Monitor Well MW-13C. The silty clay layer most likely represents lagoon or marsh deposits identified as being within the lower Columbia Group (VDMR 1973). Based on visual examination, the silty clay exhibited very low permeability relative to the overlying sand and fill materials, but thin sand lenses were encountered at various depths within the unit. MGP-degradation was observed throughout the silty clay unit especially within the sand lenses at monitor well locations along the southwestern border of the site.

The silty clay layer is underlain by a sand unit that appears to be continuous across the site vicinity. The top of the lower sand unit was encountered approximately 30 to 45 feet below land surface and most likely, represents the upper contact of the Yorktown Formation. The lower sand unit consists of fine-to medium-grained sand and silt. The upper eight feet of this unit consists of mostly medium sand, grading to coarse sand with depth. The five B-Series wells are screened within this lower sand. Below approximately eight feet from the upper contact, the lower sand grades quickly with depth to fine sand and silt to a depth of 82 feet. Monitor Well MW-13C is screened within this horizon.

3.3 SITE HYDROGEOLOGY

The depth to water in the monitor wells was measured on March 22, 1993 and January 31, 1994. These data were used to calculate the groundwater elevations that are tabulated in Table 3. The groundwater elevation data show differences in hydraulic heads between the shallow water-table monitor wells and B-Series monitor wells, suggesting distinct aquifer systems. This is, most likely, due to the continuous silty clay layer that separates the shallow water-table aquifer and the lower sand aquifer. As such, the following discussion of groundwater-flow conditions is divided into the "shallow water-table" and "lower sand" aquifer systems.

3.3.1 Shallow Aquifer

Groundwater-elevation contour maps for the shallow water-table aquifer were developed for March 22, 1993 and January 31, 1994 and are presented on Figures 12 and 13. The generalized contours developed for these dates are similar to groundwater-elevation contours developed during the Phase III investigation (Geraghty & Miller, Inc. 1991) in that several monitor wells in the northern portion of the site display groundwater elevations that are consistently lower than groundwater elevations in the southern portion of the site and at off-site locations. During the Phase III investigation, the storm sewer that transects the site within the former Smiths Creek channel was examined as a possible groundwater-elevation control mechanism. It was suggested that the deteriorated storm sewer may act as a 'French drain" to locally lower the water-table elevation. Improvements made to the storm sewer since completion of the Phase III investigation has most likely eliminated the potential for the storm sewer to be solely responsible for groundwater-elevation control.

Additional information provided by more recent groundwater-elevation data, the results of the constant-rate aquifer test, and additional rising head slug tests conducted at the site during the Phase IV investigation suggest that elevation of the water table is likely to be influenced by the contrast in soil permeability between the native sand and the fill material present in the former Smiths Creek channel. The permeability of the fill material is likely to be much greater throughout the creek channel than the

native sand adjacent to the former creek. In effect, the entire creek channel is likely to act as a drain receiving shallow groundwater from the adjacent native sand. The contrast in permeabilities creates a localized hydraulic gradient from adjacent areas where native geologic materials are present towards the debris-filled creek channel, as indicated by the groundwater-elevation contours shown on Figures 12 and 13. In areas beyond the influence of this localized hydraulic gradient, shallow groundwater flow is expected to be toward the west/southwest and the Elizabeth River, the natural discharge area in the site vicinity. The downgradient border of the site, therefore, extends from the southwestern corner at Monitor Well MW-12 north to the northwestern corner near Monitor Well MW-8. Shallow groundwater flow in central portions of the site appears to be toward the former creek channel to the west and northwest.

3.3.2 Lower Sand Aquifer

Hydraulic heads measured in the B-Series wells are approximately 4 to 6 feet lower than those measured in adjacent shallow monitor wells. This suggests that the silty clay unit is a confining layer that separates the water table and the lower sand aquifer. The presence of lower hydraulic heads in the lower sand unit indicates a downward component of groundwater flow across the silty clay layer. This appears to be confirmed by the presence of visible MGP degradation within thin sand lenses in the silty clay layer in monitor well locations along the southwestern border of the site. Hydraulic heads measured in Monitor Wells MW-13B and MW-13C are similar, suggesting that the B-Series and C-Series monitor wells are screened within the same aquifer system. No downward hydraulic gradient exists between Monitor Wells MW-13B and MW-13C.

Generalized groundwater elevation contour maps for the lower sand aquifer were developed for March 22, 1993 and January 31, 1994 and are presented as Figures 14 and 15, respectively. Groundwater flow is generally to the west within the lower sand aquifer, similar to conditions reported for the water-table aquifer. The groundwater elevations measured in monitor well MW-20B were slightly higher than expected based on data for Monitor Wells MW-19B and MW-21B. Insufficient data are available to conclude the cause for this anomaly. Groundwater flow conditions within the

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lower sand aquifer are not influenced by the water table aquifer. Therefore, the direction of groundwater movement within the lower sand aquifer indicates that Monitor Wells MW-13B and MW-13C are located at the downgradient border of the site. Monitor Well MW-21B is located directly downgradient of the site. Monitor Well MW-20B is most likely downgradient of the site, although hydraulic heads at that location are similar to those at Monitor Well MW-13B. Monitor Well MW-19B is not hydraulically downgradient of the site. The water-level elevation datum for Monitor Well MW-19B on March 22, 1994 is considered an anomaly.

3.4 AQUIFER CHARACTERISTICS

3.4.1 Shallow Water-Table Aquifer

The constant-rate aquifer test performed in Well RW-23 yielded data that was unusable for quantitative characterization of the shallow water-table aquifer because of a lack of sufficient available drawdown on the well needed to influence water levels in nearby observation wells. However, this indicated that the hydraulic conductivity of the shallow aquifer in that area is greater than expected, suggesting it is part of the former Smiths Creek channel. Water-quality samples were collected from the pumping discharge stream at 15 and 210 minutes after the start of pumping and analyzed for constituents that might affect groundwater treatment if groundwater extraction becomes necessary. The results of the analysis are included in Appendix G.

In lieu of the constant-rate test, rising head slug tests were performed in Monitor Wells MW-10, MW-14, and MW-22 to supplement slug tests performed in Monitor Wells MW-1, MW-2, MW-8, MW-12, and MW-13 during the Phase II investigation (Geraghty & Miller, Inc. 1990). Slug test data were analyzed using the Bouwer and Rice method (1976). The graphical solutions are included in Appendix H. Slug tests provide a gross estimate of the hydraulic conductivity immediately adjacent to the well screen. A summary of the hydraulic conductivity data obtained for the ten monitor wells tested during Phase II and IV is presented in Table 9. Hydraulic conductivity values for wells

completed in fill material associated with the former Smiths Creek channel ranged from 0.71 feet per day (ft/day) at Monitor Well MW-22 to 45.36 ft/day at Monitor Well MW-13. Wells completed in native geologic materials had hydraulic conductivity values ranging from 0.04 ft/day at Monitor Well MW-12 to 1.84 ft/day at Monitor Well MW-4. These results suggest that the average hydraulic conductivity of the fill material is one to two orders of magnitude greater than in the native geologic materials. This supports conclusions drawn from groundwater-elevation data that groundwater moves more freely through the fill material present in the former Smiths Creek channel.

3.4.2 Lower Sand Aquifer

A constant-rate aquifer test was conducted in Well RW-24B to determine hydraulic parameters of the lower sand aquifer necessary to evaluate hydraulic containment alternatives. The drawdown data collected at Wells RW-24B, RW-25B, MW-13B, MW-13C, and MW-21B during the constant-rate aquifer test conducted in Well RW-24B were analyzed using the Hantush and Jacob (1955) solution for leaky confined aquifers. The Hantush and Jacob solution assumes that the confining unit leaks water to the underlying aquifer as the hydraulic heads are decreased due to pumping. It was also assumed that groundwater flow in the confining unit is vertical and that the confining unit has no storage. The time-drawdown plots associated with these analyses are shown on Figures 1 through 5 in Appendix I. Partial penetration effects were considered in the solution because none of the wells fully penetrated the lower sand aquifer. The B-Series wells were screened near the upper ten feet of the aquifer, and the C-Series well was screened over a ten foot interval, approximately 35 feet below the top of the aquifer. Partially penetrating wells generally have extra head loss at and near the pumping well. The time-drawdown curves (Appendix I) flatten during the later time data which suggests that leakage occurred from the confining unit.

Table 10 summarizes the results of the time-drawdown analyses for the data collected. The calculated transmissivity values ranged from 0.0027 to 0.0751 square feet per minute (ft^2/min.). Hydraulic conductivity values were calculated by dividing the transmissivity values by

the estimated average saturated thickness of the aquifer (50 feet). The hydraulic conductivity values ranged from 0.0708 to 2.16 ft/day.

The transmissivity values calculated for each analyses are in relatively close agreement. The transmissivity and hydraulic conductivity values determined from the pumping well data are lower than those determined for the observation wells. This is attributed to well loss at the pumping well. Well losses are associated with the non-linear flow of groundwater in the vicinity of the pumping well, and the drawdown measured at the pumping well is typically exaggerated. Consequently, the transmissivity and hydraulic conductivity estimates for the pumping well are lower than the actual values.

The vertical hydraulic conductivity of the confining unit was estimated from the Hantush well function (r/β) term (Hantush and Jacob 1955) for each well analyzed (Table 1). The average thickness of the confining unit was 25 feet. The mean transmissivity and hydraulic conductivity were 0.04398 ft^2/min and 1.27 ft/day, respectively. Only Wells RW-25B and MW-21B provided estimates of vertical hydraulic conductivity indicative of a clay confining unit. Vertical hydraulic conductivities estimated from other test wells were quite high and may be suspect or may represent areas of minimal confinement of the lower aquifer. The estimated storativity of the values ranged from 0.0004 to 0.1879 with an average of 0.0443.

The degree of communication between the shallow and confined aquifers can be assessed qualitatively from an aquifer test by examining the water-level response in the shallow aquifer from pumping in the confined aquifer. Shallow Monitor wells MW-13, MW-14, and MW-22 were monitored during the confined aquifer test. Only Monitor Well MW-13 showed an appreciable response during the aquifer test (0.4 feet drawdown), which indicates some degree of leakage from the shallow aquifer to the lower sand aquifer.

Water-quality samples were collected from the pumping discharge stream and analyzed for constituents that might affect the design of groundwater treatment if groundwater extraction becomes necessary. The results of these analyses are included in Appendix G.

3.5 SOIL QUALITY

Soil samples were collected from zero to six feet at Phase II soil boring monitor well locations and analyzed to provide soil-quality data necessary to estimate human health risks associated with exposure to soils at the site. The Phase II analytical results for soils are included in Appendix J. No new soil-quality data have been collected since the Phase II investigation. The following summarizes the discussion previously provided in the Phase II report (Geraghty & Miller, Inc. 1989) which includes a full discussion of analytical results for site soils. Tables 11 and 12 summarize the most pertinent soil-quality results.

3.5.1 Total Benzene, Toluene, Ethylbenzene, and Xylenes

Total BTEX refers to the volatile compounds benzene, toluene, ethylbenzene, and xylene which are associated with manufactured gas by-products and also with petroleum products. Data for boring locations, B-6 and B-7, in the northern half of the site showed total BTEX concentrations ranged from 0.15 milligrams per kilogram (mg/kg) at the surface in Boring B-7 to 15.4 mg/kg from four to six feet in Boring B-6. The higher levels at depth in Boring B-6 are attributed to the refuse layer encountered at that location.

Soil samples from the former MGP-operations area were expected to contain higher levels of total BTEX based on the widespread oil staining and odors noted during Phase I and II field activities. Total BTEX levels at the surface ranged from 0.09 mg/kg at Boring B-2 to 88.3 mg/kg at Boring B-9. In general, total BTEX concentrations increased with depth, with the highest level observed at Boring B-4 (213 mg/kg). The lower levels in the surficial samples are most likely related to volatilization and/or grading of the site with clean cover material.

3.5.2 Total Polynuclear Aromatic Hydrocarbons

In the northern half of the site, PAHs were detected in both samples collected in Borings B-6 and B-7 at levels ranging from 3.3 to 86.7 mg/kg, respectively. The highest total PAH levels were found at depth in Boring B-6 and suggest that the oily contamination observed in the refuse is partly coal-tar related and not entirely petroleum products.

Total PAH concentrations were higher in the former manufacturing area due to the proximity of the sample to the source material. The lowest total PAH level reported was in Boring B-9 (21.4 mg/kg) in a sample from four to six feet; five samples displayed total PAH concentrations greater than 1,000 mg/kg.

3.5.3 Cyanide

Cyanide was not detected in the surficial samples from Borings B-6 and B-7 in the northern half of the site but was detected at depth in both these borings (17 and 2 mg/kg, respectively). Within the former plant area, cyanide is present in surficial samples at four of the seven boring locations (B-1, B-3, B-5, and B-9) at concentrations ranging from 130 to 840 mg/kg. Cyanide levels decrease by approximately one order of magnitude between the surface and the four to six foot interval at these locations.

3.5.4 Lead

Analysis of soils for metals was completed using both total digestion and EP Toxicity extraction procedures. The total metals data are needed for risk evaluation, and EP Toxicity concentrations are used as the basis for determining if a material exhibits characteristics that would require management as a RCRA hazardous waste. Lead was the only metal detected at levels considered to be elevated above background conditions, and therefore, lead concentrations are summarized in Table 12.

Lead was present at all sample locations from which samples were submitted for analysis at concentrations between 40 and 757 mg/kg. In general, lead concentrations appeared higher in the northern half of the site and may be related to the shallow fill being predominantly cinders.

EP Toxicity concentrations for the ten soil samples ranged from less than 0.02 to 0.58 milligrams per liter (mg/L) at location MW-8. These levels are well below the EP Toxicity standard of 5.0 mg/L, and thus, soils would not be classified as a hazardous waste due to lead.

3.5.5 Additional Analyses

Two visibly impacted soil samples were selected for additional analysis of BTEX and PAH compounds using the TCLP. This procedure provides an indication of the leachability of contaminants from a soil or sludge and the USEPA has established leachate concentrations above which a material would be classified as a RCRA hazardous waste (Federal Register 1991).

The two samples selected for TCLP extraction were from borings B-4 (4 to 6 feet) and B-10 (4 to 6 feet), both of which contained high levels of BTEX as determined by standard methods. Analysis of the extract showed benzene present at 380 microgram per liter (ug/L) and 560 ug/L, respectively. Toluene was present at 820 ug/L and 88 ug/L at Borings B-4 and B-10, respectively.

Comparison of the analytical results to the proposed TCLP standards shows that visibly impacted site soils could be classified in the future as hazardous materials due to benzene levels. The toluene levels, most likely, will not affect the classification because the standard for toluene is more than one order of magnitude higher than the observed levels.

3.6 GROUNDWATER QUALITY

A summary of constituents detected in groundwater samples collected from the monitor wells on October 25, 1990 and March 5, 1991 (Phase III) and February 1, 1994 (Phase IV) is

presented in Table 13. Laboratory results of the groundwater-quality analyses are included in Appendix K. The discussion of groundwater quality is separated into the shallow water-table and the lower sand aquifers to reflect the different hydrologic conditions in these units. The discussion of groundwater quality for each aquifer will focus on indicators of MGP-degradation. These include the presence or absence of separate-phase product, total BTEX, and total PAHs. Dense separate-phase product is present within both the shallow water-table and lower sand aquifer at on-site locations. The separate-phase product is most likely associated with residual coal tar. Volatile organics such as BTEX are the most soluble constituents associated with MGP wastes and, therefore, should define the downgradient extent of any groundwater plume. The PAH compounds are less soluble than BTEX but are primary indicators of coal-tar degradation in soil and groundwater due to their high concentrations in MPG wastes.

Why not water sample at 13B? very high!

3.65.1 Shallow Aquifer

3.6.1.2 Separate-Phase Product

Groundwater samples collected from shallow Monitor Wells MW-5 and MW-9 on January 31, 1994 contained droplets of a dense separate-phase product most likely associated with localized pockets of residual coal tar in the subsurface. While product droplets were apparent, no measurable quantity or thickness of the separate-phase product was present. Groundwater samples from Monitor Wells MW-5 and MW-9 were not submitted for analysis to avoid contamination of laboratory analytical instruments.

3.6.1.2 Benzene, Toluene, Ethylbenzene, and Xylenes

BTEX compounds were present at detectable levels in on-site shallow Monitor Wells MW-4, MW-8, MW-12, MW-13, MW-14, and MW-15 (Figure 6). BTEX compounds were expected to be present in Monitor Wells MW-5 and MW-9 due to the presence of dense separate-phase product droplets in these monitor wells. BTEX levels have decreased since the Phase III

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sampling event at Monitor Wells MW-4, MW-12, MW-13, and MW-14. Benzene was present along the western border of the site at levels above the Primary Drinking Water Standard of five ug/L at Monitor Well MW-12, MW-13, and MW-14 (54 ug/L, 800 ug/L, and 720 ug/L, respectively). The benzene concentration in Monitor Well MW-4 will likely exceed the Primary Drinking Water Standard although it was flagged during quality assurance/quality control QA/QC procedures; however, groundwater-elevation data indicate this well is not located along the downgradient limit of the site.

Groundwater-quality data for the off-site monitor wells indicate BTEX concentrations were below laboratory detection limits at all off-site locations sampled during the Phase III and Phase IV investigations except xylene which was detected in Monitor Well MW-17 at 3.3 ug/L during the Phase IV sampling event. Monitor Well MW-17 is not located downgradient of the site. Therefore, the presence of xylene would not likely be related to the former MGP site. The downgradient extent of the BTEX in the shallow water-table aquifer detected at Monitor Wells MW-12 and MW-13 is defined by non-detectable levels of BTEX in Monitor Well MW-21. Therefore, it does not appear that BTEX compounds have migrated off-site within the water-table aquifer in this location. This suggests that natural attenuation processes (sorption and biodegradation) are active in the aquifer and are impeding the migration of MGP-related constituents within the shallow groundwater.

PAH compounds were present in on-site Monitor Wells MW-12, MW-13, MW-14, and MW-15. The concentration of total PAHs decreased in these four wells since the Phase III sampling events. PAH compounds were expected to be present in Monitor Wells MW-5 and MW-9 due to the presence of droplets of separate-phase product. No PAHs were detected in Phase III off-site shallow monitor wells during either the Phase III or Phase IV sampling events. This is consistent with the results for the more soluble BTEX compounds.

PAH compounds were detected in Monitor Well OW-1 during both Phase III sampling rounds and a preliminary sampling completed in September 1988 (Geraghty & Miller, Inc. 1989).

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The presence of PAHs at Monitor Well OW-1 was not likely the result of off-site migration from the site because no volatile compounds are present (Table 13). The most likely source of the PAH levels present at Monitor Well OW-1 would be a localized pocket of residual coal tar within the former Smiths Creek channel debris.

3.6.2 Lower Sand Aquifer

3.6.2.1 Separate-Phase Product

Measurable thicknesses of approximately one to seven feet of dense separate-phase product was present in on-site Monitor Wells MW-13B, RW-24B, and RW-25B along the western border of the site during the Phase IV sampling which confirms visual observations of staining and residual coal tar in split-spoon samples collected during the installation of these wells. The dense separate-phase product encountered in the B-Series wells would most likely be associated with residual coal tar that has migrated downward from the surface of the site.

3.6.2.2 Benzene, Toluene, Ethylbenzene, Xylenes

The B-Series and C-Series monitor wells were used to evaluate the vertical extent of groundwater quality defined by the shallow water-table monitor wells. BTEX compounds are present at elevated levels in the lower sand aquifer at Monitor Wells MW-4B and MW-13B, suggesting that the silty clay is not completely effective in preventing the downward migration of MGP constituents. The visible staining of the silty clay unit observed during the installation of deeper monitor wells along the western border of the site and the presence of dense separate-phase product detected in Monitor Wells MW-13B, RW-24, and RW-25 indicate that the lower sand aquifer is degraded within the borders of the site. Based on the available groundwater-quality data (Table 13), the highest elevated BTEX levels at the site were detected at Monitor Well MW-13B. The downgradient extent of the BTEX plume present at Monitor Well MW-13B is defined by non-detectable levels of BTEX in Monitor Well MW-21B because groundwater flow in the lower sand aquifer is toward the west and unaffected by shallow hydraulic gradients

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associated with the former Smiths Creek channel. As such, BTEX compounds do not appear to have migrated off-site within the lower sand aquifer, consistent with conditions observed for the shallow water-table aquifer.

The groundwater-quality data indicate that the vertical extent of the BTEX plume detected in Monitor Well MW-13B was defined by BTEX levels near laboratory detection limits in Monitor Well MW-13C. It appears that the presence of a downward hydraulic gradient between the shallow water-table aquifer and the lower sand aquifer and a denser-than-water source material (coal tar) have resulted in degradation of the lower sand aquifer. However, a downward hydraulic gradient does not exist between Monitor Wells MW-13B and MW-13C (Table 3); therefore, further downward expansion of the plume would occur primarily due to the density of the source material being greater than water.

3.6.2.3 Polynuclear Aromatic Hydrocarbons

The extent of groundwater-quality degradation, as defined by detectable BTEX compounds in the lower sand aquifer along the western border of the site, is supported by the PAH data for Monitor Well MW-13B. The presence of dense separate-phase product in Monitor Well MW-13B was reflected by highly elevated levels of PAHs during the Phase III sampling. PAHs remained below detectable limits at Monitor Well MW-4B, indicating that degradation of the lower sand aquifer was limited to BTEX compounds at that location. PAH compounds were near laboratory detection limits in Monitor Well MW-13C during the Phase IV sampling event, confirming low levels detected during the Phase III sampling round. No PAH compounds were detected in deeper off-site monitor wells, which is consistent with the results for more soluble BTEX compounds.

3.7 SOIL-VAPOR EXTRACTION TESTING

Data collected from the SVE test performed in March 1993 are presented in Tables 7, 8, and 9. The data concluded that soil vapor extraction using vertical wells might not be applicable at the site. Approximately 68 inches of vacuum was applied to the wells, which caused

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groundwater to upwell into the well screens, that had been installed at five to six feet within the vadose zone. The wells became clogged, and little vacuum influence was achieved in the subsurface. Due to the upwelling of groundwater, significant air flow through the vadose zone was not achieved. Therefore, the shallow water table at the site precludes the applicability of vertical well SVE at the site.

3.8 BIOREMEDIATION TREATABILITY TESTING

Results from the total heterotrophic microbial plating studies indicated population values ranging from less than 9.3×10^4 colony following units/gram (CFU/g) to 4.4×10^5 CFU/g. Coal-tar degrading microbial populations values ranged from 3.1×10^5 CFU/g to 9.4×10^5 CFU/g. Microbial populations in samples can range from 1×10^2 to greater than 1×10^9 CFU/g. Typical soil populations range from 1×10^4 to 1×10^6 CFU/g. These results indicated a viable microbial population was present in the samples, and the microbes have adapted to degrade the coal-tar residue at the site.

The TPH values ranged from 21 to 950 mg/kg. The soil pH ranged from 7.5 to 7.9. The soil pH is within the optimal range of 6 to 8 for microbial growth. The moisture content ranged from 55.2 to 80.9 percent of the soil holding capacity. The suggested moisture content for optimal growth is between 40 and 70 percent of the soil holding capacity. Sample VM-3A (Dirty) had a moisture content above the optimal range, 80.9 percent. The soluble ammonia values ranged from 0.8 mg/kg to 9.7 mg/kg. The soluble ortho-phosphate values were 0.1 mg/kg in all the samples.

The highest respiration rates were occurring in Samples VM-3A (Dirty) and VM-2A. The respiration rates in samples VM-1A and VM-2A (Clean) were significantly lower. The complete presentation of data for the biotreatability test are included in Appendix L.

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4.0 RISK ASSESSMENT

A risk assessment was conducted to evaluate whether constituents detected in soil and groundwater at the former Norfolk MGP site pose a risk to human health. This section describes the methodologies used in the risk assessment and summarizes the results.

4.1 INTRODUCTION

The risks to human health and the environment associated with exposure to constituents detected in soils and groundwater at the former Norfolk MGP site were first evaluated by Geraghty & Miller in 1990 (Geraghty & Miller, Inc. 1990). The risk assessment addressed: (1) the potential for exposure to constituents found at the site; (2) the inherent toxicological hazards associated with the detected constituents; (3) the risks posed by potential exposure to constituents detected at the site.

In developing potential exposure scenarios, the site was divided into two zones, Zone 1 that encompasses the northern half of the site, and Zone 2 that comprises the former MGP operations area. The limits of Zones 1 and 2 were delineated based on soil-quality data and information regarding the presence of subsurface structures, generated during the Phase I field investigation, that affect the feasibility of future development schemes. The risk evaluation addressed potential exposure pathways to MGP-related constituents associated with both current site conditions and possible site development scenarios such as slab-on-grade commercial buildings in Zone 1 and a paved parking area in Zone 2.

The initial risk assessment examined a total of 11 exposure pathways (current and hypothetical) to soils in Zones 1 and 2 at the site. Groundwater and surface water were eliminated from the evaluation as exposure pathways because no current or expected future groundwater supply uses exist in the site vicinity; no surface water bodies exist within 2,000 feet of the site; and no data were available to support an off-site risk analysis. The site receptors that were considered included maintenance workers in Zone 1 and a parking lot attendant in Zone 2.

Future hypothetical receptors included construction workers in both Zone 1 and 2, commercial employees in Zone 1 and the parking lot attendant and commuters in Zone 2.

Public health risks to both non-carcinogenic and carcinogenic compounds were calculated for the various receptors identified. The hazard indices (HIs) associated with non-carcinogenic effects were determined to be acceptable (i.e., less than 1) for all exposure scenarios. Calculated excess lifetime cancer risks (ELCRs) were below 10^{-6} for all exposure scenarios with the exception of the current maintenance worker in Zone 1 and the current parking lot attendant in Zone 2. ELCRs for these receptors were within the potentially acceptable range of 10^{-4} to 10^{-6}.

Since the completion of the initial risk analysis in 1990, the construction of a landscaped asphalt parking lot over the entire site has been initiated to provide a needed parking area for the City of Norfolk. The parking lot has been designed as an effective remedial measure to isolate impacted soils at the site from surface receptors and is scheduled to be completed in the fall of 1994. As such, the following updated risk evaluation has been completed to reexamine the human health risks associated with potential exposure to the constituents detected in the soils at the site under the capped site scenario. Since a single land use will be employed, the site division into separate zones has been eliminated, and the highest constituent concentrations detected in soils primarily in the southern portion of the site (i.e., Zone 2) have been used for the updated risk calculations for remaining exposure pathways for soils. Groundwater and surface water were again screened from the risk assessment as exposure pathways because no current or expected future groundwater uses exist in the site vicinity, no evidence of off-site groundwater-quality degradation exists and no surface water bodies exist within 2,000 feet of the site. In addition, the Monticello Trunk Storm Sewer improvement has eliminated discharge of groundwater into the storm sewer as an exposure pathway.

4.2 CONSTITUENT CHARACTERIZATION

This section discusses the occurrence of the constituents detected in soils and

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groundwater at the former MGP site. The soil analytical data collected in 1989 and presented in the Geraghty & Miller report "A Site Assessment and Risk Evaluation of the Norfolk Gas Plant" (Geraghty & Miller, Inc. 1990) were selected as representative of the occurrence of constituents in soils at the site. Groundwater-quality data were presented in the 1990 investigative report (Geraghty & Miller, Inc. 1990), in the May 1991 report "An Off-Site Groundwater Quality Investigation for the Norfolk Gas Plant" (Geraghty & Miller, Inc. 1991), and in this report (i.e, data collected in January 1994). Collectively, these data have been selected to represent on- and off-site groundwater quality at the former Norfolk MGP site.

4.2.1 Occurrence of Constituents in Soil

As discussed in the previously prepared risk assessment (Geraghty & Miller, Inc. 1990), soil samples were collected from two areas at the site (Zones 1 and 2). Zone 1 comprises the northern half of the site, and Zone 2 comprises the former MGP operations area of the site. These areas were evaluated separately in the 1990 risk assessment. However, the City of Norfolk no longer plans to develop the site by zones. Soil concentrations were greatest in the MGP operation area of the site (Zone 2). Therefore, Zone 2 soil-quality data were used in this updated risk assessment to conservatively represent current site conditions. Fourteen soil samples were collected from Zone 2 at depths ranging from zero to six feet below ground surface and analyzed for VOCs and semivolatile organics. Five samples were analyzed for inorganics. The results of the statistical analyses on the soil samples are shown in Table 4-1 located in Appendix M. The table includes the frequency and range of detected values, the arithmetic mean, and the 95 percent upper confidence limit (UCL) on the mean.

Constituents detected in the soil samples included BTEX, 15 PAHs; 2,4-dimethylphenol; phenol, and six inorganics (arsenic, barium, cadmium, chromium, lead, mercury). Except for dibenzo(a,h)anthracene; 2,4-dimethylphenol; and phenol; all the VOCs and semivolatile organics were detected in 12 or more of the 14 samples. The inorganics were detected in all five samples, except for cadmium which was detected only once.

4.2.2 Occurrence of Constituents in On-site/Off-site Groundwater

A discussion of the groundwater investigations conducted at the Norfolk MGP site are provided in Section 3 of this report. The data indicate that groundwater quality has been degraded by coal-tar constituents within the border of the former Norfolk MGP site. Off-site groundwater-quality data indicate that no migration of constituents has occurred beyond the downgradient border of the site within the water-table or lower aquifer.

As discussed in the 1990 Geraghty & Miller risk assessment, exposure to constituents in groundwater is unlikely to occur at the former Norfolk MGP site. Potable water is supplied by the City of Norfolk and is derived largely from reservoirs. No current or expected future uses of groundwater exist on-site. Data collected from off-site monitor wells indicate that no evidence exists of off-site groundwater contamination, and no surface water bodies exist within 2,000 feet of the site. Additionally, the City of Norfolk and VDEQ control the permitting of wells and; therefore, can regulate future use of the groundwater beneath the site. The impermeable asphalt parking lot being installed at the site will prevent the release of vapors from soils and groundwater to the atmosphere and to current or future on-site buildings. Based on the absence of a complete exposure pathway, exposure to groundwater will not be evaluated further in this risk assessment.

In addition, the Monticello Truck Storm Sewer improvements completed in 1991 have resulted in no exposure pathway for MGP-degraded site groundwater to discharge to a surface water body. Therefore, surface-water exposure will not be evaluated further in this risk assessment.

4.2.3 Constituents of Potential Concern

Constituents of potential concern (COCs) were selected for the site following USEPA guidance (1989a, 1993a). Region III USEPA guidance suggests the screening of COCs through the use of risk-based concentrations (RBCs) (USEPA 1993a). Therefore, the USEPA Region III

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RBCs were used as the criteria for selecting the COCs by focusing on those constituents posing the greatest threat to human health. The RBCs for the constituents detected at least once are presented in Table 4-1 in Appendix M. Maximum concentrations of constituents in Zone 2 soils were compared to the residential RBCs. Constituents detected at maximum concentrations greater than the RBCs were retained as COCs.

Ethylbenzene; toluene; xylenes; acenaphthene; anthracene; 2,4-dimethylphenol; fluoranthene; fluorene; phenol; pyrene were detected in soils at levels below the USEPA Region III screening levels for residential exposure. All inorganics (except arsenic) were detected at concentrations below the USEPA Region III screening levels. The maximum detected concentration of benzene; benzo(a)anthracene; benzo(a)pyrene; benzo(b,k)pyrene; chrysene; dibenzo(a,h)anthracene; indeno(1,2,3-cd)pyrene; and naphthalene exceeded the USEPA Region III screening levels. Additionally, several of the semivolatile organics (acenaphthylene; benzo[g,h,i]perylene; and phenanthrene) did not have USEPA Region III screening levels to compare to the measured concentrations. Benzene, semivolatile organics exceeding or without USEPA Region III screening levels, and arsenic were included in the risk assessment as COCs.

The risk-based concentration for lead (825 mg/kg) was derived from the USEPA uptake biokinetic model (UBK). The UBK model provides a method to predict blood lead levels in populations exposed to lead in air, diet, drinking water, soil, dust, and paint. The model is designed to accept input of variables pertaining to site-specific exposures to lead through air, diet, water, soil, dust, and paint. The UBK model then integrates these input parameters with pharmacokinetic algorithms that model absorption, distribution, and excretion of lead in the body. The current version of the UBK model (LEAD5) predicts the mean blood lead levels and population distributions in a sensitive subpopulation, children of ages zero to six years old. Default values for exposure concentrations and pharmacokinetic parameters were incorporated into the UBK model.

4.3 TOXICITY ASSESSMENT

Risk associated with exposure to chemical constituents is a function of the toxicity and exposure dose. Toxicity values for non-carcinogenic and carcinogenic effects are determined from available databases, the USEPA's Integrated Risk Information System (IRIS) (1994) and USEPA's Health Effects Assessment Summary Tables (HEAST) (USEPA 1993b). Because toxicity values for dermal exposure are rarely available (appropriate toxicity data are scarce), the oral reference dose (RfD) and cancer slope factor (CSF) are adjusted to an absorbed dose, using the constituent-specific oral absorption efficiency, as recommended by the USEPA (1989a), to derive an adjusted RfD and CSF to assess dermal exposure. RfDs for the COCs are presented in Table 4-2 in Appendix M. CSFs, cancer type or tumor sites, and carcinogen classifications for the carcinogenic COCs at the site are presented in Table 4-3 in Appendix M. Derivation of the adjusted RfDs and CSFs is shown in Table 4-4 in Appendix M.

4.3.1 Non-Carcinogenic Effects

For many non-carcinogenic effects, protective mechanisms must be overcome before the effect is manifested. Therefore, a finite dose (threshold), below which adverse effects will not occur, is believed to exist for non-carcinogens. A single compound might elicit several adverse effects depending on the dose, the exposure route, and the duration of exposure. For a given chemical, the dose that elicits no effect (NOEL) when evaluating the most sensitive response (the adverse effect that occurs at the lowest dose) in the most sensitive species tested is used to establish an RfD.

The RfD is an estimate of a daily exposure level that is unlikely to cause non-carcinogenic health effects. Therefore, exposure levels must exceed a threshold dose to produce toxic effects. Chronic RfDs are used to assess long-term exposures ranging from seven years to a lifetime. Subchronic RfDs are used to assess short-term exposure periods ranging from two weeks to seven years. In this risk assessment, subchronic RfDs were used to assess the potential for non-

carcinogenic effects for a hypothetical future on-site utility worker.

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RfDs are derived by dividing the NOELs by uncertainty factors typically ranging from 10 to 10,000 depending on the suitability and quality of the available database. RfDs for inhalation exposure that are sanctioned by the USEPA are called reference concentrations (RfCs). In this risk assessment, RfCs have been converted to reference doses for inhalation exposure (RfD_is) by assuming a breathing rate of 20 cubic meters per day (m^3/day) and a body weight of 70 kilograms (kg) (USEPA 1993b). Table 4-2 in Appendix M presents the RfDs used in this risk assessment. Target sites affected by each constituent are shown in the table, as well as the confidence value and uncertainty factors associated with the RfDs. The uncertainty factor represents a specific area of uncertainty inherent in the extrapolation from the available data. The confidence levels (low, medium, high) assess the degree of confidence in the extrapolation of available data.

A limited number of RfDs are available for the PAHs detected at the former Norfolk MGP site. The following PAHs have USEPA-verified RfDs: acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, and pyrene. Naphthalene and pyrene are the only PAH COCs at the site that have USEPA-verified RfDs. The oral RfD for pyrene is the lowest of the oral RfDs that have been established for the PAHs. Therefore, as a conservative approach, the oral RfD for pyrene was used to evaluate non-carcinogenic effects associated with oral exposure to those PAHs for which oral RfDs have not been developed.

4.3.2 Carcinogenic Effects

Constituents are classified as known, probable, or possible human carcinogens based on the USEPA weight-of-evidence scheme in which chemicals are systematically evaluated for their ability to cause cancer in humans or laboratory animals. The USEPA classification scheme (USEPA 1989a) contains six classes, based on the weight of available evidence, as follows:

- A known human carcinogen;
- B1 probable human carcinogen -- limited evidence in humans;
- B2 probable human carcinogen -- sufficient evidence in animals and inadequate data in humans;
- C possible human carcinogen -- limited evidence in animals;
- D inadequate evidence to classify; and
- E evidence of non-carcinogenicity.

The USEPA uses the linearized multistage model for extrapolating cancer risk from high doses associated with occupational exposure or laboratory animal studies to low doses typically associated with environmental exposures. The model provides a 95 percent upperbound estimate of cancer incidence at a given dose. The slope of the extrapolated curve, called the CSF, is used to calculate the probability of cancer associated with the exposure dose. Table 4-3 in Appendix M presents the CSFs used in the risk assessment. Target sites affected by each constituent are shown in the table for both the oral and inhalation routes. USEPA cancer classifications also are listed.

Currently, the USEPA does not have a national standard for assigning CSFs to different PAHs. In the past, the policy has been to assume the cancer potency of all of the carcinogenic PAHs is equivalent to that of benzo(a)pyrene. The evaluation of the carcinogenicity of the PAHs was based on a recommendation from the Environmental Criteria and Assessment Office (ECAO) (USEPA 1993c). ECAO conducted a scientific review of PAH cancer potency issues and concluded that a set of toxicity equivalency factors (TEFs) based on a report from Clement International was the most scientifically appropriate approach to PAH cancer risk assessment. TEFs for the PAHs that are COCs at the site are included in Table 4-3.

It is not appropriate to use the oral slope factor to evaluate the risks associated with dermal exposure to carcinogens, such as benzo(a)pyrene, that cause skin cancer through a direct action at the point of application (USEPA 1989a). Therefore, the oral CSF for benzo(a)pyrene

was not adjusted to evaluate dermal exposure to the carcinogenic PAHs. It is noted that where there is the potential for dermal exposure to the carcinogenic PAHs, the cancer risk estimates may be low because cancer risks associated with dermal exposure were not evaluated quantitatively.

4.4 EXPOSURE ASSESSMENT

An exposure assessment was conducted as part of the risk assessment to evaluate the potential exposure pathways that may occur at the former Norfolk MGP site. Exposure can only occur when the potential exists for a receptor to contact released constituents directly or if there is a mechanism for released constituents to be transported to a receptor. Without exposure, there can be no risk. Therefore, the evaluation of exposure is a key element in evaluating potential risk at a site.

4.4.1 Exposure Pathways and Receptors

As discussed in the 1990 risk assessment (Geraghty & Miller, Inc. 1990), and in Section 4.3.2 of this report, exposure to constituents in groundwater and surface water are not a concern for the Norfolk MGP site; therefore, this risk assessment focuses on current and hypothetical future exposure to impacted soils at the site. By autumn 1994, the entire site will be completely covered by an impermeable asphalt parking lot. The cap will be underlain by two to 14 feet of imported fly ash that was applied to create the desired landscaping. This asphalt cap will serve as a barrier against exposure of surface receptors; therefore, on-site current exposure pathways were not identified for soils. In the event that the soils around the perimeter of the cap (i.e., in the margins between the asphalt and sidewalk) are excavated for underground cable or pipe installation, the potential exists for a utility worker or excavation worker to be exposed to constituents detected in soils through incidental ingestion, dermal contact (direct contact to exposed skin), and inhalation of fugitive dust and vapors during excavation activities. The concentrations of constituents in the perimeter soils are much lower than those detected in the

Zone 2 soils. However, as a conservative scenario, the concentrations of constituents detected in the Zone 2 soils were used to evaluate hypothetical future utility worker exposure.

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4.4.2 Exposure Point Concentrations

The soil exposure point concentration was selected as the lower value of the maximum concentration or the 95 percent UCL on the arithmetic mean concentration for combined surficial and subsurface soil in Zone 2. This represents a conservative approach because higher concentrations of COCs were reported for Zone 2 soils compared to the concentrations in Zone 1 soils.

4.4.3 Exposure Dose Calculations

Average daily exposure doses were calculated using site-specific information when available, standard exposure assumptions (USEPA 1989b, 1991a), and professional judgment. Exposure point concentrations were selected as the lesser of the maximum and the UCL concentrations in combined surficial/subsurface soil. A basic assumption underlying all exposure calculations was that the exposure point concentrations would remain constant throughout the exposure period. Natural attenuation processes were not considered. Therefore, using these concentrations as representative exposure point concentrations over the entire exposure period should result in overestimates of exposure.

Current risk assessment guidance requires that the averaging time used to calculate average daily exposure doses depends on the toxic effect (cancer or non-cancer). For cancer effects, the total cumulative dose was averaged over a lifetime (70 years); whereas the total cumulative dose was averaged over the exposure period for non-cancer effects. The approach for carcinogens is based on the assumption that any dose may induce a response (non-threshold), and a given dose has the same probability of inducing a response regardless of the exposure period. In

other words, a higher dose received over a short exposure period is equivalent to a lower dose received over a lifetime, as long as the total dose is the same.

In the event that soils along the site perimeter excavated for underground cable or pipe installation, the potential exists for a utility worker to be exposed to constituents in soil incidental ingestion, dermal contact (direct contact to exposed skin), and inhalation of fugitive dust and vapors. Assumptions used to assess hypothetical future utility worker exposure to subsurface soil include the following:

(1) Body weight of 70 kg (USEPA 1991a);

(2) Breathing (inhalation) rate of 2.5 cubic meters per hour (m^3/hr) (USEPA 1991a);

(3) Incidental ingestion rate of 480 milligrams per day (mg/day) (USEPA 1991a);

(4) Exposed skin area of 3,160 square centimeters (cm^2) (adult wearing a short-sleeved, open-necked shirt, pants, and shoes, with no gloves or hat) (USEPA 1992a);

(5) Soil adherence rate of 1.0 milligrams per square centimeters-day (mg/cm^2-day) (USEPA 1992a);

(6) Exposure time of 8 hours/day (based on professional judgment);

(7) Exposure frequency of five days/week (based on professional judgment); and

(8) Exposure duration of 13 weeks (professional judgement).

Soil exposure doses were calculated following USEPA guidance (1989a, 1991a,b). The

equation used to calculate the soil exposure doses is shown in Table 4-6 of Appendix M, along with an example calculation. Potential inhalation exposure to vapors and particulates originating in the soils is calculated via the volatilization factor (VF) and particulate emission factor (PEF) (USEPA 1991b) as shown in Table 4-6 of Appendix M. The VF and PEF equations were obtained from Region IV USEPA (undated [a]) as a correction to those presented in standard USEPA guidance (USEPA, 1991b). Site-specific information for average soil moisture content (60 percent of saturation), average porosity (30 percent [medium sand]), and average bulk density (120 pounds/cubic feet [lbs/ft^3]) were used in the VF calculation. The exposure doses for the hypothetical future utility worker exposure scenario are summarized in Table 4-7 of Appendix M.

4.5 HUMAN HEALTH RISKS

Risks to human health can be evaluated quantitatively by combining exposure and hazard data. A distinction is made between non-carcinogenic and carcinogenic effects, and two general criteria are used to describe risk: the ELCR (for constituents that are thought to be potential human carcinogens) and the hazard quotient (HQ) (for non-carcinogenic effects).

The ELCR is an estimate of the increased risk of cancer associated with exposure to constituents detected in media at the site. Estimated doses, or intakes, for each constituent are averaged over an expected lifetime of 70 years. It is assumed that a large dose received over a short period is equal to a smaller dose received over a longer period, as long as the total doses are equivalent. The ELCR, equal to the product of the exposure dose and the CSF, is estimated for each known, probable, or possible carcinogenic constituent in each medium. The risk values provided in this report are an indication of the increased risk, above that applying to the general population. The risk estimate is considered to be an upperbound estimate; therefore, it is likely that the true risk is less than that predicted by the model.

As stated in the National Contingency Plan (NCP), Section 3.00.430(e)(2), "For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that

represent an excess upperbound lifetime cancer risk to an individual of between 10^{-4} to 10^{-6} using information on the relationship between dose and response. The USEPA has indicated that where the cumulative site risk to an individual is less than 1 in 10,000 (10^{-4}), action generally is not warranted (USEPA 1991c).

Exposure doses are averaged only over the expected exposure period to evaluate non-carcinogenic effects. The HQ is the ratio of the estimated exposure dose and the RfD. An HQ greater than 1 indicates that the estimated exposure exceeds the RfD. This ratio does not provide the probability of an adverse effect as does the ELCR. Although an HQ greater than 1 indicates that the estimated exposure dose for that constituent exceeds acceptable levels for protection against non-carcinogenic effects, it does not necessarily imply that adverse health effects will occur. The sum of the HQs is the HI. If the HI exceeds 1, the constituents may be grouped according to critical toxic effects, and HIs may be calculated separately for each effect. The USEPA has indicated that when the HI calculated for a site is less than 1, action generally is not warranted (USEPA 1991c).

The risk assessment indicate that because there are no complete exposure pathways, there are no current risks posed by the site. In addition, the risks to potential receptors were within or below acceptable risk ranges. The results of the risk assessment can be summarized as follows:

With the exception of arsenic and benzene, the inorganic constituents and VOCs were detected in soils at concentrations below the USEPA Region III risk-based residential levels. There was one reported arsenic concentrations above the RBC, but the average and UCL concentrations were below the RBC. Considerable scientific debate exists regarding the validity of the arsenic CSF. The USEPA has indicated that the uncertainties in the CSF for arsenic are such that cancer risk estimates could be modified downward by as much as an order of magnitude (USEPA 1992b). The cancer risk estimates for arsenic presented in this report are, therefore, upperbound, conservative values.

No current exposure to impacted soils exists at the Norfolk MGP site. The entire site will be completely covered by an impermeable asphalt parking lot by Autumn 1994. A hypothetical future utility worker potentially could be exposed to constituents in soils around the perimeter of the cap (i.e., in the margins between the asphalt and sidewalk) through incidental ingestion, dermal contact, and inhalation of fugitive dust and vapors. As a conservative assumption, soil concentrations in the most impacted area of the site (Zone 2) were used as exposure point concentrations for a hypothetical future utility worker. The ELCR and HI for this scenario are $1x10^{-5}$ and 0.7, respectively. The ELCR is within the USEPA target risk range of 10^{-4} and 10^{-6}. The HI is below the USEPA target HI of one.

4.6 UNCERTAINTIES IN THE RISK ASSESSMENT

The risk estimates presented here are conservative estimates of the risks associated with exposure to constituents detected in soil samples. Uncertainty is inherent in the risk assessment process, and these uncertainties are identified in this section. Each of the three basic building blocks for risk assessment (monitoring data, exposure scenarios, and toxicity values) contribute uncertainties. Environmental sampling itself introduces uncertainty, largely because of the potential for uneven distribution of constituents in the environment.

Exposure scenarios contribute uncertainty to the risk assessment. Exposure doses were calculated based on the assumption that the current conditions would remain stable throughout the exposure period. This simplifies reality because natural attenuation processes are expected to reduce constituent concentrations over time. Although uncertainty is inherent in the exposure assessment, the exposure assumptions also were chosen to err on the side of conservatism.

The toxicity values and other toxicologic (health effects) information used in this report are associated with significant uncertainty. Many toxicity values are developed using results of studies in which laboratory animals are exposed to high doses. Although species differences in absorption, distribution, metabolism, excretion, and target organ sensitivity are well documented,

available data are not sufficient to allow compensation for these differences. Most laboratory studies strictly control as many factors as possible, yet the human population is genetically diverse and affected by a variety of diets, occupations, pharmaceuticals, and other factors. When human epidemiologic data are available, a different set of uncertainties is present. For instance, exposure dose is seldom well characterized in epidemiologic studies.

Recent research on the mechanisms of carcinogenesis suggests that use of the linearized multistage model may overestimate the cancer risks associated with exposure to low doses of chemicals. At high doses, many chemicals cause large-scale cell death that stimulates replacement by division. Dividing cells are more subject to mutations than quiescent (non-dividing) cells; thus, an increased potential for tumor formation exists. It is possible that administration of these same chemicals at lower doses would not increase cell division and, thus, would not increase mutations. This would suggest that the current methodology may over- estimate cancer risk.

Uncertainty is also associated with the toxicity of mixtures. For the most part, data about the toxicity of chemical mixtures are unavailable. Rather, toxicity studies generally are performed using a single chemical. Chemicals present in a mixture can interact chemically to yield a new chemical or one can interfere with the absorption, distribution, metabolism, or excretion of another. Chemicals also may act by the same mechanism at the same target organ or can act completely independently. The risk assessment assumes that toxicity is additive; the ELCRs and HQs were summed across chemicals. This assumes that the mixture of constituents present at the site has neither synergistic nor antagonistic interactions.

The use of upperbound assumptions, no attenuation, and the conservatism built into the RfDs and CSFs are believed to result in an overestimate of human-health risk. Therefore, actual risk may be lower than the estimates presented here but is unlikely to be greater.

4.7 FINDINGS AND CONCLUSIONS

This risk assessment was conducted to evaluate whether the presence of MGP constituents in soils and groundwater at the former Norfolk MGP site pose a threat to human health. No current receptors were identified for soils or groundwater and therefore there are no risks to human health. The soils at the site are covered with an impermeable cap, and no current or expected future uses of groundwater exist.

The only hypothetical future soil receptor identified was a utility worker exposed to constituents during potential excavation activities. A utility worker potentially could be exposed to constituents in soils through incidental ingestion, dermal contract, and inhalation of fugitive dust and vapors. The ELCR and HI for this scenario are 1×10^{-5} and 0.7, respectively. The ELCR is within the USEPA target risk range of 10^{-4} and 10^{-6}. The HI is below the USEPA target HI of one. As a result, soils at the former Norfolk MGP site are not expected to pose a risk to human health.

ORIGINAL (Red)

5.0 SITE REMEDIATION OBJECTIVES

Site remedial action objectives have been developed for each of the environmental media at the site. The remedial action objectives are derived from §4.4.C.5 of the VDEQ Solid Waste Management Regulations (SWMRs) (VDEQ 1973) and results of the site characterization investigation. The VDEQ is using these regulations as guidelines for their voluntary cleanup program under which the Norfolk MGP site is being addressed. The remedy to be selected for the site should:

- Be protective of human health and the environment;
- Attain cleanup standards; and
- Control the source of the release in order to reduce or eliminate, to the extent practicable, further releases of waste that may pose a threat to human health and the environment.

Soil and groundwater are identified as the potential media of concern based on the results of the site investigation. Therefore, action levels will be identified for those media of concern. For constituents for which no established action levels exist, cleanup standards will be developed. Risk-based cleanup levels will be used as the focus for remedial selection.

5.1 IDENTIFICATION OF ACTION LEVELS

Pursuant to §4.5 of the SWMR action levels are defined as follows:

5.1.1 Soil

Assuming exposure through consumption of impacted soil with an concentration-based action level is established which satisfies the following criteria:

- Derived in a manner consistent with federal guidelines for assessing the health risk of environmental pollutants;
- Based on scientifically valid studies conducted in accordance with the Toxic Substances Control Act (TSCA);
- For carcinogens, a concentration associated with an ELCR of 1×10^{-6} due to continuous lifetime exposure; and
- For systemic toxicants, a concentration at which the human population could be exposed on a daily basis that is likely to be without appreciable risk of detrimental effects during a lifetime.

5.1.2 Groundwater

Assuming exposure through consumption of impacted groundwater, a concentration that satisfies the following critiera:

Maximum Contaminant Level (MCLs) as promulgated under 40CFR §141 and constituents for which MCLs have not been promulgated, assuming exposure through the consumption of water at a concentration that satisfies the following criteria:

- Derived in a manner consistent with federal guidelines for assessing the health risk of environmental pollutants;
- Based on scientifically valid studies conducted in accordance with the TSCA;
- For carcinogens, a concentration associated with an ELCR of 1×10^{-6} due to continuous lifetime exposure; and
- For systemic toxicants, a concentration at which the human population could be exposed on a daily basis that is likely to be without appreciable risk of detrimental effects during a lifetime.

The COCs at MGP sites afford varied characteristics, such as mobility and solubility. Implementing remedial technologies to attain regulatory action levels would be impracticable and would result in increased risks to human health and the environment by potentially providing a direct exposure pathway or would involve maintaining costly treatment systems in perpetuity without ever attaining the action level (e.g., MCL). Therefore, it is concluded that restoration of the Norfolk MGP site to meet the above-described soil and groundwater action levels cannot be achieved.

5.2 IDENTIFICATION OF RISK-BASED CLEANUP LEVELS

The State, however, can establish risk-based cleanup standards for remediation. As described in §4.6 of the SWMR, "cleanup standards shall be concentrations which protect human health and the environment. For known or suspected carcinogens, cleanup standards shall be established at concentration levels which represent an ELCR to an individual of between 1×10^{-4} to 1×10^{-6}.

As discussed in Section 4.0, a risk assessment was performed for the site. Risk calculations were performed using the soil constituent concentrations obtained during the Phase I and II investigations to evaluate future exposure scenarios to subsurface soils at the margins of the site during utility excavation. As an asphalt parking lot, an evaluation was not performed for groundwater scenarios. Groundwater is not being utilized as a drinking water source in the site

vicinity nor is its use expected in the future. The VDEQ has restrictions on the installation of portable water wells within the City of Norfolk. The Virginia State Health Department currently prohibits the use of the water-table aquifer for public drinking water supply.

PFE ORIGINAL (Red)

6.0 DEVELOPMENT AND SCREENING OF REMEDIAL TECHNOLOGIES

In this section, the areas of concern for the site will be identified, and remedial technologies will be evaluated for each of the media. After screening, the technologies that have been retained will be compiled into a range of remedial alternatives, which will be described in Section 7.0.

6.1 IDENTIFICATION OF TARGET AREAS

During the investigations of the Norfolk MGP site, two areas of concern were identified. These two areas included soils and groundwater. They will be discussed in more detail in the following sections.

6.1.1 Soils

Soil quality was found to be degraded throughout the former gas plant area and also within the former Smiths Creek channel. Volatile compounds (BTEX) and PAHs were found in soil samples collected across the site. Elevated concentrations of lead were found to be present in shallow soils across the site, while elevated concentrations of cyanide were limited to the southern portion of the site. Toxicity testing performed at the site soils indicated that the soils were not a RCRA hazardous waste due to metal concentrations. However, volatile organic analyses using TCLP suggested that the soils could be classified a RCRA hazardous waste based upon the benzene concentrations. The unsaturated soils are limited to property owned by the City of Norfolk.

6.1.2 Groundwater

Groundwater quality was characterized within the shallow water-table and lower sand aquifer. Groundwater within the shallow water-table aquifer was degraded by elevated concentrations of BTEX, PAHs, and inorganics. Water quality within the lower sand aquifer showed degradation by dissolved BTEX and PAH compounds and the presence of separate-phase product at the downgradient border of the site. Groundwater-quality degradation within the lower sand aquifer was limited to approximately 70 feet below grade.

As described in Section 3, a dense separate-phase product was discovered in several locations throughout the site; specifically Monitor Wells MW-5, MW-9, and MW-13B. The shallow water-table and lower sand aquifers contained groundwater degraded by MGP constituents. This groundwater-quality degradation appears to be restricted to the site boundary based on the available monitor well data.

6.2 IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

In this section, potential remedial technologies for soils and groundwater are identified based on the PFS (Geraghty & Miller, Inc. 1992) that served as an initial screening of remedial technologies. In the Preliminary Feasibility Study, Geraghty & Miller examined technologies that were potentially viable at the site based upon experience with similar MGP sites. The technologies described below are proven and effective for these types of sites and the constituents of concern. As recommended in the report, additional data gathering was performed to better evaluate these technologies. The conclusions from the additional field activities are presented in Section 3. The results from this task have been used to further screen the technologies for their applicability for the site. The surviving technologies will then be assembled into remedial alternatives for the Norfolk MGP site.

6.2.1 Soil Remedial Technologies

Based upon current site conditions, several remedial technologies were identified as described in the Preliminary Feasibility Study at the Norfolk MGP site. These technologies were refined using information obtained during the FFS. General response actions were developed to include no action, institutional controls, containment, excavation, treatment, and disposal. These general response actions may be used singularly or in combination with other actions.

6.2.1.1 No Action

No action is used as a baseline for comparison to evaluate the potential impacts associated with not implementing any remedial actions for soils at the site. No action is defined as the absence of active steps to remediate soils but may include periodic monitoring of soil-quality conditions. No action will be retained for soils because the risk assessment indicated soils do not pose a human health risk.

6.2.1.2 Institutional Controls

Institutional controls are used to limit the exposure to hazardous substances by limiting human activities at or near facilities where hazardous substances remain on-site. Institutional controls for soils could include fencing, land use prohibitions, deed restrictions, and deed notices. The site is currently fenced and access is restricted to City of Norfolk employees. Deed restrictions involve annotating the deed for the subject property to limit future activities that could expose humans to subsurface soils left in place. Deed restrictions also would restrict future development and use of the site, such as prohibiting construction of subsurface foundations at the site. The City of Norfolk currently owns the site; thus, they would have no difficulty implementing deed restrictions on the property. Institutional controls will be retained as a feasible technology.

6.2.1.3 Containment

Containment refers to the isolation of waste through engineering controls. These engineering controls would reduce the infiltration of precipitation into wastes left in place, reduce the exposure of waste to humans and the environment, and reduce the potential for contamination of air and surface waters. Containment includes storm-water management controls and capping. Capping is a proven remedial technology for minimizing direct contact exposure pathways for human and environmental receptors to subsurface soils. Typical cap construction materials could include topsoil, common borrow soils, compacted clay, soil/bentonite mixtures, synthetic membranes, concrete, asphalt, or synthetic membrane/clay composites.

The City of Norfolk and Virginia Power are currently installing a permanent cover system at the site. This cover system, or cap, consists of two to 10 feet of flyash that is being placed on the site and covered with four to six inches of asphalt. Flyash is being supplied the Virginia Power Chesapeake Energy Center, which is a peak coal-fired electric generation plant. The City of Norfolk has elected to develop this property into an improved parking facility, which is consistent with the results of the site risk assessment. Construction of the cap is beginning on the northern portion of the site and working toward the southern end. Construction is anticipated to be complete by late 1994. Thus, the planned surface cover would minimize direct contact exposure pathways for human and environmental receptors. Therefore, containment will be retained for further consideration.

6.2.1.4 Excavation

Excavation may be required in situations where wastes may be located unacceptably close to potential receptors. Excavation of soils may also be effective for hot spots or areas of elevated constituent levels. This technology is typically used in conjunction with treatment and/or disposal. Intrusive investigation at the site has not identified the presence of any defined areas of product or heavily stained materials. In

general, the entire site area contains soils of similar MGP concentrations. Additionally, the entire site consists of rubble and foundations in the subsurface. Thus, excavation would not be practical at the site because of the volume associated with removing all affected soils or wastes at the site and the difficulty in excavating and segregating this material for treatment and/or disposal. This remedial technology would also not be practical because excavation would cause greater risk to human health and the environment by exposing the wastes in the subsurface. Because the soils are contained, excavation of the soils would pose difficulty due to current site conditions, and greater risk to human health would be posed by excavation. Therefore, excavation will be eliminated from further consideration.

6.2.1.5 Stabilization

Stabilization of the soils would be performed by amending the soils with cement, flyash, or similar binding agents. The process would seal constituents in the soil/binding agent matrix and minimize the mobility of the COCs at the site. Stabilization is not a stand-alone remedial measure and would be used in conjunction with excavation and disposal. Organic compounds would not be immobilized, whereas inorganics such as lead would be stabilized. Since VOCs and PAHs, are the primary COCs, and rubble is present through the site, ex-situ stabilization of affected soils and wastes would not be practical. Therefore, stabilization will not be considered further.

6.2.1.6 In-situ Bioremediation

Biological treatment of soils involves the use of microorganisms to metabolize or degrade organic waste constituents. The ultimate goal is to convert organic wastes into biomass and harmless products such as carbon dioxide, methane, and inorganic salts. These processes are naturally occuring in site soils; however, modifications can be made to enhance these processes. In-situ bioremediation would be applicable for VOCs that may be associated with MGP wastes; however, many of the PAHs that are also present at the site would not be affected by this technology. Various studies conducted by the Gas

Research Institute (GRI) and Electric Power Research Institute (EPRI) indicate that biodegradation of PAHs is generally effective for lower molecular weight compounds having three hydrocarbon rings or less.

Geraghty & Miller performed bioremediation treatability testing as a result of the FFS. Soil samples were collected and evaluated for the following:

- To determine if aerobic microbes were present;
- To determine if the microbes had adapted to degrade selected organic compounds;
- To determine if the environmental conditions (pH and moisture content) were conducive to support microbes; and
- To determine if soluble inorganic nutrients (ammonia and ortho-phosphate) were present in sufficient quantities for bioremediation of the contaminants.

Results from the microbiological evaluation of the soils at the former Norfolk MGP site indicated that aerobic activity was occurring. Analyses of the soils, pH, moisture content, and respirometer testing, indicated favorable conditions for the microbes in the soil to use MGP-related constituents as a carbon source. Thus, in-situ bioremediation was naturally occurring without any additional enhancements at the site. Therefore, based upon the results of the treatability testing performed on samples obtained from the site, in-situ bioremediation will be retained for further evaluation.

6.2.1.7 SVE

SVE technology uses a vacuum applied to a series of extraction wells to create air flow through the vadose zone. Volatile contaminants move through the soil and are withdrawn and treated by an emission control system such as activated carbon.

Geraghty & Miller performed a pilot SVE test in March 1993 as part of the FFS. In performing the SVE test, this technology would be screened further in conjunction with in-situ bioremediation in order to enhance the degradation of MGP-related constituents in the subsurface. Results from the pilot test indicated that the vacuum caused the water table to mound, which allowed for groundwater to flood the well. In turn, the well screen was clogged, and very little air flow was achieved in the subsurface.

However, the data indicated that horizontal wells may be more appropriate than vertical wells. Horizontal wells would be placed at four feet depths and connected to a vertical riser. Horizontal wells would provide more screen length for air flow and would not have the upwelling problems experienced with vertical wells since the horizontal wells would be placed above the water table. These type of wells however, may be difficult to construct at the site because of the numerous foundations and structures present in the subsurface.

SVE would be a short-term remediation technology that would be effective for the VOCs present at the site. SVE would have limited effectiveness on the higher ring PAHs due to their low volatility. Based upon the pilot test results and the current site conditions, SVE will be eliminated from further consideration.

6.2.1.8 Disposal

Disposal would be used in conjunction with excavation and/or treatment. The excavated material would likely be disposed off-site. As described previously, this technology would not be practical due to the large volume of affected soils that is associated with the site. Specific areas that could be addressed as hot spots were not identified; the entire site is, therefore, considered a source area. Also, as previously described, a greater risk to human health and the environment would be associated with excavating the material at the site. Therefore, disposal will be eliminated from further consideration.

6.2.2 Groundwater Remedial Technologies

Based on current site conditions, several remedial technologies were developed for groundwater at the Norfolk MGP site. General response actions were developed to include no action, institutional controls, containment, and product recovery. These general response actions may be used singularly or in combination with other actions.

6.2.2.1 No Action

No action is used as a baseline for comparison to evaluate the potential impacts associated with not implementing any remedial action. No action is defined as the absence of active steps to remediate groundwater but may include periodic site groundwater monitoring. Since groundwater is not used as potable water source, no action will be retained as a potential technology for the Norfolk MGP site.

6.2.2.2 Institutional Controls

As previously discussed, institutional controls are used to limit the exposure to hazardous substances by limiting human activities at or near facilities where hazardous substances will remain on-site. Deed restrictions are a form of institutional controls that would restrict future development and use of the site, such as prohibiting construction of on-site residential wells. The site is currently vacant and used as a parking lot. On-site groundwater is not being used for drinking water purposes. The Virginia State Health Department does not permit using the water-table aquifer for public water supplies. Therefore, institutional controls could effectively eliminate the exposure pathway associated with groundwater in the site vicinity, institutional controls will be retained as a feasible technology.

6.2.2.3 Site Monitoring

Regularly scheduled groundwater sampling and analysis would be undertaken to monitor the condition of groundwater beneath and adjacent to the site. Analysis would include VOCs, PAHs , and selected inorganics. Existing wells could be utilized for the groundwater monitoring program. Site monitoring will be retained as a feasible technology for further consideration.

6.2.2.4 Containment

Containment is used to control the migration of contaminants in the groundwater. Several methods of containing groundwater exist and include natural bioremediation, physical barriers, and hydraulic barriers. Containment provides a method of controlling groundwater to prevent migration to a receptor as opposed to restoration of an aquifer to a designated cleanup standard. Restoration of groundwater at an MGP site, such as Norfolk, is not achievable because of the difficulty in mobilizing PAHs and separate-phase product droplets. Thus, groundwater can be contained using various technologies, but remediation to action levels is not reasonable.

Natural or enhanced bioremediation is a method of groundwater containment. As discussed previously in the soil remedial technologies (Section 6.2.1.6), passive in-situ bioremediation of soils is occurring at the site. Site conditions are favorable for the aerobic microbes to use MGP-related constituents as a carbon source for nutrients. Research conducted by the Electric Power Research Institute (EPRI) and Gas Research Institute (GRI), on numerous MGP sites throughout the United States have shown that MGP-constituents in groundwater can be degraded by naturally occurring aerobic microbes. This amount of microbial degradation can haven an impact on the size of the dissolve plume that originates at an MGP site. It appears that natural bioremediation is occurring in both the water-table and lower sand aquifers based on the fact that the former MGP plant has been located at the site for more than 140 years and that MGP constituents

in groundwater do not appear to have migrated off-site. Therefore, natural bioremediation will be retained as a method for achieving groundwater containment.

If natural bioremediation is not completely effective as a groundwater containment technology, the potential to enhance in-situ groundwater bioremediation through the addition of oxygen and/or nutrients to the aquifer will be considered. In the event that both natural and enhanced bioremediation are not effective, then other options for containment such as physical and/or hydraulic barriers will be considered.

Physical barriers are typically used to reduce the horizontal permeability of the soils. Several options are available for physical barriers including slurry walls, sheet piling walls, and grout curtains. These physical barriers are fabricated of low permeability materials, such as mixtures of soil and bentonite, mixtures of cement and bentonite, or engineered materials (e.g., sheet piling). A chemical analysis of wall/contaminant compatibility is necessary for the final selection of construction materials. These walls may be keyed into an underlying, low permeability zone, such as a clay horizon.

A hydraulic barrier utilizes groundwater extraction to control migration and could consist of an interceptor trench, drain, or pumping wells. An interceptor trench or drain typically consists of an excavated trench filled with a permeable material such as stone, sand, or gravel. Perforated piping along the trench is often incorporated as a collection conduit. The overlying permeable materials induce groundwater to flow into the trench. A trench or drain is sloped to one or more sumps, where pumps or skimmers remove the collected fluids. The interceptor trench or drain is typically anchored into a relatively impermeable confining layer.

Groundwater extraction wells are an effective means of collecting and controlling groundwater flow at a site. Groundwater wells would be equipped with submersible pumps or with a series of well points connected to a vacuum header. Extracted groundwater would be treated prior to discharge to a publicly owned treatment works

(POTW) or surface water body. The local POTW, HRSD, will not accept groundwater from long-term remediation projects without extensive pretreatment to levels near National Pollutant Discharge Elimination System (NPDES) limits.

6.2.5 Product Recovery

Product recovery is a common remedial technology used at sites that have a measurable product layer in contact with groundwater. Separate-phase product droplets exist at MGP sites commonly without measurable product accumulations. In monitor wells that contain dense separate-phase product, remedial measures can range from periodic bailing to automated pumping for product recovery. Product recovery rates are a function of the mobility of the product droplets.

Existing wells that contain measurable thicknesses of dense separate-phase product could be used as recovery wells. The initial phase of product recovery may involve periodic bailing of the product, followed by monitoring of the product recharge rate. If periodic bailing indicated that the product layer does not recover in the well(s), then no additional remediation for dense separate-phase product would occur. If the periodic bailing is not effective at removing separate-phase product on a continuing basis, then an automated product recovery scheme may be used to improve recovery efficiency.

Dense separate-phase product pumping typically involves pumping of only the product layer. In some cases, the product recovery scheme may also include an additional well constructed adjacent to the product recovery well with the screen interval in the groundwater zone. Groundwater is withdrawn from the upper screen which results in upwelling of the separate-phase product. A conductance sensor is placed within the well at the static level of the dense separate-phase product. Upon detection of a suitable recoverable amount of dense separate-phase product, a high pressure pump would recover the product from the well and discharge it into an above ground recovery tank. Proper disposal of the dense separate-phase product would be required once the tank is full.

Because recovery of the dense separate-phase product would be used to reduce contaminant transport into groundwater, this technology will be retained for further consideration.

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7.0 DEVELOPMENT AND DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

The remedial technologies that were not eliminated during the screening process in Section 6 were combined into site-wide remedial alternatives. These site-wide remedial alternatives are described and evaluated under specific criteria in this section.

The site-wide remedial alternatives were developed by combining potential remedial technologies for each of the target medias of concern: soils and groundwater. These remedial alternatives include a true no action alternative, a limited action alternative, and a limited action alternative with source control.

As discussed in Section 6, the site consists of demolished subsurface foundations and will be utilized as a parking lot for current and future use. Characteristic MGP constituents, such as VOCs and PAHs, have different mobilities and solubilities in the media of concern. The risk assessment concluded that potential risks to human receptors under the current exposure scenarios were within acceptable ranges. Treatment of groundwater to attain regulatory-driven cleanup standards would not be cost-effective and would not be achieved in the short-term. To date, field investigations indicate that impacted groundwater has not migrated off-site. Thus, no risk to human health associated with groundwater exists because no receptors are present at the site. In addition, the Virginia State Health Department currently prohibits the use of the water-table aquifer for public drinking water supply.

After the remedial alternatives have been described, each alternative will be evaluated against several criteria cited in §4.4 of the SWMR (VDEQ 1993). As discussed previously, the VDEQ is using these regulations as guidelines for their voluntary cleanup program. These criteria include the following:

- Long-term reliability and effectiveness;
- Reduction of toxicity, mobility, and volume;
- Short-term effectiveness;
- Implementability; and
- Cost.

7.1 REMEDIAL ALTERNATIVE 1

Remedial Alternative 1 represents a no action alternative, where no active remediation for each target area would occur at the site. However, natural bioremediation of both unsaturated soils and groundwater is occurring at the site. The no action alternative is used as a baseline to which the other remedial alternatives can be compared. A summary of Alternative 1 is as follows:

Soils:	No Action
Groundwater:	No Action

7.1.1 Long-term Reliability and Effectiveness

Remedial Alternative 1 would be reliable and effective over the short-term because all current exposure pathways for human health and the environment are acceptable. However, because no mechanisms would exist to control future exposure scenarios, no action would not be reliable and effective in the long term.

7.1.2 Reduction of Toxicity, Mobility, and Volume

MGP-constituent levels in soils and groundwater would be reduced in toxicity or volume only through natural biodegradation. No other treatment would be performed for these target areas. Dense separate-phase product that has accumulated in wells at the downgradient border of the site would continue to exist. The concentrations and extent of MGP-related constituents in groundwater would not be monitored.

7.1.3 Short-term Effectiveness

This remedial alternative would not be completely effective in the short-term because no site remedial action or source containment beyond natural bioremediation would be performed at the site. No site sampling of groundwater would occur; thus, constituent concentrations and migration of MGP constituents in groundwater could not be monitored.

7.1.4 Implementability

No implementability constraints would be associated with this remedial alternative because no activity would be required.

7.1.5 Cost

No costs would be associated with this remedial alternative because no activities would be performed.

7.2 REMEDIAL ALTERNATIVE 2

Remedial Alternative 2 represents an elimination of soil exposure pathways and passive remediation of soils and groundwater. Deed restrictions would be placed on the property to limit future use of the site, control future excavation, and prohibit development of the site for residential purposes. A cover system would be constructed on the entire site for use as a parking lot. As discussed previously, the data from the treatability study indicated that natural bioremediation was occurring in the soils at the site. Deed restrictions would be placed on-site to prevent the installation and extraction of groundwater from wells for any purpose. Natural bioremediation of MGP constituents in groundwater is likely a factor controlling migration. Groundwater monitoring of wells for VOCs (USEPA Method 8020), PAHs (USEPA Method 8270) and metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) would determine any future change in groundwater-flow direction or constituent concentrations. A summary of Alternative 2 is as follows:

Soils: Deed Restrictions, Cover System Installation, Natural Bioremediation
Groundwater: Deed Restrictions, Natural Bioremediation, Groundwater Monitoring

7.2.1 Long-term Reliability and Effectiveness

As described in the Risk Assessment, the soil data indicated that risks were within the acceptable ranges for all current human receptors. Potential future risks to human receptors were also within acceptable ranges. Placing deed restrictions on the property would prohibit both current and future exposure to soils and groundwater. In addition, the City of Norfolk currently owns the site and plans to utilize the site as a parking lot; therefore, future use of the site would be assured. Thus, instituting deed restrictions on the property would be effective in the long-term. With proper maintenance, the cover system is reliable and effective in the long-term. Natural bioremediation may be effective in controlling migration of MGP constituents in groundwater. Groundwater monitoring would be effective in gauging MGP-constituent migration and concentrations.

7.2.2 Reduction in Toxicity, Mobility, and Volume

Remedial Alternative 2 would not reduce the toxicity, mobility, or volume of MGP constituents in soils or groundwater beyond the natural attenuation and bioremediation that is occurring. Dense separate-phase product that has accumulated in wells at the downgradient border of the site would continue to exist.

7.2.3 Short-Term Effectiveness

No short-term risk to the community or workers are associated with this remedial alternative. No adverse short-term effects on human health and the environment would result from the implementation of this remedial alternative. This remedial alternative could be fully implemented within six months of selection. As previously discussed, the cover system is currently being installed.

PFE ORIGINAL (Red)

7.2.4 Implementability

No construction or operation issues related to the implementation of Remedial Alternative 2 exist. Skilled workers, specialized equipment, and off-site transportation and disposal facilities would not be required.

7.2.5 Cost

Costs associated with Remedial Alternative 2 would be higher than those associated with the no action alternative. Initial costs include filing fees associated with deed restrictions and cover system construction. Operational and maintenance costs would include cover system maintenance, and groundwater sample analytical costs associated with long-term groundwater monitoring.

7.3 REMEDIAL ALTERNATIVE 3

Remedial Alternative 3 represents an elimination of soil exposure pathways, with containment of the existing groundwater plume using either natural or active measures. The deed restrictions that would be implemented for soils and groundwater would be identical to those described in Section 7.2 for Remedial Alternative 2. A cover system would be constructed so the site could be utilized as a parking lot.

Groundwater containment would occur to ensure that MGP-related constituents do not migrate from the site. Groundwater containment may be achieved using natural bioremediation, enhanced bioremediation, physical barriers or hydraulic barriers. The method of ensuring groundwater containment would be determined following evaluation of the ability of natural or enhanced bioremediation to achieve containment. Dense separate-phase product would be removed from wells where it has accumulated in measurable thickness. Product recovery would be initiated using periodic bailing and monitoring to determine the effectiveness of periodic recovery. If periodic bailing is not effective at removing separate-phase product on a continuing basis, then an automated product recovery scheme could be used to improve recovery efficiency.

Soils:	Deed Restrictions, Cover System Installation, Natural Bioremediation
Groundwater:	Deed Restrictions, Groundwater Monitoring, Natural Bioremediation, Groundwater Containment, Dense Separate-Phase Product Recovery.

7.3.1 Long-Term Reliability and Effectiveness

As described in the Risk Assessment, the soil data indicated that risks were within the acceptable ranges for all current human receptors. Potential future risks to human receptors were within acceptable ranges. As previously discussed, deed restrictions are an effective means of prohibiting future residential use of the site. This would also be ensured since the City of Norfolk currently owns the property. With proper maintenance, the cover system would be reliable and effective in the long-term.

Containment of the existing groundwater plume can be accomplished using a variety of technologies. The method for demonstrating containment will be periodic monitoring of groundwater quality conditions downgradient of the site.

Dense separate-phase product will be collected as long as a measurable thickness exists in site monitor wells.

7.3.2 Reduction of Toxicity, Mobility, and Volume

The volume of MGP constituents in soils will be reduced because passive bioremediation is occurring in soils at the site. Dense separate-phase product recovery would reduce the volume of MGP-related constituents and support the groundwater containment site objective by removing highly concentrated source materials for groundwater degradation. The migration of MGP-related constituents in groundwater would be controlled.

7.3.3 Short-Term Effectiveness

No short-term risk to the community or workers are associated with this remedial alternative. No adverse short-term effects on human health and the environment would result from the implementation of this remedial alternative. This remedial alternative could be fully implemented within six months of selection.

7.3.4 Implementability

Implementation issues associated with Remedial Alternative 3 include selection of the method of groundwater containment and determination of the appropriate technique for collecting dense separate-phase product.

7.3.5 Cost

Costs associated with implementing Remedial Alternative 3 would be similar to or higher than Remedial Alternative 2. Costs include filing fees associated with deed restrictions, dense separate-phase product recovery, cover system installation and groundwater containment and monitoring. The costs associated with Remedial Alternative 3 will be higher than for Remedial Alternative 2 if physical or hydraulic barrier are needed for groundwater containment and long-term dense separate-phase product is necessary.

7.4 RECOMMENDED REMEDIAL ALTERNATIVE

Based upon the evaluation of the criteria cited in §4.4 of the SWMRs (VDEQ 1993) which is used by the VDEQ as guidelines for their voluntary cleanup program, Remedial Alternatives 2 and 3 would attain these criteria. As a review, a summary of these Alternatives is provided below:

Alternative 2
Soils: Deed Restrictions, Cover System Installation, Natural Bioremediation
Groundwater: Deed Restrictions, Natural Bioremediation, Groundwater Monitoring

Alternative 3	
Soils:	Deed Restrictions, Cover System Installation, Natural Bioremediation
Groundwater:	Deed Restrictions, Groundwater Monitoring, Natural Bioremediation Groundwater Containment, Dense Separate-Phase Product Recovery.

Comparison of the site characterization and risk assessment data to the remedial objectives for Alternatives 2 and 3 indicates that Alternative 2 is the most cost-effective means to comply with §4.4 of the SWMRs (VDEQ 1993). Alternative 2 is recommended for implementation for the following reasons:

- The remedial provisions for soils are identical and are capable of ensuring that no unacceptable risks to human health and the environment exist through the use of the site cover system and deed restrictions.

- The existing site data suggests that natural bioremediation is effectively controlling the movement of MGP constituents in the site groundwater. Thus, a groundwater monitoring program combined with natural bioremediation can be used to ensure that no unacceptable risks exist in the future as a result of off-site migration of MGP constituents in the groundwater.

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8.0 CONCLUSIONS

Investigation of environmental conditions at the former Norfolk MGP site has been completed using a phased approach. Phase I and II consisted of an on-site assessment of shallow soils and groundwater and a risk analysis for potential exposure scenarios associated with site soils and groundwater. The Phase III investigation focused on defining the lateral and vertical extent of groundwater degradation identified by the results of the Phase II on-site investigation. A PFS was completed to establish remedial objectives for the site. A Phase IV investigation has been completed to further evaluate groundwater and soil remedial alternatives and develop a conceptual remedial action plan. Conclusions based on these investigative phases are as follows.

Soil quality was found to be degraded throughout the former gas plant area and also within the former Smiths Creek channel. The lateral and vertical extent of degraded soil quality was determined through both visual observations and laboratory analysis of selected samples. Volatile compounds (BTEX) and PAHs were found in soil samples collected across the site. Analyses for volatile organics (BTEX) using the TCLP procedure suggest that visibly-affected soils could be classified as a RCRA hazardous waste based on benzene concentrations.

The hydrogeology in the site vicinity includes a 15-foot thick, shallow, water-table aquifer. Shallow groundwater flow is hydraulically controlled by the contrast in permeabilities between native geologic materials beneath the former MGP operations area and fill material within the former Smiths Creek channel. As such, shallow groundwater flow beneath the southern portion of the site is toward the west and northwest into the former creek channel fill material.

The base of the water-table aquifer is defined by a laterally continuous silty clay unit that extends to an average depth of 40 feet below ground surface. The silty clay separates the water-table aquifer from the underlying lower sand layer that is a distinct aquifer system. A downward hydraulic gradient exists between the two aquifers. The direction of groundwater flow in the lower sand aquifer is toward the west and is unaffected by the hydraulic influence of the former creek channel.

Groundwater quality in the shallow water-table aquifer throughout the southern portion of the site is degraded by MGP-constituents. Droplets of dense separate-phase product are present in Monitor Wells MW-5 and MW-9 and are, most likely, associated with localized pockets of residual coal tar in the subsurface. No evidence exists that MGP constituents have migrated beyond the downgradient borders of the site within the water-table aquifer although additional shallow monitoring points to the west of Monticello Avenue, within the former Smiths Creek channel, may be warranted.

Groundwater quality in the lower sand aquifer has been degraded by MGP constituents to depths as great as 70 feet within the former MGP site. Monitor Wells MW-13B, RW-24B, and RW-25B along the downgradient border of the site contain measurable thicknesses of dense separate-phase product. Constituent levels below detection limits in Monitor Well MW-21B indicates that groundwater-quality degradation in the lower sand aquifer, observed at the western site border, does not extend off-site.

The updated risk assessment examined human health risks associated with soils, groundwater, and surface water at the site. No current receptors were identified for soil, groundwater, or surface water under the future "capped" site conditions. A hypothetical utility worker could be exposed to soils at the margins of the site in the future. The risk assessment concluded that the risks to this potential receptor were within acceptable ranges.

The recommended remedial alternative for the site includes deed restrictions that would limit soil excavation and groundwater extraction, recovery of separate-phase product present in the lower sand aquifer, groundwater containment to restrict off-site migration of degraded groundwater, and groundwater monitoring. The alternative was selected based on long-term reliability and effectiveness, reduction of constituent mobility, short-term effectiveness, implementability, and cost.

PEE ORIGINAL (Red)

REFERENCES

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ORIGINAL
(Red)

REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR), 1987a. Draft Toxicological Profile for Benzo(a)pyrene. Prepared by ICF-Clement for ATSDR. Oak Ridge National Laboratory, October.

Agency for Toxic Substances and Disease Registry (ATSDR), 1987b. Draft Toxicological Profile for Benzene. Prepared by Oak Ridge National Laboratory for ATSDR. December.

Agency for Toxic Substances and Disease Registry (ATSDR), 1988. Draft Toxicological Profile for Cyanide. Prepared by Technical Resources, Inc. for ATSDR. Oak Ridge National Laboratory, January.

Agency for Toxic Substances and Disease Registry (ATSDR), 1989a. Toxicological Profile for Arsenic. Prepared by Life Systems, Inc. for ATSDR. Oak Ridge National Laboratory, March.

Agency for Toxic Substances and Disease Registry (ATSDR), 1989b. Draft Toxicological Profile for Total Xylenes. Prepared by Clement Associates, Inc. for ATSDR. Oak Ridge National Laboratory, October.

Agency for Toxic Substances and Disease Registry (ATSDR), 1990. Toxicological Profile for Benzo(a)pyrene. Public Health Services, U.S. Department of Health and Human Services, Atlanta, GA.

AQTESOLV-Aquifer Test Solver Documentation, Version 1.00, Geraghty and Miller Modeling Group, Reston, VA, pp. 78.

Atlantic Environmental Services, Inc. (AES), 1988. Management of Manufactured Gas Plant Sites, Volume III - Risk Assessment. Prepared for Gas Research Institute, May. GRI-87/0260.3.

Bouwer, H. and R.C. Rice, 1976. A slug test method for determining concentration data: review and analysis. Research Triangle Institute, Research Triangle Park, NC.

Duffield, G.M. and J.O. Rumbaugh, 1989. Geraghty and Miller's Environmental Research and Technology, Inc. (ERT), 1984. Handbook

Federal Register. 1985. National Primary Drinking Water Regulations; Synthetic Organic Chemicals, Inorganic Chemicals, and Microorganisms. 50(219): 47000-47001.

Federal Register, 1988. Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Final Exclusion. 53(148): 29038-29045.

Geraghty & Miller, Inc. 1988. Quality Assurance Manual.

PFE ORIGINAL

Geraghty & Miller, Inc. 1989. Summary of Soil and Ground-Water Quality Conditions Related to the Monticello Trunk Project. Unpublished consultant report prepared for the City of Norfolk.

Geraghty & Miller, Inc. 1990. A Site Assessment and Risk Evaluation of the Norfolk Gas Plant Site. Unpublished consultant report prepared for the City of Norfolk and Virginia Power.

Geraghty and Miller, Inc. 1991. An Off-site Groundwater Quality Investigation for the Norfolk Gas Plant. Unpublished consultants report prepared for the City of Norfolk and Virginia Power Company.

Goehring, D.B., 1989. NC Division of Health Services. Personal Communication, January 3, to J.S. Heath, Geraghty & Miller, Inc., Raleigh, NC.

Hantush, M.S. and C.E. Jacob. 1955. Non-steady radial flow in an infinite leaky aquifer, Am. Geophys. Union Trans. vol. 36, pp. 95-100.

Hawley, J.K., 1985. Assessment of Health Risks from Exposure to Contaminated Soil. Risk Analysis (5)4:289-302.

Howard, P.H., 1989. Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Volume 1, Large Production and Priority Contaminants. Lewis Publishers, Inc., Chelsea, MI.

Howard, P.H., R.S. Boethling, W.F. Jarvis, W.M. Meylan, and E.M. Michalenko, 1991. Handbook of Environmental Degradation Rates. Lewis Publishers, Inc., Chelsea, MI. 725 pp.

Hwang, S.T., 1982. Toxic Emissions from Land Disposal Facilities. Env. Progress, (1):46-52.

Hwang, S.T., and J.W. Falco, 1986. Estimation of Multimedia Exposures Related to Hazardous Waste Facilities In Pollutants in a Multimedia Environment. Y. Cohen (Ed.), Plenum Press, New York, NY, pp. 229-264.

Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells, Water Resources Research, vol. 12, no. 3, pp. 423-428.

Integrated Risk Information System (IRIS), 1989. U.S. Environmental Protection Agency, Office of Health and Environmental Assessment, Cincinnati, OH.

Integrated Risk Information System (IRIS), 1994. On-line Computerized Database, USEPA.

Kenaga, E.E., 1980. Predicted Bioconcentration Factors and Soil Sorption Coefficients of Pesticides and Other Chemicals. Ecotoxical. Environ. Safety, 4: 26-38.

Lugg, G.A., 1968. Diffusion Coefficients of Some Organic and Other Vapors in Air. Analytical Chemistry, 40(7):1072-1077.

PFE ORIGINAL (Red)

Lyman, W.J., W.F. Reehl, and D.H. Rosenblatt, 1982. Handbook of Chemical Property Estimation Methods. McGraw-Hill Book Company, New York, NY.

Mackay, D., and P.J. Leinonen, 1975. Rate of Evaporation of Low Solubility Contaminants from Water Bodies to Atmosphere. Environ. Sci. Technol., 9: 1178-1180.

Massachusetts Department of Environmental Quality Engineering (MDEQE), 1988. Draft Interim Guidance for Disposal Site Risk Characterization - In Support of the Massachusetts Contingency Plan. Office of Research and Standards. October.

Montgomery, J.H., and L.M. Welkom, 1990. Groundwater Chemicals Desk Reference. Lewis Publishers, Inc., Chelsea, MI. 640 pp. on Manufactured Gas Plant Sites.

Procedure Test Used Under RCRA to Find Leaching Potential of Waste Constituents. 51 (261, 271, 302): 21648.

Ryan, E.A., E.T. Hawkins, B. Magee, and S.L. Santos, 1987. Assessing Risk from Dermal Exposure at Hazardous Waste Sites. Superfund Procedures of the Eighth National Conference, Washington, DC. November 16-18.

Shen, T.J., 1982. Air Quality Assurance for Land Disposal of Industrial Waste. Environ. Mgmt., 6:297-305.

Siudyla, E.A., A.E. May, D.W. Hawthorne. 1981. Ground Water Resources of the Four Cities Area, Virginia. Commonwealth of Virginia, State Water Control Board, Bureau of Water Control Management, Planning Bulletin 331, Richmond, Virginia.

Thibodeaux, L.J., and S.T. Hwang, 1982. Landfarming of Petroleum Wastes-Modeling. The Air Emission Problem. Env. Progress, (1):42-46.

U.S. Environmental Protection Agency, 1979. Water Related Environmental Fate of 129 Priority Pollutants, Volumes I and II. Office of Water Planning and Standards, Washington, D.C. USEPA 440/4-79-029a and b.

U.S. Environmental Protection Agency (USEPA), 1980. POM Source and Ambient Concentration Data: Review and Analysis: Office of Industrial and Environmental Research, Research Triangle Park, NC EPA 600/7-80-044.

U.S. Environmental Protection Agency, 1985. Health and Environmental Effects Profile for Lead Alkyls. Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH.

U.S. Environmental Protection Agency, 1986a. Air Quality Criteria for Lead. Office of Health and Environmental Assessment, Environmental Criteria and assessment Office, Cincinnati, OH. EPA 600/8-83-018F.

PFE
ORIGINAL
ORIGINAL
(Red)

U.S. Environmental Protection Agency, 1986b. Superfund Public Health Evaluation Manual. Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency, 1988. Superfund Exposure Assessment Manual. Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency (USEPA), 1989a. Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, DC. EPA/540/1-89/002. December, 1989.

U.S. Environmental Protection Agency (USEPA). 1989b. Exposure Factors Handbook. Exposure Assessment Group, Office of Health and Environmental Assessment, Washington, D.C., EPA/600/8-89/043.

U.S. Environmental Protection Agency (USEPA). 1991a. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance, "Standard Default Exposure Factors," Interim Final. Office of Emergency and Remedial Response, Washington, DC. OSWER Directive 9285.6-03. March 25, 1991.

U.S. Environmental Protection Agency (USEPA). 1991b. Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part B: Development of Risk-based Preliminary Remediation Goals. Office of Solid Waste and Emergency Response, Washington, DC. OSWER Directive 9285.7-01B. December 13, 1991.

U.S. Environmental Protection Agency (USEPA). 1991c. OSWER Directive 9355.0-30, Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions. April 22, 1991.

U.S. Environmental Protection Agency (USEPA). 1991d. Toxic Substance Spreadsheet. Water Quality Standards Unit, Region IV. February 25.

U.S. Environmental Protection Agency (USEPA). 1992a. Dermal Exposure Assessment: Principles and Applications. Office of Research and Development, Washington, DC. EPA 600/8-91/011B.

U.S. Environmental Protection Agency (USEPA). 1992b. Memorandum from Julie Keller (Region IV Toxicologist) to Patsy Goldberg (Region IV RPM). Subject: Agrico Chemical Site Baseline Risk Assessment Supplement, Remedial Goal for Arsenic in Soil. September 28, 1992.

U.S. Environmental Protection Agency (USEPA). 1993a. Risk-Based Concentration Table, Fourth Quarter 1993. Region III, Philadelphia, PA. October 15, 1993.

ORIGINAL

U.S. Environmental Protection Agency (USEPA). 1993b. Health Effects Assessment Summary Tables, FY-1993 Annual. Office of Research and Development and Office of Emergency and Remedial Response, Washington, DC. OHEA ECAO-CIN-821. OERR 9200.6-303(92-1). NTIS No. PB92-921199. March, 1993.

U.S. Environmental Protection Agency (USEPA). 1993c. Assessment of Cancer Risk from Exposure to Mixtures of Polycyclic Aromatic Hydrocarbons (PAHs). Memorandum from Gerald F.S. Hiatt, Senior Risk Assessment Advisor, Region IX, to Richard A. Becker, May, 1993.

U.S. Environmental Protection Agency (USEPA). undated [a]. Corrections to RAGs-- Part B, Sections 3.3.1 and 3.3.2. Region IV. Atlanta, GA.

U.S. Environmental Protection Agency (USEPA). undated [b]. Risk Assessment Issue Paper For: Derivation of a Provisional RfC for Benzene (CASRN 71-43-2). Environmental Criteria Assessment Office.

U.S. Geological Survey, 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States. Professional Paper 1270.

Verschueren, K. 1983. Handbook of Environmental Data on Organic Chemicals, Second ed. Van Nostrand Reinhold, New York, NY.

Virginia Division of Mineral Resources. 1973. Post-Miocene Stratigraphy and Morphology, Southeastern Virginia, Bulletin 82. Charlottesville, Virginia.

Weast, R.E. (Ed.), 1981. Handbook of Chemistry and Physics, 62nd ed. CRC Press, Cincinnati, OH.

White, J.B., and R.R. Vanderslice, 1980. POM Source and Ambient

AN ENVIRONMENTAL QUALITY INVESTIGATION SUMMARY AND CORRECTIVE MEASURES STUDY OF THE FORMER NORFOLK MANUFACTURED GAS PLANT SITE

Prepared for

City of Norfolk
and
Virginia Power Company

Prepared by

Geraghty & Miller, Inc.
180 Admiral Cochrane Drive
Suite 300
Annapolis, Maryland 21401
(410) 224-8777

October 1994

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Appendix L Microbiological Evaluation
Appendix M Risk Assessment

FIGURES

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(Red)

SOURCE: U.S.G.S. NORFOLK SOUTH QUAD. 1965

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SITE LOCATION MAP

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE
1

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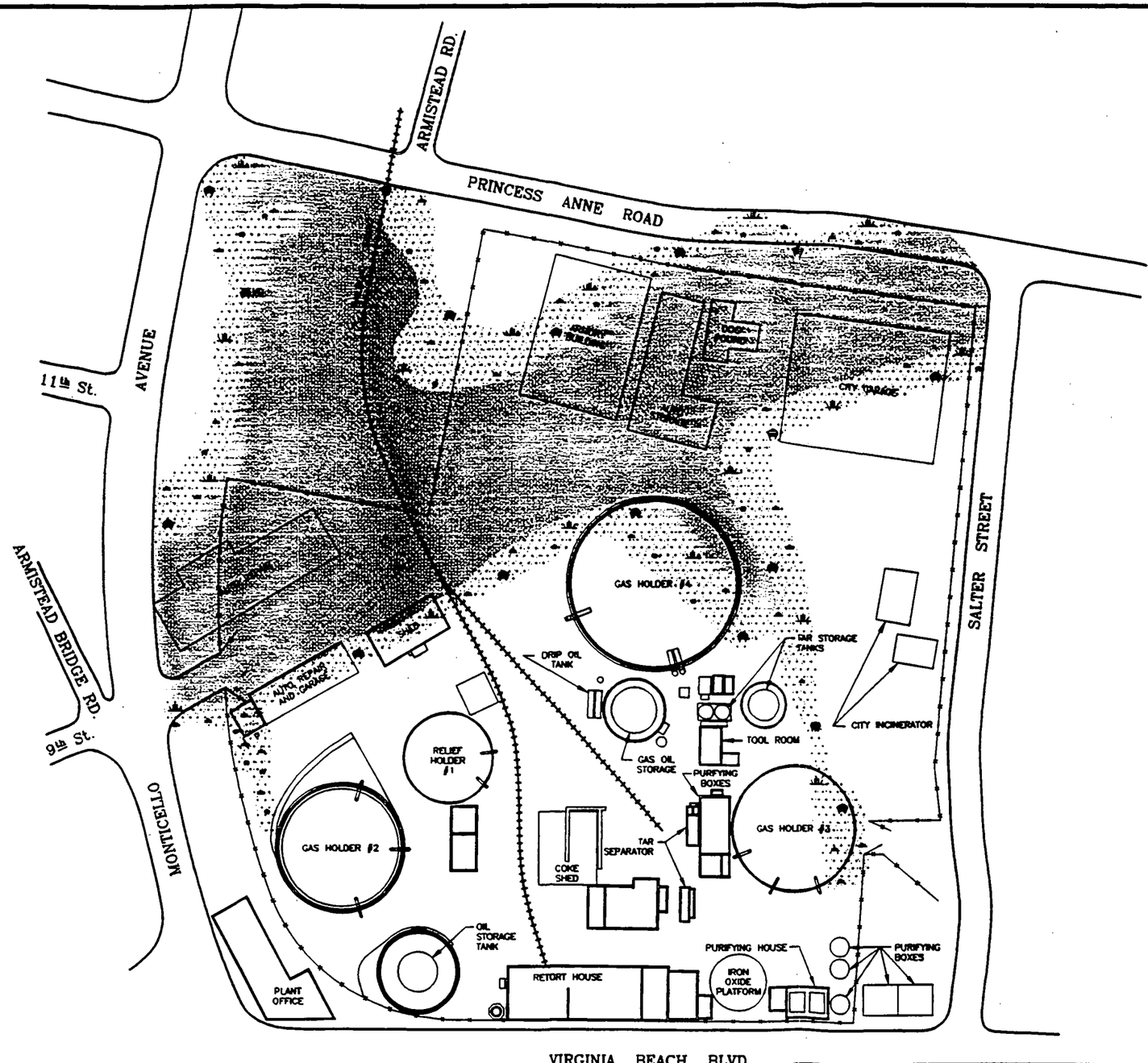

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0 60 120 240

SCALE: FEET

LEGEND:

APPROXIMATE LOCATION OF TIDAL MARSHES (FORMER SMITHS CREEK).

APPROXIMATE LOCATIONS OF TIDAL WATER (FORMER SMITHS CREEK).

SOURCE: CITY OF NORFOLK MAP DATED APRIL 6, 1887

BUILDING LOCATIONS BASED ON THE FOLLOWING SOURCES:

1. VIRGINIA ELECTRIC AND POWER COMPANY PLANT MAP DATED DECEMBER 1925; REVISED JANUARY 15,1947.
2. PLANT OF THE CITY GAS COMPANY OF NORFOLK VIRGINIA MAP DATED OCTOBER 1914.
3. 1937 AERIAL PHOTOGRAPH.
4. SANBORN FIRE INSURANCE MAPS DATED 1887, 1898, 1910 AND 1928.

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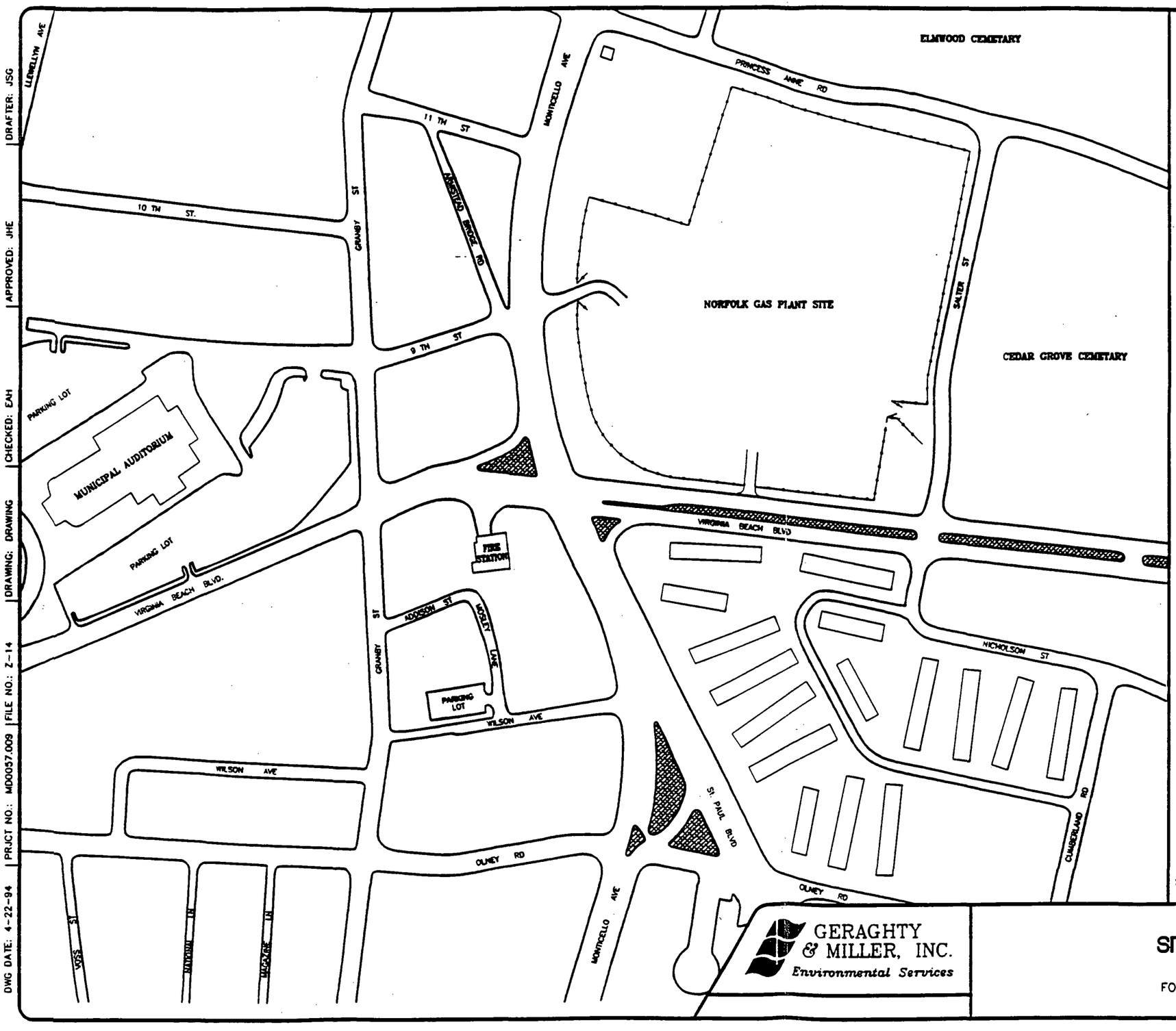
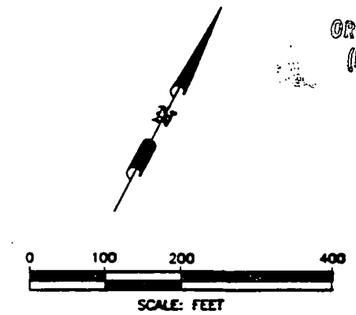
SITE MAP DEPICTING HISTORIC CONDITIONS

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 2





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SOURCE: ABRAMS AERIAL SURVEY CORP. LANSING, MICH. 1983
BUILDINGS REFERENCED FOR LANDMARKS ARE SHOWN.

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SITE VICINITY MAP

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE
3

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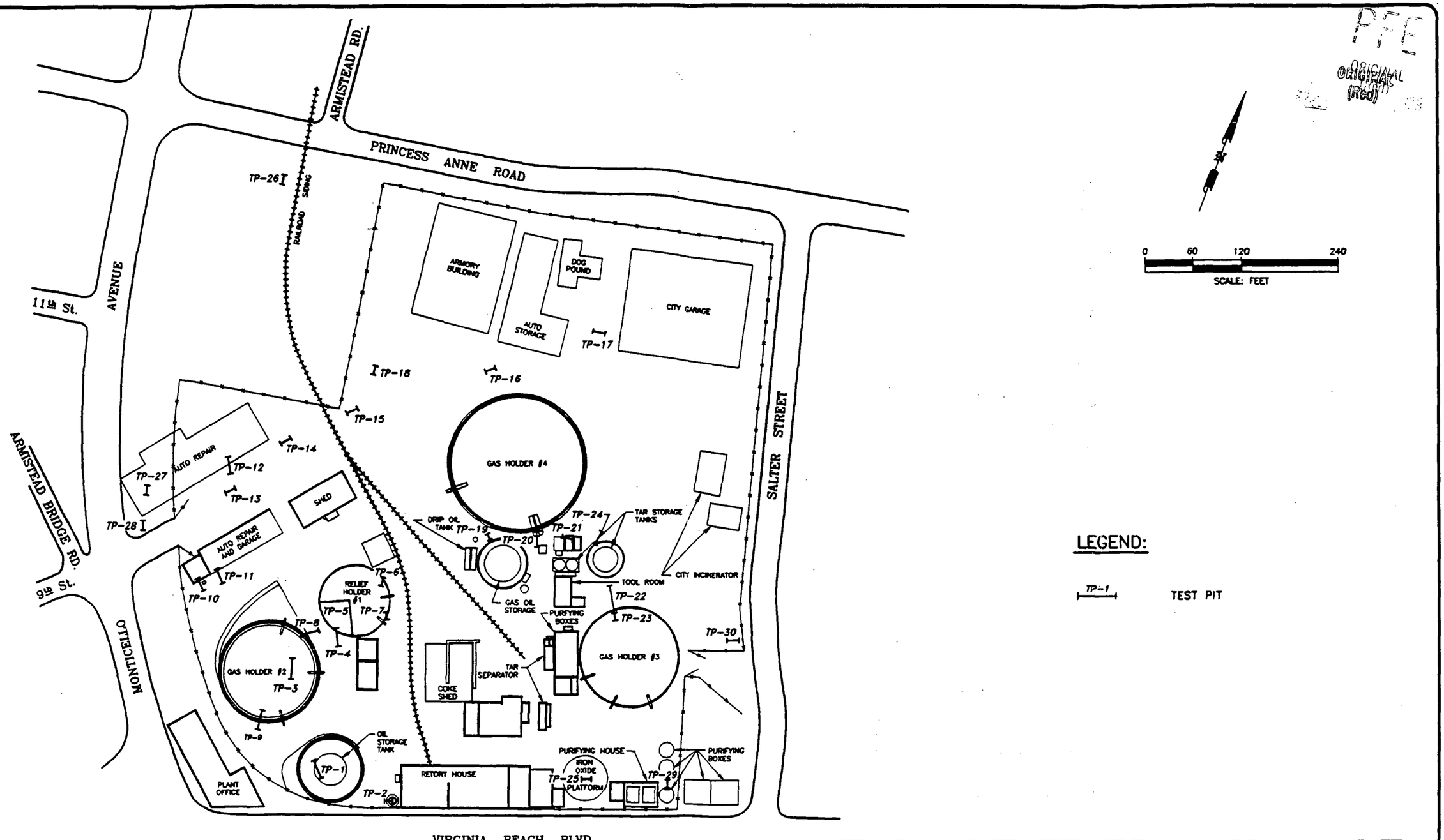

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TEST PIT LOCATIONS

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE
4

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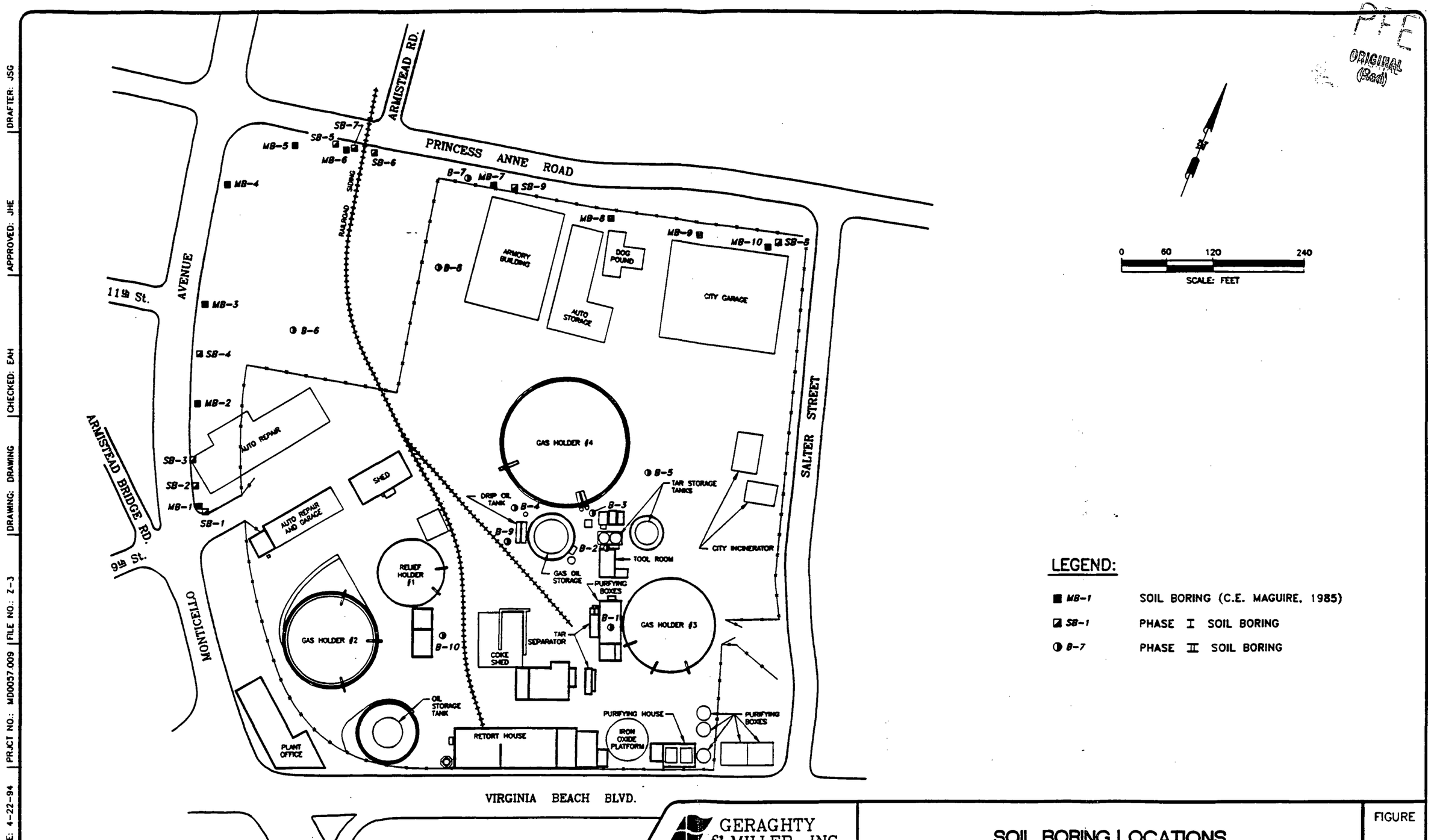

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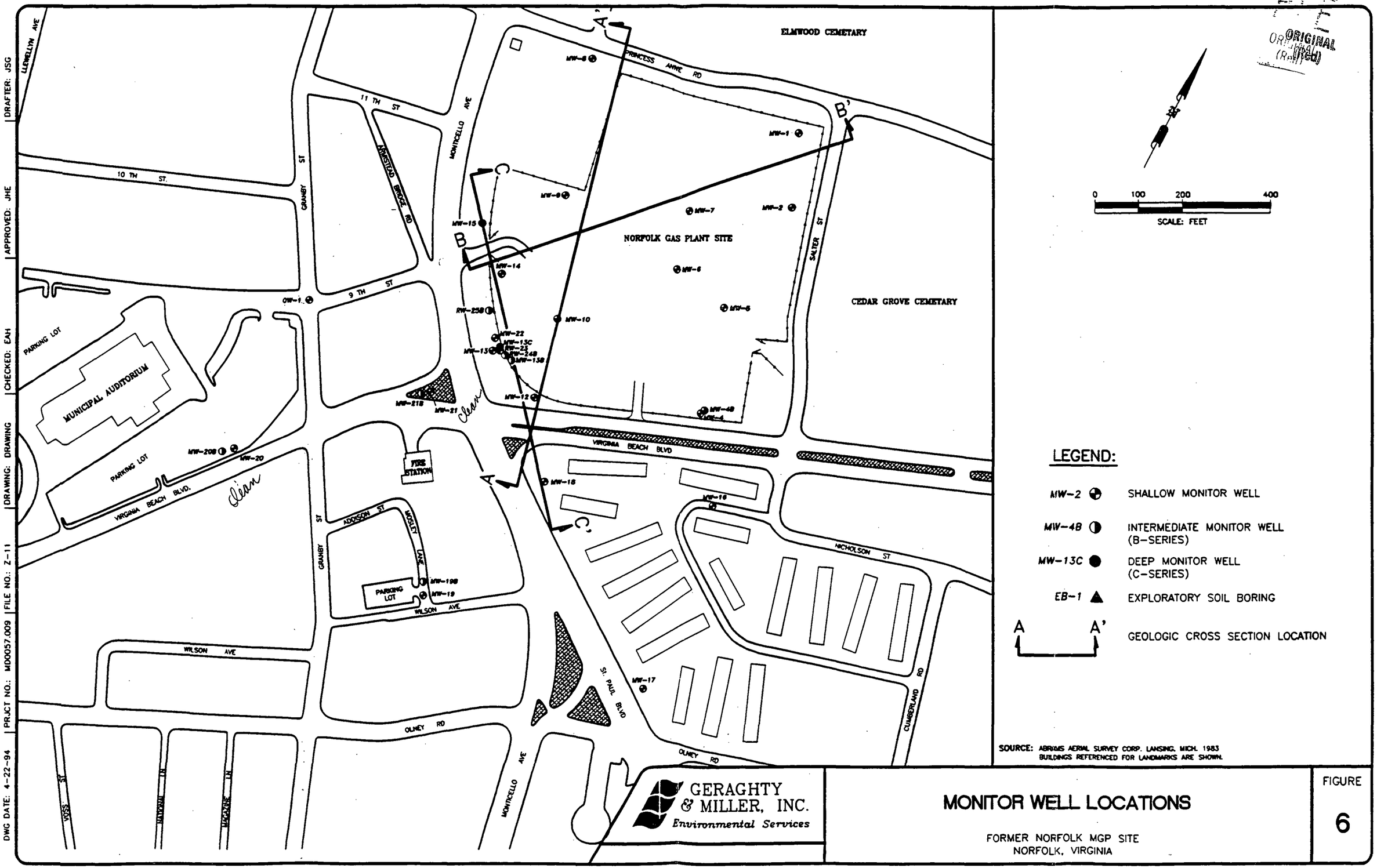
SOIL BORING LOCATIONS

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 5

DRAFTER: JSG | APPROVED: JHE | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: Z-3 | PRJCT NO.: MD0057.009 | DWG DATE: 4-22-94



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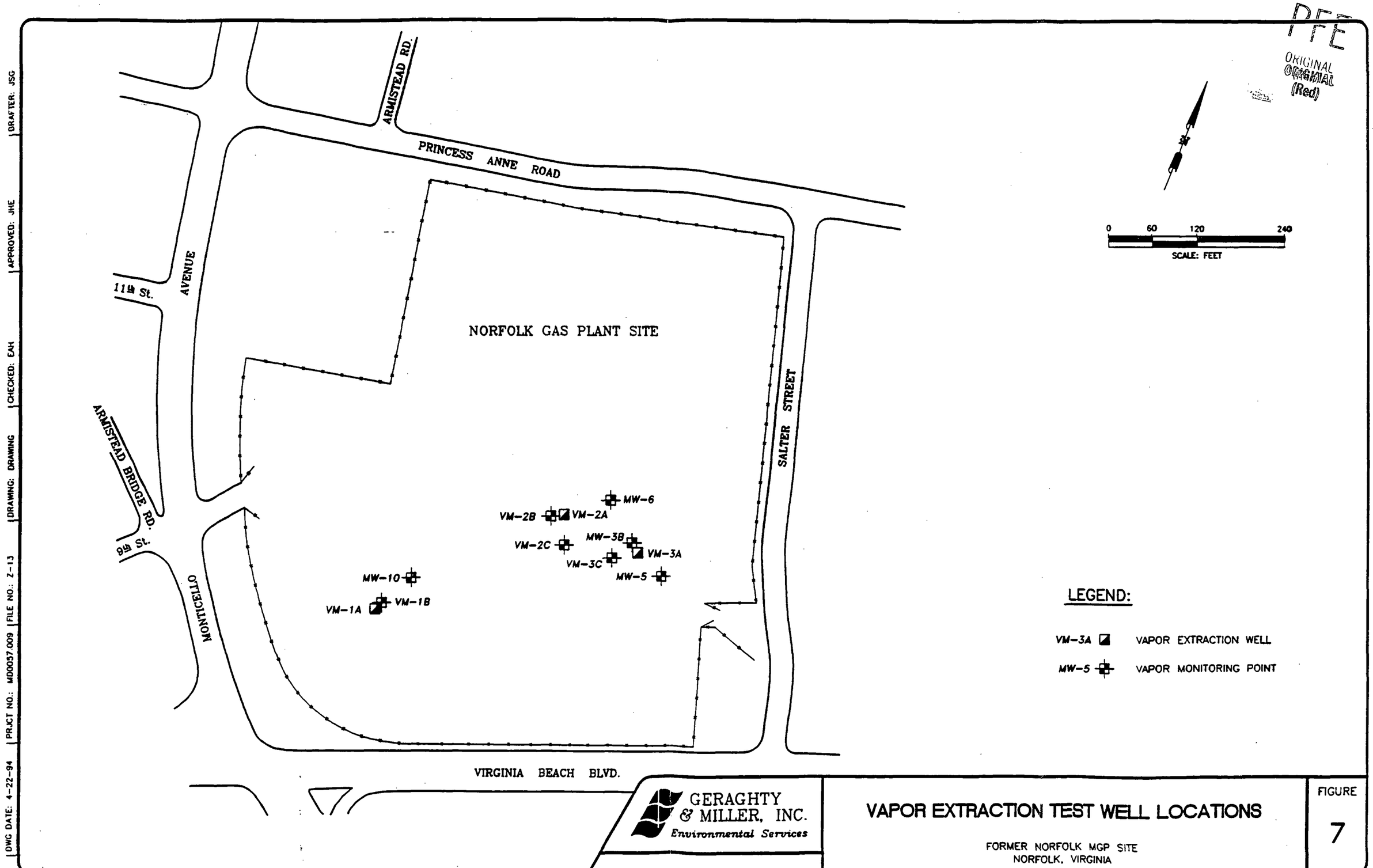
MONITOR WELL LOCATIONS

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 6

DRAFTER: JSG | APPROVED: JHE | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: Z-11 | PRJCT NO.: MD0057.009 | DWG DATE: 4-22-94



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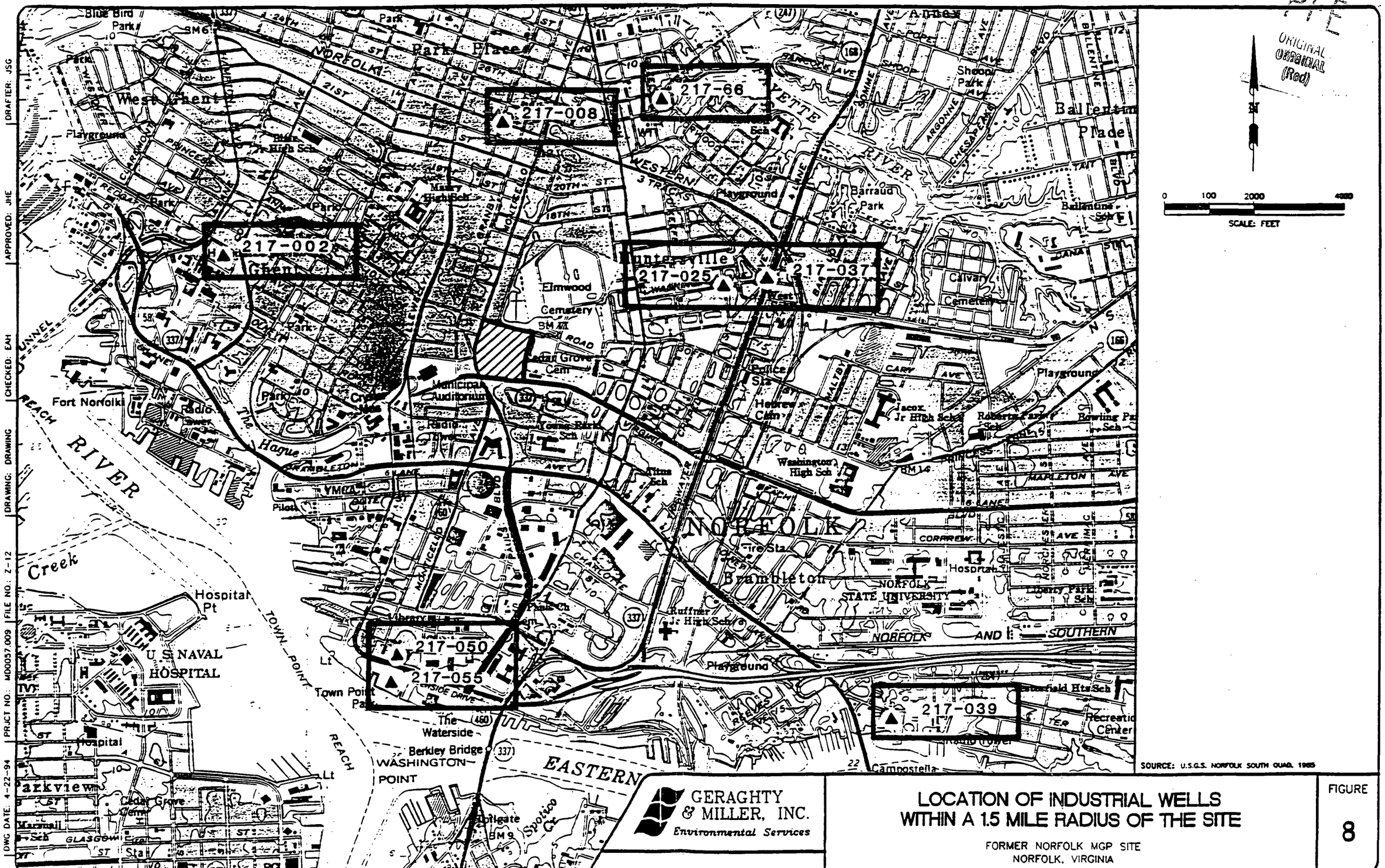
VAPOR EXTRACTION TEST WELL LOCATIONS

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 7

DRAFTER: JSG | APPROVED: JHE | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: Z-13 | PRJCT NO.: MD0057.009 | DWG DATE: 4-22-94

PFE ORIGINAL (Red)



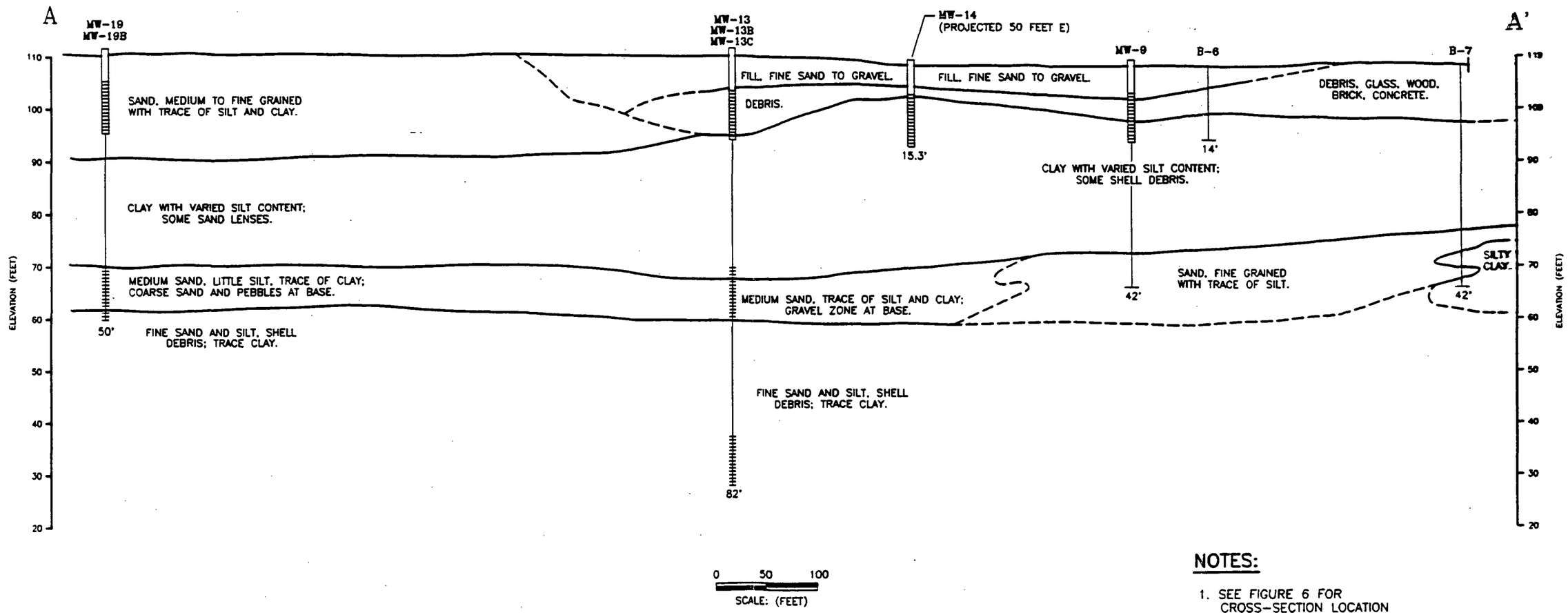
GERAGHTY & MILLER, INC.
Environmental Services

LOCATION OF INDUSTRIAL WELLS WITHIN A 1.5 MILE RADIUS OF THE SITE

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 8

DRAFTER: JSG | APPROVED: JHE | CHECKED: EAH | DRAWING: | FILE NO: Z-12 | PRJCT NO: MD0057.009 | DWG DATE: 4-22-94



NOTES:

1. SEE FIGURE 6 FOR CROSS-SECTION LOCATION
2. ELEVATIONS ARE REFERENCED TO NORFOLK CITY DATUM.
3. 5X VERTICAL EXAGGERATION.

LEGEND:

MW-7 — MONITOR WELL

SCREEN

15.3' TOTAL DEPTH

SOIL BORING

42' TOTAL DEPTH

INFERRED CONTACT

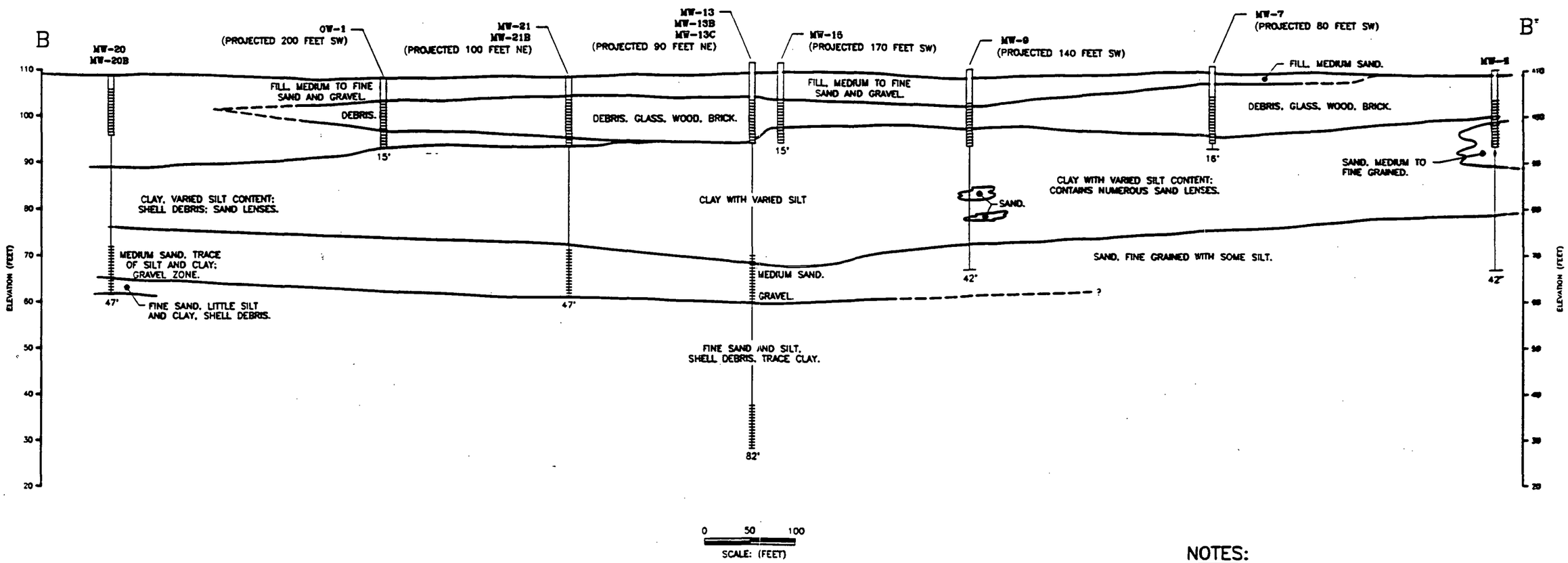
GERAGHTY & MILLER, INC.
Environmental Services

GEOLOGIC CROSS SECTION A-A'

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 9

DRAFTER: JSG | APPROVED: JHE | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: Z-5 | PRJCT NO.: MD0057.009 | DWG DATE: 4-22-94



NOTES:

1. SEE FIGURE 6 FOR CROSS-SECTION LOCATION
2. ELEVATIONS ARE REFERENCED TO NORFOLK CITY DATUM.
3. 5X VERTICAL EXAGGERATION.

LEGEND:

MW-7 — MONITOR WELL

SCREEN

15.3' TOTAL DEPTH

SOIL BORING

42' TOTAL DEPTH

INFERRED CONTACT

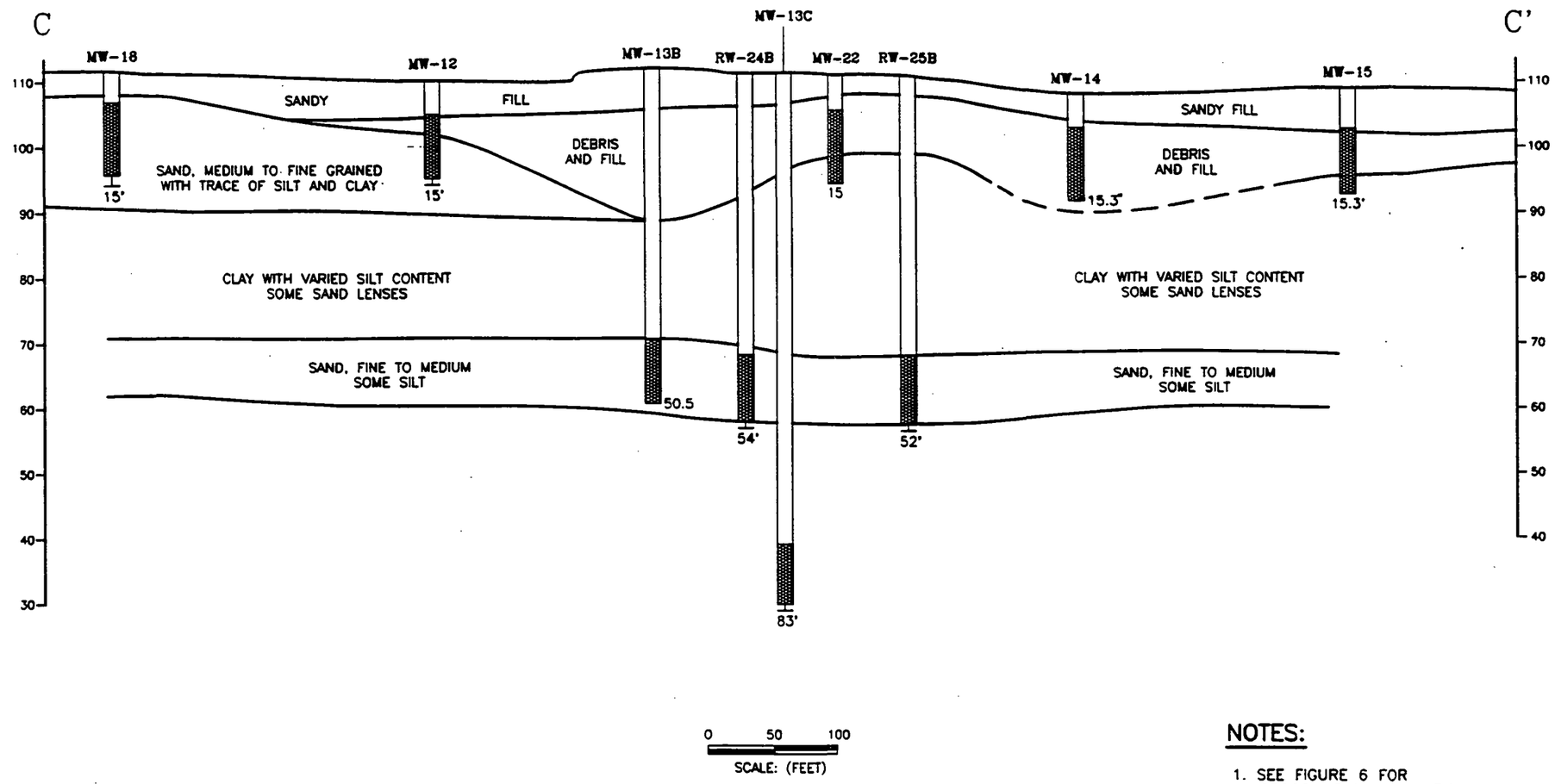
GERAGHTY & MILLER, INC.
Environmental Services

GEOLOGIC CROSS SECTION B-B'

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 10

DRAFTER: JSG | APPROVED: JHE | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: Z-4 | PRJCT NO.: MD0057.009 | DWG DATE: 4-22-94



NOTES:

1. SEE FIGURE 6 FOR CROSS-SECTION LOCATION
2. ELEVATIONS ARE REFERENCED TO NORFOLK CITY DATUM.
3. 5X VERTICAL EXAGGERATION.

LEGEND:

MW-7 — MONITOR WELL

SCREEN

15.3' TOTAL DEPTH

SOIL BORING

42' TOTAL DEPTH

INFERRED CONTACT

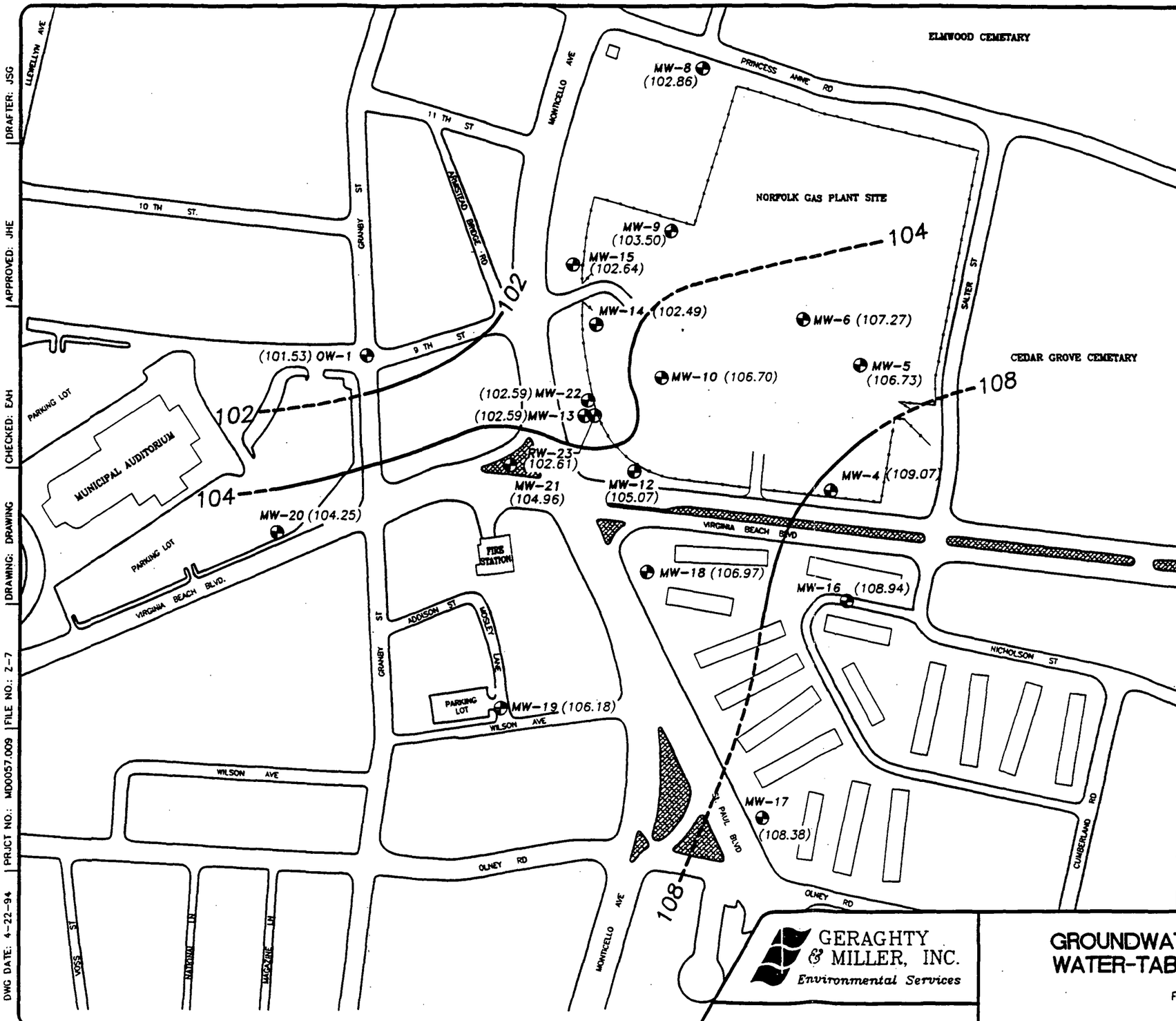
GERAGHTY & MILLER, INC.
Environmental Services

GEOLOGIC CROSS SECTION C-C'

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 11

DRAFTER: | APPROVED: JHE | CHECKED: EAH | DRAWING: | FILE NO.: Z-16 | PRJCT NO.: M00057.009 | DATE: 4-22-94 | DWG



LEGEND:

MW-2	SHALLOW MONITOR WELL
(98.92)	GROUNDWATER ELEVATION
———	EQUIPOTENTIAL LINE
- - - -	EQUIPOTENTIAL LINE (INFERRED)

SOURCE: ABRAMS AERIAL SURVEY CORP. LANSING, MICH. 1983
BUILDINGS REFERENCED FOR LANDMARKS ARE SHOWN.

GERAGHTY & MILLER, INC.
Environmental Services

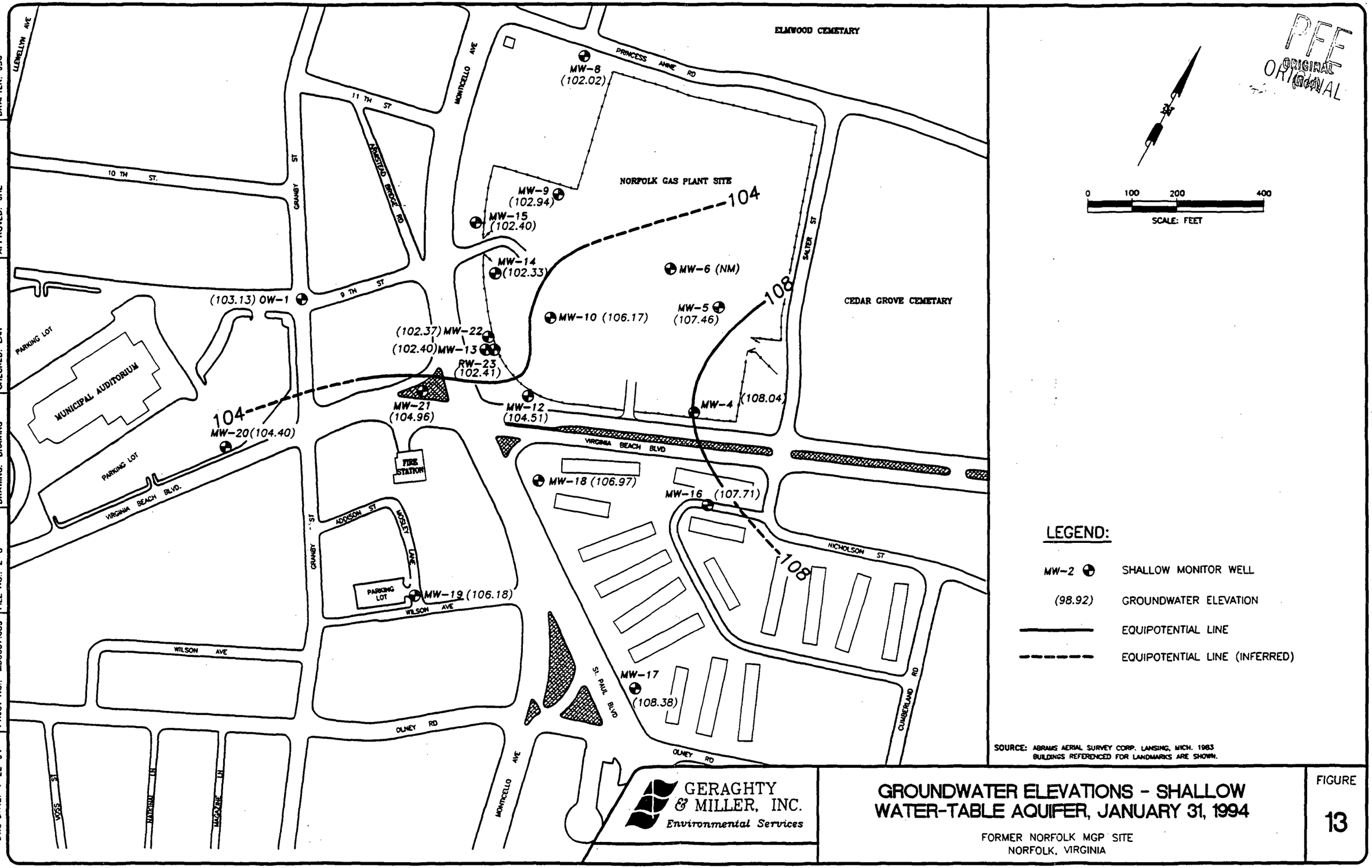
GROUNDWATER ELEVATIONS - SHALLOW WATER-TABLE AQUIFER, MARCH 22, 1993

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 12

DRAFTER: JSG | APPROVED: JHE | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: Z-7 | PRJCT NO.: MD0057.009 | DWG DATE: 4-22-94

PFE ORIGINAL (Red)



SOURCE: ABRAMS AERIAL SURVEY CORP. LANSING, MICH. 1983
BUILDINGS REFERENCED FOR LANDMARKS ARE SHOWN.

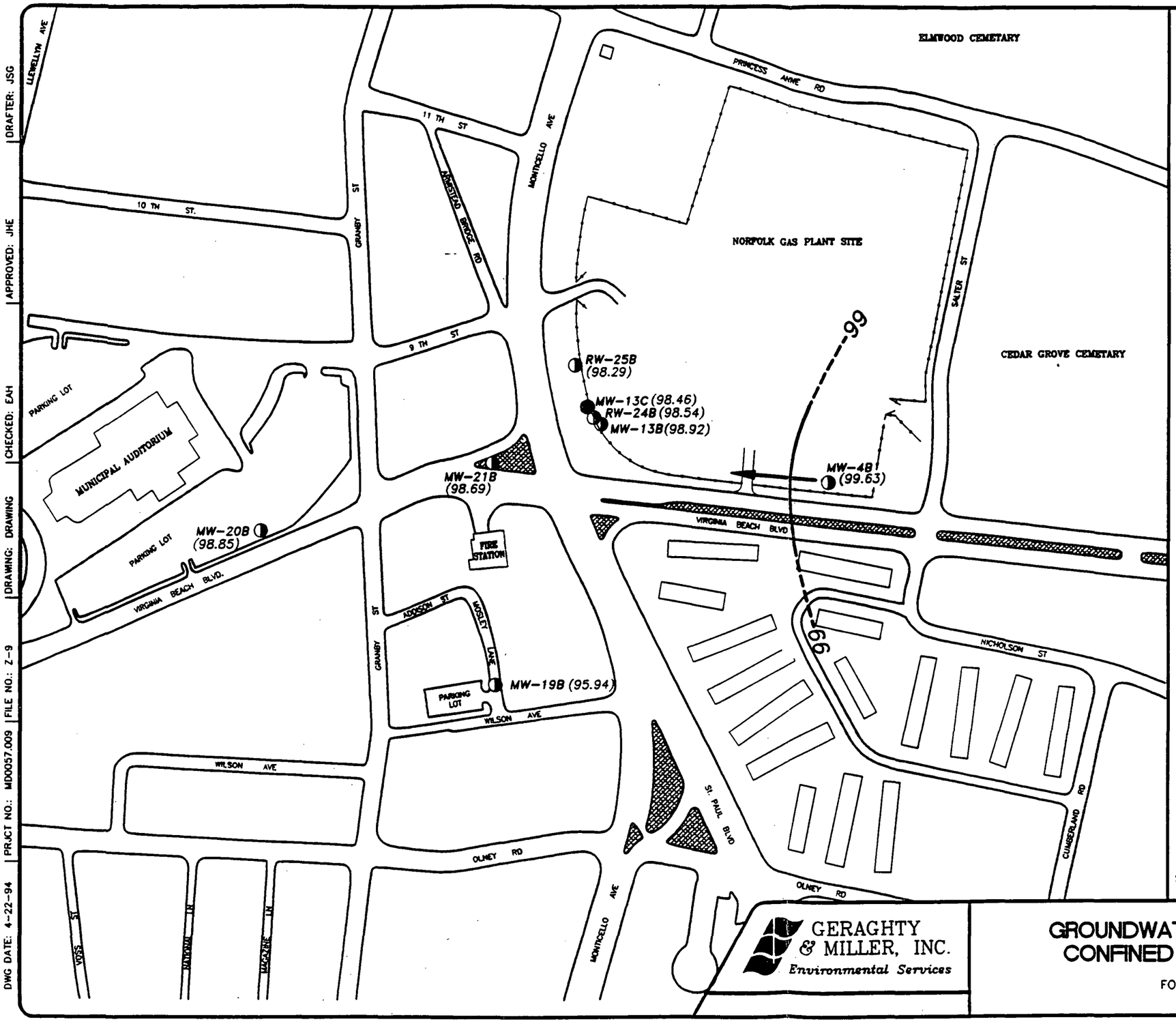
GERAGHTY & MILLER, INC.
Environmental Services

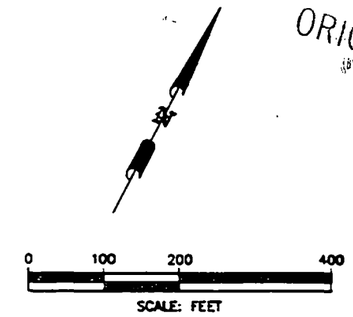
GROUNDWATER ELEVATIONS - SHALLOW WATER-TABLE AQUIFER, JANUARY 31, 1994

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 13

DRAFTER: JSG | APPROVED: JHE | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: Z-8 | PRJCT NO.: MD0057.009 | DWG DATE: 4-22-94





PFE ORIGINAL

LEGEND:

MW-4B ◑	INTERMEDIATE MONITOR WELL (B-SERIES)
MW-13C ●	DEEP MONITOR WELL (C-SERIES)
(98.92)	GROUNDWATER ELEVATION
———	EQUIPOTENTIAL LINE
- - - -	EQUIPOTENTIAL LINE (INFERRED)
◄———	DIRECTION OF GROUNDWATER FLOW

SOURCE: ABRAMS AERIAL SURVEY CORP. LANSING, MICH. 1983
BUILDINGS REFERENCED FOR LANDMARKS ARE SHOWN.

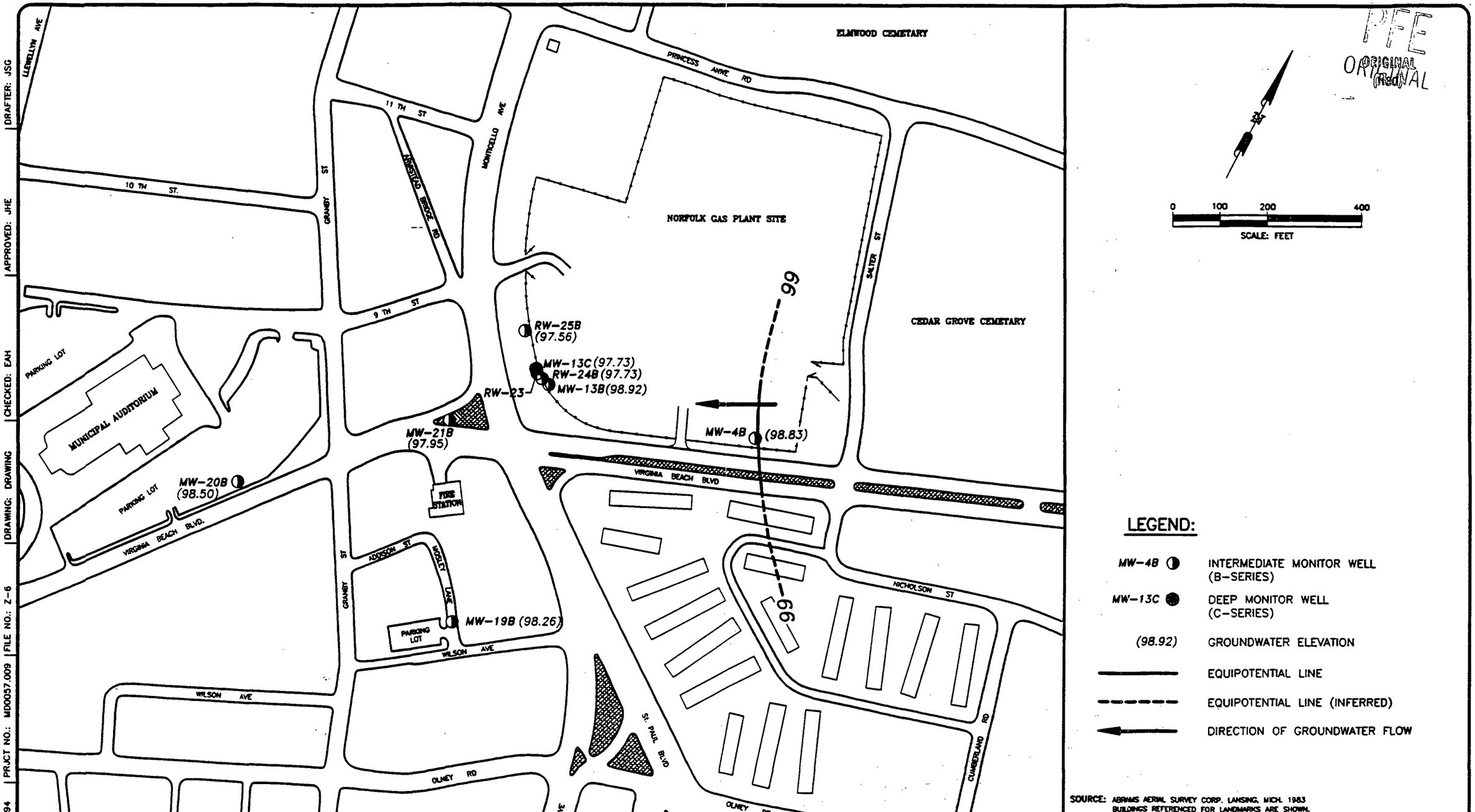
GERAGHTY & MILLER, INC.
Environmental Services

GROUNDWATER ELEVATIONS - DEEPER CONFINED AQUIFER, MARCH 22, 1993

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 14

DRAFTER: JSG | APPROVED: JHE | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: Z-9 | PRJCT NO.: MD0057.009 | DWG DATE: 4-22-94



SOURCE: ABRAMS AERIAL SURVEY CORP. LANSING, MICH. 1983
BUILDINGS REFERENCED FOR LANDMARKS ARE SHOWN.

PFE ORIGINAL (Red)

GERAGHTY & MILLER, INC.
Environmental Services

GROUNDWATER ELEVATIONS - DEEPER CONFINED AQUIFER, JANUARY 31, 1994

FORMER NORFOLK MGP SITE
NORFOLK, VIRGINIA

FIGURE 15

DRAFTER: JSG | APPROVED: JHE | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: Z-6 | PRJCT NO.: MD0057.009 | DWG DATE: 4-22-94

ORIGINAL

TABLES

ORIGINAL

TABLES

Table 1
Summary of Soil-Quality Analyses
Former Norfolk Manufactured Gas Plant Site

ORIGINAL (Red)
PFE
ORIGINAL

Sample ID	Depth Interval (feet)	A	B	C	D	E
B-1	0-2	+	+	+	+	
	4-6	+	+	+		
B-2	0-2	+	+	+		
B-3	0-2	+	+	+		
	4-6	+	+	+	+	
B-4	0-2	+	+	+		
	4-6	+	+	+		+
B-5	0-2	+	+	+		
	4-6	+	+	+		
B-6	0-2	+	+	+		
	4-6	+	+	+		
B-7	0-2	+	+	+		
	4-6	+	+	+		
B-9	0-2	+	+	+		
	4-6	+	+	+		
B-10	0-2	+	+	+		
	4-6	+	+	+	+	+
MW-1	2-4				+	
MW-2	4-6				+	
MW-3	2-4				+	
MW-8	2-4				+	
MW-9	4-6				+	
MW-10	6	+	+	+		
MW-12	0-2				+	
MW-14	0-2				+	

+ = Analysis performed
Suite A = pH, moisture content, total cyanide, sulfate, total iron, phenols.
Suite B = Volatile organics.
Suite C = Semi-volatile organics.
Suite D = Metals: arsenic, barium, cadmium, total chromium, total lead, mercury, selenium silver. Analysis completed for both total digestion and Extraction Procedure.
Suite E = Toxicity Characteristics Leaching Procedure Testing: Volatile Organics, Semivolatile organics.

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TABLE 2
Summary of Well Construction Details
Former Norfolk Manufactured Gas Plant Site

Well No.	Date Constructed	Aquifer Screened	Casing Material	Casing Diameter (inches)	Screened Interval (Feet bls)	Top-of-Casing Elevations
MW-1 (1)	9/12/89	Shallow Water-table	PVC	2	4.7-14.7	109.66
MW-2 (1)	9/12/89	Shallow Water-table	PVC	2	4.5-15.5	110.93
MW-3 (2)	9/12/89	Shallow Water-table	PVC	2	4.4-14.4	112.00
MW-4	9/12/89	Shallow Water-table	PVC	2	4.5-14.5	116.28
MW-4B	10/1/90	Lower Sand	PVC	2	41.5-51.5	116.51
MW-5	9/12/89	Shallow Water-table	PVC	2	5-15	114.92
MW-6	9/12/89	Shallow Water-table	PVC	2	5-15	114.30
MW-7 (1)	9/12/89	Shallow Water-table	PVC	2	5.4-15.4	109.70
MW-8	9/13/89	Shallow Water-table	PVC	2	4.91-14.91	109.40
MW-9	9/12/89	Shallow Water-table	PVC	2	4.7-14.7	110.44
MW-10	9/12/89	Shallow Water-table	PVC	2	4.7-14.7	114.66
MW-12	9/13/89	Shallow Water-table	PVC	2	4.5-14.5	112.46
MW-13	9/14/89	Shallow Water-table	PVC	2	4.9-14.9	111.55
MW-13B	9/27/90	Lower Sand	PVC	2	40.5-50.5	111.96
MW-13C	10/26/90	Lower Sand	PVC	2	72-82	111.64
MW-14	9/13/89	Shallow Water-table	PVC	2	5.3-15.3	110.42
MW-15	9/13/89	Shallow Water-table	PVC	2	5.34-15.34	108.93
MW-16	9/13/90	Shallow Water-table	PVC	2	4.5-14.5	113.98
MW-17	9/13/90	Shallow Water-table	PVC	2	4.5-14.5	111.58
MW-18	9/13/90	Shallow Water-table	PVC	2	4.5-14.5	111.28
MW-19	9/14/90	Shallow Water-table	PVC	2	4.5-14.5	110.79
MW-19B	9/25/90	Lower Sand	PVC	2	40-50	110.86
MW-20	9/14/90	Shallow Water-table	PVC	2	3.6-13.6	108.43
MW-20B	9/21/90	Lower Sand	PVC	2	37-47	108.56
MW-21	2/20/91	Shallow Water-table	PVC	2	4.5-14.5	108.88
MW-21B	2/21/91	Lower Sand	PVC	2	36.9-46.9	108.76
MW-22 *	3/3/93	Shallow Water-table	PVC	2	5-15	111.09
RW-23 *	3/10/93	Shallow Water-table	Stainless Steel	4	13.3-13.13	111.65
RW-24B *	3/11/93	Lower Sand	Stainless Steel	4	43-53	110.30
RW-25B *	3/8/93	Lower Sand	Stainless Steel	4	41-51	110.25

Notes:

(1) Wells abadoned February 1994
(2) Well abandoned October 1989
* Aquifer Test Well
PVC - polyvinyl chloride
bls - below land surface

G:\PRJCTS\NORFOLK\TABLES\DETAILS.WK4

TABLE 3
Summary of Groundwater Elevations
Former Norfolk Manufactured Gas Plant Site

Well No.	Top of Casing Elevation	3/22/93		1/31/94	
		Depth to Water bls	Groundwater Elevation	Depth to Water bls	Groundwater Elevation
MW-1	109.66	A	A	A	A
MW-2	110.93	A	A	A	A
MW-4	116.28	7.21	109.07	8.24	108.04
MW-4B	116.51	16.88	99.63	17.68	98.83
MW-5	114.92	8.19	106.73	7.46 Product	107.43
MW-6	114.30	7.03	107.27	A	A
MW-7	109.70	A	A	A	A
MW-8	109.40	6.54	102.86	7.38	102.02
MW-9	110.44	6.94	103.50	7.50 Product	102.94
MW-10	114.66	7.96	106.70	8.49	106.71
MW-12	112.46	7.59	105.07	7.95	104.51
MW-13	111.55	8.96	102.59	9.15	102.40
MW-13B	111.96	13.04	98.92	13.04 Product	98.92
MW-13C	111.64	13.18	98.46	13.91	97.73
MW-14	110.42	7.93	102.49	8.09	102.33
MW-15	108.93	6.29	102.64	6.53	102.40
MW-16	113.98	5.04	108.94	6.27	107.71
MW-17	111.58	3.20	108.38	5.08	106.50
MW-18	111.28	4.31	106.97	4.62	106.66
MW-19	110.79	4.61	106.18	4.64	106.15
MW-19B	110.86	14.92	95.94	12.60	98.26
MW-20	108.43	4.18	104.25	4.03	104.40
MW-20B	108.56	9.71	98.85	10.06	98.50
MW-21	108.88	3.92	104.96	3.92	104.96
MW-21B	108.76	10.07	98.69	10.81	97.95
MW-22	111.09	8.50	102.59	8.72	102.37
RW-23	111.65	9.04	102.61	9.24	102.41
RW-24B	110.30	11.76	98.54	12.57 Product	97.73
RW-25B	110.25	11.96	98.29	12.69 Product	97.56
OW-1	108.15	6.62	101.53	5.02	103.13

Notes:

bls - below land surface
A - Well Abandoned
Product - Immiscible product observed

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Table 4
Summary of Monitor Well Sampling
Former Norfolk Manufactured Gas Plant Site

ORIGINAL (Red)
ORIGINAL

Well Identification	Round 1 10-25-90	Round 2 3-5-91	Round 3 2-1-94
MW-4	+		+
MW-4B	+		+
MW-8		+	+
MW-12	+		+
MW-13	+		+
MW-13B	+		
MW-13C	+	+	+
MW-14	+		+
MW-15	+	+	+
MW-16	+		+
MW-17	+		+
MW-18	+		+
MW-19	+		+
MW-19B	+		+
MW-20	+	+	+
MW-20B	+	+	+
MW-21		+	+
MW-21B		+	+
OW-1	+	+	

Notes:
+ = Wells samples

Round 1 -

October 25, 1990/	Benzene, Toluene,	602/8020
November 25, 1990	Ethylbenzene, Xylenes (BTEX)	602/8020
	EPA-CLP Semivolatiles	625
	Cyanides - Total and Free	335.3
	Total Lead, Arsenic, Chromium	7060

Round 2 -

March 5, 1991	BTEX	602/8020
	EPA-CLP Semivolatiles	625
	Cyanides - Total and Free	335.3
	Total Lead, Arsenic, Chromium	7060

Round 3 -

February 1, 1994	BTEX	8020
	EPA-CLP Semivolatiles	8070
	RCRA Metals (Total)	7060
	Total Cyanide	335.2
	Free Cyanide	335.1

Table 5
SVE Test VM-1A Data Summary
Former Norfolk Manufactured Gas Plant Site

Date 03/08/93	Elapsed Time (minutes)	Blower FPM Influent	Blower FPM Effluent	Blower CFPM Influent	Blower CFPM Effluent	Extraction Well VM-1A (Inches of Water)	Monitor Wells VM1B (Inches of Water)	Monitor Wells MW10 (Inches of Water)	Monitor Wells MW14 (Inches of Water)	Micro TIP Readings in ppm	Dilution Valve
	0.00	85	5,900	1.98	137.48	2.22	0.02	0.00	0.00	13	Full Open
	4	–	–			2.22	0.00	0.00	0.00	121	
	5	85	5,900	1.98	137.48	2.22	0.00	0.00	0.00	130	
	10	85	5,900	1.98	137.48	2.22	0.04	0.00	0.00	–	
	12					–				131	
	15	85	5,900	1.98	137.48	2.49	0.03	0.00	0.00	137	
	16	–	–	–	–	–	–	–	–	141	
	20	80	5,950	1.86	138.65	2.22	0.00	0.00	0.00	143	
	23	–	–	–	–	–	–	–	–	147	
	25	85	5,900	1.98	137.48	2.22	0.00	0.00	–	–	
	30	95	5,950	2.21	138.65	2.22	0.00	0.00	–	–	
	32	440	4,900	10.25	114.18	20.78	0.02	0.45	–	–	Close to half open @ ET 31 mins
	35	440	4,900	10.25	114.18	20.78	0.02	0.40	0.015	139	
	37	–	–	–	–	–	–	–	–	141	
	40	410	5,100	9.55	118.84	21.05	0.02	0.40	–	145	
	45	480	4,900	11.19	114.18	21.05	0.02	0.40	–	152	
	48	–	–			–	–	–	–	149	
	50	395	4,900	9.20	114.18	21.05	0.02	0.35	–	145	
	55	390	4,900	9.09	114.18	21.05	0.02	0.37	0.015	141	
	60	395	4,800	9.20	111.85	21.05	0.02	0.40	0.025	141	
	62	1,300	1,300	30.29	30.29	67.87	0.03	0.75	0.025	158	Turn Valve to Full Close @ ET 61 mins
	65	1,150	1,150	26.80	26.80	58.17	0.32	0.51	0.03	162	
	70	1,375	1,490	32.04	34.72	56.79	0.38	0.51	–	169	
	75	1,290	1,470	30.06	34.25	56.79	0.39	0.50	0.00	174	
	80	1,200	1,490	27.96	34.72	55.40	0.35	0.51	0.00	170	
	85	1,200	1,440	27.96	33.56	62.33	0.34	0.51	0.00	158	
	90	1,150	1,440	26.80	32.62	60.94	0.36	0.54	–	164	
Stop	92	–	–			–	–	–	–	170	Stop Blower

Calculation: 2" schd 40 pressure PVC has .0233021 linear feet per cubic foot (LFPCF)
Example: 5,900 FPM x .0233021 (LFPCF) = 137.48 cubic feet per minute (CFPM)
Test Date: 03-08-1993 By: Dana P. O'Dell
PPM = parts per million
FPM = feet per minute
ET = Elapsed time
PVC = polyvinyl chloride

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ORIGINAL (Red)

Table 6
SVE Test VM-2A Data Summary
Former Norfolk Manufactured Gas Plant Site

Date 03/08/93	Elapsed Time (minutes)	Blower FPM Influent	Blower FPM Effluent	Blower CFPM Influent	Blower CFPM Effluent	Extraction Well VM2A (Inches of Water)	MW6 (Inches of Water)	VM2B (Inches of Water)	VM2C (Inches of Water)	VM3C (Inches of Water)	VM3B (Inches of Water)	Micro TIP Readings in ppm	Dilution Valve
	0.00	45	5,800	1.05	135.15	2.22	–	(1) –	–	–	–	–	Full Open
	5	35	5,700	0.82	132.82	2.22	0.04	0.00	0.05	0.05	0.08	20	
	20	25	5,400	0.58	125.83	2.22	0.03	0.00	0.00	0.00	0.07	34	
	24	180	4,500	4.19	104.86	20.78	–	–	–	–	–	–	Close to half open
	28	–	–	–	–	–	–	–	–	–	–	143	
	30	260	400	6.06	102.53	20.78	0.03	0.00	0.05	0.03	0.01	116	
	35	320	4,250	7.46	99.03	20.78	0.03	0.00	0.05	0.03	0.08 (2)	132	
	42	295	4,300	6.87	100.20	20.78	–	–	–	–	–	129	
	45	180	4,150	4.19	96.70	20.75	0.02	0.00	0.05	0.00	0.05	136	
	55	270	4,800	6.29	111.85	20.75	0.02	0.00	0.00	0.04	0.10	132	
	60	170	340	3.96	7.92	69.25	0.04	0.05	–	–	–	144	Turn DV Valve to Full Close
	63	–	–	–	–	–	–	–	0.05	0.04	0.07	–	
	70	195	260	4.54	6.06	62.33	0.00	0.05	–	–	–	156	
	72	–	–	–	–	–	–	–	0.05	0.03	0.12	–	
	80	220	210	5.13	4.89	69.25	0.04	0.02	0.02	0.00	0.12	155	
Stop Test	90	220	210	5.13	4.89	69.25	0.00	0.10	0.05	0.00	0.06	159	

(1) VM2B bentonite pellets did not appear to be hydrated at surface.
(2) Pressure fluctuates
Calculation: 2" schd 40 pressure PVC has .0233021 linear feet per cubic foot (LFPCF)
Example: 5,900 FPM x .0233021 (LFPCF) = 137.48 cubic feet per minute (CFPM)
FPM = Feet Per Minute
Test Date: 03-08-1993 By: Dana P. O'Dell
PPM = parts per million
FPM = feet per minute
ET = Elapsed time
PVC = polyvinyl chloride

Note: Micro Tip has 10.6 eV lamp and was calibrated with isobutylene, as such MicroTip reading has a relative response of 1.78 to benzene, 2.25 to 1,2-dichorobenzene, and 1.91 to toluene

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ORIGINAL (Red)
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ORIGINAL

Table 7
SVE Test VM-3A Data Summary
Former Norfolk Manufactured Gas Plant Site

Date 03/08/93	Elapsed Time (minutes)	Blower FPM Influent	Blower FPM Effluent	Blower CFPM Influent	Blower CFPM Effluent	Extraction Well VM3A (Inches of Water)	Monitor Wells MW2	Monitor Wells VM3B	Monitor Wells MW6	Monitor Wells VM2B	Monitor Wells VM2C	Monitor Wells VM3B	Micro TIP Readings in ppm	Dilution Valve
	0.00	45	5,550	1.05	129.33	1.94	--	--	--	--	--	--	556	Full Open
	5	60	555	1.40	129.33	1.94	0.05	0.15	0.00	0.00	0.00	0.02	485	
	20	45	5,100	1.05	118.84	1.94	0.15	0.15	0.04	0.01	0.00	0.03	424	
	30	60	5,200	1.40	121.17	1.94	0.15	0.17	0.50	0.005	0.00	0.00	444	Turn Valve to half open
	40	275	4,100	6.41	95.54	29.09	--	0.28	0.00	0.00	0.05	0.04	408	
	50	245	4,100	5.71	95.54	30.19	0.00	0.27	0.02	0.00	0.04	0.04	403	
	60	210	4,200	4.89	97.87	28.53	0.00	0.27	0.02	0.00	0.02	0.14	400	Full Close
	71	650	900	15.15	20.97	--	--	--	--	--	--	--	398	
	75	--	--	--	--	--	0.00	0.28	0.02	0.00	0.00	0.075	--	
	80	400	600	9.32	12.98	67.87	0.00	0.27	0.02	0.00	0.03	0.08	383	
	90	540	510	12.58	11.88	67.87	0.00	0.27	0.02	0.00	0.00	0.07	365	
Stop	95	570	510	13.28	11.88	--	--	--	--	--	--	--	382	

Calculation: 2" schd 40 pressure PVC has .0233021 linear feet per cubic foot (LFPCF)
Example: 5,550 FPM x 0.0233021 (LFPCF) = 129.33 cubic feet per minute (CFPM)
Test Date: 03-08-1993 By: Dana P. O'Dell
FPM = Feet Per Minute
PPM = parts per million
FPM = feet per minute
ET = Elapsed time
PVC = polyvinyl chloride
Note: Micro Tip has 10.6 eV lamp and was calibrated with isobutylene, as such MicroTip reading has a relative response of 1.78 to benzene, 2.25 to 1,2-dichorobenzene and 1.91 to toluene

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Table 8
Summary of Off-site Well Data
Former Norfolk Manufactured Gas Plant Site

Well No. (1)	Installation Date	Depth (feet)	Depth of Screened Interval (feet)	Distance from Site (feet)	Original Owner	Reported Use
217-066	1980	830	820-830	5000	Compeco Cleaners	Cleaning
217-055	1969	773	740-773	5300	1st and Merchants Bank Building	Unused
217-050	1965	765	775-765	4900	Seldon Arcade Building	Heating and Cooling
217-039	1943 (2)	106	91-106	8600	Southern Materials Corp.	Unknown
217-037	1955 (3)	60	18-23 35-50	4600	Norfolk Contracting Company	Dewatering
217-025	unknown	135	unknown	3800	Champale Products Corp.	Process Water
217-008	1938	723	703-723	3800	Old Dominion Peanut Co.	Abandoned?
217-002	1966	75	63-68	4500	Norfolk General Hospital	Heating and Cooling, Emergency potable supply

Notes:
(1) Virginia State Water Control Board Designation
(2) Four Identical Wells
(3) Two Identical Wells

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ORIGINAL (Red)
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TABLE 9
Rising Head Slug Test Results
Former Norfolk Manufactured Gas Plant Site

ORIGINAL (Red)

Well No.	Test Date	Formation Material	Hydraulic Conductivity f/d	Hydraulic Conductivity cm/sec
MW-1	10/5/89	Fill/Sand	9.92	3.5×10^{-3}
MW-2	10/5/89	Fill/Sand	3.69	1.3×10^{-3}
MW-4	10/5/89	Sand	1.87	6.5×10^{-4}
MW-8	10/5/89	Fill/Sand	3.69	1.3×10^{-3}
MW-10	3/25/93	Sand	0.96	3.4×10^{-4}
MW-12	10/5/89	Sand	0.04	1.4×10^{-5}
MW-13	3/25/93	Fill/Sand	45.36	1.6×10^{-2}
MW-14	3/25/93	Fill/Sand	23.53	8.3×10^{-3}
MW-15	10/5/89	Fill/Clay	15.31	5.4×10^{-3}
MW-22	3/25/93	Fill/Sand	0.71	2.5×10^{-4}

f/day
cm/sec

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ORIGINAL (Red)

ORIGINAL

Table 10
Summary of Lower Sand Constant Rate Aquifer Test Results
Former Norfolk Manufactured Gas Plant Site

Time Drawdown Analysis (Hantush - Jacob 1955)				
Well ID	**T** ft^2/min	**S**	**K_h** ft/day	**K_v[b]** ft/day
MW-13B	0.07165	0.1879	2.0635	2.6222
MW-13C	0.009915	0.01352	0.2856	2.2753
MW-21B	0.07505	0.0006119	2.1614	0.1059
RW-24B[a]	0.002663	0.01884	0.0767	2.1255
RW-25B	0.06064	0.0003869	1.7464	0.0488
Mean	0.04398	0.0443	1.2667	0.0774[c]

a Pumping Well
b Vertical hydraulic conductivity of the confining unit
c Average of MW-21B and RW-25B only
T Transmisivity
S Storage Co-efficiency
K_h Horizontal hydraulic conductivity
K_v Vertical hydraulic conductivity
ft^2/min square feet per minute
ft/day feet per day

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Table 11
Summary of Total BTEX and Total PAH Concentrations in Soils
Former Norfolk Manufactured Gas Plant Site

ORIGINAL (Red)
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Sample	Depth (feet)	Total BTEX (mg/kg)	Total PAHs (mg/kg)	Total Cyanide (mg/kg)
B-1	0-2	0.62	64.2	230
B-1	4-6	77.1	3,036	10
B-2	4-6	0.09	64	<1
B-2	2-4	--	--	--
B-3	4-6	39.3	2,531	270
B-3	2-4	115	1049	36
B-4	2-4	4.4	199	<1
B-4	4-6	213	116	5
B-5	0-2	2.1	2115	840
B-5	0-2	4.4	31.8	13
B-6	0-2	1.3	4.5	<1
B-6	4-6	15.4	86.7	17
B-7	0-2	0.15	8.8	<1
B-7	4-6	ND	3.3	2
B-9	0-2	88.3	812	130
B-9	4-6	11.9	21.4	10
B-10	0-2	0.54	32.7	<1
B-10	4-6	98	655	1
MW-10	6	211	15143	49

ND Not Detected
-- Sample Not Collected

Notes:
1. No samples from Boring B-8 were submitted for analysis.
BTEX - benzene, toluene, ethylbenzene, and xylene
PAHs - Poly Aromatic Hydrocarbons
mg/kg - milligrams per kilograms

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Table 12
Summary of Lead Concentrations in Soils
Former Norfolk Manufactured Gas Plant Site

Sample	Depth (feet)	Total Lead (mg/kg)	EP Toxicity (mg/L)
B-1	0-2	385	0.12
B-3	4-6	376	<0.02
B-10	4-6	56	<0.02
MW-1	2-4	451	0.26
MW-2	4-6	534	<0.02
MW-3	2-4	99	0.10
MW-8	2-4	757	0.58
MW-8	4-6	461	0.06
MW-12	0-2	47	<0.02
MW-14	0-2	40	<0.02

Notes:
Only Monitor Well and Soil Boring Locations for which metals analysis was completed are listed.
EP -
mg/kg - milligrams per kilograms
mg/L - milligrams per liter

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ORIGINAL (Red)

TABLE 13
SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER
FORMER NORFOLK MANUFACTURED GAS PLANT SITE
NORFOLK, VIRGINIA

WELL NO.	OW-1			MW-4			MW-4B		
DATE SAMPLED	10-25-90 (1)	3-5-91 (1)	02-01-94	10-25-90 (1)	3-5-91	02-01-94 (2)	10-25-90 (1)	3-5-91	2-01-94 (2)
Volatile Organics (ug/L)									
Benzene	< 20	< 1	–	37000	–	1500 (B)	< 1	–	90
Toluene	< 20	< 1	–	13000	–	750 (B)	< 1	–	< 1.4
Ethylbenzene	< 20	< 1	–	4700	–	1200	< 1	–	2
Total Xylenes	< 20	< 1	–	10000	–	2400	< 1	–	8.2
Total BTEX (ug/L)	0	0	–	64700	–	3600	0	–	100.2
Semivolatiles (ug/L)									
Non-PAH Compounds									
Phenol	< 10	< 10	–	130	–	< 11	< 10	–	< 10 (R)
Benzyl Alcohol	< 20	< 20	–	32	–	< 11	< 20	–	< 10
2-Methylphenol	< 10	< 10	–	32	–	< 11	< 10	–	< 10 (R)
4-Methylphenol	< 10	< 10	–	39	–	< 11	< 10	–	< 10 (R)
2-4,Dimethylphenol	< 10	< 10	–	26	–	< 11	< 10	–	< 10 (R)
Benzoic Acid	< 50	< 50	–	31	–	< 53	< 50	–	< 50
Dimethyl Phthalate	< 10	< 10	–	< 10	–	< 11	< 10	–	< 10
bis(2-Ethylhexyl)phthalate	< 10	< 10	–	< 10	–	3.7	< 10	–	< 10
Diethylphthalate	< 10	< 10	–	< 10	–	< 11	< 10	–	< 10
Di-N-octylphthalate	< 10	< 10	–	< 10	–	< 11	< 10	–	< 10
Dibenzofuran	60	38	–	< 10	–	< 11	< 10	–	< 10
Polynuclear Aromatic Hydrocarbons									
Naphthalene	92	71	–	3700	–	< 11	< 10	–	< 10
Acenaphthene	82	< 10	–	15	–	< 11	< 10	–	< 10
Acenaphthylene	< 10	53	–	68	–	< 11	< 10	–	< 10
Anthracene	110	46	–	< 10	–	< 11	< 10	–	< 10
Phenanthrene	240	127	–	48	–	< 11	< 10	–	< 10
Fluorene	56	32	–	31	–	< 11	< 10	–	< 10
Fluoranthene	230	92	–	11	–	< 11	< 10	–	< 10
Pyrene	210	73	–	15	–	< 11	< 10	–	< 10
Chrysene	110	34	–	< 10	–	< 11	< 10	–	< 10
Benzo(a)Anthracene	120	39	–	< 10	–	< 11	< 10	–	< 10
Benzo(b)Fluoranthene	< 10	44	–	< 10	–	< 11	< 10	–	< 10
Benzo(k)Fluoranthene	42	12	–	< 10	–	< 11	< 10	–	< 10
Benzo(a)Pyrene	170	29	–	< 10	–	< 11	< 10	–	< 10
Benzo(g,h,i)Perylene	42	12	–	< 10	–	< 11	< 10	–	< 10
Indeno(1,2,3-cd)Pyrene	50	14	–	< 10	–	< 11	< 10	–	< 10
Dibenzo(a,h)Anthracene	14	< 10	–	< 10	–	< 11	< 10	–	< 10
2-Methylnaphthalene	22	11	–	550	–	< 11	< 10	–	< 10
Total PAHs (ug/L)	1590	689	–	4438	–	0	0	–	0
Inorganics (mg/L)									
Cyanide, total	< 0.010	< 0.010	–	0.68	–	0.29	0.19	–	0.1
Cyanide, free	< 0.010	< 0.010	–	0.56	–	0.13	0.1	–	< 0.020
Lead	0.13	< 0.005	–	< 0.050	–	0.008	< 0.050	–	< 0.0024
Arsenic	< 0.005	< 0.005	–	0.068	–	0.008	0.01	–	< 0.0035
Chromium	< 0.020	< 0.005	–	0.03	–	< 0.010	< 0.020	–	< 0.010
Barium	–	–	–	–	–	0.159	–	–	< 0.0333
Selenium	–	–	–	–	–	< 0.002	–	–	< 0.002

(1) Level II reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
(2) Level III reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
< Not detected, reported as "less than (<) quantitation limit"
– Not sampled
(B) Detected in an associated blank at similar concentrations. Result qualified as non-detect.
(R) Non-detect result qualified as unusable due to Quality Assurance/Quality Control problems criteria
BTEX Benzene, Toluene, Ethylbenzene, and Xylenes
ug/L Micrograms per Liter
mg/L Milligrams per Liter
PAH PolynuclearAromatic Hydrocarbons

ORIGINAL (RED)

TABLE 13 (continued)
SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER
FORMER NORFOLK MANUFACTURED GAS PLANT SITE
NORFOLK, VIRGINIA

WELL NO.	MW-8			MW-12			MW-13		
DATE SAMPLED	10-25-90	3-6-91 (1)	02-01-94 (2)	10-25-90 (1)	3-5-91	02-01-94 (2)	10-25-90 (1)	3-5-91	02-01-94 (2)
Volatile Organics (ug/L)									
Benzene	–	< 1	< 1	< 10	–	54	1600	–	800
Toluene	–	2	< 1	97	–	1.5 (B)	< 40	–	150 (B)
Ethylbenzene	–	< 1	< 1	< 10	–	9.1	1400	–	610
Total Xylenes	–	1	3.3	230	–	6.4	140	–	240
Total BTEX (ug/L)	–	3	3.3	327	–	69.5	3140	–	1650
Semivolatiles (ug/L)									
Non-PAH Compounds									
Phenol	–	< 10	< 10	46	–	13	17	–	4.2
Benzyl Alcohol	–	< 20	< 10	< 20	–	< 10	< 20	–	< 10
2-Methylphenol	–	< 10	< 10	< 10	–	< 10	< 10	–	< 10
4-Methylphenol	–	< 10	< 10	< 10	–	< 10	< 10	–	< 10
2-4,Dimethylphenol	–	< 10	< 10	< 10	–	1.4	12	–	6.8
Benzoic Acid	–	< 50	< 50	< 50	–	< 50	< 50	–	< 50
Dimethyl Phthalate	–	< 10	< 10	< 10	–	< 10	130	–	< 10
bis(2-Ethylhexyl)phthalate	–	< 10	< 10	< 10	–	1.5	< 10	–	< 10
Diethylphthalate	–	< 10	< 10	< 10	–	< 10	< 10	–	< 10
Di-N-octylphthalate	–	< 10	< 10	< 10	–	< 10	< 10	–	< 10
Dibenzofuran	–	< 10	< 10	< 10	–	< 10	< 10	–	12
Polynuclear Aromatic Hydrocarbons									
Naphthalene	–	< 10	< 10	200	–	13	570	–	160
Acenaphthene	–	< 10	< 10	88	–	13	130	–	120
Acenaphthylene	–	< 10	< 10	< 10	–	1.7	< 10	–	11
Anthracene	–	< 10	< 10	54	–	8.9	34	–	35
Phenanthrene	–	< 10	< 10	170	–	25	120	–	110
Fluorene	–	< 10	< 10	54	–	7.3	62	–	52
Fluoranthene	–	< 10	< 10	60	–	12	40	–	42
Pyrene	–	< 10	< 10	80	–	18	50	–	73
Chrysene	–	< 10	< 10	38	–	8.1	20	–	30
Benzo(a)Anthracene	–	< 10	< 10	40	–	7.5	22	–	28
Benzo(b)Fluoranthene	–	< 10	< 10	36	–	4.4	16	–	15
Benzo(k)Fluoranthene	–	< 10	< 10	14	–	3.3	< 10	–	17
Benzo(a)Pyrene	–	< 10	< 10	60	–	3.7	30	–	15
Benzo(g,h,i)Perylene	–	< 10	< 10	14	–	< 10	< 10	–	15
Indeno(1,2,3-cd)Pyrene	–	< 10	< 10	16	–	< 10	< 10	–	15
Dibenzo(a,h)Anthracene	–	< 10	< 10	< 10	–	< 10	< 10	–	7.6
2-Methylnaphthalene	–	< 10	< 10	82	–	11	160	–	20
Total PAHs (ug/L)	–	0	0	1006	–	136.9	1254	–	765.6
Inorganics (mg/L)									
Cyanide, total	–	< 0.010	< 0.020	1.7	–	1.7	0.53	–	0.3
Cyanide, free	–	< 0.010	< 0.020	0.78	–	< 0.020	0.5	–	0.13
Lead	–	< 0.005	0.063	< 0.050	–	0.00403	0.08	–	0.0824
Arsenic	–	0.0068	< 0.0035	< 0.005	–	0.0079	0.007	–	< 0.0035
Chromium	–	< 0.005	< 0.010	< 0.020	–	0.032	< 0.020	–	0.011
Barium	–	–	0.589	–	–	0.0741	–	–	0.15
Selenium	–	–	< 0.010	–	–	< 0.002	–	–	< 0.002

(1) Level II reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
(2) Level III reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
< Not detected, reported as "less than (<) quantitation limit"
– Not sampled
(B) Detected in an associated blank at similar concentrations. Result qualified as non-detect.
(J) Non-detect result qualified as unusable due to Quality Assurance/Quality Control problems criteria
BTEX Benzene, Toluene, Ethylbenzene, and Xylenes
ug/L Micrograms per Liter
mg/L Milligrams per Liter
PAH PolynuclearAromatic Hydrocarbons

ORIGINAL (Red)

TABLE 13 (continued)
SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER
FORMER NORFOLK MANUFACTURED GAS PLANT SITE
NORFOLK, VIRGINIA

WELL NO.	MW-13B			MW-13C			MW-14		
DATE SAMPLED	10-25-90 (1)	3-5-91	02-01-94	11-25-90 (1)	3-5-91 (1)	02-01-94 (2)	10-25-90 (1)	3-5-91	02-01-94 (2)
Volatile Organics (ug/L)									
Benzene	48000	–	–	< 1	< 1	1.2 (B)	8300	–	720
Toluene	15000	–	–	20 (B)	2	1.4 (B)	< 40	–	100 (B)
Ethylbenzene	19000	–	–	17 (B)	1	1.3	1600	–	310
Total Xylenes	24000	–	–	45 (B)	3	< 3	< 40	–	170
Total BTEX (ug/L)	106000	–	–	0	6	1.3	9900	–	1200
Semivolatiles (ug/L)									
Non-PAH Compounds									
Phenol	< 240	–	–	< 10	< 10	< 10	< 10	–	< 10
Benzyl Alcohol	< 240	–	–	< 20	< 20	< 10	< 20	–	< 10
2-Methylphenol	< 240	–	–	< 10	< 10	< 10	< 10	–	< 10
4-Methylphenol	< 240	–	–	< 10	< 10	< 10	< 10	–	< 10
2-4,Dimethylphenol	< 240	–	–	< 10	< 10	< 10	< 10	–	< 10
Benzoic Acid	< 240	–	–	< 50	< 50	< 50	< 50	–	< 50
Dimethyl Phthalate	< 240	–	–	< 10	< 10	< 10	< 10	–	< 10
bis(2-Ethylhexyl)phthalate	< 240	–	–	< 10	< 10	< 10	< 10	–	< 10
Diethylphthalate	< 240	–	–	< 10	< 10	< 10	< 10	–	< 10
Di-N-octylphthalate	< 240	–	–	< 10	< 10	5.3	< 10	–	< 10
Dibenzofuran	4500	–	–	< 10	< 10	< 10	38	–	4.3
Polynuclear Aromatic Hydrocarbons									
Naphthalene	320000	–	–	< 10	< 10	4.7	360	–	1000
Acenaphthene	47000	–	–	< 10	< 10	< 10	270	–	80
Acenaphthylene	9000	–	–	< 10	< 10	< 10	36	–	3.7
Anthracene	29000	–	–	< 10	< 10	< 10	100	–	6.8
Phenanthrene	130000	–	–	< 10	< 10	< 10	280	–	29
Fluorene	39000	–	–	< 10	< 10	< 10	150	–	23
Fluoranthene	28000	–	–	< 10	< 10	< 10	140	–	7.2
Pyrene	40000	–	–	< 10	< 10	< 10	170	–	13
Chrysene	21000	–	–	< 10	< 10	< 10	< 10	–	3.3
Benzo(a)Anthracene	23000	–	–	< 10	< 10	< 10	90	–	3.4
Benzo(b)Fluoranthene	16000	–	–	< 10	< 10	< 10	90	–	< 10
Benzo(k)Fluoranthene	5100	–	–	< 10	< 10	< 10	40	–	1.5
Benzo(a)Pyrene	16000	–	–	< 10	< 10	< 10	140	–	< 10
Benzo(g,h,i)Perylene	5500	–	–	< 10	< 10	< 10	40	–	< 10
Indeno(1,2,3-cd)Pyrene	4900	–	–	< 10	< 10	< 10	40	–	< 10
Dibenzo(a,h)Anthracene	1800	–	–	< 10	< 10	< 10	10	–	< 10
2-Methylnaphthalene	220000	–	–	< 10	< 10	3.2	110	–	120
Total PAHs (ug/L)	955300	–	–	0	0	7.9	2066	–	1290.9
Inorganics (mg/L)									
Cyanide, total	0.16	–	–	< 0.010	< 0.010	< 0.020	0.53	–	0.13
Cyanide, free	0.1	–	–	< 0.010	< 0.010	< 0.020	0.21	–	< 0.020
Lead	< 0.050	–	–	0.24	< 0.005	0.00243	0.05	–	0.003
Arsenic	0.013	–	–	0.006	< 0.005	0.0035	0.012	–	< 0.0035
Chromium	< 0.020	–	–	< 0.020	< 0.005	< 0.010	0.02	–	< 0.010
Barium	–	–	–	–	–	0.0752	–	–	0.0872
Selenium	–	–	–	–	–	< 0.002	–	–	< 0.002

(1) Level II reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
(2) Level III reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
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– Not sampled
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(X) Non-detect result qualified as unusable due to Quality Assurance/Quality Control problems criteria
BTEX Benzene, Toluene, Ethylbenzene, and Xylenes
ug/L Micrograms per Liter
mg/L Milligrams per Liter
PAH PolynuclearAromatic Hydrocarbons

ORIGINAL

TABLE 13 (continued)
SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER
FORMER NORFOLK MANUFACTURED GAS PLANT SITE
NORFOLK, VIRGINIA

WELL NO.	MW-15			MW-16			MW-17		
DATE SAMPLED	10-25-90 (1)	3-5-91 (1)	02-01-94 (2)	10-25-90 (1)	3-5-91	02-01-94 (2)	10-25-90 (1)	3-5-91	02-01-94 (2)
Volatile Organics (ug/L)									
Benzene	< 1	< 1	1.3 (B)	< 1	–	< 1	< 1	–	1.3 (B)
Toluene	< 1	< 1	1.4 (B)	< 1	–	1.1 (B)	< 1	–	1.4 (B)
Ethylbenzene	< 1	< 1	< 1	< 1	–	< 1	< 1	–	< 1
Total Xylenes	< 1	< 1	3.3	< 1	–	< 3	< 1	–	3.3
Total BTEX (ug/L)	0	0	3.3	0	–	0	0	–	3.3
Semivolatiles (ug/L)									
Non-PAH Compounds									
Phenol	< 10	< 10	< 10	< 10	–	> 11	< 10	–	< 10
Benzyl Alcohol	< 20	< 20	< 20	< 20	–	> 11	< 20	–	< 10
2-Methylphenol	< 10	< 10	< 10	< 10	–	> 11	< 10	–	< 10
4-Methylphenol	< 10	< 10	< 10	< 10	–	> 11	< 10	–	< 10
2-4,Dimethylphenol	< 10	< 10	< 10	< 10	–	> 11	< 10	–	< 10
Benzoic Acid	< 50	< 50	< 50	< 50	–	< 56	< 50	–	< 50
Dimethyl Phthalate	< 10	< 10	< 10	< 10	–	> 11	< 10	–	< 10
bis(2-Ethylhexyl)phthalate	< 10	< 10	2.9	< 10	–	> 11	< 10	–	< 10
Diethylphthalate	< 10	< 10	< 10	< 10	–	> 11	< 10	–	< 10
Di-N-octylphthalate	< 10	< 10	< 10	< 10	–	> 11	< 10	–	< 10
Dibenzofuran	< 10	17	< 10	< 10	–	> 11	< 10	–	< 10
Polynuclear Aromatic Hydrocarbons									
Naphthalene	< 10	27	< 10	< 10	–	> 11	< 10	–	< 10
Acenaphthene	20	36	1.3	< 10	–	> 11	< 10	–	< 10
Acenaphthylene	< 10	< 10	< 10	< 10	–	> 11	< 10	–	< 10
Anthracene	< 10	37	< 10	< 10	–	> 11	< 10	–	< 10
Phenanthrene	30	103	1.4	< 10	–	> 11	< 10	–	< 10
Fluorene	< 10	23	< 10	< 10	–	> 11	< 10	–	< 10
Fluoranthene	12	73	< 10	< 10	–	> 11	< 10	–	< 10
Pyrene	12	71	< 10	< 10	–	> 11	< 10	–	< 10
Chrysene	< 10	32	< 10	< 10	–	> 11	< 10	–	< 10
Benzo(a)Anthracene	< 10	38	< 10	< 10	–	> 11	< 10	–	< 10
Benzo(b)Fluoranthene	< 10	43	< 10	< 10	–	> 11	< 10	–	< 10
Benzo(k)Fluoranthene	< 10	14	< 10	< 10	–	> 11	< 10	–	< 10
Benzo(a)Pyrene	< 10	29	< 10	< 10	–	> 11	< 10	–	< 10
Benzo(g,h,i)Perylene	< 10	13	< 10	< 10	–	> 11	< 10	–	< 10
Indeno(1,2,3-cd)Pyrene	< 10	17	< 10	< 10	–	> 11	< 10	–	< 10
Dibenzo(a,h)Anthracene	< 10	< 10	< 10	< 10	–	> 11	< 10	–	< 10
2-Methylnaphthalene	< 10	< 10	< 10	< 10	–	> 11	< 10	–	< 10
Total PAHs (ug/L)	74	556	2.7	0	–	0	0	–	0
Inorganics (mg/L)									
Cyanide, total	0.52	0.33	0.18	< 0.010	–	< 0.020	< 0.010	–	< 0.020
Cyanide, free	0.31	0.05	< 0.020	< 0.010	–	< 0.020	< 0.010	–	< 0.020
Lead	0.26	< 0.005	0.664	< 0.05	–	0.00119	0.06	–	0.0034
Arsenic	0.008	< 0.005	< 0.0035	0.007	–	< 0.0035	< 0.005	–	< 0.0035
Chromium	< 0.020	< 0.005	< 0.010	<0.020	–	0.051	<0.020	–	0.033
Barium	–	–	0.374	–	–	0.141	–	–	0.042
Selenium	–	–	< 0.002	–	–	< 0.002	–	–	0.0047

(1) Level II reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
(2) Level III reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
< Not detected, reported as "less than (<) quantitation limit"
– Not sampled
(B) Detected in an associated blank at similar concentrations. Result qualified as non-detect.
Non-detect result qualified as unusable due to Quality Assurance/Quality Control problems criteria
BTEX Benzene, Toluene, Ethylbenzene, and Xylenes
ug/L Micrograms per Liter
mg/L Milligrams per Liter
PAH PolynuclearAromatic Hydrocarbons

ORIGINAL

TABLE 13 (continued)
SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER
FORMER NORFOLK MANUFACTURED GAS PLANT SITE
NORFOLK, VIRGINIA

WELL NO.	MW-18			MW-19			MW-19B		
DATE SAMPLED	10-25-90 (1)	3-5-91	02-01-94 (2)	10-25-90 (1)	3-5-91	02-01-94 (2)	10-25-90 (1)	3-5-91	02-01-94 (2)
Volatile Organics (ug/L)									
Benzene	< 1	–	1.2 (B)	< 1	–	1.2 (B)	< 1	–	1.2 (B)
Toluene	< 1	–	5.5 (B)	< 1	–	1.3 (B)	< 1	–	1.3 (B)
Ethylbenzene	< 1	–	< 1	< 1	–	< 1	< 1	–	< 1
Total Xylenes	< 1	–	< 3	< 1	–	< 3	< 1	–	< 3
Total BTEX (ug/L)	0	–	0	0	–	0	0	–	0
Semivolatiles (ug/L)									
Non-PAH Compounds									
Phenol	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Benzyl Alcohol	< 20	–	< 10	< 20	–	< 11	< 20	–	< 11
2-Methylphenol	< 10	–	2.9	< 10	–	< 11	< 10	–	< 11
4-Methylphenol	< 10	–	2.7	< 10	–	< 11	< 10	–	< 11
2-4,Dimethylphenol	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Benzoic Acid	< 50	–	< 50	< 50	–	< 50	< 50	–	< 50
Dimethyl Phthalate	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
bis(2-Ethylhexyl)phthalate	< 10	–	< 10	< 10	–	< 11	< 10	–	1.6
Diethylphthalate	< 10	–	3.7	< 10	–	< 11	< 10	–	< 11
Di-N-octylphthalate	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Dibenzofuran	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Polynuclear Aromatic Hydrocarbons									
Naphthalene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Acenaphthene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Acenaphthylene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Anthracene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Phenanthrene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Fluorene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Fluoranthene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Pyrene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Chrysene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Benzo(a)Anthracene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Benzo(b)Fluoranthene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Benzo(k)Fluoranthene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Benzo(a)Pyrene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Benzo(g,h,i)Perylene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Indeno(1,2,3-cd)Pyrene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Dibenzo(a,h)Anthracene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
2-Methylnaphthalene	< 10	–	< 10	< 10	–	< 11	< 10	–	< 11
Total PAHs (ug/L)	0	–	0	0	–	0	0	–	0
Inorganics (mg/L)									
Cyanide, total	< 0.010	–	< 0.020	< 0.010	–	< 0.020	< 0.010	–	< 0.020
Cyanide, free	< 0.010	–	< 0.020	< 0.010	–	< 0.020	< 0.010	–	< 0.020
Lead	< 0.05	–	0.0063	< 0.05	–	0.0115	< 0.05	–	< 0.0024
Arsenic	0.03	–	< 0.0175	< 0.005	–	< 0.0035	0.005	–	< 0.0035
Chromium	<0.020	–	0.014	<0.020	–	0.026	<0.020	–	< 0.010
Barium	–	–	0.0805	–	–	0.0559	–	–	0.0816
Selenium	–	–	0.0043	–	–	< 0.002	–	–	< 0.002

(1) Level II reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
(2) Level III reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
< Not detected, reported as "less than (<) quantitation limit"
– Not sampled
(B) Detected in an associated blank at similar concentrations. Result qualified as non-detect.
Non-detect result qualified as unusable due to Quality Assurance/Quality Control problems criteria
BTEX Benzene, Toluene, Ethylbenzene, and Xylenes
ug/L Micrograms per Liter
mg/L Milligrams per Liter
PAH PolynuclearAromatic Hydrocarbons

ORIGINAL (Red)

TABLE 13 (continued)
SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER
FORMER NORFOLK MANUFACTURED GAS PLANT SITE
NORFOLK, VIRGINIA

WELL NO.	MW-20			MW-20B			MW-21		
DATE SAMPLED	10-25-90 (1)	3-5-91 (1)	02-01-94 (2)	10-25-90 (1)	3-5-91 (1)	02-01-94 (2)	10-25-90	3-5-91 (1)	02-01-94 (2)
Volatile Organics (ug/L)									
Benzene	< 1	< 1	1.3 (B)	< 1	< 1(UJ)	1.3 (B)	--	< 1	1.2 (B)
Toluene	< 1	< 1	1.4 (B)	< 1	< 1(UJ)	1.4 (B)	--	< 1	1.3 (B)
Ethylbenzene	< 1	< 1	< 1	< 1	< 1(UJ)	< 1	--	< 1	< 1
Total Xylenes	< 1	< 1	< 3	< 1	< 1(UJ)	< 3	--	< 1	< 3
Total BTEX (ug/L)	0	0	0	0	0	0	--	0	0
Semivolatiles (ug/L)									
Non-PAH Compounds									
Phenol	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Benzyl Alcohol	< 20	< 20	< 10	< 20	< 20	< 11	--	< 20	< 10
2-Methylphenol	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
4-Methylphenol	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
2-4,Dimethylphenol	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Benzoic Acid	< 50	< 50	< 50	< 50	< 50	< 50	--	< 50	< 50
Dimethyl Phthalate	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
bis(2-Ethylhexyl)phthalate	< 10	< 10	< 10	< 10	< 10	1.1	--	< 10	< 10
Diethylphthalate	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Di-N-octylphthalate	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Dibenzofuran	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Polynuclear Aromatic Hydrocarbons									
Naphthalene	< 10	< 10	< 10	14	< 10	< 11	--	< 10	< 10
Acenaphthene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Acenaphthylene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Anthracene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Phenanthrene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Fluorene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Fluoranthene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Pyrene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Chrysene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Benzo(a)Anthracene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Benzo(b)Fluoranthene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Benzo(k)Fluoranthene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Benzo(a)Pyrene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Benzo(g,h,i)Perylene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Indeno(1,2,3-cd)Pyrene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Dibenzo(a,h)Anthracene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
2-Methylnaphthalene	< 10	< 10	< 10	< 10	< 10	< 11	--	< 10	< 10
Total PAHs (ug/L)	0	0	0	14	0	0	--	0	0
Inorganics (mg/L)									
Cyanide, total	< 0.020	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	--	< 0.010	< 0.020
Cyanide, free	< 0.020	< 0.010	< 0.020	< 0.010	< 0.010	< 0.020	--	< 0.010	< 0.020
Lead	< 0.05	< 0.005	0.057	< 0.050	< 0.005	< 0.0024	--	< 0.005	0.0293
Arsenic	0.011	0.0055	< 0.0035	< 0.005	< 0.005	< 0.0035	--	0.005	< 0.0035
Chromium	<0.020	< 0.005	0.041	< 0.020	< 0.005	< 0.010	--	< 0.005	0.043
Barium	--	--	0.693	--	--	< 0.0333	--	--	0.141
Selenium	--	--	< 0.002	--	--	< 0.002	--	--	< 0.002

(1) Level II reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
(2) Level III reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
< Not detected, reported as "less than (<) quantitation limit"
-- Not sampled
(B) Detected in an associated blank at similar concentrations. Result qualified as non-detect.
(R) Non-detect result qualified as unusable due to Quality Assurance/Quality Control problems criteria
BTEX Benzene, Toluene, Ethylbenzene, and Xylenes
ug/L Micrograms per Liter
mg/L Milligrams per Liter
PAH PolynuclearAromatic Hydrocarbons

ORIGINAL (Red)

TABLE 13 (continued)
SUMMARY OF DETECTED CONSTITUENTS IN GROUNDWATER
FORMER NORFOLK MANUFACTURED GAS PLANT SITE
NORFOLK, VIRGINIA

WELL NO.	MW-21B		
DATE SAMPLED	10-25-90	3-5-91 (1)	02-01-94 (2)
Volatile Organics (ug/L)			
Benzene	--	< 1	1.2 (B)
Toluene	--	< 1	1.3 (B)
Ethylbenzene	--	< 1	< 1
Total Xylenes	--	< 1	< 3
Total BTEX (ug/L)	--	0	0
Semivolatiles (ug/L)			
Non-PAH Compounds			
Phenol	--	< 10	< 10 ((R)
Benzyl Alcohol	--	< 20	< 10 ((R)
2-Methylphenol	--	< 10	< 10 (R)
4-Methylphenol	--	< 10	< 10 (R)
2-4,Dimethylphenol	--	< 10	< 10 (R)
Benzoic Acid	--	< 50	< 50 (R)
Dimethyl Phthalate	--	< 10	< 10 (R)
bis(2-Ethylhexyl)phthalate	--	< 10	< 10 (R)
Diethylphthalate	--	< 10	< 10 (R)
Di-N-octylphthalate	--	< 10	< 10 (R)
Dibenzofuran	--	< 10	< 10 (R)
Polynuclear Aromatic Hydrocarbons			
Naphthalene	--	< 10	< 10 (R)
Acenaphthene	--	< 10	< 10 (R)
Acenaphthylene	--	< 10	< 10 (R)
Anthracene	--	< 10	< 10 (R)
Phenanthrene	--	< 10	< 10 (R)
Fluorene	--	< 10	< 10 (R)
Fluoranthene	--	< 10	< 10 (R)
Pyrene	--	< 10	< 10 (R)
Chrysene	--	< 10	< 10 (R)
Benzo(a)Anthracene	--	< 10	< 10 (R)
Benzo(b)Fluoranthene	--	< 10	< 10 (R)
Benzo(k)Fluoranthene	--	< 10	< 10 (R)
Benzo(a)Pyrene	--	< 10	< 10 (R)
Benzo(g,h,i)Perylene	--	< 10	< 10 (R)
Indeno(1,2,3-cd)Pyrene	--	< 10	< 10 (R)
Dibenzo(a,h)Anthracene	--	< 10	< 10 (R)
2-Methylnaphthalene	--	< 10	< 10 (R)
Total PAHs (ug/L)		0	0
Inorganics (mg/L)			
Cyanide, total	--	< 0.010	< 0.020
Cyanide, free	--	< 0.010	< 0.020
Lead	--	< 0.005	< 0.0024
Arsenic	--	< 0.005	< 0.0035
Chromium	--	< 0.005	< 0.010
Barium	--	--	0.0367
Selenium	--	--	< 0.002

(1) Level II reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
(2) Level III reporting package, data not validated by Geraghty & Miller Quality Assurance/Quality Control Department
< Not detected, reported as "less than (<) quantitation limit"
-- Not sampled
(B) Detected in an associated blank at similar concentrations. Result qualified as non-detect.
(R) Non-detect result qualified as unusable due to Quality Assurance/Quality Control problems criteria
BTEX Benzene, Toluene, Ethylbenzene, and Xylenes
ug/L Micrograms per Liter
mg/L Milligrams per Liter
PAH PolynuclearAromatic Hydrocarbons

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APPENDIX A

PEE
ORIGINAL
(Red)
ORIGINAL

APPENDIX A

TEST PIT LOGS

PFE ORIGINAL

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 1 - (2,3,4)

Location NORFOLK, VIRGINIA Date JULY 17,1989

TEST-PIT IDENTIFICATION TP-1

Depth (Ft.)	Description
0'	Topsoil, brown, root zone with vegetation.
1'	Fill, light tan, sand, medium grained.
2'	Fill, dark brown, cobbles, bricks and varied debris.
3'	Fill, black and brown, wooden beams, bricks and varied debris; bottom of tank impoundment; wet; slight coal tar odor.
4'	Bottom of excavation 4.0'
5'	
6'	
7'	
8'	
9'	
10'	
11'	
12'	

ORIGINAL

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 1-5, 1-6

Location NORFOLK, VIRGINIA Date JULY 17,1989

TEST-PIT IDENTIFICATION TP-2

Depth (Ft.)	Description
0'	
	Fill, coarse gravel and sand with brick fragments; moist.
1'	
	Concrete foundation 0.75'
2'	
3'	
4'	
5'	
6'	
7'	
8'	
9'	
10'	
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 1 - (7,8,9)

Location NORFOLK, VIRGINIA Date JULY 17,1989

TEST-PIT IDENTIFICATION TP-3

Depth (Ft.)	Description
0'	Topsoil, gravel, root zone with vegetation.
1'	Fill, dark brown, silt and fine sand with brick fragments.
2'	
3'	Fill, large concrete slabs, brick fragments, wooden beams, and varied debris; oil staining and oily sheen; strong hydrocarbon odor.
4'	
5'	
6'	
7'	Holder bottom 6.5'
8'	
9'	
10'	
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 1 - (10 - 13)

Location NORFOLK, VIRGINIA Date JULY 17,1989

TEST-PIT IDENTIFICATION TP-4

Depth (Ft.)	Description
0'	Topsoil, light brown, gravel, root zone.
1'	Fill, light brown, sand with brick fragments.
2'	Fill, black, ash layer with brick fragments; coal-tar odor.
3'	Fill, light gray, sand; coal-tar odor.
4'	Sand, some silt, moist; oil stained; strong coal-tar odor.
5'	
6'	
7'	
8'	Bottom of excavation 7.0'
9'	
10'	
11'	
12'	

ORIGINAL

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 1 - (14 - 18)

Location NORFOLK, VIRGINIA Date JULY 17,1989

TEST-PIT IDENTIFICATION TP-5

Depth (Ft.)	Description
0'	
	Sand, gravel, and pavement.
1'	
	Fill, black, wood, brick and varied debris; tar coated; strong coal-tar odor.
2'	
3'	
4'	Coal tar, black, high plasticity; strong coal-tar odor.
5'	Steel holder bottom 4.25'
6'	
7'	
8'	
9'	
10'	
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 1 - (19 - 21)

Location NORFOLK, VIRGINIA Date JULY 17,1989

TEST-PIT IDENTIFICATION TP-6

Depth (Ft.)	Description
0'	Coal tar.
1'	Fill, gray, sand and gravel with brick and concrete fragments; moist; coal-tar odor.
2'	
3'	Fill, black, sand and coal tar grading to coal tar at base.
4'	
5'	
6'	Steel holder bottom 5.0'
7'	
8'	
9'	NOTE: Wall of the relief holder was exposed in northern end of pit.
10'	
11'	
12'	

ORIGINAL

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 1-(22-25),2-A

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-7

Depth (Ft.)	Description
0'	Coal tar, stiff.
1'	Fill, light tan to dark brown, coarse sand with angular brick and granite cobbles; moist; slight coal-tar odor.
2'	
3'	Fill, black, sand and coal tar grading to coal tar at base.
4'	
5'	
6'	Steel holder bottom 5.5'
7'	
8'	
9'	
10'	
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 2 - (B,1,2)

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-8

Depth (Ft.)	Description
0'	
1'	Fill, light gray, medium sand; moist; slight coal-tar odor.
2'	
3'	Fill, bricks, concrete and varied debris; coal-tar odor.
4'	
5'	Fill, wood and concrete; oil and coal-tar staining; oily sheen on water in pit.
6'	
7'	Bottom of excavation 6.0'
8'	
9'	NOTE: Top of concrete wall for Holder #2 is approximately 4 feet below grade.
10'	
11'	
12'	

ORIGINAL

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 2 - (3 - 7)

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-9I

Depth (Ft.)	Description
0′	Topsoil and pavement.
1′	
2′	
3′	Fill, varied debris; oily sheen on water surface; strong odor.
4′	
5′	
6′	
7′	
8′	Holder bottom 7.1′
9′	NOTE: Top of concrete holder wall encountered at 1.5′, bottom of wall is at 6.5′. Wall constructed of 12" concrete with slab bottom, externally supported by timbers.
10′	
11′	
12′	

PE ORIGINAL

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 2 - (3 - 7)

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-9E

Depth (Ft.)	Description
0'	
1'	Topsoil.
2'	
3'	Fill, black and brown, ash and cinders with medium sand lenses.
4'	
5'	
6'	
7'	Silty sand, gray; oil stained; hydrocarbon odor.
8'	
9'	
10'	Bottom of excavation 9.4'
11'	
12'	

ORIGINAL
(Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 2 - (8,9)

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-10

Depth (Ft.)	Description
0'	
	Topsoil and concrete.
1'	Fill, fine sand and silt.
2'	
3'	Fill, cinder and ash; oily sheen on water surface
4'	
5'	
6'	
	Bottom of excavation 6.0'
7'	
8'	
9'	
10'	
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 2- (10-11)

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-11

Depth (Ft.)	Description
0'	
	Topsoil, root zone.
1'	Concrete.
2'	Fill, light tan and orange, medium sand, thinning to the southeast.
3'	
4'	
5'	
6'	Fill, black, brick and cinders; oily sheen; strong odor.
7'	
8'	
9'	Fine sand, little silt, light blue; root fragments.
	Bottom of excavation 9.0'
10'	
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 2 - (12-14)

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-12

Depth (Ft.)	Description
0′ – 1′	Fill, brown, medium sand, trace clay; moist.
1′ – 2′	
2′ – 3′	Fill, black, cinders and brick; moist; oil stained; hydrocarbon odor.
3′ – 4′	
4′ – 5′	Fill, gray, fine sand; moist; slight hydrocarbon odor.
5′ – 6′	
6′ – 7′	Fill, black, cinders and refuse; oily sheen on water surface; slight coal-tar odor.
7′ – 8′	
8′	Bottom of excavation 7.5′
9′	
10′	
11′	
12′	

TEST-PIT LOG

ORIGINAL (Red)

Project CITY OF NORFOLK / VEPCO Photo IDs # 2-15, 2-16

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-13

Depth (Ft.)	Description
0'	
	Topsoil.
1'	Fill, light brown, sand with small cobbles.
	Fill, black, varied debris and ash; moist.
2'	
	Fill, tan, sand with brick and cobbles; moist.
3'	
4'	
5'	
6'	Fill, refuse including bottles, shoes, and shells; oily; strong hydrocarbon odor.
7'	
8'	
9'	
	Bottom of excavation 8.7'
10'	
11'	
12'	

ORIGINAL (Red) ORIGINAL

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 2 - (17-19)

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-14

Depth (Ft.)	Description
0'	Topsoil.
1'	Fill, brown, sand and gravel; moist.
2'	Fill, black, cinders and brick fragments.
3'	
4'	Fill, dark gray, medium fine sand; moist; oil stained.
5'	
6'	Fill, wood, bottles, and varied debris; oil saturated in spots; strong hydrocarbon odor.
7'	
8'	Bottom of excavation 8.0'
9'	
10'	
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 2 - (20-22)

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-15

Depth (Ft.)	Description
0'	Topsoil
1'	
2'	Fill, black, cinder blocks and sand; coal-tar odor.
3'	
4'	Fill, light brown, sand and brick fragments.
5'	Fill, shell fragments; oil stained.
6'	
7'	
8'	Fill, cinders and refuse; oily sheen on water surface; hydrocarbon odor.
9'	
10'	
11'	
12'	
	Bottom of excavation 12.0'

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 2 - (23-25)

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-16

Depth (Ft.)	Description
0′ – 1′	Fill, yellowish brown, sand and asphalt.
1′ – 4′	Fill, dark brown, sand, bricks and rubble; hydrocarbon odor.
4′ – 8′	Fill, black, cinders and varied debris; railroad bed with track and ties; oily sheen on water surface; hydrocarbon odor.
8′	Bottom of excavation 8.0′

0′ 1′ 2′ 3′ 4′ 5′ 6′ 7′ 8′ 9′ 10′ 11′ 12′

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 3 - (A,B,1)

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-17

Depth (Ft.)	Description
0'	Topsoil.
1'	Fill, brown, medium fine cinders.
2'	Fill, grayish black, medium fine sand; moist. Fill, brown, medium fine, cinders.
3'	
4'	Fill, black, brick and rubble; slight hydrocarbon odor.
5'	
6'	Fill, white/brown, partially incinerated ash.
7'	
8'	Fill, black, rubble; oily sheen on water surface; hydrocarbon odor.
9'	
10'	Bottom of excavation 9.5'
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 3-2, 3-4

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-18

Depth (Ft.)	Description
0'	
1'	Fill, tan, medium sand, gravel and asphalt.
2'	Fill, gray/tan, medium sand.
3'	Fill, black, sand and brick fragments; hydrocarbon odor.
4'	
5'	Fill, black, refuse and timbers with some sand and clay; oily sheen on water surface.
6'	
7'	
8'	Bottom of excavation 7.5'
9'	
10'	
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 3-4, 3-5

Location NORFOLK, VIRGINIA Date JULY 18,1989

TEST-PIT IDENTIFICATION TP-19

Depth (Ft.)	Description
0′	
	Topsoil, gravel and sand.
1′	Medium fine sand with medium gravel, dark brown and black.
2′	Sand, dark gray to black, some silt with cobbles; oil stained soils surrounding two pipes at 1 - 2 feet below ground surface; strong hydrocarbon and coal-tar odors.
3′	
4′	Bottom of excavation 3.5′
5′	
6′	
7′	
8′	
9′	
10′	
11′	
12′	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 3-6, 3-7

Location NORFOLK, VIRGINIA Date JULY 19,1989

TEST-PIT IDENTIFICATION TP-20

Depth (Ft.)	Description
0'	
	Topsoil, root zone.
1'	Fill, gray/brown, gravel and medium sand.
2'	Fill, dark brown, medium sand, little gravel.
3'	Fill, varied debris and cobbles; railroad track and bed; oil stained; hydrocarbon odor.
	Bottom of excavation 3.0'
4'	
5'	
6'	
7'	
8'	
9'	
10'	
11'	
12'	

TEST-PIT LOG

ORIGINAL (Red)

Project CITY OF NORFOLK / VEPCO Photo IDs # 3 - (8-10)

Location NORFOLK, VIRGINIA Date JULY 19,1989

TEST-PIT IDENTIFICATION TP-21

Depth (Ft.)	Description
0'	Topsoil, medium sand and gravel, root zone.
1'	Fill, tan, medium sand.
2'	Fill, gray, mediun sand; oil stained; strong coal-tar odor.
3'	
4'	Fill, black, coal tar mixed with sand, little silt; timbers and concrete foundation at base of pit; strong coal-tar odor.
5'	
6'	
7'	Bottom of excavation 7.0'
8'	
9'	NOTE: 1"-2" pipes in pit contain black coal tar.
10'	
11'	
12'	

ORIGINAL (RED)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 4-1, 4-2

Location NORFOLK, VIRGINIA Date JULY 19,1989

TEST-PIT IDENTIFICATION TP-22

Depth (Ft.)	Description
0′	
	Topsoil, root zone.
1′	Fill, brown, medium sand, some gravel.
2′	
	Coal tar, black; strong coal-tar odor.
3′	
4′	
5′	
6′	Fill, gray, black and tan, medium sand; oil stained; oily sheen on water surface; strong hydrocarbon odor.
7′	
8′	
9′	Bottom of excavation 8.4′
10′	NOTE: Calcereous marine sediments replace sand layer in the southern end of the pit.
11′	NOTE: 10" clay tile drain pipe present at 7′ below ground surface.
12′	

TEST-PIT LOG

ORIGINAL (Red)

Project CITY OF NORFOLK / VEPCO Photo IDs # 4 - (A,B,3)

Location NORFOLK, VIRGINIA Date JULY 19,1989

TEST-PIT IDENTIFICATION TP-23

Depth (Ft.)	Description
0'	Topsoil, asphalt and gravel.
1'	
2'	Fill, brick, rubble and varied debris; oily sheen on water surface.
3'	
4'	Holder bottom.
5'	
6'	
7'	
8'	
9'	
10'	
11'	
12'	

ORIGINAL

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 4 - (4 - 6)

Location NORFOLK, VIRGINIA Date JULY 19,1989

TEST-PIT IDENTIFICATION TP-24

Depth (Ft.)	Description
0'	Topsoil, tan, medium gravel.
1'	Fill, black, sand; varying in thickness; coal-tar stained; strong coal-tar odor.
2'	Fill, brown, coarse cinders and brick fragments with root and plant debris.
3'	
4'	Fill, black, coarse cinders with medium sand and silt; oil stained.
5'	
6'	
7'	Fill, wood, brick fragments and refuse; oil stained; strong hydrocarbon odor.
8'	
9'	
10'	Bottom of excavation 9.0'
11'	
12'	

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 4-7, 4-8

Location NORFOLK, VIRGINIA Date JULY 19,1989

TEST-PIT IDENTIFICATION TP-25

Depth (Ft.)	Description
0′	Topsoil, dark brown, medium sand and gravel.
1′	
2′	Clayey silt, light gray.
3′	
4′	
5′	
6′	
7′	
8′	
9′	
10′	
11′	Bottom of excavation 10.0′
12′	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 4-9, 4-10

Location NORFOLK, VIRGINIA Date JULY 19,1989

TEST-PIT IDENTIFICATION TP-26

Depth (Ft.)	Description
0'	Asphalt.
1'	Fill, dark brown, cinders.
2'	Fill, light gray and tan, sand with brick fragments and cobbles, little clay.
3'	
4'	Fill, refuse.
5'	
6'	Sand, light gray and tan, medium grained with little silt and silty clay lenses; slight oily sheen on water surface; hydrocarbon odor.
7'	Bottom of excavation 7.0'
8'	
9'	
10'	
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO

Photo Ids # 4-(11,12), 5-(A,1,2), 6-(A, 1,2,3,4)

Location NORFOLK, VIRGINIA Date JULY 19, 1989

TEST-PIT IDENTIFICATION TP-27

Depth (Ft.)	Description
0'	Sand and gravel, hard packed parking area.
1'	Concrete, two foundation pads; strong hydrocarbon odor at first pad.
2'	
3'	Fill, black and brown, medium sand with medium to coarse cinder and brick fragments.
4'	Sand, light gray, medium to coarse grained.
5'	
6'	Bottom of excavation 5.8'
7'	
8'	
9'	
10'	
11'	
12'	

ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 5-3

Location NORFOLK, VIRGINIA Date JULY 19,1989

TEST-PIT IDENTIFICATION TP-28

Depth (Ft.)	Description
0′	Pavement, brown, with medium sand and gravel.
1′	
2′	Fill, dark gray, medium sand and some brick fragments; railroad tracks; oil stained.
3′	
4′	
5′	
6′	Fill, grayish brown, sand and refuse including wood, bricks and varied debris; slight oily sheen on water surface; hydrocarbon odor.
7′	
8′	
9′	
10′	Bottom of excavation 9.0′
11′	
12′	

PFE ORIGINAL (Red)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 5-4, 5-5

Location NORFOLK, VIRGINIA Date JULY 19,1989

TEST-PIT IDENTIFICATION TP-29

Depth (Ft.)	Description
0'	Topsoil, root zone.
1'	Fill, reddish brown, medium coarse cinders and brick fragments; moist.
2'	
3'	Fill, black to gray, medium sand and coal tar; strong hydrocarbon odor.
4'	
5'	Silt and clay, black to gray; oil stained; hydrocarbon odor.
6'	
7'	Sand, gray and tan, medium grained; oil stained; slight hydrocarbon odor.
8'	
9'	Bottom of excavation 8.0'
10'	
11'	
12'	

PFE ORIGINAL (RED)

TEST-PIT LOG

Project CITY OF NORFOLK / VEPCO Photo IDs # 5-6, 5-7

Location NORFOLK, VIRGINIA Date JULY 19,1989

TEST-PIT IDENTIFICATION TP-30

Depth (Ft.)	Description
0'	
	Topsoil, root zone.
1'	
	Fill, light gray/white, ash with some medium sand.
2'	
3'	
	Fill, reddish brown, medium coarse cinders with sand.
4'	
5'	
6'	
7'	
	Fill, black, refuse with ash, sand, and cinders.
8'	
9'	
10'	
11'	
	Bottom of excavation 11.0'
12'	

PFE
ORIGINAL
(Red)

APPENDIX B

ORIGINAL (Red)
ORIGINAL (Red)

APPENDIX B

SOIL BORING LOGS

ORIGINAL (Red)

PHASE I - SOIL BORINGS

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red) ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well SB-1 Project/No. City of Norfolk/Vepco MD057.01 Page 1 of 1

Site Location Norfolk, Virginia Drilling Started 7/20/89 Drilling Completed 7/20/89

Total Depth Drilled 14.5 feet Hole Diameter 4.5 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 2"x24" Sampling Interval continuous feet

Land-Surface Elev. --- feet ☐ Surveyed ☐ Estimated Datum ---

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Steven's Drilling Driller Mike Helper Mike

Prepared By Chris Havlicek Hammer Weight 140lbs Hammer Drop 42 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Fill, medium sand, and medium cinders, black; slight hydrocarbon odor
		11-15 13	
		3-4 5	Fill, medium sand with little silt; some shell frags., tan/grey; strong hydrocarbon odor
5		2-2 2	
		1-1 2	Debris, with wood, brick, and shell fragments, little silt and clay; heavily stained; slight hydrocarbon odor.
		2/12-1	
		1/16-1/2	
10		1/9-1/4	
		WOR WOH	Sandy clay, with plant fragments, tan/grey
		WOR 6-1-1	
15			Bottom of Boring 14.5'
20			
25			
30			
35			

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Ground-Water Consultants

ORIGINAL (Red) ORIGINAL (Blue)

SAMPLE/CORE LOG

Boring/Well SB-2 Project/No. City of Norfolk/Vepco MD057.01 Page 1 of

Site Location Norfolk, Virginia Drilling Started 7/20/89 Drilling Completed 7/20/89

Total Depth Drilled 14 feet Hole Diameter 4.5 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 2"x24" Sampling Interval continuous feet

Land-Surface Elev. --- feet ☐ Surveyed ☐ Estimated Datum ----

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Stevens Drilling Driller Mike Helper Mike

Prepared By Chris Havlicek Hammer Weight 140lbs Hammer Drop 42 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Fill, medium sand with some brick and shell fragment; black staining; hydrocarbon odor.
	X	2-2 / 1-4	
5	X	2-2 / 1-1	Fill, medium sand with little gravel and silt, tan; black staining; slight hydrocarbon odor.
	X	1-6 / 16-50/3	
	X	3-2 / 1-1	Debris layer, wood, brick and shell frags.
10	X	WOH / 24	Clay with little root frags., dark grey
	X	WOR & WOH / 18	
15			Bottom of Boring 14'
20			
25			
30			
35			

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ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well SB-3 Project/No. City of NOrfolk/Vepco MD057.01 Page 1 of 1

Site Location Norfolk, Virginia Drilling Started 7/20/89 Drilling Completed 7/20/89

Total Depth Drilled 15 feet Hole Diameter 4.5 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 2"x24" Sampling Interval continuous feet

Land-Surface Elev. --- feet ☐ Surveyed ☐ Estimated Datum ---

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Steven's Drilling Driller Mike Helper Mike

Prepared By Chris Havlicek Hammer Weight 140lbs Hammer Drop 42 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			
	X	3-3 4-4	Fill, medium sand, tan to dark brown, little wood and cinders, some staining, slight ordor
	X	2-2 1-1	Fill, brick, wood and shell frags. with medium sand, black staining
5	X	WOH 24	
	X	2-1/12 1	
10	X	1/12 1/12	Clay with reed fragments, grey
	X	WOH 24	
	X	WOR 12 WOH 12	
15			Bottom of Boring 15'
20			
25			
30			
35			

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ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well SB-4 Project/No. City of Norfolk/Vepco MD057.01 Page 1 of 1

Site Location Norfolk, Virginia Drilling Started 7/20/89 Drilling Completed 7/20/89

Total Depth Drilled 15 feet Hole Diameter 4.5 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 2"x24" Sampling Interval continuous feet

Land-Surface Elev. --- feet ☐ Surveyed ☐ Estimated Datum ---

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Steven's Drilling Driller Mike Helper Mike

Prepared By Chris Havlicek Hammer Weight 140lbs Hammer Drop 42 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	3-4 4-3	Fill, medium sand with brick and shell frags., tan to dark brown; black staining
	X	5-6 7-9	
5	X	6-7 8-7	Sand, fine grained, light tan grading to orange
	X	5-4 5-3	
10	X	5-4 5-3	
	X	1/12 1/12	Sand, fine grained with little silt, grey; lense of fine white sand
	X	WOR/12 WOH/12	Clay with little silt, grey
15			Bottom of Boring 15'
20			
25			
30			
35			

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PEE ORIGINAL

SAMPLE/CORE LOG

Boring/Well SB-5 Project/No. City of Norfolk.Vepco MD057.01 Page 1 of 1

Site Location Norfolk, Virginia Drilling Started 7/20/89 Drilling Completed 7/20/89

Total Depth Drilled 15 feet Hole Diameter 4.5 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 2"x24" Sampling Interval continuous feet

Land-Surface Elev. --- feet ☐ Surveyed ☐ Estimated Datum ---

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Steven's Drilling Driller Mike Helper Mike

Prepared By Chris Havlicek Hammer Weight 140lbs. Hammer Drop 42 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Fill, medium sand with some silt and coarse shell frags., brown, tan and black
		2-2 3-2	
		4-2 1-1	
5		1/12 1-1	Debris layer, wood brick and shell frags., black
		1/12 1/12	Medium to fine sand with clay, little shell frags., trace roots, grey
10		WOR/6 WOR/12 3	Clay, plant frags., grey
		WOR/12 WOH/12	
		WOR/4 WOH/12	
15			Bottom of Boring 15'
20			
25			
30			
35			

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Ground-Water Consultants

PEE ORIGINAL (Red) ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well SB-6 Project/No. City of Norfolk/Vepco MD057.01 Page 1 of 1

Site Location Norfolk, Virginia Drilling Started 7/20/89 Drilling Completed 7/20/89

Total Depth Drilled 17 feet Hole Diameter 4.5 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 2"x24" Sampling Interval continuous feet

Land-Surface Elev. --- feet ☐ Surveyed ☐ Estimated Datum -------

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Steven's Drilling Driller Mike Helper Mike

Prepared By Chris Havlicek Hammer Weight 140lbs Hammer Drop 42 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Fill, medium sand with brick coal, and shell frags., stained
		18-6	
		3-2	
		6-42	
5		20-13	Medium fine sand grading to silt and clay, dark grey, plant frags. and roots; hydrocarbon odor
		2-2	
		4-1	
		1/6 1/12	
		1/6	
10		1/12	Clay, with trace of wood and shell frags., grey; root zone with hydrocarbon odor at 11'
		1/12	
		WOR/6 WOR/18	
		WOR/9 -1	
		1 -1	
15		WOR/15 WOR/7	
20			Bottom of Boring 17'
25			
30			
35			

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Ground-Water Consultants

PE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well SB-7 Project/No. City of Norfolk/Vepco Md057.01 Page 1 of 1

Site Location Norfolk, Virginia Drilling Started 7/20/89 Drilling Completed 7/20/89

Total Depth Drilled 17 feet Hole Diameter 4.5 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 2"x24" Sampling Interval continuous feet

Land-Surface Elev. --- feet ☐ Surveyed ☐ Estimated Datum ---

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Steven's Drilling Driller Mike Helper Mike

Prepared By Chris Havlicek Hammer Weight 140lbs Hammer Drop 42 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	18-6 3-2	Fill, medium sand with some silt and gravel, some brick frags., dark grey; layer of asphalt at 6"
	X	6-42 20-13	
5	X	2-2 4-1	
	X	1/6, 1/12, 1/6	Debris layer, sand and gravel with glass, brick, wood, and shell frags.
10	X	1/12, 1/12	Clay with shells, roots and plant frags., grey; some medium grained sand lenses; strong H_2S odor
	X	WOR/6, WOR/18	
	X	WOR/9, 1-1	
15	X	WOR/15, WOR/9	
			Bottom of Boring 17'
20			
25			
30			
35			

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Ground-Water Consultants

PFE ORIGINAL

SAMPLE/CORE LOG

Boring/Well SB-8 Project/No. City of Norfolk/Vepco MD057.01 Page 1 of 1

Site Location Norfolk, Virginia Drilling Started 7/21/89 Drilling Completed 7/21/89

Total Depth Drilled 17 feet Hole Diameter 4.5 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 2"x24" Sampling Interval continuous feet

Land-Surface Elev. --- feet ☐ Surveyed ☐ Estimated Datum ---

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Steven's Drilling Driller Mike Helper Mike

Prepared By Chris Havlicek Hammer Weight 140lbs Hammer Drop 42 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Fill, medium sand with some silt evenly mixed with brick, shell, and plant frags., dark brown/black; white ash layer at 3'
		6-20 19-12	
		4-4 3-5	
5		3-2 1/12	Fill, medium sand with some shell and plant frags., some brick, wood and pottery frags., black
		WOH 6 1/18	
10		1-2 1/12	
		1/18 i	
		WOR 6 WOH/18	Clay, trace medium sand and silt; some plant and shell frags; slight hydrocarbon odor
15		WOR/6 WOH/18	
			Bottom of Boring 17'
20			
25			
30			
35			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well SB-9 Project/No. City of Norfolk/Vepco MD057.01 Page 1 of 1

Site Location Norfolk, Virginia Drilling Started 7/21/89 Drilling Completed 7/21/89

Total Depth Drilled 15 feet Hole Diameter 4.5 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 2"x24" Sampling Interval continuous feet

Land-Surface Elev. -- feet ☐ Surveyed ☐ Estimated Datum ---

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Steven's Drilling Driller Mike Helper Mike

Prepared By Chris Havlicek Hammer Weight 140lbs Hammer Drop 42 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Medium fine sand, with little silt and roots, brown
		2-2	
		3-6	
		2-2	Medium to fine sand, orange/brown grading to orange; pockets of white/tan medium fine sand
		2-3	
5		3-3	
		4-4	
		4-4	
		5-6	
10		5-5	
		4-3	
		3-2	
		2-2	
		1/24	Fine sand, trace silt, grey
15			Bottom of Boring 15'
20			
25			
30			
35			

ORIGINAL (Red)

PHASE II - SOIL BORINGS

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well B-1 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/89 Drilling Completed 9/14/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval continuous feet

Land-Surface Elev. 113.52 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used None Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140lb Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	3-6	Fill, medium to fine sand, and coarse gravel trace clay, light grey, wet
	X	15-12	Fill, cinders, bricks, coal fragments, coal-tar odor
	X	2-1	
	X	9-7	
5	X	2-2	
	X	15-23	Silty clay, black, wet, coal tar odor
	X	7-10	
	X	15-15	
	X	5-7	Fine sand, little silt, black & white strong odor, heavily stained
	X	10-12	
10	X	6-6	color change tan & white
	X	11-12	
	X	5-5	
	X	4-5	
15			Bottom of Boring 14'
20			
25			
30			
35			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well B-2 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of

Site Location Norfolk, VA Drilling Started 9/14/89 Drilling Completed 9/14/89

Total Depth Drilled 2 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval continuous feet

Land-Surface Elev. 114 feet ☐ Surveyed ☒ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller Helper

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	4-5 5-50/1	Fill, fine sand and limestone Medium to fine sand, black, brown coal-tar odor
			Obstruction at 2ft, abandoned Note: 4 attempts made nearby, all refusal at less than 2 ft.
5			
10			
15			
20			
25			
30			
35			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red) ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well B-3 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/89 Drilling Completed 9/14/89

Total Depth Drilled 6 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval continuous feet

Land-Surface Elev. 112.47 feet ☐ Surveyed ☒ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	5-8	Fill, limestone fragments
		10-8	Fill, gravel, fine sand, black, debris; coat-tar odor
5	X	3-4	
		10-10	
			Bottom of Boring 6'
10			
15			
20			
25			
30			
35			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well B-4 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/89 Drilling Completed 9/14/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval continuous feet

Land-Surface Elev. 112.46 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X		Fill, limestone fragments
	X	3-5 5-10	Fill, fine sand, coal & ash, brown/black, coal-tar odor
	X	3-4 10-8	Fine sand, black, coal-tar odor, moist
5	X	2-5 9-10	
	X	3-4 6-6	
	X	3-3 7-8	Tan, stained pockets, coal-tar odor
10	X	1-2 5-7	
	X	4-4 4-5	Fine sand, little silt, light grey, wet, slight odor
15			Bottom of Boring 14'
20			
25			
30			
35			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well B-5 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/89 Drilling Completed 9/14/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval continuous feet

Land-Surface Elev. 112.25 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Fill, sand & gravel, wood & coal fragments; coal-tar odor
	X	3-2 1-1	Fill, cinders & ash, brown, odor, moist
5	X	2-2 3-4	
	X	2-2 2-2	
	X	1-2 2-3	
10	X	1-1 2-3	
	X	1-1 2-2	oil present
15	X	WOH	Clay with root fragments; grey/green and black stained, coal-tar present, strong coal-tar odor
			Bottom of Boring 16'
20			
25			
30			
35			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well B-6 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/89 Drilling Completed 9/14/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval continuous feet

Land-Surface Elev. 112 feet ☐ Surveyed ☒ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller Helper

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0		21-6¼	Fill, coarse to fine sand, concrete, cinders, brown; moist; slight odor
		2-2 / 1-2	Medium to fine sand, trace clay, trace fine gravel; slight oil odor
5		2-3 / 4-4	Debris layer, wood & shell fragments, medium to fine sand; oil stained; odor; wet
		1-1 / 1-2	
		3-2 / 2-3	
10		2-1 / 2-2	Clay with root fragments, dark grey; black staining and odor at 10ft; moist
		1-1 / 1-2	
15			Bottom of Boring 14'
20			
25			
30			
35			

ORIGINAL (Red)

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well B-7 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/89 Drilling Completed 9/14/89

Total Depth Drilled 42 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval continuous feet

Land-Surface Elev. 109.84 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller Helper

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	3-3 15-8	Fill, medium to fine sand, oyster shells, coal & brick fragments, moist
	X	1-3 2-2	
5	X	3-3 3-3	ash layer
	X	2-1 1-2	Medium to fine sand, brown to grey, trace clay; roots moist, no odor
	X	4-6 8-9	
10	X	3-8 10-11	Fine sand and silt; light grey tar & molted-wet; no odor
			Clayey silt grading to silty clay; wet no odor; green
15	X	WOH 1-2	
20	X	WOH 1-2	increase in silt, silty clay
25	X	1-1 4-4	oyster shells
			Clayey silt, little fine sand, root traces, tan/grey mottled; wet
30	X	9-11 11-12	
			Fine sand & silt; grey, wet, no odor
35			

REF
ORIGINAL (Red)

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well B-7

Prepared By Curt A. Cramer

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35	X	3-3 4-5	Silty Clay, little fine sand pockets, wet, no odor
40	X	15-27	Fine sand, little silt, green, wet
		38-50/.4	Clayey silt, green; wet
45			Bottom of Boring 42'
50			
55			
60			
65			
70			
75			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red) PE ORIGINAL

SAMPLE/CORE LOG

Boring/Well B-8 Project/No. City of Noroflk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/89 Drilling Completed 9/14/89

Total Depth Drilled 8 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval continuous feet

Land-Surface Elev: 111.13 feet ☒ Surveyed ☐ Estimated Datum Noroflk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller Helper

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X		Fill; coal; brick fragments; glass; sand brown & black
5	X	3-3 3-4	
	X	2-5 6-6	Fine sand; trace silt; grey; root fragments; wet; no odor or stains
10			Bottom of Boring 8'
15			
20			
25			
30			
35			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well B-9 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/89 Drilling Completed 9/14/89

Total Depth Drilled 12 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval continuous feet

Land-Surface Elev. 112 feet ☐ Surveyed ☒ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	6-6	Fill, limestone fragments and fine sand, light brown
	X	7-9	Medium to fine sand, coal fragments; gasoline odor; black
	X	5-4	
	X	4-3	
5	X	3-5	Fine sand, little silt; oil stained; gasoline odor; moist; black
	X	9-9	
	X	5-8	
	X	7-7	
	X	3-3	
10	X	7-8	
	X	1-3	
	X	3-5	
15			Bottom of Boring 12'
20			
25			
30			
35			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE
ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well B-10 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/89 Drilling Completed 9/14/89

Total Depth Drilled 8 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval continuous feet

Land-Surface Elev. 113.58 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	5-10 16-18	Fill, limestone, brick fragments, coal; slight odor; moist
	X	8-7 5-5	Medium to fine sand, trace of clay & gravel; odor; moist; dark brown
5	X	5-4 4-4	
	X	1-2 50/.5	Fine sand & silt; oil sheen, black stained, wet
10			Bottom of Boring 7'
15			
20			
25			
30			
35			

PFE
ORIGINAL

APPENDIX C

ORIGINAL (Red)

PFE

ORIGINAL (Red)

APPENDIX C

MONITOR WELL LOGS AND CONSTRUCTION SUMMARIES

ORIGINAL (Red)

Shallow Water-Table Aquifer Wells

A total of 22 shallow wells were installed to characterize the on and off-site groundwater quality in the shallow water-table aquifer. Of these initial 22 wells, 4 were abandoned because of un-repairable damage. These wells were installed using the hollow-stem auger drilling method to an average depth of 15 feet below land surface.

Each shallow monitoring well was constructed of two-inch inside diameter, Schedule 40, flush joint, polyvinyl chloride (PVC) casing with a ten foot long section of 0.010-inch slotted well screen. Each well casing was centered inside the auger hole, and the annular space around the well screen backfilled from the bottom of the hole to approximately two feet above the top of the screen with clean silica sand. A one to two foot thick bentonite seal was installed above the sand pack and hydrated, and the remaining annulus was filled to land surface with bentonite-amended cement grout. Each on-site well was fitted with a stick-up style locking well cover. The off-site wells were completed at land surface with heavy-duty locking flush mount well covers.

Lower sand Aquifer Wells

A total of 6 deep wells were installed to characterize the on and off-site groundwater quality in the lower sand aquifer. These wells were installed at depths varying between 36 and 82 feet below land surface using the mud-rotary drilling technique.

Each Deep well was constructed in a multi-stage manner to minimize the potential for contaminating the deeper water bearing zone with shallow water-table groundwater. The first step in the process was the installation of a steel isolating surface casing through the shallow water-table aquifer into a confining layer. After installing the borehole, the steel surface casing was set in place and grouted with bentonite amended cement.

The second stage in the process was to drill through the bottom of the surface casing to the desired depth and installing the well casing. Each deep well was constructed of two-inch inside diameter, flush joint, PVC casing with a 10-foot long section of Schedule 40 PVC 0.010-inch slotted well screen. Each well casing was centered inside the auger hole, and the annular space around the well screen backfilled from the bottom of the hole to approximately two feet above the top of the screen with clean silica sand. A one to two foot thick bentonite seal was installed above the sand pack and hydrated, and the remaining annulus was filled to land surface with bentonite-amended cement grout. Each on-site well was fitted with a stick-up style locking well cover. The off-site wells were completed at land surface with heavy-duty locking flush mount well covers.

Aquifer Test Wells

In addition to the shallow and deep groundwater quality monitoring wells, three wells were installed on-site for aquifer testing purposes. Two of these wells were installed in the lower sand aquifer, and one in the shallow water table aquifer.

The two wells installed in the lower sand aquifer were constructed using the mud-rotary drilling technique to depths of approximately 50 feet below land surface. Each deep well was constructed of four-inch stainless steel well casing with 10 feet of 0.010-inch stainless steel slotted well screen. These wells were installed using the same general multi-stage approach described above.

The shallow water-table aquifer well was installed using the hollow-stem auger technique to a depth of 15 feet below land surface. This well was constructed of two-inch inside diameter, Schedule 40, flush joint, polyvinyl chloride (PVC) casing with a ten foot long section of 0.010-inch slotted well screen. The well casing was centered inside the auger hole, and the annular space around the well screen was backfilled from the bottom of the hole to approximately two feet above the top of the screen with clean #1 Gravel. A one foot thick bentonite seal was installed above the sand pack and hydrated, and the remaining annulus was filled to land surface with bentonite-amended cement grout. The well was fitted with a stick-up style locking well cover.

PFE ORIGINAL ORIGINAL (Red)

Shallow Water-Table Aquifer Wells

A total of 22 shallow wells were installed to characterize the on and off-site groundwater quality in the shallow water-table aquifer. Of these initial 22 wells, 4 were abandoned because of un-repairable damage. These wells were installed using the hollow-stem auger drilling method to an average depth of 15 feet below land surface.

Each shallow monitoring well was constructed of two-inch inside diameter, Schedule 40, flush joint, polyvinyl chloride (PVC) casing with a ten foot long section of 0.010-inch slotted well screen. Each well casing was centered inside the auger hole, and the annular space around the well screen backfilled from the bottom of the hole to approximately two feet above the top of the screen with clean silica sand. A one to two foot thick bentonite seal was installed above the sand pack and hydrated, and the remaining annulus was filled to land surface with bentonite-amended cement grout. Each on-site well was fitted with a stick-up style locking well cover. The off-site wells were completed at land surface with heavy-duty locking flush mount well covers.

Lower sand Aquifer Wells

A total of 6 deep wells were installed to characterize the on and off-site groundwater quality in the lower sand aquifer. These wells were installed at depths varying between 36 and 82 feet below land surface using the mud-rotary drilling technique.

Each Deep well was constructed in a multi-stage manner to minimize the potential for contaminating the deeper water bearing zone with shallow water-table groundwater. The first step in the process was the installation of a steel isolating surface casing through the shallow water-table aquifer into a confining layer. After installing the borehole, the steel surface casing was set in place and grouted with bentonite amended cement.

The second stage in the process was to drill through the bottom of the surface casing to the desired depth and installing the well casing. Each deep well was constructed of two-inch inside diameter, flush joint, PVC casing with a 10-foot long section of Schedule 40 PVC 0.010-inch slotted well screen. Each well casing was centered inside the auger hole, and the annular space around the well screen backfilled from the bottom of the hole to approximately two feet above the top of the screen with clean silica sand. A one to two foot thick bentonite seal was installed above the sand pack and hydrated, and the remaining annulus was filled to land surface with bentonite-amended cement grout. Each on-site well was fitted with a stick-up style locking well cover. The off-site wells were completed at land surface with heavy-duty locking flush mount well covers.

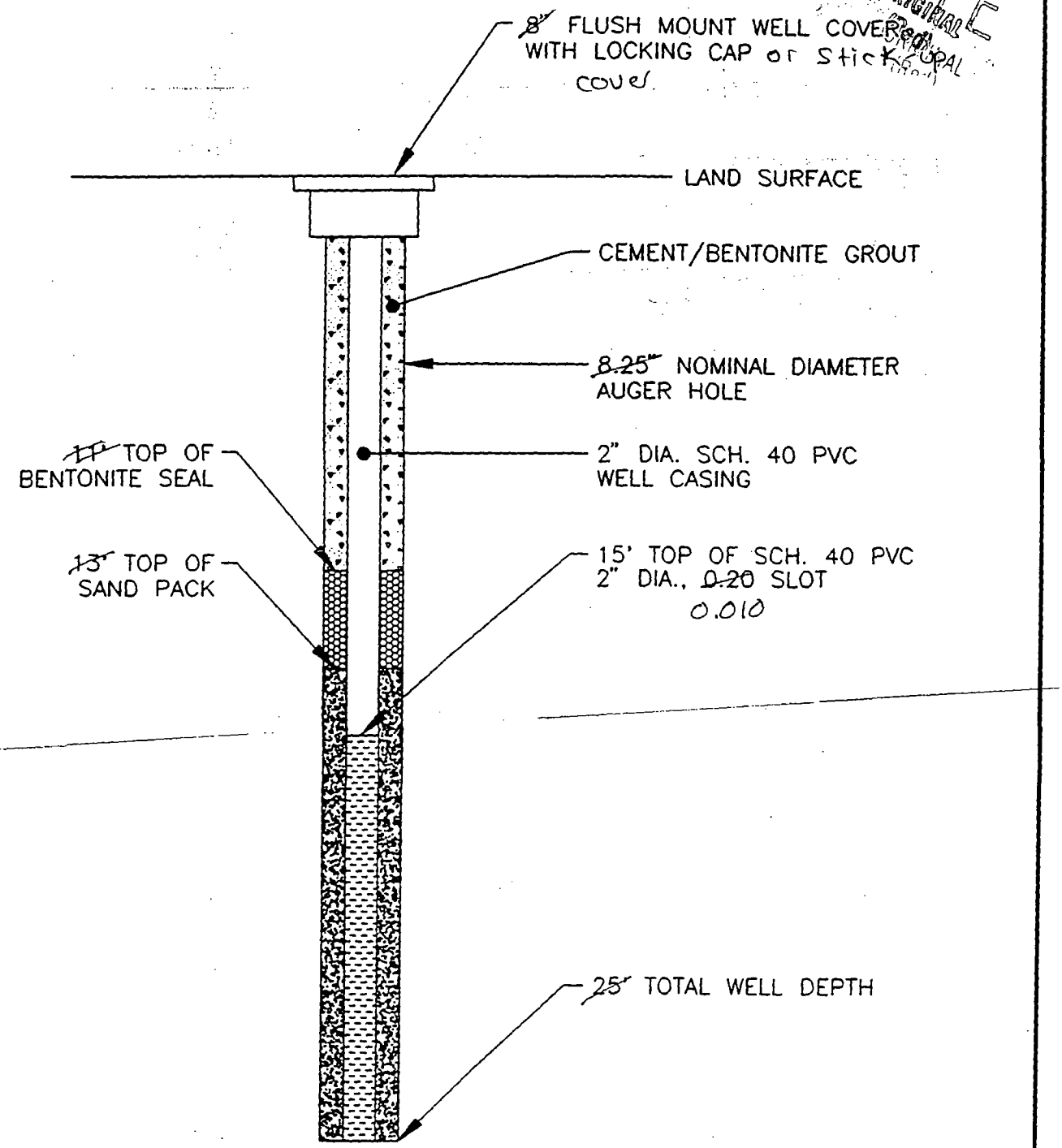
PFE
ORIGINAL (Red)

Aquifer Test Wells

In addition to the shallow and deep groundwater quality monitoring wells, three wells were installed on-site for aquifer testing purposes. Two of these wells were installed in the lower sand aquifer, and one in the shallow water table aquifer.

The two wells installed in the lower sand aquifer were constructed using the mud-rotary drilling technique to depths of approximately 50 feet below land surface. Each deep well was constructed of four-inch stainless steel well casing with 10 feet of 0.010-inch stainless steel slotted well screen. These wells were installed using the same general multi-stage approach described above.

The shallow water-table aquifer well was installed using the hollow-stem auger technique to a depth of 15 feet below land surface. This well was constructed of two-inch inside diameter, Schedule 40, flush joint, polyvinyl chloride (PVC) casing with a ten foot long section of 0.010-inch slotted well screen. The well casing was centered inside the auger hole, and the annular space around the well screen was backfilled from the bottom of the hole to approximately two feet above the top of the screen with clean #1 Gravel. A one foot thick bentonite seal was installed above the sand pack and hydrated, and the remaining annulus was filled to land surface with bentonite-amended cement grout. The well was fitted with a stick-up style locking well cover.



N.T.S.

NOTE: ALL DEPTHS REFERENCED FROM LAND SURFACE.

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL SHALLOW WELL CONSTRUCTION

RUDNICK & WOLFE
THE GARDENS SHOPPING CENTER, CHARLOTTESVILLE, VIRGINIA

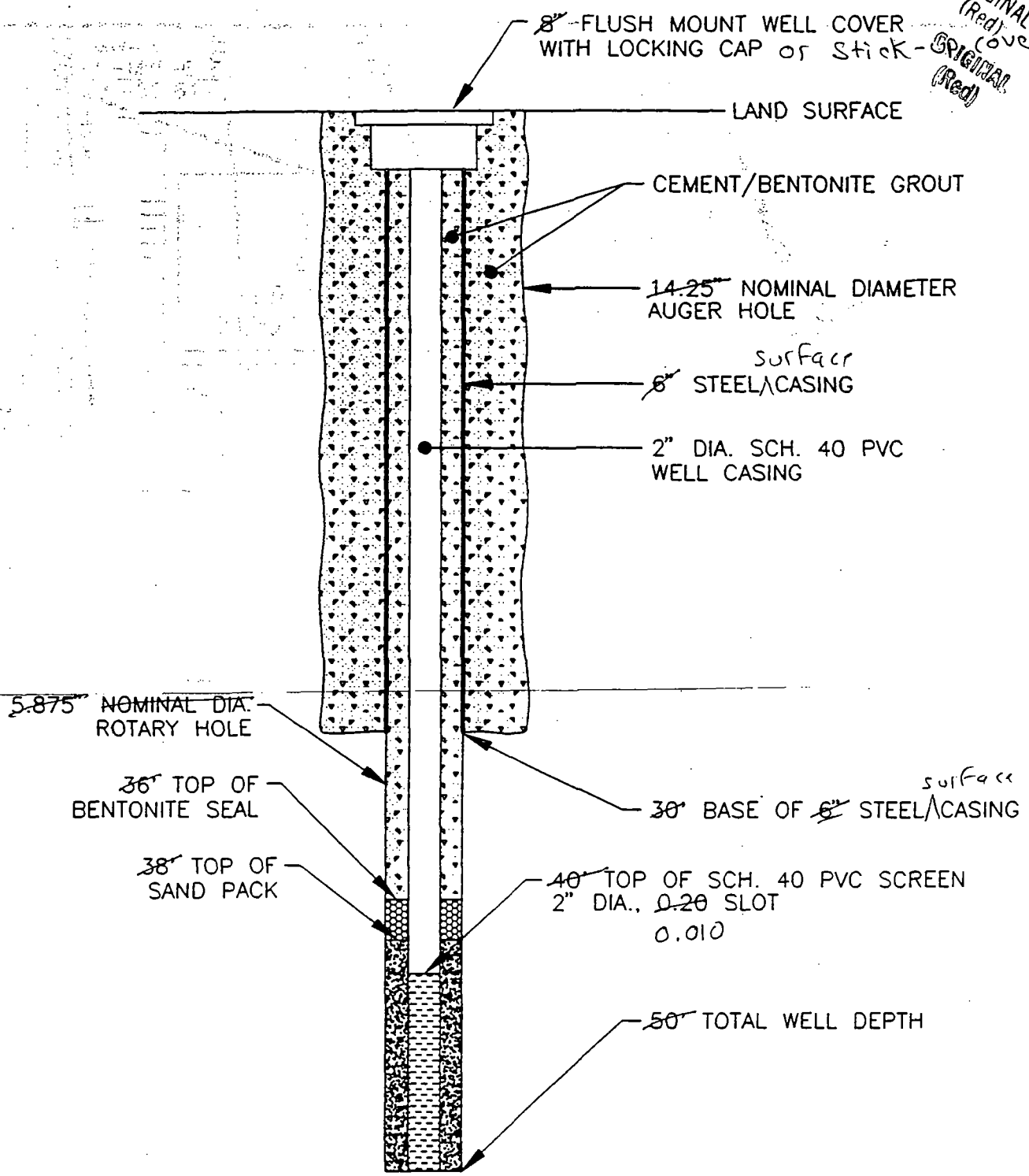
FIGURE 3

DRAFTER: JSG | APPROVED: DGM | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: WLL-2 | PRJCT NO.: MD0299.001 | DWG DATE: 9-20-93

PFE

ORIGINAL (Red) Cover

ORIGINAL (Red)



N.T.S.

NOTE: ALL DEPTHS REFERENCED FROM LAND SURFACE.

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL DEEP WELL CONSTRUCTION

RUDNICK & WOLFE
THE GARDENS SHOPPING CENTER, CHARLOTTESVILLE, VIRGINIA

FIGURE 4

DRAFTER: JSG | APPROVED: DGM | CHECKED: EAH | DRAWING: DRAWING | FILE NO.: WLL-1 | PRJCT NO.: MD0299.001 | DWG DATE: 9-20-93

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-1 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 2

Site Location Norfolk, VA Drilling Started 9/12/89 Drilling Completed 9/13/89

Total Depth Drilled _____ feet Hole Diameter _____ inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2' Sampling Interval various feet

Land-Surface Elev. 109.66 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	5-5 4-3	Fill, medium sand and cinders; brick, wood and glass fragments, grey/black
	X	1-2 2-2	
5	X	2-2 2-2	
	X	1-2 2-3	
	X	1-1 7-9	Clay, grey, plant fragments, wet
10	X	5-6 7-5	Medium to fine sand, light grey, trace silt, trace clay, some root fragment, wet
	X	3-3 1-2	
15	X	3-1 1-1	
			Clay, with some silt and fine sand; shell fragments; green/grey; wet
20	X	2-1 2-2	
25	X	WOH-2 2-3	
30	X	4-4 4-5	Fine sand, some silt; green/grey; wet
35			

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Ground-Water Consultants

PFE ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-1

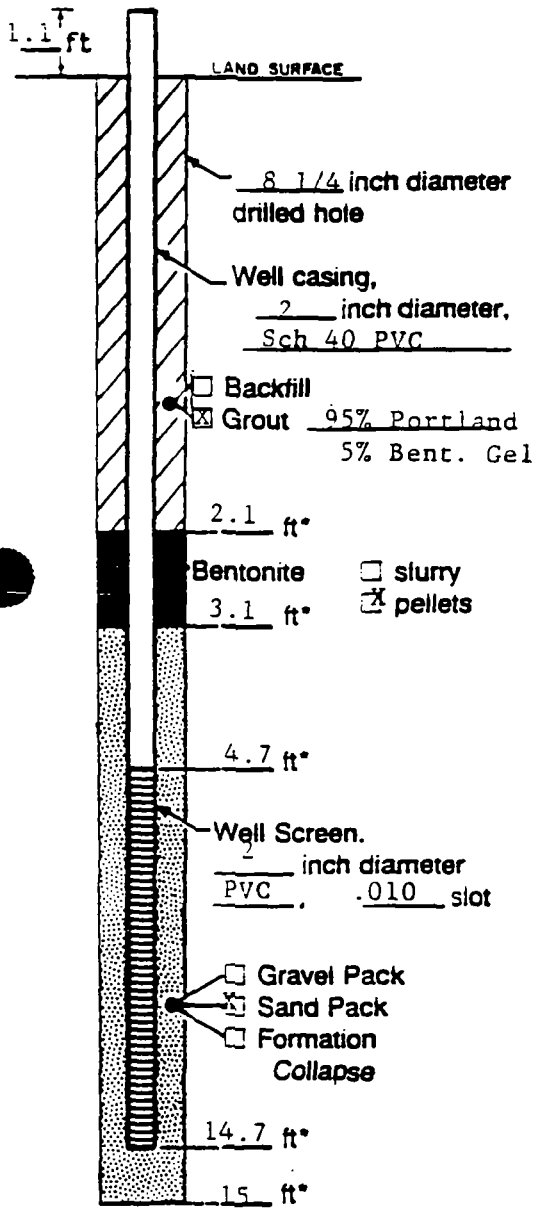
Prepared By Curt A. Cramer

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35	X	11-11 13-13	Fine sand, trace silt; grey; wet
40	X	31-33 49-35/4	Medium fine sand, trace gravel; grey
45			Bottom of Boring 42'
50			
55			
60			
65			
70			
75			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE ORIGINAL

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-1

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation

and Datum 109.66 feet ☒ surveyed

Norfolk City ☐ estimated

Installation Dates(s) 9/12/89

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc.

Drilling Fluid None

Development Techniques(s) and Date(s)

Bailed 9/18/89

Fluid Loss During Drilling NA gallons

Water Removed During Development 12 gallons gallons

Static Depth to Water 6.80 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration ----- hours

Yield ----- gpm Date ----

Specific Capacity ---- gpm/ft

Well Purpose Ground-Water Monitoring

Remarks

Prepared by Chris Havlicek

GERAGHTY & MILLER, INC.
Ground-Water Consultants

DEE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-2 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/12/89 Drilling Completed 9/12/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 110.93 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	5-5 5-5	Fill, medium to fine sand, coarse gravel; debris; dark brown
5	X	2-3 3-2	Fine sand little silt, little gravel; dark grey; wet
	X	50/.3	Medium to fine sand; coarse quartz fragments; black; wet
10	X	4-5 8-16	Buried timber; 10' to 11.6'
	X	5-10 12-10	
15			Bottom of Boring 15'
20			
25			
30			
35			

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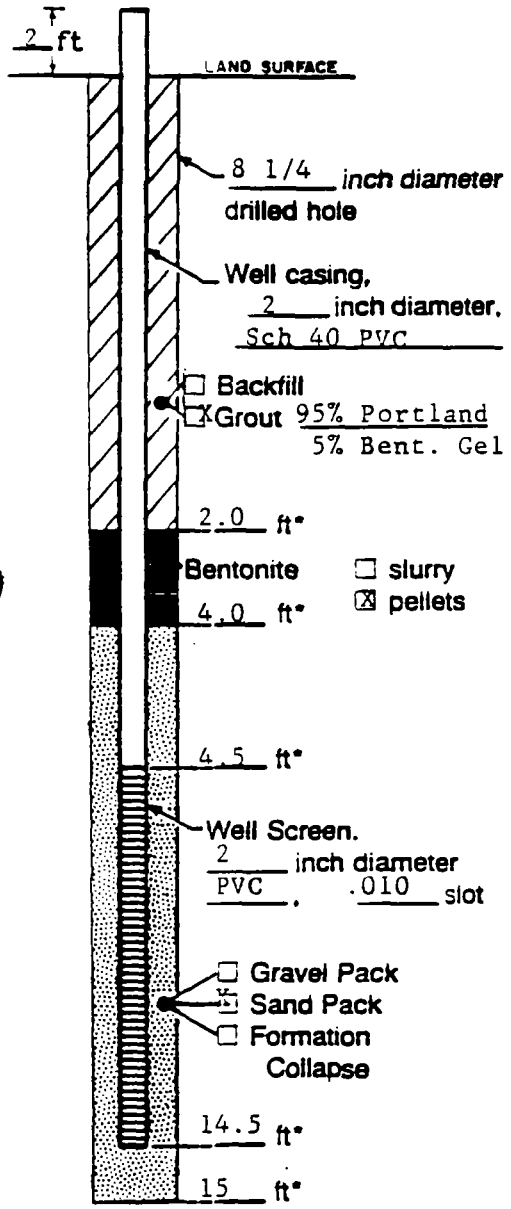
Ground-Water Consultants

ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-2

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation and Datum 110.93 feet Norfolk City ☒ surveyed ☐ estimated

Installation Dates(s) 9/12/89

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc.

Drilling Fluid None

Development Techniques(s) and Date(s)
Bailed 9/18/89

Fluid Loss During Drilling NA gallons

Water Removed During Development 12 Gallons gallons

Static Depth to Water 7.61' feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration ----- hours

Yield ----- gpm Date ----

Specific Capacity ---- gpm/ft

Well Purpose Ground-Water Monitoring

Remarks

Prepared by Curt A. Cramer

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-3 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 2

Site Location Norfolk, VA Drilling Started 9/12/89 Drilling Completed 9/12/89

Total Depth Drilled 42 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 112.00 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller Helper

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	7-10 12-10	Fill, medium sand mixed with debris, bricks, ash, cinders; brown/black
	X	3-3 4-5	strong odor
5	X	4-5 5-3	strong odor
10	X	1-1 1-2	Trash layer, with gravel & rock fragments
	X	3-1 2-2	Medium sand with little silt; brown/grey; strong odor; root fragments
15	X	50/.2	no odor at 16'
20	X	WOR	Clayey silt, with sand lens grades into clay; green/grey; root fragments; wet; no odor
25	X	2-1 2-1	Silty clay, little fine sand; shell debris; moist; no odor
30	X	2-2 1-2	
35			

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Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-3

Prepared By Curt A. Cramer

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35	X	WOH-4 9-6	Fine sand with some silt; green/grey; wet
40	X	WOH-2 2-4	
			Bottom of Boring 42'
45			
50			
55			
60			
65			
70			
75			

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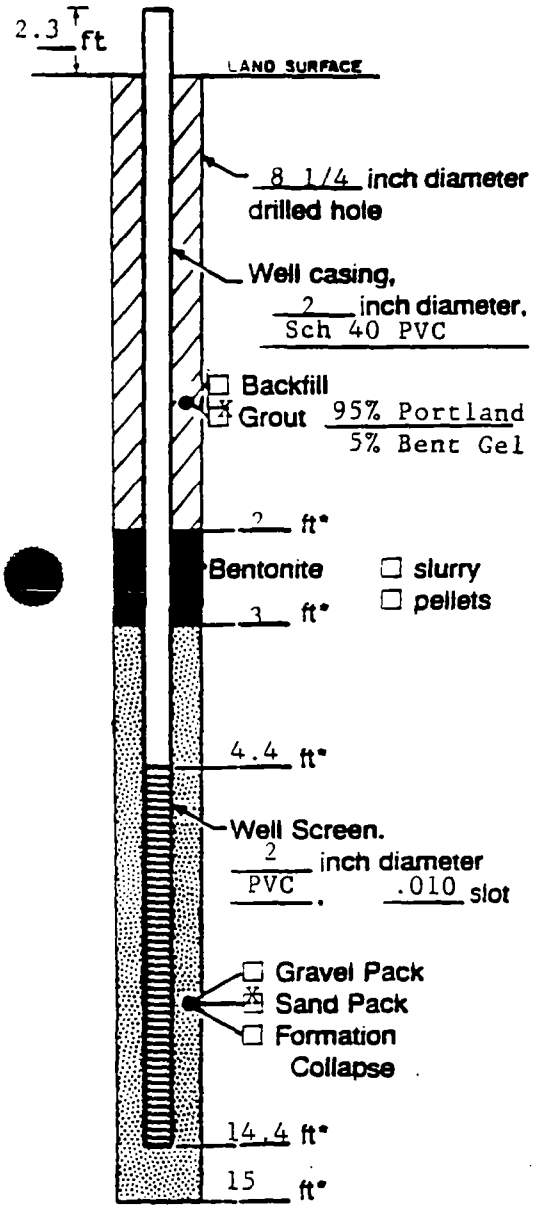
Ground-Water Consultants

PEE ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-3

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation and Datum 112 feet Norfolk City ☒ surveyed ☐ estimated

Installation Dates(s) 9/12/89

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc.

Drilling Fluid None

Development Techniques(s) and Date(s)

Not Developed

Fluid Loss During Drilling NA gallons

Water Removed During Development --- gallons

Static Depth to Water --- feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration ----- hours

Yield ----- gpm Date ----

Specific Capacity ---- gpm/ft

Well Purpose Ground-Water Monitoring

Remarks Well broken off at ground surface before development. Subsequently abandoned.

Prepared by Chris Havlicek

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-4 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/12/89 Drilling Completed 9/12/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 116.28 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	4-5 5-6	Fill, coarse to fine sand and gravel; light brown; dry; clayey silt lens at 1.5'
5	X	3-3 4-6	Silty clay, trace fine sand increasing with depth; light grey; moist; coal-tar odor
	X	3-3 4-7	Medium to fine sand; black to brown; moist; oil/coal-tar odor; black staining decreases with depth
10	X	2-2 1-1	
	X	2-3 3-4	
15			Bottom of Boring 15'
20			
25			
30			
35			

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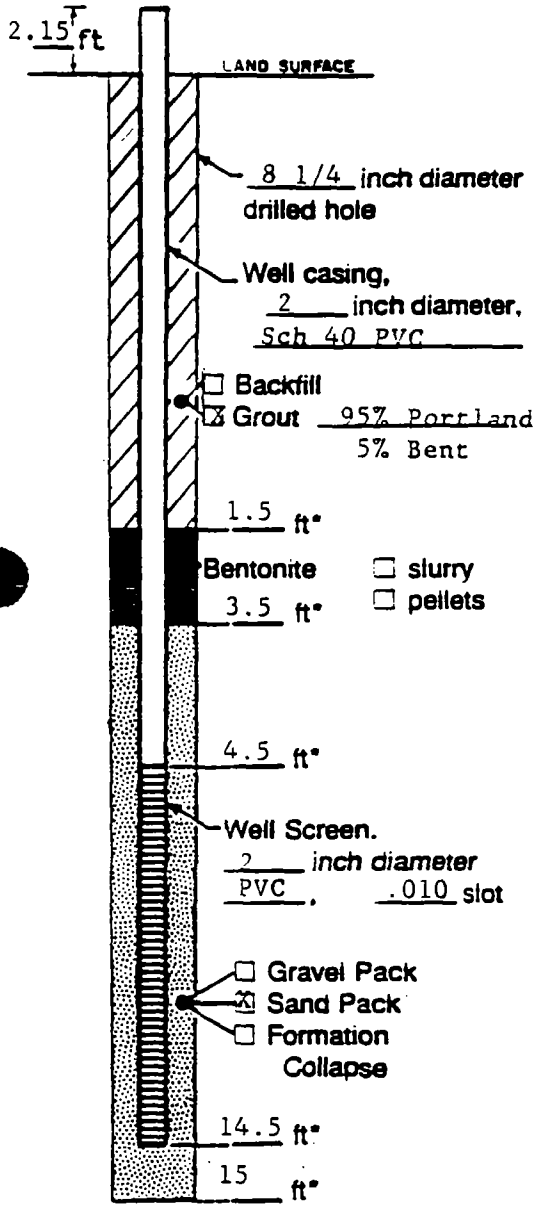
PEE ORIGINAL ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-4

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation and Datum 116.28 feet ☒ surveyed

Norfolk City ☐ estimated

Installation Dates(s) 9/12/89

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc.

Drilling Fluid Potable Water

Development Techniques(s) and Date(s)

Bailed 9/19/89

Fluid Loss During Drilling 20 gallons gallons

Water Removed During Development 15 gallons gallons

Static Depth to Water 7.80 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration ----- hours

Yield ----- gpm Date ----

Specific Capacity ---- gpm/ft

Well Purpose Ground-Water Monitoring

Remarks

Prepared by Curt A. Cramer

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE
ORIGINAL (RED)

SAMPLE/CORE LOG

Boring/Well MW-4B Project/No. Norfolk Gas Plant/MD057.03 Page 1 of 2

Site Location Norfolk, VA Drilling Started 9/26/90 Drilling Completed 9/28/90

Total Depth Drilled 53 feet Hole Diameter 12¼/6 inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 24" X 2" Sampling Interval Various feet

Land-Surface Elev. 116.51 feet ☐ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used Quik Gel and Hydrant water Drilling Method Mud rotary

Drilling Contractor Hardin-Huber, Inc. Driller Royce Helper Don

Prepared By J. Owsiany Hammer Weight 140 Hammer Drop 30 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0, 5, 10			No samples collected
15	X	4-4 7-5	Fine sand, little silt; stained black, oil sheen; grey/black; wet; moderate odor
20	X	1 WOH 3	No staining Clay with silt and fine sand grading to clay with little silt; grey; wet; no staining
25	X	2-2 3-3	Lenses of fine sand, shell fragments
30, 35			

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Ground-Water Consultants

PFE ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-4B

Prepared By J. Owsiany

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35	X	4-4 5-6	Trace fine sand
40	X	4-6 17-18	Fine to medium sand and silt, lenses of silty clay; grey; wet
	X	7-4 4-7	
45	X	7-8 15-18	
50	X	35-35 14-11	Pebbles and gravel with coarse sand
	X	7-11 18-19	Fine sand, little silt, shell fragments; dark grey-green
55			Bottom of Boring
60			
65			
70			
75			

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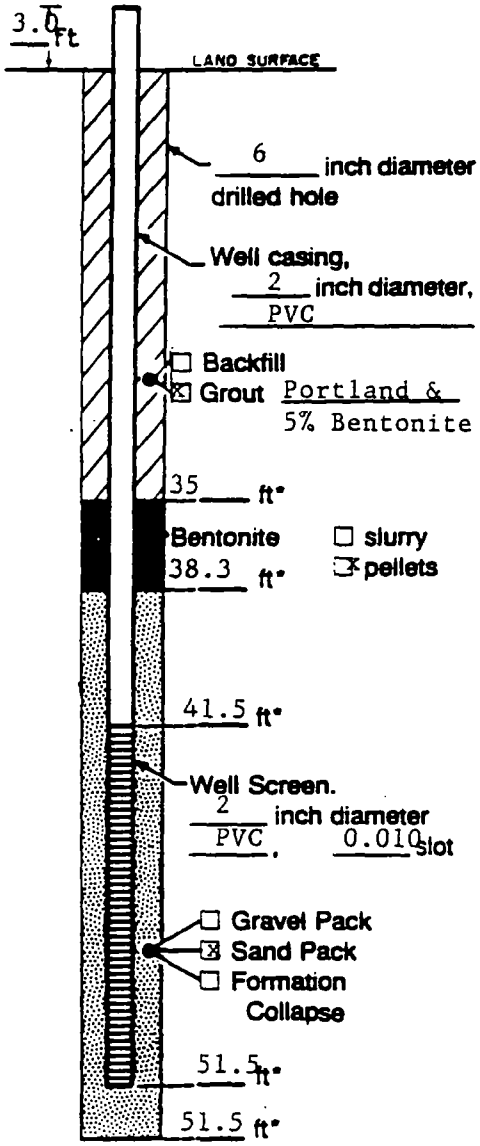
ORIGINAL (Red) ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk Well MW-4B
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 116.51 feet ☒ surveyed ☐ estimated
Installation Dates(s) 10-1-90
Drilling Method Mud Rotary
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid Quik-Gel & Hydrant water

Development Techniques(s) and Date(s)
Developed 10-18-90, by alternately surging and bailing

Fluid Loss During Drilling None detected gallons
Water Removed During Development 40 gallons
Static Depth to Water 16.32 feet below M.P.
Pumping Depth to Water _____ feet below M.P.
Pumping Duration _____ hours
Yield _____ gpm Date _____
Specific Capacity _____ gpm/ft
Well Purpose Monitor deep ground-water quality

Remarks

Prepared by J. Owsiany

Note: 6-inch diameter steel casing from 0-31.5 feet. 10-inch diameter borehole from 0-31.5feet

1/86

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Ground-Water Consultants

PFE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-5 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/12/89 Drilling Completed 9/12/89

Total Depth Drilled 16 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x 2" Sampling Interval various feet

Land-Surface Elev. 114.92 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller Helper

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	7-10 9-7	Fill, medium sand with cinders; grey to black, tar nodules, strong odor
	X	7-8 5-7	Refuse, black, oil sheen and strong odor
5	X	1-2 3-3	
10	X	5-3 2-2	
	X	5-2 1-1	Visible tar; strong odor
15	X	WOH	Clay with organic fragment, grey, no stains or odors
			Bottom of Boring 16'
20			
25			
30			
35			

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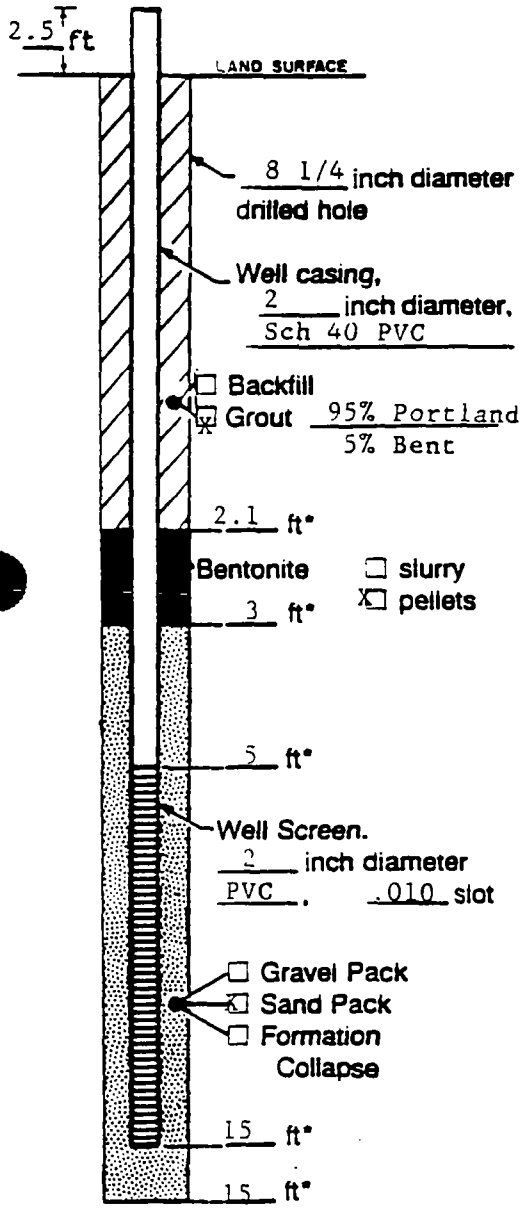
ORIGINAL

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-5

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation and Datum 114.92 feet ☒ surveyed

Norfolk City ☐ estimated

Installation Dates(s) 9/12/89

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc.

Drilling Fluid None

Development Techniques(s) and Date(s)

Bailed 9/19/89

Fluid Loss During Drilling NA gallons

Water Removed During Development 15 gallons

Static Depth to Water 8.30 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration ----- hours

Yield ----- gpm Date ----

Specific Capacity ---- gpm/ft

Well Purpose Ground-Water Monitoring

Remarks

Prepared by Chris Havlicek

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE
ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-6 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 2

Site Location Norfolk, VA Drilling Started _____ Drilling Completed _____

Total Depth Drilled 42 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"X2" Sampling Interval various feet

Land-Surface Elev. 114.30 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	2-4 5-2	Fill limestone fragments & medium to fine sand; light grey
5	X	2-4 4-4	Fine sand, little gravel; black, coal-tar odor; silty clay lens at 5'; moist
	X	5-7 8-9	
10	X	3-5 7-7	Appearance of silt in small amounts; odors
	X	2-3 5-7	more silt; wet; odor
15			
20	X	2-2 5-5	Clay; little shell fragments; grey/green; wet
25	X	2-1 3-5	More shell fragments
30	X	WOH-1 2-3	
35			

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PEE ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-6

Prepared By Curt A. Cramer

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35	X	3-3 4-5	Organic layer; root zone; no staining or visible fuel
40	X	WOH	Medium to fine sand; grey; no staining or odor
			Bottom of Boring 42'
45			
50			
55			
60			
65			
70			
75			

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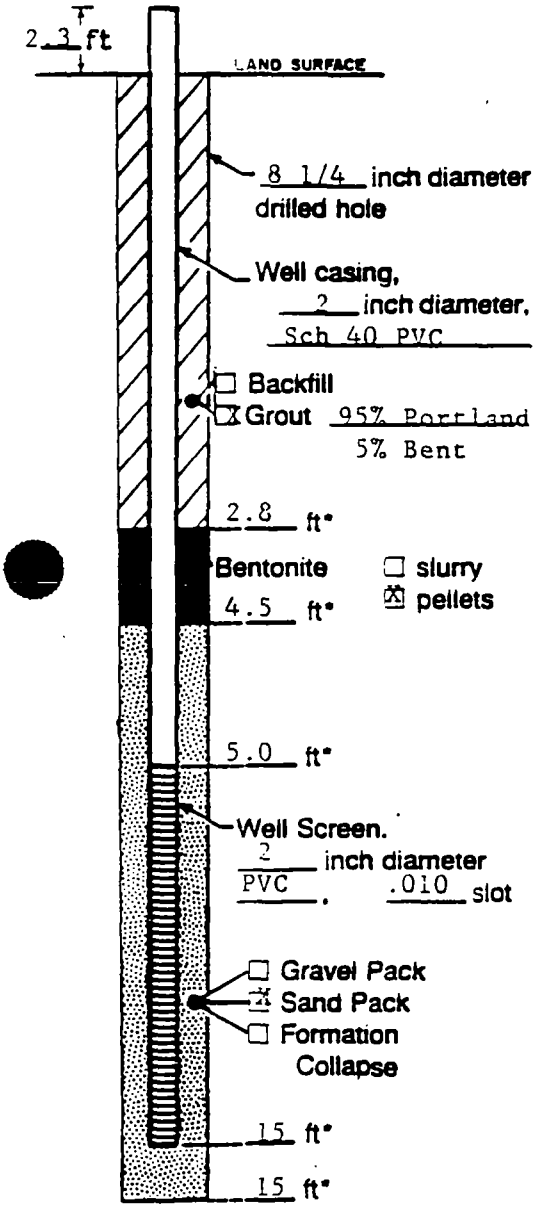
PEF ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-6

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation and Datum 114.30 feet Norfolk City ☒ surveyed ☐ estimated

Installation Dates(s) 9/12/89

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc.

Drilling Fluid None

Development Techniques(s) and Date(s)
Bailed 9/19/89

Fluid Loss During Drilling NA gallons

Water Removed During Development 15 gallons

Static Depth to Water 7.31 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration ----- hours

Yield ----- gpm Date ----

Specific Capacity ---- gpm/ft

Well Purpose Ground-Water Monitoring

Remarks

Prepared by Curt A. Cramer

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-7 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/12/89 Drilling Completed 9/12/89

Total Depth Drilled 16 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 109.7 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller Helper

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Fill, medium sand; grey to black; no odor
	X	4-4 4-4	Fill; debris, cinders, ash, coal, fragments
5			
	X	2-1 2-1	
10			Wet, slight odor
	X	2-1 2-2	
	X	4-1 1-1	
15	X	WOH 24"	Clay with organic matter; grey, wood; fragments; visible fuel pockets
20			Bottom of Boring 16'
25			
30			
35			

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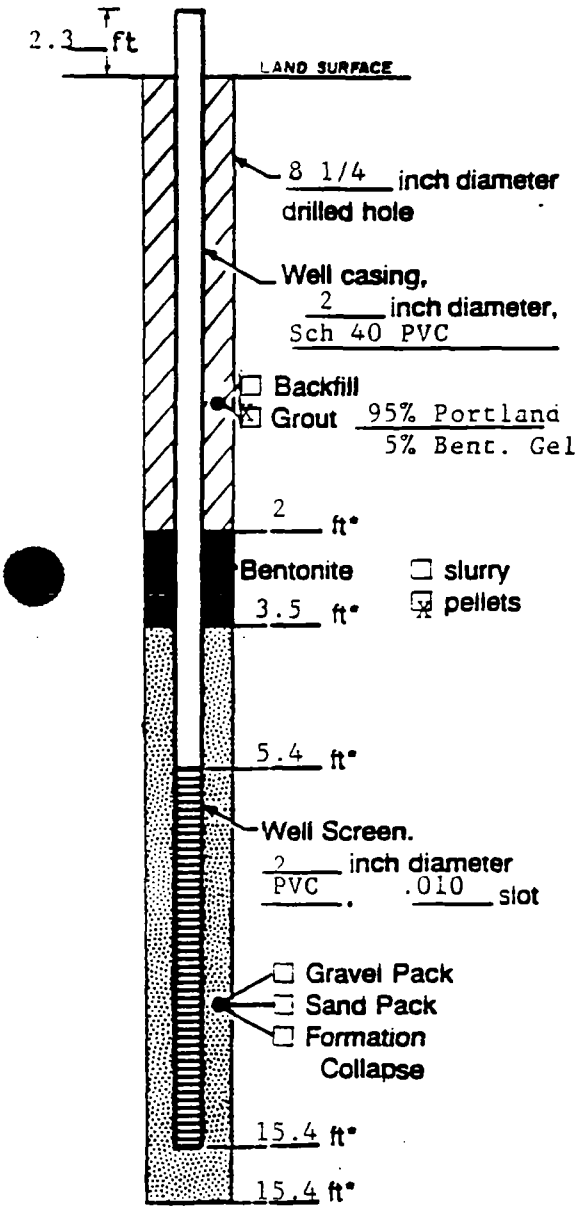
Ground-Water Consultants

PFE ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-7
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 109.70 feet ☒ surveyed
Norfolk City ☐ estimated
Installation Dates(s) 9/12/89
Drilling Method Hollow Stem Auger
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid None

Development Techniques(s) and Date(s)
Bailed 9/19/89

Fluid Loss During Drilling NA gallons
Water Removed During Development 15 gallons
Static Depth to Water 8.37 feet below M.P.
Pumping Depth to Water NA feet below M.P.
Pumping Duration ----- hours
Yield ----- gpm Date ----
Specific Capacity ---- gpm/ft
Well Purpose Ground-Water Monitoring

Remarks

Prepared by Chris Havlicek

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-8 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/13/89 Drilling Completed 9/13/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 109.40 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			
	X	3-3 3-1	Debris, cinders & ash; medium sand; black/brown; moist
5			
	X	1-1 1-1	Debris; heavily stained; strong oil odor; black
	X	WOH/18 1	
10			
	X	WOH/12 1-2	Clay with organic matter, shells & roots
15			Bottom of Boring 14'
20			
25			
30			
35			

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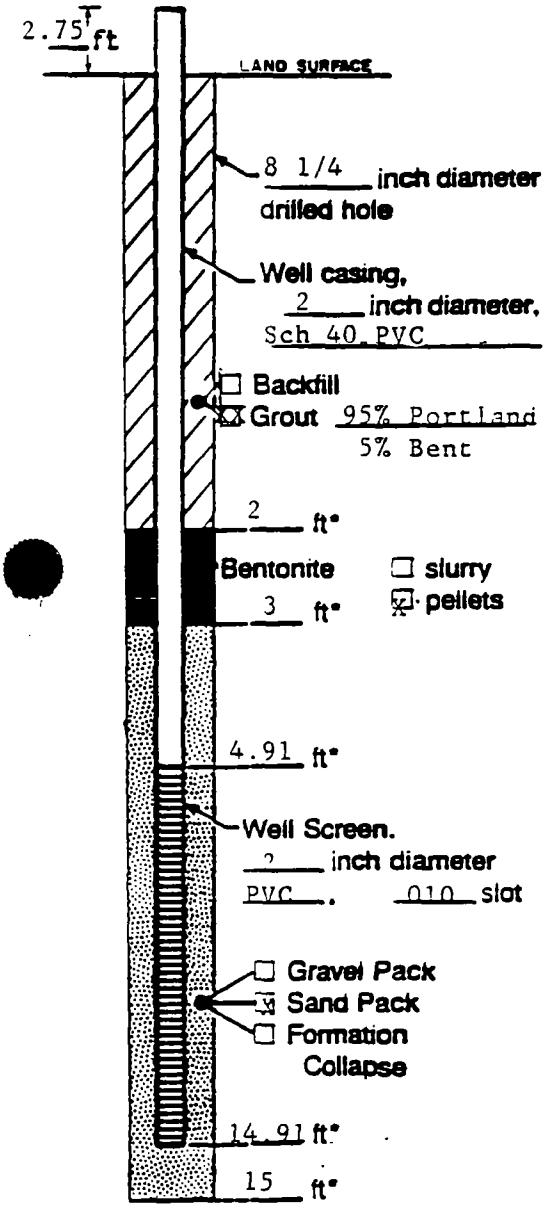
PFE ORIGINAL ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project: City of Norfolk/Vepco Well: MW-8
Town/City: Norfolk
County: City of Norfolk State: VA
Permit No.: NA
Land-Surface Elevation and Datum: 109.40 feet ☒ surveyed ☐ estimated
Norfolk City
Installation Date(s):
Drilling Method: Hollow Stem Auger
Drilling Contractor: Hardin-Huber, Inc.
Drilling Fluid: None

Development Techniques(s) and Date(s)
Bailed 9/20/89

Fluid Loss During Drilling: NA gallons
Water Removed During Development: 15 gallons
Static Depth to Water: 6.70 feet below M.P.
Pumping Depth to Water: NA feet below M.P.
Pumping Duration: ----- hours
Yield: ----- gpm Date: ----
Specific Capacity: ---- gpm/ft
Well Purpose: Ground-Water Monitoring

Remarks:

Prepared by: Chris Havlicek

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-9 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 2

Site Location Norfolk, VA Drilling Started 9/12/89 Drilling Completed 9/12/89

Total Depth Drilled 42 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 110.44 feet ☐ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller Helper

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	3-17 19-6	Fill, medium to fine sand and gravel; brown-dry
5	X	3-4 8-12	black coloration starts, coal fragments
	X	2-4 4-4	Debris; black; oil sheen; wet
	X	2-4 4-3	
10	X	2-1 1-1	Silty clay; dark grey; coal-tar odor; wet; shell fragments
	X	WOH -1	
15			Clay with root fragments; grey; no staining; slight odor
20	X	4-2 2-2	wet
25	X	2-2 2-3	Medium grained sand lens; oil stained; strong odor; wet
30	X	WOH- 2-2- 2	sand lens; wet
35			

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Ground-Water Consultants

PFE ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-9

Prepared By Curt A. Cramer

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35	X	3-5 7-7	Fine sand with trace silt; green/grey
40	X	11-15 25-25	change in odor; light grey/white
			Bottom of Boring 42'
45			
50			
55			
60			
65			
70			
75			

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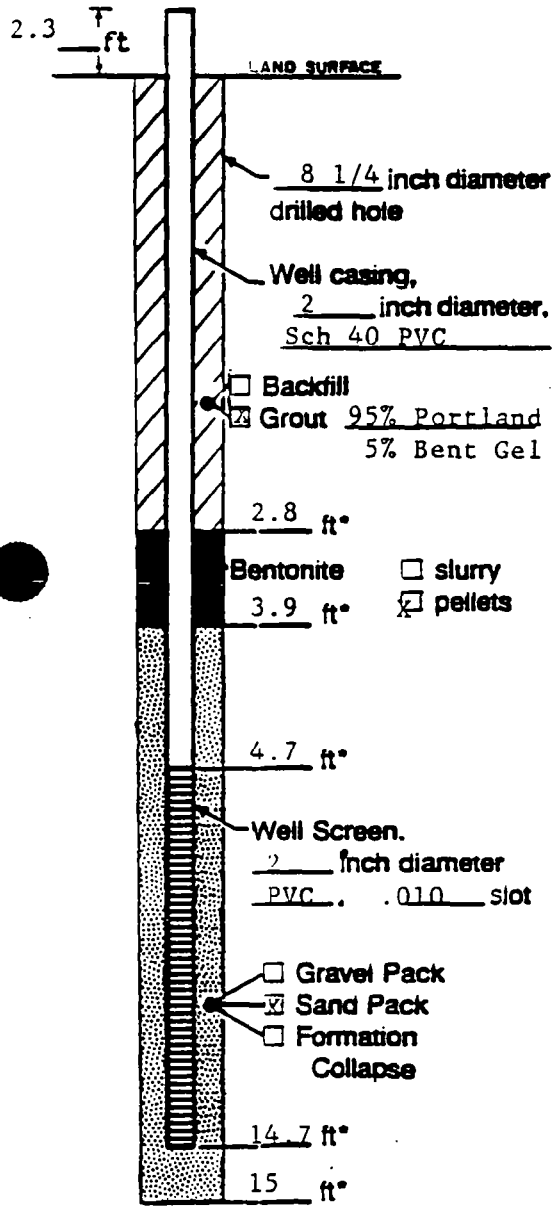
Ground-Water Consultants

PFE ORIGINAL

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project: City of Norfolk/Vepco Well: MW-9
Town/City: Norfolk
County: City of Norfolk State: VA
Permit No.: NA
Land-Surface Elevation and Datum: 110.44 feet Norfolk City ☒ surveyed ☐ estimated
Installation Date(s): 9/12/89
Drilling Method: Hollow Stem Auger
Drilling Contractor: Hardin-Huber, Inc.
Drilling Fluid: None

Development Techniques(s) and Date(s)
Bailed 9/19/89

Fluid Loss During Drilling: NA gallons
Water Removed During Development: 15 gallons
Static Depth to Water: 6.69 feet below M.P.
Pumping Depth to Water: NA feet below M.P.
Pumping Duration: ----- hours
Yield: ----- gpm Date: ----
Specific Capacity: ---- gpm/ft
Well Purpose: Ground-Water Monitoring

Remarks:

Prepared by: Curt A. Cramer

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-10 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/12/89 Drilling Completed 9/12/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 114.66 feet ☐ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

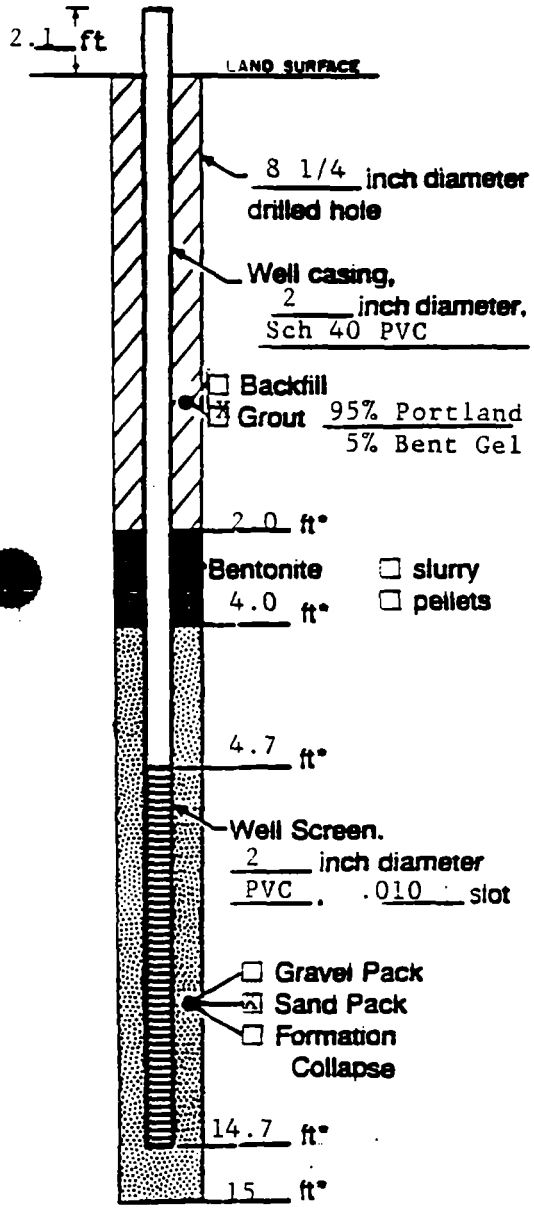
Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	2-2 3-2	Fill, coarse to fine sand with little gravel; brown; dry
5	X	1-1 1-2	
	X	2-2 2-2	
10	X	2-3 5-4	Fine sand and silt; tan; oil sheen, odor
	X	4-4 5-5	No Sheen
15			Bottom of Boring 14.7'
20			
25			
30			
35			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-10

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation and Datum 114.66 feet ☒ surveyed
Norfolk City ☐ estimated

Installation Dates(s)

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc.

Drilling Fluid None

Development Techniques(s) and Date(s)
Bailed 9/20/89

Fluid Loss During Drilling NA gallons

Water Removed During Development 15 gallons

Static Depth to Water 8.20 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration ----- hours

Yield ----- gpm Date ----

Specific Capacity ---- gpm/ft

Well Purpose Ground-Water Monitoring

Remarks

Prepared by Curt A. Cramer

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE

ORIGINAL

SAMPLE/CORE LOG

Boring/Well MW-12 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/13/89 Drilling Completed 9/13/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 112.46 feet ☐ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	3-5 5-5	Fill, silt and clay; light brown, dry
5	X	4-5 5-6	Sand layer, medium to fine; brown; oil odor
	X	2-1 1-2	Debris, cinders; black; oil sheen and odor; wet
	X	1-1 4-4	
10	X	1-4 8-6	Medium to fine sand, little clay; dark brown; moist.
	X	2-4 5-4	fine sand little silt; light grey; roots present, no odor or stains; wet
15			Bottom of Boring 14.5'
20			
25			
30			
35			

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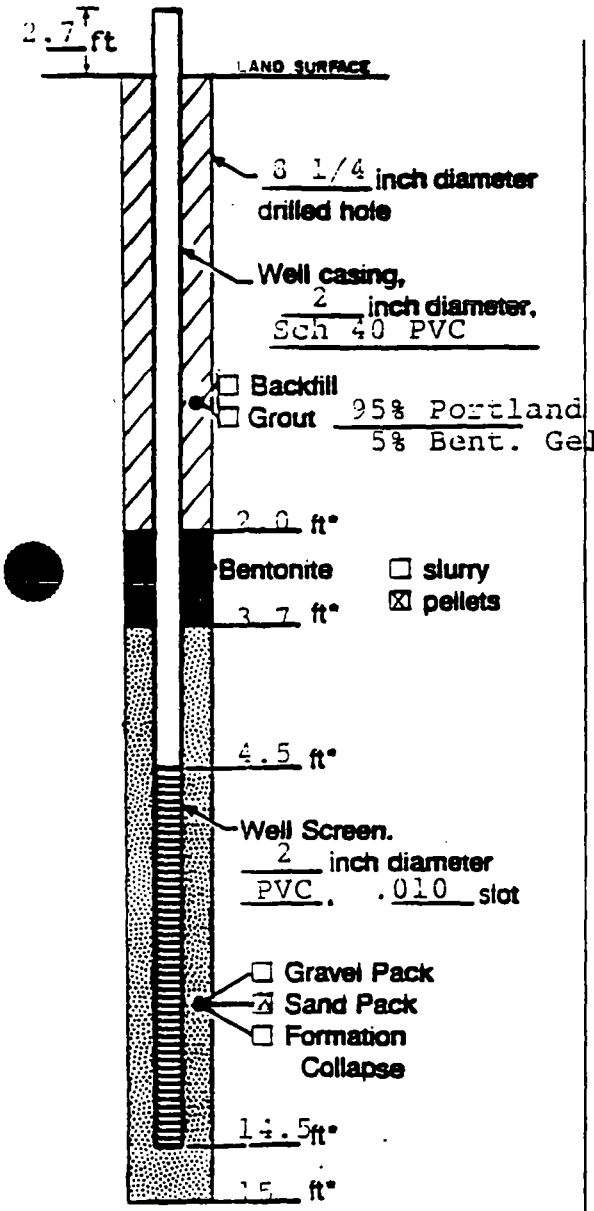
PEF ORIGINAL ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project: City of Norfolk/Vepco Well: MW-12
Town/City: Norfolk
County: City of Norfolk State: VA
Permit No.: NA
Land-Surface Elevation and Datum: 112.46 feet, Norfolk City ☒ surveyed ☐ estimated
Installation Date(s): 9/13/89
Drilling Method: Hollow Stem Auger
Drilling Contractor: Hardin-Huber, Inc.
Drilling Fluid: None

Development Techniques(s) and Date(s)
Bailed 9/20/89

Fluid Loss During Drilling: NA gallons
Water Removed During Development: 15 gallons
Static Depth to Water: 8.02 feet below M.P.
Pumping Depth to Water: NA feet below M.P.
Pumping Duration: ----- hours
Yield: ----- gpm Date: ----
Specific Capacity: ---- gpm/ft
Well Purpose: Ground-Water Monitoring

Remarks

Prepared by: Curt A. Cramer

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Ground-Water Consultants

PFE

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-13 Project/No. City of Norfolk/Vepco MD 057.02 Page 1 of 2

Site Location Norfolk, VA Drilling Started 9/13/89 Drilling Completed 9/13/89

Total Depth Drilled 42 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 111.55 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller Helper

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	9-18 17-20	Fill, medium sand and gravel; brick fragments, cinders and wood; tan/grey
	X	5-8 8-8	ash and cinders
5			
	X	1-2 2-2	Debris, glass, wood, brick; strong oil odor
	X	2-1 1-1	
10	X	1-1 1-1	Clay with root fragments; no staining no odor
15	X	WOH	
20	X	WOH 15-3	Wood timber, slight odor
25	X	2-1 2-4	Medium to fine sand with some silt; plant and wood fragments; oil stained, odor
30	X	3-4 3-6	Clay lens
35			

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PFE ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-13

Prepared By Curt A. Cramer

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35	X	WOH-3 3-4	Clay with some root fragments; grey; no stains or odors
40	X	3-3 5-3	
			Bottom of Boring 42'
45			
50			
55			
60			
65			
70			
75			

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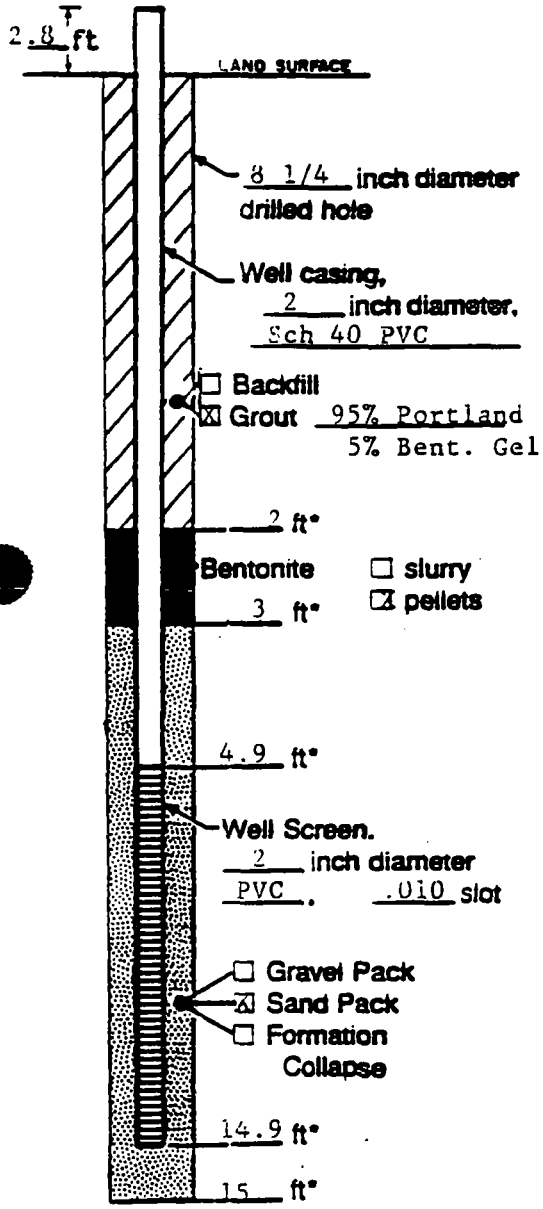
PFE ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-13
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 111.55 feet ☒ surveyed
Norfolk City ☐ estimated
Installation Date(s) 9/13/89-9/14/89
Drilling Method Hollow Stem Auger
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid None

Development Techniques(s) and Date(s)
Bailed 9/14/89

Fluid Loss During Drilling NA gallons
Water Removed During Development 10 gallons
Static Depth to Water 9.19 feet below M.P.
Pumping Depth to Water NA feet below M.P.
Pumping Duration ----- hours
Yield ----- gpm Date ----
Specific Capacity ---- gpm/ft
Well Purpose Ground-Water Monitoring

Remarks

Prepared by Chris Havlicek

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PEE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-13B Project/No. Norfolk Gas Plant/MD057.03 Page 1 of 2

Site Location Norfolk, VA Drilling Started 9/26/90 Drilling Completed 9/27/90

Total Depth Drilled 51 feet Hole Diameter 10/6 inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 24" X 2" Sampling Interval Various feet

Land-Surface Elev. 111.96 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used Drilling Method Mud Rotary

Drilling Contractor Hardin-Huber, Inc. Driller Royce Helper Don

Prepared By J. Owsiany Hammer Weight 140 Hammer Drop 30 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Note: 0-37, mud rotary drilling No spoons collected until 35'
5			
10			
15			
20			
25			
30			
35			

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ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-13B

Prepared By J. Owsiany

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35	X	1-2 2-1	Clay with little silt, trace fine sand, organics and root traces; wet; grey; slight odor, small pockets of black staining
40	X	2-2 3-2	Sand lenses with oil staining present; moderate odor
45	X	3-4 8-15 6-6 10-11	Fine sand, little silt and clay, shell fragments grey-green, slight odor
50	X	4-7 7-15	
			Bottom of Boring
55			
60			
65			
70			
75			

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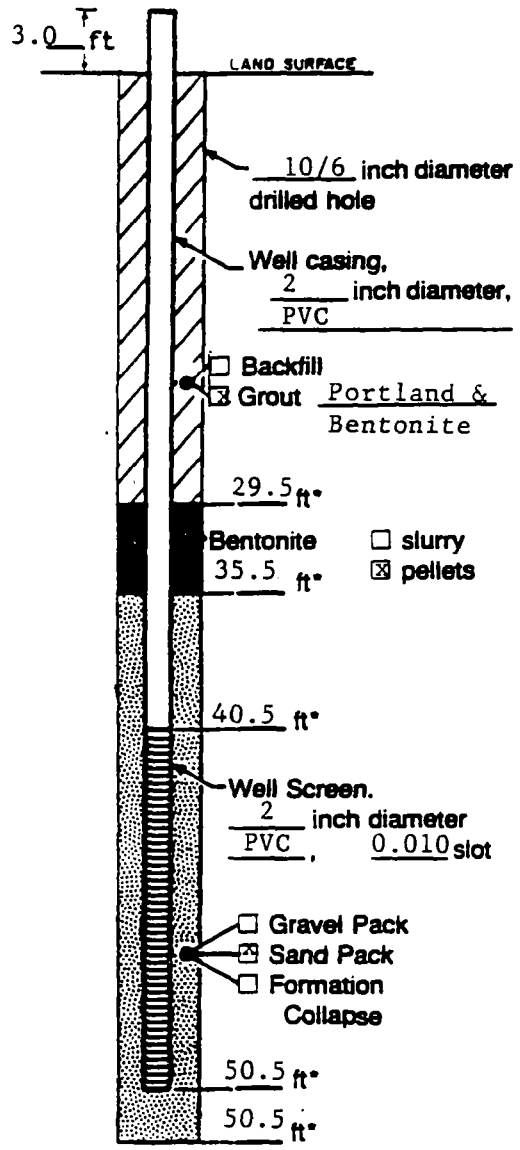
PFE ORIGINAL (Red) ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-13B
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 111.96 feet ☒ surveyed ☐ estimated
Installation Dates(s) 9-26-90; 9-27-90
Drilling Method Mud Rotary
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid Quik-Gel & Hydrant water

Development Techniques(s) and Date(s)
Developed on 10-18-90, by alternately surging and bailing

Fluid Loss During Drilling None detected gallons
Water Removed During Development 90 gallons
Static Depth to Water 8.89 feet below M.P.
Pumping Depth to Water _____ feet below M.P.
Pumping Duration _____ hours
Yield _____ gpm Date _____
Specific Capacity _____ gpm/ft
Well Purpose Monitor deep ground-water quality

Remarks Contaminated zone at 42-45, when washing hole to get well down last 0.5 and 1.0 feet, oily coal-tar residue washed out hole; also when adding sand, heavily contaminated water flushed out of well; inside of well black sand.

Note: 6-inch diameter steel casing from 0-31.5 feet 10-inch diameter borehole from 0-31.5 feet.

Prepared by J.Owsiany

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ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-13C Project/No. Norfolk Gas Plant/MD057.03 Page 1 of 3

Site Location Norfolk, VA Drilling Started 10/2/90 Drilling Completed 10/3/90

Total Depth Drilled 82 feet Hole Diameter 10/6 inches Type of Sampler/ Coring Device Split spoon

Length and Diameter of Coring Device _____ Sampling Interval Various feet

Land-Surface Elev. 111.64 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used Quik-Gel and Hydrant water Drilling Method Mud Rotary

Drilling Contractor Hardin-Huber, Inc. Driller Royce Helper Don

Prepared By J. Owsiany Hammer Weight 140 Hammer Drop 30 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			0-20, no samples, auger to set temporary casing
5			
10			
15			
20			Mud rotary, no samples 20-45 feet
25			
30			
35			

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ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-13C

Prepared By J. Owsiany

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35			
40			
45	X	8-8 9-15	Fine sand, little silt, trace clay, shell fragments; grey/green wet
50	X	6-6 9-12	
55	X	12-13 20-33	
60			
65			
70			
75			

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-13C

Page 3 of 3

Prepared By J. Owsiany

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
75	X	6-11 20-24	Fine sand and silt, with little clay; shell fragments; green/gray.
80			Bottom of boring
85			
90			
95			
100			
105			
110			
115			

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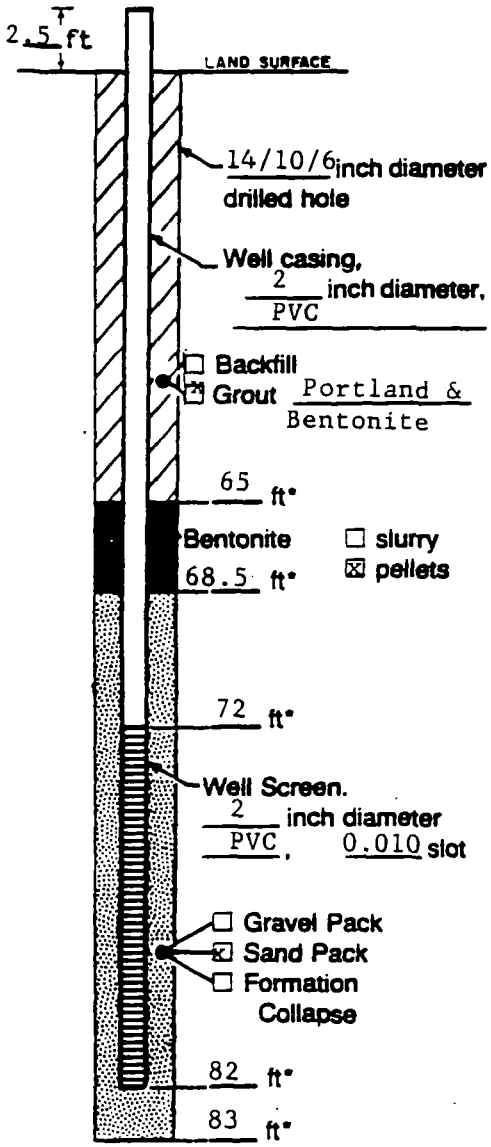
PFE ORIGINAL (GREEN)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-13C
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 111.64 feet ☒ surveyed ☐ estimated
Installation Dates(s) 10-26-90
Drilling Method Mud Rotary
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid Hydrant water, no bentonite

Development Techniques(s) and Date(s)
Developed on 10-29-90, surged and bailed

Fluid Loss During Drilling NA. redrill well & casing gallons
Water Removed During Development _____ gallons
Static Depth to Water _____ feet below M.P.
Pumping Depth to Water _____ feet below M.P.
Pumping Duration _____ hours
Yield _____ gpm Date _____
Specific Capacity _____ gpm/ft
Well Purpose Reinstallation of previous well grouted in by HHI

Remarks

Prepared by J. Owsiany

Note: 14-inch diameter borehole and 10-inch diameter casing from 0-25 feet
10-inch diameter borehole and 6-inch diameter steel casing from 0-60 feet

1/86

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Ground-Water Consultants

ORIGINAL

SAMPLE/CORE LOG

Boring/Well MW-14 Project/No. City of Norfolk/Vepco MD057.02 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/13/89 Drilling Completed 9/13/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 110.42 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller _____ Helper _____

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	7-17 7-6	Fill, coarse gravel and silt; light brown; roots, cinders; dry
5	X	2-2 1-1	Cinders; black; wet; oil odor
	X	1-1 1-1	Silty clay, root fragments; grey; wet; slight odor
	X	1-1 1-1	
10			
	X	9-6 4-4	Fine sand, trace silt; grey; wet; slight odor; tan at 13'
15			Bottom of Boring 15.3'
20			
25			
30			
35			

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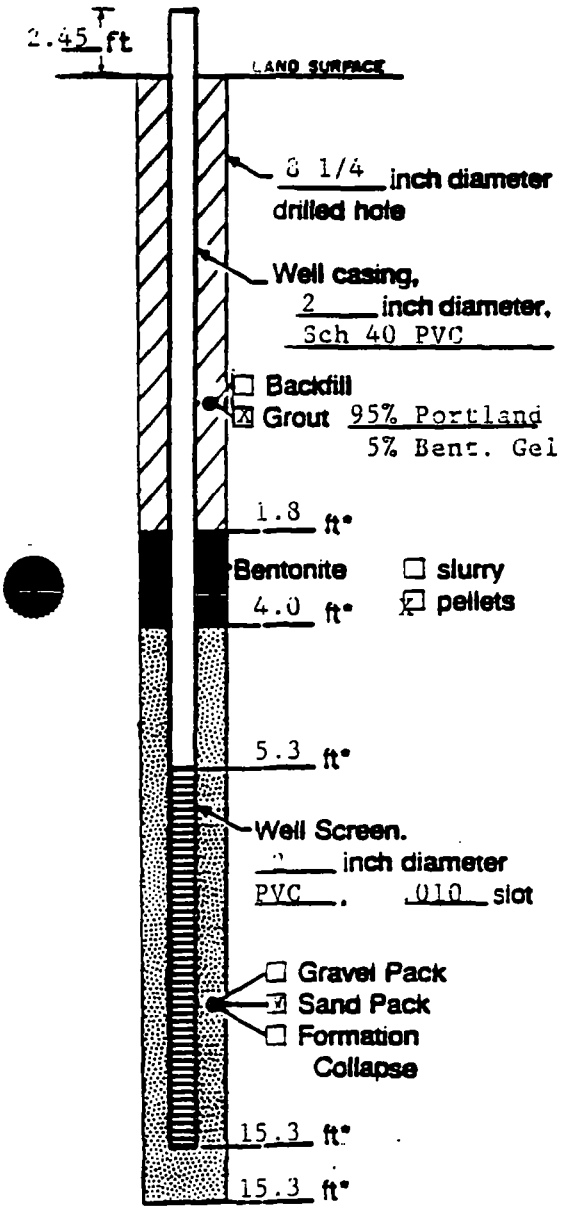
PFE ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-14

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation and Datum 110.42 feet ☒ surveyed

Norfolk City ☐ estimated

Installation Date(s) 9/13/89

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc.

Drilling Fluid None

Development Techniques(s) and Date(s)

Bailed 9/19/89

Fluid Loss During Drilling NA gallons

Water Removed During Development 20 gallons

Static Depth to Water 7.05 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration ----- hours

Yield ----- gpm Date ----

Specific Capacity ---- gpm/ft

Well Purpose Ground-Water Monitoring

Remarks

Prepared by Curt A. Cramer

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-15 Project/No. City of Norfolk/Vepco MD057.01 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/13/89 Drilling Completed 9/13/89

Total Depth Drilled 14 feet Hole Diameter 8 inches Type of Sample/Coring Device split spoon

Length and Diameter of Coring Device 24"x2" Sampling Interval various feet

Land-Surface Elev. 108.93 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method HSA

Drilling Contractor Hardin Huber, Inc. Driller Helper

Prepared By Curt A. Cramer Hammer Weight 140 Hammer Drop 36 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	7-8 12-5	Fill, medium to fine sand with little silt and gravel; tan; dry; no odor
	X	3-4 2-3	Wood and brick fragments; fuel oil odor
5	X	2-1 1-1	Debris; paper, wood, little clay and sand; black; no odor
	X	1-1 1-1	
10	X	WOH-1 1-1	Clay with trace medium to fine sand; grey; no odor or visible fuel
15			Bottom of Boring 14'
20			
25			
30			
35			

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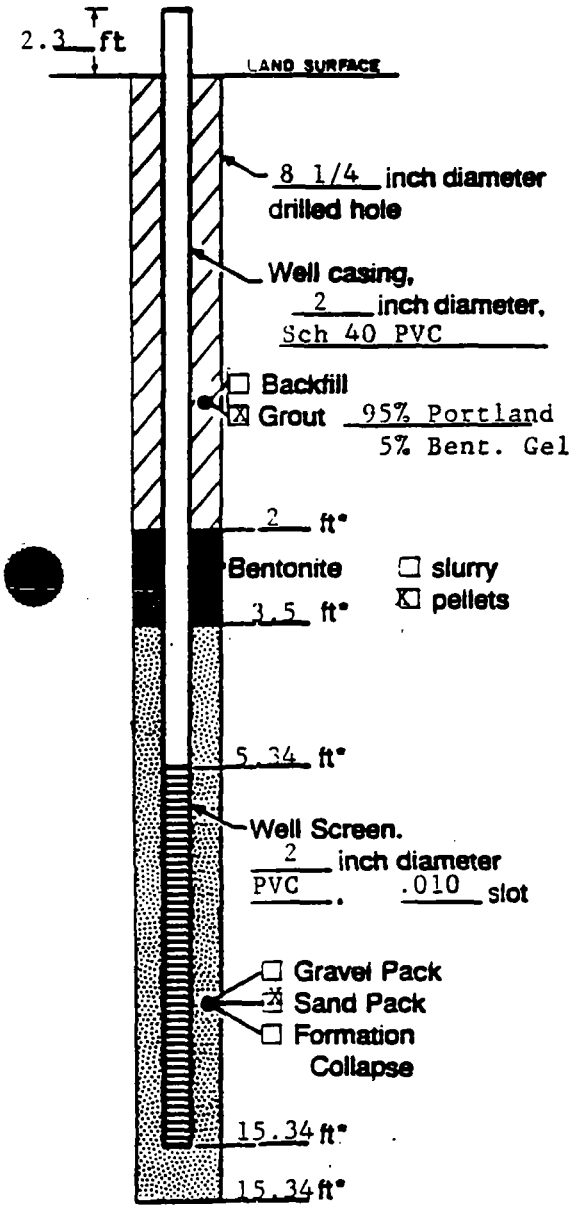
ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project City of Norfolk/Vepco Well MW-15

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation and Datum 108.93 feet ☒ surveyed

Norfolk City ☐ estimated

Installation Dates(s) 9/13/89

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc.

Drilling Fluid None

Development Techniques(s) and Date(s)

Bailed - 9/ 20/89

Fluid Loss During Drilling NA gallons

Water Removed During Development 15 gallons

Static Depth to Water 6.08 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration ----- hours

Yield ----- gpm Date ----

Specific Capacity ---- gpm/ft

Well Purpose Ground-Water Monitoring

Remarks

Prepared by Chris Havlicek

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-16 Project/No. Norfolk Gas Plant Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/13/90 Drilling Completed 9/13/90

Total Depth Drilled 18 feet Hole Diameter 8¼ inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 24" X 2" Sampling Interval 2 feet

Land-Surface Elev. 113.98 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method Hollow Stem Auger

Drilling Contractor Hardin Huber, Inc. Driller Royce Helper Don

Prepared By J. Owsiany Hammer Weight 140 Hammer Drop 30 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Asphalt and road ballast; no sampling
		12-7	No recovery
		6-7	
5		3-5	Medium sand with little silt, minor rock fragments; gray/green; moist
		7-9	
		4-7	
		15-15	
10		4-5	
		3-2	
			Fine sand, trace silt; mottled light grey-orange/brown; wet.
15			Bottom of boring
20			
25			
30			
35			

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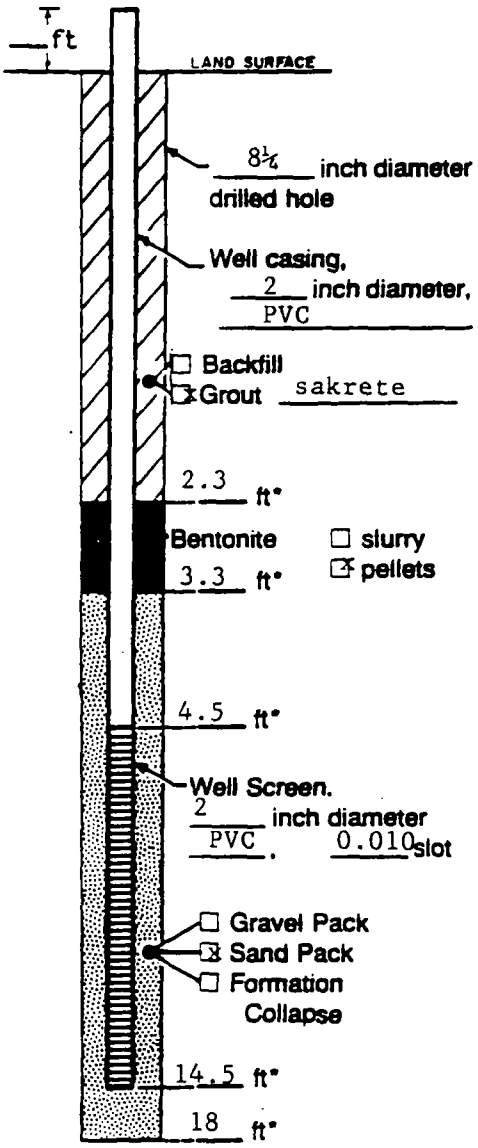
ORIGINAL

WELL CONSTRUCTION LOG

Flush Mount



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-16

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation and Datum 113.98 feet ☒ surveyed ☐ estimated

Installation Date(s) 9-13-90

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin & Huber

Drilling Fluid NA

Development Techniques(s) and Date(s)
Developed on 10-16-90, bailed with bottom filling bailer

Fluid Loss During Drilling NA gallons

Water Removed During Development 10 gallons

Static Depth to Water 6.47 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitor shallow ground water quality

Remarks Due to running sands, had to add water and over drill from 15' to 18'; hole stayed open, had to add extra sand to bring it up to 14.5'

Prepared by J. Owsiany

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE ORIGINAL (RED)

SAMPLE/CORE LOG

Boring/Well MW-17 Project/No. Norfolk Gas Plant/MD057.03 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/13/90 Drilling Completed 9/13/90

Total Depth Drilled 16 feet Hole Diameter 8¼ inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 24" X 2" Sampling Interval 2 feet

Land-Surface Elev. 111.58 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc. Driller Royce Helper Don

Prepared By J. Owsiany Hammer Weight 140 Hammer Drop 30 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	4-10 8-12	Soil Horizon
	X	4-6 6-5	Silt and little clay, trace fine sand; brown/grey; moist.
5	X	3-3 5-6	Fine to medium sand, light tan to grey moist, no odor
10	X	2-2 5-6	
	X	4-5 4-5	
15			Bottom of boring
20			
25			
30			
35			

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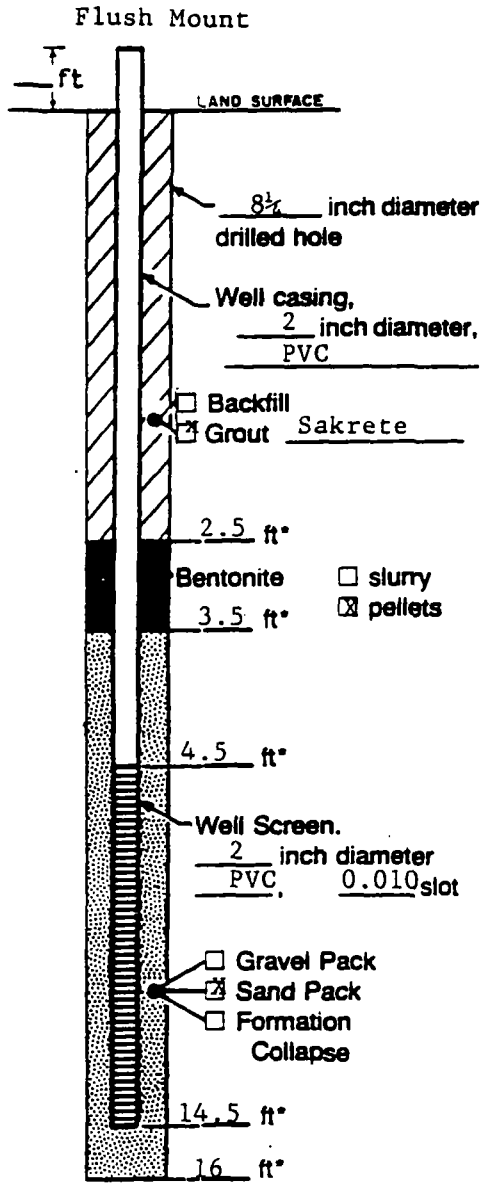
Ground-Water Consultants

PFE ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-17

Town/City Norfolk

County City of Norfolk State VA

Permit No. NA

Land-Surface Elevation and Datum 111.58 feet ☒ surveyed ☐ estimated

Installation Dates(s) 9-13-90

Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc.

Drilling Fluid NA

Development Techniques(s) and Date(s)
Developed 10-16-90, bailed with bottom bailer

Fluid Loss During Drilling NA gallons

Water Removed During Development 20 gallons

Static Depth to Water 5.62 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitor shallow ground-water quality

Remarks Washed out augers prior to setting a well with pump & hydrant water

Prepared by J. Owsiany

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-18 Project/No. Norfolk Gas Plant Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/13/90 Drilling Completed 9/13/90

Total Depth Drilled 15 feet Hole Diameter 8¼ inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 24" X 2" Sampling Interval 2 feet

Land-Surface Elev. 111.28 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc. Driller Royce Helper Don

Prepared By J. Owsiany Hammer Weight 140 Hammer Drop 30 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0	X	12-17	Soil horizon
	X	20-21	Debris, bricks, cinders, wood etc.
	X	23-5	
	X	3-3	Coarse sand and rock fragments; grey moist
5	X	2-2	
	X	3-3	
	X	2-1	Grading to medium sand, clay lens
	X	1-1	
10	X	WOH	
	X	12	
	X	1-4	Fine sand and silt; orange/brown; wet
15			Bottom of Boring
20			
25			
30			
35			

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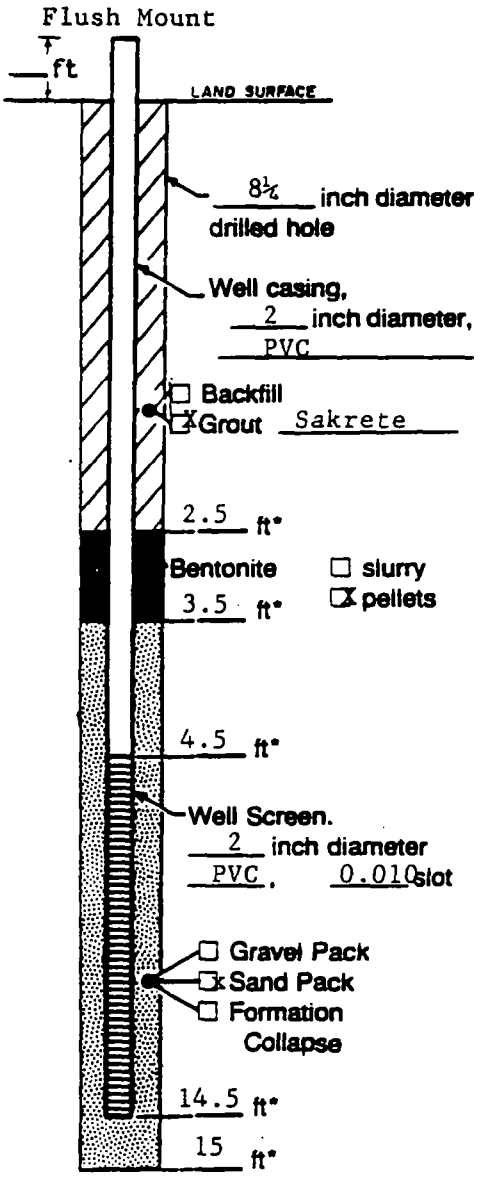
Ground-Water Consultants

ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-18
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 111.28 feet ☒ surveyed ☐ estimated
Installation Date(s) 9-13-90
Drilling Method Hollow Stem Auger
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid NA

Development Techniques(s) and Date(s)
Developed 10-16-90, bailed with a bottom filling bailer

Fluid Loss During Drilling NA gallons
Water Removed During Development 15 gallons
Static Depth to Water 5.30 feet below M.P.
Pumping Depth to Water _____ feet below M.P.
Pumping Duration _____ hours
Yield _____ gpm Date _____
Specific Capacity _____ gpm/ft
Well Purpose Monitor water quality

Remarks Washed augers prior to setting well

Prepared by J. Owsiany

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-19 Project/No. Norfolk Gas Plant/MD057.03 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/90 Drilling Completed 9/14/90

Total Depth Drilled 15 feet Hole Diameter 8¼ inches Type of Sample/Coring Device SplitSpoon

Length and Diameter of Coring Device 24" X 2" Sampling Interval 2 feet

Land-Surface Elev. 110.79 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc. Driller Royce Helper Don

Prepared By J. Owsiany Hammer Weight 140 Hammer Drop 30 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Road ballast
5	☒	5-6 8-9	Fine to medium sand, trace silt; yellow/brown; moist
	☒	9-5 9-12	
10	☒	4-6 7-10	
	☒	4-2 5-7	
15			Bottom of boring
20			
25			
30			
35			

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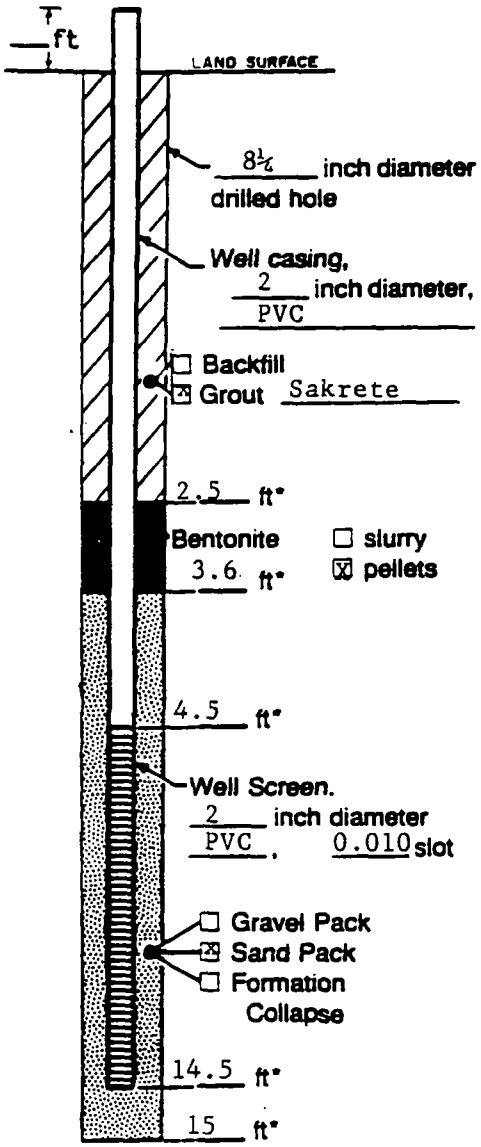
PFE ORIGINAL (Red)

WELL CONSTRUCTION LOG

Flush Mount



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-19
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 110.79 feet ☒ surveyed ☐ estimated
Installation Dates(s) 9-14-90
Drilling Method Hollow Stem Auger
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid NA

Development Techniques(s) and Date(s)
Developed on 10-16-90, bailes with a bottom filling bailer

Fluid Loss During Drilling NA gallons
Water Removed During Development 20 gallons
Static Depth to Water 5.83 feet below M.P.
Pumping Depth to Water _____ feet below M.P.
Pumping Duration _____ hours
Yield _____ gpm Date _____
Specific Capacity _____ gpm/ft
Well Purpose Monitor shallow ground-water quality

Remarks Washed auger prior to well installation

Prepared by J.Owsiany

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Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-19B Project/No. Norfolk Gas Plant/MD057.03 Page 1 of 2

Site Location Norfolk, VA Drilling Started 9-24-90 Drilling Completed 9-25-90

Total Depth Drilled 50 feet Hole Diameter 10/6 inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 24" X 2" Sampling Interval Various feet

Land-Surface Elev. 110.86 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used Quik Gel and Hydrant Water Drilling Method Mud Rotary

Drilling Contractor Hardin-Huber, Inc. Driller Royce Helper Don

Prepared By J. Owsiany Hammer Weight 140 Hammer Drop 30 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Road ballast Fine to medium sand; trace silt; yellow/brown; moist
5			
10			
15	X	3-2 2-1	Fine sand and silt; moist/wet; grey; no odor
20	X	1-1 3-12	Clay, trace to little silt; shell debris, sand lens with fine sand; moist/wet, grey
25	X	1-1 2-3	
30	X	1-2 3-2	Sand lenses
	X	2-2 2-3	Thin peat layer
35			

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ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-19B

Prepared By J. Owsiany

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35	X	4-13 6-7	
40	X	14-18 25-45	Medium sand; little silt, trace clay; grey, wet
45	X	12-48 42-29	Grading to coarse sand with pebbles
50	X	10-13 17-22	Fine sand with little silt and clay; shell fragments; grey green; wet;
55			Bottom of boring
60			
65			
70			
75			

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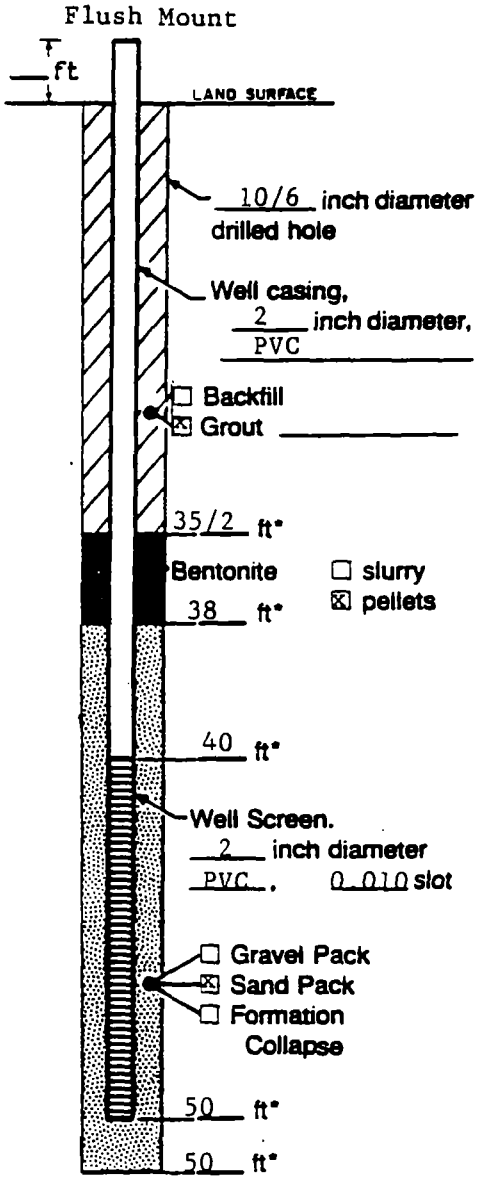
ORIGINAL (Red)

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-19B
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 110.86 feet ☒ surveyed ☐ estimated
Installation Date(s) 9-24-90/9-25-90
Drilling Method Mud Rotary
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid Quik-Gel & Hydrant Water

Development Techniques(s) and Date(s)
Developed by alternately surging and bailing well

Fluid Loss During Drilling None detected gallons
Water Removed During Development 40 gallons
Static Depth to Water 11.75 feet below M.P.
Pumping Depth to Water _____ feet below M.P.
Pumping Duration _____ hours
Yield _____ gpm Date _____
Specific Capacity _____ gpm/ft
Well Purpose Monitor deep ground-water quality

Remarks

Prepared by J. Owsiany

Note: 6-inch diameter steel casing from 0-32 feet; 10-inch diameter borehole from 0-32 feet

1/86

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Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-20 Project/No. Norfolk Gas Plant/MD057.03 Page 1 of 1

Site Location Norfolk, VA Drilling Started 9/14/90 Drilling Completed 9/14/90

Total Depth Drilled 14 feet Hole Diameter 8¼ inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 24" X 2" Sampling Interval 2 feet

Land-Surface Elev. 108.43 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used NA Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc. Driller Royce Helper Don

Prepared By J. Owsiany Hammer Weight 140 Hammer Drop 50 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Road ballast
			Fill, bricks, cinders
		5-1 1-1	
5		4-2 3-2 5-7 7-7	Fine to medium sand, little silt, thin clay lenses; grey; moist
10		4-3 3-2 WOH 6-1 1-1	
15			Fine sand and silt trace clay; dark grey; wet
			Bottom of boring
20			
25			
30			
35			

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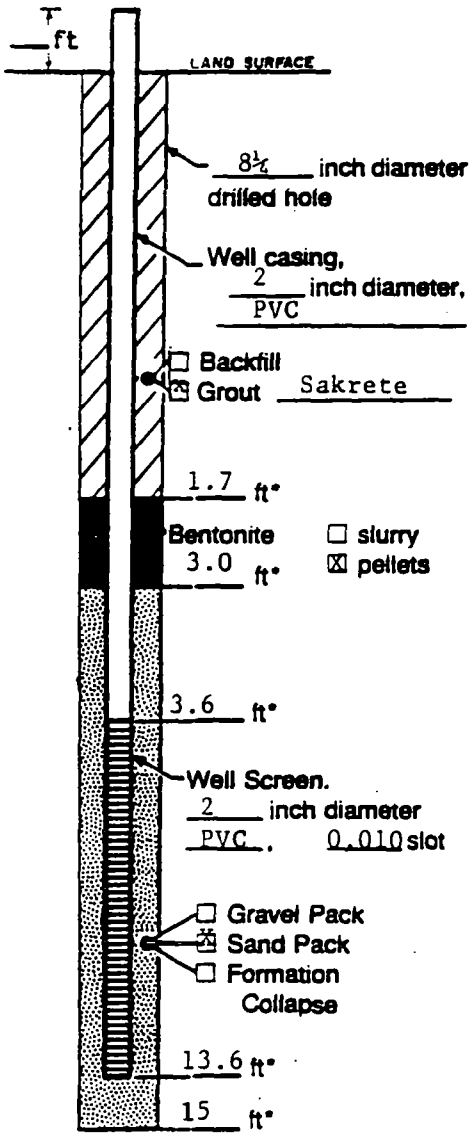
Ground-Water Consultants

ORIGINAL (Red)

WELL CONSTRUCTION LOG

Flush Mount



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-20
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 108.43 feet ☒ surveyed ☐ estimated
Installation Date(s) 9-14-90
Drilling Method Hollow Stem Auger
Drilling Contractor NA
Drilling Fluid

Development Techniques(s) and Date(s)
Developed 10-16-90, bailed with a bottom filling bailer

Fluid Loss During Drilling NA gallons
Water Removed During Development 20 gallons
Static Depth to Water 4.38 feet below M.P.
Pumping Depth to Water feet below M.P.
Pumping Duration hours
Yield gpm Date
Specific Capacity gpm/ft
Well Purpose Monitor water quality

Remarks Washed augers prior to setting well

Prepared by J. Owsiany

1/86

GERAGHTY & MILLER, INC.
Ground-Water Consultants

ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-20B Project/No. Norfolk Gas Plant/MD057.03 Page 1 of 2

Site Location Norfolk, VA Drilling Started 09/20/90 Drilling Completed 9/21/90

Total Depth Drilled 49 feet Hole Diameter 10/6 inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 24" X 2" Sampling Interval Various feet

Land-Surface Elev. 108.56 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used Hydrant water and quik gel Drilling Method Mud rotary

Drilling Contractor Hardin-Huber, Inc. Driller Royce Helper Don

Prepared By J. Owsiany Hammer Weight 140 Hammer Drop 30 inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Road ballast
			Fill, bricks, cinders
		5-1 1-1	
5		4-2 3-2	Fine to medium sand, little silt, thin clay lenses; grey; moist
		5-7 7-7	
10		4-3 3-2 WOH 6-1 1-1	
15		1-1 1-1	Fine sand and silt, little clay; wet; grey
			Silty clay; grey; wet
20		1-1 1-2	Lenses with trace fine sand
25		2-2 2-1	Fine sand lens, shell fragments
30		5-5 8-9 6-8 11-10	Fine to medium sand, little silt and clay; grey with rust mottling
35			

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ORIGINAL (Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-20B

Prepared By J. Owsiany

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35		22-26 30-33	Loss of clay component; grey-green
40		9-11 22-28 10-14 14-25	Fine sand and silt; trace clay; shell fragments; grey-green
45		9-10 11-15 12-16 27-31	
50			Bottom of boring
55			
60			
65			
70			
75			

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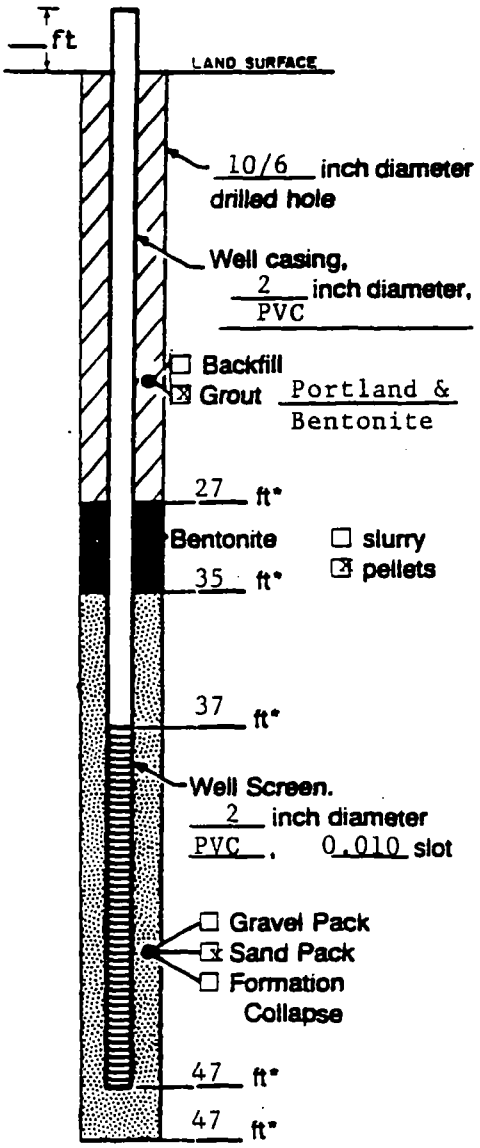
ORIGINAL (Red)

WELL CONSTRUCTION LOG

Flush Mount



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-20B
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 108.56 feet ☒ surveyed ☐ estimated
Installation Dates(s) 9-20-90/9-21-90
Drilling Method Mud Rotary
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid Quik-Gel & Hydrant Water

Development Techniques(s) and Date(s)
Developed on 10-17-90, alternately surging and bailing well

Fluid Loss During Drilling None detected gallons
Water Removed During Development 40 gallons
Static Depth to Water _____ feet below M.P.
Pumping Depth to Water _____ feet below M.P.
Pumping Duration _____ hours
Yield _____ gpm Date _____
Specific Capacity _____ gpm/ft
Well Purpose Monitor water quality

Remarks

Prepared by J. Owsiany

Note: 6-inch diameter steel casing from 0-34 feet. 10-inch diameter borehole from 0-34 feet.

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Ground-Water Consultants

PFE ORIGINAL (RED)

SAMPLE/CORE LOG

Boring/Well MW-21 Project/No. Norfolk Gas Plant/MD057.03 Page 1 of 1

Site Location Norfolk, VA Drilling Started 2/20/91 Drilling Completed 2/20/91

Total Depth Drilled 15 feet Hole Diameter 8¼ inches Type of Sample/ Coring Device

Length and Diameter of Coring Device Sampling Interval feet

Land-Surface Elev. 108.88 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Hardin-Huber, Inc. Driller Royce Helper Doug

Prepared By J. Owsiany Hammer Weight Hammer Drop inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			No samples collected, see log for MW-21B
5			
10			
15			
20			
25			
30			
35			

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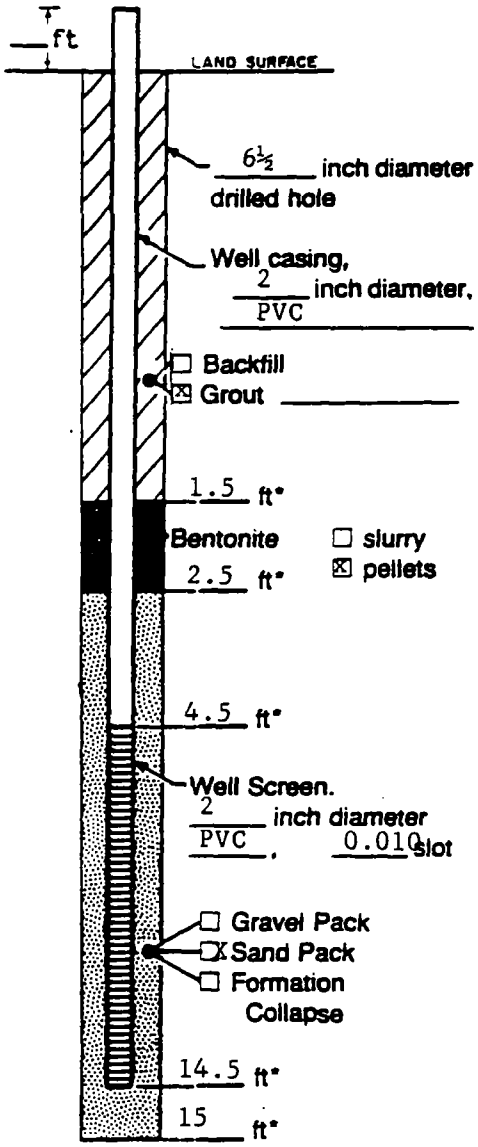
PFE
ORIGINAL (Red)

WELL CONSTRUCTION LOG

Flush Mount



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-21
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 108.88 feet ☒ surveyed ☐ estimated
Installation Dates(s) 2-20-90
Drilling Method Hollow Stem Auger
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid NS

Development Techniques(s) and Date(s)
Bailed 30 gallons, with bottom filling bailer; 3-4-91

Fluid Loss During Drilling NA gallons
Water Removed During Development 30 gallons
Static Depth to Water 4.29 feet below M.P.
Pumping Depth to Water _____ feet below M.P.
Pumping Duration _____ hours
Yield _____ gpm Date _____
Specific Capacity _____ gpm/ft
Well Purpose Monitor shallow ground-water quality

Remarks

Prepared by J. Owsiany

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Ground-Water Consultants

PEE ORIGINAL (Red)

SAMPLE/CORE LOG

Boring/Well MW-21B Project/No. Norfolk Gas Plant/MD057.03 Page 1 of 2

Site Location Norfolk, VA Drilling Started 2/19/91 Drilling Completed 2/21/91

Total Depth Drilled 48 feet Hole Diameter 12.5/6.5 inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 24" X 2" Sampling Interval 5 feet

Land-Surface Elev. 108.76 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used Quik Gel and Hydrant water Drilling Method Mud Rotary

Drilling Contractor Hardin-Huber, Inc. Driller _____ Helper _____

Prepared By J. Owsiany Hammer Weight _____ Hammer Drop _____ inches

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
0			Fill
5	X	4-5 5-8	Fine sand, trace silt; orange/yellow wet
10	X	2-2 3-3	
15	X	1/12 1-2	Clay, little to trace silt, pockets of shell fragments and root traces; grey; moist
20	X	3-3 3-2	
25	X	2-2 2-2	
	X	2-2 2-2	
30	X	2-2 2-2	
35	X	4-8	Medium sand, little to trace silt; grey; wet

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Ground-Water Consultants

PEE
ORIGINAL
(Red)

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-21B

Prepared By J. Owsiany

Depth (feet)	Interval Sampled	Blows per 6 inches	Description
35		8-29	Medium sand, little to trace silt; grey; wet
		19-11	
40		12-9	
		25-5	
		36-12	
45		9-10	Fine sand and silt, trace clay, abundant shell fragments; grey/green; wet
		10-10	
50			Bottom of boring
55			
60			
65			
70			
75			

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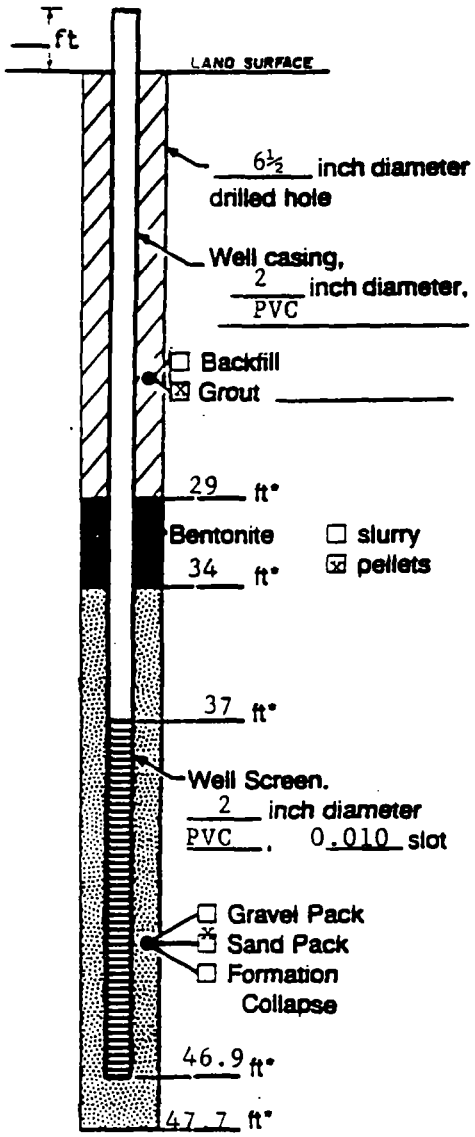
Ground-Water Consultants

WELL CONSTRUCTION LOG

Flush Mount



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk Gas Plant Well MW-21B
Town/City Norfolk
County City of Norfolk State VA
Permit No. NA
Land-Surface Elevation and Datum 108.76 feet ☒ surveyed ☐ estimated
Installation Dates(s) 2-21-91
Drilling Method Mud Rotary
Drilling Contractor Hardin-Huber, Inc.
Drilling Fluid National Bentonite and hydrant water

Development Techniques(s) and Date(s)
Surged and bailed with a bottom filling bailer

Fluid Loss During Drilling None detected gallons
Water Removed During Development 75 gallons
Static Depth to Water 9.83 feet below M.P.
Pumping Depth to Water _____ feet below M.P.
Pumping Duration _____ hours
Yield _____ gpm Date _____
Specific Capacity _____ gpm/ft
Well Purpose Monitor deep water quality

Remarks

Prepared by J. Owsiany

Note: 12.5 inch diameter borehole and 6-inch diameter steel casing from 0-31.5 feet

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

ORIGINAL (Red) ORIGINAL

Boring/Well MW-22 Project/No. Norfolk MD057.08 Page 1 of 1

Site Location Norfolk MGP Drilling Started 3·3·93 Drilling Completed 3·3·93

Total Depth Drilled 15 feet Hole Diameter 6 5/8 inches Type of Sample/Coring Device N/A

Length and Diameter of Coring Device N/A Sampling Interval N/A feet

Land-Surface Elev. 111.09 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used N/A Drilling Method H.S.A

Drilling Contractor EDI Driller HAUGE Helper DATZ

Prepared By J.H. ELSTNER Hammer Weight N/A Hammer Drop N/A inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	3			fill, medium sand + gravel, undense
				gets black stain at 2.5 some odor
3	5			rubble fill, brick fragments, black, oily.
5	11			medium sandy fill w/ gravel oily, saturated w/ product,
11	15			brown clay, product stained moderate odor

G&M Form 03 6-86 Southprint 89-1257

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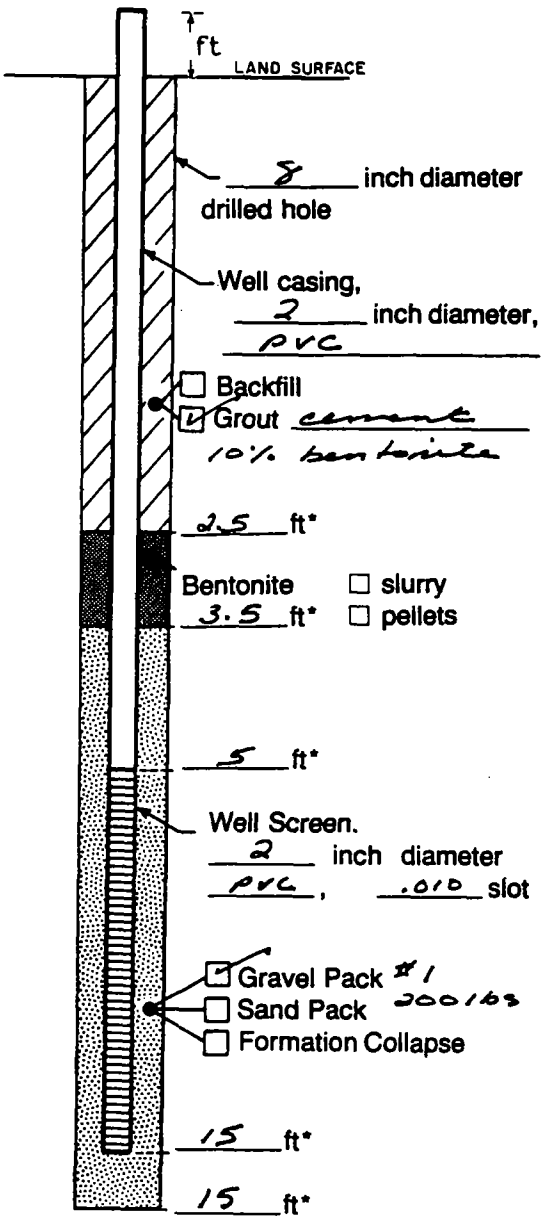
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Norfolk MD 05208 Well MW-22
Town/City Norfolk
County N/A State VA
Permit No. N/A
Land-Surface Elevation
and Datum - - feet ☒ Surveyed
TOC 111.09 ☐ Estimated
Installation Date(s) 3/3/93
Drilling Method H.S.A
Drilling Contractor EDE
Drilling Fluid N/A

Development Technique(s) and Date(s)
N/A
WAS NOT DEVELOPED

Fluid Loss During Drilling N/A gallons
Water Removed During Development Ø gallons
Static Depth to Water 8.50 3.11.93 feet below M.P.
Pumping Depth to Water N/A feet below M.P.
Pumping Duration N/A hours
Yield N/A gpm Date N/A
Specific Capacity N/A gpm/ft
Well Purpose MONITORING/OBSERVATION WELL

Remarks

Prepared by J.H ELSTNER

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

ORIGINAL (Red) ORIGINAL (Red)

Boring/Well RW-23 Project/No. MD 057.08 Page 1 of 1

Site Location Norfolk GAS PLANT Drilling Started 3·10·93 Drilling Completed 3·10·93

Total Depth Drilled 14 feet Hole Diameter 10 inches Type of Sample/ Coring Device N/A

Length and Diameter of Coring Device N/A Sampling Interval N/A feet

Land-Surface Elev. 111.65 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used N/A Drilling Method H.S.A.

Drilling Contractor EDI Driller HAUGE Helper DATE

Prepared By J.H. ELSTNER Hammer Weight N/A Hammer Drop N/A inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	3			rubble fill, some difficulty getting through
3	8			rubber and debris, some wood silty sandy fill
				produced saturation, BLACK below 6'
8	14			same as above less rubble + wood

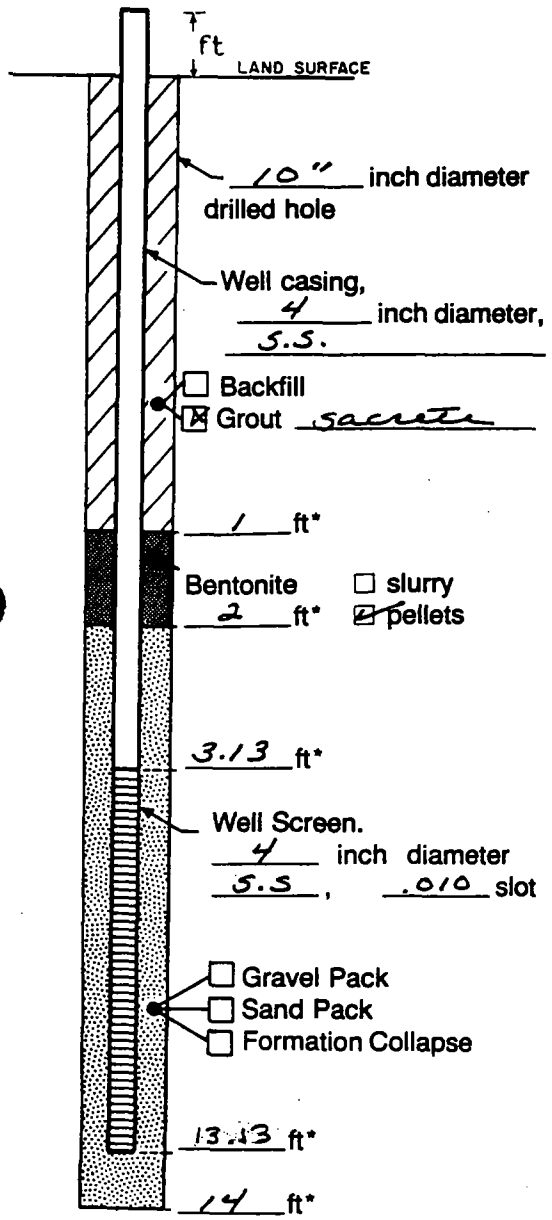
G&M Form 03 6-86

Southprint 89-1257

GERAGHTY & MILLER, INC.
Environmental Services

ORIGINAL (Red)

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project MD 057.08 Well RW-23
Town/City Norfolk MGP
County N/A State Virginia
Permit No. N/A
Land-Surface Elevation and Datum 111.65 feet ☒ Surveyed ☐ Estimated
Installation Date(s) 3.10.93
Drilling Method Hollow Stem Auger 10" OD.
Drilling Contractor EDI
Drilling Fluid N/A

Development Technique(s) and Date(s)
submersible + centrifugal pump
surge block

Fluid Loss During Drilling N/A gallons
Water Removed During Development Approx 2700 gallons
Static Depth to Water 9.22 on 3.11.93 feet below M.P.
Pumping Depth to Water 9.02 feet below M.P.
Pumping Duration 1 hours
Yield > 9 gpm Date 3.12.93
Specific Capacity 45 gpm/ft
Well Purpose recovery of shallow zone

Remarks discharge was 10% product at end of development
final pH 6.71
Temp 13.5°C
Cond 760 micromhos/inch
eh 006

Prepared by J.H. ELSTNER

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

ORIGINAL RECORD

Boring/Well RW-24B Project/No. MD 057.08 Page 1 of

Site Location Norfolk MGP Drilling Started 3.9.93 Drilling Completed 3.11.93

Total Depth Drilled 54 feet Hole Diameter 10" inches Type of Sample/Coring Device split spoons

Length and Diameter of Coring Device 24 inches / 2 inches Sampling Interval 2 feet

Land-Surface Elev. 110.30 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used bentonite mud slurry Drilling Method DIRECT ROTARY

Drilling Contractor EDI Driller Hauge Helper Dave

Prepared By J. H. ELSNER Hammer Weight 140 lbs Hammer Drop 40 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	36			no samples collected see logs for nearby well MW-13, 13B, 13C
36	38	2'	1,2,1,3	Brown stained dark gray clay product visible in voids 35 ppm off sample
38	40	2'	2,2,3,4	same as above 42 ppm off sample
40	42	1.8'	3,2,3,4	same as above more product 58 ppm off sample
42	44	2'	4,11,50/4"	silty dark gray med. silty sand at 43
				hard, less product 0 ppm of sample
44	46	ø	33,33,41,50	no recovery, hard, sounds like gravel
46	48	6"	39,40,40,38	clay and gravel, sub angular - rounded thumbnail size - slight odor no product
48	50	15"	46,50,49,30	clay and gravel finger nail size, rounded to sub angular slight odor 0 ppm off sample
				49.5' medium, green clayey sand
50	52			med green clayey sand slight odor 0 ppm off sample

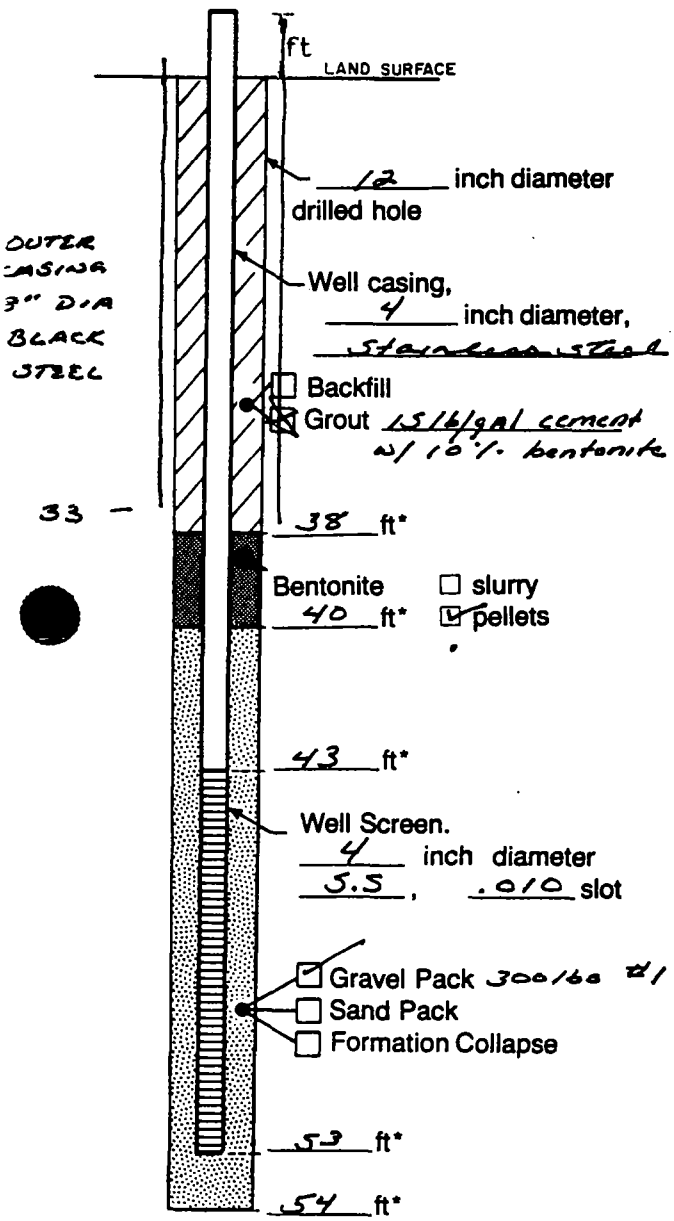
G&M Form 03 6-86

Southprint 89-1257

GERAGHTY & MILLER, INC.
Environmental Services

ORIGINAL (Red)

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project MD057.08 Well RW-24B
Town/City Norfolk
County N/A State Virginia
Permit No. N/A
Land-Surface Elevation
and Datum _____ feet ☒ Surveyed
TOC 110.30 ☐ Estimated
Installation Date(s) 3.9.93 - 3.11.93
Drilling Method AUGER TO 33 / DIRECT MUD ROTARY
Drilling Contractor EDI
Drilling Fluid bentonite mud slurry
very light in screened interval
Development Technique(s) and Date(s)
submersible pump
surge block

Fluid Loss During Drilling <5 gallons
Water Removed During Development approx. 400 gallons
Static Depth to Water 13.93 on 3.11.93 feet below M.P.
Pumping Depth to Water 31.30 feet below M.P.
Pumping Duration 2 hours
Yield 2 gpm Date 3.11.93
Specific Capacity .063 gpm/ft
Well Purpose recovery of deep zone

Remarks
maximum safe yield is to 2 gpm
discharge contained x5% product
at end of development

Prepared by J.H. ELSTNER

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

PEE ORIGINAL (Red) ORIGINAL (Red)

Boring/Well RN-25B Project/No. MD057.08 Page 1 of 1

Site Location Norfolk, VA Drilling Started 3-8-93 Drilling Completed 3-8-93

Total Depth Drilled 53 feet Hole Diameter pilot hole 4" 8 inches Type of Sample/Coring Device split spoons

Length and Diameter of Coring Device 2 foot / 2 inch diameter Sampling Interval selected feet

Land-Surface Elev. 110.25 feet ☒ Surveyed ☐ Estimated Datum Norfolk City

Drilling Fluid Used bentonite mud slurry Drilling Method Direct mud rotary

Drilling Contractor EDI Driller S. HAUGE Helper B. DATZ

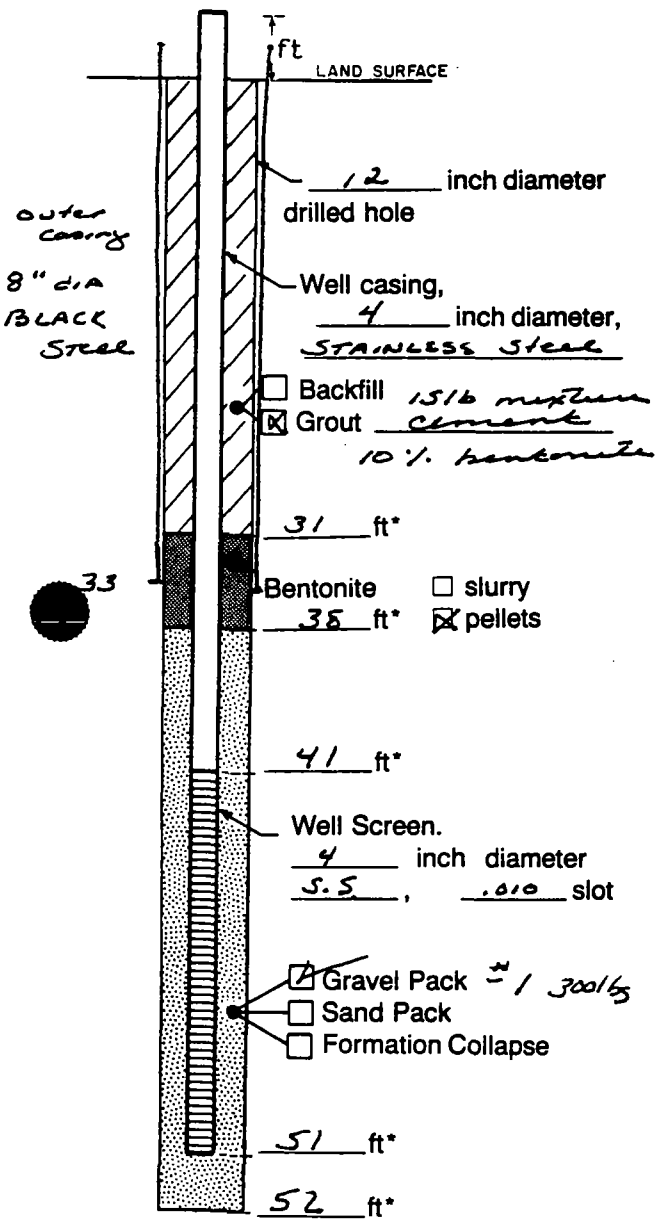
Prepared By JH ELSTOAR Hammer Weight 140 lbs Hammer Drop 40" inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	5			fill, medium sand + gravel; red brick fragments, ash + cinders
5	11			debris fill, red brick fragments concrete - sand + clay
				makes product from 6-11 ft on mudpit
11	27			Blue gray silty clay, some fine sand ~~5 making no product~~
				slight odor
27	29	24"	4,5,4,4	Blue gray silty fine sand and clay. sticky and tight. stained brown
				from contaminants. slight odor
29	30	8"	6, 8	same as above
30	31	1'	11, 18	brown clay
31	36			blue, brown clay - no sample taken
36	38		HAMMER 1,1,1,1 WEIGHT	blue gray clay w/ increasing silt slight odor, no visible staining
38	40		4,4,3,6	clay, less silt, soft and pliable slight odor
40	42		3,6,17,32	TO 40' same as above
				41' clay and med to fine sand, stained moderate odor 1.1 ppm 1 inch from TIP
42	44		15,17,14,14	med well sorted sand but dirty dark to light gray w/ brown stainins
				vigorous odor 7.1 ppm 1 inch from TIP saturated with product
44	46		6,3,5,7	no recovery in spoon
46	48	1'	9,17,20,22	hard packed f-med silty sand dark gray, slight odor 0 ppm off spoon
48	50	1'	3,4,6,9	f-med silty sand w/ angular gravel small fingernail size and smaller
50	52			very silty dark gray sand, hard + tight some angular gravel thumbnail size

GERAGHTY & MILLER, INC.
Environmental Services

PFE ORIGINAL (ORIGINAL) (Red)

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project MD 057.08 Well RW-25B

Town/City Norfolk MGP

County N/A State Virginia

Permit No. N/A

Land-Surface Elevation

and Datum - - feet ☒ Surveyed

TOC 110.25 ☐ Estimated

Installation Date(s) 3.5.93 TO 3.8.93

Drilling Method MUD ROTARY (DIRECT)

Drilling Contractor EDI

Drilling Fluid Bentonite mud slurry

very light in screened zone

Development Technique(s) and Date(s)

submersible pump

surge block

Fluid Loss During Drilling < 5 gallons

Water Removed During Development approx 700 gallons

Static Depth to Water 11.88 3.12.93 feet below M.P.

Pumping Depth to Water 30.05 feet below M.P.

Pumping Duration 1 hours

Yield 2.5 gpm Date 3.10.93

Specific Capacity .13 gpm/ft

Well Purpose DEEP MONITORING AND POTENTIAL RECOVERY / FLOW CONTROL

Remarks suspected cope 24 hour yield 2gpm

well discharges 10% product at end of development

Prepared by J. H. ELSTNER

PFL
ORIGINAL
(Red)

APPENDIX D

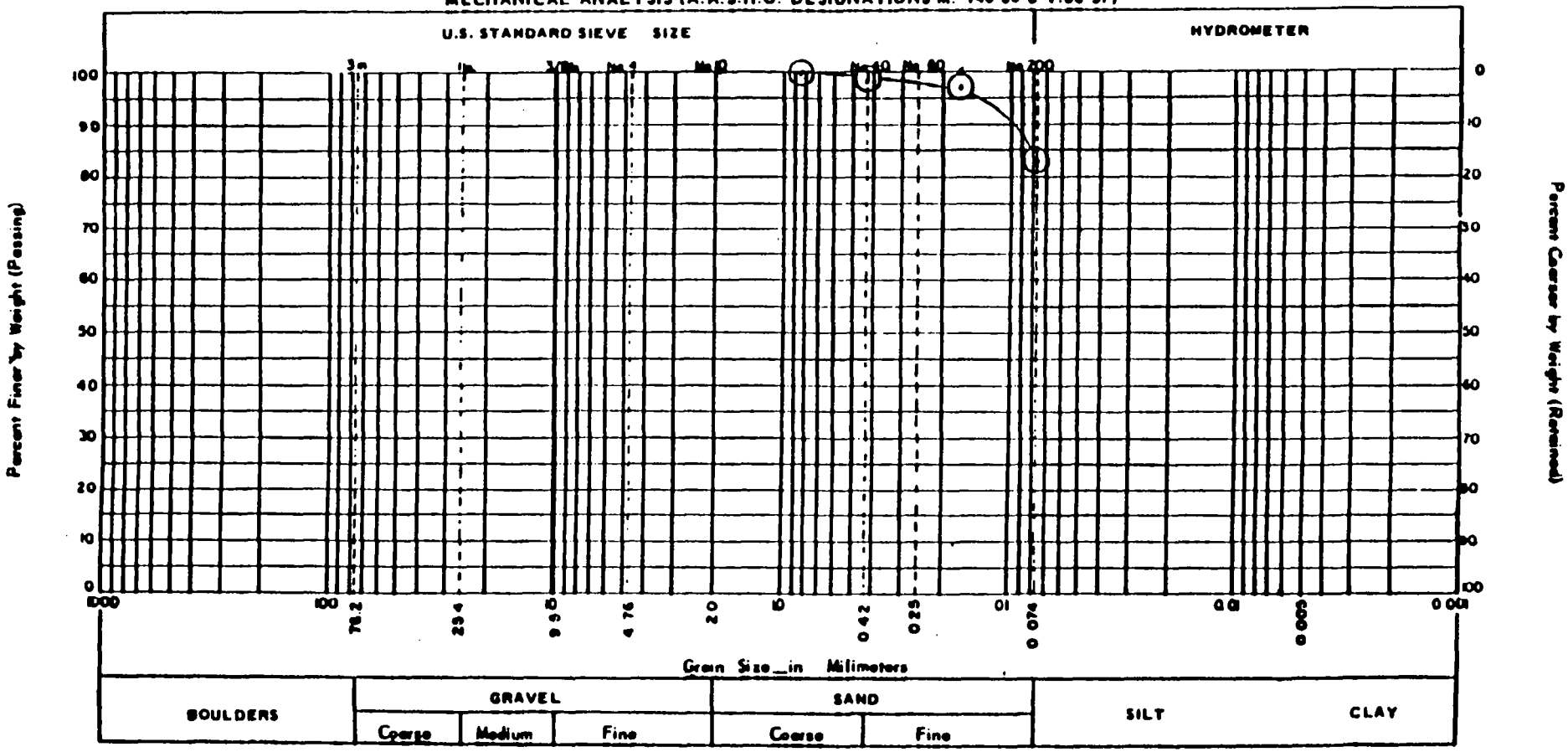
PFE
ORIGINAL

APPENDIX D

GEOTECHNICAL TEST RESULTS

PROJECT:		LOCATION:	
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
MW-3	Clay	20.0'-22.0'	89367

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900021	60.3	30	19	11		CL	

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Consulting Engineers

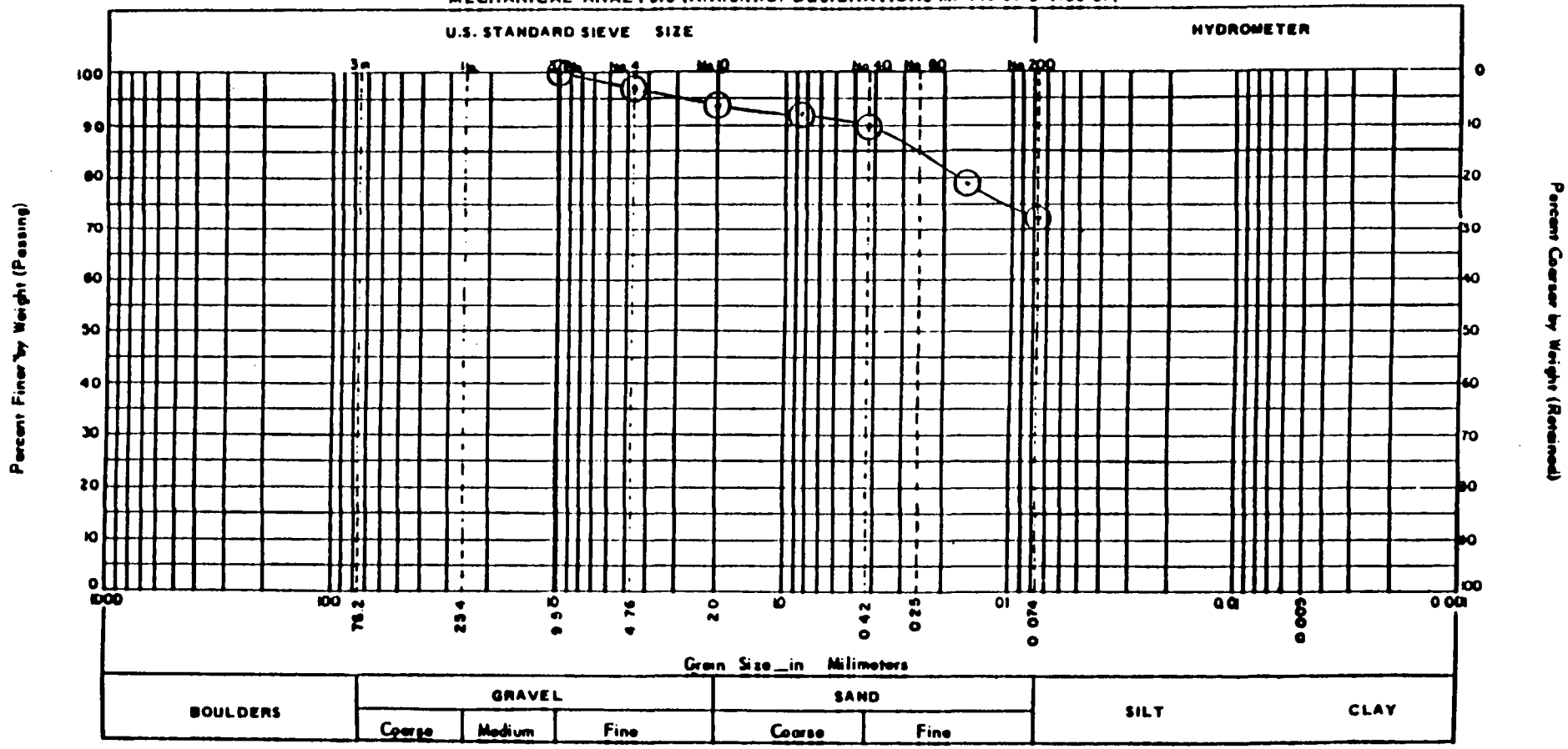
MATERIALS TESTING,
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

ORIGINAL (Red)

PROJECT:		LOCATION:	
GERAGHTY & MILLER			
BORING NO. B-7	SAMPLE NO. Clay	DEPTH: 20.0'-27.0'	CONTRACT NO. 89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900023	42.9	32	22	10		CL	MATERIAL COARSE
							THEN #40 SCREEN
							PRIMARILY SHELLS

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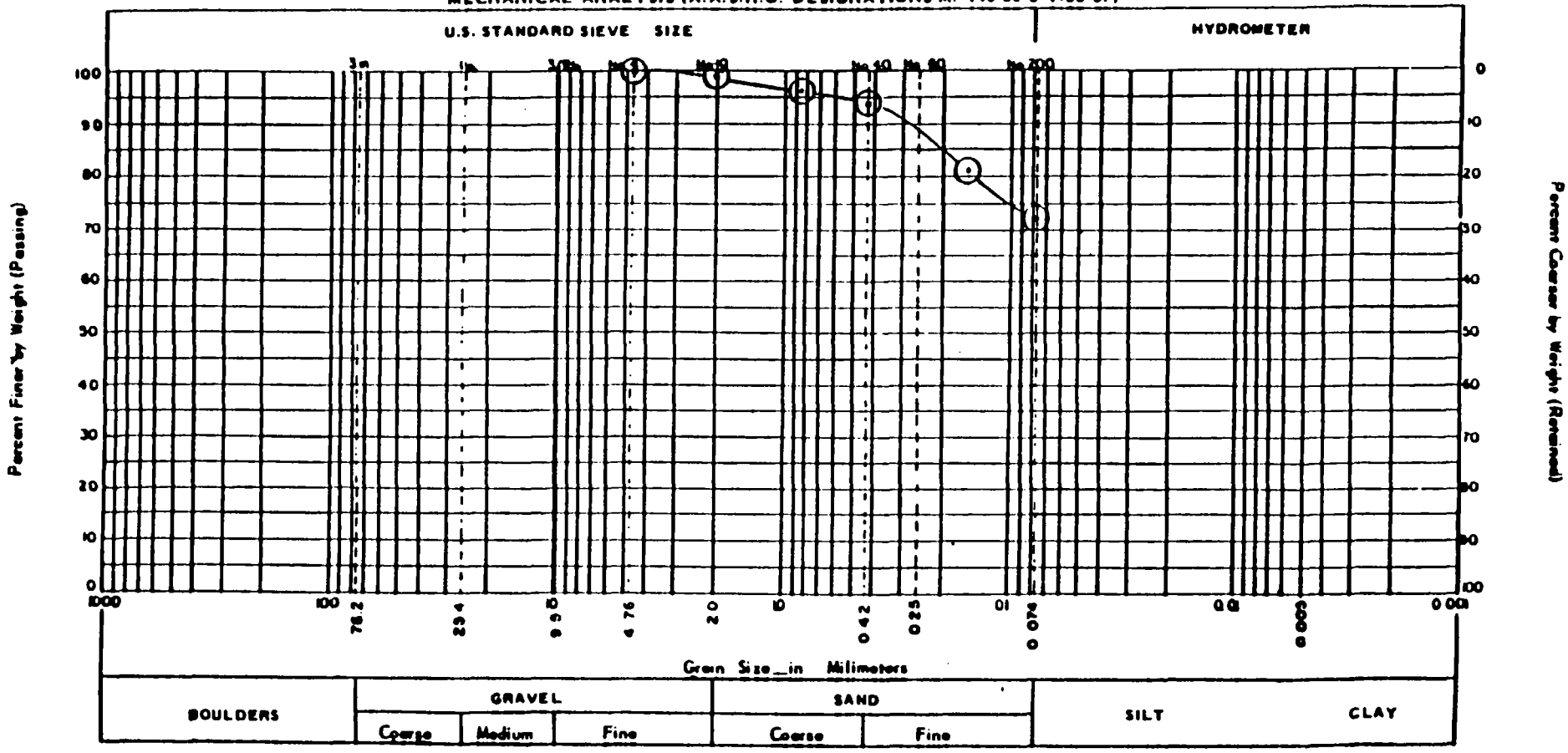
MATERIALS TESTING,
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

PROJECT:	LOCATION:		
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
MW-1	Clay	20.0'-27.0'	89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900020	54.1	34	23	11		CL	MATERIAL COARSER
							THAN #40 SCREEN
							PRIMARILY SHELLS

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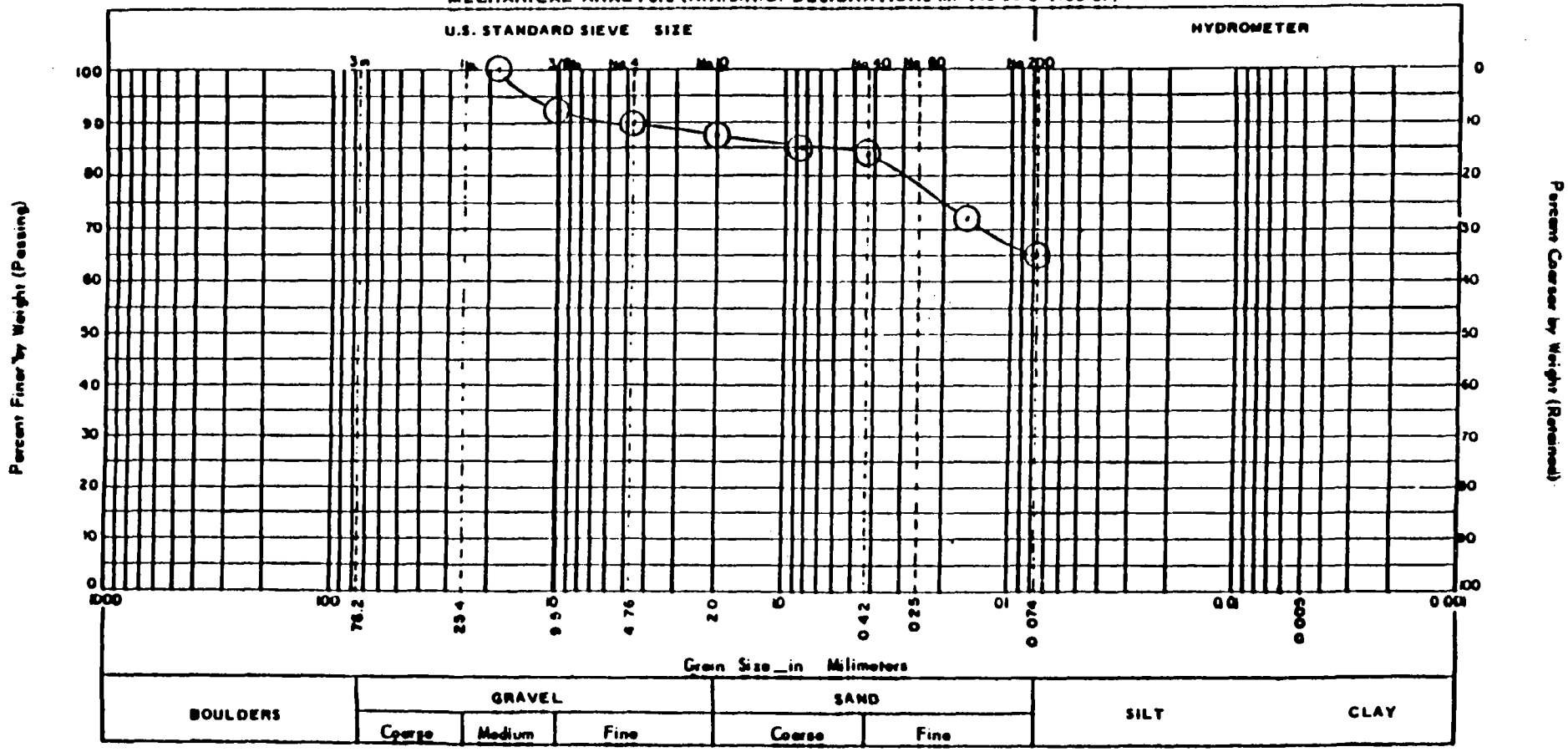
MATERIALS TESTING,
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

ORIGINAL

PROJECT:		LOCATION:	
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
MW-6	Clay	20.0'-32.0'	89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900022	38.3	31	19	12		CL	MATERIAL COARSER THEN #40 SCREEN PRIMARILY SHELLS

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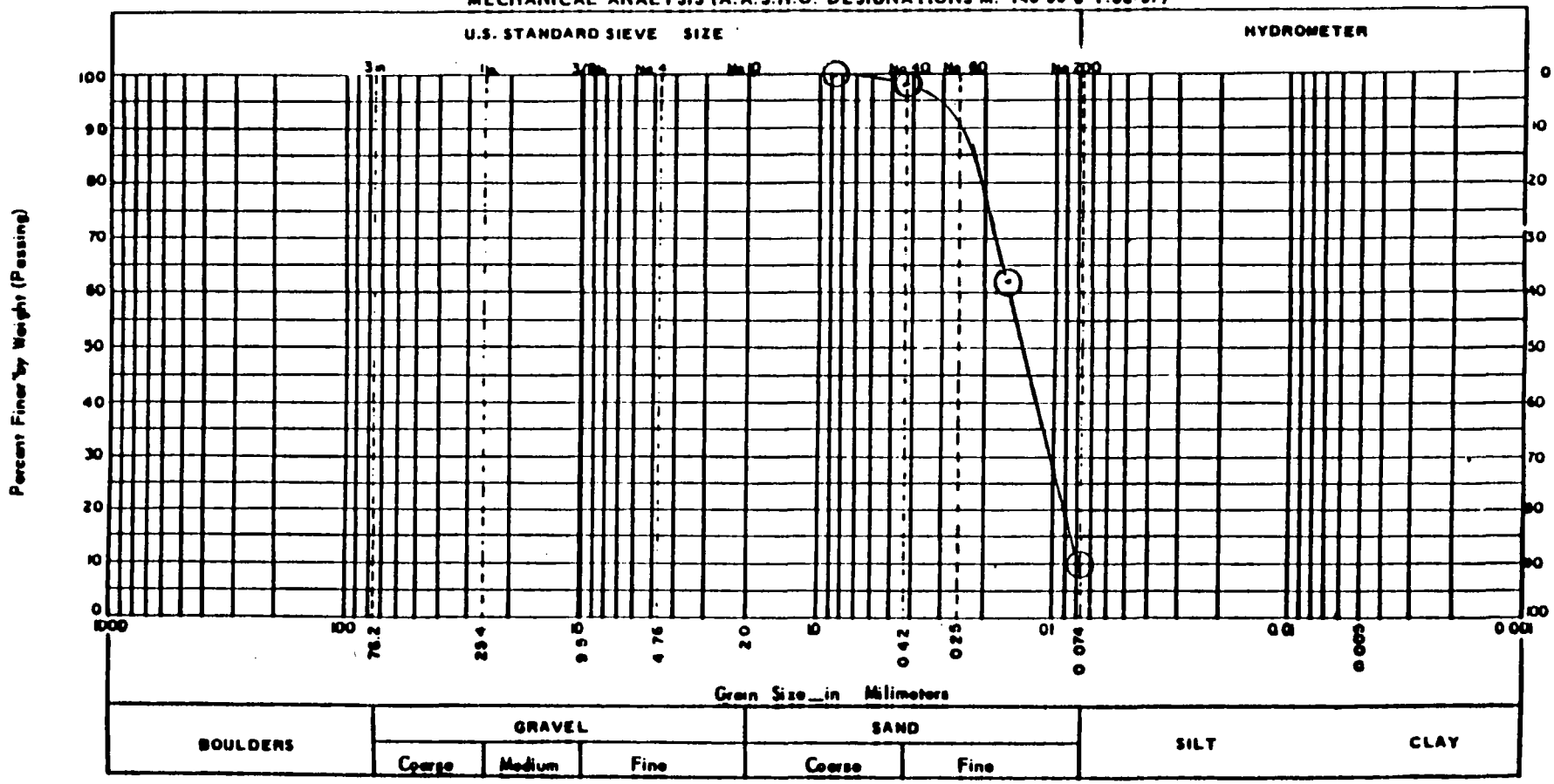
MATERIALS TESTING.
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

ORIGINAL

PROJECT:		LOCATION:	
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
MW-12	Sand	10.0'-14.0'	89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900018	23.1					(SP-SM)	

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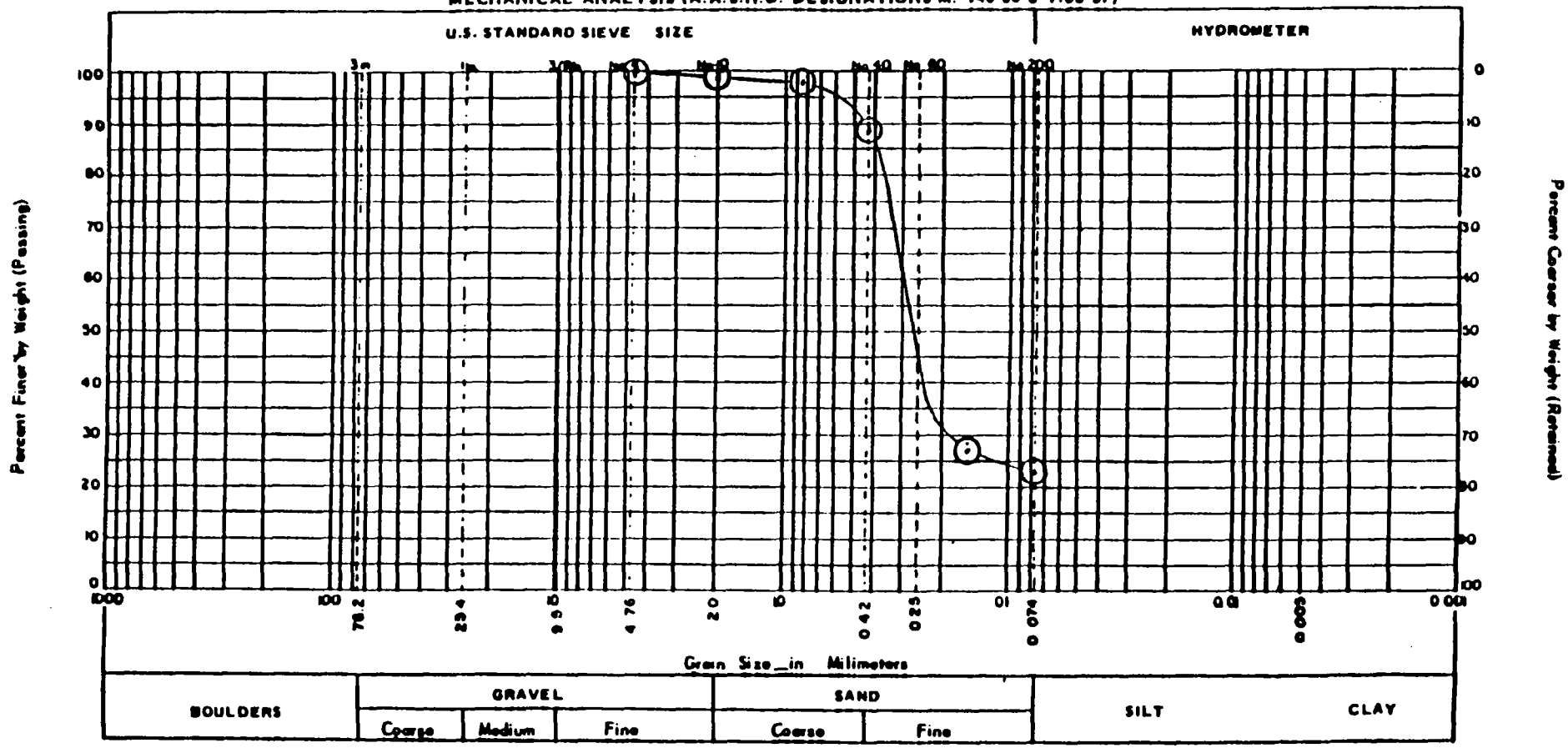
MATERIALS TESTING,
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

ORIGINAL (Red)

PROJECT:		LOCATION:	
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
B-7	Sand	8.0'-12.0'	89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900019	12.2					(SC)	

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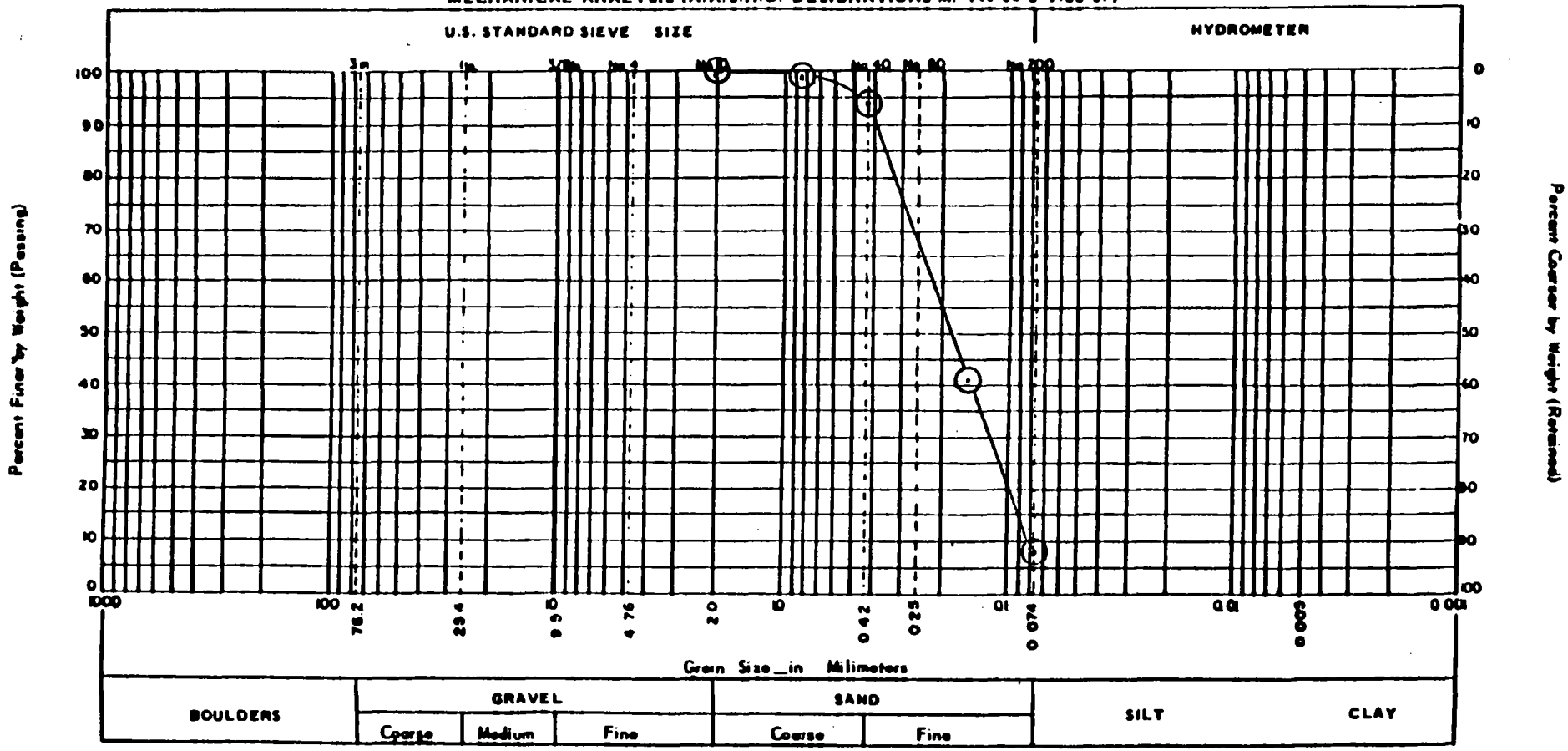
MATERIALS TESTING,
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

ORIGINAL

PROJECT:		LOCATION:	
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
MW-6	Sand	10.0'-14.0'	89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900017	22.5					(SP-SM)	

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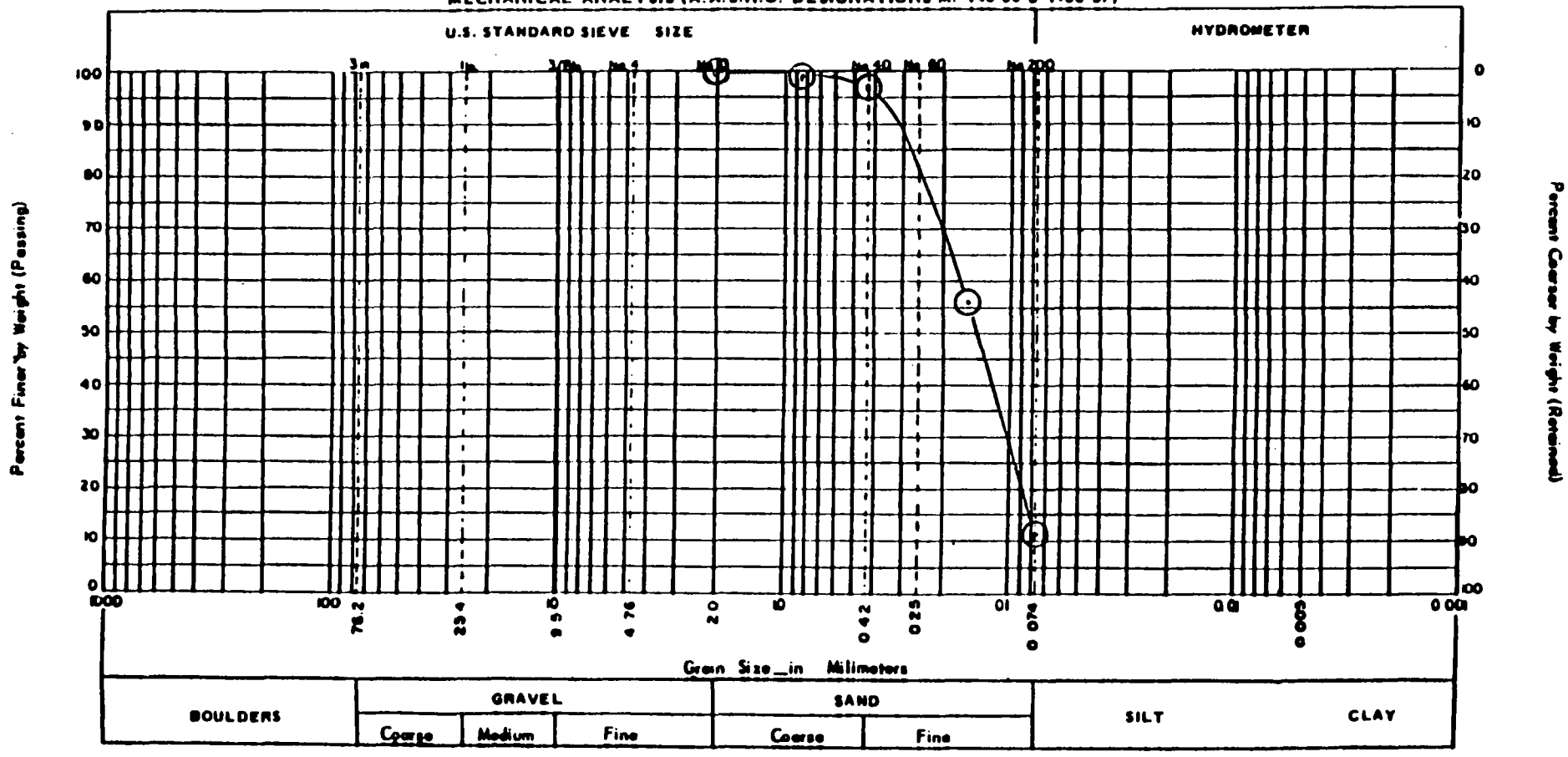
MATERIALS TESTING.
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

ORIGINAL

PROJECT:		LOCATION:	
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
MW-1	Sand	10.0'-14.0'	89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900016	22.8					(SM)	

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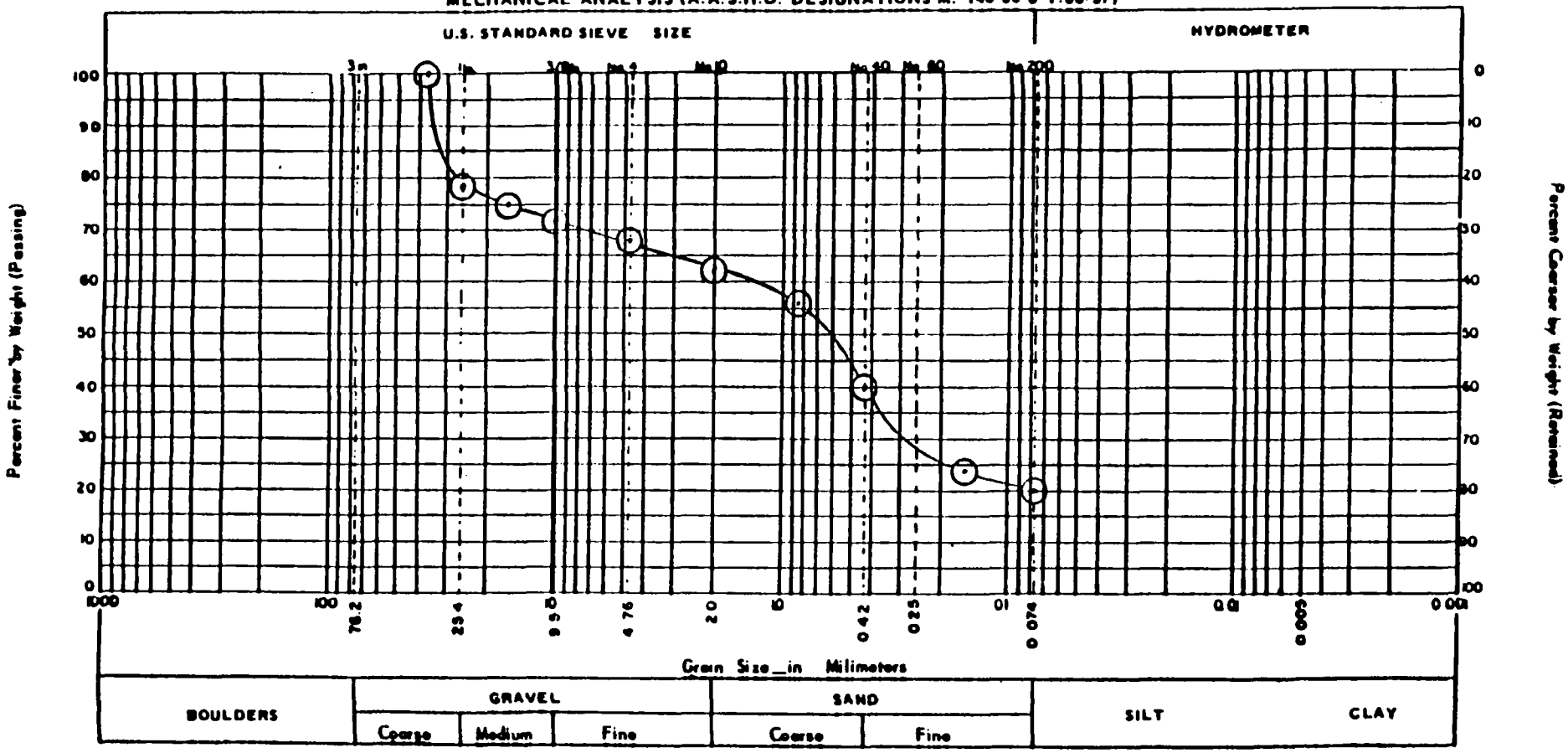
MATERIALS TESTING,
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

PROJECT:	LOCATION:		
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
MW-5	Fill	0.0'-4.0'	89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900025	24.4					(SM)	MATERIAL COARSER
							THEN #4 SCREEN
							WAS SLAG

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Consulting Engineers

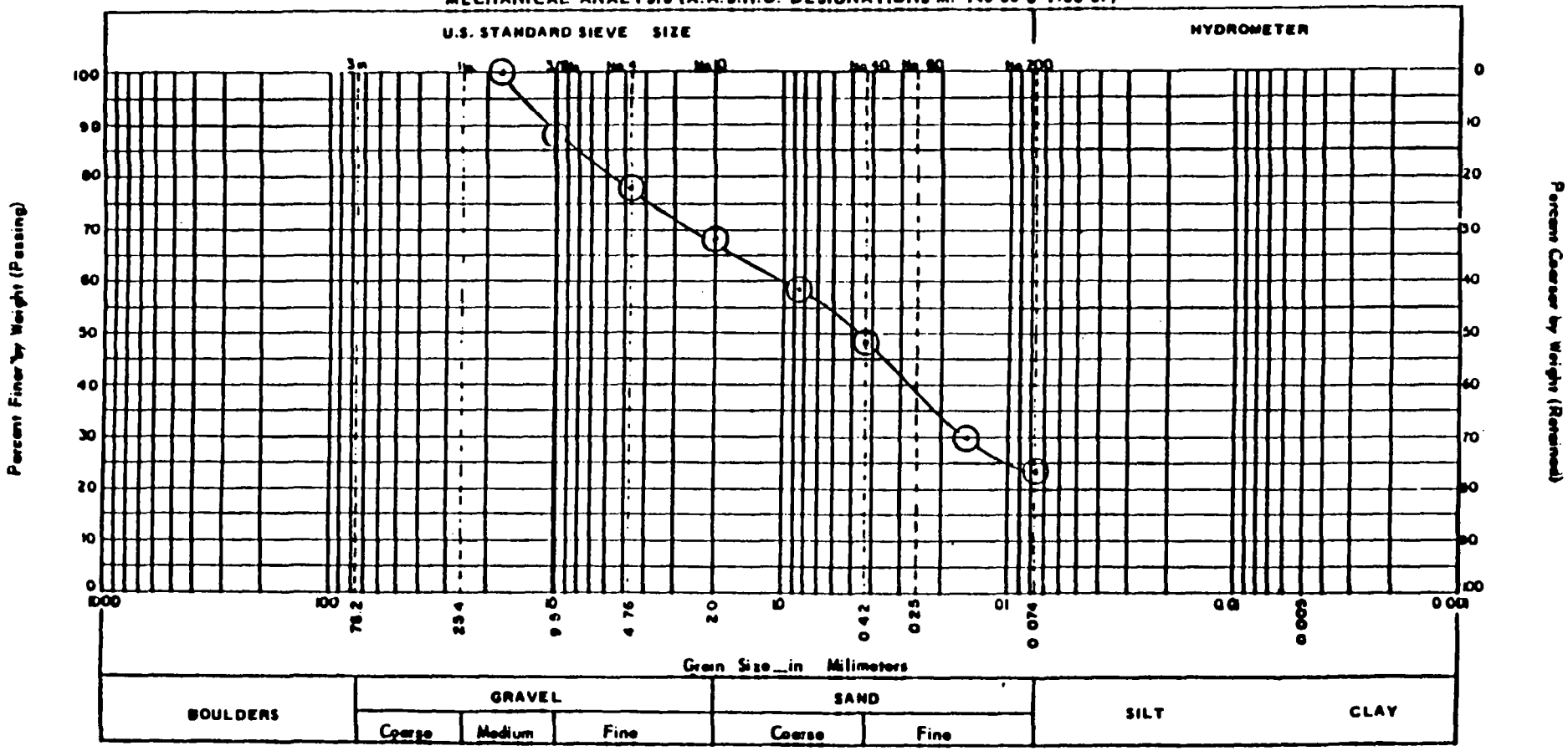
MATERIALS TESTING,
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

ORIGINAL (Red)

PROJECT:		LOCATION:	
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
MW-1	Fill	0.0'-6.0'	89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900024	31.0					(SM)	MATERIAL RETAIN-
							ED ON THE 3/8
							AND #4 SCREENS
							PRIMARILY WOOD
							CHIPS AND SLAG

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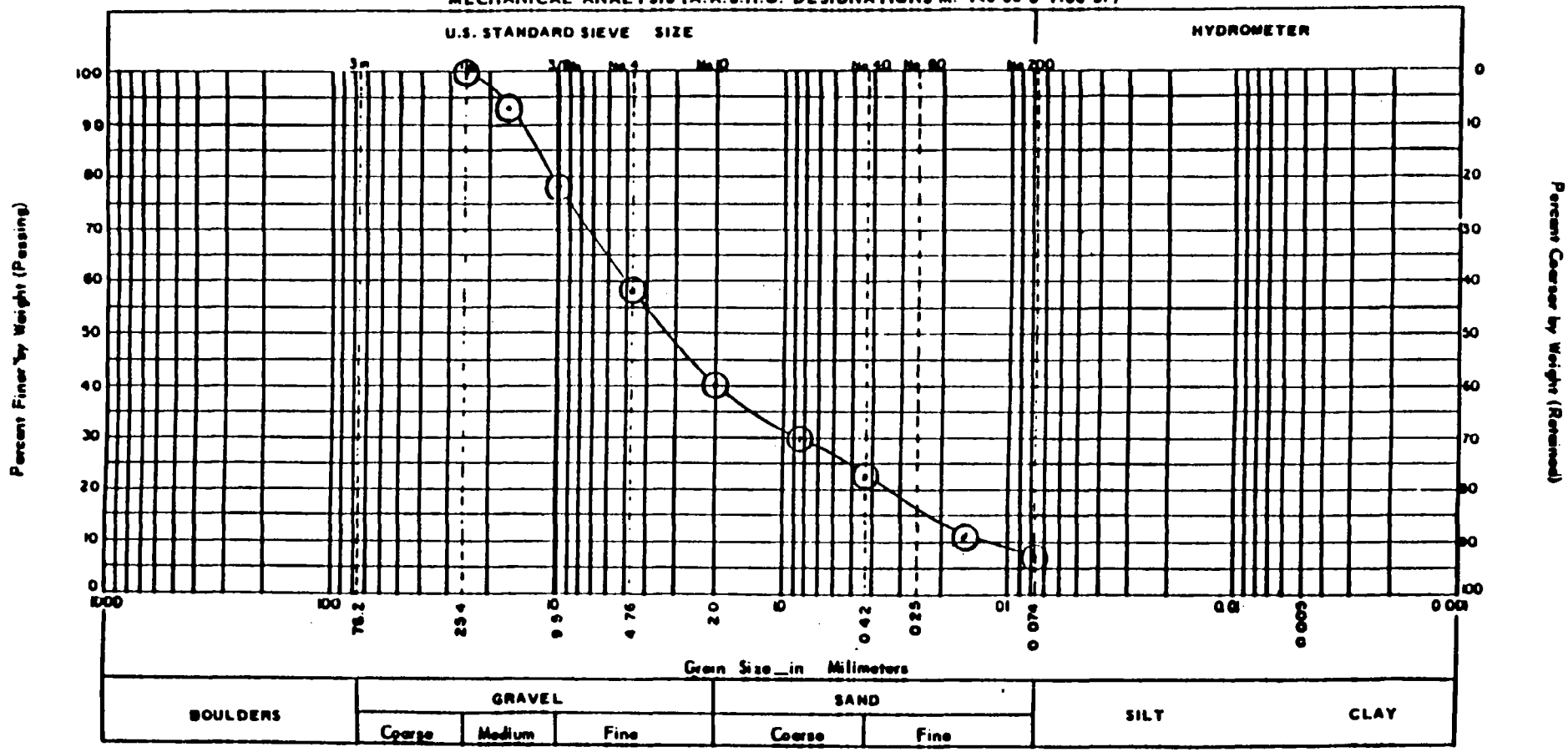
MATERIALS TESTING,
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

ORIGINAL (Red)

PROJECT:		LOCATION:	
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
MW-14	Fill	4.0'-6.0'	89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900027	31.0					(SW-SM)	MATERIAL
							PRIMARILY SLAG
						Cu= 41.7	
						Cc= 1.2	

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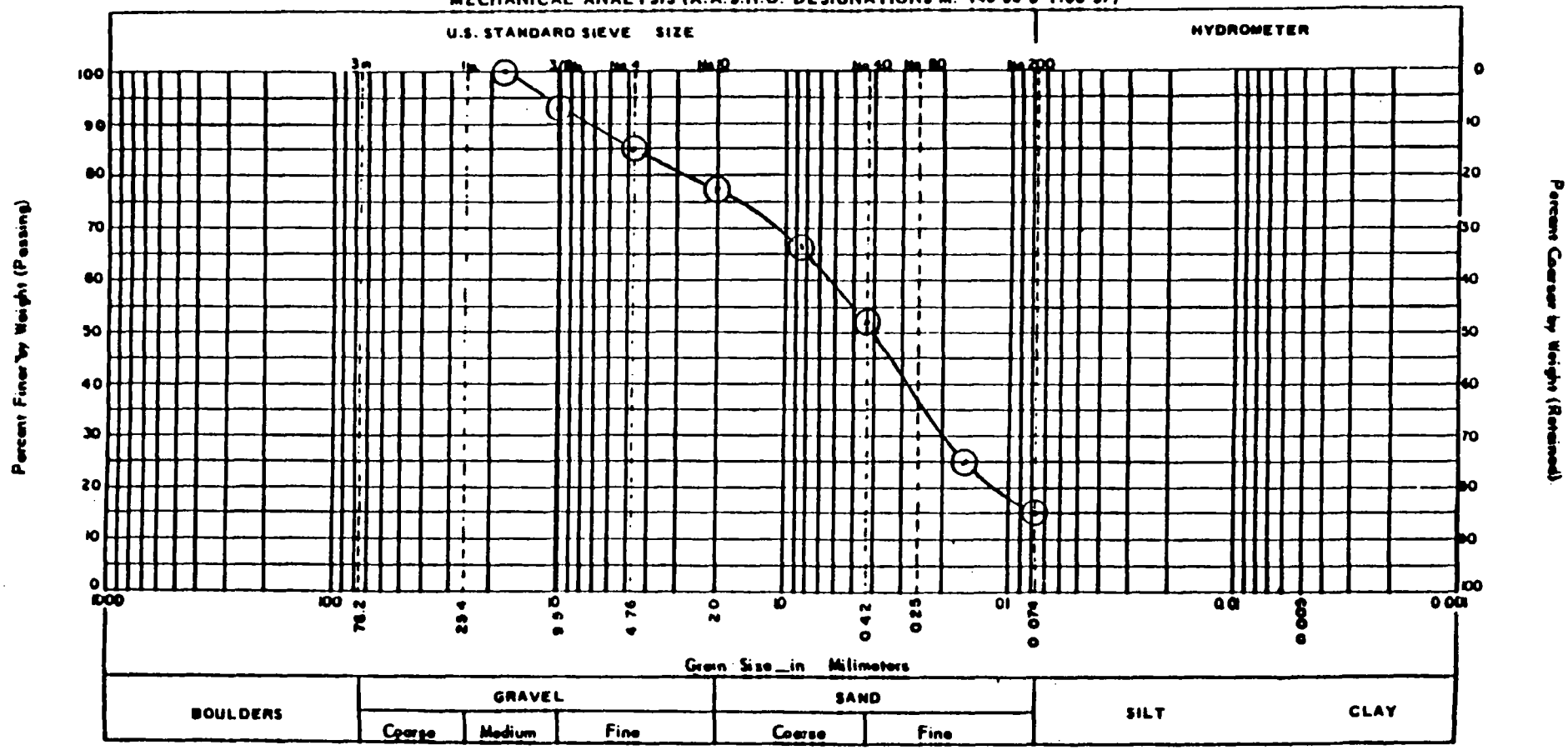
MATERIALS TESTING,
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

ORIGINAL

PROJECT:		LOCATION:	
GERAGHTY & MILLER			
BORING NO.	SAMPLE NO.	DEPTH:	CONTRACT NO.
MW-9	Fill	6.0'-10.0'	89362

MECHANICAL ANALYSIS (A.A.S.H.O. DESIGNATIONS M. 146-60 & T.88-57)



SAMPLE NO.	MOISTURE CONTENT	L.L.	P.L.	P.I.	CLASSIFICATION M.S.H.A.	CLASSIFICATION U.S.C.	REMARKS
900026	56.0					(SC)	MATERIAL COARSER
							THEN #20 SCREEN
							PRIMARILY
							ORGANICS

HARDIN - KIGHT ASSOCIATES, INC.
Consulting Engineers

MATERIALS TESTING,
SOILS AND FOUNDATIONS DIVISION

TESTED BY:	DATE:
J. PENN	JANUARY 1990
CHECKED BY:	SHEET NO. ____ OF ____

ORIGINAL

ORIGINAL

APPENDIX E

PFE
ORIGINAL
(Red)

APPENDIX E

GROUNDWATER SAMPLING LOGS

PEE
ORIGINAL
(Red)
ORIGINAL
(Red)

OCTOBER 1990

PFE ORIGINAL (Red)

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WATER SAMPLING LOG

Project/No. Vapco - City of Norfolk / 057.03 Page 1 of 1

Site Location Norfolk, Va.

Site/Well No. OW-1 Coded/ Replicate No. — Date 10/25

Weather Sunny Time Sampling Began 12:43 Time Sampling Completed 1:15

EVACUATION DATA

Description of Measuring Point (MP) 9th St & grandy St. (in Road)

Height of MP Above/Below Land Surface -2" MP Elevation —

Total Sounded Depth of Well Below MP 15 Water-Level Elevation 5.21'

Held _____ Depth to Water Below MP 5.21' Diameter of Casing 2"

Wet _____ Water Column in Well 9.79 Gallons Pumped/Bailed Prior to Sampling 5

Gallons per Foot 0.1632

Gallons in Well 1.6 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Bailed

SAMPLING DATA/FIELD PARAMETERS

Color ~~Black~~ opaque. Odor Black Appearance Cloudy Temperature 22° °F/°C

Other (specific ion; OVA; HNU; etc.) —

	pH	SP	T
0	7.09	11125	22°C
2	7.28	11000	22°C
4	7.23	11500	22°C
5	7.33	12500	22°C

Specific Conductance, umhos/cm 12500 pH 7.33

Sampling Method and Material Disp Bail / poly Rope

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
metals	500 ml plastic	HNO_3
Semi Vol.	1 L amber glass	NA
CN^- Total Free	1 L amber	NA / NaOH
VOA 602	40 ml glass vial	NA

Remarks Field Blank from MW-1

Sampling Personnel [illegible]

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

Cal. SP.
pH - 7.00

PFE

ORIGINAL (Red)

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WATER SAMPLING LOG

Project/No. md 057 03 / City of Norfolk Page 1 of 1

Site Location Norfolk, Va.

Site/Well No. MW-4 Coded/ Replicate No. — Date 10/26

Weather Rain 40s Time Sampling Began 10:30 Time Sampling Completed 11:00

EVACUATION DATA

Description of Measuring Point (MP) yellow 5' East of site TOC 211

Height of MP Above/Below Land Surface ≈2.5' MP Elevation —

Total Sounded Depth of Well Below MP 15' Water-Level Elevation —

Held ____ Depth to Water Below MP 5.8 Diameter of Casing 2"

Wet ____ Water Column in Well 9.2 Gallons Pumped/Bailed Prior to Sampling 5

Gallons per Foot .16

Gallons in Well 1.47 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Bail

SAMPLING DATA/FIELD PARAMETERS

Color Black Odor strong Appearance cloudy Temperature 20 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 975 pH 6.79

Sampling Method and Material disp. bailer/poly Rope

	DH	SC	TEMP
IN	6.55	950	20°C
3	6.58	975	20°C
10	6.67	975	19.5°C
5	6.79	975	19.5°C

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
VOA 602	40 ml glass vial	NA
metals	500 ml plastic	HNO_3
Sim Vol.	1 l amber glass	NA
CN Tot.	1 l amber	NA / NaOH to pH

Remarks —

Sampling Personnel D.C., JTP

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WATER SAMPLING LOG

Project/No. md 037.05 / City of Norfolk Page 1 of 1

Site Location Norfolk, Va.

Site/Well No. MW 4B Coded/ Replicate No. — Date 10/26/90

Weather Rain Time Sampling Began 10:00 Time Sampling Completed 11:00

EVACUATION DATA

Description of Measuring Point (MP) Brown 5" East on Site TOC 2"

Height of MP Above/Below Land Surface ≈2.5' MP Elevation —

Total Sounded Depth of Well Below MP 50' Water-Level Elevation —

Held ____ Depth to Water Below MP 15.9 Diameter of Casing 2"

Wet ____ Water Column in Well 35.6 Gallons Pumped/Bailed Prior to Sampling 20

Gallons per Foot .16

Gallons in Well 5.7 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method ____

SAMPLING DATA/FIELD PARAMETERS

Color white Odor NA Appearance cloudy Temperature ✓ °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 525 pH 7.9

Sampling Method and Material Dis. Bailer / Poly Rope

	pH	SP	Temp
IN	10.74	625	20°C
5	7.16	600	17
10	7.23	575	18°C
15	7.27	500	[illegible]
20	7.90	525	[illegible]

Constituents Sampled	Container Description From Lab ✓ or G&M ____	Preservative
VOA 602	40 ml Voa glass	NA
metals	500 ml plastic	HNO_3
Semi vol.	1 l amber	NA
CN^- total	1 l amber	NA / NaOH to pH

Remarks ____

Sampling Personnel D.O. / [illegible]

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

PFE
ORIGINAL

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WATER SAMPLING LOG

Project/No. MD 057.03/City of Norfolk. Page 1 of 1

Site Location Norfolk Va.

Site/Well No. MW-12 Coded/Replicate No. — Date 10/25

Weather cloudy Time Sampling Began 5:10 Time Sampling Completed 5:30

EVACUATION DATA

Description of Measuring Point (MP) TOC pvc 2"

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP 15 Water-Level Elevation —

Held ____ Depth to Water Below MP 6.31 Diameter of Casing 2"

Wet ____ Water Column in Well 8.69 Gallons Pumped/Bailed Prior to Sampling 7

Gallons per Foot .16

Gallons in Well 1.4 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Bail

SAMPLING DATA/FIELD PARAMETERS

Color Black/clear Odor odor Appearance turbid Temperature 20 °F/°C

Other (specific ion; OVA; HNU; etc.)

Specific Conductance, umhos/cm 925 pH 6.20

Sampling Method and Material Dis. Bail / poly Rope

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
VOA 602	40 ml glass vial	NA
metals	500 ml plastic	HNO_3
Semi Vol.	1 l amber glass	NA
CN^- total Sulf.	1 l amber	NA / NaOH in lab

Remarks Screen in filter had trace coal tar on it - after sampling methanol

Sampling Personnel TP DPD

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

PEE ORIGINAL

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WATER SAMPLING LOG

Project/No. Md 057.02 / City of Norfolk Page 1 of 1

Site Location Norfolk, Va.

Site/Well No. MW 13 Coded/ Replicate No. — Date 10/25

Weather pt cl Time Sampling Began 3:42 p. Time Sampling Completed 4:15

EVACUATION DATA

Description of Measuring Point (MP) 2' pvc TOC

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP 15 Water-Level Elevation —

Held ____ Depth to Water Below MP 7.10 Diameter of Casing 2"

Wet ____ Water Column in Well 7.9 Gallons Pumped/Bailed Prior to Sampling 6

Gallons per Foot .16

Gallons in Well 1.30 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Bail

SAMPLING DATA/FIELD PARAMETERS

Color dark gray Odor solvent Appearance sheen Temperature 19 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 1800 pH 6.72

Sampling Method and Material Disp. bail / Poly P. Rope

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
VOA 602	40 ml. glass vial	NA
metals	500 ml plastic	HNO_3
Semi Vol.	1 l glass amber	NA
CN^- Total Phen	1 l amber glass	NA

Remarks —

Sampling Personnel JP / DPD

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

PFE

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WATER SAMPLING LOG

Project/No. md057.03/City of Norfolk Page 1 of 1

Site Location Norfolk, Va.

Site/Well No. MW-13B Coded/ Replicate No. — Date 10/26

Weather cloudy Time Sampling Began 1:00 Time Sampling Completed 2:50

EVACUATION DATA

Description of Measuring Point (MP) PVC

Height of MP Above/Below Land Surface ____ MP Elevation —

Total Sounded Depth of Well Below MP 150' Water-Level Elevation —

Held ____ Depth to Water Below MP 11.74 Diameter of Casing 2"

Wet ____ Water Column in Well 35 Gallons Pumped/Bailed Prior to Sampling 15

Gallons per Foot .16

Gallons in Well 5.6 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Bail

SAMPLING DATA/FIELD PARAMETERS

Color Brown Clear/Black Odor coal tar Appearance clear w/ tar balls Temperature 20 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm NA pH NA - coal tar

Sampling Method and Material Dis Bailed / Poly Rope.

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
VOA 602	40 ml Voa glass	NA
metal	500 ml plastic	HNO_3
semi Vol	1 l amber	NA
CN^- tot	1 l amber	NA / NaOH in lab.

Remarks —

Sampling Personnel JP / DD.

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

PFE ORIGINAL

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WATER SAMPLING LOG

Project/No. MD 052.03 / City of Norfolk Page 1 of 1

Site Location Norfolk, Va

Site/Well No. MW-14 Coded/ Replicate No. — Date 10/25

Weather pt cl. 50° Time Sampling Began 2:10 Time Sampling Completed [illegible]

EVACUATION DATA

Description of Measuring Point (MP) casing - pvc TOC

Height of MP Above/Below Land Surface -2" MP Elevation —

Total Sounded Depth of Well Below MP 15 Water-Level Elevation —

Held ____ Depth to Water Below MP 7.50 Diameter of Casing 2"

Wet ____ Water Column in Well 7.5 Gallons Pumped/Bailed Prior to Sampling 10

Gallons per Foot .16

Gallons in Well 1.2 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Dis Bail / Poly Rope

SAMPLING DATA/FIELD PARAMETERS

Color gray Odor solvent Appearance sheen Temperature 21 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 800 pH 6.51

Sampling Method and Material dis. bail / poly Rope

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
VOA 602	40 ml glass vaa	NA
metals	500 ml plastic	HNO_3
semi Vol.	1 l. amber	NA
CN^- total free	1 l amber	NA / NaOH [illegible]

Remarks —

Sampling Personnel [illegible]

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

PFE

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Ground-Water Consultants

WATER SAMPLING LOG

Project/No. Md 057.07 / City of Norfolk. Page 1 of 1

Site Location Norfolk, Va.

Site/Well No. gw-15 Coded/ Replicate No. — Date 10/15/90

Weather pt cl. 50's Time Sampling Began 1:30 Time Sampling Completed 2:00

EVACUATION DATA

Description of Measuring Point (MP) Toc 2" pvc

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP 15 Water-Level Elevation —

Held ____ Depth to Water Below MP 6.10 Diameter of Casing 2"

Wet ____ Water Column in Well 8.9 Gallons Pumped/Bailed Prior to Sampling 6

Gallons per Foot .16

Gallons in Well 1.4 Sampling Pump Intake Setting ____ (feet below land surface) ____

Evacuation Method Bail

SAMPLING DATA/FIELD PARAMETERS

Color brown. Odor none Appearance cloudy Temperature 20.0 °F/°C

Other (specific ion; OVA; HNU; etc.) ____

Specific Conductance, umhos/cm 3500 pH 6.74

Sampling Method and Material Disp. bailer / poly. Rope

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
VOA 602	40 ml glass vial	NA
Metals	500 ml plastic	NA/NaOH in lab
semi-Vol	1 L amber	NA
CN- Tot. Free	1 L. amber	HNO_3

Remarks —

Sampling Personnel TP DPO

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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WATER SAMPLING LOG

Project/No. City of Norfolk / MD057-03 Page 1 of 1

Site Location Norfolk VA

Site/Well No. MW-16 Coded/ Replicate No. — Date 10-24-90

Weather cool 60's Time Sampling Began 7:38 Time Sampling Completed 8:30

EVACUATION DATA

Description of Measuring Point (MP) 2" PVC TOC

Height of MP Above/Below Land Surface -0.40' MP Elevation —

Total Sounded Depth of Well Below MP 14.5 Water-Level Elevation —

Held ____ Depth to Water Below MP 6.44 Diameter of Casing 2"

Wet ____ Water Column in Well 8.06' Gallons Pumped/Bailed Prior to Sampling 5.0

Gallons per Foot 0.16

Gallons in Well 1.28 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Disposable Bailer & Rope

SAMPLING DATA/FIELD PARAMETERS

Color lt tan/grey Odor None detect. Appearance cloudy Temperature 24 °F/°C

Other (specific ion; OVA; HNU; etc.) ~~84~~

Gal	pH	S.C.	temp
Init.	5.82	625	24°C
2.5	5.82	550	24
5.0	5.81	545	24

Specific Conductance, umhos/cm 545 pH 5.81

Sampling Method and Material Dis Bail / poly rope

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
Metals VOA-602	500 ml Plastic 40 ml glass VOA	~~500 ml~~ HNO3 NA
CN- Total Free	1 liter amber	NA / NaOH in lab
Semi Volatile	1 liter amber	NA

Calib. SC. 950 cond - 1000
pH = 580 - 7 cond. 6.82 pH 4 = 3.90 401

Remarks

Sampling Personnel J.A.O. D.P.O.

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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PFE ORIGINAL (Red)

WATER SAMPLING LOG

Project/No. City of Norfolk / MD057.03 Page 1 of 1

Site Location Norfolk VA

Site/Well No. MW-17 Coded/ Replicate No. — Date 10-24-90

Weather cool 60's Time Sampling Began 7:05 Time Sampling Completed 9:57

EVACUATION DATA

Description of Measuring Point (MP) Top of 2" PVC

Height of MP Above/Below Land Surface 0.40 MP Elevation —

Total Sounded Depth of Well Below MP 19.5 Water-Level Elevation —

Held _____ Depth to Water Below MP 5.65 Diameter of Casing 2"

Wet _____ Water Column in Well 8.85 Gallons Pumped/Bailed Prior to Sampling 5

Gallons per Foot 0.16

Gallons in Well 1.41 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Disposable Bailer & Rope

SAMPLING DATA/FIELD PARAMETERS

Color tan/brown Odor None detect Appearance cloudy Temperature 24° °F/°C

Other (specific ion; OVA; HNU; etc.)

Gal	pH	SC	temp
Init	5.09	375	24 °C
2	4.91	375	24 °C
4	4.92	400	24 °C
5	4.93	390	24 °C

Specific Conductance, umhos/cm 410 pH 4.98

Sampling Method and Material Disposable Baile & polyrope

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
~~500 ml~~ Metals	500 ml Plastic	HNO_3
Semi Vol CN^-	1 liter amber	NA CN^- in lab NaOH
VOA 602	40 ml glass	NA

Calibrate SC 1150 corr. = 1000

Remarks ph 7 = 7.18 ~~200~~ 695 ph 4 = 4.08 4.01

Sampling Personnel JAO DPO.

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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ORIGINAL

WATER SAMPLING LOG

Project/No. City of Norfolk, MID057.03 Page 1 of 1

Site Location Norfolk VA

Site/Well No. MW-18 Coded/Replicate No. — Date 10-24-89

Weather cool 70's Time Sampling Began 10:32 Time Sampling Completed 11:21

EVACUATION DATA

Description of Measuring Point (MP) Top 2" PVC

Height of MP Above/Below Land Surface -0.30 MP Elevation —

Total Sounded Depth of Well Below MP 14.5 Water-Level Elevation —

Held _____ Depth to Water Below MP 5.29 Diameter of Casing 2"

Wet _____ Water Column in Well 9.21 Gallons Pumped/Bailed Prior to Sampling 5

Gallons per Foot 0.16

Gallons in Well 1.47 Sampling Pump Intake Setting _____ (feet below land surface) _____

Evacuation Method Disposable Bailer

SAMPLING DATA/FIELD PARAMETERS

Color lt brown/tan Odor Grease/Sewer Appearance cloudy Temperature 24 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Gal	pH	S.C.	Temp
Init.	6.78	850	24
2	6.74	890	23
3.5	6.75	890	23
5.0	6.72	850	24

Specific Conductance, umhos/cm 825 pH 6.71

Sampling Method and Material _____

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
~~soil~~ Metals	500 ml Plastic	HNO_3
Semi Vol.		
CN^- total/free	1 liter amber	NA / NaOH in lab
VOA 502	40 ml VOA glass	NA

Remarks _____

Sampling Personnel S.C. 1000 cont — pH 7 = 7.08 7.00 pH 4 = 4.03

J.A.O. DPO

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

PFE ORIGINAL (RED)

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WATER SAMPLING LOG

Project/No. City of Norfolk / MD057.03 Page 1 of 1

Site Location Norfolk VA

Site/Well No. MW-19 Coded/Replicate No. — Date 10-24-89

Weather warm 70's Time Sampling Began 1:05 Time Sampling Completed 2:07

EVACUATION DATA

Description of Measuring Point (MP) Top 2"

Height of MP Above/Below Land Surface -0.40 MP Elevation —

Total Sounded Depth of Well Below MP 14.5 Water-Level Elevation —

Held ____ Depth to Water Below MP 5.38 Diameter of Casing 2"

Wet ____ Water Column in Well 9.12 Gallons Pumped/Bailed Prior to Sampling 5

Gallons per Foot 0.16

Gallons in Well 1.45 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Disposable Bailer & poly rope

SAMPLING DATA/FIELD PARAMETERS

Color tan Odor None detect Appearance cloudy Temperature 24 °F/°C

Other (specific ion; OVA; HNU; etc.)

Specific Conductance, umhos/cm 510 pH 5.78

Sampling Method and Material Disposable Baile poly rope.

Gal	pH	SC	temp
Init	5.57	570	25
1	5.66	560	25
3	5.69	540	25
4	5.78	525	25
5	5.76	530	24

Constituents Sampled	Container Description From Lab X or G&M	Preservative
metals	500 ml plastic	HNO_3
VOA-602	40 ml glass Voa.	NA
CN^- Total Free	1 l. amber	NA / NaOH [illegible]
Semi Volatile	1 l amber	NA

S.C. = 1025 [illegible] 1000

Remarks ph 7 6.91 1000 = a 6.98 ph 4 = 4.02 —

Sampling Personnel JAO DPO

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

GERAGHTY & MILLER, INC.
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ORIGINAL

WATER SAMPLING LOG

Project/No. City of Norfolk / Md. 057.03 Page 1 of 1

Site Location Norfolk Va

Site/Well No. MW-19B Coded/Replicate No. — Date 10-24-90

Weather 60's Time Sampling Began 2:00 Time Sampling Completed 2:30

EVACUATION DATA

Description of Measuring Point (MP) 2" pvc TOC

Height of MP Above/Below Land Surface — MP Elevation —

Total Sounded Depth of Well Below MP 50.00 Water-Level Elevation —

Held ____ Depth to Water Below MP 11.21 Diameter of Casing 2"

Wet ____ Water Column in Well 38.79 Gallons Pumped/Bailed Prior to Sampling 20

Gallons per Foot .16

Gallons in Well 6.20 x3=18.61 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method

SAMPLING DATA/FIELD PARAMETERS

Color lt. gray Odor organic Appearance sl. Cloudy Temperature 19.5 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 2200 pH 7.69

Sampling Method and Material Dis Bail / poly Rope

Gal	pH	S.C.	temp
Init	9.33	2000	20°C
5	9.65	2000	19°C
10	8.22	2050	19°C
15	7.78	2100	19°C
20	7.69	2200	19°C

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
metals	500 ml plastic	HNO_3
CN^- tot. free	1 l. amber	NA / NaOH in lab
semi vol	1 l. amber	NA
VOA-602	40 ml glass vac.	NA

Remarks Well had pressure pushed of plug

Sampling Personnel JAO DPO

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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WATER SAMPLING LOG

Project/No. City of Norfolk / Md. 057.03 Page 1 of 1

Site Location Norfolk, Va.

Site/Well No. MW-20 Coded/ Replicate No. — Date 10/24

Weather 60's Time Sampling Began _____ Time Sampling Completed _____

EVACUATION DATA

Description of Measuring Point (MP) Top 2" PVC

Height of MP Above/Below Land Surface _____ MP Elevation —

Total Sounded Depth of Well Below MP 13.5 Water-Level Elevation —

Held _____ Depth to Water Below MP 4.27 Diameter of Casing 2"

Wet _____ Water Column in Well 9.23 Gallons Pumped/Bailed Prior to Sampling 4.5

Gallons per Foot 0.16

Gallons in Well 1.47 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method Dis. Bail

SAMPLING DATA/FIELD PARAMETERS

Color lt gray Odor Chlorine Appearance cloudy Temperature 25 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 640 pH 6.40

Sampling Method and Material Disp. Bail/poly Rope.

Gal	pH	SC	temp
Init	6.26	700	24
2.0	6.40	710	25
3.0	6.43	675	25
4.5	6.39	680	25

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
VOA-602	40 ml glass VOA	NA
Metals	500 ml plastic	HNO_3
CN^- total free	1 l amber	NA / NaOH in lab.
Semi Vol.	1 l. amber	NA

S.C. 1050 cost 1000

Remarks ph 7 = 7.17 cost 701 [illegible] ph 4.0 = 4.00 —

Sampling Personnel IAO DRO

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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WATER SAMPLING LOG

Project/No. Vepco Page 1 of 1

Site Location Norfolk // Grandy & Va Bch. Blvd.

Site/Well No. MW-20B Coded/ Replicate No. Rep-1 Date 10/25

Weather pt. cloudy Time Sampling Began 7:08 Time Sampling Completed 0:25

EVACUATION DATA

Description of Measuring Point (MP) PVC

Height of MP Above/Below Land Surface -3" MP Elevation —

Total Sounded Depth of Well Below MP 47 Water-Level Elevation —

Held ____ Depth to Water Below MP 8.48 Diameter of Casing 2"

Wet ____ Water Column in Well 38.52 Gallons Pumped/Bailed Prior to Sampling 20

Gallons per Foot .16

Gallons in Well 6.16 Sampling Pump Intake Setting (feet below land surface) —

18.48

Evacuation Method Bailed

SAMPLING DATA/FIELD PARAMETERS

Color clear Odor None Appearance Slight Turbid Temperature 20 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 1200 pH 11.45

Sampling Method and Material Disp Bail / poly Rope

	PH	SDC	Temp
INI	11.76	2400	19°C
5	11.96	2100	19°C
10	11.58	1750	19°C
15	11.78	1250	19.5°C
20	11.45	1200	20°C
Samp			

Constituents Sampled	Container Description From Lab / or G&M	Preservative
VOA 602	40 ml glass vial	NA
metals	500ml plastic	HNO_3
Semi Vol.	1l glass amber	NA
Total Fuel	1l glass amber	NA

Remarks

Sampling Personnel

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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PFE ORIGINAL

WATER SAMPLING LOG

Project/No. Vapco / 057.03 Page 1 of 1
Site Location Norfolk, Va.
Site/Well No. OW-1 Rep./FB No. — Date 11/26/90
Weather Sunny 70's Start 11:00 Stop 11:30

EVACUATION DATA

Description of Measuring Point (MP) Toc - steel com.
Height of MP -2" (m.p.) MP Elevation —
Total Depth 12.90 Water-Level Elev. —
Depth to Water 7.50 Casing Diameter 2"
Water Column in Well 5.4 Evacuation Vol. 5 g.
Gallons per Foot .16 Gallons in Well .86
Pump Intake — Evacuation Method Disp. Bail

Gallons	init	3g	5g.		
pH	7.40	7.35	7.30		
Specific Conductance	15,000	14,000	13,500		
Temperature (°C/°F)	12	12	12		

SAMPLING DATA/FIELD PARAMETERS

Color Black Odor sl. tar Appearance Turbid
Other Comments

Specific Conductance (umhos/cm) 13,500
pH 7.30 Temp 12 (°C/°F)
Sampling Material/Method Disp. Bail / Poly Rope.

CONTAINER DESCRIPTION

Constituents	From Lab ___ or G&M X	Preservative
VOA	(2) 40 ml VOA	NA

Remarks

Sampling Personnel JP
JTJ 6/89

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

ORIGINAL (Red)

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WATER SAMPLING LOG

Project/No. Vepco/057.03 Page 1 of 1
Site Location Norfolk, Va.
Site/Well No. 13-C Rep./FB No. — Date 11/27/90
Weather Sunny 70's Start 11:00 Stop 1:00

EVACUATION DATA

Description of Measuring Point (MP) TOC 2" pvc.
Height of MP ~2.5' MP Elevation —
Total Depth 89.66 Water-Level Elev. —
Depth to Water 12.34 Casing Diameter 2"
Water Column in Well 71.32 Evacuation Vol. 35
Gallons per Foot .16 Gallons in Well 11.4
Pump Intake ~~[illegible]~~ 3/4" hose Evacuation Method Ag. Bug / Disp Bail

Gallons	initial	10	20	35	
pH	11.13	11.40	11.45	11.00	
Specific Conductance	1400	1250	1200	1150	
Temperature (°C/°F)	12	12	15 ↑ Bug no good	12	12	

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor NA Appearance clear
Other Comments

Specific Conductance (umhos/cm) 1150
pH 11.0 Temp 12 (°C/°F)
Sampling Material/Method Disp Bail.

CONTAINER DESCRIPTION

Constituents	From Lab X or G&M	Preservative
metals	500 ml plastic	NA
VOA	40 ml VOA	
BNA	1 l amber.	
CN^-	1 l amber.	

Remarks

Sampling Personnel JP.
JTJ 6/89

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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WATER SAMPLING LOG

Project/No. Vepco / 057.03 Page 1 of 1

Site Location Norfolk, Va.

Site/Well No. MW-16 Coded/ Replicate No. — Date 11/26

Weather sunny 70°F Time Sampling Began 10:30 am Time Sampling Completed 11:Am.

EVACUATION DATA

Description of Measuring Point (MP) steel corn.

Height of MP Above/Below Land Surface -.3' MP Elevation

Total Sounded Depth of Well Below MP 10.80 Water-Level Elevation

Held Depth to Water Below MP 6.71 Diameter of Casing 2"

Wet Water Column in Well 4.09 Gallons Pumped/Bailed Prior to Sampling 5 gal.

Gallons per Foot .16

Gallons in Well .65 Sampling Pump Intake Setting (feet below land surface) 1'

Evacuation Method Disp bail

SAMPLING DATA/FIELD PARAMETERS

Color Lt. Blk. Odor [redacted] NA Appearance Clear/ Turbid Temperature 13 °F/°C

Other (specific ion; OVA; HNU; etc.)

Specific Conductance, umhos/cm pH

Sampling Method and Material Disp Bail/Poly R.

gal.	SC.	pH	T
initial	650	6.37	13
3	650	6.40	13
5	590	6.30	13

Constituents Sampled	Container Description From Lab X or G&M	Preservative
BNA	1 l amber	NA

Remarks

Sampling Personnel JP

WELL CASING VOLUMES

GAL./FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

PFE

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(Red)

AN ENVIRONMENTAL QUALITY INVESTIGATION SUMMARY AND CORRECTIVE MEASURES STUDY OF THE FORMER NORFOLK MANUFACTURED GAS PLANT SITE

October 1994

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ORIGINAL

MARCH 1991

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PFE
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WATER SAMPLING LOG

Project/No. City of Norfolk / MD057.05 Page 1 of 1
Site Location Norfolk VA
Site/Well No. 13C Rep./FB No. — Date 3-6-91
Weather cool 50's Start 10:45 Stop 11:30

EVACUATION DATA

Description of Measuring Point (MP) Top 2" PVC
Height of MP _____ MP Elevation _____
Total Depth 81' Water-Level Elev. _____
Depth to Water 12.58' Casing Diameter 2"
Water Column in Well 68.42 Evacuation Vol. 33 gal
Gallons per Foot .16 Gallons in Well 10.95
Pump Intake _____ Evacuation Method _____

Gallons	Ini	8	16	24	33
pH	9.45	9.99	10.09	9.57	9.44
Specific Conductance	505	490	445	435	420
Temperature (°C/°F)	17.7	17.6	17.6	17.8	17.8

SAMPLING DATA/FIELD PARAMETERS

Color lt gray Odor very light Appearance cloudy
Other Comments _____

Specific Conductance (umhos/cm) _____ _____ _____ _____
pH _____ _____ _____ _____ Temp _____ _____ _____ _____ (°C/°F)
Sampling Material/Method Disposable bailer & poly rope

CONTAINER DESCRIPTION

Constituents	From Lab X or G&M ___	Preservative
602 + Xylenes	40 ml glass VOA	NA
625 BNA	1 liter amber	NA
835.5 Total Cyanide	1 liter amber	NaOH
412.6 Free Cyanide	1 liter amber	NaOH
Metals	1 liter amber	HNO_3

Remarks _____

Sampling Personnel JAO DRO
JTJ 6/89

WELL CASING VOLUMES

GAL/FT	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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WATER SAMPLING LOG

Project/No. City of Norfolk / m0057.05 Page 1 of 1
Site Location Norfolk VA
Site/Well No. mw-21 Rep./FB No. — Date 3-6-90
Weather cool 60's Start 2:45 Stop 3:20

EVACUATION DATA

Description of Measuring Point (MP) top of 2" PVC
Height of MP - 0.50 MP Elevation
Total Depth 19.5 Water-Level Elev.
Depth to Water 4.27 Casing Diameter
Water Column in Well 10.32 Evacuation Vol. 6 (8)
Gallons per Foot 0.16 Gallons in Well 1.8
Pump Intake Evacuation Method

Gallons	~~Init~~	2	4	6	8
pH	6.80	6.84	6.88	6.85	6.88
Specific Conductance	860	775	750	725	700
Temperature (°C/°F)	14.5	14.8	14.2	14.3	14.2

SAMPLING DATA/FIELD PARAMETERS

Color BROWN Odor NONE Appearance cloudy
Other Comments

Specific Conductance (umhos/cm) 700 695 705 710
pH 6.88 6.87 6.90 6.92 Temp 14.8 14.5 14.3 14.1 (°C/°F)
Sampling Material/Method

CONTAINER DESCRIPTION

Constituents	From Lab ✓ or G&M ___	Preservative
602 + Xylenes	40 ml glass VOA	NA
625 BNA	1 liter amber	NA
335.5 total cyanide	1 liter amber	NaOH
412.6 free cyanide	1 liter amber	NaOH
Metals	1 liter amber	HNO3

Remarks

Sampling Personnel JAD DPO
JTJ 6/89

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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WATER SAMPLING LOG

Project/No. City of Norfolk / 11005 7.05 Page 1 of 1
Site Location Norfolk VA
Site/Well No. MW2-21B Rep./FB No. — Date 3-6-91
Weather cool 50's Start 12:45 Stop 2:10

EVACUATION DATA

Description of Measuring Point (MP) Top of 2" PVC
Height of MP -0.40 MP Elevation
Total Depth 47' Water-Level Elev.
Depth to Water 9.83 Casing Diameter
Water Column in Well 37.17 Evacuation Vol. 18 (30)
Gallons per Foot 0.16 Gallons in Well 5.94
Pump Intake Evacuation Method

Gallons	Init	10	20	25	30
pH	9.51	10.00	9.03	8.90	8.80
Specific Conductance	950	1100	1260	1210	1300
Temperature (°C/°F)	13°C	16°C	17°	17	18

SAMPLING DATA/FIELD PARAMETERS

Color lt gray Odor None Appearance cloudy
Other Comments very light sheen

Specific Conductance (umhos/cm)	740	700	740	725
pH 8.45 8.53 8.37 8.43 Temp	18.4	18.7	18.0	17.6 (°C/°F)

Sampling Material/Method

CONTAINER DESCRIPTION

Constituents	From Lab X or G&M ___	Preservative
VOA 602 + Xylenes	40 ml glass VOA	NA
625 BNA	1 liter glass	NA
335.5 Total Cyanide	1 liter glass	NaOH
412.6 Free Cyanide	1 liter glass	NaOH
Metals	1 liter glass	HNO_3

Remarks Inst. Calib. SC Init 400 Cont 1200 Final 1200
pH pH 7 6.74 7.01 4 4.00 — 4.01 6.98
Sampling Personnel JAO, DPO
JTJ 6/89

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.48

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WATER SAMPLING LOG

Project/No. City of Norfolk / MD057.05 Page 1 of 1
Site Location Norfolk VA
Site/Well No. MW-8 Rep./FB No. — Date 3-6-91
Weather cool 50s Start 5:00 Stop 5:30

EVACUATION DATA

Description of Measuring Point (MP) Top of 2in PVC
Height of MP + 2.5 MP Elevation
Total Depth 15 Water-Level Elev.
Depth to Water 6.86 Casing Diameter 2in
Water Column in Well 8.14 Evacuation Vol. 3.90 (6)
Gallons per Foot 0.16 Gallons in Well 1.30
Pump Intake — Evacuation Method Bailed

	INI	1	2	3	4
Gallons					
pH	6.68	6.70	6.77	6.78	6.72
Specific Conductance	1090	1020	900	820	790
Temperature (°C/°F)	14.1	14.1	14.6	14.1	14.0

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814
3024

SAMPLING DATA/FIELD PARAMETERS

Color lt gray Odor moderate Appearance turbid
Other Comments

Specific Conductance (umhos/cm)	775	770	740	725
pH	6.78	6.79	6.80	6.84
Temp (°C/°F)	14.5	14.4	14.3	14.1

Sampling Material/Method

CONTAINER DESCRIPTION

Constituents	From Lab X or G&M —	Preservative
VOA 602 + Xylenes	40 ml glass VOA	NA
625 BNA	1 liter amber glass	NA
335.5 total cyanide	1 liter amber glass	NaOH
412.6 free cyanide	1 liter amber glass	NaOH
Metals	1 liter amber glass	HNO_3

Remarks

Sampling Personnel TAO DAO

JTJ 6/89

WELL CASING VOLUMES

GAL/FT	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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ORIGINAL (Red)

WATER SAMPLING LOG

Project/No. City of Norfolk / MW0057.05 Page 1 of 1
Site Location Norfolk VA
Site/Well No. MW-20 Rep./FB No. ____ Date 3-5-91
Weather cool 50's Start 10:45 Stop 11:05

EVACUATION DATA

Description of Measuring Point (MP) Top 2" PVC
Height of MP -0.25 MP Elevation ____
Total Depth 14.5' Water-Level Elev. ____
Depth to Water 4.35 Casing Diameter 2in
Water Column in Well 10.15 Evacuation Vol. 4.8 gal
Gallons per Foot 0.16 Gallons in Well 1.62
Pump Intake ____ Evacuation Method ____

Gallons	~~Init~~	1.5	3.0	4.5	6.0
pH	6.45	6.44	6.54	6.47	6.49
Specific Conductance	410	400	400	360	360
Temperature (°C/°F)	17.1	16.0	16.5	16.7	16.8

SAMPLING DATA/FIELD PARAMETERS

Color light tan Odor none detected Appearance cloudy
Other Comments ____

Specific Conductance (umhos/cm) 410 405 400 425
pH 6.55 6.53 6.52 6.53 Temp 17.3 17.0 16.6 16.9 (°C/°F)
Sampling Material/Method ____

CONTAINER DESCRIPTION

Constituents	From Lab ✓ or G&M ___	Preservative
VOA 602 & Xylene	2ea 40ML glass	None 4°c
625 BNA	1ea litre amber	None 4°c
335.5 Total Cyanide	1ea litre amber	NAOH 4°c
412.6 Free Cyanide	1ea litre amber	NAOH 4°c
Metals	1ea litre amber	HNO^3 4°c

Remarks ____

Sampling Personnel J.A.O. D.E.C.

JTJ 6/89

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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WATER SAMPLING LOG

Project/No. City of Norfolk / WND057.05 Page 1 of 1
Site Location Norfolk VA
Site/Well No. MW-201R Rep./FB No. — Date 3-5-91
Weather cool 50's Start _____ Stop _____

EVACUATION DATA

Description of Measuring Point (MP) top of 2" PVC
Height of MP ~ 0.25 ft MP Elevation _____
Total Depth 47' Water-Level Elev. _____
Depth to Water 9.36 Casing Diameter 2in
Water Column in Well 37.64 Evacuation Vol. 18 gal
Gallons per Foot 0.16 Gallons in Well 6.02
Pump Intake _____ Evacuation Method Bailed

Gallons	Init	5	10	15	20
pH	11.37	11.69	11.69	10.77	10.12
Specific Conductance	1030	1125	1075	825	825
Temperature (°C/°F)	20.0	20.0	19.8	19.0	19.0

SAMPLING DATA/FIELD PARAMETERS

Color Colorless Odor None Appearance clear
Other Comments _____

Specific Conductance (umhos/cm) 810 810 815 820
pH 10.20 10.58 10.19 9.87 Temp 19.8 19.6 19.6 19.6 (°C/°F)
Sampling Material/Method _____

CONTAINER DESCRIPTION

Constituents	From Lab X or G&M ___	Preservative
VOA 602 + Xylenes	40 ml glass	NA
625 BNA	1 liter Amber glass	NA
335.5 total Cyanide	1 liter Amber glass	NaOH
412.6 Free Cyanide	1 liter Amber glass	NaOH
Metals	1 liter Amber glass	HNO_3

Remarks _____

Sampling Personnel JAD DPD
JTJ 6/89

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.10	2-1/2" = 0.24	3-1/2" = 0.50	6" = 1.46

GERAGHTY & MILLER, INC.
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PCC ORIGINAL (Red)

WATER SAMPLING LOG

Project/No. City of Norfolk / MD057.05 Page 1 of 1
Site Location Norfolk VA
Site/Well No. OW-1 Rep./FB No. — Date 3-5-91
Weather cool 60 Start 1:30 pm Stop 2:06 pm

EVACUATION DATA

Description of Measuring Point (MP) top of 2" PVC
Height of MP -0.30 MP Elevation
Total Depth 15' Water-Level Elev.
Depth to Water 5.38 Casing Diameter
Water Column in Well 9.62 Evacuation Vol. 4.61
Gallons per Foot 0.16 Gallons in Well 1.53
Pump Intake — Evacuation Method Bailed

Gallons	Init	2	4	6	9
pH	7.45	7.46	7.57	7.55	7.57
Specific Conductance	5100	5000	5000	5000	5100
Temperature (°C/°F)	14.5	13.8	13.7	13.5	13.7

SAMPLING DATA/FIELD PARAMETERS

Color dark grey Odor slight sewer Appearance
Other Comments

Specific Conductance (umhos/cm) 5400 5450 5400 4500
pH 7.12 7.12 7.12 7.68 Temp 14.2 14.7 14.2 14.8 (°C/°F)
Sampling Material/Method

CONTAINER DESCRIPTION

Constituents	From Lab X or G&M ___	Preservative
VOA 602 + Xylenes	2ea 40 ML glass	NA 4°c
625 BNA	1ea litre - amber glass	None 4°c
335.5 Total Cyanide	" " "	NAOH 4°c
412.6 Free Cyanide	" " "	NAOH 4°c
Metals	" " "	HNO3 4°c

Remarks Note High tide 12:17, sewer depth 5.55' at 1:19 PM 5-5-91

Sampling Personnel
JTJ 6/89

WELL CASING VOLUMES

GAL/FT				
	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

PFE ORIGINAL (Red)

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WATER SAMPLING LOG

Project/No. City of Norfolk / 1M0057.05 Page 1 of 1
Site Location Norfolk VA
Site/Well No. MW-15 Rep./FB No. Rep-1 Date 3-5-91
Weather cod 50's Start 4:00 Stop 4:30

EVACUATION DATA

Description of Measuring Point (MP) Top of 2" PVC
Height of MP +2.25' MP Elevation
Total Depth 15 Water-Level Elev.
Depth to Water 6.42 Casing Diameter 2in
Water Column in Well 8.58 Evacuation Vol. 4.11 (
Gallons per Foot 0.16 Gallons in Well 1.37
Pump Intake — Evacuation Method Bailed

Gallons	Ini	2	4	6	8
pH	6.91	6.69	6.73	6.67	6.69
Specific Conductance	1850	1300	1300	1850	2005
Temperature (°C/°F)	17.5	15.1	15.1	14.9	15.0

SAMPLING DATA/FIELD PARAMETERS

Color blackish Odor Slight Gasoline Appearance cloudy
Other Comments

Specific Conductance (umhos/cm) 2200 2250 2200 2200
pH 6.67 6.72 6.72 6.73 Temp 15.3 15.2 15.3 15.8 (°C/°F)
Sampling Material/Method Disposable Bailer & poly rope

CONTAINER DESCRIPTION

Constituents	From Lab ✓ or G&M ___	Preservative	
VOA-602 + Xylenes	2ea 40ML glass	NA	4°c
625 BNA	1ea 1 litre amber glass	None	4°c
335.5 Total Cyanide	1ea " " "	NAOH	4°c
412.6 Free Cyanide	1ea " " "	NAOH	4°c
Metals	1ea " " "	HNO3	4°c

Remarks

Sampling Personnel J.A.D D.P.O.
JTJ 6/89

WELL CASING VOLUMES

GAL/FT	1-¼" = 0.077	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.10	2-½" = 0.24	3-½" = 0.50	6" = 1.46

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FEBRUARY 1994

GERAGHTY & MILLER, INC.
Environmental Services

PFE ORIGINAL (Red)

WATER SAMPLING LOG

Project/No. Norfolk MGP M00057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-4 Coded/ Replicate No. — Date 2-1-99

Weather Sunny, 35°F Time Sampling Began 4:20 Time Sampling Completed 4:50

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 14.5 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 8.24 Diameter of Casing 2"

Wet ✓ Water Column in Well 6.26 Gallons Pumped/Bailed Prior to Sampling 3.00 / 3.00

Gallons per Foot .16

Gallons in Well 1.00 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color grey Odor Coal Tar Appearance Turbid Temperature 13 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 1300 pH 6.25

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA Metals 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

PFE ORIGINAL (RED)

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-4B Coded/ Replicate No. — Date 2-1-94

Weather Flurries 35°F Time Sampling Began 4:30 Time Sampling Completed 5:00

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 51.5 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 17.68 Diameter of Casing 2"

Wet ✓ Water Column in Well 33.82 Gallons Pumped/Bailed Prior to Sampling 16.23

Gallons per Foot .16

Gallons in Well 5.41 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method disposable bailer, new poly string

SAMPLING DATA/FIELD PARAMETERS

Color clear Odor _____ Appearance clear Temperature 16.5 °F/(C)

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 720 pH 6.90

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
VOC'S 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel AT Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

ORIGINAL (Red)

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-8 Coded/ Replicate No. — Date 2-1-94

Weather Sunny 35°F Time Sampling Began 9:15 Time Sampling Completed 9:25

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 14.91 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 7.38 Diameter of Casing 2"

Wet ✓ Water Column in Well 7.53 Gallons Pumped/Bailed Prior to Sampling 3.61 / 3.75

Gallons per Foot .16

Gallons in Well 1.20 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color Lt. Grey Odor _____ Appearance Sl. Turbid Temperature 13 °F/(C)

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 5050 pH 6.82

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

G&M Form 12 6-86 Southprint 89-1473

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Environmental Services

ORIGINAL

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-12 Coded/ Replicate No. — Date 2-1-94

Weather Sunny 38°F Time Sampling Began 11:00 Time Sampling Completed 11:20

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 14.5 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 7.95 Diameter of Casing 2"

Wet ✓ Water Column in Well 6.55 Gallons Pumped/Bailed Prior to Sampling 3.14, 3.25

Gallons per Foot .16

Gallons in Well 1.05 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color Med. Grey Odor _____ Appearance Turbid Temperature 15.5 °F (°C)

Other (specific ion: OVA; HNU; etc.) —

Specific Conductance umhos/cm 1180 pH 6.11

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

PFE ORIGINAL (Red)

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-13 Coded/ Replicate No. MW-13 MS. MW-13 MSD. Date 2-1-94

Weather Sunny 38°F Time Sampling Began 11:30 Time Sampling Completed 11:50

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 14.9 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 9.15 Diameter of Casing 2"

Wet ✓ Water Column in Well 5.75 Gallons Pumped/Bailed Prior to Sampling 2.76

Gallons per Foot .16

Gallons in Well 0.92 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color Lt. Grey Odor _____ Appearance Sl. Turbid Temperature 14.5 °F (°C)

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 1900 pH 6.46

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA Metals 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.			
1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

PFE ORIGINAL (Red)

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-13C Coded/ Replicate No. — Date 2-2-94

Weather SNOW 32°F Time Sampling Began 8:45 Time Sampling Completed 9:45

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 82 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 13.91 Diameter of Casing 2"

Wet ✓ Water Column in Well 68.09 Gallons Pumped/Bailed Prior to Sampling 32.68 / 33

Gallons per Foot .16

Gallons in Well 10.89 Sampling Pump Intake Setting (feet below land surface) 81'

Evacuation Method Pumped with new poly hose + check valve

SAMPLING DATA/FIELD PARAMETERS

Color Lt. Grey Odor _____ Appearance SL. Turbid Temperature 15 °F/°C

Other (specific ion: OVA; HNU; etc.) —

Specific Conductance, umhos/cm 900 pH 10.38

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
VOC'S 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

PEF ORIGINAL (Red)

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-14 Coded/ Replicate No. — Date 2/1/94

Weather Sunny 35°F Time Sampling Began 10:05 Time Sampling Completed 10:30

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 15.3 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 8.09 Diameter of Casing 2"

Wet ✓ Water Column in Well 7.21 Gallons Pumped/Bailed Prior to Sampling 3.46 / 3.50

Gallons per Foot .16

Gallons in Well 1.15 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method Disp Bailer w/ New string

SAMPLING DATA/FIELD PARAMETERS

Color clear Odor _____ Appearance clear Temperature 14 °F (°C)

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 620 pH 5.88

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

G&M Form 12 6-86 Southborn: 89-1473

GERAGHTY & MILLER, INC.
Environmental Services

PFE ORIGINAL

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-15 Coded/ Replicate No. — Date 2-1-94

Weather SUNNY 35°F Time Sampling Began 9:40 Time Sampling Completed 10:00

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 15.34 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 6.53 Diameter of Casing 2"

Wet ✓ Water Column in Well 8.81 Gallons Pumped/Bailed Prior to Sampling 4.23 +.25

Gallons per Foot .16

Gallons in Well 1.41 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color LT. Tan Odor _____ Appearance SL. Turbid Temperature 13.5 °F (°C)

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 1520 pH 6.84

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-16 Coded/Replicate No. — Date 1-31-94

Weather Overcast 32°F Time Sampling Began 5:00 Time Sampling Completed 5:25

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 14.5 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 6.27 Diameter of Casing 2"

Wet ✓ Water Column in Well 8.23 Gallons Pumped/Bailed Prior to Sampling 3.95 / 4.0

Gallons per Foot .16

Gallons in Well 1.32 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color LT. Grey Odor _____ Appearance Turbid Temperature 20 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 600 pH 5.72

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

PEF ORIGINAL

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-17 Coded/ Replicate No. — Date 2-1-94

Weather Sunny 35°F Time Sampling Began 8:20 Time Sampling Completed 8:45 am

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 14.5 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 5.08 Diameter of Casing 2"

Wet ✓ Water Column in Well 9.42 Gallons Pumped/Bailed Prior to Sampling 4.52

Gallons per Foot .16

Gallons in Well 1.51 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color LT. TAN Odor _____ Appearance Turbid Temperature 13.5 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 600 pH 4.91

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

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Environmental Services

ORIGINAL

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-18 Coded/Replicate No. — Date 2/1/94

Weather P. Cloudy 35°F Time Sampling Began 2:00 Time Sampling Completed 2:20

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 14.5 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 4.62 Diameter of Casing 2"

Wet ✓ Water Column in Well 9.88 Gallons Pumped/Bailed Prior to Sampling 4.74

Gallons per Foot 0.16

Gallons in Well 1.58 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method Deep Bailer, New String

SAMPLING DATA/FIELD PARAMETERS

Color Lt. Grey Odor _____ Appearance SL. Turbid Temperature 14 °F (°C)

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance umhos/cm 1000 pH 6.93

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
VOC'S 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hanoum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

PFE (ORIGINAL (Red))

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-19 Coded/ Replicate No. — Date 1-31-94

Weather overcast 32°F Time Sampling Began 3:45 Time Sampling Completed 4:10

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 14.5 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 4.64 Diameter of Casing 2"

Wet ✓ Water Column in Well 9.86 Gallons Pumped/Bailed Prior to Sampling 4.73 / 4.75

Gallons per Foot .16

Gallons in Well 1.58 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color Lt. tan Odor _____ Appearance sl. turbid Temperature 13.5 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance umhos/cm 540 pH 5.86

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al. Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

PFE ORIGINAL (Red)

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-19B Coded/ Replicate No. — Date 1-31-94

Weather overcast 32°F Time Sampling Began 3:45 Time Sampling Completed 4:35

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 50 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 12.60 Diameter of Casing 2"

Wet ✓ Water Column in Well 37.40 Gallons Pumped/Bailed Prior to Sampling 17.95

Gallons per Foot .16

Gallons in Well 5.98 Sampling Pump Intake Setting (feet below land surface) ✓

Evacuation Method disposable bailer, new poly string

SAMPLING DATA/FIELD PARAMETERS

Color clear Odor _____ Appearance clear Temperature 16.5 °F/(°C)

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 1360 pH 6.76

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

G&M Form 12 6-86 Southprint 89-1473

GERAGHTY & MILLER, INC.
Environmental Services

ORIGINAL

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-20 Coded/ Replicate No. — Date 2-1-99

Weather Overcast 35°F Time Sampling Began 3:00 Time Sampling Completed 3:40

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 13.6 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 4.03 Diameter of Casing 2"

Wet ✓ Water Column in Well 9.57 Gallons Pumped/Bailed Prior to Sampling 4.59

Gallons per Foot .16

Gallons in Well 1.53 Sampling Pump Intake Setting (feet below land surface) /

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color V.LT. Tan Odor _____ Appearance clear Temperature 13.5 °F/(C)

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 960 pH 6.62

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannon, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

G&M Form 12 6-86 Southprint 89-1473

GERAGHTY & MILLER, INC.
Environmental Services

ORIGINAL (Red)

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-20B Coded/ Replicate No. — Date 2-1-99

Weather overcast 35°F Time Sampling Began 3:00 Time Sampling Completed 4:00

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 47 Water-Level Elevation _____

Held / Depth to Water Below MP 10.06 Diameter of Casing 2"

Wet / Water Column in Well 36.94 Gallons Pumped/Bailed Prior to Sampling 17.73

Gallons per Foot .16

Gallons in Well 5.91 Sampling Pump Intake Setting (feet below land surface) /

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color clear Odor _____ Appearance clear Temperature 18 °F (°C)

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance umhos/cm 1600 pH 8.58

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA METALS 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

G&M Form 12 6-86 Southprint 89-1473

GERAGHTY & MILLER, INC.
Environmental Services

PFE ORIGINAL

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-21 Coded/ Replicate No. Rep-1 Date 1-31-94

Weather Overcast 32°F Time Sampling Began 1:58 Time Sampling Completed 2:50

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 14.5 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 3.92 Diameter of Casing 2"

Wet ✓ Water Column in Well 10.58 Gallons Pumped/Bailed Prior to Sampling 5.08 / 5.25

Gallons per Foot .16

Gallons in Well 1.69 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color gray Odor — Appearance Turbid Temperature 10 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance umhos/cm 920 pH 6.83

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA Metals 6010/7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. Norfolk MGP MD0057.009 Page 1 of 1

Site Location Norfolk, Virginia

Site/Well No. MW-21 B Coded/ Replicate No. — Date 1-31-94

Weather Overcast 32°F Time Sampling Began 1:58 Time Sampling Completed 2:50

EVACUATION DATA

Description of Measuring Point (MP) Top of Casing

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP 46.9 Water-Level Elevation _____

Held ✓ Depth to Water Below MP 10.81 Diameter of Casing 2"

Wet ✓ Water Column in Well 36.09 Gallons Pumped/Bailed Prior to Sampling 17.32 / 18

Gallons per Foot .16

Gallons in Well 5.77 Sampling Pump Intake Setting (feet below land surface) —

Evacuation Method disposable bailer, new string

SAMPLING DATA/FIELD PARAMETERS

Color clear Odor none Appearance clear Temperature 17 °F/°C

Other (specific ion; OVA; HNU; etc.) —

Specific Conductance, umhos/cm 1180 pH 7.11

Sampling Method and Material disposable bailer, new string

Constituents Sampled	Container Description From Lab X or G&M ___	Preservative
VOC's 8020	(3) 40 ml amber glass VOA	HCl
BNA 8270	(1) liter amber glass	—
RCRA Metals 6010 / 7470	(1) liter plastic	HNO_3
Total CN 335.3	(1) liter plastic	NaOH
Free CN	(1) liter plastic	NaOH

Remarks _____

Sampling Personnel Al Hannum, Brian Newgent

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

ORIGINAL

APPENDIX F

PFE
ORIGINAL (Red)

APPENDIX F

AQUIFER TEST DISCHARGE SAMPLINGS LOGS

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE 1A

WATER SAMPLING LOG

ORIGINAL

Project/No. MD05708 Page 1 of

Site Location NORFOLK MGP

Site/Well No. RW-24B Coded/ Replicate No. Date 3-23-93

Weather CLOUDY 50°F Time Sampling Began 09:55 Time Sampling Completed 10:05

EVACUATION DATA

Description of Measuring Point (MP)

Height of MP Above/Below Land Surface MP Elevation

Total Sounded Depth of Well Below MP Water-Level Elevation

Held Depth to Water Below MP Diameter of Casing 2GPM x 45MIN

Wet Water Column in Well Gallons Pumped/Bailed Prior to Sampling 90 GALS

Gallons per Foot

Gallons in Well Sampling Pump Intake Setting (feet below land surface)

Evacuation Method SUBMERSIBLE PUMP DURING pumping test

SAMPLING DATA/FIELD PARAMETERS

Color LIGHT BROWN Odor STRONG HYDROCARBON ODOR Appearance TURBID SUSPENDED FREE PRODUCT Temperature 18°C °F/°C

Other (specific ion; OVA; HNU; etc.) 9 PPM TO 1.0 PPM PHOTO IONIZATION METER

Specific Conductance, umhos/cm 1800 pH 6.30

Sampling Method and Material FACET IN DISCHARGE LINE

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
BTEX 8020	(2) 40 ML VIALS	HCL/Na_2SO_3
SEMIVOLATILES 8270	(2) 1L AMBER GLASS	Na_2SO_3
AS, CR, FE, PB	(1) 500 ML PLASTIC	HNO_3
TOTAL CN	(1) 500 ML PLASTIC	NAOH
FREE CN	(1) 1L PLASTIC	NAOH

Remarks SAMPLE COLLECTED AFTER 45 MIN OF PUMPING AT 2GPM

Sampling Personnel DOUG MEHAN

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE 1B

WATER SAMPLING LOG

ORIGINAL (Red)

Project/No. MD057.08 Page 1 of 1

Site Location NORFOLK GAS PLANT

Site/Well No. RW-24B Coded/ Replicate No. _____ Date 3.23.93

Weather CLOUDY 50°F Time Sampling Began 2:00 PM Time Sampling Completed 3:00 PM

EVACUATION DATA

Description of Measuring Point (MP) collected during pumping test

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP _____ Water-Level Elevation _____

Held _____ Depth to Water Below MP _____ Diameter of Casing _____

Wet _____ Water Column in Well _____ Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method SUBMERSIBLE PUMP during pumping test

SAMPLING DATA/FIELD PARAMETERS

Color BROWN Odor STRONG HYDROCARBON Appearance TURBID Suspended Temperature 68.4 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm 1820 pH 6.38

Sampling Method and Material FACET IN DISCHARGE LINE

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
BTEX 8020	(2) 40ml	
Semi volitiles 8270	(2) 1L Amber glass	
As, CR, FE, Pb	(1) 500 ml PLASTIC	
TOTAL CN	(1) 500 ml PLAST	
FREE CN (SEE REVERSE	(1) 1 L PLASTIC	

Remarks _____

Sampling Personnel JOHN ELSTNER

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

Sample 1 C

PEE ORIGINAL ORIGINAL

WATER SAMPLING LOG

Project/No. MD057.08 Page ____ of ____

Site Location Norfolk MGP

Site/Well No. RW-24B Coded/ Replicate No. ____ Date 3-23-93

Weather CLOUDY 50°F Time Sampling Began 9:25 Time Sampling Completed 9:50

EVACUATION DATA

Description of Measuring Point (MP) ____

Height of MP Above/Below Land Surface ____ MP Elevation ____

Total Sounded Depth of Well Below MP ____ Water-Level Elevation ____

Held ____ Depth to Water Below MP ____ Diameter of Casing 2 GPM x 12 HRS

Wet ____ Water Column in Well ____ Gallons Pumped/Bailed Prior to Sampling ____

Gallons per Foot ____

Gallons in Well ____ Sampling Pump Intake Setting (feet below land surface) ____

Evacuation Method Submersible Pump During Pump test

SAMPLING DATA/FIELD PARAMETERS

Color BROWN Odor STRONG HYDROCARBON Appearance TURBID-FREEPRODUCT THROUGHOUT SAMPLE Temperature 17.5 °F/°C

Other (specific ion; OVA; HNU; etc.) ____

Specific Conductance, umhos/cm METER NOT WORKING pH 6.09

Sampling Method and Material Faucet in discharge line

Constituents Sampled	Container Description From Lab ☒ or G&M ____	Preservative
BTEX 8020	(2) 40 ml amber glass	HCl / Na_2SO_3
Semivolatiles 8270	(2) 1 liter amber glass	Na_2SO_3
AS, CR, FE, PB	(1) 500 ml plastic	HNO_3
Total CN	(1) 500 ml plastic	NaOH
Free CN	(1) 1 liter plastic	NaOH

Remarks Sample collected after 12 hours pumping at 2 GPM

Sampling Personnel Al Hannum / Jim Shilliday

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE ID

WATER SAMPLING LOG

PFE

ORIGINAL

Project/No. MD5708 Page 1 of 1

Site Location NORFOLK MGP

Site/Well No. RW-24B Coded/ Replicate No. _____ Date 3-24-93

Weather RAINING Time Sampling Began 5:40 AM Time Sampling Completed 6:00 AM

EVACUATION DATA

Description of Measuring Point (MP) _____

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP _____ Water-Level Elevation _____

Held _____ Depth to Water Below MP _____ Diameter of Casing _____

Wet _____ Water Column in Well _____ Gallons Pumped/Bailed Prior to Sampling 2 GPM x 1230 MIN

Gallons per Foot _____

Gallons in Well _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method SUBMERSIBLE PUMP DURING PUMP TEST

SAMPLING DATA/FIELD PARAMETERS

Color BROWN Odor STRONG H-CARBON Appearance FREE PRODUCT TURBID Temperature 16.7 °F (°C)

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm METER NOT WORKING pH 6.25

Sampling Method and Material FAUCET IN DISCHARGE LINE

SAME AS 1A, 1B, & 1C

Constituents Sampled	Container Description From Lab or G&M	Preservative

Remarks _____

Sampling Personnel A. HAUNUM & J. SHILLIDAY

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE 2A

PFE ORIGINAL

WATER SAMPLING LOG

Project/No. MD057.08 Page 1 of 1

Site Location Norfolk MGP

Site/Well No. RW-23 Coded/ Replicate No. _____ Date 3-24-93

Weather RAIN Time Sampling Began 10:30 Time Sampling Completed 11:00

EVACUATION DATA

Description of Measuring Point (MP) sample collected during pumping test

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP _____ Water-Level Elevation _____

Held _____ Depth to Water Below MP _____ Diameter of Casing _____

Wet _____ Water Column in Well _____ Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method Submersible pump

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor Hydrocarbon Appearance Clear Temperature 14 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm — pH 7.26

Sampling Method and Material Spigot in discharge line

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
SAME AS	1A	

Remarks _____

Sampling Personnel Hannum

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

SAMPLE 2B

GERAGHTY & MILLER, INC.
Environmental Services

PFE ORIGINAL

WATER SAMPLING LOG

Project/No. MD05708 Page 1 of 1

Site Location Norfolk MGP

Site/Well No. RW-23 Coded/ Replicate No. _____ Date 3-24-93

Weather ~60°; Overcast Time Sampling Began 1320 Time Sampling Completed 1400

EVACUATION DATA

Description of Measuring Point (MP) sample collected during pumping test

Height of MP Above/Below Land Surface _____ MP Elevation _____

Total Sounded Depth of Well Below MP _____ Water-Level Elevation _____

Held _____ Depth to Water Below MP _____ Diameter of Casing _____

Wet _____ Water Column in Well _____ Gallons Pumped/Bailed Prior to Sampling _____

Gallons per Foot _____

Gallons in Well _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method _____

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor Coal Tar Appearance Clear w/sheen Temperature 59.8 °F/°C

Other (specific ion; OVA; HNU; etc.) _____

Specific Conductance, umhos/cm Meter Not Working pH 6.92

Sampling Method and Material _____

Constituents Sampled	Container Description From Lab ____ or G&M ____	Preservative
BTEX 8020	(2) 40 ml	
Sem Volatiles 8270	(2) 1L Amber glass	
ASER, FE, Pb	(1) 500 ml Plastic	
TOTAL CN	(1) 500 ml Plastic	
FREE CN.	(1) 1L Plast	

Remarks _____

Sampling Personnel J. A. ELSTNER

WELL CASING VOLUMES

GAL./FT.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

ORIGINAL (Red)

APPENDIX G

ORIGINAL (Red)

APPENDIX G

AQUIFER TEST DISCHARGE ANALYTICAL RESULTS

April 5, 1993

PFE
ORIGINAL
(Red)

SUBMITTED BY:

James R. Reed and Associates, Inc.
11864 Canon Blvd., Suite 103
Newport News, VA 23606

RECEIVED
APR 12 1993
GERAGHTY & MILLER, INC.
ANNAPOLIS, MD.

Geraghty & Miller
Attn: Doug Mehan
180 Admiral Cochrane Drive Suite 300
Annapolis, Maryland 21401

Sample Identification: 1A, 1B, 1C, 1D, 2A, 2B
RE: MD05708

Sample Received: 03/24/93 @ 17:00
Sample Collected: See attachments

Respectfully,

Carol Isenhour
Vice President

JRA:sms

April 5, 1993

SUBMITTED BY:

Geraghty & Miller
Attn: Doug Mehan
180 Admiral Cochrane Drive Suite 300
Annapolis, Maryland 21401

James R. Reed and Associates, Inc.
11864 Canon Blvd., Suite 103
Newport News, Virginia 23606
(804)873-4703

Samples Received: 03/24/93 @ 17:00
Samples Collected: 03/23/93 @ 10:05
RE: MD05708
Sample Identification: 1A
JRA No.: 93-2477

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS				
N-nitrosodimethylamine	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Bis (2-chloroethyl) ether	8270	0.250	<0.250	CL-03/29/93 @ 08:54
1,3-dichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
1,4-dichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
1,2-dichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Bis (2-chloroisopropyl) ether	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Hexachloroethane	8270	0.250	<0.250	CL-03/29/93 @ 08:54
N-nitroso-di-n-propylamine	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Nitrobenzene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Isophorone	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Bis (2-Chloroethoxy) methane	8270	0.250	<0.250	CL-03/29/93 @ 08:54
1,2,4-trichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Napthalene	8270	0.250	160	CL-03/29/93 @ 08:54
Hexachlorobutadiene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Hexachlorocyclopentadiene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
2-chloronapthalene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Acenapthylene	8270	0.250	3.4	CL-03/29/93 @ 08:54
Dimethyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 08:54
2,6-dinitrotoluene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Acenapthene	8270	0.250	0.15	CL-03/29/93 @ 08:54
2,4-dinitrotoluene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Fluorene	8270	0.250	1.2	CL-03/29/93 @ 08:54
4-chlorophenyl phenyl ether	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Diethyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 08:54
1,2-diphenylhydrazine	8270	0.250	<0.250	CL-03/29/93 @ 08:54
N-nitrosodiphenylamine	8270	0.250	<0.250	CL-03/29/93 @ 08:54

PFE

ORIGINAL

REED & ASSOCIATES ORIGINAL

JRA No.: 93-2477

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS (cont.)				
4-bromophenyl phenyl ether	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Hexachlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Phenanthrene	8270	0.250	33.6	CL-03/29/93 @ 08:54
Anthracene	8270	0.250	13.1	CL-03/29/93 @ 08:54
Di-n-butyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Fluoranthene	8270	0.250	9.7	CL-03/29/93 @ 08:54
Pyrene	8270	0.250	17.1	CL-03/29/93 @ 08:54
Benzidine	8270	1.000*	<1.000	CL-03/29/93 @ 08:54
Butyl benzyl phthalate	8270	0.250*	<0.250	CL-03/29/93 @ 08:54
Benzo (a) anthracene	8270	0.250*	6.5	CL-03/29/93 @ 08:54
Chrysene	8270	0.250*	4.8	CL-03/29/93 @ 08:54
3,3'-dichlorobenzidine	8270	1.000*	<1.000	CL-03/29/93 @ 08:54
Bis (2-ethylhexyl) phthalate	8270	0.250*	<0.250	CL-03/29/93 @ 08:54
Di-n-octyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Benzo (b) fluoranthene	8270	0.250	7.5	CL-03/29/93 @ 08:54
Benzo (K) fluoranthene	8270	0.250	1.4	CL-03/29/93 @ 08:54
Benzo (a) pyrene	8270	0.250	4.8	CL-03/29/93 @ 08:54
Indeno (1,2,3-cd) pyrene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Dibenzo (a,h) anthracene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
Benzo (ghi) perylene	8270	0.250	<0.250	CL-03/29/93 @ 08:54
TCDD-Dioxin	8270	N/A	not detected	CL-03/29/93 @ 08:54

*Normal detection limits cannot be reached due to sample matrix.

ACID EXTRACTABLES				
2-Chlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 14:47
Phenol	8270	0.005	0.024	CL-03/28/93 @ 14:47
2-nitrophenol	8270	0.005	<0.005	CL-03/28/93 @ 14:47
2,4-Dimethylphenol	8270	0.005	0.023	CL-03/28/93 @ 14:47
2,4-Dichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 14:47
4-chloro-3-methylphenol	8270	0.005	<0.005	CL-03/28/93 @ 14:47
2,4,6-trichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 14:47
2,4-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 14:47
4-nitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 14:47
2-methyl-4,6-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 14:47
Pentachlorophenol	8270	0.020	<0.020	CL-03/28/93 @ 14:47
BTEX				
Benzene	8020	0.500*	41	CP-03/29/93 @ 21:24
Toluene	8020	0.500*	9.5	CP-03/29/93 @ 21:24
Ethylbenzene	8020	0.500*	10	CP-03/29/93 @ 21:24
Xylenes	8020	0.500*	11.5	CP-03/29/93 @ 21:24

*Normal detection limits cannot be reached due to sample matrix.

PFE

ORIGINAL (Red)

REED & ASSOCIATES

ORIGINAL (Red)

JRA No.: 93-2477

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
Arsenic	206.2	0.001	0.064	FPE-04/01/93 @ 15:05
Chromium	218.2	0.001	0.005	FPE-03/26/93 @ 13:30
Iron	236.1	1	10	SKH-04/05/93 @ 07:00
Lead	239.2	0.001	0.013	FPE-03/26/93 @ 10:00
Total Cyanide	335.3	0.02	0.41	MAF-03/30/93 @ 22:54
Free Cyanide	SM/16/412H	0.01	0.26	MAF-04/02/93 @ 16:48

April 5, 1993

SUBMITTED BY:

Geraghty & Miller
Attn: Doug Mehan
180 Admiral Cochrane Drive Suite 300
Annapolis, Maryland 21401

James R. Reed and Associates, Inc.
11864 Canon Blvd., Suite 103
Newport News, Virginia 23606
(804)873-4703

Samples Received: 03/24/93 @ 17:00
Samples Collected: 03/23/93 @ 15:00
RE: MD05708
Sample Identification: 1B
JRA No.: 93-2478

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS*				
N-nitrosodimethylamine	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Bis (2-chloroethyl) ether	8270	0.250	<0.250	CL-03/29/93 @ 11:24
1,3-dichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
1,4-dichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
1,2-dichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Bis (2-chloroisopropyl) ether	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Hexachloroethane	8270	0.250	<0.250	CL-03/29/93 @ 11:24
N-nitroso-di-n-propylamine	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Nitrobenzene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Isophorone	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Bis (2-Chloroethoxy) methane	8270	0.250	<0.250	CL-03/29/93 @ 11:24
1,2,4-trichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Napthalene	8270	0.250	95	CL-03/29/93 @ 11:24
Hexachlorobutadiene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Hexachlorocyclopentadiene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
2-chloronapthalene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Acenapthylene	8270	0.250	1.3	CL-03/29/93 @ 11:24
Dimethyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 11:24
2,6-dinitrotoluene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Acenapthene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
2,4-dinitrotoluene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Fluorene	8270	0.250	8.0	CL-03/29/93 @ 11:24
4-chlorophenyl phenyl ether	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Diethyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 11:24
1,2-diphenylhydrazine	8270	0.250	<0.250	CL-03/29/93 @ 11:24
N-nitrosodiphenylamine	8270	0.250	<0.250	CL-03/29/93 @ 11:24

PFE ORIGINAL (Red) REED & ASSOCIATES ORIGINAL (Red)

JRA No.: 93-2478

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS (cont.)				
4-bromophenyl phenyl ether	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Hexachlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Phenanthrene	8270	0.250	20	CL-03/29/93 @ 11:24
Anthracene	8270	0.250	6.1	CL-03/29/93 @ 11:24
Di-n-butyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Fluoranthene	8270	0.250	6.3	CL-03/29/93 @ 11:24
Pyrene	8270	0.250	12.2	CL-03/29/93 @ 11:24
Benzidine	8270	1.000	<1.000	CL-03/29/93 @ 11:24
Butyl benzyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Benzo (a) anthracene	8270	0.250	4.2	CL-03/29/93 @ 11:24
Chrysene	8270	0.250	2.6	CL-03/29/93 @ 11:24
3,3'-dichlorobenzidine	8270	1.000	<1.000	CL-03/29/93 @ 11:24
Bis (2-ethylhexyl) phthalate	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Di-n-octyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Benzo (b) fluoranthene	8270	0.250	2.8	CL-03/29/93 @ 11:24
Benzo (K) fluoranthene	8270	0.250	0.63	CL-03/29/93 @ 11:24
Benzo (a) pyrene	8270	0.250	2.2	CL-03/29/93 @ 11:24
Indeno (1,2,3-cd) pyrene	8270	0.250	1.6	CL-03/29/93 @ 11:24
Dibenzo (a,h) anthracene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
Benzo (ghi) perylene	8270	0.250	<0.250	CL-03/29/93 @ 11:24
TCDD-Dioxin	8270	N/A	not detected	CL-03/29/93 @ 11:24

*Normal detection limits cannot be reached due to sample matrix.

ACID EXTRACTABLES				
2-Chlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 15:45
Phenol	8270	0.005	0.014	CL-03/28/93 @ 15:45
2-nitrophenol	8270	0.005	<0.005	CL-03/28/93 @ 15:45
2,4-Dimethylphenol	8270	0.005	0.020	CL-03/28/93 @ 15:45
2,4-Dichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 15:45
4-chloro-3-methylphenol	8270	0.005	<0.005	CL-03/28/93 @ 15:45
2,4,6-trichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 15:45
2,4-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 15:45
4-nitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 15:45
2-methyl-4,6-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 15:45
Pentachlorophenol	8270	0.020	<0.020	CL-03/28/93 @ 15:45
BTEX				
Benzene	8020	0.500*	40	CP-03/29/93 @ 22:06
Toluene	8020	0.500*	9.5	CP-03/29/93 @ 22:06
Ethylbenzene	8020	0.500*	5.0	CP-03/29/93 @ 22:06
Xylenes	8020	0.500*	5.5	CP-03/29/93 @ 22:06

*Normal detection limits cannot be reached due to sample matrix.

PFE REED & ASSOCIATES ORIGINAL (Red)

JRA No.: 93-2478

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
Arsenic	206.2	0.001	0.032	FPE-04/01/93 @ 13:52
Chromium	218.2	0.001	0.004	FPE-03/26/93 @ 13:30
Iron	236.1	1	11	SKH-04/05/93 @ 07:00
Lead	239.2	0.001	0.007	FPE-03/26/93 @ 10:00
Total Cyanide	335.3	0.02	0.46	MAF-03/30/93 @ 22:54
Free Cyanide	SM/16/412H	0.01	0.13	MAF-04/02/93 @ 16:48
Magnesium	242.1	2	29	SKH-03/27/93 @ 09:00
Manganese	243.1	0.02	0.78	SKH-04/05/93 @ 08:00
Sodium	273.1	1	69	SKH-03/26/93 @ 09:30
Total Hardness	130.2	1	570	FPE-03/25/93 @ 11:15
Calcium	215.2	2	178	CSA-03/31/93 @ 15:00
Silicon	6010	0.3	23.4	LAN(RSJ)04/06/93 @ 1800
Chloride	325.3	1	49	FPE-03/31/93 @ 16:15
Sulfate	375.4	5	<5	FPE-03/30/93 @ 12:30
BOD_5	401.5	1.0	22	SW-03/25/93 @ 13:05
Total Suspended Solids	160.2	1	354*	CSA-03/29/93 @ 09:05
Total Dissolved Solids	160.1	10	1090	CSA/CL-03/25/93 @ 10:30

*Sample had a considerable layer of oil. It was mixed well and crucible was dried to a constant second weight.

April 5, 1993

SUBMITTED BY: PFE ORIGINAL (Red) REED & ASSOCIATES

Geraghty & Miller
Attn: Doug Mehan
180 Admiral Cochrane Drive Suite 300
Annapolis, Maryland 21401

James R. Reed and Associates, Inc.
11864 Canon Blvd., Suite 103
Newport News, Virginia 23606
(804)873-4703

Samples Received: 03/24/93 @ 17:00
Samples Collected: 03/23/93 @ 09:25
RE: MD05708
Sample Identification: 1C
JRA No.: 93-2479

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS*				
N-nitrosodimethylamine	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Bis (2-chloroethyl) ether	8270	0.500	<0.500	CL-03/29/93 @ 12:29
1,3-dichlorobenzene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
1,4-dichlorobenzene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
1,2-dichlorobenzene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Bis (2-chloroisopropyl) ether	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Hexachloroethane	8270	0.500	<0.500	CL-03/29/93 @ 12:29
N-nitroso-di-n-propylamine	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Nitrobenzene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Isophorone	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Bis (2-Chloroethoxy) methane	8270	0.500	<0.500	CL-03/29/93 @ 12:29
1,2,4-trichlorobenzene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Napthalene	8270	0.500	240	CL-03/29/93 @ 12:29
Hexachlorobutadiene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Hexachlorocyclopentadiene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
2-chloronapthalene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Acenapthylene	8270	0.500	17.4	CL-03/29/93 @ 12:29
Dimethyl phthalate	8270	0.500	<0.500	CL-03/29/93 @ 12:29
2,6-dinitrotoluene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Acenapthene	8270	0.500	76.2	CL-03/29/93 @ 12:29
2,4-dinitrotoluene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Fluorene	8270	0.500	49.6	CL-03/29/93 @ 12:29
4-chlorophenyl phenyl ether	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Diethyl phthalate	8270	0.500	<0.500	CL-03/29/93 @ 12:29
1,2-diphenylhydrazine	8270	0.500	<0.500	CL-03/29/93 @ 12:29
N-nitrosodiphenylamine	8270	0.500	<0.500	CL-03/29/93 @ 12:29

*Normal detection limits cannot be reached due to sample matrix.

JRA No.: 93-2479

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS (cont.)*				
4-bromophenyl phenyl ether	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Hexachlorobenzene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Phenanthrene	8270	0.500	2.8	CL-03/29/93 @ 12:29
Anthracene	8270	0.500	137	CL-03/29/93 @ 12:29
Di-n-butyl phthalate	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Fluoranthene	8270	0.500	208	CL-03/29/93 @ 12:29
Pyrene	8270	0.500	64	CL-03/29/93 @ 12:29
Benzidine	8270	2.000	<2.000	CL-03/29/93 @ 12:29
Butyl benzyl phthalate	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Benzo (a) anthracene	8270	0.500	5.6	CL-03/29/93 @ 12:29
Chrysene	8270	0.500	21.2	CL-03/29/93 @ 12:29
3,3'-dichlorobenzidine	8270	2.000	<2.000	CL-03/29/93 @ 12:29
Bis (2-ethylhexyl) phthalate	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Di-n-octyl phthalate	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Benzo (b) fluoranthene	8270	0.500	30	CL-03/29/93 @ 12:29
Benzo (K) fluoranthene	8270	0.500	4.6	CL-03/29/93 @ 12:29
Benzo (a) pyrene	8270	0.500	17.5	CL-03/29/93 @ 12:29
Indeno (1,2,3-cd) pyrene	8270	0.500	7.9	CL-03/29/93 @ 12:29
Dibenzo (a,h) anthracene	8270	0.500	<0.500	CL-03/29/93 @ 12:29
Benzo (ghi) perylene	8270	0.500	4.0	CL-03/29/93 @ 12:29
TCDD-Dioxin	8270	N/A	not detected	CL-03/29/93 @ 12:29

*Normal detection limits cannot be reached due to sample matrix.

ACID EXTRACTABLES				
2-Chlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 16:52
Phenol	8270	0.005	0.026	CL-03/28/93 @ 16:52
2-nitrophenol	8270	0.005	<0.005	CL-03/28/93 @ 16:52
2,4-Dimethylphenol	8270	0.005	0.029	CL-03/28/93 @ 16:52
2,4-Dichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 16:52
4-chloro-3-methylphenol	8270	0.005	<0.005	CL-03/28/93 @ 16:52
2,4,6-trichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 16:52
2,4-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 16:52
4-nitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 16:52
2-methyl-4,6-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 16:52
Pentachlorophenol	8270	0.020	<0.020	CL-03/28/93 @ 16:52
BTEX				
Benzene	8020	0.500*	39	CP-03/29/93 @ 22:47
Toluene	8020	0.500*	9.0	CP-03/29/93 @ 22:47
Ethylbenzene	8020	0.500*	8.5	CP-03/29/93 @ 22:47
Xylenes	8020	0.500*	9.0	CP-03/29/93 @ 22:47

*Normal detection limits cannot be reached due to sample matrix.

PFE ORIGINAL (Red)

REED & ASSOCIATES

JRA No.: 93-2479

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
Arsenic	206.2	0.001	0.031	FPE-04/01/93 @ 14:01
Chromium	218.2	0.001	0.006	FPE-03/26/93 @ 13:30
Iron	236.1	1	12	SKH-04/05/93 @ 07:00
Lead	239.2	0.001	0.012	FPE-03/26/93 @ 10:00
Total Cyanide	335.3	0.01	0.24	MAF-04/02/93 @ 16:48
Free Cyanide**	SM/16/412H	0.01	0.39	MAF-04/02/93 @ 16:48

**Free Cyanide has possible positive interference due to reactions during sample preparation.

April 5, 1993

SUBMITTED BY: ORIGINAL (Red)

Geraghty & Miller
Attn: Doug Mehan
180 Admiral Cochrane Drive Suite 300
Annapolis, Maryland 21401

James R. Reed and Associates, Inc.
11864 Canon Blvd., Suite 103
Newport News, Virginia 23606
(804)873-4703

Samples Received: 03/24/93 @ 17:00
Samples Collected: 03/24/93 @ 17:40
RE: MD05708
Sample Identification: 1D
JRA No.: 93-2480

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS*				
N-nitrosodimethylamine	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Bis (2-chloroethyl) ether	8270	0.250	<0.250	CL-03/29/93 @ 13:34
1,3-dichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
1,4-dichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
1,2-dichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Bis (2-chloroisopropyl) ether	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Hexachloroethane	8270	0.250	<0.250	CL-03/29/93 @ 13:34
N-nitroso-di-n-propylamine	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Nitrobenzene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Isophorone	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Bis (2-Chloroethoxy) methane	8270	0.250	<0.250	CL-03/29/93 @ 13:34
1,2,4-trichlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Napthalene	8270	0.250	122	CL-03/29/93 @ 13:34
Hexachlorobutadiene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Hexachlorocyclopentadiene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
2-chloronapthalene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Acenapthylene	8270	0.250	10	CL-03/29/93 @ 13:34
Dimethyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 13:34
2,6-dinitrotoluene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Acenapthene	8270	0.250	36	CL-03/29/93 @ 13:34
2,4-dinitrotoluene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Fluorene	8270	0.250	26.6	CL-03/29/93 @ 13:34
4-chlorophenyl phenyl ether	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Diethyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 13:34
1,2-diphenylhydrazine	8270	0.250	<0.250	CL-03/29/93 @ 13:34
N-nitrosodiphenylamine	8270	0.250	<0.250	CL-03/29/93 @ 13:34

*Normal detection limits cannot be reached due to sample matrix.

JRA No.: 93-2480

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS (cont.)*				
4-bromophenyl phenyl ether	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Hexachlorobenzene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Phenanthrene	8270	0.250	1.1	CL-03/29/93 @ 13:34
Anthracene	8270	0.250	107	CL-03/29/93 @ 13:34
Di-n-butyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Fluoranthene	8270	0.250	26.3	CL-03/29/93 @ 13:34
Pyrene	8270	0.250	49.5	CL-03/29/93 @ 13:34
Benzidine	8270	1.000	<1.000	CL-03/29/93 @ 13:34
Butyl benzyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Benzo (a) anthracene	8270	0.250	3.3	CL-03/29/93 @ 13:34
Chrysene	8270	0.250	9.4	CL-03/29/93 @ 13:34
3,3'-dichlorobenzidine	8270	1.000	<1.000	CL-03/29/93 @ 13:34
Bis (2-ethylhexyl) phthalate	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Di-n-octyl phthalate	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Benzo (b) fluoranthene	8270	0.250	12.2	CL-03/29/93 @ 13:34
Benzo (K) fluoranthene	8270	0.250	2.1	CL-03/29/93 @ 13:34
Benzo (a) pyrene	8270	0.250	7.8	CL-03/29/93 @ 13:34
Indeno (1,2,3-cd) pyrene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Dibenzo (a,h) anthracene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
Benzo (ghi) perylene	8270	0.250	<0.250	CL-03/29/93 @ 13:34
TCDD-Dioxin	8270	N/A	not detected	CL-03/29/93 @ 13:34

*Normal detection limits cannot be reached due to sample matrix.

ACID EXTRACTABLES				
2-Chlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 17:55
Phenol	8270	0.005	0.044	CL-03/28/93 @ 17:55
2-nitrophenol	8270	0.005	<0.005	CL-03/28/93 @ 17:55
2,4-Dimethylphenol	8270	0.005	0.033	CL-03/28/93 @ 17:55
2,4-Dichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 17:55
4-chloro-3-methylphenol	8270	0.005	<0.005	CL-03/28/93 @ 17:55
2,4,6-trichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 17:55
2,4-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 17:55
4-nitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 17:55
2-methyl-4,6-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 17:55
Pentachlorophenol	8270	0.020	<0.020	CL-03/28/93 @ 17:55
BTEX				
Benzene	8020	0.500*	38	CP-03/29/93 @ 22:47
Toluene	8020	0.500*	8.5	CP-03/29/93 @ 22:47
Ethylbenzene	8020	0.500*	4.5	CP-03/29/93 @ 22:47
Xylenes	8020	0.500*	3.5	CP-03/29/93 @ 22:47

*Normal detection limits cannot be reached due to sample matrix.

PFE

ORIGINAL (Red)

REED & ASSOCIATES

ORIGINAL (Red)

JRA No.: 93-2480

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
Arsenic	206.2	0.001	0.021	FPE-04/01/93 @ 14:06
Chromium	218.2	0.001	0.006	FPE-03/26/93 @ 13:30
Iron	236.1	1	10	SKH-04/05/93 @ 07:00
Lead	239.2	0.001	0.008	FPE-03/26/93 @ 10:00
Total Cyanide	335.3	0.01	0.36	MAF-04/02/93 @ 16:48
Free Cyanide	SM/16/412H	0.01	<0.01	MAF-04/02/93 @ 16:48

April 5, 1993

SUBMITTED BY:

PFE ORIGINAL (Red)

REED & ASSOCIATES ORIGINAL (Red)

Geraghty & Miller
Attn: Doug Mehan
180 Admiral Cochrane Drive Suite 300
Annapolis, Maryland 21401

James R. Reed and Associates, Inc.
11864 Canon Blvd., Suite 103
Newport News, Virginia 23606
(804)873-4703

Samples Received: 03/24/93 @ 17:00
Samples Collected: 03/24/93 @ 10:00
RE: MD05708
Sample Identification: 2A
JRA No.: 93-2481

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS*				
N-nitrosodimethylamine	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Bis (2-chloroethyl) ether	8270	0.005	<0.005	CL-03/29/93 @ 12:46
1,3-dichlorobenzene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
1,4-dichlorobenzene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
1,2-dichlorobenzene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Bis (2-chloroisopropyl) ether	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Hexachloroethane	8270	0.005	<0.005	CL-03/29/93 @ 12:46
N-nitroso-di-n-propylamine	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Nitrobenzene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Isophorone	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Bis (2-Chloroethoxy) methane	8270	0.005	<0.005	CL-03/29/93 @ 12:46
1,2,4-trichlorobenzene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Napthalene	8270	0.005	5.6	CL-03/29/93 @ 12:46
Hexachlorobutadiene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Hexachlorocyclopentadiene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
2-chloronapthalene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Acenapthylene	8270	0.005	0.022	CL-03/29/93 @ 12:46
Dimethyl phthalate	8270	0.005	<0.005	CL-03/29/93 @ 12:46
2,6-dinitrotoluene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Acenapthene	8270	0.005	0.25	CL-03/29/93 @ 12:46
2,4-dinitrotoluene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Fluorene	8270	0.005	0.058	CL-03/29/93 @ 12:46
4-chlorophenyl phenyl ether	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Diethyl phthalate	8270	0.005	<0.005	CL-03/29/93 @ 12:46
1,2-diphenylhydrazine	8270	0.005	<0.005	CL-03/29/93 @ 12:46
N-nitrosodiphenylamine	8270	0.005	<0.005	CL-03/29/93 @ 12:46

*Normal detection limits cannot be reached due to sample matrix.

PFE ORIGINAL (Red)

REED & ASSOCIATES ORIGINAL (Red)

JRA No.: 93-2481

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS (cont.)*				
4-bromophenyl phenyl ether	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Hexachlorobenzene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Phenanthrene	8270	0.005	0.056	CL-03/29/93 @ 12:46
Anthracene	8270	0.005	0.010	CL-03/29/93 @ 12:46
Di-n-butyl phthalate	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Fluoranthene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Pyrene	8270	0.005	0.006	CL-03/29/93 @ 12:46
Benzidine	8270	0.020	<0.020	CL-03/29/93 @ 12:46
Butyl benzyl phthalate	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Benzo (a) anthracene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Chrysene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
3,3'-dichlorobenzidine	8270	0.020	<0.020	CL-03/29/93 @ 12:46
Bis (2-ethylhexyl) phthalate	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Di-n-octyl phthalate	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Benzo (b) fluoranthene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Benzo (K) fluoranthene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Benzo (a) pyrene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Indeno (1,2,3-cd) pyrene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Dibenzo (a,h) anthracene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
Benzo (ghi) perylene	8270	0.005	<0.005	CL-03/29/93 @ 12:46
TCDD-Dioxin	8270	N/A	not detected	CL-03/29/93 @ 12:46

*Normal detection limits cannot be reached due to sample matrix.

ACID EXTRACTABLES				
2-Chlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 12:46
Phenol	8270	0.005	<0.005	CL-03/28/93 @ 12:46
2-nitrophenol	8270	0.005	<0.005	CL-03/28/93 @ 12:46
2,4-Dimethylphenol	8270	0.005	<0.005	CL-03/28/93 @ 12:46
2,4-Dichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 12:46
4-chloro-3-methylphenol	8270	0.005	<0.005	CL-03/28/93 @ 12:46
2,4,6-trichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 12:46
2,4-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 12:46
4-nitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 12:46
2-methyl-4,6-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 12:46
Pentachlorophenol	8270	0.020	<0.020	CL-03/28/93 @ 12:46
BTEX				
Benzene	8020	0.500*	1.5	CP-03/30/93 @ 00:09
Toluene	8020	0.500*	<0.500	CP-03/30/93 @ 00:09
Ethylbenzene	8020	0.500*	0.500	CP-03/30/93 @ 00:09
Xylenes	8020	0.500*	<0.500	CP-03/30/93 @ 00:09

*Normal detection limits cannot be reached due to sample matrix.

PFE

ORIGINAL (Red)

REED & ASSOCIATES

ORIGINAL (Red)

JRA No.: 93-2481

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
Arsenic	206.2	0.001	<0.001	FPE-04/01/93 @ 14:24
Chromium	218.2	0.001	0.002	FPE-03/26/93 @ 13:30
Iron	236.1	1	0.7	SKH-04/05/93 @ 07:00
Lead	239.2	0.001	0.023	FPE-03/26/93 @ 10:00
Total Cyanide	335.3	0.01	0.187	MAF-03/30/93 @ 22:54
Free Cyanide	SM/16/412H	0.01	0.035	MAF-04/02/93 @ 16:48

April 5, 1993

SUBMITTED BY:

PFE ORIGINAL (Red)

REED & ASSOCIATES

ORIGINAL (Red)

Geraghty & Miller
Attn: Doug Mehan
180 Admiral Cochrane Drive Suite 300
Annapolis, Maryland 21401

James R. Reed and Associates, Inc.
11864 Canon Blvd., Suite 103
Newport News, Virginia 23606
(804)873-4703

Samples Received: 03/24/93 @ 17:00
Samples Collected: 03/24/93 @ 14:00
RE: MD05708
Sample Identification: 2B
JRA No.: 93-2482

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS*				
N-nitrosodimethylamine	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Bis (2-chloroethyl) ether	8270	0.005	<0.005	CL-03/29/93 @ 13:44
1,3-dichlorobenzene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
1,4-dichlorobenzene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
1,2-dichlorobenzene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Bis (2-chloroisopropyl) ether	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Hexachloroethane	8270	0.005	<0.005	CL-03/29/93 @ 13:44
N-nitroso-di-n-propylamine	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Nitrobenzene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Isophorone	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Bis (2-Chloroethoxy) methane	8270	0.005	<0.005	CL-03/29/93 @ 13:44
1,2,4-trichlorobenzene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Napthalene	8270	0.005	6.8	CL-03/29/93 @ 13:44
Hexachlorobutadiene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Hexachlorocyclopentadiene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
2-chloronapthalene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Acenapthylene	8270	0.005	0.026	CL-03/29/93 @ 13:44
Dimethyl phthalate	8270	0.005	<0.005	CL-03/29/93 @ 13:44
2,6-dinitrotoluene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Acenapthene	8270	0.005	0.28	CL-03/29/93 @ 13:44
2,4-dinitrotoluene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Fluorene	8270	0.005	0.068	CL-03/29/93 @ 13:44
4-chlorophenyl phenyl ether	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Diethyl phthalate	8270	0.005	<0.005	CL-03/29/93 @ 13:44
1,2-diphenylhydrazine	8270	0.005	<0.005	CL-03/29/93 @ 13:44
N-nitrosodiphenylamine	8270	0.005	<0.005	CL-03/29/93 @ 13:44

*Normal detection limits cannot be reached due to sample matrix.

JRA No.: 93-2482

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
BASE NEUTRALS (cont.)*				
4-bromophenyl phenyl ether	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Hexachlorobenzene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Phenanthrene	8270	0.005	0.076	CL-03/29/93 @ 13:44
Anthracene	8270	0.005	0.016	CL-03/29/93 @ 13:44
Di-n-butyl phthalate	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Fluoranthene	8270	0.005	0.006	CL-03/29/93 @ 13:44
Pyrene	8270	0.005	0.014	CL-03/29/93 @ 13:44
Benzidine	8270	0.020	<0.020	CL-03/29/93 @ 13:44
Butyl benzyl phthalate	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Benzo (a) anthracene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Chrysene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
3,3'-dichlorobenzidine	8270	0.020	<0.020	CL-03/29/93 @ 13:44
Bis (2-ethylhexyl) phthalate	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Di-n-octyl phthalate	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Benzo (b) fluoranthene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Benzo (K) fluoranthene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Benzo (a) pyrene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Indeno (1,2,3-cd) pyrene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Dibenzo (a,h) anthracene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
Benzo (ghi) perylene	8270	0.005	<0.005	CL-03/29/93 @ 13:44
TCDD-Dioxin	8270	N/A	not detected	CL-03/29/93 @ 13:44

*Normal detection limits cannot be reached due to sample matrix.

ACID EXTRACTABLES				
2-Chlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 13:44
Phenol	8270	0.005	<0.005	CL-03/28/93 @ 13:44
2-nitrophenol	8270	0.005	<0.005	CL-03/28/93 @ 13:44
2,4-Dimethylphenol	8270	0.005	<0.005	CL-03/28/93 @ 13:44
2,4-Dichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 13:44
4-chloro-3-methylphenol	8270	0.005	<0.005	CL-03/28/93 @ 13:44
2,4,6-trichlorophenol	8270	0.005	<0.005	CL-03/28/93 @ 13:44
2,4-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 13:44
4-nitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 13:44
2-methyl-4,6-dinitrophenol	8270	0.020	<0.020	CL-03/28/93 @ 13:44
Pentachlorophenol	8270	0.020	<0.020	CL-03/28/93 @ 13:44
BTEX				
Benzene	8020	0.500*	<0.500	CP-03/30/93 @ 00:50
Toluene	8020	0.500*	<0.500	CP-03/30/93 @ 00:50
Ethylbenzene	8020	0.500*	1.0	CP-03/30/93 @ 00:50
Xylenes	8020	0.500*	<0.500	CP-03/30/93 @ 00:50

*Normal detection limits cannot be reached due to sample matrix.

PFE ORIGINAL (Red)

REED & ASSOCIATES

ORIGINAL (Red)

JRA No.: 93-2482

Analysis(mg/L)	Method No.	Detection Limit	Results	Analyst/Date/Time
Arsenic	206.2	0.001	<0.001	FPE-04/01/93 @ 14:33
Chromium	218.2	0.001	0.019	FPE-03/26/93 @ 13:30
Iron	236.1	1	0.7	SKH-04/05/93 @ 07:00
Lead	239.2	0.001	0.007	FPE-03/26/93 @ 10:00
Total Cyanide	335.3	0.01	0.180	MAF-03/30/93 @ 22:54
Free Cyanide	SM/16/412H	0.01	0.010	MAF-04/02/93 @ 16:48
Magnesium	242.1	1	8	SKH-03/27/93 @ 09:00
Manganese	243.1	0.01	0.09	SKH-04/05/93 @ 08:00
Sodium	273.1	1	25	SKH-03/26/93 @ 09:30
Total Hardness	130.2	1	384	FPE-03/25/93 @ 11:15
Calcium	215.2	2	142	CSA-03/31/93 @ 15:00
Silicon	6010	0.3	120	LAN(RSJ)04/06/93 @ 18:00
Chloride	325.3	1	18	FPE-03/31/93 @ 16:15
Sulfate	375.4	5	15	FPE-03/30/93 @ 12:30
BOD_5	401.5	1.0	650	SW-03/25/93 @ 13:05
Total Suspended Solids	160.2	1	34	CSA-03/29/93 @ 09:05
Total Dissolved Solids	160.1	10	541	CSA/CL-03/25/93 @ 10:30
Total Alkalinity	310.1	10	363	CSA-03/31/93 @ 08:50
Carbonate			<1	CSA-03/31/93 @ 08:50
Bicarbonate			363	CSA-03/31/93 @ 08:50

ORIGINAL (Red)

REED & ASSOCIATES

ORIGINAL (Red)

JRA No.: 93-2475

Sample Received: 03/24/93 @ 17:00
Sample Collected: 03/23/93
Sample ID: Trip Blank

Analysis	Method No.	Detection Limit	Results	Analyst/Date/Time
Benzene	8020	0.001	<0.001	CP-03/29/93 @ 20:02
Toluene	8020	0.001	<0.001	CP-03/29/93 @ 20:02
Ethylbenzene	8020	0.001	<0.001	CP-03/29/93 @ 20:02
Xylenes	8020	0.001	<0.001	CP-03/29/93 @ 20:02

JRA No.: 93-2476

Sample Received: 03/24/93 @ 17:00
Sample Collected: 03/24/93
Sample ID: Trip Blank

Analysis	Method No.	Detection Limit	Results	Analyst/Date/Time
Benzene	8020	0.001	<0.001	CP-03/29/93 @ 20:43
Toluene	8020	0.001	<0.001	CP-03/29/93 @ 20:43
Ethylbenzene	8020	0.001	<0.001	CP-03/29/93 @ 20:43
Xylenes	8020	0.001	<0.001	CP-03/29/93 @ 20:43

PFE ORIGINAL

REED & ASSOCIATES ORIGINAL (Red)

Base Neutrals and Acid Extractables - Library Search

RE: 1A (93-2477)

Library search showed some major peaks as follows:
dibenzofuran,4-methyl-
1-naphthalenol,2-methyl-
1,4-methanonaphthalene,1,4-dihydro-
phenol,2,4,5-trimethyl-
phenol,2-propyl-
phenol,2-ethyl-5-methyl-
phenol,2-ethyl-
phenol,2,6-dimethyl-
benzene,1-propenyl-
phenol,2-fluoro-
cyclohexene
acenaphthylene,1,2-dihydro-
naphthalene 1,5-dimethyl
naphthalene,2-ethenyl-
naphthalene,1,2-dihydro-3-methyl-
1H-indene,1-methyl-
benzene,1-ethenyl-2-methyl-
benzene,1,2,4-trimethyl-
benzene,1-ethyl-2-methyl-
benzene,(1-methylethyl)-

RE: 1B (93-2478)

Library search showed some major peaks as follows:
cyclohexene
phenol,2-fluoro-
phenol,2,6-dimethyl-
phenol,2,3,5-trimethyl-
phenol,2-ethyl-5-methyl-
phenol,2,propyl-
1,4-methanonaphthalene,1,4-dihydro-
furan,3-phenyl-
3-butenoic acid,4-phenyl-
1-naphthalenol,2-methyl-
anthracene,1-methyl-
benzene,1-ethyl-3-methyl-
naphthalene,1-methyl-
acenaphthylene,1,2-dihydro-
9H-fluorene
dibenzothiophene
9,10-dimethylanthracene
naphthelene,1,3-dimethyl-
naphthalene,2-ethenyl-
pyrene,1-methyl-

RE: 1C (93-2479)

Library search showed some major peaks as follows:
cyclohexene
phenol,2-fluoro-
benzene,1-ethenyl-2-methyl-
phenol,2,6-dimethyl-
phenol,2,4,5-trimethyl-
phenol,4-propyl-
benzoic acid,2,3-dimethyl-
1-naphthalenol,2-methyl-
phenol,3-(2-phenylethyl)-
benzene, methyl-
benzene, (1-methylethyl)-
benzene,1-ethyl-2-methyl-
benzene,1,2,3-trimethyl-
benzene,1-ethenyl-2-methyl-
1H-indene,1-methyl-
naphthalene,1-methyl-
naphthalene,2-ethyl-
acenaphthylene,1,2-dihydro-
pyrene,1-methyl-
triphenylene,2-methyl-

RE: 1D (93-2480)

Library search showed some major peaks as follows:
cyclohexene
1H-indene,2,3-dihydro-
phenol,2-methyl-
phenol,4-methyl-
phenol,2,6-dimethyl-
phenol,2,3,5-trimethyl-
phenol,2-ethyl-5-methyl-
phenol,2,-propyl-
1,4-methanonaphthalene,1,4-dihydro-
benzoic acid,3,4-dimethyl-
1-naphthalenol,3-methyl-
cyclobutene,2-propenylidene-
benzene,(1-methylethyl)-
benzene,1-ethyl-2-methyl-
benzene,1,2,3-trimethyl-
benzene,1-ethenyl-2-methyl-
benzene,2-ethyl-1,4-dimethyl-
naphthalene,1-methyl-
naphthalene,2-ethenyl-
naphthalene,1,5-dimethyl-

ORIGINAL

ORIGINAL (Red)

Base Neutrals and Acid Extractables - Library Search

RE: 2A (93-2481)

Library search showed some major peaks as follows:
benzene,1,2,4-trimethyl-
benzene,1-ethenyl-2-methyl-
benzene,2-ethyl-1,4-dimethyl-
benzene,1,2,3,4-tetramethyl-
1H-indene,2,3-dihydro-4-methyl-
1H-indene,1-methyl-
1H-indene,1,1-dimethyl-
1,4-methanonaphthalene,1,4-dihydro-
naphthalene,1,3-dimethyl-
naphthalene,2-ethyl-
dibenzofuran
1H-phenalene
cyclohexene
benzene,methyl-
benzene,ethyl-
benzene,1,4-dimethyl-
benzene,1,2-dimethyl-
benzene,(1-methylethyl)-
benzene,1-ethyl-2-methyl-
2-methylnaphthalene

RE: 2B (93-2482)

Library search showed some major peaks as follows:
naphthelene,1-(2-propenyl)-
dibenzofuran
naphthalene,1,3-dimethyl-
naphthalene,2-ethyl-
naphthalene,2-ethenyl-
naphthalene,1-methyl-
1H-indene,1,1-dimethyl-
1H-indene,1-methyl-
1H-indene,2,3-dihydro-4-methyl-
benzene,(1-methyl-1-propenyl)-,(E)-
benzene,2-ethyl-1,4-dimethyl-
benzene,1-ethenyl-2-methyl-
benzene,1,2,3=trimethyl-
benzene,1-ethyl-2-methyl-
benzene,(1-methylethyl)-
xylenes
ethylbenzene
cyclohexene
benzene
2-methylnaphthalene

APPENDIX H

ORIGINAL PAGE

ORIGINAL (Red)

PFE

ORIGINAL (Red)

APPENDIX H

SLUG TEST SOLUTIONS

GERAGHTY & MILLER, INC.
Environmental Services

SUBJECT: SLUG TEST DATA
PROJECT: MD0057.008 Norfolk MGP
CLIENT/PROJECT: NO:

BY: JLE DATE: 3/31/93
CHKD: DATE:
REV: DATE:

PAGE
SHEET 1

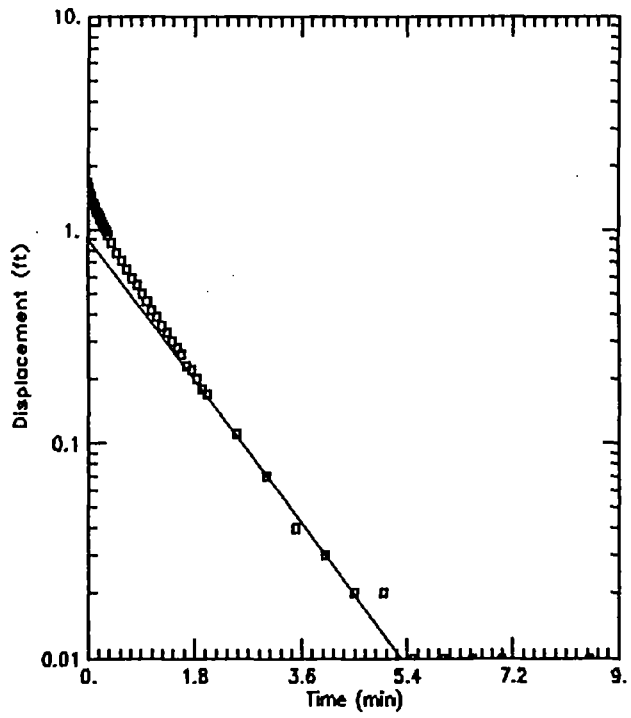
ORIGINAL (Red)
PFE
ORIGINAL (Red)

MONITOR WELL MW-10
SLUG TEST DATA

TIME SINCE SLUG REMOVED (SECONDS)	DEPTH TO WATER BELOW INITIAL STATIC WATER LEVEL
0.0000	-1.66
0.0033	-1.57
0.0066	-1.57
0.0133	-1.52
0.0166	-1.53
0.0200	-150
0.0233	-1.49
0.0266	-1.48
0.0300	-1.47
0.0500	-1.42
0.833	-1.34
0.1000	-1.31
0.1333	-1.25
0.1500	-1.21
0.2000	-1.13
0.2500	-1.06
0.3000	-1.00
0.3333	-0.95
0.5000	-0.78
0.7500	-0.59
1.000	-0.46
1.2500	-0.35
1.500	-0.25
1.7500	-0.22
2.0000	-0.17
2.5000	-0.11
3.000	-0.07
4.000	-0.03
5.000	-0.02
5.500	-0.01

Geraghty & Miller, Inc.	
Project No.: MD057.08	Location: Norfolk MGP

MW-10 SLUG TEST



DATA SET:
B:\mw-10.aqt
03/31/93

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATE:
March 25,1993

ESTIMATED PARAMETERS:
K = 0.0006743 ft/min
y0 = 0.9233 ft

TEST DATA:
H0 = 1.66 ft
rc = 0.08 ft
rw = 0.34 ft
L = 10. ft
b = 8.84 ft
H = 8.84 ft

ORIGINAL (Red)

GERAGHTY & MILLER, INC.
Environmental Services

SUBJECT:	BY: DATE:
PROJECT:	CHKD: DATE:
CLIENT/PROJECT: NO:	REV: DATE:

PAGE

SHEET 1

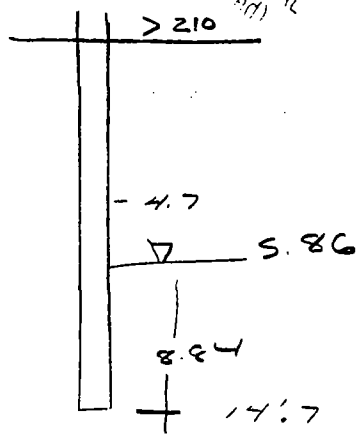
ORIGINAL (Red)

PFE

ORIGINAL (Red)

MW-10

initial drawdown in well 1.66 ft
radius of well casing .08 ft
radius of well (effective) .34 ft
saturated thickness 8.84 ft
screen length 10 ft
static height of water 8.84 ft



3.4×10^{-4} cm/sec

GERAGHTY & MILLER, INC.
Environmental Services

SUBJECT: SLUG TEST DATA
PROJECT: MD0057.008 Norfolk MGP
CLIENT/PROJECT: NO:

BY: JHE DATE: 3/31/93
CHKD: DATE:
REV: DATE:

PAGE
SHEET 1

WELL MW-13

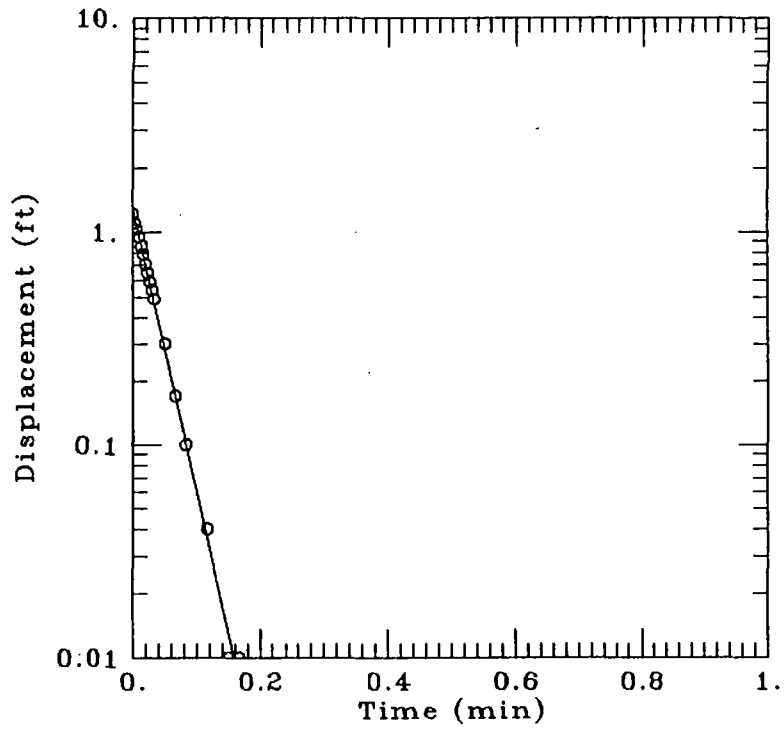
SLUG TEST DATA

ORIGINAL (Red)

TIME SINCE SLUG REMOVED ( )	DEPTH TO WATER BELOW INITIAL STATIC WATER LEVEL
0.0000	-1.22
0.0033	-1.10
0.0066	-1.03
0.0099	-0.95
0.0133	-0.86
0.0166	-0.79
0.0200	-0.71
0.0233	-0.65
0.0266	-0.59
0.0300	-0.54
0.0500	-0.30
0.0666	-0.17
0.0833	-0.10
0.1000	-0.06
0.1166	-0.04
0.1333	-0.02
0.1500	-0.01
0.1666	-0.01
0.1833	-0.00

Geraghty & Miller, Inc.	
Project No.: MD057.08	Location: Norfolk MGP

MW-13 SLUG TEST



DATA SET:
B:\mw-13.aqt
03/31/93

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATE:
March 25,1993

ESTIMATED PARAMETERS:
K = 0.03116 ft/min
y0 = 1.305 ft

TEST DATA:
H0 = 1.22 ft
rc = 0.08 ft
rw = 0.34 ft
L = 8.5 ft
b = 5.36 ft
H = 5.36 ft

ORIGINAL (Red)
ORIGINAL (Red)

GERAGHTY & MILLER, INC.
Environmental Services

SUBJECT:
PROJECT:
CLIENT/PROJECT: NO:

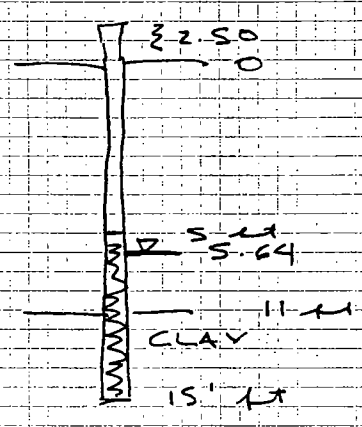
BY: DATE:
CHKD: DATE:
REV: DATE:

PAGE
SHEET 1

mw-13

ORIGINAL (Red)

initial drawdown in well	1.22	ft
radius of well casing	.08	ft
radius of well (effective)	.34	ft
saturated thickness	5.36	ft
screen length	6.5	ft
static height of water	5.36	ft



.03116 ft/m = .016 1.6×10^{-2} cm/sec

GERAGHTY & MILLER, INC.
Environmental Services

SUBJECT: SLUG TEST DATA
PROJECT: MD0057.008 Norfolk NGP
CLIENT/PROJECT: NO:

BY: YHL DATE: 3/31/93
CHKD: DATE:
REV: DATE:

PAGE
SHEET 1

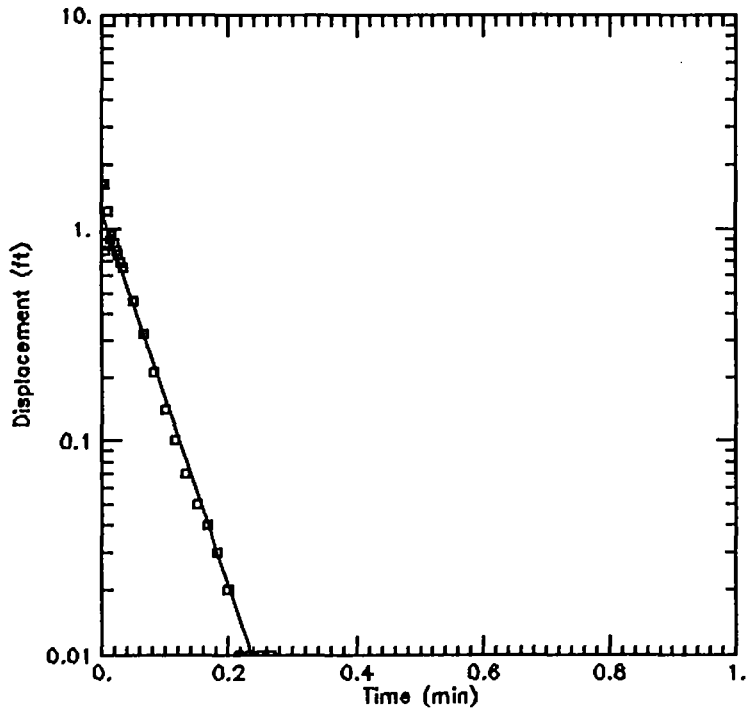
ORIGINAL (Red)

MW-14
SLUG TEST DATA

TIME SINCE SLUG REMOVED MINUTES	DEPTH TO WATER BELOW INITIAL STATIC WATER LEVEL
0.0000	-1.00
0.0033	-1.63
0.0066	-0.79
0.0099	-1.21
0.0133	-0.89
0.0166	-0.93
0.0200	-0.86
0.0233	-0.76
0.0266	-0.66
0.0300	-0.46
0.0500	-0.32
0.0666	-0.21
0.0833	-0.14
0.1000	-0.10
0.1166	-0.07
0.1333	-0.05
0.1500	-0.04
0.1666	-0.03
0.1833	-0.02
0.2000	-0.01
0.2166	-0.01
0.2333	-0.01
0.2666	0.00
0.2833	

Geraghty & Miller, Inc.	
Project No.: MD057.08	Location: Norfolk MGP

MW-14 SLUG TEST



DATA SET:
B:\mw-14.aqt
04/01/93

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATE:
March 25,1993

ESTIMATED PARAMETERS:
K = 0.01628 ft/min
y0 = 1.223 ft

TEST DATA:
H0 = 1.63 ft
rc = 0.08 ft
rw = 0.34 ft
L = 10. ft
b = 9.46 ft
H = 9.46 ft

ORIGINAL (Red)
ORIGINAL (Red)
PLE

GERAGHTY & MILLER, INC.
Environmental Services

SUBJECT:
PROJECT:
CLIENT/PROJECT: NO:

BY: DATE:
CHKD: DATE:
REV: DATE:

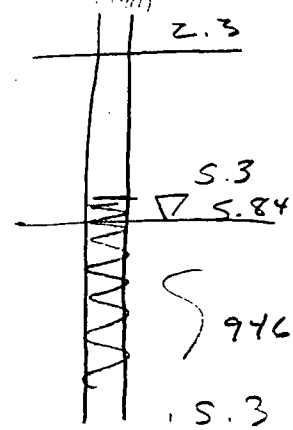
SHEET 1

MW-14

ORIGINAL (Red)

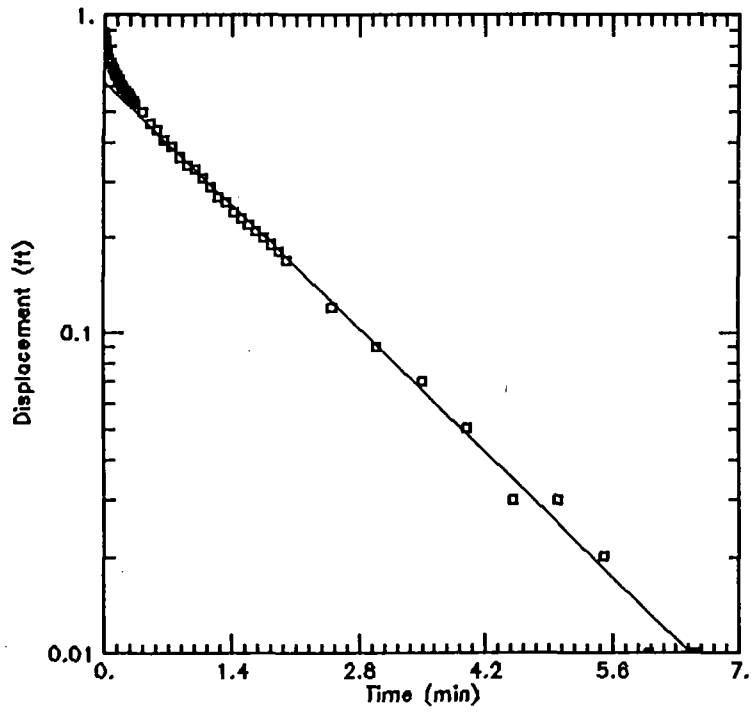
ORIGINAL (Red)

initial drawdown in well	1.63
radius of well casing	.08
radius of well (effective)	.34
saturated thickness	9.46
screen length	10
static height of water	9.46



Geraghty & Miller, Inc.	
Project No.: MD057.08	Location: Norfolk MGP

MW-22 SLUG TEST



DATA SET:
b:\MW-22.AQT
04/01/93

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATE:
March 25,1993

ESTIMATED PARAMETERS:
K = 0.0005004 ft/min
y0 = 0.6215 ft

TEST DATA:
H0 = 0.88 ft
rc = 0.08 ft
rw = 0.34 ft
L = 10. ft
b = 8.38 ft
H = 8.38 ft

ORIGINAL (Red)

PFE

ORIGINAL (Red)

GERAGHTY & MILLER, INC.
Environmental Services

SUBJECT:	BY:	DATE:
PROJECT:	CHKD:	DATE:
CLIENT/PROJECT: NO:	REV:	DATE:

PAGE

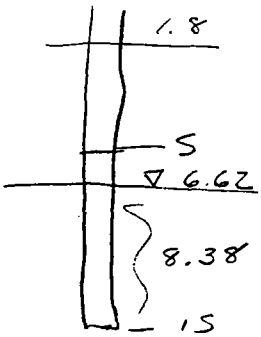
SHEET 1

PFE ORIGINAL (Red)

ORIGINAL (Red)

MW-22

initial drawdown in well	.88 ft
radius of well casing	.08
radius of well (effective)	.34
saturated thickness	8.38
screen length	10.0
static height of water	8.38



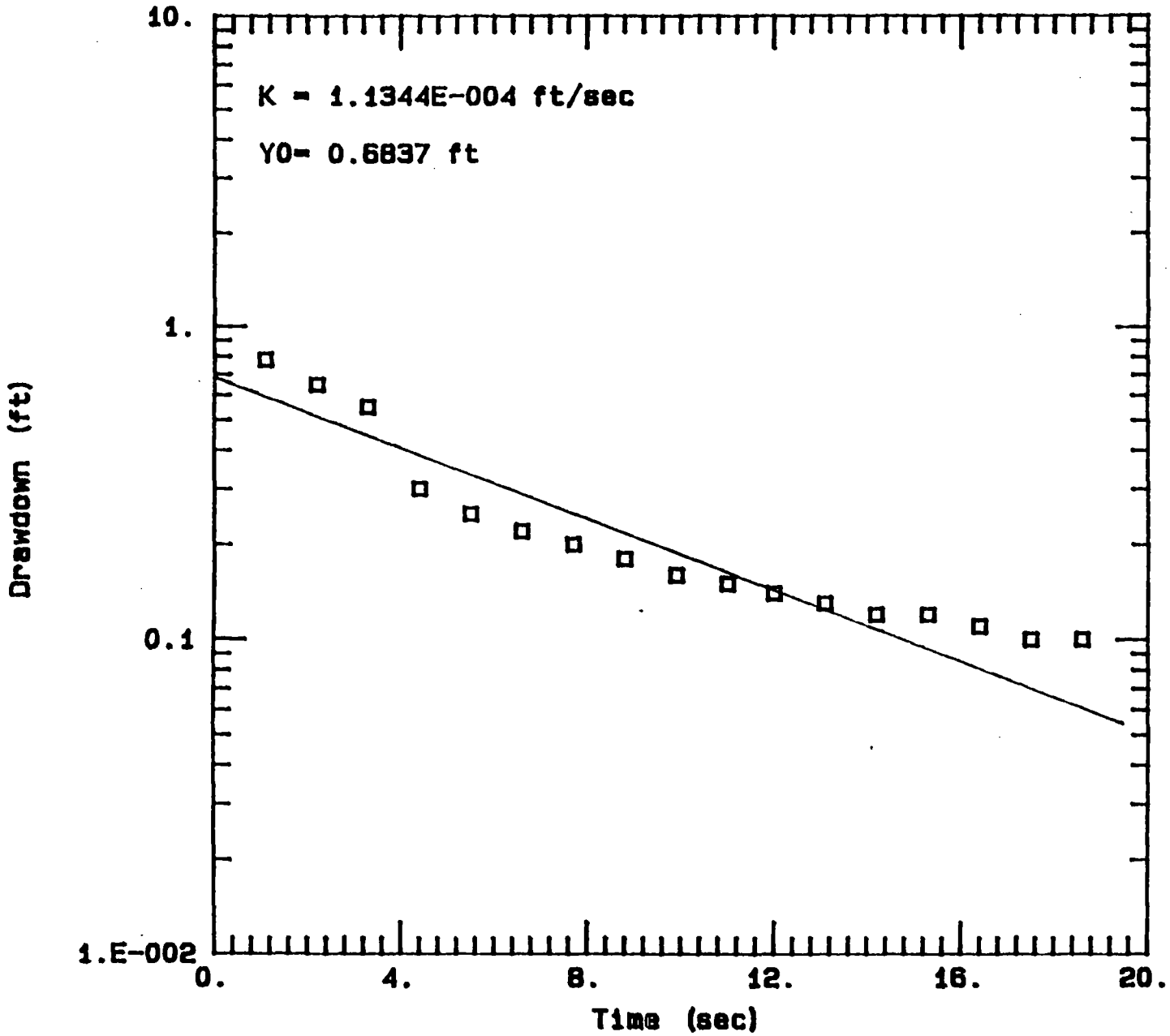
PFE
ORIGINAL (Red)

Well MW-1
Slug Test Data

Test Start: 10/5/89 16:56
Test End: 10/5/89 16:59
Test Duration (min): 2
Static Depth to Water (ft): 6.16

Time Since Slug Removed In Seconds	Depth to Water Below Top of Casing (ft)
0	6.98
1	6.74
2	6.61
3	6.52
4	6.46
5	6.41
7	6.39
8	6.36
9	6.34
10	6.32
12	6.30
14	6.28
20	6.27
30	6.25
42	6.25

Note: Additional data was collected; however, only data used for the test analysis are presented.



PFE
ORIGINAL (Red)

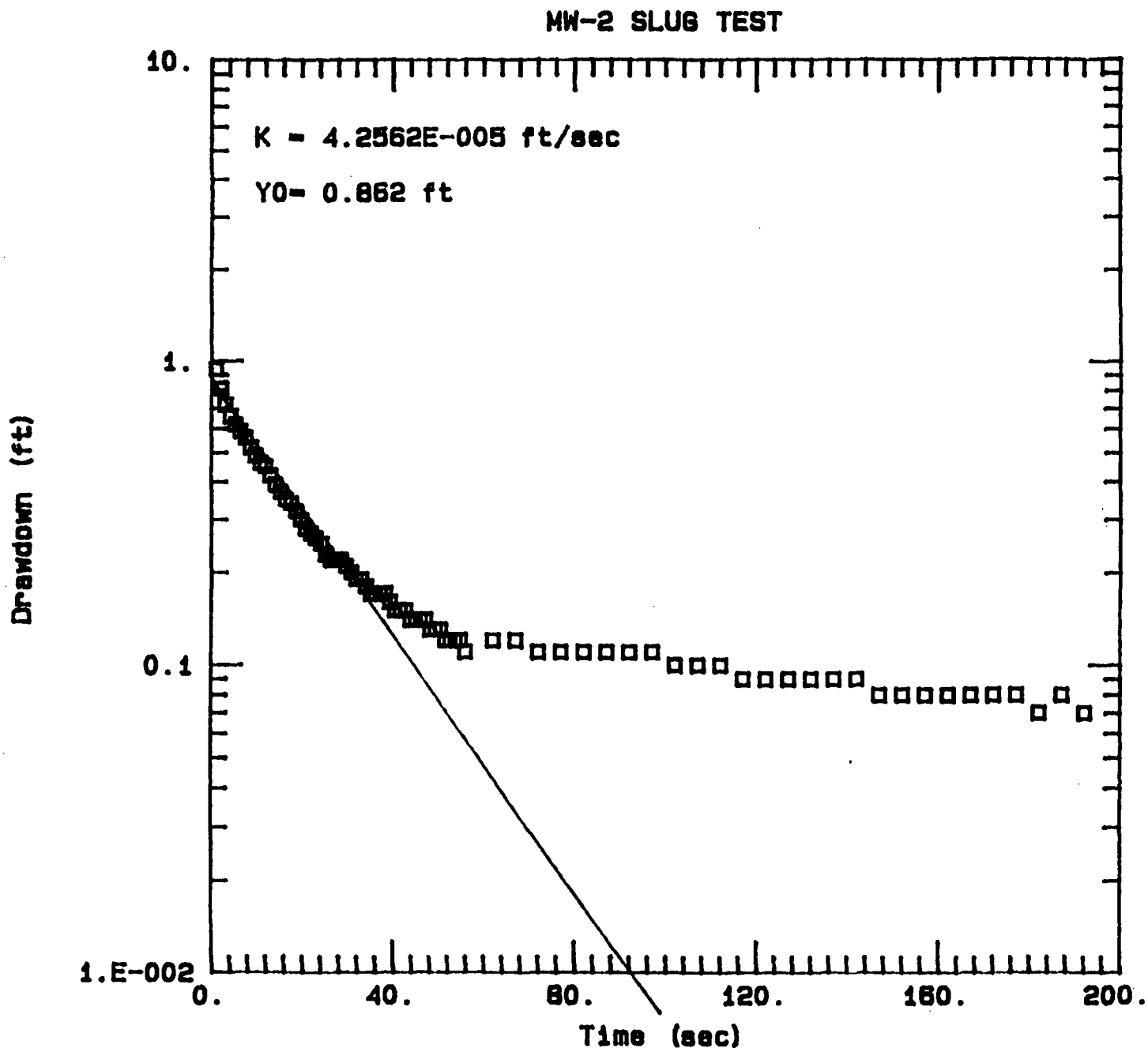
PFE
ORIGINAL (Red) ORIGINAL (Red)

Well MW-2
Slug Test Data

Test Start: 10/5/89 17:09
Test End: 10/5/89 17:12
Test Duration (min): 3
Static Depth to Water (ft): 6.81

Time Since Slug Removed In Seconds	Depth to Water Below Top of Casing (ft)
0	7.92
1	7.71
2	7.58
3	7.49
4	7.43
5	7.39
7	7.36
8	7.33
9	7.29
10	7.26
12	7.22
14	7.16
16	7.12
20	7.07
22	7.04
25	7.00
30	6.98
35	6.94
45	6.91
55	6.89
117	6.86
147	6.85
192	6.84

Note: Additional data was collected; however, only data used for the test analysis are presented.



PFE
ORIGINAL
(Red)
Original
(Red)

PFE
ORIGINAL (Red)

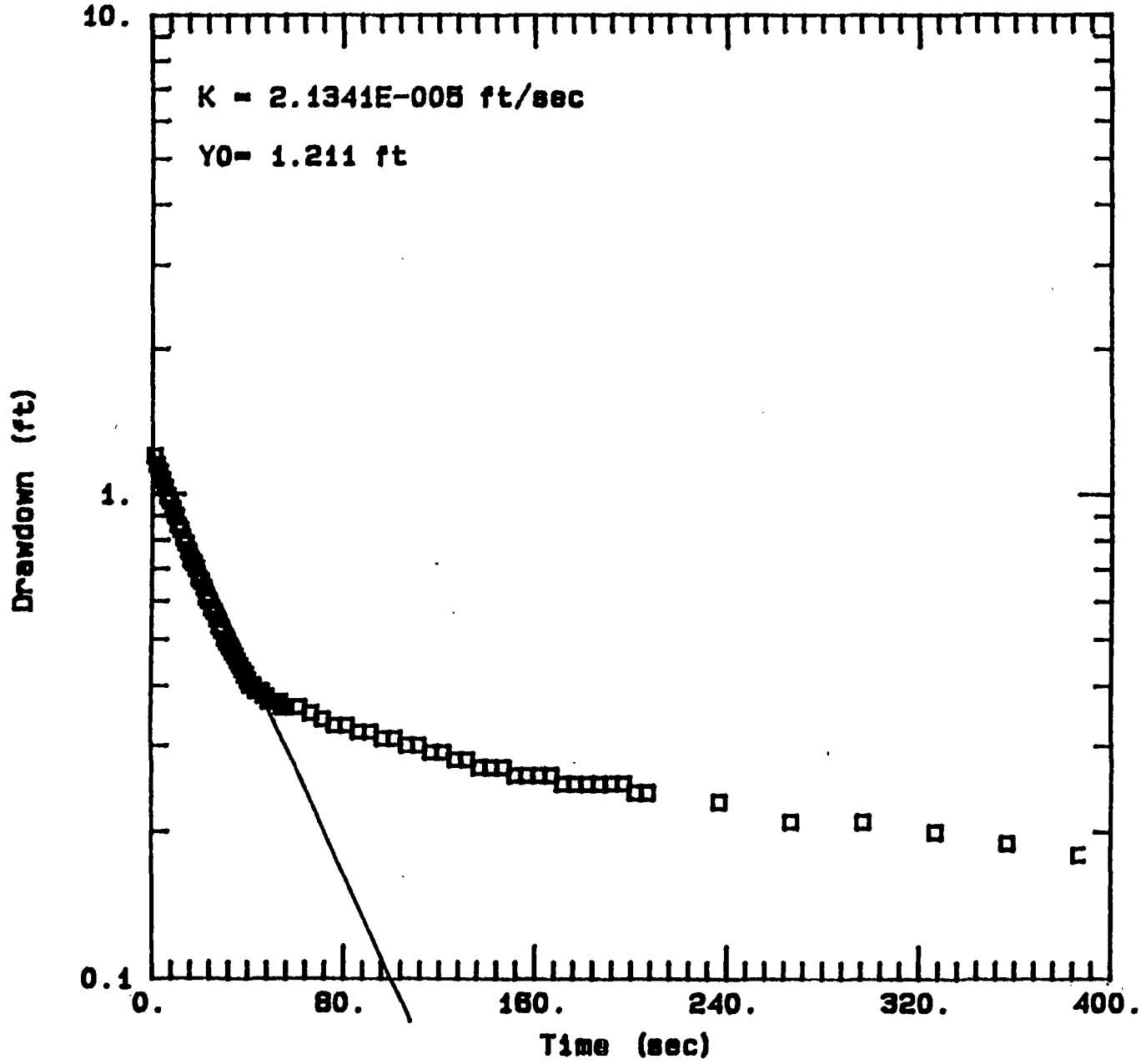
Well MW-4
Slug Test Data

Test Start: 10/5/89 17:41
Test End: 10/5/89 17:48
Test Duration (min): 7
Static Depth to Water (ft): 7.72

Time Since Slug Removed In Seconds	Depth to Water Below Top of Casing (ft)
0	9.27
1	9.22
2	9.17
3	9.13
4	9.09
6	9.05
7	9.01
8	8.99
9	8.95
10	8.92
12	8.86
14	8.81
16	8.75
18	8.74
20	8.69
22	8.66
25	8.60
30	8.54
35	8.48
41	8.43
50	8.39
67	8.37
87	8.34
107	8.32
127	8.30
147	8.29
197	8.27
267	8.23
387	8.20

Note: Additional data was collected; however, only data used for the test analysis are presented.

MW-4 SLUG TEST



ORIGINAL (Red)

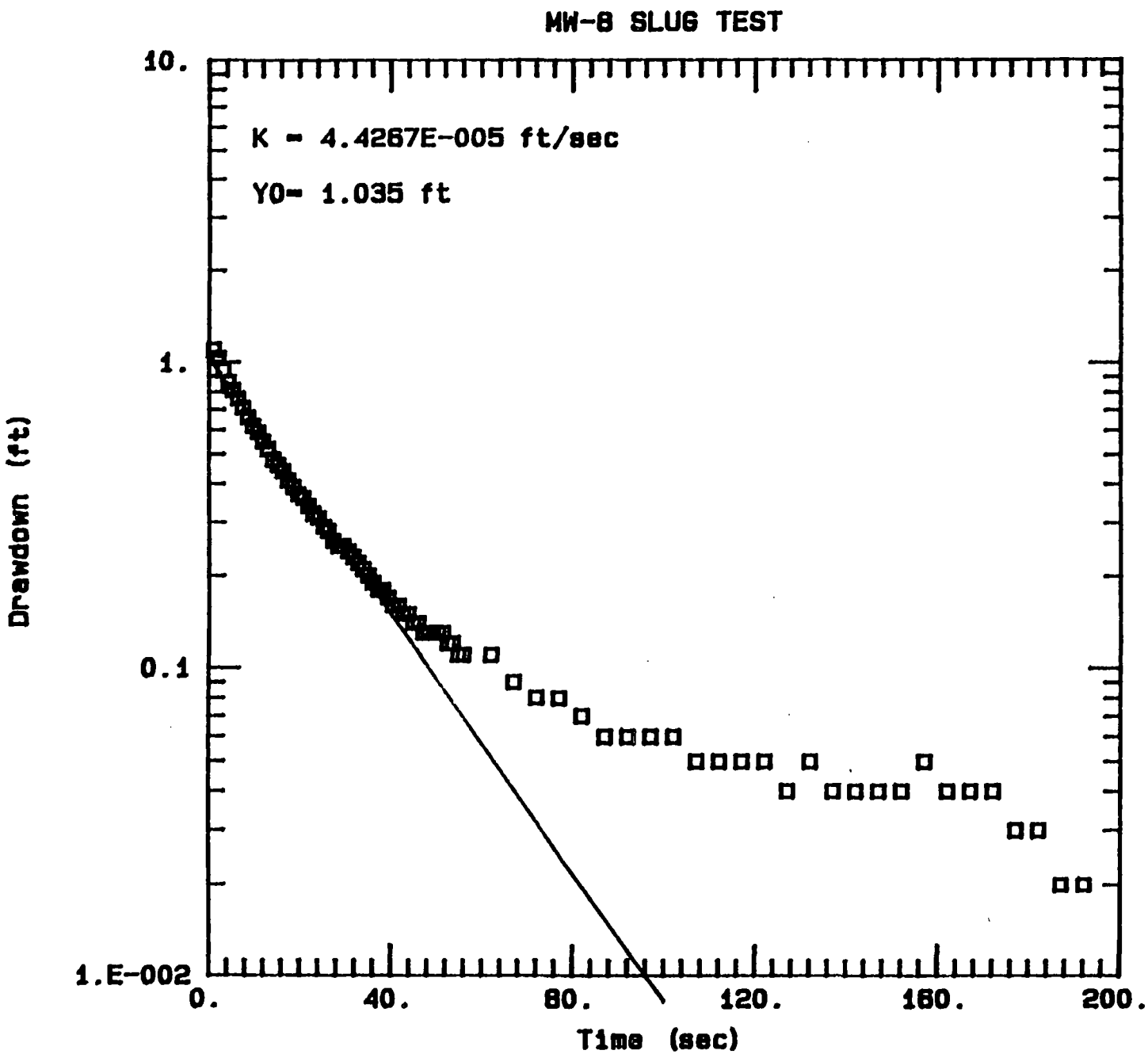
PFE
ORIGINAL (Red)

Well MW-8
Slug Test Data

Test Start: 10/5/89 14:08
Test End: 10/5/89 14:12
Test Duration (min): 4
Static Depth to Water (ft): 6.34

Time Since Slug Removed In Seconds	Depth to Water Below Top of Casing (ft)
0	7.59
1	7.44
2	7.37
3	7.28
4	7.20
5	7.15
7	7.10
8	7.05
9	7.00
10	6.96
12	6.89
15	6.80
18	6.75
20	6.71
25	6.63
30	6.59
35	6.54
42	6.50
52	6.47
62	6.45
72	6.42
82	6.41
87	6.40
107	6.39
137	6.38
162	6.38
177	6.37
197	6.35

Note: Additional data was collected; however, only data used for the test analysis are presented.



ORIGINAL (Red)

PFE
ORIGINAL (Red)

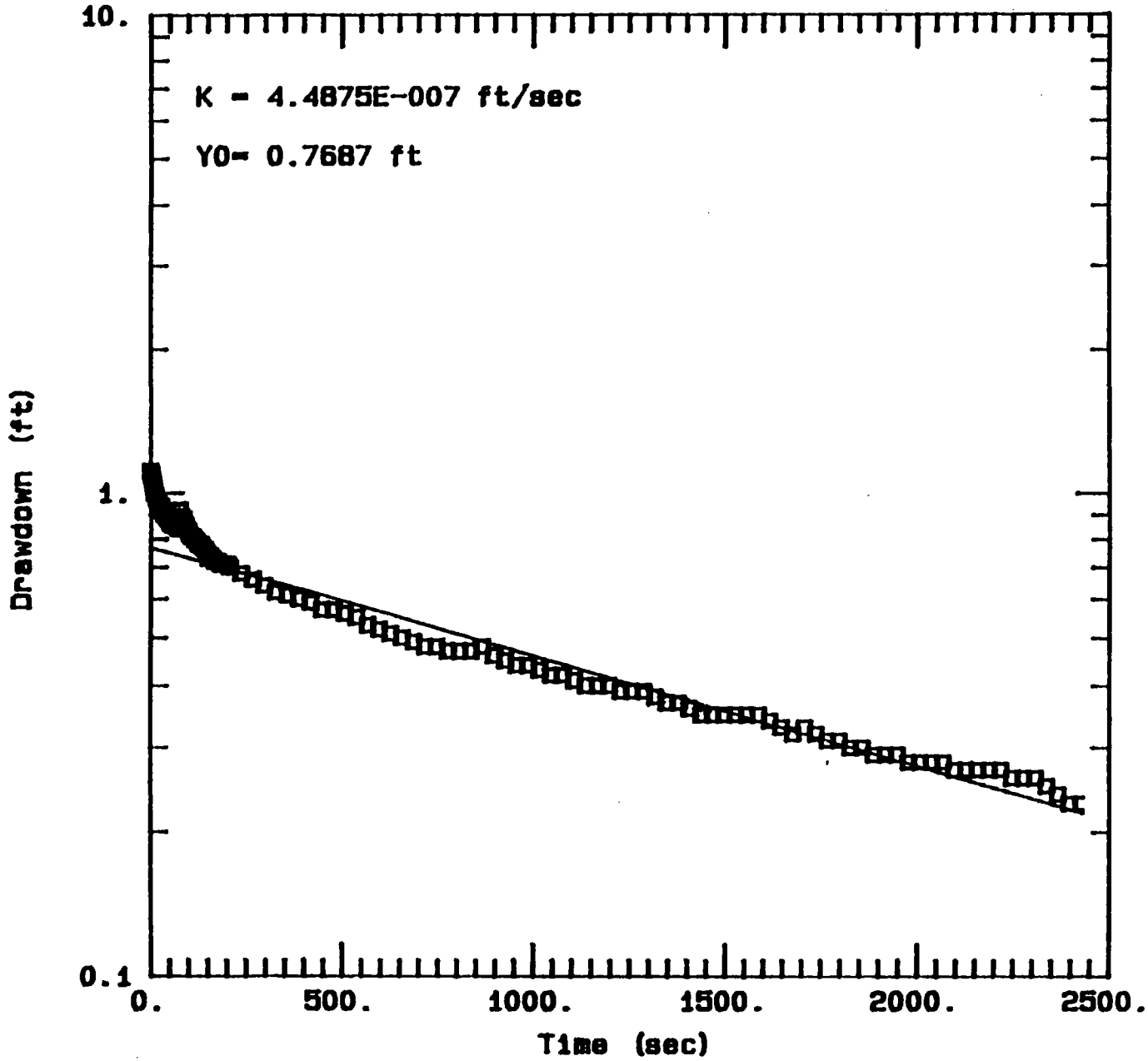
Well MW-12
Slug Test Data

Test Start: 10/5/89 14:58
Test End: 10/5/89 15:41
Test Duration (min): 42
Static Depth to Water (ft): 7.74

Time Since Slug Removed In Minutes	Depth to Water Below Top of Casing (ft)
0.0	8.92
0.1	8.80
0.2	8.74
0.3	8.71
0.5	8.67
0.7	8.63
1.0	8.60
2.0	8.53
3.0	8.45
5.0	8.38
7.0	8.33
10.0	8.26
12.0	8.22
15.0	8.19
20.0	8.14
25.0	8.09
30.0	8.05
35.0	8.01
40.0	7.97
41.5	7.96

Note: Additional data was collected; however, only data used for the test analysis are presented.

MW-12 SLUG TEST



ORIGINAL (Red)

ORIGINAL

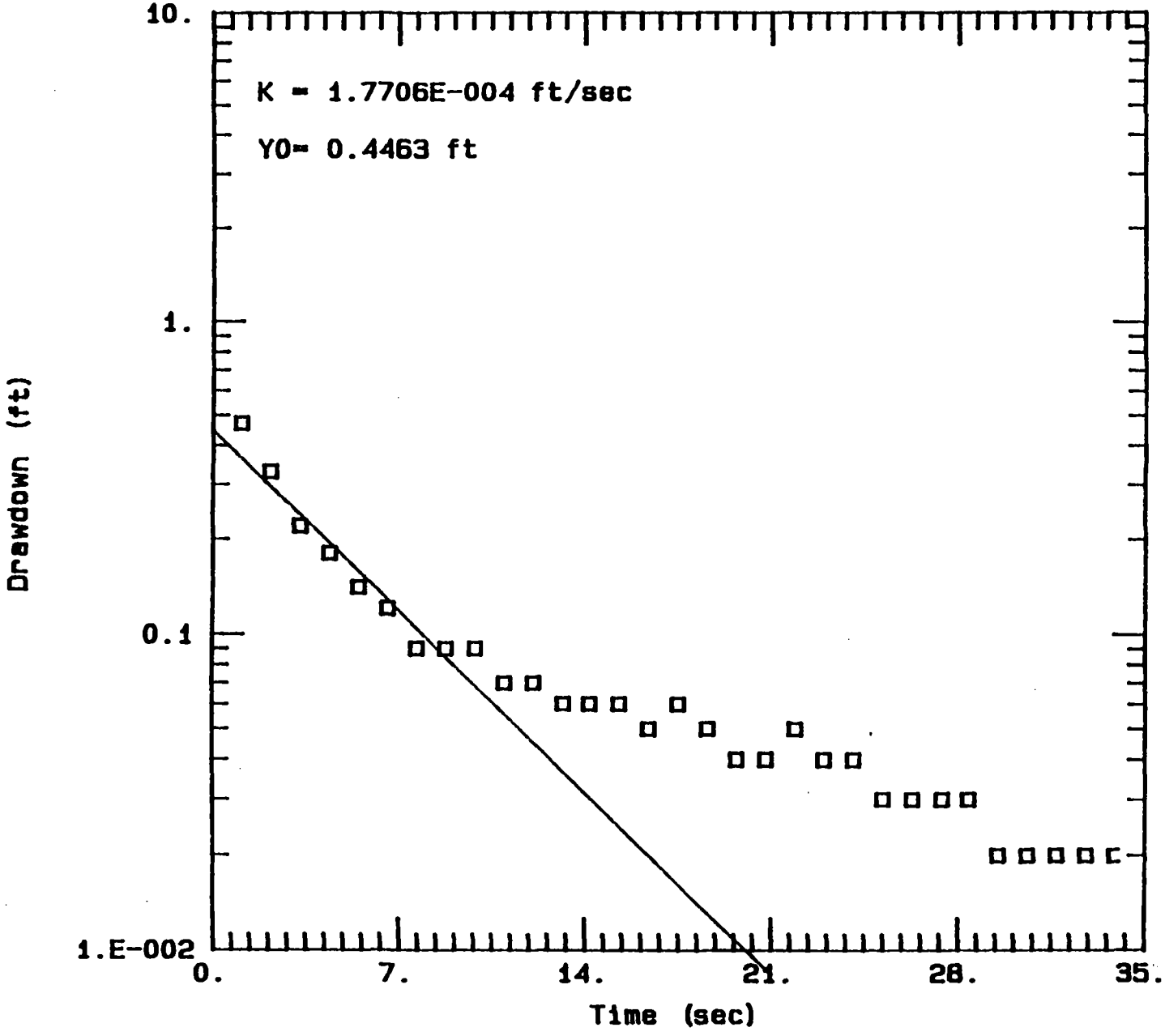
Well MW-15
Slug Test Data

Test Start: 10/5/89 14:30
Test End: 10/5/89 14:33
Test Duration (min): 3
Static Depth to Water (ft): 5.42

Time Since Slug Removed In Seconds	Depth to Water Below Top of Casing (ft)
0	6.15
1	5.89
2	5.75
3	5.64
4	5.60
6	5.56
7	5.54
8	5.51
9	5.51
10	5.51
15	5.48
20	5.46
25	5.45
30	5.44

Note: Additional data was collected; however, only data used for the test analysis are presented.

MW-15 SLUG TEST



ORIGINAL ORIGINAL (Red)

ORIGINAL

APPENDIX I

PFE
ORIGINAL
ORIGINAL
(Red)

APPENDIX I

CONSTANT-RATE AQUIFER TEST SOLUTIONS

DWG DATE: 07APR94 | PRJCT NO.: MD0057.009 | FILE: | DRAWING: RW24BL1.DWG | CHECKED: MPK | APPROVED: DRB | DRAFTER: CMS

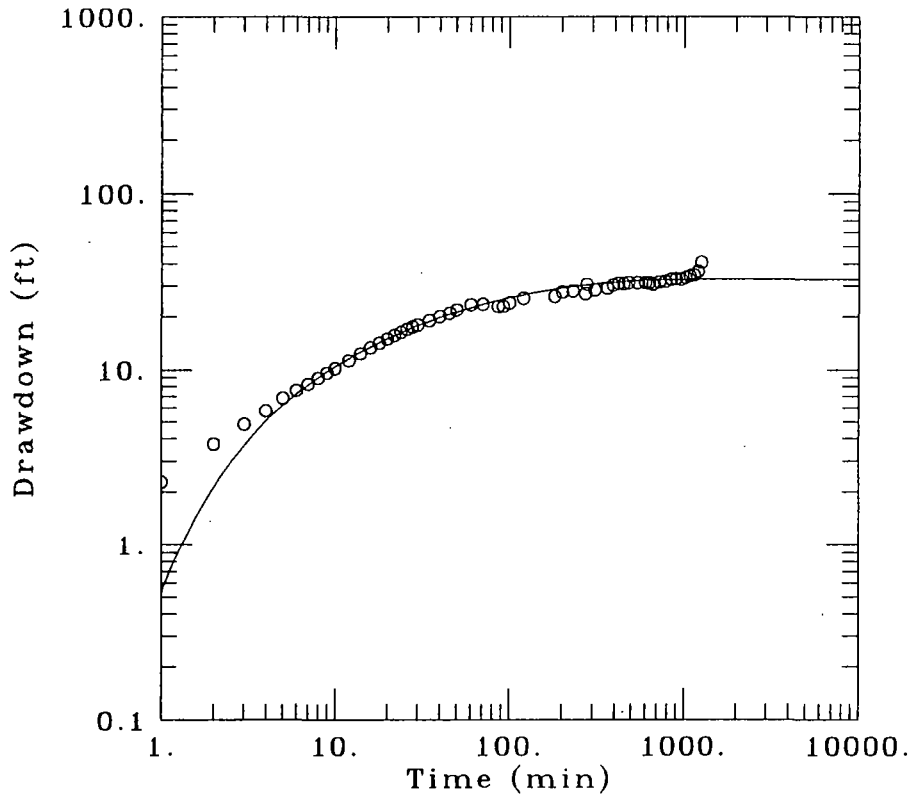
ORIGINAL (Red)

Geraghty & Miller, Inc.

Project No.: MD0057.009

Location: Norfolk MGP

RW-24B Drawdown Data



DATA SET:
rw24bdra.aqt
04/06/94

AQUIFER TYPE:
Leaky

SOLUTION METHOD:
Hantush

TEST DATE:
March 23, 1993

TEST WELL:
RW-24B

OBS. WELL:
RW-25B

ESTIMATED PARAMETERS:
T = 0.002663 ft^2/min
S = 0.01884
r/B = 0.1489

TEST DATA:
Q = 0.2674 ft^3/min
r = 1. ft
rc = 0.167 ft
rw = 1. ft
b = 50. ft
TEST WELL:
t.o.s. = 0. ft
b.o.s. = 10. ft
OBS. WELL:
t.o.s. = 0. ft
b.o.s. = 10. ft

GERAGHTY & MILLER, INC.
Environmental Services

Pumping Test Analysis for Well RW-24B Using the Hantush and Jacob (1955) Leaky Aquifer Solution.

NORFOLK GAS PLANT SITE
Norfolk, Virginia

FIGURE
1

DWG DATE: 07APR94 | PRJCT NO.: MD0057.009 | FILE: | DRAWING: RW25BL1.DWG | CHECKED: MPK | APPROVED: DRB | DRAFTER: CMS

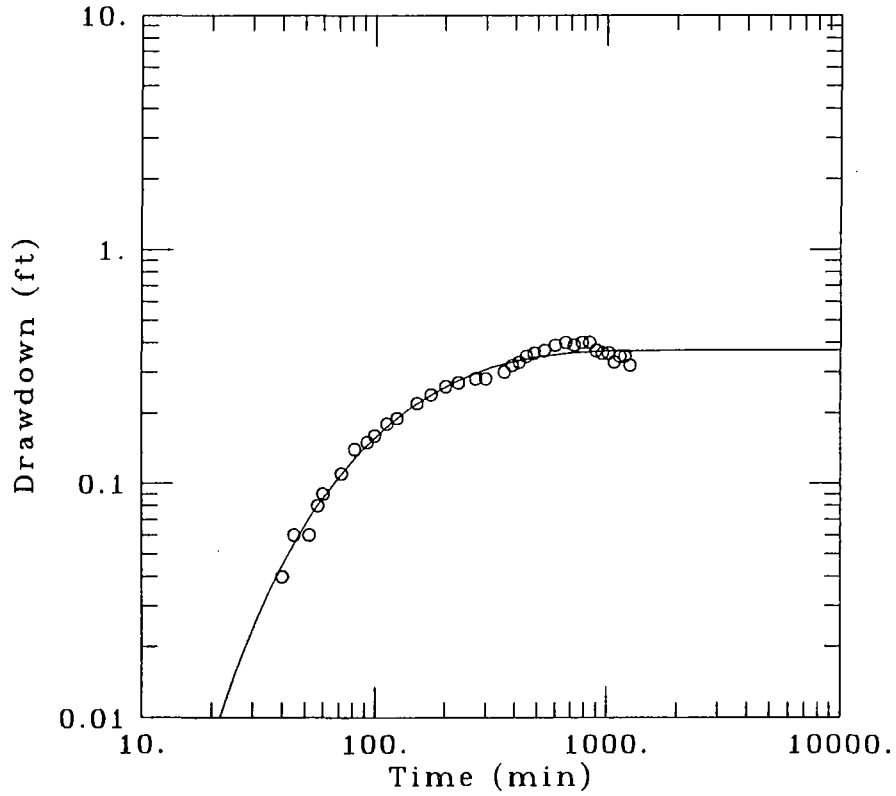
ORIGINAL (Red)

Geraghty & Miller, Inc.

Project No.: MD0057.009

Location: Norfolk MGP

RW-25B Drawdown Data



DATA SET:
rw25bd2.aqt
04/06/94

AQUIFER TYPE:
Leaky

SOLUTION METHOD:
Hantush

TEST DATE:
March 23, 1993

TEST WELL:
RW-24B

OBS. WELL:
RW-25B

ESTIMATED PARAMETERS:
T = 0.06064 ft^2/min
S = 0.0003869
r/B= 0.8462

TEST DATA:
Q = 0.2674 ft^3/min
r = 179. ft
rc = 0.167 ft
rw = 1. ft
b = 50. ft
TEST WELL:
t.o.s. = 0. ft
b.o.s. = 10. ft
OBS. WELL:
t.o.s. = 0. ft
b.o.s. = 10. ft

GERAGHTY & MILLER, INC.
Environmental Services

Pumping Test Analysis for Well RW-25B Using the Hantush and Jacob (1955) Leaky Aquifer Solution.

NORFOLK GAS PLANT SITE
Norfolk, Virginia

FIGURE
2

DWG DATE: 07APR94 | PRJCT NO.: MD0057.009 | FILE: | DRAWING: MW21BL1.DWG | CHECKED: MPK | APPROVED: DRB | DRAFTER: CMS

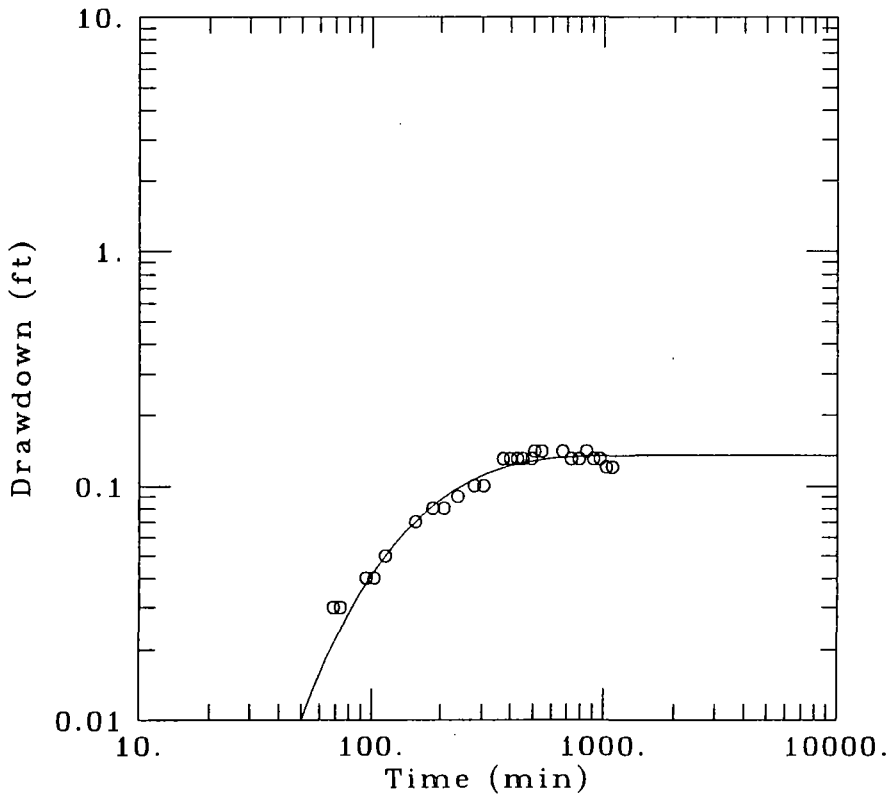
REF. ORIGINAL (Red) ORIGINAL (Red)

Geraghty & Miller, Inc.

Project No.: MD0057.009

Location: Norfolk MGP

MW-21B Drawdown Test



DATA SET:
mw21b.aqt
04/06/94

AQUIFER TYPE:
Leaky

SOLUTION METHOD:
Hantush

TEST DATE:
March 23, 1993

TEST WELL:
RW-24B

OBS. WELL:
MW-21B

ESTIMATED PARAMETERS
T = 0.07505 ft^2/min
S = 0.0006119
r/B= 1.421

TEST DATA:
Q = 0.2674 ft^3/min
r = 227. ft
rc = 0.167 ft
rw = 1. ft
b = 50. ft
TEST WELL:
t.o.s. = 0. ft
b.o.s. = 10. ft
OBS. WELL:
t.o.s. = 0. ft
b.o.s. = 10. ft

GERAGHTY & MILLER, INC.
Environmental Services

Pumping Test Analysis for Well MW-21B Using the Hantush and Jacob (1955) Leaky Aquifer Solution.

NORFOLK GAS PLANT SITE
Norfolk, Virginia

FIGURE
3

DWG DATE: 07APR94	PRJCT NO.: MD0057.009	FILE:	DRAWING: MW13BL1.DWG	CHECKED: MPK	APPROVED: DRB	DRAFTER: CMS

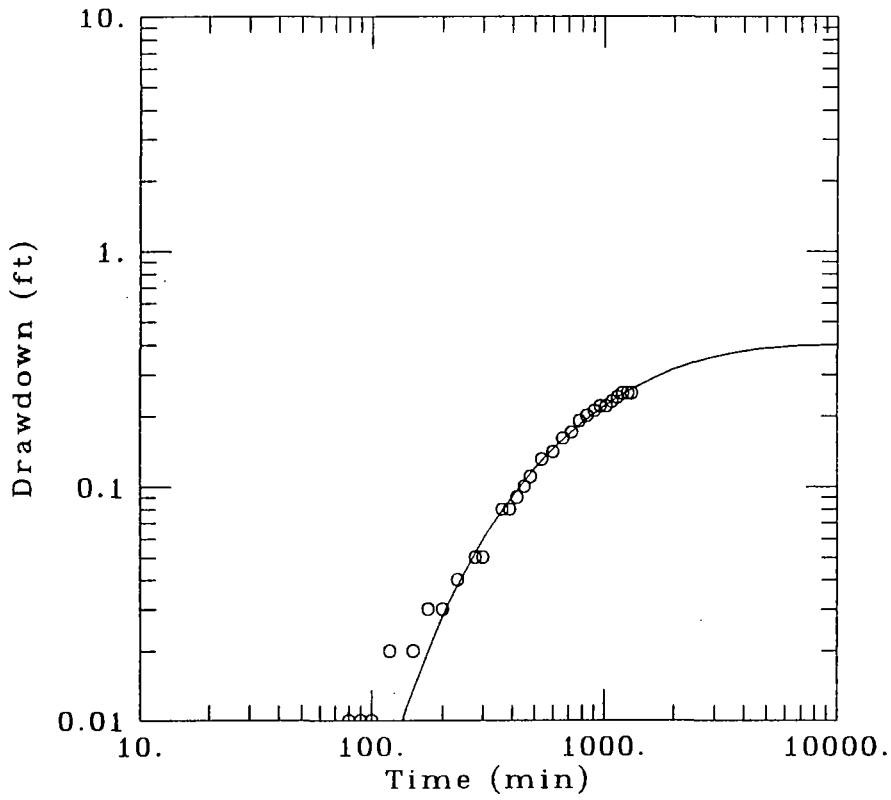
ORIGINAL (Red)

Geraghty & Miller, Inc.

Project No.: MD0057.009

Location: Norfolk MGP

MW-13B Drawdown Data



DATA SET:
mw13bdra.aqt
04/06/94

AQUIFER TYPE:
Leaky

SOLUTION METHOD:
Hantush

TEST DATE:
March 23, 1993

TEST WELL:
RW-24B

OBS. WELL:
MW-13B

ESTIMATED PARAMETERS:
T = 0.07165 ft^2/min
S = 0.1879
r/B = 0.6855

TEST DATA:
Q = 0.2674 ft^3/min
r = 21.5 ft
rc = 0.167 ft
rw = 1. ft
b = 50. ft
TEST WELL:
t.o.s. = 0. ft
b.o.s. = 10. ft
OBS. WELL:
t.o.s. = 0. ft
b.o.s. = 10. ft

GERAGHTY & MILLER, INC.
Environmental Services

Pumping Test Analysis for Well MW-13B Using the Hantush and Jacob (1955) Leaky Aquifer Solution.

NORFOLK GAS PLANT SITE
Norfolk, Virginia

FIGURE
4

DWG DATE: 07APR94 | PRJCT NO.: MD0057.009 | FILE: | DRAWING: MW13CL1.DWG | CHECKED: MPK | APPROVED: DRB | DRAFTER: CMS

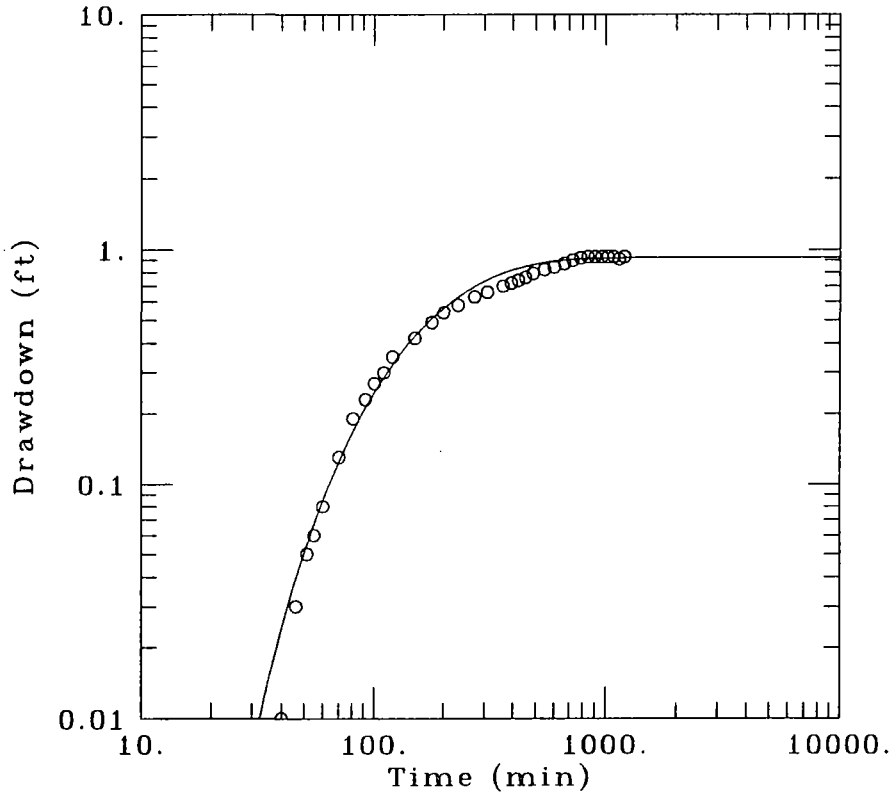
ORIGINAL (Red)

Geraghty & Miller, Inc.

Project No.: MD0057.009

Location: Norfolk MGP

MW-13C Drawdown Data



DATA SET:
mw13cdra.aqt
04/07/94

AQUIFER TYPE:
Leaky

SOLUTION METHOD:
Hantush

TEST DATE:
March 23, 1993

TEST WELL:
RW-24B

OBS. WELL:
mw-13C

ESTIMATED PARAMETERS:
T = 0.009915 ft^2/min
S = 0.01352
r/B = 1.497

TEST DATA:
Q = 0.2674 ft^3/min
r = 18.75 ft
rc = 0.167 ft
rw = 1. ft
b = 50. ft
TEST WELL:
t.o.s. = 0. ft
b.o.s. = 10. ft
OBS. WELL:
t.o.s. = 30. ft
b.o.s. = 40. ft

GERAGHTY & MILLER, INC.
Environmental Services

Pumping Test Analysis for Well MW-13C Using the Hantush and Jacob (1955) Leaky Aquifer Solution.

NORFOLK GAS PLANT SITE
Norfolk, Virginia

FIGURE
5

ORIGINAL

APPENDIX J

PFE

ORIGINAL (Red)

ORIGINAL (Red)

APPENDIX J

SOIL-QUALITY ANALYTICAL RESULTS

MARTEL

Certificate of Laboratory Analysis

MARTEL LABORATORY SERVICES, INC. 1025 Cromwell Bridge Road Baltimore, Maryland 21204 (301) 825-7790
5920 North Belt, Suite 111 Houston, Texas 77396 (713) 441-4965
Capital Airport Springfield, Illinois 62707 (217) 522-0009

ORIGINAL (Red)

ORIGINAL (Red)

Invoice Number 03159

Sample W-5008

Samples received by Martel Laboratory Services.
Project MD057.02 Norfolk/VEPCO

Geraghty & Miller
844 West Street
Annapolis, Maryland 21401
Attention: Mr. Curt Cramer

October 27, 1989

Client Identification: GERANOR

Log Identification: W-5008
Date Received: 09/15/89

Sample Id: 1. B-1, 0'-2'

pH	EPA 150.1	8.2	
Solids (Total)	EPA 160.3	83.4	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	230	ppm
Sulfate	EPA 375.3	24000	ppm
Iron (total)	EPA 236.1	2.74	%
Arsenic	EPA 206.2	10	ppm
Barium	EPA 200.7	1.15	ppm
Cadmium	EPA 213.1	2	ppm
Chromium	EPA 218.1	9	ppm
Lead (total)	EPA 239.1	385	ppm
Mercury	EPA 245.1	2.1	ppm
Selenium	EPA 270.2	<1	ppm
Silver	EPA 272.1	<1	ppm
EP Toxicity:	Method	Result	
Arsenic	EPA 206.2	0.011	mg/l
Barium	EPA 200.7	0.32	mg/l
Cadmium	EPA 213.1	<0.01	mg/l
Chromium	EPA 218.1	0.05	mg/l
Lead (total)	EPA 239.1	0.12	mg/l
Mercury	EPA 245.1	0.001	mg/l
Selenium	EPA 270.2	<0.01	mg/l
Silver	EPA 272.1	<0.01	mg/l

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ORIGINAL (Red)

PFE

ORIGINAL (Red)

Client Identification: GERANOR
Log Identification: W-5008
October 27, 1989
Page 2

Sample Id: 2. B-1, 4'-6'

pH	EPA 150.1	8.1	
Solids (Total)	EPA 160.3	68.2	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	2	ppm
Cyanide (total)	EPA 335.3	10	ppm
Sulfate	EPA 375.3	2500	ppm
Iron (total)	EPA 236.1	5.26	%

Sample Id: 3. B-2, 0'-2'

pH	EPA 150.1	5.9	
Solids (Total)	EPA 160.3	95.2	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	<1	ppm
Sulfate	EPA 375.3	1100	ppm
Iron (total)	EPA 236.1	3310	ppm

Sample Id: 4. B-3, 0'-2'

pH	EPA 150.1	6.8	
Solids (Total)	EPA 160.3	79.0	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	1	ppm
Cyanide (total)	EPA 335.3	270	ppm
Sulfate	EPA 375.3	820	ppm
Iron (total)	EPA 236.1	2.79	%

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Certificate of Laboratory Analysis

ORIGINAL (Red)

ORIGINAL (Red)

Client Identification: GERANOR
Log Identification: W-5008
October 27, 1989

Sample Id: 5. B-3, 4'-6'

pH	EPA 150.1	8.9	
Solids (Total)	EPA 160.3	83.1	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	2	ppm
Cyanide (total)	EPA 335.3	36	ppm
Sulfate	EPA 375.3	1400	ppm
Iron (total)	EPA 236.1	1.91	%
Arsenic	EPA 206.2	2.2	ppm
Barium	EPA 200.7	0.25	ppm
Cadmium	EPA 213.1	<1	ppm
Chromium	EPA 218.1	7	ppm
Lead (total)	EPA 239.1	376	ppm
Mercury	EPA 245.1	0.2	ppm
Selenium	EPA 270.2	<1	ppm
Silver	EPA 272.1	<1	ppm
EP Toxicity:	Method	Result	
Arsenic	EPA 206.2	<0.01	mg/l
Barium	EPA 200.7	0.35	mg/l
Cadmium	EPA 213.1	<0.01	mg/l
Chromium	EPA 218.1	0.02	mg/l
Lead (total)	EPA 239.1	<0.02	mg/l
Mercury	EPA 245.1	<0.001	mg/l
Selenium	EPA 270.2	<0.01	mg/l
Silver	EPA 272.1	<0.01	mg/l

Sample Id: 6. B-4, 0'-2'

pH	EPA 150.1	6.6	
Solids (Total)	EPA 160.3	82.2	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	<1	ppm
Sulfate	EPA 375.3	730	ppm
Iron (total)	EPA 236.1	2.17	%

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Capital Airport Springfield, Illinois 62707 (217) 522-0009

ORIGINAL (Red)

Client Identification: GERANOR
Log Identification: W-5008
October 27, 1989
Page 4

Sample Id: 7. B-4, 4'-6'

pH	EPA 150.1	7.1	
Solids (Total)	EPA 160.3	91.4	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	11	ppm
Cyanide (total)	EPA 335.3	5	ppm
Sulfate	EPA 375.3	1200	ppm
Iron (total)	EPA 236.1	4790	ppm
Toxicity Characteristic Leaching Proc.	EPA pend.	Result	
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached

Sample Id: 8. B-5, 0'-2'

pH	EPA 150.1	4.1	
Solids (Total)	EPA 160.3	91.2	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	840	ppm
Sulfate	EPA 375.3	4900	ppm
Iron (total)	EPA 236.1	1.63	%

Sample Id: 9. B-5, 4'-6'

pH	EPA 150.1	4.5	
Solids (Total)	EPA 160.3	69.5	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	13	ppm
Sulfate	EPA 375.3	1200	ppm
Iron (total)	EPA 236.1	5480	ppm

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Capital Airport Springfield, Illinois 62707 (217) 522-0009

PFE ORIGINAL (Red)

Client Identification: GERANOR
Log Identification: W-5008
October 27, 1989
Page 5

Sample Id: 10. B-6, 0'-2'

pH	EPA 150.1	7.3	
Solids (Total)	EPA 160.3	94.2	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	<1	ppm
Sulfate	EPA 375.3	1800	ppm
Iron (total)	EPA 236.1	5820	ppm

Sample Id: 11. B-6, 4'-6'

pH	EPA 150.1	7.1	
Solids (Total)	EPA 160.3	79.1	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	17	ppm
Sulfate	EPA 375.3	2700	ppm
Iron (total)	EPA 236.1	2.11	%

Sample Id: 12. B-7, 0'-2'

pH	EPA 150.1	7.5	
Solids (Total)	EPA 160.3	94.7	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	<1	ppm
Sulfate	EPA 375.3	1200	ppm
Iron (total)	EPA 236.1	1.17	%

MARTEL

Certificate of Laboratory Analysis

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5920 North Belt, Suite 111 Houston, Texas 77396 (713) 441-4965
Capital Airport Springfield, Illinois 62707 (217) 522-0009

PFE

ORIGINAL (Red)

Client Identification: GERANOR
Log Identification: W-5008
October 27, 1989

Sample Id: 13. B-7, 4'-6'

pH	EPA 150.1	7.6	
Solids (Total)	EPA 160.3	76.3	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	2	ppm
Sulfate	EPA 375.3	860	ppm
Iron (total)	EPA 236.1	8.14	%

Sample Id: 14. B-9, 0'-2'

pH	EPA 150.1	7.4	
Solids (Total)	EPA 160.3	84.3	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	130	ppm
Sulfate	EPA 375.3	1900	ppm
Iron (total)	EPA 236.1	3.12	%

Sample Id: 15. B-9, 4'-6'

pH	EPA 150.1	6.1	
Solids (Total)	EPA 160.3	87.5	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	1	ppm
Cyanide (total)	EPA 335.3	10	ppm
Sulfate	EPA 375.3	1300	ppm
Iron (total)	EPA 236.1	1.76	%

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Certificate of Laboratory Analysis

ORIGINAL (Red)

Client Identification: GERANOR
Log Identification: W-5008
October 27, 1989

Sample Id: 16. B-10, 0'-2'

pH	EPA 150.1	7.9	
Solids (Total)	EPA 160.3	89.8	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	<1	ppm
Cyanide (total)	EPA 335.3	<1	ppm
Sulfate	EPA 375.3	1100	ppm
Iron (total)	EPA 236.1	1.02	%

Sample Id: 17. B-10, 4'-6'

pH	EPA 150.1	8.6	
Solids (Total)	EPA 160.3	86.6	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached
Phenolics	EPA 420.1	3	ppm
Cyanide (total)	EPA 335.3	1	ppm
Sulfate	EPA 375.3	690	ppm
Iron (total)	EPA 236.1	1.58	%
Arsenic	EPA 206.2	1.8	ppm
Barium	EPA 200.7	0.41	ppm
Cadmium	EPA 213.1	<1	ppm
Chromium	EPA 218.1	6.5	ppm
Lead (total)	EPA 239.1	56	ppm
Mercury	EPA 245.1	0.1	ppm
Selenium	EPA 270.2	<1	ppm
Silver	EPA 272.1	<1	ppm
EP Toxicity:	Method	Result	
Arsenic	EPA 206.2	<0.01	mg/l
Barium	EPA 200.7	0.42	mg/l
Cadmium	EPA 213.1	<0.01	mg/l
Chromium	EPA 218.1	<0.01	mg/l
Lead (total)	EPA 239.1	<0.02	mg/l
Mercury	EPA 245.1	<0.001	mg/l
Selenium	EPA 270.2	<0.01	mg/l
Silver	EPA 272.1	<0.01	mg/l
Toxicity Characteristic Leaching Proc.	EPA pend.	Result	

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PEE

ORIGINAL (Red)

ORIGINAL (Red)

Client Identification: GERANOR
Log Identification: W-5008
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Sample Id: 17. B-10, 4'-6'

Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached

Sample Id: 18. MW-1, 2'-4'

Arsenic	EPA 206.2	5.4	ppm
Barium	EPA 200.7	259	ppm
Cadmium	EPA 213.1	<1	ppm
Chromium	EPA 218.1	12	ppm
Lead (total)	EPA 239.1	451	ppm
Mercury	EPA 245.1	2.5	ppm
Selenium	EPA 270.2	<1	ppm
Silver	EPA 272.1	<1	ppm
EP Toxicity:	Method	Result	
Arsenic	EPA 206.2	<0.01	mg/l
Barium	EPA 200.7	0.83	mg/l
Cadmium	EPA 213.1	<0.01	mg/l
Chromium	EPA 218.1	0.03	mg/l
Lead (total)	EPA 239.1	0.26	mg/l
Mercury	EPA 245.1	<0.001	mg/l
Selenium	EPA 270.2	<0.01	mg/l
Silver	EPA 272.1	<0.01	mg/l

Sample Id: 19. MW-2, 4'-6'

Arsenic	EPA 206.2	4.2	ppm
Barium	EPA 200.7	225	ppm
Cadmium	EPA 213.1	<11	ppm
Chromium	EPA 218.1	11	ppm
Lead (total)	EPA 239.1	534	ppm
Mercury	EPA 245.1	0.3	ppm
Selenium	EPA 270.2	<1	ppm
Silver	EPA 272.1	<1	ppm
EP Toxicity:	Method	Result	
Arsenic	EPA 206.2	0.013	mg/l
Barium	EPA 200.7	0.47	mg/l

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Sample Id: 19. MW-2, 4'-6'

Cadmium	EPA 213.1	<0.01	mg/l
Chromium	EPA 218.1	0.02	mg/l
Lead (total)	EPA 239.1	<0.02	mg/l
Mercury	EPA 245.1	<0.001	mg/l
Selenium	EPA 270.2	<0.01	mg/l
Silver	EPA 272.1	<0.01	mg/l

Sample Id: 20. MW-3, 2'-4'

Arsenic	EPA 206.2	<1	ppm
Barium	EPA 200.7	52	ppm
Cadmium	EPA 213.1	<1	ppm
Chromium	EPA 218.1	9.7	ppm
Lead (total)	EPA 239.1	99.0	ppm
Mercury	EPA 245.1	0.5	ppm
Selenium	EPA 270.2	<1	ppm
Silver	EPA 272.1	<1	ppm
EP Toxicity:	Method	Result	
Arsenic	EPA 206.2	<0.01	mg/l
Barium	EPA 200.7	0.32	mg/l
Cadmium	EPA 213.1	<0.01	mg/l
Chromium	EPA 218.1	0.06	mg/l
Lead (total)	EPA 239.1	0.10	mg/l
Mercury	EPA 245.1	<0.001	mg/l
Selenium	EPA 270.2	<0.01	mg/l
Silver	EPA 272.1	0.03	mg/l

Sample Id: 21. MW-8, 2'-4'

Arsenic	EPA 206.2	<1	ppm
Barium	EPA 200.7	149	ppm
Cadmium	EPA 213.1	<1	ppm
Chromium	EPA 218.1	6.8	ppm
Lead (total)	EPA 239.1	757	ppm
Mercury	EPA 245.1	2.1	ppm
Selenium	EPA 270.2	<1	ppm
Silver	EPA 272.1	<1	ppm

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Sample Id: 21. MW-8, 2'-4'

EP Toxicity:	Method	Result	
Arsenic	EPA 206.2	<0.01	mg/l
Barium	EPA 200.7	0.94	mg/l
Cadmium	EPA 213.1	<0.01	mg/l
Chromium	EPA 218.1	<0.01	mg/l
Lead (total)	EPA 239.1	0.58	mg/l
Mercury	EPA 245.1	<0.001	mg/l
Selenium	EPA 270.2	<0.01	mg/l
Silver	EPA 272.1	0.02	mg/l

Sample Id: 22. MW-9, 4'-6'

Arsenic	EPA 206.2	<1	ppm
Barium	EPA 200.7	71	ppm
Cadmium	EPA 213.1	<1	ppm
Chromium	EPA 218.1	5.9	ppm
Lead (total)	EPA 239.1	461	ppm
Mercury	EPA 245.1	0.5	ppm
Selenium	EPA 270.2	<1	ppm
Silver	EPA 272.1	<1	ppm
EP Toxicity:	Method	Result	
Arsenic	EPA 206.2	<0.01	mg/l
Barium	EPA 200.7	<0.01	mg/l
Cadmium	EPA 213.1	<0.01	mg/l
Chromium	EPA 218.1	<0.01	mg/l
Lead (total)	EPA 239.1	0.06	mg/l
Mercury	EPA 245.1	<0.001	mg/l
Selenium	EPA 270.2	<0.01	mg/l
Silver	EPA 272.1	<0.01	mg/l

Sample Id: 23. MW-10, 6'

pH	EPA 150.1	7.6	
Solids (Total)	EPA 160.3	70.0	%
Volatile Organic Compounds	EPA 602	see	attached
Base/Neutral Extractables	EPA 8270	see	attached
Acid Extractables	EPA 8040	see	attached

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PFE ORIGINAL (Red) ORIGINAL (Red)

Client Identification: GERANOR
Log Identification: W-5008
October 27, 1989

Sample Id: 23. MW-10, 6'

Phenolics	EPA 420.1	7	ppm
Cyanide (total)	EPA 335.3	49	ppm
Sulfate	EPA 375.3	6500	ppm
Iron (total)	EPA 236.1	3.57	%

Sample Id: 24. MW-12, 0'-2'

Arsenic	EPA 206.2	1.9	ppm
Barium	EPA 200.7	63	ppm
Cadmium	EPA 213.1	<1	ppm
Chromium	EPA 218.1	5.9	ppm
Lead (total)	EPA 239.1	47	ppm
Mercury	EPA 245.1	0.3	ppm
Selenium	EPA 270.2	<1	ppm
Silver	EPA 272.1	<1	ppm
EP Toxicity:	Method	Result	
Arsenic	EPA 206.2	<0.01	mg/l
Barium	EPA 200.7	0.18	mg/l
Cadmium	EPA 213.1	<0.01	mg/l
Chromium	EPA 218.1	<0.01	mg/l
Lead (total)	EPA 239.1	<0.02	mg/l
Mercury	EPA 245.1	<0.001	mg/l
Selenium	EPA 270.2	<0.01	mg/l
Silver	EPA 272.1	<0.01	mg/l

Sample Id: 25. MW-14, 0'-2'

Arsenic	EPA 206.2	1.8	ppm
Barium	EPA 200.7	39	ppm
Cadmium	EPA 213.1	<1	ppm
Chromium	EPA 218.1	7.7	ppm
Lead (total)	EPA 239.1	40	ppm
Mercury	EPA 245.1	9.3	ppm
Selenium	EPA 270.2	<1	ppm
Silver	EPA 272.1	<1	ppm
EP Toxicity:	Method	Result	
Arsenic	EPA 206.2	<0.01	mg/l

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ORIGINAL (Red)

ORIGINAL (Red)

Client Identification: GERANOR
Log Identification: W-5008
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Sample Id: 25. MW-14, 0'-2'

Barium	EPA 200.7	0.24	mg/l
Cadmium	EPA 213.1	<0.01	mg/l
Chromium	EPA 218.1	<0.01	mg/l
Lead (total)	EPA 239.1	<0.02	mg/l
Mercury	EPA 245.1	<0.001	mg/l
Selenium	EPA 270.2	<0.01	mg/l
Silver	EPA 272.1	<0.01	mg/l

All procedures followed were in accordance with EPA-600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", or SW-846, "Test Methods for Evaluating Solid Waste", 1986.

Helen Lewandowski

Joseph C. Wolfkill II
President

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10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-1, 0'-2'			
N-Nitrosodimethylamine	ND	<1000	ug/kg
Bis (2-Chloroethyl) Ether	ND	<1000	ug/kg
1,3-Dichlorobenzene	ND	<1000	ug/kg
1,4-Dichlorobenzene	ND	<1000	ug/kg
1,2-Dichlorobenzene	ND	<1000	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<1000	ug/kg
Hexachloroethane	ND	<1000	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<1000	ug/kg
Nitrobenzene	ND	<1000	ug/kg
Isophorone	ND	<1000	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<1000	ug/kg
1,2,4-Trichlorobenzene	ND	<1000	ug/kg
Naphthalene	7600	<1000	ug/kg
Hexachlorobutadiene	ND	<1000	ug/kg
Hexachlorocyclopentadiene	ND	<1000	ug/kg
2-Chloronaphthalene	ND	<1000	ug/kg
Acenaphthylene	28000	<1000	ug/kg
Dimethyl Phthalate	ND	<1000	ug/kg
2,6-Dinitrotoluene	ND	<1000	ug/kg
Acenaphthene	1400	<1000	ug/kg
2,4-Dinitrotoluene	ND	<1000	ug/kg
Fluorene	2300	<1000	ug/kg
Diethyl Phthalate	ND	<1000	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<1000	ug/kg
N-Nitrosodiphenylamine	ND	<1000	ug/kg
1,2-Diphenylhydrazine	ND	<1000	ug/kg
4-Bromophenyl Phenyl Ether	ND	<1000	ug/kg
Hexachlorobenzene	ND	<1000	ug/kg
Phenanthrene	35000	<1000	ug/kg
Anthracene	12000	<1000	ug/kg
Di-n-Butyl Phthalate	ND	<1000	ug/kg
Fluoranthene	30000	<1000	ug/kg
Benzidine	ND	<1000	ug/kg
Pyrene	58000	<1000	ug/kg
Butyl Benzyl Phthalate	ND	<1000	ug/kg
Benzo (a) Anthracene	19000	<1000	ug/kg
3,3-Dichlorobenzidine	ND	<1000	ug/kg
Chrysene	17000	<1000	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<1000	ug/kg
Di-n-Octyl Phthalate	ND	<1000	ug/kg
Benzo (a) Pyrene	16000	<1000	ug/kg
Indeno (1,2,3-cd) Pyrene	ND	<1000	ug/kg
Dibenzo (a,h) Anthracene	ND	<1000	ug/kg
Benzo (g,h,i) Perylene	14000	<1000	ug/kg
Benzo (b+k) Fluoranthene	31000	<1000	ug/kg

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PFE

ORIGINAL (Red)

ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-1, 0'-2'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-1, 0'-2'			
Benzene	240	<50	ug/kg
Toluene	50	<50	ug/kg
Ethylbenzene	260	<50	ug/kg
m-Xylene	ND	<50	ug/kg
(o- + p-) Xylenes	68	<50	ug/kg

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PFE ORIGINAL (Red)

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10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-1, 4'-6'			
N-Nitrosodimethylamine	ND	<1000	ug/kg
Bis (2-Chloroethyl) Ether	ND	<1000	ug/kg
1,3-Dichlorobenzene	ND	<1000	ug/kg
1,4-Dichlorobenzene	ND	<1000	ug/kg
1,2-Dichlorobenzene	ND	<1000	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<1000	ug/kg
Hexachloroethane	ND	<1000	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<1000	ug/kg
Nitrobenzene	ND	<1000	ug/kg
Isophorone	ND	<1000	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<1000	ug/kg
1,2,4-Trichlorobenzene	ND	<1000	ug/kg
Naphthalene	470000	<1000	ug/kg
Hexachlorobutadiene	ND	<1000	ug/kg
Hexachlorocyclopentadiene	ND	<1000	ug/kg
2-Chloronaphthalene	ND	<1000	ug/kg
Acenaphthylene	150000	<1000	ug/kg
Dimethyl Phthalate	ND	<1000	ug/kg
2,6-Dinitrotoluene	ND	<1000	ug/kg
Acenaphthene	280000	<1000	ug/kg
2,4-Dinitrotoluene	ND	<1000	ug/kg
Fluorene	240000	<1000	ug/kg
Diethyl Phthalate	ND	<1000	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<1000	ug/kg
N-Nitrosodiphenylamine	ND	<1000	ug/kg
1,2-Diphenylhydrazine	ND	<1000	ug/kg
4-Bromophenyl Phenyl Ether	ND	<1000	ug/kg
Hexachlorobenzene	ND	<1000	ug/kg
Phenanthrene	590000	<1000	ug/kg
Anthracene	280000	<1000	ug/kg
Di-n-Butyl Phthalate	ND	<1000	ug/kg
Fluoranthene	360000	<1000	ug/kg
Benzidine	ND	<1000	ug/kg
Pyrene	6200	<1000	ug/kg
Butyl Benzyl Phthalate	ND	<1000	ug/kg
Benzo (a) Anthracene	120000	<1000	ug/kg
3,3-Dichlorobenzidine	ND	<1000	ug/kg
Chrysene	134000	<1000	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<1000	ug/kg
Di-n-Octyl Phthalate	ND	<1000	ug/kg
Benzo (a) Pyrene	77000	<1000	ug/kg
Indeno (1,2,3-cd) Pyrene	83000	<1000	ug/kg
Dibenzo (a,h) Anthracene	22000	<1000	ug/kg
Benzo (g,h,i) Perylene	74000	<1000	ug/kg
Benzo (b+k) Fluoranthene	150000	<1000	ug/kg

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10/19/89

ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-1, 4'-6'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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ORIGINAL (Red)

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-1, 4'-6'			
Benzene	3400	<500	ug/kg
Toluene	740	<500	ug/kg
Ethylbenzene	20000	<500	ug/kg
m-Xylene	48000	<500	ug/kg
(o- + p-) Xylenes	5000	<500	ug/kg

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ORIGINAL (Red)

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-2, 0'-2'			
N-Nitrosodimethylamine	ND	<100	ug/kg
Bis (2-Chloroethyl) Ether	ND	<100	ug/kg
1,3-Dichlorobenzene	ND	<100	ug/kg
1,4-Dichlorobenzene	ND	<100	ug/kg
1,2-Dichlorobenzene	ND	<100	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<100	ug/kg
Hexachloroethane	ND	<100	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<100	ug/kg
Nitrobenzene	ND	<100	ug/kg
Isophorone	ND	<100	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<100	ug/kg
1,2,4-Trichlorobenzene	ND	<100	ug/kg
Naphthalene	3600	<100	ug/kg
Hexachlorobutadiene	ND	<100	ug/kg
Hexachlorocyclopentadiene	ND	<100	ug/kg
2-Chloronaphthalene	ND	<100	ug/kg
Acenaphthylene	11000	<100	ug/kg
Dimethyl Phthalate	ND	<100	ug/kg
2,6-Dinitrotoluene	ND	<100	ug/kg
Acenaphthene	1300	<100	ug/kg
2,4-Dinitrotoluene	ND	<100	ug/kg
Fluorene	1700	<100	ug/kg
Diethyl Phthalate	ND	<100	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<100	ug/kg
N-Nitrosodiphenylamine	ND	<100	ug/kg
1,2-Diphenylhydrazine	ND	<100	ug/kg
4-Bromophenyl Phenyl Ether	ND	<100	ug/kg
Hexachlorobenzene	ND	<100	ug/kg
Phenanthrene	2500	<100	ug/kg
Anthracene	3900	<100	ug/kg
Di-n-Butyl Phthalate	ND	<100	ug/kg
Fluoranthene	6400	<100	ug/kg
Benzidine	ND	<100	ug/kg
Pyrene	11000	<100	ug/kg
Butyl Benzyl Phthalate	ND	<100	ug/kg
Benzo (a) Anthracene	3900	<100	ug/kg
3,3-Dichlorobenzidine	ND	<100	ug/kg
Chrysene	5900	<100	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<100	ug/kg
Di-n-Octyl Phthalate	ND	<100	ug/kg
Benzo (a) Pyrene	ND	<100	ug/kg
Indeno (1,2,3-cd) Pyrene	3000	<100	ug/kg
Dibenzo (a,h) Anthracene	ND	<100	ug/kg
Benzo (g,h,i) Perylene	3000	<100	ug/kg
Benzo (b+k) Fluoranthene	7000	<100	ug/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-2, 0'-2'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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PFE ORIGINAL (Red)

ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-2, 0'-2'			
Benzene	89	<50	ug/kg
Toluene	ND	<50	ug/kg
Ethylbenzene	ND	<50	ug/kg
m-Xylene	ND	<50	ug/kg
(o- + p-) Xylenes	ND	<50	ug/kg

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PFE ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-3, 0'-2'			
N-Nitrosodimethylamine	ND	<1000	ug/kg
Bis (2-Chloroethyl) Ether	ND	<1000	ug/kg
1,3-Dichlorobenzene	ND	<1000	ug/kg
1,4-Dichlorobenzene	ND	<1000	ug/kg
1,2-Dichlorobenzene	ND	<1000	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<1000	ug/kg
Hexachloroethane	ND	<1000	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<1000	ug/kg
Nitrobenzene	ND	<1000	ug/kg
Isophorone	ND	<1000	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<1000	ug/kg
1,2,4-Trichlorobenzene	ND	<1000	ug/kg
Naphthalene	1200000	<1000	ug/kg
Hexachlorobutadiene	ND	<1000	ug/kg
Hexachlorocyclopentadiene	ND	<1000	ug/kg
2-Chloronaphthalene	ND	<1000	ug/kg
Acenaphthylene	83000	<1000	ug/kg
Dimethyl Phthalate	ND	<1000	ug/kg
2,6-Dinitrotoluene	ND	<1000	ug/kg
Acenaphthene	110000	<1000	ug/kg
2,4-Dinitrotoluene	ND	<1000	ug/kg
Fluorene	110000	<1000	ug/kg
Diethyl Phthalate	ND	<1000	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<1000	ug/kg
N-Nitrosodiphenylamine	ND	<1000	ug/kg
1,2-Diphenylhydrazine	ND	<1000	ug/kg
4-Bromophenyl Phenyl Ether	ND	<1000	ug/kg
Hexachlorobenzene	ND	<1000	ug/kg
Phenanthrene	250000	<1000	ug/kg
Anthracene	70000	<1000	ug/kg
Di-n-Butyl Phthalate	ND	<1000	ug/kg
Fluoranthene	130000	<1000	ug/kg
Benzidine	ND	<1000	ug/kg
Pyrene	220000	<1000	ug/kg
Butyl Benzyl Phthalate	ND	<1000	ug/kg
Benzo (a) Anthracene	67000	<1000	ug/kg
3,3-Dichlorobenzidine	ND	<1000	ug/kg
Chrysene	77000	<1000	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<1000	ug/kg
Di-n-Octyl Phthalate	ND	<1000	ug/kg
Benzo (a) Pyrene	59000	<1000	ug/kg
Indeno (1,2,3-cd) Pyrene	34000	<1000	ug/kg
Dibenzo (a,h) Anthracene	ND	<1000	ug/kg
Benzo (g,h,i) Perylene	32000	<1000	ug/kg
Benzo (b+k) Fluoranthene	89000	<1000	ug/kg

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ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-3, 0'-2'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-3, 0'-2'			
Benzene	1100	<500	ug/kg
Toluene	1100	<500	ug/kg
Ethylbenzene	20000	<500	ug/kg
m-Xylene	10000	<500	ug/kg
(o- + p-) Xylenes	7100	<500	ug/kg

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PFE ORIGINAL (Red)
ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-3, 4'-6'			
N-Nitrosodimethylamine	ND	<1000	ug/kg
Bis (2-Chloroethyl) Ether	ND	<1000	ug/kg
1,3-Dichlorobenzene	ND	<1000	ug/kg
1,4-Dichlorobenzene	ND	<1000	ug/kg
1,2-Dichlorobenzene	ND	<1000	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<1000	ug/kg
Hexachloroethane	ND	<1000	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<1000	ug/kg
Nitrobenzene	ND	<1000	ug/kg
Isophorone	ND	<1000	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<1000	ug/kg
1,2,4-Trichlorobenzene	ND	<1000	ug/kg
Naphthalene	690000	<1000	ug/kg
Hexachlorobutadiene	ND	<1000	ug/kg
Hexachlorocyclopentadiene	ND	<1000	ug/kg
2-Chloronaphthalene	ND	<1000	ug/kg
Acenaphthylene	14000	<1000	ug/kg
Dimethyl Phthalate	ND	<1000	ug/kg
2,6-Dinitrotoluene	ND	<1000	ug/kg
Acenaphthene	32000	<1000	ug/kg
2,4-Dinitrotoluene	ND	<1000	ug/kg
Fluorene	27000	<1000	ug/kg
Diethyl Phthalate	ND	<1000	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<1000	ug/kg
N-Nitrosodiphenylamine	ND	<1000	ug/kg
1,2-Diphenylhydrazine	ND	<1000	ug/kg
4-Bromophenyl Phenyl Ether	ND	<1000	ug/kg
Hexachlorobenzene	ND	<1000	ug/kg
Phenanthrene	84000	<1000	ug/kg
Anthracene	26000	<1000	ug/kg
Di-n-Butyl Phthalate	ND	<1000	ug/kg
Fluoranthene	36000	<1000	ug/kg
Benzidine	ND	<1000	ug/kg
Pyrene	52000	<1000	ug/kg
Butyl Benzyl Phthalate	ND	<1000	ug/kg
Benzo (a) Anthracene	15000	<1000	ug/kg
3,3-Dichlorobenzidine	ND	<1000	ug/kg
Chrysene	18000	<1000	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<1000	ug/kg
Di-n-Octyl Phthalate	ND	<1000	ug/kg
Benzo (a) Pyrene	15000	<1000	ug/kg
Indeno (1,2,3-cd) Pyrene	8900	<1000	ug/kg
Dibenzo (a,h) Anthracene	3100	<1000	ug/kg
Benzo (g,h,i) Perylene	8700	<1000	ug/kg
Benzo (b+k) Fluoranthene	19000	<1000	ug/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-3, 4'-6'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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PFK

ORIGINAL (Red)

10/19/89

ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-3, 4'-6'			
Benzene	4600	<500	ug/kg
Toluene	3400	<500	ug/kg
Ethylbenzene	51000	<500	ug/kg
m-Xylene	35000	<500	ug/kg
(o- + p-) Xylenes	21000	<500	ug/kg

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ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-4, 0'-2'			
N-Nitrosodimethylamine	ND	<1000	ug/kg
Bis (2-Chloroethyl) Ether	ND	<1000	ug/kg
1,3-Dichlorobenzene	ND	<1000	ug/kg
1,4-Dichlorobenzene	ND	<1000	ug/kg
1,2-Dichlorobenzene	ND	<1000	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<1000	ug/kg
Hexachloroethane	ND	<1000	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<1000	ug/kg
Nitrobenzene	ND	<1000	ug/kg
Isophorone	ND	<1000	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<1000	ug/kg
1,2,4-Trichlorobenzene	ND	<1000	ug/kg
Naphthalene	33000	<1000	ug/kg
Hexachlorobutadiene	ND	<1000	ug/kg
Hexachlorocyclopentadiene	ND	<1000	ug/kg
2-Chloronaphthalene	ND	<1000	ug/kg
Acenaphthylene	27000	<1000	ug/kg
Dimethyl Phthalate	ND	<1000	ug/kg
2,6-Dinitrotoluene	ND	<1000	ug/kg
Acenaphthene	1100	<1000	ug/kg
2,4-Dinitrotoluene	ND	<1000	ug/kg
Fluorene	2000	<1000	ug/kg
Diethyl Phthalate	ND	<1000	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<1000	ug/kg
N-Nitrosodiphenylamine	ND	<1000	ug/kg
1,2-Diphenylhydrazine	ND	<1000	ug/kg
4-Bromophenyl Phenyl Ether	ND	<1000	ug/kg
Hexachlorobenzene	ND	<1000	ug/kg
Phenanthrene	12000	<1000	ug/kg
Anthracene	8400	<1000	ug/kg
Di-n-Butyl Phthalate	ND	<1000	ug/kg
Fluoranthene	4300	<1000	ug/kg
Benzidine	ND	<1000	ug/kg
Pyrene	18000	<1000	ug/kg
Butyl Benzyl Phthalate	ND	<1000	ug/kg
Benzo (a) Anthracene	9700	<1000	ug/kg
3,3-Dichlorobenzidine	ND	<1000	ug/kg
Chrysene	11000	<1000	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<1000	ug/kg
Di-n-Octyl Phthalate	ND	<1000	ug/kg
Benzo (a) Pyrene	13000	<1000	ug/kg
Indeno (1,2,3-cd) Pyrene	19000	<1000	ug/kg
Dibenzo (a,h) Anthracene	4800	<1000	ug/kg
Benzo (g,h,i) Perylene	17000	<1000	ug/kg
Benzo (b+k) Fluoranthene	19000	<1000	ug/kg

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ORIGINAL (Red)

ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-4, 0'-2'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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ORIGINAL (Red)
ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-4, 0'-2'			
Benzene	710	<50	ug/kg
Toluene	1900	<50	ug/kg
Ethylbenzene	630	<50	ug/kg
m-Xylene	680	<50	ug/kg
(o- + p-) Xylenes	450	<50	ug/kg

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ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-4, 4'-6'			
N-Nitrosodimethylamine	ND	<100	ug/kg
Bis (2-Chloroethyl) Ether	ND	<100	ug/kg
1,3-Dichlorobenzene	ND	<100	ug/kg
1,4-Dichlorobenzene	ND	<100	ug/kg
1,2-Dichlorobenzene	ND	<100	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<100	ug/kg
Hexachloroethane	ND	<100	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<100	ug/kg
Nitrobenzene	ND	<100	ug/kg
Isophorone	ND	<100	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<100	ug/kg
1,2,4-Trichlorobenzene	ND	<100	ug/kg
Naphthalene	79000	<100	ug/kg
Hexachlorobutadiene	ND	<100	ug/kg
Hexachlorocyclopentadiene	ND	<100	ug/kg
2-Chloronaphthalene	ND	<100	ug/kg
Acenaphthylene	2000	<100	ug/kg
Dimethyl Phthalate	ND	<100	ug/kg
2,6-Dinitrotoluene	ND	<100	ug/kg
Acenaphthene	3500	<100	ug/kg
2,4-Dinitrotoluene	ND	<100	ug/kg
Fluorene	3000	<100	ug/kg
Diethyl Phthalate	ND	<100	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<100	ug/kg
N-Nitrosodiphenylamine	ND	<100	ug/kg
1,2-Diphenylhydrazine	ND	<100	ug/kg
4-Bromophenyl Phenyl Ether	ND	<100	ug/kg
Hexachlorobenzene	ND	<100	ug/kg
Phenanthrene	12000	<100	ug/kg
Anthracene	3400	<100	ug/kg
Di-n-Butyl Phthalate	ND	<100	ug/kg
Fluoranthene	4300	<100	ug/kg
Benzidine	ND	<100	ug/kg
Pyrene	ND	<100	ug/kg
Butyl Benzyl Phthalate	ND	<100	ug/kg
Benzo (a) Anthracene	1400	<100	ug/kg
3,3-Dichlorobenzidine	ND	<100	ug/kg
Chrysene	1700	<100	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<100	ug/kg
Di-n-Octyl Phthalate	ND	<100	ug/kg
Benzo (a) Pyrene	1000	<100	ug/kg
Indeno (1,2,3-cd) Pyrene	520	<100	ug/kg
Dibenzo (a,h) Anthracene	ND	<100	ug/kg
Benzo (g,h,i) Perylene	500	<100	ug/kg
Benzo (b+k) Fluoranthene	3200	<100	ug/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

ORIGINAL (Red)

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-4, 4'-6'			
Phenol	4.4	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-4, 4'-6'			
Benzene	29000	<500	ug/kg
Toluene	54000	<500	ug/kg
Ethylbenzene	48000	<500	ug/kg
m-Xylene	61000	<500	ug/kg
(o- + p-) Xylenes	21000	<500	ug/kg

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ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-4, 4'-6', TCLP Extract			
N-Nitrosodimethylamine	ND	<10	ug/l
Bis (2-Chloroethyl) Ether	ND	<5	ug/l
1,3-Dichlorobenzene	ND	<5	ug/l
1,4-Dichlorobenzene	ND	<5	ug/l
1,2-Dichlorobenzene	ND	<5	ug/l
Bis (2-Chloroisopropyl) Ether	ND	<5	ug/l
Hexachloroethane	ND	<5	ug/l
N-Nitroso-Di-n-Propylamine	ND	<10	ug/l
Nitrobenzene	ND	<10	ug/l
Isophorone	ND	<5	ug/l
Bis (2-Chloroethoxy) Methane	ND	<5	ug/l
1,2,4-Trichlorobenzene	ND	<5	ug/l
Naphthalene	520	<5	ug/l
Hexachlorobutadiene	ND	<5	ug/l
Hexachlorocyclopentadiene	ND	<10	ug/l
2-Chloronaphthalene	ND	<5	ug/l
Acenaphthylene	9	<5	ug/l
Dimethyl Phthalate	ND	<5	ug/l
2,6-Dinitrotoluene	ND	<5	ug/l
Acenaphthene	13	<5	ug/l
2,4-Dinitrotoluene	ND	<5	ug/l
Fluorene	9	<5	ug/l
Diethyl Phthalate	ND	<5	ug/l
4-Chlorophenyl Phenyl Ether	ND	<5	ug/l
N-Nitrosodiphenylamine	ND	<5	ug/l
1,2-Diphenylhydrazine	ND	<5	ug/l
4-Bromophenyl Phenyl Ether	ND	<5	ug/l
Hexachlorobenzene	ND	<10	ug/l
Phenanthrene	6	<5	ug/l
Anthracene	ND	<5	ug/l
Di-n-Butyl Phthalate	ND	<5	ug/l
Fluoranthene	ND	<5	ug/l
Benzidine	ND	<50	ug/l
Pyrene	ND	<5	ug/l
Butyl Benzyl Phthalate	ND	<5	ug/l
Benzo (a) Anthracene	ND	<5	ug/l
3,3-Dichlorobenzidine	ND	<10	ug/l
Chrysene	ND	<5	ug/l
Bis (2-Ethylhexyl) Phthalate	ND	<50	ug/l
Di-n-Octyl Phthalate	ND	<5	ug/l
Benzo (a) Pyrene	ND	<5	ug/l
Indeno (1,2,3-cd) Pyrene	ND	<10	ug/l
Dibenzo (a,h) Anthracene	ND	<10	ug/l
Benzo (g,h,i) Perylene	ND	<10	ug/l
Benzo (b+k) Fluoranthene	ND	<10	ug/l

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ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-4, 4'-6', TCLP Extract			
Phenol	170	<10	ug/l
2-Chlorophenol	ND	<10	ug/l
2-Nitrophenol	ND	<20	ug/l
2,4-Dimethylphenol	ND	<10	ug/l
2,4-Dichlorophenol	ND	<10	ug/l
4-Chloro-3-methylphenol	ND	<10	ug/l
2,4,6-Trichlorophenol	ND	<10	ug/l
2,4-Dinitrophenol	ND	<50	ug/l
4-Nitrophenol	ND	<10	ug/l
2-Methyl-4,6-dinitrophenol	ND	<50	ug/l
Pentachlorophenol	ND	<10	ug/l

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PFE

ORIGINAL (Red)

ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-4, 4'-6', TCLP Extract			
Benzene	380	<50	ug/l
Toluene	820	<50	ug/l
Ethylbenzene	420	<50	ug/l
m-Xylene	690	<50	ug/l
(o- + p-) Xylenes	250	<50	ug/l

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PFE ORIGINAL (Red)

10/19/89

ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-5, 0'-2'			
N-Nitrosodimethylamine	ND	<1000	ug/kg
Bis (2-Chloroethyl) Ether	ND	<1000	ug/kg
1,3-Dichlorobenzene	ND	<1000	ug/kg
1,4-Dichlorobenzene	ND	<1000	ug/kg
1,2-Dichlorobenzene	ND	<1000	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<1000	ug/kg
Hexachloroethane	ND	<1000	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<1000	ug/kg
Nitrobenzene	ND	<1000	ug/kg
Isophorone	ND	<1000	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<1000	ug/kg
1,2,4-Trichlorobenzene	ND	<1000	ug/kg
Naphthalene	52000	<1000	ug/kg
Hexachlorobutadiene	ND	<1000	ug/kg
Hexachlorocyclopentadiene	ND	<1000	ug/kg
2-Chloronaphthalene	ND	<1000	ug/kg
Acenaphthylene	180000	<1000	ug/kg
Dimethyl Phthalate	ND	<1000	ug/kg
2,6-Dinitrotoluene	ND	<1000	ug/kg
Acenaphthene	20000	<1000	ug/kg
2,4-Dinitrotoluene	ND	<1000	ug/kg
Fluorene	53000	<1000	ug/kg
Diethyl Phthalate	ND	<1000	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<1000	ug/kg
N-Nitrosodiphenylamine	ND	<1000	ug/kg
1,2-Diphenylhydrazine	ND	<1000	ug/kg
4-Bromophenyl Phenyl Ether	ND	<1000	ug/kg
Hexachlorobenzene	ND	<1000	ug/kg
Phenanthrene	240000	<1000	ug/kg
Anthracene	81000	<1000	ug/kg
Di-n-Butyl Phthalate	ND	<1000	ug/kg
Fluoranthene	220000	<1000	ug/kg
Benzidine	ND	<1000	ug/kg
Pyrene	560000	<1000	ug/kg
Butyl Benzyl Phthalate	ND	<1000	ug/kg
Benzo (a) Anthracene	110000	<1000	ug/kg
3,3-Dichlorobenzidine	ND	<1000	ug/kg
Chrysene	120000	<1000	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<1000	ug/kg
Di-n-Octyl Phthalate	ND	<1000	ug/kg
Benzo (a) Pyrene	120000	<1000	ug/kg
Indeno (1,2,3-cd) Pyrene	75000	<1000	ug/kg
Dibenzo (a,h) Anthracene	26000	<1000	ug/kg
Benzo (g,h,i) Perylene	78000	<1000	ug/kg
Benzo (b+k) Fluoranthene	180000	<1000	ug/kg

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PFE ORIGINAL (Green)

10/19/89

ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-5, 0'-2'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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PFE ORIGINAL (Red)

ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-5, 0'-2'			
Benzene	ND	<50	ug/kg
Toluene	1200	<50	ug/kg
Ethylbenzene	ND	<50	ug/kg
m-Xylene	930	<50	ug/kg
(o- + p-) Xylenes	ND	<50	ug/kg

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PFE ORIGINAL (Red)

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-5, 4'-6'			
N-Nitrosodimethylamine	ND	<100	ug/kg
Bis (2-Chloroethyl) Ether	ND	<100	ug/kg
1,3-Dichlorobenzene	ND	<100	ug/kg
1,4-Dichlorobenzene	ND	<100	ug/kg
1,2-Dichlorobenzene	ND	<100	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<100	ug/kg
Hexachloroethane	ND	<100	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<100	ug/kg
Nitrobenzene	ND	<100	ug/kg
Isophorone	ND	<100	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<100	ug/kg
1,2,4-Trichlorobenzene	ND	<100	ug/kg
Naphthalene	4600	<100	ug/kg
Hexachlorobutadiene	ND	<100	ug/kg
Hexachlorocyclopentadiene	ND	<100	ug/kg
2-Chloronaphthalene	ND	<100	ug/kg
Acenaphthylene	280	<100	ug/kg
Dimethyl Phthalate	ND	<100	ug/kg
2,6-Dinitrotoluene	ND	<100	ug/kg
Acenaphthene	ND	<100	ug/kg
2,4-Dinitrotoluene	ND	<100	ug/kg
Fluorene	ND	<100	ug/kg
Diethyl Phthalate	ND	<100	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<100	ug/kg
N-Nitrosodiphenylamine	ND	<100	ug/kg
1,2-Diphenylhydrazine	ND	<100	ug/kg
4-Bromophenyl Phenyl Ether	ND	<100	ug/kg
Hexachlorobenzene	ND	<100	ug/kg
Phenanthrene	3100	<100	ug/kg
Anthracene	470	<100	ug/kg
Di-n-Butyl Phthalate	ND	<100	ug/kg
Fluoranthene	4900	<100	ug/kg
Benzidine	ND	<100	ug/kg
Pyrene	2400	<100	ug/kg
Butyl Benzyl Phthalate	ND	<100	ug/kg
Benzo (a) Anthracene	2000	<100	ug/kg
3,3-Dichlorobenzidine	ND	<100	ug/kg
Chrysene	2800	<100	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<100	ug/kg
Di-n-Octyl Phthalate	ND	<100	ug/kg
Benzo (a) Pyrene	2400	<100	ug/kg
Indeno (1,2,3-cd) Pyrene	2400	<100	ug/kg
Dibenzo (a,h) Anthracene	740	<100	ug/kg
Benzo (g,h,i) Perylene	2000	<100	ug/kg
Benzo (b+k) Fluoranthene	3700	<100	ug/kg

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ORIGINAL (Red)

ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-5, 4'-6'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

ORIGINAL (Red)

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-5, 4'-6'			
Benzene	370	<50	ug/kg
Toluene	850	<50	ug/kg
Ethylbenzene	1300	<50	ug/kg
m-Xylene	910	<50	ug/kg
(o- + p-) Xylenes	960	<50	ug/kg

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EPA Priority Pollutant Analysis

ORIGINAL (Red)

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-6, 0'-2'			
N-Nitrosodimethylamine	ND	<100	ug/kg
Bis (2-Chloroethyl) Ether	ND	<100	ug/kg
1,3-Dichlorobenzene	ND	<100	ug/kg
1,4-Dichlorobenzene	ND	<100	ug/kg
1,2-Dichlorobenzene	ND	<100	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<100	ug/kg
Hexachloroethane	ND	<100	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<100	ug/kg
Nitrobenzene	ND	<100	ug/kg
Isophorone	ND	<100	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<100	ug/kg
1,2,4-Trichlorobenzene	ND	<100	ug/kg
Naphthalene	120	<100	ug/kg
Hexachlorobutadiene	ND	<100	ug/kg
Hexachlorocyclopentadiene	ND	<100	ug/kg
2-Chloronaphthalene	ND	<100	ug/kg
Acenaphthylene	620	<100	ug/kg
Dimethyl Phthalate	ND	<100	ug/kg
2,6-Dinitrotoluene	ND	<100	ug/kg
Acenaphthene	ND	<100	ug/kg
2,4-Dinitrotoluene	ND	<100	ug/kg
Fluorene	650	<100	ug/kg
Diethyl Phthalate	ND	<100	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<100	ug/kg
N-Nitrosodiphenylamine	ND	<100	ug/kg
1,2-Diphenylhydrazine	ND	<100	ug/kg
4-Bromophenyl Phenyl Ether	ND	<100	ug/kg
Hexachlorobenzene	ND	<100	ug/kg
Phenanthrene	330	<100	ug/kg
Anthracene	220	<100	ug/kg
Di-n-Butyl Phthalate	ND	<100	ug/kg
Fluoranthene	ND	<100	ug/kg
Benzidine	ND	<100	ug/kg
Pyrene	780	<100	ug/kg
Butyl Benzyl Phthalate	ND	<100	ug/kg
Benzo (a) Anthracene	450	<100	ug/kg
3,3-Dichlorobenzidine	ND	<100	ug/kg
Chrysene	420	<100	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<100	ug/kg
Di-n-Octyl Phthalate	ND	<100	ug/kg
Benzo (a) Pyrene	380	<100	ug/kg
Indeno (1,2,3-cd) Pyrene	ND	<100	ug/kg
Dibenzo (a,h) Anthracene	ND	<100	ug/kg
Benzo (g,h,i) Perylene	ND	<100	ug/kg
Benzo (b+k) Fluoranthene	570	<100	ug/kg

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ORIGINAL (Red)

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ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-6, 0'-2'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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ORIGINAL (Red)

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-6, 0'-2'			
Benzene	1300	<500	ug/kg
Toluene	ND	<500	ug/kg
Ethylbenzene	ND	<500	ug/kg
m-Xylene	ND	<500	ug/kg
(o- + p-) Xylenes	ND	<500	ug/kg

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ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-6, 4'-6'			
N-Nitrosodimethylamine	ND	<100	ug/kg
Bis (2-Chloroethyl) Ether	ND	<100	ug/kg
1,3-Dichlorobenzene	ND	<100	ug/kg
1,4-Dichlorobenzene	ND	<100	ug/kg
1,2-Dichlorobenzene	ND	<100	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<100	ug/kg
Hexachloroethane	ND	<100	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<100	ug/kg
Nitrobenzene	ND	<100	ug/kg
Isophorone	ND	<100	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<100	ug/kg
1,2,4-Trichlorobenzene	ND	<100	ug/kg
Naphthalene	64000	<100	ug/kg
Hexachlorobutadiene	ND	<100	ug/kg
Hexachlorocyclopentadiene	ND	<100	ug/kg
2-Chloronaphthalene	ND	<100	ug/kg
Acenaphthylene	1600	<100	ug/kg
Dimethyl Phthalate	ND	<100	ug/kg
2,6-Dinitrotoluene	ND	<100	ug/kg
Acenaphthene	1900	<100	ug/kg
2,4-Dinitrotoluene	ND	<100	ug/kg
Fluorene	2700	<100	ug/kg
Diethyl Phthalate	ND	<100	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<100	ug/kg
N-Nitrosodiphenylamine	ND	<100	ug/kg
1,2-Diphenylhydrazine	ND	<100	ug/kg
4-Bromophenyl Phenyl Ether	ND	<100	ug/kg
Hexachlorobenzene	ND	<100	ug/kg
Phenanthrene	4100	<100	ug/kg
Anthracene	1400	<100	ug/kg
Di-n-Butyl Phthalate	ND	<100	ug/kg
Fluoranthene	3400	<100	ug/kg
Benzidine	ND	<100	ug/kg
Pyrene	ND	<100	ug/kg
Butyl Benzyl Phthalate	ND	<100	ug/kg
Benzo (a) Anthracene	1300	<100	ug/kg
3,3-Dichlorobenzidine	ND	<100	ug/kg
Chrysene	1800	<100	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<100	ug/kg
Di-n-Octyl Phthalate	ND	<100	ug/kg
Benzo (a) Pyrene	890	<100	ug/kg
Indeno (1,2,3-cd) Pyrene	800	<100	ug/kg
Dibenzo (a,h) Anthracene	ND	<100	ug/kg
Benzo (g,h,i) Perylene	720	<100	ug/kg
Benzo (b+k) Fluoranthene	2100	<100	ug/kg

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-6, 4'-6'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-6, 4'-6'			
Benzene	400	<500	ug/kg
Toluene	ND	<500	ug/kg
Ethylbenzene	10000	<500	ug/kg
m-Xylene	2200	<500	ug/kg
(o- + p-) Xylenes	2800	<500	ug/kg

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-7, 0'-2'			
N-Nitrosodimethylamine	ND	<100	ug/kg
Bis (2-Chloroethyl) Ether	ND	<100	ug/kg
1,3-Dichlorobenzene	ND	<100	ug/kg
1,4-Dichlorobenzene	ND	<100	ug/kg
1,2-Dichlorobenzene	ND	<100	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<100	ug/kg
Hexachloroethane	ND	<100	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<100	ug/kg
Nitrobenzene	ND	<100	ug/kg
Isophorone	ND	<100	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<100	ug/kg
1,2,4-Trichlorobenzene	ND	<100	ug/kg
Naphthalene	ND	<100	ug/kg
Hexachlorobutadiene	ND	<100	ug/kg
Hexachlorocyclopentadiene	ND	<100	ug/kg
2-Chloronaphthalene	ND	<100	ug/kg
Acenaphthylene	ND	<100	ug/kg
Dimethyl Phthalate	ND	<100	ug/kg
2,6-Dinitrotoluene	ND	<100	ug/kg
Acenaphthene	ND	<100	ug/kg
2,4-Dinitrotoluene	ND	<100	ug/kg
Fluorene	ND	<100	ug/kg
Diethyl Phthalate	ND	<100	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<100	ug/kg
N-Nitrosodiphenylamine	ND	<100	ug/kg
1,2-Diphenylhydrazine	ND	<100	ug/kg
4-Bromophenyl Phenyl Ether	ND	<100	ug/kg
Hexachlorobenzene	ND	<100	ug/kg
Phenanthrene	1300	<100	ug/kg
Anthracene	290	<100	ug/kg
Di-n-Butyl Phthalate	ND	<100	ug/kg
Fluoranthene	2100	<100	ug/kg
Benzidine	ND	<100	ug/kg
Pyrene	1300	<100	ug/kg
Butyl Benzyl Phthalate	ND	<100	ug/kg
Benzo (a) Anthracene	800	<100	ug/kg
3,3-Dichlorobenzidine	ND	<100	ug/kg
Chrysene	1000	<100	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<100	ug/kg
Di-n-Octyl Phthalate	ND	<100	ug/kg
Benzo (a) Pyrene	630	<100	ug/kg
Indeno (1,2,3-cd) Pyrene	ND	<100	ug/kg
Dibenzo (a,h) Anthracene	ND	<100	ug/kg
Benzo (g,h,i) Perylene	ND	<100	ug/kg
Benzo (b+k) Fluoranthene	1400	<100	ug/kg

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-7, 0'-2'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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PFE

ORIGINAL

ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-7, 0'-2'			
Benzene	ND	<50	ug/kg
Toluene	150	<50	ug/kg
Ethylbenzene	ND	<50	ug/kg
m-Xylene	ND	<50	ug/kg
(o- + p-) Xylenes	ND	<50	ug/kg

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PFE ORIGINAL (Red)

ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-7, 4'-6'			
N-Nitrosodimethylamine	ND	<100	ug/kg
Bis (2-Chloroethyl) Ether	ND	<100	ug/kg
1,3-Dichlorobenzene	ND	<100	ug/kg
1,4-Dichlorobenzene	ND	<100	ug/kg
1,2-Dichlorobenzene	ND	<100	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<100	ug/kg
Hexachloroethane	ND	<100	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<100	ug/kg
Nitrobenzene	ND	<100	ug/kg
Isophorone	ND	<100	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<100	ug/kg
1,2,4-Trichlorobenzene	ND	<100	ug/kg
Naphthalene	ND	<100	ug/kg
Hexachlorobutadiene	ND	<100	ug/kg
Hexachlorocyclopentadiene	ND	<100	ug/kg
2-Chloronaphthalene	ND	<100	ug/kg
Acenaphthylene	ND	<100	ug/kg
Dimethyl Phthalate	ND	<100	ug/kg
2,6-Dinitrotoluene	ND	<100	ug/kg
Acenaphthene	ND	<100	ug/kg
2,4-Dinitrotoluene	ND	<100	ug/kg
Fluorene	ND	<100	ug/kg
Diethyl Phthalate	ND	<100	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<100	ug/kg
N-Nitrosodiphenylamine	ND	<100	ug/kg
1,2-Diphenylhydrazine	ND	<100	ug/kg
4-Bromophenyl Phenyl Ether	ND	<100	ug/kg
Hexachlorobenzene	ND	<100	ug/kg
Phenanthrene	490	<100	ug/kg
Anthracene	470	<100	ug/kg
Di-n-Butyl Phthalate	ND	<100	ug/kg
Fluoranthene	600	<100	ug/kg
Benzidine	ND	<100	ug/kg
Pyrene	450	<100	ug/kg
Butyl Benzyl Phthalate	ND	<100	ug/kg
Benzo (a) Anthracene	250	<100	ug/kg
3,3-Dichlorobenzidine	ND	<100	ug/kg
Chrysene	280	<100	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<100	ug/kg
Di-n-Octyl Phthalate	ND	<100	ug/kg
Benzo (a) Pyrene	ND	<100	ug/kg
Indeno (1,2,3-cd) Pyrene	ND	<100	ug/kg
Dibenzo (a,h) Anthracene	ND	<100	ug/kg
Benzo (g,h,i) Perylene	ND	<100	ug/kg
Benzo (b+k) Fluoranthene	780	<100	ug/kg

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ORIGINAL (Red)

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-7, 4'-6'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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EPA Priority Pollutant Analysis

ORIGINAL (Red)

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-7, 4'-6'			
Benzene	ND	<50	ug/kg
Toluene	ND	<50	ug/kg
Ethylbenzene	ND	<50	ug/kg
m-Xylene	ND	<50	ug/kg
(o- + p-) Xylenes	ND	<50	ug/kg

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-9, 0'-2'			
N-Nitrosodimethylamine	ND	<1000	ug/kg
Bis (2-Chloroethyl) Ether	ND	<1000	ug/kg
1,3-Dichlorobenzene	ND	<1000	ug/kg
1,4-Dichlorobenzene	ND	<1000	ug/kg
1,2-Dichlorobenzene	ND	<1000	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<1000	ug/kg
Hexachloroethane	ND	<1000	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<1000	ug/kg
Nitrobenzene	ND	<1000	ug/kg
Isophorone	ND	<1000	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<1000	ug/kg
1,2,4-Trichlorobenzene	ND	<1000	ug/kg
Naphthalene	170000	<1000	ug/kg
Hexachlorobutadiene	ND	<1000	ug/kg
Hexachlorocyclopentadiene	ND	<1000	ug/kg
2-Chloronaphthalene	ND	<1000	ug/kg
Acenaphthylene	98000	<1000	ug/kg
Dimethyl Phthalate	ND	<1000	ug/kg
2,6-Dinitrotoluene	ND	<1000	ug/kg
Acenaphthene	5700	<1000	ug/kg
2,4-Dinitrotoluene	ND	<1000	ug/kg
Fluorene	9500	<1000	ug/kg
Diethyl Phthalate	ND	<1000	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<1000	ug/kg
N-Nitrosodiphenylamine	ND	<1000	ug/kg
1,2-Diphenylhydrazine	ND	<1000	ug/kg
4-Bromophenyl Phenyl Ether	ND	<1000	ug/kg
Hexachlorobenzene	ND	<1000	ug/kg
Phenanthrene	43000	<1000	ug/kg
Anthracene	29000	<1000	ug/kg
Di-n-Butyl Phthalate	ND	<1000	ug/kg
Fluoranthene	48000	<1000	ug/kg
Benzidine	ND	<1000	ug/kg
Pyrene	98000	<1000	ug/kg
Butyl Benzyl Phthalate	ND	<1000	ug/kg
Benzo (a) Anthracene	36000	<1000	ug/kg
3,3-Dichlorobenzidine	ND	<1000	ug/kg
Chrysene	41000	<1000	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<1000	ug/kg
Di-n-Octyl Phthalate	ND	<1000	ug/kg
Benzo (a) Pyrene	52000	<1000	ug/kg
Indeno (1,2,3-cd) Pyrene	50000	<1000	ug/kg
Dibenzo (a,h) Anthracene	3800	<1000	ug/kg
Benzo (g,h,i) Perylene	48000	<1000	ug/kg
Benzo (b+k) Fluoranthene	80000	<1000	ug/kg

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-9, 0'-2'			
Phenol	ND	<1	mg/kg
2-Chlorophenol	ND	<1	mg/kg
2-Nitrophenol	ND	<2	mg/kg
2,4-Dimethylphenol	ND	<1	mg/kg
2,4-Dichlorophenol	ND	<1	mg/kg
4-Chloro-3-methylphenol	ND	<1	mg/kg
2,4,6-Trichlorophenol	ND	<1	mg/kg
2,4-Dinitrophenol	ND	<5	mg/kg
4-Nitrophenol	ND	<1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<5	mg/kg
Pentachlorophenol	ND	<1	mg/kg

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10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-9, 0'-2'			
Benzene	12000	<500	ug/kg
Toluene	7300	<500	ug/kg
Ethylbenzene	27000	<500	ug/kg
m-Xylene	29000	<500	ug/kg
(o- + p-) Xylenes	13000	<500	ug/kg

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-9, 4'-6'			
N-Nitrosodimethylamine	ND	<100	ug/kg
Bis (2-Chloroethyl) Ether	ND	<100	ug/kg
1,3-Dichlorobenzene	ND	<100	ug/kg
1,4-Dichlorobenzene	ND	<100	ug/kg
1,2-Dichlorobenzene	ND	<100	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<100	ug/kg
Hexachloroethane	ND	<100	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<100	ug/kg
Nitrobenzene	ND	<100	ug/kg
Isophorone	ND	<100	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<100	ug/kg
1,2,4-Trichlorobenzene	ND	<100	ug/kg
Naphthalene	11000	<100	ug/kg
Hexachlorobutadiene	ND	<100	ug/kg
Hexachlorocyclopentadiene	ND	<100	ug/kg
2-Chloronaphthalene	ND	<100	ug/kg
Acenaphthylene	530	<100	ug/kg
Dimethyl Phthalate	ND	<100	ug/kg
2,6-Dinitrotoluene	ND	<100	ug/kg
Acenaphthene	1400	<100	ug/kg
2,4-Dinitrotoluene	ND	<100	ug/kg
Fluorene	ND	<100	ug/kg
Diethyl Phthalate	ND	<100	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<100	ug/kg
N-Nitrosodiphenylamine	ND	<100	ug/kg
1,2-Diphenylhydrazine	ND	<100	ug/kg
4-Bromophenyl Phenyl Ether	ND	<100	ug/kg
Hexachlorobenzene	ND	<100	ug/kg
Phenanthrene	2500	<100	ug/kg
Anthracene	1200	<100	ug/kg
Di-n-Butyl Phthalate	ND	<100	ug/kg
Fluoranthene	1200	<100	ug/kg
Benzidine	ND	<100	ug/kg
Pyrene	1200	<100	ug/kg
Butyl Benzyl Phthalate	ND	<100	ug/kg
Benzo (a) Anthracene	450	<100	ug/kg
3,3-Dichlorobenzidine	ND	<100	ug/kg
Chrysene	590	<100	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<100	ug/kg
Di-n-Octyl Phthalate	ND	<100	ug/kg
Benzo (a) Pyrene	300	<100	ug/kg
Indeno (1,2,3-cd) Pyrene	ND	<100	ug/kg
Dibenzo (a,h) Anthracene	ND	<100	ug/kg
Benzo (g,h,i) Perylene	ND	<100	ug/kg
Benzo (b+k) Fluoranthene	1000	<100	ug/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-9, 4'-6'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-9, 4'-6'			
Benzene	330	<50	ug/kg
Toluene	ND	<50	ug/kg
Ethylbenzene	5600	<50	ug/kg
m-Xylene	ND	<50	ug/kg
(o- + p-) Xylenes	6000	<50	ug/kg

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ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-10, 0'-2'			
N-Nitrosodimethylamine	ND	<100	ug/kg
Bis (2-Chloroethyl) Ether	ND	<100	ug/kg
1,3-Dichlorobenzene	ND	<100	ug/kg
1,4-Dichlorobenzene	ND	<100	ug/kg
1,2-Dichlorobenzene	ND	<100	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<100	ug/kg
Hexachloroethane	ND	<100	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<100	ug/kg
Nitrobenzene	ND	<100	ug/kg
Isophorone	ND	<100	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<100	ug/kg
1,2,4-Trichlorobenzene	ND	<100	ug/kg
Naphthalene	820	<100	ug/kg
Hexachlorobutadiene	ND	<100	ug/kg
Hexachlorocyclopentadiene	ND	<100	ug/kg
2-Chloronaphthalene	ND	<100	ug/kg
Acenaphthylene	1100	<100	ug/kg
Dimethyl Phthalate	ND	<100	ug/kg
2,6-Dinitrotoluene	ND	<100	ug/kg
Acenaphthene	820	<100	ug/kg
2,4-Dinitrotoluene	ND	<100	ug/kg
Fluorene	920	<100	ug/kg
Diethyl Phthalate	ND	<100	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<100	ug/kg
N-Nitrosodiphenylamine	ND	<100	ug/kg
1,2-Diphenylhydrazine	ND	<100	ug/kg
4-Bromophenyl Phenyl Ether	ND	<100	ug/kg
Hexachlorobenzene	ND	<100	ug/kg
Phenanthrene	5200	<100	ug/kg
Anthracene	1600	<100	ug/kg
Di-n-Butyl Phthalate	ND	<100	ug/kg
Fluoranthene	5600	<100	ug/kg
Benzidine	ND	<100	ug/kg
Pyrene	3700	<100	ug/kg
Butyl Benzyl Phthalate	ND	<100	ug/kg
Benzo (a) Anthracene	2300	<100	ug/kg
3,3-Dichlorobenzidine	ND	<100	ug/kg
Chrysene	2500	<100	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<100	ug/kg
Di-n-Octyl Phthalate	ND	<100	ug/kg
Benzo (a) Pyrene	2000	<100	ug/kg
Indeno (1,2,3-cd) Pyrene	1300	<100	ug/kg
Dibenzo (a,h) Anthracene	ND	<100	ug/kg
Benzo (g,h,i) Perylene	1400	<100	ug/kg
Benzo (b+k) Fluoranthene	3400	<100	ug/kg

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ORIGINAL (Red)

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-10, 0'-2'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	ND	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-10, 0'-2'			
Benzene	220	<50	ug/kg
Toluene	60	<50	ug/kg
Ethylbenzene	260	<50	ug/kg
m-Xylene	ND	<50	ug/kg
(o- + p-) Xylenes	ND	<50	ug/kg

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ORIGINAL (Red)

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-10, 4'-6'			
N-Nitrosodimethylamine	ND	<1000	ug/kg
Bis (2-Chloroethyl) Ether	ND	<1000	ug/kg
1,3-Dichlorobenzene	ND	<1000	ug/kg
1,4-Dichlorobenzene	ND	<1000	ug/kg
1,2-Dichlorobenzene	ND	<1000	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<1000	ug/kg
Hexachloroethane	ND	<1000	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<1000	ug/kg
Nitrobenzene	ND	<1000	ug/kg
Isophorone	ND	<1000	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<1000	ug/kg
1,2,4-Trichlorobenzene	ND	<1000	ug/kg
Naphthalene	320000	<1000	ug/kg
Hexachlorobutadiene	ND	<1000	ug/kg
Hexachlorocyclopentadiene	ND	<1000	ug/kg
2-Chloronaphthalene	ND	<1000	ug/kg
Acenaphthylene	13000	<1000	ug/kg
Dimethyl Phthalate	ND	<1000	ug/kg
2,6-Dinitrotoluene	ND	<1000	ug/kg
Acenaphthene	18000	<1000	ug/kg
2,4-Dinitrotoluene	ND	<1000	ug/kg
Fluorene	21000	<1000	ug/kg
Diethyl Phthalate	ND	<1000	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<1000	ug/kg
N-Nitrosodiphenylamine	ND	<1000	ug/kg
1,2-Diphenylhydrazine	ND	<1000	ug/kg
4-Bromophenyl Phenyl Ether	ND	<1000	ug/kg
Hexachlorobenzene	ND	<1000	ug/kg
Phenanthrene	92000	<1000	ug/kg
Anthracene	20000	<1000	ug/kg
Di-n-Butyl Phthalate	ND	<1000	ug/kg
Fluoranthene	47000	<1000	ug/kg
Benzidine	ND	<1000	ug/kg
Pyrene	53000	<1000	ug/kg
Butyl Benzyl Phthalate	ND	<1000	ug/kg
Benzo (a) Anthracene	14000	<1000	ug/kg
3,3-Dichlorobenzidine	ND	<1000	ug/kg
Chrysene	15000	<1000	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<1000	ug/kg
Di-n-Octyl Phthalate	ND	<1000	ug/kg
Benzo (a) Pyrene	12000	<1000	ug/kg
Indeno (1,2,3-cd) Pyrene	5600	<1000	ug/kg
Dibenzo (a,h) Anthracene	2800	<1000	ug/kg
Benzo (g,h,i) Perylene	6500	<1000	ug/kg
Benzo (b+k) Fluoranthene	15000	<1000	ug/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-10, 4'-6'			
Phenol	1.5	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	0.5	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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Certificate of Laboratory Analysis

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Capital Airport Springfield, Illinois 62707 (217) 522-0009

PFE ORIGINAL (Red)

ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-10, 4'-6'			
Benzene	13000	<500	ug/kg
Toluene	31000	<500	ug/kg
Ethylbenzene	15000	<500	ug/kg
m-Xylene	26000	<500	ug/kg
(o- + p-) Xylenes	13000	<500	ug/kg

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EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* B-10, 4'-6', TCLP Extract			
N-Nitrosodimethylamine	ND	<4	ug/l
Bis (2-Chloroethyl) Ether	ND	<2	ug/l
1,3-Dichlorobenzene	ND	<2	ug/l
1,4-Dichlorobenzene	ND	<2	ug/l
1,2-Dichlorobenzene	ND	<2	ug/l
Bis (2-Chloroisopropyl) Ether	ND	<2	ug/l
Hexachloroethane	ND	<2	ug/l
N-Nitroso-Di-n-Propylamine	ND	<4	ug/l
Nitrobenzene	ND	<4	ug/l
Isophorone	ND	<2	ug/l
Bis (2-Chloroethoxy) Methane	ND	<2	ug/l
1,2,4-Trichlorobenzene	ND	<2	ug/l
Naphthalene	1000	<2	ug/l
Hexachlorobutadiene	ND	<2	ug/l
Hexachlorocyclopentadiene	ND	<4	ug/l
2-Chloronaphthalene	ND	<2	ug/l
Acenaphthylene	ND	<2	ug/l
Dimethyl Phthalate	ND	<2	ug/l
2,6-Dinitrotoluene	ND	<2	ug/l
Acenaphthene	2	<2	ug/l
2,4-Dinitrotoluene	ND	<2	ug/l
Fluorene	4	<2	ug/l
Diethyl Phthalate	ND	<2	ug/l
4-Chlorophenyl Phenyl Ether	ND	<2	ug/l
N-Nitrosodiphenylamine	ND	<2	ug/l
1,2-Diphenylhydrazine	ND	<2	ug/l
4-Bromophenyl Phenyl Ether	ND	<2	ug/l
Hexachlorobenzene	ND	<4	ug/l
Phenanthrene	11	<2	ug/l
Anthracene	3	<2	ug/l
Di-n-Butyl Phthalate	ND	<2	ug/l
Fluoranthene	2	<2	ug/l
Benzidine	ND	<20	ug/l
Pyrene	9	<2	ug/l
Butyl Benzyl Phthalate	ND	<2	ug/l
Benzo (a) Anthracene	ND	<2	ug/l
3,3-Dichlorobenzidine	ND	<4	ug/l
Chrysene	ND	<2	ug/l
Bis (2-Ethylhexyl) Phthalate	ND	<20	ug/l
Di-n-Octyl Phthalate	ND	<2	ug/l
Benzo (a) Pyrene	ND	<2	ug/l
Indeno (1,2,3-cd) Pyrene	ND	<4	ug/l
Dibenzo (a,h) Anthracene	ND	<4	ug/l
Benzo (g,h,i) Perylene	ND	<4	ug/l
Benzo (b+k) Fluoranthene	ND	<4	ug/l

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ORIGINAL (Rcd)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* B-10, 4'-6', TCLP Extract			
Phenol	11	<10	ug/l
2-Chlorophenol	ND	<10	ug/l
2-Nitrophenol	ND	<20	ug/l
2,4-Dimethylphenol	ND	<10	ug/l
2,4-Dichlorophenol	ND	<10	ug/l
4-Chloro-3-methylphenol	ND	<10	ug/l
2,4,6-Trichlorophenol	ND	<10	ug/l
2,4-Dinitrophenol	ND	<50	ug/l
4-Nitrophenol	ND	<10	ug/l
2-Methyl-4,6-dinitrophenol	ND	<50	ug/l
Pentachlorophenol	ND	<10	ug/l

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* B-10, 4'-6', TCLP Extract			
Benzene	560	<50	ug/l
Toluene	88	<50	ug/l
Ethylbenzene	1800	<50	ug/l
m-Xylene	820	<50	ug/l
(o- + p-) Xylenes	450	<50	ug/l

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Base/Neutral Extractables			
* MW-10, 6'			
N-Nitrosodimethylamine	ND	<1000	ug/kg
Bis (2-Chloroethyl) Ether	ND	<1000	ug/kg
1,3-Dichlorobenzene	ND	<1000	ug/kg
1,4-Dichlorobenzene	ND	<1000	ug/kg
1,2-Dichlorobenzene	ND	<1000	ug/kg
Bis (2-Chloroisopropyl) Ether	ND	<1000	ug/kg
Hexachloroethane	ND	<1000	ug/kg
N-Nitroso-Di-n-Propylamine	ND	<1000	ug/kg
Nitrobenzene	ND	<1000	ug/kg
Isophorone	ND	<1000	ug/kg
Bis (2-Chloroethoxy) Methane	ND	<1000	ug/kg
1,2,4-Trichlorobenzene	ND	<1000	ug/kg
Naphthalene	7000000	<1000	ug/kg
Hexachlorobutadiene	ND	<1000	ug/kg
Hexachlorocyclopentadiene	ND	<1000	ug/kg
2-Chloronaphthalene	ND	<1000	ug/kg
Acenaphthylene	660000	<1000	ug/kg
Dimethyl Phthalate	ND	<1000	ug/kg
2,6-Dinitrotoluene	ND	<1000	ug/kg
Acenaphthene	1300000	<1000	ug/kg
2,4-Dinitrotoluene	ND	<1000	ug/kg
Fluorene	540000	<1000	ug/kg
Diethyl Phthalate	ND	<1000	ug/kg
4-Chlorophenyl Phenyl Ether	ND	<1000	ug/kg
N-Nitrosodiphenylamine	ND	<1000	ug/kg
1,2-Diphenylhydrazine	ND	<1000	ug/kg
4-Bromophenyl Phenyl Ether	ND	<1000	ug/kg
Hexachlorobenzene	ND	<1000	ug/kg
Phenanthrene	1900000	<1000	ug/kg
Anthracene	490000	<1000	ug/kg
Di-n-Butyl Phthalate	ND	<1000	ug/kg
Fluoranthene	650000	<1000	ug/kg
Benzidine	ND	<1000	ug/kg
Pyrene	1200000	<1000	ug/kg
Butyl Benzyl Phthalate	ND	<1000	ug/kg
Benzo (a) Anthracene	290000	<1000	ug/kg
3,3-Dichlorobenzidine	ND	<1000	ug/kg
Chrysene	390000	<1000	ug/kg
Bis (2-Ethylhexyl) Phthalate	ND	<1000	ug/kg
Di-n-Octyl Phthalate	ND	<1000	ug/kg
Benzo (a) Pyrene	230000	<1000	ug/kg
Indeno (1,2,3-cd) Pyrene	120000	<1000	ug/kg
Dibenzo (a,h) Anthracene	43000	<1000	ug/kg
Benzo (g,h,i) Perylene	120000	<1000	ug/kg
Benzo (b+k) Fluoranthene	210000	<1000	ug/kg

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ORIGINAL (Red)

10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Acid Extractables			
* MW-10, 6'			
Phenol	ND	<0.1	mg/kg
2-Chlorophenol	ND	<0.1	mg/kg
2-Nitrophenol	ND	<0.2	mg/kg
2,4-Dimethylphenol	9.8	<0.1	mg/kg
2,4-Dichlorophenol	ND	<0.1	mg/kg
4-Chloro-3-methylphenol	ND	<0.1	mg/kg
2,4,6-Trichlorophenol	ND	<0.1	mg/kg
2,4-Dinitrophenol	ND	<0.5	mg/kg
4-Nitrophenol	ND	<0.1	mg/kg
2-Methyl-4,6-dinitrophenol	ND	<0.5	mg/kg
Pentachlorophenol	ND	<0.1	mg/kg

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10/19/89

EPA Priority Pollutant Analysis

Analytical Parameter	Result	Detection Limit	Units
** Volatile Organic Compounds			
* MW-10, 6'			
Benzene	27000	<500	ug/kg
Toluene	38000	<500	ug/kg
Ethylbenzene	72000	<500	ug/kg
m-Xylene	46000	<500	ug/kg
(o- + p-) Xylenes	28000	<500	ug/kg

ORIGINAL

APPENDIX K

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(Red)

APPENDIX K

GROUNDWATER-QUALITY ANALYTICAL RESULTS

ORIGINAL

ROUND 3 - 1994

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Norfolk MGP
Data Validation Summary
Samples Collected From 01/31/94 to 02/02/94

Seventeen groundwater samples, one field duplicate, one field blank, and three trip blanks were collected from the Norfolk MGP site from 01/03/94 to 02/02/94. These samples were submitted to the American Environmental Network (AEN) laboratory located in Columbia, MD for BTEX by method 8020, semivolatiles by method 8270, RCRA metals by ICP and Graphite Furnace, and Total and Free Cyanide by method 335.

Organics

The organic data was reviewed according to the "National Functional Guidelines for Organic Data Review", June 1991 revision.

1. Technical Holding Times and Preservation

All volatile and semivolatile samples were correctly preserved and analyzed within acceptable holding times.

2. GC/MS Tuning

All GC/MS Tunes were within acceptable limits. Four samples were analyzed past the 12-hour tuning limit, MW-13C, MW-13CMS, MW-13CMSD and MW-21BRE. The results for sample MW-13C have been qualified as estimated values, and flagged J for detected results and UJ for non-detects. Since the original analysis for MW-21B was chosen as the most representative analysis, no qualificaition of results were required for sample MW-21BRE.

3. Initial and Continuing Calibration

A. The volatile initial and continuing calibrations were within acceptable QC limits.

B. The Semivolatile inital calibration had acceptable results for all response factors, and one percent relative standard deviation (%RSD) outlier for 3,3'-Dichlorobenzidine. Three semivolatile continuing calibrations are associated with the analyses of this group of samples. All response factor results were within acceptable limts. There were several relative percent difference (RPD) outliers for each of the continuing calibrations. The RPD outliers are summarized in an attached table. Associated sample results have been qualified as estimated values and flagged "J" for detected values, and "UJ" for non-detects.

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4. Internal Standards

All internal standard retention times were acceptable. For sample MW-14 the response for IS2 (NPT) was less than 50% of the contining calibration standard reference value. No re-extraction and analysis for this sample was possible due to lack of sufficient sample. Results for compounds quantitated using IS2 have been qualified as estimated values, and flagged "J" for detected values and "UJ" for non-detects.

5. Blanks

A. Several of the blanks (method, trip, and field) were found to contain low levels of Benzene (maximum 1.4 ug/L) and Toluene (maximum 1.4 ug/L). Associated sample results less than 5 times the blank concentration (as corrected for any dilutions required) were qualified as non-detect values and flagged "U".

B. No semivolatile target compounds were detected in any blank.

6. Surrogates

A. All volatile surrogate recoveries were within acceptable limts with the exception of samples MW-8 (25%), MW-14 (20%), and MW-13MSD (30%). The results for samples MW-8 and MW-14 have been qualified as estimated values, and have been flagged "J" for detected values and "UJ" for non-detects.

B. All semivolatile surrogate recoveries were within acceptable limits with the exception of samples MW-4B, MW-12, MW-16 and MW-21B. MW-12 and MW-16 each had two base/neutral surrogate recoveries below the acceptable limts. All base/neutral compounds have been qualified as estimated values and flagged "J" for detected values and "UJ" for non-detects. Sample MW-4B had all surrogate recoveries low, and all acid surrogate recoveries less than 10%. All base/neutral results for sample MW-4B have been qualified as estimated values and flagged "UJ" for non-detects. The acid results for sample MW-4B have been qualified as unusable and have been flagged "R" for non-detects. Sample MW-21B had all surrogate recoveries less than 10%, and subsequent re-analysis results were similar. All results for sample MW-21B have been qualified as unusuable and flagged "R".

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7. Matrix Spike/Matrix Spike Duplicate

A. Volatile (BTEX) MS/MSD analyses were run on two samples, MW-13 and MW-16. The MS/MSD results for sample MW-16 were acceptable. Sample MW-13 was found to contain elevated levels of target compounds such that the sample was diluted before the matrix spike was performed. The MS/MSD spike recoveries were all low for sample MW-13, and all of the RPD values were greater than the QC limits. In addition to the MS/MSD analyses, laboratory control sample/laboratory control sample duplicate (LCS/LCSD) analyses were performed. All LCS/LCSD analysis results were within QC limits. Due to the advisory nature of MS/MSD analyses, no analytical results have been qualified due to MS/MSD outliers.

Inorganics

The inorganic data was reviewed according to the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", July 1, 1988 revision.

1. Technical Holding Times

All inorganic samples were correctly preserved, and were analyzed within acceptable holding times.

2. Initial and Continuing Calibration

All initial and continuing calibration results were withing acceptable limits.

3. Blanks

No target compounds were detected in any of the laboratory or field blanks.

4. ICP Interference Check Sample

The ICP interference check sample (ICS) results were all within acceptable limts.

5. Laboratory Control Sample

All laboratory control sample (LCS) results were within acceptable limits.

6. Duplicates

All laboratory and field duplicate RPD values were within acceptable limits.

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(RED)

7. Matrix Spikes

Matrix spike recoveries were withing acceptable limits with the exception of the MSD recovery for arsenic (67.4%). All arsenic results have been qualifed as estimated values, and flagged "J" for detected values and "UJ" for non-detects.

8. ICP Serial Dilution

All ICP serial dilution results were within acceptable limits.

9. CRDL Standard

The contract required detection limit (CRDL) standard had one or more low recoveries for lead and silver. Due to the advisory nature of the CRDL standard no results have been qualified due to low CRDL standard recoveries.

PFE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK, INC.

February 15, 1994

CLIENT: GERAGHTY AND MILLER

PROJECT: MD0057.009 NORFOLK

CONTRACT #: 9402001

ANALYSIS: BTEX by 8020

Client ID	AENI ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-16	23933	01/31/94	02/01/94	02/07/94	02/07/94
REP-1	23934	01/31/94	02/01/94	02/07/94	02/07/94
MW-19	23935	01/31/94	02/01/94	02/07/94	02/07/94
MW-19B	23936	01/31/94	02/01/94	02/07/94	02/07/94
MW-21	23937	01/31/94	02/01/94	02/07/94	02/07/94
MW-21B	23938	01/31/94	02/01/94	02/07/94	02/08/94
TRIP BLANK	23939	01/31/94	02/01/94	02/07/94	02/08/94

Seven water samples were received and analyzed for Benzene, Toluene, EthylBenzene and Total Xylenes by method 8020.

The enclosed package contains tabulated results (Form I),a surrogate recovery form(Form II), and a matrix spike/matrix spike dup recovery summary (Form III).

Form I (Organic Analysis Data Sheet)
The qualifier 'U' indicates that a compound was analyzed for but not detected above the detection limit. The qualifier 'B' indicates that trace amounts of the compound was also found in the associated blank. All samples were extracted and analyzed within the method specified holding times.

Form II (Surrogate recovery summary)
All percent recoveries are within lab criteria. The lab criteria for percent recovery is 50 to 150 percent.

Form III (Matrix Spike Recovery Summary)
A batch blank spike and spike duplicate and a matrix spike/matrix duplicate are supplied. All values are within lab criteria. Lab criteria for percent recovery is 50 to 150 %. Lab criteria for RPD is 0 to 30 %.

Data Released by _____
Charles E. Ferrin, Jr.
GC/LC Laboratory Manager

PFE ORIGINAL (RED)

AMERICAN ENVIRONMENTAL NETWORK, INC.

February 16,1994

CLIENT: GERAGHTY AND MILLER

PROJECT: NORFOLK MGP, MD0057-009

CONTRACT #: 9402026

ANALYSIS: BTEX by method 8020

Client ID	AENI ID	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-13C	24019	02/02/94	02/03/94	02/07/94	02/07/94
TRIP BLANK	24020	02/02/94	02/03/94	02/07/94	02/07/94

Two water samples were received and analyzed for BTEX by method 8020.

The enclosed package contains tabulated results (Form I),a surrogate recovery summary (Form II), and a matrix spike/matrix spike dup recovery summary (Form III).

Form I (Organic Analysis Data Sheet)
The qualifier 'U' indicates that a compound was analyzed for but not detected above the detection limit. The qualifier 'B' indicates that the compound was also identified in the associated blank. All samples were extracted and analyzed within the method specified holding times.

Form III (Matrix Spike Recovery Summary)
A batch blank spike and spike duplicate are supplied. All values are within lab criteria. Lab criteria for percent recovery is 50 - 150 %. Lab criteria for RPD is 0 to 30 %.

Data Released by CEFJr
Charles E. Ferrin, Jr.
GC/LC Laboratory Manager

PFE
ORIGINAL (Red) (Red)

AMERICAN ENVIRONMENTAL NETWORK, INC.

February 22, 1994

Client: Geraghty & Miller

Project: Norfolk, VA

Case: 9402012

Analysis: BTEX By method 8020

Client ID	AEN ID	Date Sampled	Date Received	Date Analyzed
MW-8	9402012-001	02/01/94	02/02/94	02/15/94
MW-17	9402012-002	02/01/94	02/02/94	02/15/94
MW-15	9402012-003	02/01/94	02/02/94	02/15/94
MW-12	9402012-004	02/01/94	02/02/94	02/15/94
MW-14	9402012-005	02/01/94	02/02/94	02/15/94
MW-FIELD BLANK	9402012-006	02/01/94	02/02/94	02/15/94
MW-18	9402012-007	02/01/94	02/02/94	02/15/94
MW-13	9402012-008	02/01/94	02/02/94	02/15/94
MW-4B	9402012-011	02/01/94	02/02/94	02/15/94
MW-4	9402012-012	02/01/94	02/02/94	02/15/94
MW-20B	9402012-013	02/01/94	02/02/94	02/15/94
MW-20	9402012-014	02/01/94	02/02/94	02/15/94
MW-TRIP BLANK	9402012-015	02/01/94	02/02/94	02/15/94

Thirteen water samples were analyzed for Benzene, Toluene, Ethyl benzene and total Xylenes by method 8020.

The enclosed package consists specifically of tabulated results (Form Is) surrogate recovery data (Form II) and a matrix spike/matrix spike duplicate (Form III).

Form I's (Tabulated Results)

The qualifier U indicates that a compound was analyzed for but not detected above the method detection limit. All samples were analyzed within holding times. The associated blank contained traces of Benzene and Toluene, all samples that contained these analytes are flagged with the letter "B".

Form II (Surrogate recovery)

α, α, α - Trifluorotoluene was used as the surrogate. A point to point calibration was used to quantitate the recoveries. The recoveries for samples # MW-8, MW-14 and the MSD were below lab criteria. All other recoveries were within laboratory criteria.

Form III (Matrix Spike & Matrix Spike duplicate)

Client supplied samples were used as the matrix spike/matrix spike duplicate and lab control samples were also run with this set. The recovery of the matrix spike duplicate was low, due to a bad purge, however the recoveries of the lab control samples are within lab criteria.

Data Released By _____
Charles E. Ferrin Jr.
GC/LC Lab Manager

PFE
ORIGINAL (ORIGINAL)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-4

Concentration:_____ low

Contract # :_____ 9402012

AENI ID:_____ 23976

Client Name:_____ Geraghty & Miller

Date Extracted/Prepared:_____ 2/15/94

Project :_____ Norfolk, VA

Date Analyzed :_____ 2/15/94

Sample Matrix : _____ Water

Conc/Dil Factor :_____ 500

Date Sample Received___ 2/2/94

Percent Moisture :_____ N/A

Compound	conc ug/L	detection limit	flag
Benzene	1500	500	~~B~~ U
Toluene	750	500	~~B~~ U
Ethyl Benzene	1200	500	
Xylenes	2400	1500	

FORM I

PFE ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-4B

Concentration: low

Contract # : 9402012

AENI ID: 23975

Client Name: Geraghty & Miller

Date Extracted/Prepared: 2/15/94

Project : Norfolk, VA

Date Analyzed : 2/15/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/2/94

Percent Moisture : N/A

Compound	conc ug/L	detection limit	flag
Benzene	90	1.0	~~B~~
Toluene	1.4	1.0	~~B~~ U
Ethyl Benzene	2.0	1.0	
Xylenes	8.2	3.0	

FORM I

PFE
ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-8

Concentration: low

Contract # : 9402012

AENI ID: 23965

Client Name: Geraghty & Miller

Date Extracted/Prepared: 2/15/94

Project : Norfolk, VA

Date Analyzed : 2/15/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/2/94

Percent Moisture : N/A

Compound	conc ug/L	detection limit	flag
Benzene		1.0	U J
Toluene		1.0	U J
Ethyl Benzene		1.0	U J
Xylenes	3.3	3.0	J

FORM I

PFE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-12

Concentration:_____ low

Contract # :_____ 9402012

AENI ID:_____ 23968

Client Name:_____ Geraghty & Miller

Date Extracted/Prepared:_____ 2/15/94

Project :_____ Norfolk, VA

Date Analyzed :_____ 2/15/94

Sample Matrix : _____ Water

Conc/Dil Factor :_____ 1

Date Sample Received___ 2/2/94

Percent Moisture :_____ N/A

Compound	conc ug/L	detection limit	flag
Benzene	54	1.0	~~B~~
Toluene	1.5	1.0	~~B~~ U
Ethyl Benzene	9.1	1.0	
Xylenes	6.4	3.0	

FORM I

PFE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-13

Concentration:_____ low

Contract # :_____ 9402012

AENI ID:_____ 23972

Client Name:_____ Geraghty & Miller

Date Extracted/Prepared:____ 2/15/94

Project :_____ Norfolk, VA

Date Analyzed :_____ 2/15/94

Sample Matrix : _____ Water

Conc/Dil Factor :_____ 100

Date Sample Received___ 2/2/94

Percent Moisture :_____ N/A

Compound	conc ug/L	detection limit	flag
Benzene	800	100	~~B~~
Toluene	150	100	~~B~~ U
Ethyl Benzene	610	100	
Xylenes	240	300	J

J-Indicates an estimated value, because the concentration is below the detection limit.

FORM I

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-13C

Concentration: low

Contract # : 9402026

AENI ID: 24019

Client Name: GERAGHTY & MILLER

Date Extracted/Prepared: 2/7/94

Project : NORFOLK MGP, MD0057-009

Date Analyzed : 2/7/94

Sample Matrix : WATER

Conc/Dil Factor : 1

Date Sample Received 2/3/94

Percent Moisture : N/A

Compound	conc ug/L	detection limit	flag
Benzene	1.2	1.0	~~B~~ U
Toluene	1.4	1.0	~~B~~ U
Ethyl Benzene	1.3	1.0	
Xylenes		3.0	U

FORM I

PFE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-14

Concentration:_____ low

Contract # :_____ 9402012

AENI ID:_____ 23969

Client Name:_____ Geraghty & Miller

Date Extracted/Prepared:____ 2/15/94

Project :_____ Norfolk, VA

Date Analyzed :_____ 2/15/94

Sample Matrix : _____ Water

Conc/Dil Factor :_____ 100

Date Sample Received___ 2/2/94

Percent Moisture :_____ N/A

Compound	conc ug/L	detection limit	flag
Benzene	720	100	~~B~~ J
Toluene		100	~~B~~ U5
Ethyl Benzene	310	100	J
Xylenes	170	300	J

J- Indicates an estimated value, because the concentration is below the detection limit.

FORM I

PFE
ORIGINAL
(Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-15

Concentration:_____ low

Contract # :_____ 9402012

Client Name:_____ Geraghty & Miller

Project :_____ Norfolk, VA

Sample Matrix : _____ Water

Date Sample Received___ 2/2/94

AENI ID:_____ 23967

Date Extracted/Prepared:____ 2/15/94

Date Analyzed :_____ 2/15/94

Conc/Dil Factor :_____ 1

Percent Moisture :_____ N/A

Compound	conc ug/L	detection limit	flag
Benzene	1.3	1.0	~~B~~ U
Toluene	1.4	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes	3.3	3.0	

FORM I

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-16

Concentration: low

Contract # : 9402001

AENI ID: 23933

Client Name: GERAGHTY AND MILLER

Date Extracted/Prepared: 2/7/94

Project : MD-0057.059 Norfolk

Date Analyzed : 2/7/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/1/94

Percent Moisture : n/a

Compound	conc ug/L	detection limit	flag
Benzene		1.0	U
Toluene	1.1	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-17

Concentration: low

Contract # : 9402012

AENI ID: 23966

Client Name: Geraghty & Miller

Date Extracted/Prepared: 2/15/94

Project : Norfolk, VA

Date Analyzed : 2/15/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/2/94

Percent Moisture : N/A

Compound	conc ug/L	detection limit	flag
Benzene	1.3	1.0	~~B~~ U
Toluene	1.4	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes	3.3	3.0	

FORM I

PFE
ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-18

Concentration: low

Contract # : 9402012

AENI ID: 23971

Client Name: Geraghty & Miller

Date Extracted/Prepared: 2/15/94

Project : Norfolk, VA

Date Analyzed : 2/15/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/2/94

Percent Moisture : N/A

Compound	conc ug/L	detection limit	flag
Benzene	1.2	1.0	~~B~~ U
Toluene	5.5	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-19

Concentration:_____ low

Contract # :_____ 9402001

AENI ID:_____ 23935

Client Name:_____ GERAGHTY AND MILLER

Date Extracted/Prepared:_____ 2/7/94

Project :_____ MD-0057.059 Norfolk

Date Analyzed :_____ 2/7/94

Sample Matrix : _____ Water

Conc/Dil Factor :_____ 1

Date Sample Received___ 2/1/94

Percent Moisture :_____ n/a

Compound	conc ug/L	detection limit	flag
Benzene	1.2	1.0	~~B~~ U
Toluene	1.3	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-19B

Concentration:_____ low

Contract # :_____ 9402001

AENI ID:_____ 23936

Client Name:_____ GERAGHTY AND MILLER

Date Extracted/Prepared:_____ 2/7/94

Project :_____ MD-0057.059 Norfolk

Date Analyzed :_____ 2/7/94

Sample Matrix : _____ Water

Conc/Dil Factor :_____ 1

Date Sample Received___ 2/1/94

Percent Moisture :_____ n/a

Compound	conc ug/L	detection limit	flag
Benzene	1.2	1.0	~~B~~ U
Toluene	1.3	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE ORIGINAL (RED)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-20

Concentration: low

Contract # : 9402012

AENI ID: 23978

Client Name: Geraghty & Miller

Date Extracted/Prepared: 2/15/94

Project : Norfolk, VA

Date Analyzed : 2/15/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/2/94

Percent Moisture : N/A

Compound	conc ug/L	detection limit	flag
Benzene	1.3	1.0	~~B~~ U
Toluene	1.4	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE

ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-20B

Concentration:_____ low

Contract # :_____ 9402012

AENI ID:_____ 23977

Client Name:_____ Geraghty & Miller

Date Extracted/Prepared:____ 2/15/94

Project :_____ Norfolk, VA

Date Analyzed :_____ 2/15/94

Sample Matrix : _____ Water

Conc/Dil Factor :_____ 1

Date Sample Received___ 2/2/94

Percent Moisture :_____ N/A

Compound	conc ug/L	detection limit	flag
Benzene	1.3	1.0	~~B~~ U
Toluene	1.4	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PEE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-21

Concentration: low

Contract # : 9402001

AENI ID: 23937

Client Name: GERAGHTY AND MILLER

Date Extracted/Prepared: 2/7/94

Project : MD-0057.059 Norfolk

Date Analyzed : 2/7/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/1/94

Percent Moisture : n/a

Compound	conc ug/L	detection limit	flag
Benzene	1.2	1.0	~~B~~ U
Toluene	1.3	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: MW-21B

Concentration: low

Contract # : 9402001

AENI ID: 23938

Client Name: GERAGHTY AND MILLER

Date Extracted/Prepared: 2/7/94

Project : MD-0057.059 Norfolk

Date Analyzed : 2/8/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/1/94

Percent Moisture : n/a

Compound	conc ug/L	detection limit	flag
Benzene	1.2	1.0	~~B~~ U
Toluene	1.3	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: REP-1

Concentration: low

Contract # : 9402001

AENI ID: 23934

Client Name: GERAGHTY AND MILLER

Date Extracted/Prepared: 2/7/94

Project : MD-0057.059 Norfolk

Date Analyzed : 2/7/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/1/94

Percent Moisture : n/a

Compound	conc ug/L	detection limit	flag
Benzene	1.1	1.0	~~B~~ U
Toluene	1.2	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE ORIGINAL (Red) ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: Field Blank

Concentration:_____ low

Contract # :_____ 9402012

AENI ID:_____ 23970

Client Name:_____ Geraghty & Miller

Date Extracted/Prepared:_____ 2/15/94

Project :_____ Norfolk, VA

Date Analyzed :_____ 2/15/94

Sample Matrix : _____ Water

Conc/Dil Factor :_____ 1

Date Sample Received___ 2/2/94

Percent Moisture :_____ N/A

Compound	conc ug/L	detection limit	flag
Benzene	1.2	1.0	B
Toluene	1.4	1.0	B
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: TRIP BLANK

Concentration: low

Contract # : 9402001

AENI ID: 23939

Client Name: GERAGHTY AND MILLER

Date Extracted/Prepared: 2/7/94

Project : MD-0057.059 Norfolk

Date Analyzed : 2/8/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/1/94

Percent Moisture : n/a

Compound	conc ug/L	detection limit	flag
Benzene	1.2	1.0	~~B~~U
Toluene	1.3	1.0	~~B~~U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: BLANK

Concentration: low

Contract # : 9402026

AENI ID: B0207

Client Name: GERAGHTY & MILLER

Date Extracted/Prepared: 2/7/94

Project : NORFOLK MGP, MD0057-009

Date Analyzed : 2/7/94

Sample Matrix : WATER

Conc/Dil Factor : 1

Date Sample Received 2/3/94

Percent Moisture : N/A

Compound	conc ug/L	detection limit	flag
Benzene	1.3	1.0	
Toluene	1.4	1.0	
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: Trip Blank

Concentration:_____ low

Contract # :_____ 9402012

AENI ID:_____ 23979

Client Name:_____ Geraghty & Miller

Date Extracted/Prepared:____ 2/15/94

Project :_____ Norfolk, VA

Date Analyzed :_____ 2/15/94

Sample Matrix : _____ Water

Conc/Dil Factor :_____ 1

Date Sample Received__ 2/2/94

Percent Moisture :_____ N/A

Compound	conc ug/L	detection limit	flag
Benzene	1.3	1.0	B
Toluene	1.4	1.0	B
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: Blank

Concentration:_____ low

Contract # :_____ 9402012

Client Name:_____ Geraghty & Miller

Project :_____ Norfolk, VA

Sample Matrix : _____ Water

Date Sample Received___ N/A

AENI ID:_____ B0215

Date Extracted/Prepared:____ 2/15/94

Date Analyzed :_____ 2/15/94

Conc/Dil Factor :_____ 1

Percent Moisture :_____ N/A

Compound	conc ug/L	detection limit	flag
Benzene	1.3	1.0	~~B~~ U
Toluene	1.4	1.0	~~B~~ U
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE

ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: BLANK

Concentration: low

Contract # : 9402001

AENI ID: B0207

Client Name: GERAGHTY AND MILLER

Date Extracted/Prepared: 2/7/94

Project : MD-0057.059 Norfolk

Date Analyzed : 2/7/94

Sample Matrix : Water

Conc/Dil Factor : 1

Date Sample Received 2/1/94

Percent Moisture : n/a

Compound	conc ug/L	detection limit	flag
Benzene	1.0	1.0	
Toluene	1.2	1.0	
Ethyl Benzene		1.0	U
Xylenes		3.0	U

FORM I

PFE
ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK Inc.

ORGANIC ANALYSIS DATA SHEET

BTEX

Client ID: TRIP BLANK

Concentration:_____ low

Contract # :_____ 9402026

AENI ID:_____ 24020

Client Name:_____ GERAGHTY & MILLER

Date Extracted/Prepared:_____ 2/7/94

Project :_____ NORFOLK MGP, MD0057-009

Date Analyzed :_____ 2/7/94

Sample Matrix : _____ WATER

Conc/Dil Factor :_____ 1

Date Sample Received___ 2/3/94

Percent Moisture :_____ N/A

Compound	conc ug/L	detection limit	flag	
Benzene	1.1	1.0	~~B U~~	B
Toluene	1.2	1.0	~~B U~~	B
Ethyl Benzene		1.0	U	DJM
Xylenes		3.0	U	04/15/94

FORM I

PFE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK, INC.
ORGANIC ANALYSIS DATA SHEET
SURROGATE PERCENT RECOVERIES

CLIENT NAME: Geraghty & Miller
PROJECT NAME: Norfolk, VA
CONTRACT NUMBER : 9402012
SURROGATE: alpha, alpha, alpha-Trifluorotoluene
ACCEPTANCE CRITERIA: (50-150%)
UNITS: ug/L

CLIENT ID	AENI ID	% RECOVERY
BLANK	B0215	102
MW-8	23965	25
MW-17	23966	82
MW-15	23967	84
MW-12	23968	83
MW-14	23969	20
FIELD BLANK	23970	74
MW-18	23971	82
MW-13	23972	82
MW-4B	23975	72
MW-4	23976	60
MW-20B	23977	83
MW-20	23978	90
TRIP BLANK	23979	90
MW-13MS	23973	74
MW-13MSD	23974	30
BLANK SPIKE	BS0215	65
BLANK SPIKE DUP	BSD0215	71

PFE
ORIGINAL (RED)

AMERICAN ENVIRONMENTAL NETWORK, INC.
ORGANIC ANALYSIS DATA SHEET
MATRIX SPIKE RECOVERIES

CONTRACT NUMBER : 9402012

DATE OF ANALYSIS : 2/16/94

SAMPLE NUMBER : MW-13MS/MW-13MSD

			MS		MSD		
	theo	sample	actual		actual		
	conc	conc	conc	%rec	conc	%rec	RPD
	ug/L	ug/L	ug/L		ug/L		
Benzene	4.0	8.0	9.8	45	4.1	-98	82
Toluene	4.0	1.5	3.3	45	1.8	8	59
Ethyl Benzene	4.0	6.2	7.8	40	3.8	-60	69
Total Xylenes	12.0	2.4	11.0	72	6.4	33	53

FORM IIIM

PFE
ORIGINAL
(Red)

AMERICAN ENVIRONMENTAL NETWORK, INC.
ORGANIC ANALYSIS DATA SHEET
MATRIX SPIKE RECOVERIES

CONTRACT NUMBER : 9402012

DATE OF ANALYSIS : 2/16/94

SAMPLE NUMBER : LCS/LCSD 0215

			BS		BSD		
	theo	sample	actual		actual		
	conc	conc	conc	%rec	conc	%rec	RPD
	ug/L	ug/L	ug/L		ug/L		
Benzene	4.0	0.0	3.4	85	3.2	80	6
Toluene	4.0	0.0	3.2	80	3.2	80	0
Ethyl Benzene	4.0	0.0	3.3	83	3.1	78	6
Total Xylenes	12.0	0.0	9.1	76	9.0	75	1

FORM IIIM

PFE
ORIGINAL
(REDUCED)

AMERICAN ENVIRONMENTAL NETWORK, INC.
ORGANIC ANALYSIS DATA SHEET
SURROGATE PERCENT RECOVERIES

CLIENT NAME: GERAGHTY & MILLER
PROJECT NAME: NORFOLK MGP, MD0057-009
CONTRACT NUMBER : 9402026
SURROGATE: ALPHA, ALPHA, ALPHA TRIFLUOROTOLUENE
ACCEPTANCE CRITERIA: (50-150%)
UNITS: ug/L

CLIENT ID	AENI ID	% RECOVERY
BLANK	B0207	100
MW-13C	24019	77
TRIP BLANK	24020	96

FORM II

PFE ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK, INC.
ORGANIC ANALYSIS DATA SHEET
MATRIX SPIKE RECOVERIES

CONTRACT NUMBER : 9402026

DATE OF ANALYSIS : 2/7/94

SAMPLE NUMBER : LCS/LCS DUP

			LCS		LCS DUP		
	theo	sample	actual		actual		
	conc	conc	conc	%rec	conc	%rec	RPD
	ug/L	ug/L	ug/L		ug/L		
Benzene	4.0	0.0	3.3	83	3.3	83	0
Toluene	4.0	0.0	3.4	85	3.4	85	0
Ethyl Benzene	4.0	0.0	3.3	83	3.3	83	0
Total Xylenes	12.0	0.0	9.7	81	9.9	83	2

FORM IIIM

PFE ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK, INC.
ORGANIC ANALYSIS DATA SHEET
SURROGATE PERCENT RECOVERIES

CLIENT NAME: GERAGHTY AND MILLER
PROJECT NAME: MD0057.009 NORFOLK
CONTRACT NUMBER : 9402001
SURROGATE: ALPHA, ALPHA, ALPHA -TRIFLUOROTOLUENE
ACCEPTANCE CRITERIA: (50-150%)
UNITS: ug/l

CLIENT ID	AENI ID	% RECOVERY
BLANK	B0207	98
MW-16	23933	51
REP-1	23934	82
MW-19	23935	90
MW-19B	23936	98
MW-21	23937	92
MW-21B	23938	92
TRIP BLANK	23939	96

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(Red)

AMERICAN ENVIRONMENTAL NETWORK, INC.
ORGANIC ANALYSIS DATA SHEET
MATRIX SPIKE RECOVERIES

CONTRACT NUMBER : 9402001

DATE OF ANALYSIS : 2/7/94

SAMPLE NUMBER : MW-16 MS/MSD

			MS		MSD		
	theo	sample	actual		actual		
	conc	conc	conc	%rec	conc	%rec	RPD
	ug/L	ug/L	ug/L		ug/L		
Benzene	4.0	0.0	3.2	80	3.2	80	0
Toluene	4.0	0.0	3.3	83	3.3	83	0
Ethyl Benzene	4.0	0.0	3.2	80	3.2	80	0
Total Xylenes	12.0	0.0	9.6	80	9.5	79	1

PFE
ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK, INC.
ORGANIC ANALYSIS DATA SHEET
MATRIX SPIKE RECOVERIES

CONTRACT NUMBER : 9402001

DATE OF ANALYSIS : 2/7/94

SAMPLE NUMBER : LCS/LCS DUP

			LCS		LCS DUP		
	theo	sample	actual		actual		
	conc	conc	conc	%rec	conc	%rec	RPD
	ug/L	ug/L	ug/L		ug/L		
Benzene	4.0	0.0	3.3	83	3.3	83	0
Toluene	4.0	0.0	3.4	85	3.4	85	0
Ethyl Benzene	4.0	0.0	3.3	83	3.3	83	0
Total Xylenes	12.0	0.0	9.7	81	9.9	83	2

FORM IIIM

PFE

ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 RUMSEY ROAD
COLUMBIA, MD. 21045
(410) 730-8525

Project Number: 9402-001
Client Name: GERAGHTY & MILLER
Project Title: Norfolk VA - MD0057-009

Six water samples were analyzed for the semivolatile organic compounds by method 8270. All analyses followed the SW846 QA/QC protocol.

This package consists of the EPA/CLP forms I, II, III, IV, V, VI, VII and VIII. The chromatograms and mass spectra of the samples and method blanks are also included.

Data Released Minh-Thuy L. Nguyen 2/18/94
Minh-Thuy L. Nguyen
GC/MS Lab Manager

Client ID	AENI ID	Matrix	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-16	01-001	Water	01/31/94	02/01/94	02/02/94	02/05/94
REP-1	01-002	Water	01/31/94	02/01/94	02/02/94	02/05/94
MW-19	01-003	Water	01/31/94	02/01/94	02/02/94	02/05/94
MW-19B	01-004	Water	01/31/94	02/01/94	02/02/94	02/05/94
MW-21	01-005	Water	01/31/94	02/01/94	02/02/94	02/05/94
MW-21B	01-006	Water	01/31/94	02/01/94	02/02/94	02/05/94

Form I & Tabulated Results
All samples were extracted and analyzed within the technical holding time.

Form II (Surrogate Recoveries)
The recoveries of all surrogate compounds in sample MW-21B (#01-006) were below 10% in duplicate analyses. Two B/N surrogates in sample MW-16 (#01-001) were above 30%, but below the method limits. No samples remained for re extraction.
The method blank and all other samples were within the method criteria.

Form III (MS/MSD Analysis)
A batch BS/BSD was reported. All recoveries and %RPDs were within limits.

Form IV (Method Blank Summary)
Phthalate esters are common laboratory artifacts and should be viewed with suspicion if detected below 5ppb.

Form V (Tuning and Mass Calibration)
All calibration standard, sample and method blank analyses were performed within the method specified mass calibration and 12-hr tune criteria, except for sample MW-21B (#01-006), which was analyzed 11 min outside of the tune time criteria. The sample was reanalyzed, and both analyses were reported for surrogate QC purpose.

Form VI (Initial Calibration Standard)
All CCC and SPPC compounds were within the maximum %RSD and minimum RRF criteria.

Form VII (Continuing Calibration Standard)
All CCC and SPPC compounds were within the maximum %D and minimum RRF criteria. However, on 02/15/94, benzyl alcohol and 3-nitroaniline (non CCC compounds) had %D above 50. New standards were prepared and a new calibration curve will be analyzed to bring all compounds within the max %D limit.

Form VIII (Internal Standard Area and Retention Time
All analyses were within the suggested limits for retention time and area recovery.

PFE ORIGINAL (Red)

EPA - Defined Qualifiers

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. The mass spectral data indicate the presence of the compound that meets the identification criteria. However, the result is less than the sample quantitation limit but greater than zero.

B - Indicates that the compound is found in the associated blank as well as in the sample, a possible/probable indication of blank contamination. It warns the data user to take appropriate action.

X - Indicates that the compound is not found in the associated blank but is a common laboratory artifact.

E - Indicates compounds whose concentrations exceed the calibration range of the instrument for that specific analysis.

D - Indicates compounds identified in an analysis at a secondary dilution factor.

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 RUMSEY ROAD
COLUMBIA, MD. 21045
(410) 730-8525

ORIGINAL

Project Number: 9402-012
Client Name: GERAGHTY & MILLER
Project Title: Norfolk VA

Fourteen liquid samples (including one set of MS/MSD) were analyzed for the semivolatile organic compounds by method 8270. All analyses followed the SW846 QA/QC protocol.

This package consists of the EPA/CLP forms I, II, III, IV, V, VI, VII and VIII. The chromatograms and mass spectra of the samples and method blanks are also included.

Data Released Thuy L. Nguyen 2/10/94
Minh-Thuy L. Nguyen
GC/MS Lab Manager

PFE ORIGINAL

Client ID	AENI ID	Matrix	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-8	12-001	Liquid	02/01/94	02/02/94	02/04/94	02/10/94
MW-17	12-002	Liquid	02/01/94	02/02/94	02/04/94	02/10/94
MW-15	12-003	Liquid	02/01/94	02/02/94	02/04/94	02/10/94
MW-12	12-004	Liquid	02/01/94	02/02/94	02/04/94	02/10/94
MW-14	12-005	Liquid	02/01/94	02/02/94	02/04/94	02/10/94
FIELD BLANK	12-006	Liquid	02/01/94	02/02/94	02/04/94	02/10/94
MW-18	12-007	Liquid	02/01/94	02/02/94	02/04/94	02/10/94
MW-13	12-008	Liquid	02/01/94	02/02/94	02/04/94	02/11/94
MW-13MS	12-009	Liquid	02/01/94	02/02/94	02/04/94	02/11/94
MW-13MSD	12-010	Liquid	02/01/94	02/02/94	02/04/94	02/11/94
MW-4B	12-011	Liquid	02/01/94	02/02/94	02/04/94	02/16/94
MW-4	12-012	Liquid	02/01/94	02/02/94	02/04/94	02/16/94
MW-20B	12-013	Liquid	02/01/94	02/02/94	02/04/94	02/16/94
MW-20	12-014	Liquid	02/01/94	02/02/94	02/04/94	02/16/94

Form I & Tabulated Results
All samples were extracted and analyzed within the technical holding time.

Form II (Surrogate Recoveries)
Three surrogate recoveries in sample MW-4B (#12-011) were below 10%. Two surrogates in sample MW-12 (#12-004) were above 20%, but below the method suggested limits. No samples remained for re extraction. Samples MW-17 (#12-002) and MW-13 (#12-008) each had one B/N surrogate above 10% but below the method limits. Sample MW-17 also had one A/P surrogate below limits.
Sample MW-14 (#12-005) had one B/N surrogate above the QC limits. High background interference was noted, and the sample will be re analyzed. The method blank and all other samples were within the QC criteria.

Form III (MS/MSD Analysis)
The MS/MSD analysis was performed on the specified samples. Due to the presence of the spiking compounds in the sample, two spike recoveries and one %RPD were outside of the advisory limits. A batch BS/BSD was also reported with all recoveries and %RPDs within limits.

Form IV (Method Blank Summary)
Phthalate esters are common laboratory artifacts and should be viewed with suspicion if detected below 5ppb.

Form V (Tuning and Mass Calibration)
All calibration standard, sample and method blank analyses were performed within the method specified mass calibration and 12-hr tune criteria, except for the MS and MSD analyses, which were analyzed within one hour after the tune time has elapsed.

ORIGINAL

Form VI (Initial Calibration Standard)
All CCC and SPPC compounds were within the maximum %RSD and minimum RRF criteria.

Form VII (Continuing Calibration Standard)
All CCC and SPPC compounds were within the maximum %D and minimum RRF criteria. However, on 02/15/94, benzyl alcohol and 3-nitroaniline (non CCC compounds) had %D above 50. New standards were prepared and a new calibration curve will be analyzed to bring all compounds within the max %D limit.

Form VIII (Internal Standard Area and Retention Time
All analyses were within the suggested limits for retention time and area recovery, except for sample MW-14 (#12-005) where a very high level of target analytes was noted.

PFE
ORIGINAL

EPA - Defined Qualifiers

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. The mass spectral data indicate the presence of the compound that meets the identification criteria. However, the result is less than the sample quantitation limit but greater than zero.

B - Indicates that the compound is found in the associated blank as well as in the sample, a possible/probable indication of blank contamination. It warns the data user to take appropriate action.

X - Indicates that the compound is not found in the associated blank but is a common laboratory artifact.

E - Indicates compounds whose concentrations exceed the calibration range of the instrument for that specific analysis.

D - Indicates compounds identified in an analysis at a secondary dilution factor.

PFE
ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK, INC.
9151 RUMSEY ROAD
COLUMBIA, MD. 21045
(410) 730-8525

Project Number: 9402-026
Client Name: GERAGHTY & MILLER
Project Title: Norfolk VA

One water sample was analyzed for the semivolatile organic compounds by method 8270. All analyses followed the SW846 QA/QC protocol.

This package consists of the EPA/CLP forms I, II, IV, V, VI, VII and VIII. The chromatograms and mass spectra of the sample and method blank are also included.

Data Released Minh-Thuy L. Nguyen 2/18/94
Minh-Thuy L. Nguyen
GC/MS Lab Manager

PFE ORIGINAL

Client ID	AENI ID	Matrix	Date Sampled	Date Received	Date Extracted	Date Analyzed
MW-13C	26-001	Water	02/02/94	02/03/94	02/09/94	02/15/94

Form I & Tabulated Results
The sample was extracted and analyzed within the technical holding time.

Form II (Surrogate Recoveries)
The method blank had one A/P surrogate outside the QC criteria. The sample was within limits. No sample remained for re extraction.

Form III (MS/MSD Analysis)
A batch BS/BSD was reported with all recoveries and %RPDs within limits.

Form IV (Method Blank Summary)
Phthalate esters are common laboratory artifacts and should be viewed with suspicion if detected below 5ppb.

Form V (Tuning and Mass Calibration)
All calibration standard, sample and method blank analyses were performed within the method specified mass calibration and 12-hr tune criteria.

Form VI (Initial Calibration Standard)
All CCC and SPPC compounds were within the maximum %RSD and minimum RRF criteria.

Form VII (Continuing Calibration Standard)
All CCC and SPPC compounds were within the maximum %D and minimum RRF criteria. However, benzyl alcohol and 3-nitroaniline (non CCC compounds) had %D above 50. New standards were prepared and a new calibration curve will be analyzed to bring all compounds within the max %D limit.

Form VIII (Internal Standard Area and Retention Time
All analyses were within the suggested limits for retention time and area recovery.

PFE
ORIGINAL
(Red)

EPA - Defined Qualifiers

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. The mass spectral data indicate the presence of the compound that meets the identification criteria. However, the result is less than the sample quantitation limit but greater than zero.

B - Indicates that the compound is found in the associated blank as well as in the sample, a possible/probable indication of blank contamination. It warns the data user to take appropriate action.

X - Indicates that the compound is not found in the associated blank but is a common laboratory artifact.

E - Indicates compounds whose concentrations exceed the calibration range of the instrument for that specific analysis.

D - Indicates compounds identified in an analysis at a secondary dilution factor.

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
MW-4 ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-012

Sample wt/vol: 950.0 (g/mL ML Lab File ID: DB153.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/16/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	11	U
108-95-2	Phenol	11	U
95-57-8	2-Chlorophenol	11	~~U~~ UJ
541-73-1	1,3-Dichlorobenzene	11	U
106-46-7	1,4-Dichlorobenzene	11	U
95-50-1	1,2-Dichlorobenzene	11	U
100-56-1	Benzyl alcohol	11	~~U~~ UJ
108-60-1	bis(2-chloroisopropyl)ether	11	~~U~~ UJ
95-48-7	2-Methylphenol	11	U
67-72-1	Hexachloroethane	11	U
621-64-7	N-Nitroso-di-n-propylamine	11	~~U~~ UJ
106-44-5	4-Methylphenol	11	U
98-95-3	Nitrobenzene	11	U
78-59-1	Isophorone	11	U
88-75-5	2-Nitrophenol	21	U
105-67-9	2,4-Dimethylphenol	11	U
65-85-0	Benzoic Acid	53	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	11	U
120-83-2	2,4-Dichlorophenol	11	U
120-82-1	1,2,4-Trichlorobenzene	11	U
91-20-3	Naphthalene	11	U
106-47-8	4-Chloroaniline	11	~~U~~ UJ
87-68-3	Hexachlorobutadiene	11	U
59-50-7	4-Chloro-3-methylphenol	11	U
91-57-6	2-Methylnaphthalene	11	U
77-47-4	Hexachlorocyclopentadiene	11	U
88-06-2	2,4,6-Trichlorophenol	21	U
95-95-4	2,4,5-Trichlorophenol	53	U
91-58-7	2-Chloronaphthalene	11	U
88-74-4	2-Nitroaniline	53	U
208-96-8	Acenaphthylene	11	~~U~~ UJ
131-11-3	Dimethylphthalate	11	U
606-20-2	2,6-Dinitrotoluene	11	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-4

ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N/A

Matrix: (soil/water) LIQUID Lab Sample ID: #12-012

Sample wt/vol: 950.0 (g/mL ML Lab File ID: DB153.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/16/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	11	U
99-09-2	3-Nitroaniline	53	~~U~~ UJ
51-28-5	2,4-Dinitrophenol	53	~~U~~ UJ
132-64-9	Dibenzofuran	11	U
121-14-2	2,4-Dinitrotoluene	11	U
100-02-7	4-Nitrophenol	53	~~U~~ UJ
86-73-7	Fluorene	11	U
7005-72-3	4-Chlorophenyl-phenylether	11	U
84-66-2	Diethylphthalate	11	U
100-01-6	4-Nitroaniline	53	~~U~~ UJ
534-52-1	4,6-Dinitro-2-methylphenol	53	U
86-30-6	n-Nitrosodiphenylamine	11	U
101-55-3	4-Bromophenyl-phenylether	11	U
118-74-1	Hexachlorobenzene	11	U
87-86-5	Pentachlorophenol	53	U
85-01-8	Phenanthrene	11	U
120-12-7	Anthracene	11	U
84-74-2	Di-n-butylphthalate	11	U
206-44-0	Fluoranthene	11	U
129-00-0	Pyrene	11	~~U~~ UJ
85-68-7	Butylbenzylphthalate	11	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	21	U
56-55-3	Benzo[a]anthracene	11	~~U~~ UJ
218-01-9	Chrysene	11	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	3.7	J
117-84-0	Di-n-octylphthalate	11	U
205-99-2	Benzo[b]fluoranthene	11	U
207-08-9	Benzo[k]fluoranthene	11	~~U~~ UJ
50-32-8	Benzo[a]pyrene	11	U
193-39-5	Indeno[1,2,3-cd]pyrene	11	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	11	U
191-24-2	Benzo[g,h,i]perylene	11	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-4B

ORIGINAL

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-011

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB152.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/16/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	U UJ
108-95-2	Phenol	10	U R
95-57-8	2-Chlorophenol	10	U R
541-73-1	1,3-Dichlorobenzene	10	U UJ
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	U R
108-60-1	bis(2-chloroisopropyl)ether	10	U UJ
95-48-7	2-Methylphenol	10	U R
67-72-1	Hexachloroethane	10	U UJ
621-64-7	N-Nitroso-di-n-propylamine	10	U UJ
106-44-5	4-Methylphenol	10	U R
98-95-3	Nitrobenzene	10	U UJ
78-59-1	Isophorone	10	U UJ
88-75-5	2-Nitrophenol	20	U R
105-67-9	2,4-Dimethylphenol	10	U R
65-85-0	Benzoic Acid	50	U R
111-91-1	bis(2-Chloroethoxy)methane	10	U UJ
120-83-2	2,4-Dichlorophenol	10	U R
120-82-1	1,2,4-Trichlorobenzene	10	U UJ
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U R
91-57-6	2-Methylnaphthalene	10	U UJ
77-47-4	Hexachlorocyclopentadiene	10	U UJ
88-06-2	2,4,6-Trichlorophenol	20	U R
95-95-4	2,4,5-Trichlorophenol	50	U R
91-58-7	2-Chloronaphthalene	10	U UJ
88-74-4	2-Nitroaniline	50	U
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-4B

ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-011

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB152.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/16/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U UJ
99-09-2	3-Nitroaniline	50	U UJ
51-28-5	2,4-Dinitrophenol	50	U R
132-64-9	Dibenzofuran	10	U UJ
121-14-2	2,4-Dinitrotoluene	10	U UJ
100-02-7	4-Nitrophenol	50	U R
86-73-7	Fluorene	10	U UJ
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U R
86-30-6	n-Nitrosodiphenylamine	10	U UJ
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U R
85-01-8	Phenanthrene	10	U UJ
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo[a]anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	U
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	U
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

FORM I SV

SW846

000182

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-8 ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-001

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB126.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	U
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-8

ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-001

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB126.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U
99-09-2	3-Nitroaniline	50	U
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	20	~~U~~ UJ
56-55-3	Benzo[a]anthracene	10	~~U~~ UJ
218-01-9	Chrysene	10	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	10	~~U~~ UJ
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	U
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-12

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-004

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB129.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	~~U~~ UJ
108-95-2	Phenol	13	
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	~~U~~ UJ
106-46-7	1,4-Dichlorobenzene	10	~~U~~ UJ
95-50-1	1,2-Dichlorobenzene	10	~~U~~ UJ
100-56-1	Benzyl alcohol	10	U
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	~~U~~ UJ
621-64-7	N-Nitroso-di-n-propylamine	10	~~U~~ UJ
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	~~U~~ UJ
78-59-1	Isophorone	10	~~U~~ UJ
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	1.4	J
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	~~U~~ UJ
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	~~U~~ UJ
91-20-3	Naphthalene	13	J
106-47-8	4-Chloroaniline	10	~~U~~ UJ
87-68-3	Hexachlorobutadiene	10	~~U~~ UJ
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	11	
77-47-4	Hexachlorocyclopentadiene	10	~~U~~ UJ
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	~~U~~ UJ
88-74-4	2-Nitroaniline	50	~~U~~ UJ
208-96-8	Acenaphthylene	1.7	J
131-11-3	Dimethylphthalate	10	~~U~~ UJ
606-20-2	2,6-Dinitrotoluene	10	~~U~~ UJ

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-12

ORIGINAL

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-004

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB129.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	13	J
99-09-2	3-Nitroaniline	50	~~U~~ UJ
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	10	~~U~~ UJ
121-14-2	2,4-Dinitrotoluene	10	~~U~~ UJ
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	7.3	J
7005-72-3	4-Chlorophenyl-phenylether	10	~~U~~ UJ
84-66-2	Diethylphthalate	10	~~U~~ UJ
100-01-6	4-Nitroaniline	50	~~U~~ UJ
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	~~U~~ UJ
101-55-3	4-Bromophenyl-phenylether	10	~~U~~ UJ
118-74-1	Hexachlorobenzene	10	~~U~~ UJ
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	25	J
120-12-7	Anthracene	8.9	J
84-74-2	Di-n-butylphthalate	10	~~U~~ UJ
206-44-0	Fluoranthene	12	J
129-00-0	Pyrene	18	J
85-68-7	Butylbenzylphthalate	10	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	20	~~U~~ UJ
56-55-3	Benzo[a]anthracene	7.5	J
218-01-9	Chrysene	8.1	J
117-81-7	bis(2-Ethylhexyl)phthalate	1.5	J
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	4.4	J
207-08-9	Benzo[k]fluoranthene	3.3	J
50-32-8	Benzo[a]pyrene	3.7	J
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	~~U~~ UJ
191-24-2	Benzo[g,h,i]perylene	10	~~U~~ UJ

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
MW-13

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-008

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB133.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/11/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	~~U~~ UJ
108-95-2	Phenol	4.2	J
95-57-8	2-Chlorophenol	10	U UJ
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	U
108-60-1	bis(2-chloroisopropyl)ether	10	U
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	6.8	J
65-85-0	Benzoic Acid	50	U UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	160	J
106-47-8	4-Chloroaniline	10	U UJ
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	20	J
77-47-4	Hexachlorocyclopentadiene	10	U UJ
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
208-96-8	Acenaphthylene	11	J
131-11-3	Dimethylphthalate	10	U UJ
606-20-2	2,6-Dinitrotoluene	10	U UJ

FORM I SV

000166

SW846

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
MW-13

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-008

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB133.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/11/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	120	J
99-09-2	3-Nitroaniline	50	~~U~~ UJ
51-28-5	2,4-Dinitrophenol	50	~~U~~ UJ
132-64-9	Dibenzofuran	12	J
121-14-2	2,4-Dinitrotoluene	10	~~U~~ UJ
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	52	J
7005-72-3	4-Chlorophenyl-phenylether	10	~~U~~ UJ
84-66-2	Diethylphthalate	10	~~U~~
100-01-6	4-Nitroaniline	50	~~U~~
534-52-1	4,6-Dinitro-2-methylphenol	50	~~U~~
86-30-6	n-Nitrosodiphenylamine	10	~~U~~
101-55-3	4-Bromophenyl-phenylether	10	~~U~~
118-74-1	Hexachlorobenzene	10	~~U~~
87-86-5	Pentachlorophenol	50	~~U~~ ↓
85-01-8	Phenanthrene	110	J
120-12-7	Anthracene	35	J
84-74-2	Di-n-butylphthalate	10	~~U~~ UJ
206-44-0	Fluoranthene	42	J
129-00-0	Pyrene	73	J
85-68-7	Butylbenzylphthalate	10	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	20	~~U~~ UJ
56-55-3	Benzo[a]anthracene	28	J
218-01-9	Chrysene	30	J
117-81-7	bis(2-Ethylhexyl)phthalate	10	~~U~~ UJ
117-84-0	Di-n-octylphthalate	10	~~U~~ UJ
205-99-2	Benzo[b]fluoranthene	15	J
207-08-9	Benzo[k]fluoranthene	17	J
50-32-8	Benzo[a]pyrene	15	J
193-39-5	Indeno[1,2,3-cd]pyrene	15	J
53-70-3	Dibenz[a,h]anthracene	7.6	J
191-24-2	Benzo[g,h,i]perylene	15	J

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-13C

Lab Name: AENI MD Contract: 02-026

Project No.: G & M Site: NORFOLK Location: VA Group: MD0057100

Matrix: (soil/water) WATER Lab Sample ID: #26-001

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB148.D

Level: (low/med) Date Received: 2/3/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/9/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/15/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	~~U~~ UJ
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	~~U~~ UJ
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	~~U~~ UJ
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	4.7	J
106-47-8	4-Chloroaniline	10	~~U~~ UJ
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	3.2	J
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	~~U~~ UJ
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
MW-13C

Lab Name: AENI MD Contract: 02-026

Project No.: G & M Site: NORFOLK Location: VA Group: MD0057-00

Matrix: (soil/water) WATER Lab Sample ID: #26-001

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB148.D

Level: (low/med) Date Received: 2/3/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/9/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/15/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
83-32-9	Acenaphthene	10	U
99-09-2	3-Nitroaniline	50	~~U~~ UJ
51-28-5	2,4-Dinitrophenol	50	~~U~~ UJ
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	~~U~~ UJ
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo[a]anthracene	10	~~U~~ UJ
218-01-9	Chrysene	10	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
117-84-0	Di-n-octylphthalate	5.3	J
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	~~U~~ UJ
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-14

PFE

ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-005

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB130.D

ORIGINAL (Red)

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	8.4	J
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	U
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	~~U~~ UJ
78-59-1	Isophorone	10	~~U~~
88-75-5	2-Nitrophenol	20	~~U~~
105-67-9	2,4-Dimethylphenol	10	~~U~~
65-85-0	Benzoic Acid	50	~~U~~
111-91-1	bis(2-Chloroethoxy)methane	10	~~U~~
120-83-2	2,4-Dichlorophenol	10	~~U~~
120-82-1	1,2,4-Trichlorobenzene	10	~~U~~ ↓
91-20-3	Naphthalene	1000	~~E~~ J
106-47-8	4-Chloroaniline	10	~~U~~ UJ
87-68-3	Hexachlorobutadiene	10	~~U~~
59-50-7	4-Chloro-3-methylphenol	10	~~U~~ ↓
91-57-6	2-Methylnaphthalene	120	J
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
208-96-8	Acenaphthylene	3.7	J
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-14

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-005

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB130.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

ORIGINAL (Red)

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	80	
99-09-2	3-Nitroaniline	50	U
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	4.3	J
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	23	
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	29	
120-12-7	Anthracene	6.8	J
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	7.2	J
129-00-0	Pyrene	13	J
85-68-7	Butylbenzylphthalate	10	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	20	~~U~~ UJ
56-55-3	Benzo[a]anthracene	3.4	J
218-01-9	Chrysene	3.3	J
117-81-7	bis(2-Ethylhexyl)phthalate	10	~~U~~ UJ
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	1.5	J
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
MW-15

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-003

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB128.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units:

CAS No.	Compound	(ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	U
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-15

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-003

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB128.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units:

CAS No.	Compound	(ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	1.3	J
99-09-2	3-Nitroaniline	50	U
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	1.4	J
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	20	~~U~~ UJ
56-55-3	Benzo[a]anthracene	10	~~U~~ UJ
218-01-9	Chrysene	10	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	2.9	J
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	U
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	U
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
MW-16

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-001

Sample wt/vol: 900.0 (g/mL ML Lab File ID: DB114.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/9/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units:

CAS No.	Compound	(ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	11	~~U~~ UJ
108-95-2	Phenol	11	U
95-57-8	2-Chlorophenol	11	U
541-73-1	1,3-Dichlorobenzene	11	~~U~~ UJ
106-46-7	1,4-Dichlorobenzene	11	~~U~~ UJ
95-50-1	1,2-Dichlorobenzene	11	~~U~~ UJ
100-56-1	Benzyl alcohol	11	U
108-60-1	bis(2-chloroisopropyl)ether	11	~~U~~ UJ
95-48-7	2-Methylphenol	11	~~U~~ UJ
67-72-1	Hexachloroethane	11	~~U~~ UJ
621-64-7	N-Nitroso-di-n-propylamine	11	~~U~~ UJ
106-44-5	4-Methylphenol	11	U
98-95-3	Nitrobenzene	11	~~U~~ UJ
78-59-1	Isophorone	11	~~U~~ UJ
88-75-5	2-Nitrophenol	22	U
105-67-9	2,4-Dimethylphenol	11	U
65-85-0	Benzoic Acid	56	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	11	~~U~~ UJ
120-83-2	2,4-Dichlorophenol	11	U
120-82-1	1,2,4-Trichlorobenzene	11	~~U~~ UJ
91-20-3	Naphthalene	11	~~U~~ UJ
106-47-8	4-Chloroaniline	11	~~U~~ UJ
87-68-3	Hexachlorobutadiene	11	~~U~~ UJ
59-50-7	4-Chloro-3-methylphenol	11	U
91-57-6	2-Methylnaphthalene	11	~~U~~ UJ
77-47-4	Hexachlorocyclopentadiene	11	~~U~~ UJ
88-06-2	2,4,6-Trichlorophenol	22	U
95-95-4	2,4,5-Trichlorophenol	56	U
91-58-7	2-Chloronaphthalene	11	~~U~~ UJ
88-74-4	2-Nitroaniline	56	~~U~~ UJ
208-96-8	Acenaphthylene	11	~~U~~ UJ
131-11-3	Dimethylphthalate	11	~~U~~ UJ
606-20-2	2,6-Dinitrotoluene	11	~~U~~ UJ

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-16

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-001

Sample wt/vol: 900.0 (g/mL ML Lab File ID: DB114.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/9/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	11	~~U~~ UJ
99-09-2	3-Nitroaniline	56	~~U~~ UJ
51-28-5	2,4-Dinitrophenol	56	U
132-64-9	Dibenzofuran	11	~~U~~ UJ
121-14-2	2,4-Dinitrotoluene	11	~~U~~
100-02-7	4-Nitrophenol	56	~~U~~
86-73-7	Fluorene	11	~~U~~
7005-72-3	4-Chlorophenyl-phenylether	11	~~U~~
84-66-2	Diethylphthalate	11	~~U~~
100-01-6	4-Nitroaniline	56	~~U~~
534-52-1	4,6-Dinitro-2-methylphenol	56	U
86-30-6	n-Nitrosodiphenylamine	11	~~U~~ UJ
101-55-3	4-Bromophenyl-phenylether	11	~~U~~
118-74-1	Hexachlorobenzene	11	~~U~~
87-86-5	Pentachlorophenol	56	U
85-01-8	Phenanthrene	11	~~U~~ UJ
120-12-7	Anthracene	11	~~U~~
84-74-2	Di-n-butylphthalate	11	~~U~~
206-44-0	Fluoranthene	11	~~U~~
129-00-0	Pyrene	11	~~U~~
85-68-7	Butylbenzylphthalate	11	~~U~~
91-94-1	3,3'-Dichlorobenzidine	22	~~U~~
56-55-3	Benzo[a]anthracene	11	~~U~~
218-01-9	Chrysene	11	~~U~~
117-81-7	bis(2-Ethylhexyl)phthalate	11	~~U~~
117-84-0	Di-n-octylphthalate	11	~~U~~
205-99-2	Benzo[b]fluoranthene	11	~~U~~
207-08-9	Benzo[k]fluoranthene	11	~~U~~
50-32-8	Benzo[a]pyrene	11	~~U~~
193-39-5	Indeno[1,2,3-cd]pyrene	11	~~U~~
53-70-3	Dibenz[a,h]anthracene	11	~~U~~
191-24-2	Benzo[g,h,i]perylene	11	~~U~~

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-17

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-002

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB127.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

ORIGINAL (Red)

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	U
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-17

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-002

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB127.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units:

CAS No.	Compound	(ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U
99-09-2	3-Nitroaniline	50	U
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	20	~~U~~ UJ
56-55-3	Benzo[a]anthracene	10	~~U~~ UJ
218-01-9	Chrysene	10	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	10	~~U~~ UJ
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	U
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-18

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-007

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB132.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	U
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	2.9	J
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
106-44-5	4-Methylphenol	2.7	J
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-18

PFE

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

ORIGINAL (Red)

Matrix: (soil/water) LIQUID Lab Sample ID: #12-007

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB132.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units:

CAS No.	Compound	(ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U
99-09-2	3-Nitroaniline	50	U
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	3.7	J
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	~~U~~
91-94-1	3,3'-Dichlorobenzidine	20	~~U~~
56-55-3	Benzo[a]anthracene	10	~~U~~
218-01-9	Chrysene	10	~~U~~
117-81-7	bis(2-Ethylhexyl)phthalate	10	~~U~~
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	U
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-19

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-003

Sample wt/vol: 900.0 (g/mL ML Lab File ID: DB116.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/9/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
111-44-4	bis(2-Chloroethyl)ether	11	U
108-95-2	Phenol	11	U
95-57-8	2-Chlorophenol	11	U
541-73-1	1,3-Dichlorobenzene	11	U
106-46-7	1,4-Dichlorobenzene	11	U
95-50-1	1,2-Dichlorobenzene	11	U
100-56-1	Benzyl alcohol	11	U
108-60-1	bis(2-chloroisopropyl)ether	11	~~U~~UJ
95-48-7	2-Methylphenol	11	U
67-72-1	Hexachloroethane	11	U
621-64-7	N-Nitroso-di-n-propylamine	11	U
106-44-5	4-Methylphenol	11	U
98-95-3	Nitrobenzene	11	U
78-59-1	Isophorone	11	U
88-75-5	2-Nitrophenol	22	U
105-67-9	2,4-Dimethylphenol	11	U
65-85-0	Benzoic Acid	56	~~U~~UJ
111-91-1	bis(2-Chloroethoxy)methane	11	U
120-83-2	2,4-Dichlorophenol	11	U
120-82-1	1,2,4-Trichlorobenzene	11	U
91-20-3	Naphthalene	11	U
106-47-8	4-Chloroaniline	11	U
87-68-3	Hexachlorobutadiene	11	U
59-50-7	4-Chloro-3-methylphenol	11	U
91-57-6	2-Methylnaphthalene	11	U
77-47-4	Hexachlorocyclopentadiene	11	U
88-06-2	2,4,6-Trichlorophenol	22	U
95-95-4	2,4,5-Trichlorophenol	56	U
91-58-7	2-Chloronaphthalene	11	U
88-74-4	2-Nitroaniline	56	U
208-96-8	Acenaphthylene	11	U
131-11-3	Dimethylphthalate	11	U
606-20-2	2,6-Dinitrotoluene	11	U

000106

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-19

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-003

Sample wt/vol: 900.0 (g/mL ML Lab File ID: DB116.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/9/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
83-32-9	Acenaphthene	11	U
99-09-2	3-Nitroaniline	56	U
51-28-5	2,4-Dinitrophenol	56	U
132-64-9	Dibenzofuran	11	U
121-14-2	2,4-Dinitrotoluene	11	U
100-02-7	4-Nitrophenol	56	~~U~~ UJ
86-73-7	Fluorene	11	U
7005-72-3	4-Chlorophenyl-phenylether	11	U
84-66-2	Diethylphthalate	11	U
100-01-6	4-Nitroaniline	56	U
534-52-1	4,6-Dinitro-2-methylphenol	56	U
86-30-6	n-Nitrosodiphenylamine	11	U
101-55-3	4-Bromophenyl-phenylether	11	U
118-74-1	Hexachlorobenzene	11	U
87-86-5	Pentachlorophenol	56	U
85-01-8	Phenanthrene	11	U
120-12-7	Anthracene	11	U
84-74-2	Di-n-butylphthalate	11	U
206-44-0	Fluoranthene	11	U
129-00-0	Pyrene	11	~~U~~ UJ
85-68-7	Butylbenzylphthalate	11	U
91-94-1	3,3'-Dichlorobenzidine	22	~~U~~ UJ
56-55-3	Benzo[a]anthracene	11	~~U~~ UJ
218-01-9	Chrysene	11	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	11	~~U~~ UJ
117-84-0	Di-n-octylphthalate	11	U
205-99-2	Benzo[b]fluoranthene	11	U
207-08-9	Benzo[k]fluoranthene	11	U
50-32-8	Benzo[a]pyrene	11	U
193-39-5	Indeno[1,2,3-cd]pyrene	11	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	11	~~U~~ UJ
191-24-2	Benzo[g,h,i]perylene	11	~~U~~ UJ

000107

FORM I SV SW846

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-19B

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-004

Sample wt/vol: 900.0 (g/mL ML Lab File ID: DB117.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/9/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units:

CAS No.	Compound	(ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	11	U
108-95-2	Phenol	11	U
95-57-8	2-Chlorophenol	11	U
541-73-1	1,3-Dichlorobenzene	11	U
106-46-7	1,4-Dichlorobenzene	11	U
95-50-1	1,2-Dichlorobenzene	11	U
100-56-1	Benzyl alcohol	11	U
108-60-1	bis(2-chloroisopropyl)ether	11	~~U~~ UJ
95-48-7	2-Methylphenol	11	U
67-72-1	Hexachloroethane	11	U
621-64-7	N-Nitroso-di-n-propylamine	11	U
106-44-5	4-Methylphenol	11	U
98-95-3	Nitrobenzene	11	U
78-59-1	Isophorone	11	U
88-75-5	2-Nitrophenol	22	U
105-67-9	2,4-Dimethylphenol	11	U
65-85-0	Benzoic Acid	56	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	11	U
120-83-2	2,4-Dichlorophenol	11	U
120-82-1	1,2,4-Trichlorobenzene	11	U
91-20-3	Naphthalene	11	U
106-47-8	4-Chloroaniline	11	U
87-68-3	Hexachlorobutadiene	11	U
59-50-7	4-Chloro-3-methylphenol	11	U
91-57-6	2-Methylnaphthalene	11	U
77-47-4	Hexachlorocyclopentadiene	11	U
88-06-2	2,4,6-Trichlorophenol	22	U
95-95-4	2,4,5-Trichlorophenol	56	U
91-58-7	2-Chloronaphthalene	11	U
88-74-4	2-Nitroaniline	56	U
208-96-8	Acenaphthylene	11	U
131-11-3	Dimethylphthalate	11	U
606-20-2	2,6-Dinitrotoluene	11	U

000110

FORM I SV

SW846

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-19B

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-004

Sample wt/vol: 900.0 (g/mL ML Lab File ID: DB117.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/9/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units:

CAS No.	Compound	(ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	11	U
99-09-2	3-Nitroaniline	56	U
51-28-5	2,4-Dinitrophenol	56	U
132-64-9	Dibenzofuran	11	U
121-14-2	2,4-Dinitrotoluene	11	U
100-02-7	4-Nitrophenol	56	~~U~~ UJ
86-73-7	Fluorene	11	U
7005-72-3	4-Chlorophenyl-phenylether	11	U
84-66-2	Diethylphthalate	11	U
100-01-6	4-Nitroaniline	56	U
534-52-1	4,6-Dinitro-2-methylphenol	56	U
86-30-6	n-Nitrosodiphenylamine	11	U
101-55-3	4-Bromophenyl-phenylether	11	U
118-74-1	Hexachlorobenzene	11	U
87-86-5	Pentachlorophenol	56	U
85-01-8	Phenanthrene	11	U
120-12-7	Anthracene	11	U
84-74-2	Di-n-butylphthalate	11	U
206-44-0	Fluoranthene	11	U
129-00-0	Pyrene	11	~~U~~ UJ
85-68-7	Butylbenzylphthalate	11	U
91-94-1	3,3'-Dichlorobenzidine	22	~~U~~ UJ
56-55-3	Benzo[a]anthracene	11	~~U~~ UJ
218-01-9	Chrysene	11	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	1.6	J
117-84-0	Di-n-octylphthalate	11	U
205-99-2	Benzo[b]fluoranthene	11	U
207-08-9	Benzo[k]fluoranthene	11	U
50-32-8	Benzo[a]pyrene	11	U
193-39-5	Indeno[1,2,3-cd]pyrene	11	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	11	~~U~~ UJ
191-24-2	Benzo[g,h,i]perylene	11	~~U~~ UJ

000111

FORM I SV SW846

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-20

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-014

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB155.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/16/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	~~U~~ UJ
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	~~U~~ UJ
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	~~U~~ UJ
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	~~U~~ UJ
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	~~U~~ UJ
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-20

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-014

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB155.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/16/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U
99-09-2	3-Nitroaniline	50	~~U~~ UJ
51-28-5	2,4-Dinitrophenol	50	~~U~~ UJ
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	~~U~~ UJ
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo[a]anthracene	10	~~U~~ UJ
218-01-9	Chrysene	10	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	~~U~~ UJ
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-20B

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-013

Sample wt/vol: 950.0 (g/mL ML Lab File ID: DB154.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/16/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	11	U
108-95-2	Phenol	11	U
95-57-8	2-Chlorophenol	11	~~U~~ UJ
541-73-1	1,3-Dichlorobenzene	11	U
106-46-7	1,4-Dichlorobenzene	11	U
95-50-1	1,2-Dichlorobenzene	11	U
100-56-1	Benzyl alcohol	11	~~U~~ UJ
108-60-1	bis(2-chloroisopropyl)ether	11	~~U~~ UJ
95-48-7	2-Methylphenol	11	U
67-72-1	Hexachloroethane	11	U
621-64-7	N-Nitroso-di-n-propylamine	11	~~U~~ UJ
106-44-5	4-Methylphenol	11	U
98-95-3	Nitrobenzene	11	U
78-59-1	Isophorone	11	U
88-75-5	2-Nitrophenol	21	U
105-67-9	2,4-Dimethylphenol	11	U
65-85-0	Benzoic Acid	53	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	11	U
120-83-2	2,4-Dichlorophenol	11	U
120-82-1	1,2,4-Trichlorobenzene	11	U
91-20-3	Naphthalene	11	U
106-47-8	4-Chloroaniline	11	~~U~~ UJ
87-68-3	Hexachlorobutadiene	11	U
59-50-7	4-Chloro-3-methylphenol	11	U
91-57-6	2-Methylnaphthalene	11	U
77-47-4	Hexachlorocyclopentadiene	11	U
88-06-2	2,4,6-Trichlorophenol	21	U
95-95-4	2,4,5-Trichlorophenol	53	U
91-58-7	2-Chloronaphthalene	11	U
88-74-4	2-Nitroaniline	53	~~U~~ UJ
208-96-8	Acenaphthylene	11	U
131-11-3	Dimethylphthalate	11	U
606-20-2	2,6-Dinitrotoluene	11	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-20B

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: NOA

Matrix: (soil/water) LIQUID Lab Sample ID: #12-013

Sample wt/vol: 950.0 (g/mL ML Lab File ID: DB154.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/16/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	11	U
99-09-2	3-Nitroaniline	53	~~U~~ UJ
51-28-5	2,4-Dinitrophenol	53	~~U~~ UJ
132-64-9	Dibenzofuran	11	U
121-14-2	2,4-Dinitrotoluene	11	U
100-02-7	4-Nitrophenol	53	~~U~~ UJ
86-73-7	Fluorene	11	U
7005-72-3	4-Chlorophenyl-phenylether	11	U
84-66-2	Diethylphthalate	11	U
100-01-6	4-Nitroaniline	53	~~U~~ UJ
534-52-1	4,6-Dinitro-2-methylphenol	53	U
86-30-6	n-Nitrosodiphenylamine	11	U
101-55-3	4-Bromophenyl-phenylether	11	U
118-74-1	Hexachlorobenzene	11	U
87-86-5	Pentachlorophenol	53	U
85-01-8	Phenanthrene	11	U
120-12-7	Anthracene	11	U
84-74-2	Di-n-butylphthalate	11	U
206-44-0	Fluoranthene	11	U
129-00-0	Pyrene	11	~~U~~ UJ
85-68-7	Butylbenzylphthalate	11	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	21	U
56-55-3	Benzo[a]anthracene	11	~~U~~ UJ
218-01-9	Chrysene	11	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	1.1	J
117-84-0	Di-n-octylphthalate	11	U
205-99-2	Benzo[b]fluoranthene	11	U
207-08-9	Benzo[k]fluoranthene	11	~~U~~ UJ
50-32-8	Benzo[a]pyrene	11	U
193-39-5	Indeno[1,2,3-cd]pyrene	11	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	11	U
191-24-2	Benzo[g,h,i]perylene	11	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
MW-21

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-005

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB118.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	U
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-21

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-005

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB118.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units:

CAS No.	Compound	(ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U
99-09-2	3-Nitroaniline	50	U
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	20	~~U~~ UJ
56-55-3	Benzo[a]anthracene	10	~~U~~ UJ
218-01-9	Chrysene	10	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
117-84-0	Di-n-octylphthalate	10	
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	U
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	~~U~~ UJ
191-24-2	Benzo[g,h,i]perylene	10	~~U~~ UJ

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-21B

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-006

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB119.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q	
111-44-4	bis(2-Chloroethyl)ether	10	U	R
108-95-2	Phenol	10	U	
95-57-8	2-Chlorophenol	10	U	
541-73-1	1,3-Dichlorobenzene	10	U	
106-46-7	1,4-Dichlorobenzene	10	U	
95-50-1	1,2-Dichlorobenzene	10	U	
100-56-1	Benzyl alcohol	10	U	
108-60-1	bis(2-chloroisopropyl)ether	10	U	
95-48-7	2-Methylphenol	10	U	
67-72-1	Hexachloroethane	10	U	
621-64-7	N-Nitroso-di-n-propylamine	10	U	
106-44-5	4-Methylphenol	10	U	
98-95-3	Nitrobenzene	10	U	
78-59-1	Isophorone	10	U	
88-75-5	2-Nitrophenol	20	U	
105-67-9	2,4-Dimethylphenol	10	U	
65-85-0	Benzoic Acid	50	U	
111-91-1	bis(2-Chloroethoxy)methane	10	U	
120-83-2	2,4-Dichlorophenol	10	U	
120-82-1	1,2,4-Trichlorobenzene	10	U	
91-20-3	Naphthalene	10	U	
106-47-8	4-Chloroaniline	10	U	
87-68-3	Hexachlorobutadiene	10	U	
59-50-7	4-Chloro-3-methylphenol	10	U	
91-57-6	2-Methylnaphthalene	10	U	
77-47-4	Hexachlorocyclopentadiene	10	U	
88-06-2	2,4,6-Trichlorophenol	20	U	
95-95-4	2,4,5-Trichlorophenol	50	U	
91-58-7	2-Chloronaphthalene	10	U	
88-74-4	2-Nitroaniline	50	U	
208-96-8	Acenaphthylene	10	U	
131-11-3	Dimethylphthalate	10	U	
606-20-2	2,6-Dinitrotoluene	10	U	✓

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-21B

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-006

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB119.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U R
99-09-2	3-Nitroaniline	50	U
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	U
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo[a]anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	U
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	U
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U ✓

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-21BRE

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-006R

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB122.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q	
111-44-4	bis(2-Chloroethyl)ether	10	U	R
108-95-2	Phenol	10	U	
95-57-8	2-Chlorophenol	10	U	
541-73-1	1,3-Dichlorobenzene	10	U	
106-46-7	1,4-Dichlorobenzene	10	U	
95-50-1	1,2-Dichlorobenzene	10	U	
100-56-1	Benzyl alcohol	10	U	
108-60-1	bis(2-chloroisopropyl)ether	10	U	
95-48-7	2-Methylphenol	10	U	
67-72-1	Hexachloroethane	10	U	
621-64-7	N-Nitroso-di-n-propylamine	10	U	
106-44-5	4-Methylphenol	10	U	
98-95-3	Nitrobenzene	10	U	
78-59-1	Isophorone	10	U	
88-75-5	2-Nitrophenol	20	U	
105-67-9	2,4-Dimethylphenol	10	U	
65-85-0	Benzoic Acid	50	U	
111-91-1	bis(2-Chloroethoxy)methane	10	U	
120-83-2	2,4-Dichlorophenol	10	U	
120-82-1	1,2,4-Trichlorobenzene	10	U	
91-20-3	Naphthalene	10	U	
106-47-8	4-Chloroaniline	10	U	
87-68-3	Hexachlorobutadiene	10	U	
59-50-7	4-Chloro-3-methylphenol	10	U	
91-57-6	2-Methylnaphthalene	10	U	
77-47-4	Hexachlorocyclopentadiene	10	U	
88-06-2	2,4,6-Trichlorophenol	20	U	
95-95-4	2,4,5-Trichlorophenol	50	U	
91-58-7	2-Chloronaphthalene	10	U	
88-74-4	2-Nitroaniline	50	U	
208-96-8	Acenaphthylene	10	U	
131-11-3	Dimethylphthalate	10	U	
606-20-2	2,6-Dinitrotoluene	10	U	✓

ORIGINAL (Red)

FORM I SV

SW846

000124

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

MW-21BRE

PFE ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-006R

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB122.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound	ug/L	Q
83-32-9	Acenaphthene	10	U R
99-09-2	3-Nitroaniline	50	U
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	U
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo[a]anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	U
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	U
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

REP-1

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-002

Sample wt/vol: 900.0 (g/mL ML Lab File ID: DB115.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/9/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	11	U
108-95-2	Phenol	11	U
95-57-8	2-Chlorophenol	11	U
541-73-1	1,3-Dichlorobenzene	11	U
106-46-7	1,4-Dichlorobenzene	11	U
95-50-1	1,2-Dichlorobenzene	11	U
100-56-1	Benzyl alcohol	11	U
108-60-1	bis(2-chloroisopropyl)ether	11	~~U~~ UJ
95-48-7	2-Methylphenol	11	U
67-72-1	Hexachloroethane	11	U
621-64-7	N-Nitroso-di-n-propylamine	11	U
106-44-5	4-Methylphenol	11	U
98-95-3	Nitrobenzene	11	U
78-59-1	Isophorone	11	U
88-75-5	2-Nitrophenol	22	U
105-67-9	2,4-Dimethylphenol	11	U
65-85-0	Benzoic Acid	56	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	11	U
120-83-2	2,4-Dichlorophenol	11	U
120-82-1	1,2,4-Trichlorobenzene	11	U
91-20-3	Naphthalene	11	U
106-47-8	4-Chloroaniline	11	U
87-68-3	Hexachlorobutadiene	11	U
59-50-7	4-Chloro-3-methylphenol	11	U
91-57-6	2-Methylnaphthalene	11	U
77-47-4	Hexachlorocyclopentadiene	11	U
88-06-2	2,4,6-Trichlorophenol	22	U
95-95-4	2,4,5-Trichlorophenol	56	U
91-58-7	2-Chloronaphthalene	11	U
88-74-4	2-Nitroaniline	56	U
208-96-8	Acenaphthylene	11	U
131-11-3	Dimethylphthalate	11	U
606-20-2	2,6-Dinitrotoluene	11	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

REP-1

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: #01-002

Sample wt/vol: 900.0 (g/mL ML Lab File ID: DB115.D

Level: (low/med) Date Received: 2/1/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/9/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	11	U
99-09-2	3-Nitroaniline	56	U
51-28-5	2,4-Dinitrophenol	56	U
132-64-9	Dibenzofuran	11	U
121-14-2	2,4-Dinitrotoluene	11	U
100-02-7	4-Nitrophenol	56	~~U~~ UJ
86-73-7	Fluorene	11	U
7005-72-3	4-Chlorophenyl-phenylether	11	U
84-66-2	Diethylphthalate	11	U
100-01-6	4-Nitroaniline	56	U
534-52-1	4,6-Dinitro-2-methylphenol	56	U
86-30-6	n-Nitrosodiphenylamine	11	U
101-55-3	4-Bromophenyl-phenylether	11	U
118-74-1	Hexachlorobenzene	11	U
87-86-5	Pentachlorophenol	56	U
85-01-8	Phenanthrene	11	U
120-12-7	Anthracene	11	U
84-74-2	Di-n-butylphthalate	11	U
206-44-0	Fluoranthene	11	U
129-00-0	Pyrene	11	~~U~~ UJ
85-68-7	Butylbenzylphthalate	11	U
91-94-1	3,3'-Dichlorobenzidine	22	~~U~~ UJ
56-55-3	Benzo[a]anthracene	11	~~U~~ UJ
218-01-9	Chrysene	11	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	11	~~U~~ UJ
117-84-0	Di-n-octylphthalate	11	U
205-99-2	Benzo[b]fluoranthene	11	U
207-08-9	Benzo[k]fluoranthene	11	U
50-32-8	Benzo[a]pyrene	11	U
193-39-5	Indeno[1,2,3-cd]pyrene	11	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	11	~~U~~ UJ
191-24-2	Benzo[g,h,i]perylene	11	~~U~~ UJ

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

FIELD BLANK

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-006

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB131.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	U
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

FIELD BLANK

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) LIQUID Lab Sample ID: #12-006

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB131.D

Level: (low/med) Date Received: 2/2/94

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U
99-09-2	3-Nitroaniline	50	U
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	~~U~~
91-94-1	3,3'-Dichlorobenzidine	20	~~U~~
56-55-3	Benzo[a]anthracene	10	~~U~~
218-01-9	Chrysene	10	~~U~~
117-81-7	bis(2-Ethylhexyl)phthalate	10	~~U~~
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	U
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

FORM I SV

SW846

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

SBLK01

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: 0202DABK

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB149.D

Level: (low/med) Date Received:

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/15/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	~~U~~ UJ
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	~~U~~ UJ
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	~~U~~ UJ
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	~~U~~ UJ
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	~~U~~ UJ
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

SBLK01

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: 0202DABK

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB149.D

Level: (low/med) Date Received:

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/2/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/15/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U
99-09-2	3-Nitroaniline	50	~~U~~ UJ
51-28-5	2,4-Dinitrophenol	50	~~U~~ UJ
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	~~U~~ UJ
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo[a]anthracene	10	~~U~~ UJ
218-01-9	Chrysene	10	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	~~U~~ UJ
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

SBLK01

Lab Name: AENI MD Contract: 02-026

Project No.: G & M Site: NORFOLK Location: VA Group: MD0057-00

Matrix: (soil/water) WATER Lab Sample ID: 0209LCBK

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB145.D

Level: (low/med) Date Received:

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/9/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/15/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

Concentration Units: (ug/L or ug/Kg) ug/L

CAS No.	Compound		Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	~~U~~ UJ
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	~~U~~ UJ
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	~~U~~ UJ
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	~~U~~ UJ
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	~~U~~ UJ
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

SBLK01

Lab Name: AENI MD Contract: 02-026

Project No.: G & M Site: NORFOLK Location: VA Group: MD0057-00

Matrix: (soil/water) WATER Lab Sample ID: 0209LCBK

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB145.D

Level: (low/med) Date Received:

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/9/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/15/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U
99-09-2	3-Nitroaniline	50	~~U~~ UJ
51-28-5	2,4-Dinitrophenol	50	~~U~~ UJ
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	~~U~~ UJ
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	~~U~~ UJ
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo[a]anthracene	10	~~U~~ UJ
218-01-9	Chrysene	10	~~U~~ UJ
117-81-7	bis(2-Ethylhexyl)phthalate	10	~~U~~ UJ - OK DJM 04/15/94
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	~~U~~ UJ
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.
SBLK01

PFE ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: 0204AABK

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB123.D

Level: (low/med) Date Received:

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

ORIGINAL (Red)

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
111-44-4	bis(2-Chloroethyl)ether	10	U
108-95-2	Phenol	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
100-56-1	Benzyl alcohol	10	U
108-60-1	bis(2-chloroisopropyl)ether	10	~~U~~ UJ
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
106-44-5	4-Methylphenol	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	20	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic Acid	50	~~U~~ UJ
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	20	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
208-96-8	Acenaphthylene	10	U
131-11-3	Dimethylphthalate	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

SBLK01

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

Matrix: (soil/water) WATER Lab Sample ID: 0204AABK

Sample wt/vol: 1000.0 (g/mL ML Lab File ID: DB123.D

Level: (low/med) Date Received:

% Moisture: 100 decanted: (Y/N): N Date Extracted: 2/4/94

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 2/10/94

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.6

CAS No.	Compound	Concentration Units: (ug/L or ug/Kg) ug/L	Q
83-32-9	Acenaphthene	10	U
99-09-2	3-Nitroaniline	50	U
51-28-5	2,4-Dinitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
100-02-7	4-Nitrophenol	50	~~U~~ UJ
86-73-7	Fluorene	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
84-66-2	Diethylphthalate	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	n-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	~~U~~ UJ
85-68-7	Butylbenzylphthalate	10	~~U~~
91-94-1	3,3'-Dichlorobenzidine	20	~~U~~
56-55-3	Benzo[a]anthracene	10	~~U~~
218-01-9	Chrysene	10	~~U~~
117-81-7	bis(2-Ethylhexyl)phthalate	10	~~U~~
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo[b]fluoranthene	10	U
207-08-9	Benzo[k]fluoranthene	10	U
50-32-8	Benzo[a]pyrene	10	U
193-39-5	Indeno[1,2,3-cd]pyrene	10	~~U~~ UJ
53-70-3	Dibenz[a,h]anthracene	10	U
191-24-2	Benzo[g,h,i]perylene	10	U

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

ORIGINAL (Red)

	SAMPLE NO.	S1 (2FP) #	S2 (PHL) #	S3 (NBZ) #	S4 (FBP) #	S5 (TBP) #	S6 (TPH) #	#	#	TOT OUT
01	MW-16	37	29	45	39 *	48	32 *			2
02	REP-1	43	35	69	65	72	54			
03	MW-19	40	33	66	68	76	61			
04	MW-19B	45	38	74	70	74	58			
05	MW-21	44	35	67	66	70	73			
06	MW-21B	1 *	1 *	1 *	2 *	1 *	3 *			6
07	MW-21BRE	1 *	1 *	1 *	2 *	1 *	3 *			6
08	SBLK01	38	41	81	66	64	76			
09										
10										
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30										

	QC LIMITS
S1 (2FP) = 2-Fluorophenol	(21-100)
S2 (PHL) = Phenol-d5	(10-94)
S3 (NBZ) = Nitrobenzene-d5	(34-114)
S4 (FBP) = 2-Fluorobiphenyl	(43-116)
S5 (TBP) = 2,4,6-Tribromophenol	(10-123)
S6 (TPH) = Terphenyl-d14	(33-141)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogate diluted out

FORM II SV-1

SW846

3C

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

PFE ORIGINAL

Lab Name: AENI MD Contract: 02-001

Project No.: G & M Site: NORFOL Location: VA Group: N.A.

Matrix Spike - Sample No.: SBLK01

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
Phenol	200	0	55	28	(12-89)
2-Chlorophenol	200	0	98	49	(27-123)
1,4-Dichlorobenzene	100	0	53	53	(36-97)
N-Nitroso-di-n-propylamine	100	0	72	72	(41-116)
1,2,4-Trichlorobenzene	100	0	58	58	(39-98)
4-Chloro-3-methylphenol	200	0	120	60	(23-97)
Acenaphthene	100	0	70	70	(46-118)
2,4-Dinitrotoluene	100	0	68	68	(24-96)
4-Nitrophenol	200	0	19	10	(10-80)
Pentachlorophenol	200	0	120	60	(9-103)
Pyrene	100	0	80	80	(26-127)

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	200	62	31	12	42	(12-89)
2-Chlorophenol	200	110	55	12	40	(27-123)
1,4-Dichlorobenzene	100	59	59	11	28	(36-97)
N-Nitroso-di-n-propylamine	100	80	80	11	38	(41-116)
1,2,4-Trichlorobenzene	100	62	62	7	28	(39-98)
4-Chloro-3-methylphenol	200	120	60	0	42	(23-97)
Acenaphthene	100	74	74	6	31	(46-118)
2,4-Dinitrotoluene	100	69	69	1	38	(24-96)
4-Nitrophenol	200	24	12	23	50	(10-80)
Pentachlorophenol	200	140	70	15	50	(9-103)
Pyrene	100	86	86	7	31	(26-127)

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 11 outside limits

Spike Recovery: 0 out of 22 outside limits

Comments: _____

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

PFE ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOLK Location: VA Group: N.A.

	SAMPLE NO.	S1 (2FP) #	S2 (PHL) #	S3 (NBZ) #	S4 (FBP) #	S5 (TBP) #	S6 (TPH) #	#	#	TOT OUT
01	SBLK01	35	29	55	57	64	70			
02	SBLK01MS	41	35	72	64	77	82			
03	SBLK01MSD	46	38	75	67	80	88			
04	MW-8	37	34	57	55	70	77			
05	MW-17	19 *	18	36	38 *	37	50			2
06	MW-15	27	22	42	45	54	62			
07	MW-12	31	28	34	25 *	38	20 *			2
08	MW-14	37	32	141 *	60	62	73			1
09	FIELD BLANK	40	35	67	62	72	89			
10	MW-18	35	31	58	54	68	71			
11	MW-13	36	32	56	39 *	59	48			1
12	MW-13MS	34	29	55	43	64	62			
13	MW-13MSD	40	34	65	56	70	77			
14	MW-4B	6 *	5 *	10 *	13 *	8 *	13 *			6
15	MW-4	37	38	78	69	64	77			
16	MW-20B	36	38	79	67	63	72			
17	MW-20	35	36	78	66	62	73			
18										
19										
20										
21										
22										
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27										
28										
29										
30										

	QC LIMITS
S1 (2FP) = 2-Fluorophenol	(21-100)
S2 (PHL) = Phenol-d5	(10-94)
S3 (NBZ) = Nitrobenzene-d5	(34-114)
S4 (FBP) = 2-Fluorobiphenyl	(43-116)
S5 (TBP) = 2,4,6-Tribromophenol	(10-123)
S6 (TPH) = Terphenyl-d14	(33-141)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogate diluted out

000105

3C

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOL Location: VA Group: N.A.

Matrix Spike - Sample No.: MW-13

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
Phenol	200	4	53	24	(12-89)
2-Chlorophenol	200	0	84	42	(27-123)
1,4-Dichlorobenzene	100	0	39	39	(36-97)
N-Nitroso-di-n-propylamine	100	0	60	60	(41-116)
1,2,4-Trichlorobenzene	100	0	43	43	(39-98)
4-Chloro-3-methylphenol	200	0	120	60	(23-97)
Acenaphthene	100	120	130	10 *	(46-118)
2,4-Dinitrotoluene	100	0	50	50	(24-96)
4-Nitrophenol	200	0	62	31	(10-80)
Pentachlorophenol	200	0	120	60	(9-103)
Pyrene	100	73	130	57	(26-127)

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	200	61	30	20	42	(12-89)
2-Chlorophenol	200	99	50	16	40	(27-123)
1,4-Dichlorobenzene	100	50	50	25	28	(36-97)
N-Nitroso-di-n-propylamine	100	72	72	18	38	(41-116)
1,2,4-Trichlorobenzene	100	56	56	26	28	(39-98)
4-Chloro-3-methylphenol	200	130	65	8	42	(23-97)
Acenaphthene	100	150	30 *	100 *	31	(46-118)
2,4-Dinitrotoluene	100	56	56	11	38	(24-96)
4-Nitrophenol	200	63	32	2	50	(10-80)
Pentachlorophenol	200	130	65	8	50	(9-103)
Pyrene	100	140	67	16	31	(26-127)

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 2 out of 11 outside limits

Spike Recovery: 1 out of 22 outside limits

Comments:

000106

3C

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

PFE ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-012

Project No.: G & M Site: NORFOL Location: VA Group: N.A.

Matrix Spike - Sample No.: SBLK01

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
Phenol	200	0	55	28	(12-89)
2-Chlorophenol	200	0	98	49	(27-123)
1,4-Dichlorobenzene	100	0	53	53	(36-97)
N-Nitroso-di-n-propylamine	100	0	72	72	(41-116)
1,2,4-Trichlorobenzene	100	0	58	58	(39-98)
4-Chloro-3-methylphenol	200	0	120	60	(23-97)
Acenaphthene	100	0	70	70	(46-118)
2,4-Dinitrotoluene	100	0	68	68	(24-96)
4-Nitrophenol	200	0	19	10	(10-80)
Pentachlorophenol	200	0	120	60	(9-103)
Pyrene	100	0	80	80	(26-127)

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	200	62	31	12	42	(12-89)
2-Chlorophenol	200	110	55	12	40	(27-123)
1,4-Dichlorobenzene	100	59	59	11	28	(36-97)
N-Nitroso-di-n-propylamine	100	80	80	11	38	(41-116)
1,2,4-Trichlorobenzene	100	62	62	7	28	(39-98)
4-Chloro-3-methylphenol	200	120	60	0	42	(23-97)
Acenaphthene	100	74	74	6	31	(46-118)
2,4-Dinitrotoluene	100	69	69	1	38	(24-96)
4-Nitrophenol	200	24	12	23	50	(10-80)
Pentachlorophenol	200	140	70	15	50	(9-103)
Pyrene	100	86	86	7	31	(26-127)

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 11 outside limits

Spike Recovery: 0 out of 22 outside limits

Comments: _____

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

PFE ORIGINAL (Red)

Lab Name: AENI MD Contract: 02-026

Project No.: G & M Site: NORFOLK Location: VA Group: MD0057-009

	SAMPLE NO.	S1 (2FP) #	S2 (PHL) #	S3 (NBZ) #	S4 (FBP) #	S5 (TBP) #	S6 (TPH) #	#	#	TOT OUT
01	SBLK01	11 *	15	67	62	30	57			1
02	MW-13C	28	27	68	62	58	50			
03										
04										
05										
06										
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	QC LIMITS
S1 (2FP) = 2-Fluorophenol	(21-100)
S2 (PHL) = Phenol-d5	(10-94)
S3 (NBZ) = Nitrobenzene-d5	(34-114)
S4 (FBP) = 2-Fluorobiphenyl	(43-116)
S5 (TBP) = 2,4,6-Tribromophenol	(10-123)
S6 (TPH) = Terphenyl-d14	(33-141)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogate diluted out

3C

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

PFE ORIGINAL

Lab Name: AENI MD Contract: 02-026

Project No.: G & M Site: NORFOL Location: VA Group: N.A.

Matrix Spike - Sample No.: SBLK01

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
Phenol	200	0	55	28	(12-89)
2-Chlorophenol	200	0	98	49	(27-123)
1,4-Dichlorobenzene	100	0	53	53	(36-97)
N-Nitroso-di-n-propylamine	100	0	72	72	(41-116)
1,2,4-Trichlorobenzene	100	0	58	58	(39-98)
4-Chloro-3-methylphenol	200	0	120	60	(23-97)
Acenaphthene	100	0	70	70	(46-118)
2,4-Dinitrotoluene	100	0	68	68	(24-96)
4-Nitrophenol	200	0	19	10	(10-80)
Pentachlorophenol	200	0	120	60	(9-103)
Pyrene	100	0	80	80	(26-127)

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	200	62	31	12	42	(12-89)
2-Chlorophenol	200	110	55	12	40	(27-123)
1,4-Dichlorobenzene	100	59	59	11	28	(36-97)
N-Nitroso-di-n-propylamine	100	80	80	11	38	(41-116)
1,2,4-Trichlorobenzene	100	62	62	7	28	(39-98)
4-Chloro-3-methylphenol	200	120	60	0	42	(23-97)
Acenaphthene	100	74	74	6	31	(46-118)
2,4-Dinitrotoluene	100	69	69	1	38	(24-96)
4-Nitrophenol	200	24	12	23	50	(10-80)
Pentachlorophenol	200	140	70	15	50	(9-103)
Pyrene	100	86	86	7	31	(26-127)

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 11 outside limits

Spike Recovery: 0 out of 22 outside limits

Comments:

PFE
ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK, INC.

February 18, 1994

Client: Geraghty & Miller MD

Project: MD0057.009 Norfolk MGP, VA

Case: 9402001, 9402012, and 9402026

Analysis: RCRA Metals

Client ID	AENI ID	Date Sampled	Date Received	Date Analyzed
MW-16	23933	01/31/94	02/01/94	02/04-02/15/94
REP-1	23934	01/31/94	02/01/94	02/04-02/15/94
MW-19	23935	01/31/94	02/01/94	02/04-02/15/94
MW-19B	23936	01/31/94	02/01/94	02/04-02/15/94
MW-21	23937	01/31/94	02/01/94	02/04-02/15/94
MW-21B	23938	01/31/94	02/01/94	02/04-02/15/94
MW-8	23965	02/01/94	02/02/94	02/04-02/15/94
MW-17	23966	02/01/94	02/02/94	02/04-02/15/94
MW-15	23967	02/01/94	02/02/94	02/04-02/15/94
MW-12	23968	02/01/94	02/02/94	02/04-02/15/94
MW-14	23969	02/01/94	02/02/94	02/04-02/15/94
FIELD BLANK	23970	02/01/94	02/02/94	02/04-02/15/94
MW-18	23971	02/01/94	02/02/94	02/04-02/15/94
MW-13	23972	02/01/94	02/02/94	02/04-02/15/94
MW-13MS	23973	02/01/94	02/02/94	02/04-02/15/94
MW-13MSD	23974	02/01/94	02/02/94	02/04-02/15/94
MW-4B	23975	02/01/94	02/02/94	02/04-02/15/94
MW-4	23976	02/01/94	02/02/94	02/04-02/15/94
MW-20B	23977	02/01/94	02/02/94	02/04-02/15/94
MW-20	23978	02/01/94	02/02/94	02/04-02/15/94
MW-13C	24019	02/02/94	02/03/94	02/04-02/15/94

Twenty-one liquid samples were received and analyzed for RCRA Metals. Results are reported in units of ug/l.

All quality control met standard laboratory criteria.

This report consists specifically of tabulated sample and QC results.

Report Released By Anita Kijak
Anita Kijak
Metals Laboratory Manager

AMERICAN ENVIRONMENTAL
NETWORK

1

INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

MW-4

Matrix (soil/water): WATER

Lab Sample ID: W23976

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	8.0	~~B~~	J	F
7440-39-3	Barium	159	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	10.0	U		P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	8.0			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER

Clarity Before: WATER

Texture:

Color After: WATER

Clarity After: WATER

Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

MW-4B

Matrix (soil/water): WATER

Lab Sample ID: W23975

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	33.3	U		P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	10.0	U		P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	2.4	U		F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1

INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

Lab Name:AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.:GM1126

MW-8

Matrix (soil/water): WATER

Lab Sample ID: W23965

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	589			P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	10.0	U		P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	63.0			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	10.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER Clarity Before: WATER Texture:

Color After: WATER Clarity After: WATER Artifacts:

Comments:

PFE

ORIGINAL (Red)

AMERICAN ENVIRONMENTAL
NETWORK

1

INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

MW-12

Matrix (soil/water): WATER

Lab Sample ID: W23968

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	7.9	~~B~~	J	F
7440-39-3	Barium	74.1	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	32.0			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	40.3			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER

Clarity Before: WATER

Texture:

Color After: WATER

Clarity After: WATER

Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

Lab Name:AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.:GM1126

MW-13

Matrix (soil/water): WATER

Lab Sample ID: W23972

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	150	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	11.0			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	82.4			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

FORM I - IN

AMERICAN ENVIRONMENTAL
NETWORK

1

INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE (ORIGINAL (RED))

Lab Name:AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.:GM1126

MW-13C

Matrix (soil/water): WATER

Lab Sample ID: W24019

Level (low/med): LOW

Date Received: 02/03/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~B~~	J	F
7440-39-3	Barium	75.2	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	10.0	U		P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	24.3			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER

Clarity Before: WATER

Texture:

Color After: WATER

Clarity After: WATER

Artifacts:

Comments:

FORM I - IN

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

MW-14

Lab Name:AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.:GM1126

Matrix (soil/water): WATER

Lab Sample ID: W23969

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	87.2	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	10.0	U		P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	3.0			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

MW-15

Matrix (soil/water): WATER

Lab Sample ID: W23967

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	374			P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	10.0	U		P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	664			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

ORIGINAL (Red)

Lab Name:AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.:GM1126

MW-16

Matrix (soil/water): WATER

Lab Sample ID: W23933

Level (low/med): LOW

Date Received: 02/01/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	141	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	51.0			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	11.9			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

PFE
ORIGINAL (Red)

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

MW-17

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

Matrix (soil/water): WATER
Lab Sample ID: W23966

Level (low/med): LOW
Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	42.0	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	33.0			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	3.4			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	4.7	~~B~~	J	F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1

INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

MW-18

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

Matrix (soil/water): WATER

Lab Sample ID: W23971

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	17.5	~~U~~	UJ	F
7440-39-3	Barium	80.5	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	14.0			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	6.3			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	4.3	~~B~~	J	F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

MW-19

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

Matrix (soil/water): WATER

Lab Sample ID: W23935

Level (low/med): LOW

Date Received: 02/01/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	55.9	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	26.0			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	11.5			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1

INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

MW-19B

Matrix (soil/water): WATER

Lab Sample ID: W23936

Level (low/med): LOW

Date Received: 02/01/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	81.6	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	10.0	U		P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	2.4	U		F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

Lab Name:AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.:GM1126

MW-20

Matrix (soil/water): WATER

Lab Sample ID: W23978

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	693			P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	41.0			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	57.0			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL

Lab Name:AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.:GM1126

MW-20B

Matrix (soil/water): WATER

Lab Sample ID: W23977

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	33.3	U		P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	10.0	U		P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	2.4	U		F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

MW-21

Matrix (soil/water): WATER

Lab Sample ID: W23937

Level (low/med): LOW

Date Received: 02/01/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	141	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	43.0			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	29.3			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

FORM I - IN

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

MW-21B

Matrix (soil/water): WATER

Lab Sample ID: W23938

Level (low/med): LOW

Date Received: 02/01/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	36.7	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	10.0	U		P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	2.4	U		F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

AMERICAN ENVIRONMENTAL
NETWORK

1
INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

PFE ORIGINAL (Red)

Lab Name:AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.:GM1126

FIELD BLANK

Matrix (soil/water): WATER

Lab Sample ID: W23970

Level (low/med): LOW

Date Received: 02/02/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	U	UJ	F
7440-39-3	Barium	33.3	U		P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	10.0	U		P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	2.4	U		F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER
Clarity Before: WATER
Texture:

Color After: WATER
Clarity After: WATER
Artifacts:

Comments:

PFE ORIGINAL

AMERICAN ENVIRONMENTAL
NETWORK

1

INORGANIC ANALYSIS DATA SHEET SAMPLE NO.

REP-1

Lab Name: AMERICAN ENVIRON. NETWORK
Contract: 9402001,12
SDG No.: GM1126

Matrix (soil/water): WATER

Lab Sample ID: W23934

Level (low/med): LOW

Date Received: 02/01/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic	3.5	~~U~~	UJ	F
7440-39-3	Barium	163	~~B~~	J	P
7440-41-7	Beryllium				
7440-43-9	Cadmium	5.0	U		P
7440-70-2	Calcium				
7440-47-3	Chromium	45.0			P
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead	39.9			F
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.20	U		AV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium	2.0	U		F
7440-22-4	Silver	10.0	U		P
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

Color Before: WATER

Clarity Before: WATER

Texture:

Color After: WATER

Clarity After: WATER

Artifacts:

Comments:

PFE

ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Initial Calibration Source: NIST,H.P.S.

Continuing Calibration Source: NIST,H.P.S.

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									
Antimony									
Arsenic	40.0	42.45	106.1	40.0	40.86	102.2	40.96	102.4	F
Barium	10000.0	9869.10	98.7	10000.0	9456.23	94.6	9877.43	98.8	P
Beryllium									
Cadmium	250.0	241.57	96.6	250.0	233.73	93.5	241.43	96.6	P
Calcium									
Chromium	500.0	499.00	99.8	500.0	530.00	106.0	536.00	107.2	P
Cobalt									
Copper									
Iron									
Lead	50.0	51.87	103.7	50.0	52.90	105.8	52.49	105.0	F
Magnesium									
Manganese									
Mercury	2.0	1.64	82.0	2.0	1.62	81.0	1.70	85.0	AV
Nickel									
Potassium									
Selenium	25.0	27.13	108.5	25.0	25.62	102.5	23.96	95.8	F
Silver	500.0	492.34	98.5	500.0	519.29	103.9	514.79	103.0	P
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits : Mercury 80-120; Other Metals 90-110; Cyanide 85-115

FORM II (PART 1) - IN

AMERICAN ENVIRONMENTAL NETWORK

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

PLF ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Initial Calibration Source: NIST,H.P.S.

Continuing Calibration Source: NIST,H.P.S.

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									
Antimony									
Arsenic				40.0	38.38	96.0	38.08	95.2	F
Barium				10000.0	9664.81	96.6			P
Beryllium									
Cadmium				250.0	245.68	98.3			P
Calcium									
Chromium				500.0	526.00	105.2			P
Cobalt									
Copper									
Iron									
Lead				50.0	50.83	101.7	53.53	107.1	F
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver				500.0	509.21	101.8			P
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits : Mercury 80-120; Other Metals 90-110; Cyanide 85-115

FORM II (PART 1) - IN

AMERICAN ENVIRONMENTAL NETWORK

2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Initial Calibration Source: NIST,H.P.S.

Continuing Calibration Source: NIST,H.P.S.

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									
Antimony									
Arsenic				40.0	41.65	104.1	41.16	102.9	F
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead				50.0	52.90	105.8			F
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits : Mercury 80-120; Other Metals 90-110; Cyanide 85-115

AMERICAN ENVIRONMENTAL NETWORK

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

PFE ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Initial Calibration Source: NIST,H.P.S.

Continuing Calibration Source: NIST,H.P.S.

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									
Antimony									
Arsenic				40.0	39.67	99.2	43.24	108.1	F
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits : Mercury 80-120; Other Metals 90-110; Cyanide 85-115

AMERICAN ENVIRONMENTAL NETWORK

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

PEE ORIGINAL

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Initial Calibration Source: NIST,H.P.S.

Continuing Calibration Source: NIST,H.P.S.

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead	50.0	52.37	104.7	50.0	53.90	107.8	53.68	107.4	F
Magnesium									
Manganese									
Mercury	2.0	2.04	102.0	2.0	1.97	98.5	1.87	93.5	AV
Nickel									
Potassium									
Selenium	25.0	26.15	104.6	25.0	23.74	95.0	22.94	91.8	F
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits : Mercury 80-120; Other Metals 90-110; Cyanide 85-115

AMERICAN ENVIRONMENTAL NETWORK

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

REF ORIGINAL ORIGINAL

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Initial Calibration Source: NIST,H.P.S.

Continuing Calibration Source: NIST,H.P.S.

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury				2.0	1.89	94.5			AV
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits : Mercury 80-120; Other Metals 90-110; Cyanide 85-115

FORM II (PART 1) - IN

AMERICAN ENVIRONMENTAL NETWORK

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Initial Calibration Source: NIST,H.P.S.

Continuing Calibration Source: NIST,H.P.S.

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury	2.0	2.18	109.0	2.0	1.61	80.5	2.03	101.5	AV
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits : Mercury 80-120; Other Metals 90-110; Cyanide 85-115

AMERICAN ENVIRONMENTAL NETWORK

2A
INITIAL AND CONTINUING CALIBRATION VERIFICATION

PEE ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Initial Calibration Source: NIST,H.P.S.

Continuing Calibration Source: NIST,H.P.S.

Concentration Units: ug/L

Analyte	Initial Calibration True	Initial Calibration Found	Initial Calibration %R(1)	Continuing Calibration True	Continuing Calibration Found	Continuing Calibration %R(1)	Continuing Calibration Found	Continuing Calibration %R(1)	M
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury				2.0	1.93	96.5			AV
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

(1) Control Limits : Mercury 80-120; Other Metals 90-110; Cyanide 85-115

AMERICAN ENVIRONMENTAL NETWORK

2B
CRDL STANDARD FOR AA AND ICP

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

AA CRDL Standard Source: SPEX

ICP CRDL Standard Source: SPEX

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	True	Initial Found	%R	Found Found	%R
Aluminum								
Antimony								
Arsenic	10.0	8.32	83.2					
Barium				500.0	399.50	79.9	401.58	80.3
Beryllium								
Cadmium				10.0	8.00	80.0	8.14	81.4
Calcium								
Chromium				40.0	41.00	102.5	42.00	105.0
Cobalt								
Copper								
Iron								
Lead	3.0	1.56	52.0					
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium	5.0	5.15	103.0					
Silver				20.0	15.33	76.6	19.19	96.0
Sodium								
Thallium								
Vanadium								
Zinc								

AMERICAN ENVIRONMENTAL NETWORK

2B
CRDL STANDARD FOR AA AND ICP

PEF ORIGINAL

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

AA CRDL Standard Source: SPEX

ICP CRDL Standard Source: SPEX

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	True	Initial Found	%R	Found Found	%R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead	3.0	1.82	60.7					
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium	5.0	4.67	93.4					
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								

FORM II (PART 2) - IN

AMERICAN ENVIRONMENTAL NETWORK

3
BLANKS

PFE ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum											
Antimony											
Arsenic	3.5	U	3.5	U	3.5	U	3.5	U			F
Barium	33.3	U	33.3	U	33.3	U	33.3	U	33.3	U	P
Beryllium											
Cadmium	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	P
Calcium											
Chromium	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	P
Cobalt											
Copper											
Iron											
Lead	2.4	U	2.4	U	2.4	U	2.4	U			F
Magnesium											
Manganese											
Mercury	0.2	U	0.2	U	0.2	U			0.2	U	AV
Nickel											
Potassium											
Selenium	2.0	U	2.0	U	2.0	U			2.0	U	F
Silver	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	P
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

AMERICAN ENVIRONMENTAL NETWORK

3
BLANKS

PFE ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum											
Antimony											
Arsenic			3.5	U	3.5	U	3.5	U	3.5	U	F
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead			2.4	U	2.4	U			2.4	U	F
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

FORM III - IN

AMERICAN ENVIRONMENTAL NETWORK

3
BLANKS

PFE ORIGINAL (Red) (Red)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum											
Antimony											
Arsenic			3.5	U	3.5	U					F
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead											
Magnesium											
Manganese											
Mercury											
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

FORM III - IN

AMERICAN ENVIRONMENTAL NETWORK

3
BLANKS

PFE ORIGINAL (RED)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead	2.4	U	2.4	U	2.4	U					F
Magnesium											
Manganese											
Mercury	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	AV
Nickel											
Potassium											
Selenium	2.0	U	2.0	U	2.0	U					F
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

FORM III - IN

AMERICAN ENVIRONMENTAL NETWORK

3
BLANKS

PFE ORIGINAL ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Prepa-ration Blank	C	M
Aluminum											
Antimony											
Arsenic											
Barium											
Beryllium											
Cadmium											
Calcium											
Chromium											
Cobalt											
Copper											
Iron											
Lead											
Magnesium											
Manganese											
Mercury	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	AV
Nickel											
Potassium											
Selenium											
Silver											
Sodium											
Thallium											
Vanadium											
Zinc											
Cyanide											

FORM III - IN

AMERICAN ENVIRONMENTAL NETWORK

4

ICP INTERFERENCE CHECK SAMPLE

ORIGINAL (Red)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

ICP ID Number: PII ICS Source: H.P.S., SPEX

Concentration Units: ug/L

Analyte	True Sol. A	True Sol. AB	Initial Found Sol. A	Initial Found Sol. AB	Initial Found %R	Final Found Sol. A	Final Found Sol. AB	Final Found %R
Aluminum								
Antimony								
Arsenic								
Barium		500	-18	461.1	92.2	-13	475.4	95.1
Beryllium								
Cadmium		1000	1	967.2	96.7	3	945.9	94.6
Calcium								
Chromium		500	2	435.0	87.0	5	435.0	87.0
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver		1000	-1	862.7	86.3	-1	910.0	91.0
Sodium								
Thallium								
Vanadium								
Zinc								

FORM IV - IN

AMERICAN ENVIRONMENTAL
NETWORK
5A
SPIKE SAMPLE RECOVERY

ORIGINAL

SAMPLE NO.

MW-16

Lab Name: AMERICAN ENVIRON. NETWORK

Contract:9402001,12 SDG No.:GM1126 Lab Sample Id:W23933S

Matrix (soil/water): WATER Level (low/med): LOW
% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead									NR
Magnesium									NR
Manganese									NR
Mercury	75-125	2.1700		0.2000	U	2.00	108.5		AV
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Vanadium									NR
Zinc									NR
Cyanide									NR

Comments:
THIS IS A MATRIX SPIKE SAMPLE FOR MERCURY

AMERICAN ENVIRONMENTAL
NETWORK
5A
SPIKE SAMPLE RECOVERY

SAMPLE NO.

MW-16

Lab Name: AMERICAN ENVIRON. NETWORK

Contract:9402001,12 SDG No.:GM1126 Lab Sample Id:W23933S

Matrix (soil/water): WATER Level (low/med): LOW
% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead									NR
Magnesium									NR
Manganese									NR
Mercury	75-125	1.9600		0.2000	U	2.00	98.0		AV
Nickel									NR
Potassium									NR
Selenium									NR
Silver									NR
Sodium									NR
Thallium									NR
Vanadium									NR
Zinc									NR
Cyanide									NR

Comments:
THIS IS A MATRIX SPIKE DUPLICATE SAMPLE FOR MERCURY

FORM V (PART 1) - IN

AMERICAN ENVIRONMENTAL
NETWORK
5A
SPIKE SAMPLE RECOVERY

SAMPLE NO.

MW-13MS

Lab Name: AMERICAN ENVIRON. NETWORK

Contract:9402001,12 SDG No.:GM1126 Lab Sample Id:W23972S

Matrix (soil/water): WATER Level (low/med): LOW
% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony									NR
Arsenic	75-125	32.6250		3.5000	U	40.00	81.6		F
Barium	75-125	2136.4260		149.9320	B	2000.00	99.3		P
Beryllium									NR
Cadmium	75-125	45.2600		5.0000	U	50.00	90.5		P
Calcium									NR
Chromium	75-125	221.0000		11.0000		200.00	105.0		P
Cobalt									NR
Copper									NR
Iron									NR
Lead		71.9524		82.3960		20.00	-52.2		F
Magnesium									NR
Manganese									NR
Mercury	75-125	1.7300		0.2000	U	2.00	86.5		AV
Nickel									NR
Potassium									NR
Selenium	75-125	8.1619		2.0000	U	10.00	81.6		F
Silver	75-125	40.1170		10.0000	U	50.00	80.2		P
Sodium									NR
Thallium									NR
Vanadium									NR
Zinc									NR
Cyanide									NR

Comments:
THIS IS THE MATRIX SPIKE SAMPLE FOR MW-13

FORM V (PART 1) - IN

AMERICAN ENVIRONMENTAL
NETWORK
5A
SPIKE SAMPLE RECOVERY

SAMPLE NO.

MW-13MS D

Lab Name: AMERICAN ENVIRON. NETWORK

Contract:9402001,12 SDG No.:GM1126 Lab Sample Id:W23972S

Matrix (soil/water): WATER Level (low/med): LOW
% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR)	C	Sample Result (SR)	C	Spike Added (SA)	%R	Q	M
Aluminum									NR
Antimony									NR
Arsenic	75-125	26.9700		3.5000	U	40.00	67.4	N	F
Barium	75-125	2236.9000		149.9300	B	2000.00	104.3		P
Beryllium									NR
Cadmium	75-125	48.3820		5.0000	U	50.00	96.8		P
Calcium									NR
Chromium	75-125	229.0000		11.0000		200.00	109.0		P
Cobalt									NR
Copper									NR
Iron									NR
Lead		69.4670		82.3960		20.00	-64.6		F
Magnesium									NR
Manganese									NR
Mercury	75-125	1.7200		0.2000	U	2.00	86.0		AV
Nickel									NR
Potassium									NR
Selenium	75-125	7.8444		2.0000	U	10.00	78.4		F
Silver	75-125	47.1900		10.0000	U	50.00	94.4		P
Sodium									NR
Thallium									NR
Vanadium									NR
Zinc									NR
Cyanide									NR

Comments:
THIS IS THE MATRIX SPIKE DUPLICATE SAMPLE FOR MW-13

PFE

ORIGINAL (RED)

AMERICAN ENVIRONMENTAL
NETWORK
6
SPIKE DUPLICATES

SAMPLE NO.

MW-16

Lab Name: AMERICAN ENVIRON. NETWORK

Contract:9402001,12 SDG No.:GM1126 Lab Sample Id: W23933D

Matrix (soil/water): WATER Level (low/med): LOW

% Solids for Sample: 0.0 % Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Iron								
Lead								
Magnesium								
Manganese								
Mercury		2.1700		1.9600		10.2		AV
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide								

FORM VI - IN

AMERICAN ENVIRONMENTAL
NETWORK
6
SPIKE DUPLICATES

SAMPLE NO.

MW-13MSD / MS

Lab Name: AMERICAN ENVIRON. NETWORK

Contract:9402001,12 SDG No.:GM1126 Lab Sample Id: W23972D

Matrix (soil/water): WATER Level (low/med): LOW

% Solids for Sample: 0.0 % Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum								
Antimony								
Arsenic	10.0	32.6250		26.9702		19.0		F
Barium		2136.4000		2236.9060		4.6		P
Beryllium								
Cadmium		45.2600		48.3820		6.7		P
Calcium								
Chromium		221.0000		229.0000		3.6		P
Cobalt								
Copper								
Iron								
Lead	3.0	71.9520		69.4679		3.5		F
Magnesium								
Manganese								
Mercury		1.7300		1.7200		0.6		AV
Nickel								
Potassium								
Selenium	5.0	8.1619		7.8444		4.0		F
Silver	10.0	40.1170		47.1900		16.2		P
Sodium								
Thallium								
Vanadium								
Zinc								
Cyanide								

FORM VI - IN

AMERICAN ENVIRONMENTAL NETWORK

7

LABORATORY CONTROL SAMPLE

PFE ORIGINAL (RED)

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Solid LCS Source: ERA LOT 216

Aqueous LCS Source: SPEX

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum									
Antimony									
Arsenic									
Barium	2000.0	2091.67	104.6						
Beryllium									
Cadmium	50.0	50.06	100.1						
Calcium									
Chromium	200.0	221.00	110.5						
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium									
Silver	50.0	51.13	102.3						
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

FORM VII - IN

AMERICAN ENVIRONMENTAL NETWORK

7

LABORATORY CONTROL SAMPLE

PFE ORIGINAL

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Solid LCS Source: ERA LOT 216

Aqueous LCS Source: SPEX

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum									
Antimony									
Arsenic	40.0	34.81	87.0						
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead	20.0	20.61	103.0						
Magnesium									
Manganese									
Mercury									
Nickel									
Potassium									
Selenium	10.0	10.94	109.4						
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

FORM VII - IN

PFE ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK

7

LABORATORY CONTROL SAMPLE

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Solid LCS Source: ERA LOT 216

Aqueous LCS Source: SPEX

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury	2.0	2.13	106.5						
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

FORM VII - IN

PFE
ORIGINAL (Red)

AMERICAN ENVIRONMENTAL NETWORK

7

LABORATORY CONTROL SAMPLE

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Solid LCS Source: ERA LOT 216

Aqueous LCS Source: SPEX

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury	2.0	2.07	103.5						
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

FORM VII - IN

AMERICAN ENVIRONMENTAL NETWORK

7

LABORATORY CONTROL SAMPLE

Lab Name: AMERICAN ENVIRON. NETWORK Contract: 9402001,12

SDG No.: GM1126

Solid LCS Source: ERA LOT 216

Aqueous LCS Source: SPEX

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Aluminum									
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium									
Calcium									
Chromium									
Cobalt									
Copper									
Iron									
Lead									
Magnesium									
Manganese									
Mercury	2.0	1.90	95.0						
Nickel									
Potassium									
Selenium									
Silver									
Sodium									
Thallium									
Vanadium									
Zinc									
Cyanide									

FORM VII - IN

AMERICAN ENVIRONMENTAL
NETWORK
9
ICP SERIAL DILUTIONS

ORIGINAL (Red)

SAMPLE NO.

MW - 13

Lab Name: AMERICAN ENVIRON. NETWORK

Contract:9402001,12 SDG No.:GM1126 Lab Sample Id: W23972L

Matrix (soil/water): WATER Level (low/med): LOW

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	M
Aluminum							
Antimony							
Arsenic							
Barium	149.93	B	166.50	U	100.0		P
Beryllium							
Cadmium	5.00	U	25.00	U			P
Calcium							
Chromium	11.00		50.00	U	100.0		P
Cobalt							
Copper							
Iron							
Lead							
Magnesium							
Manganese							
Mercury							
Nickel							
Potassium							
Selenium							
Silver	10.00	U	50.00	U			P
Sodium							
Thallium							
Vanadium							
Zinc							

FORM IX - IN

PFE ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road, Suite 150
Columbia, MD 21045-1992
(410) 730-8525 FAX: (410) 997-2586

Report Number: 9402001
Report To: Geraghty & Miller, Inc.
Project: MD0057.009, Norfolk, VA
Date: February 18, 1994
Analysis: Free Cyanide (EPA 335.1), Total Cyanide (EPA 335.2)

Client ID	AENI ID	Date Sampled	Date Received
MW-16	23933	01/31/94	02/01/94
REP-1	23934	01/31/94	02/01/94
MW-19	23935	01/31/94	02/01/94
MW-19B	23936	01/31/94	02/01/94
MW-21	23937	01/31/94	02/01/94
MW-21B	23938	01/31/94	02/01/94

Six water samples were received and analyzed for Free and Total Cyanide. Samples were distilled 02/05/94 through 02/13/94 and analyzed on 02/14/94.

This report consists of tabulated sample results and a Quality Control Report Summary.

Report Released By: Rhonda Green-Barron
General Chemistry Laboratory Manager

ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road, Suite 150
Columbia, MD 21045-1992
(410) 730-8525 FAX: (410) 997-2586

Report Number: 9402012
Report To: Geraghty & Miller, Inc.
Project: MD0057.009, Norfolk, VA
Date: February 18, 1994
Analysis: Free Cyanide (EPA 335.1), Total Cyanide (EPA 335.2)

Client ID	AENI ID	Date Sampled	Date Received
MW-8	23965	02/01/94	02/02/94
MW-17	23966	02/01/94	02/02/94
MW-15	23967	02/01/94	02/02/94
MW-12	23968	02/01/94	02/02/94
MW-14	23969	02/01/94	02/02/94
Field Blank	23970	02/01/94	02/02/94
MW-18	23971	02/01/94	02/02/94
MW-13	23972	02/01/94	02/02/94
MW-13MS	23973	02/01/94	02/02/94
MW-13MSD	23974	02/01/94	02/02/94
MW-4B	23975	02/01/94	02/02/94
MW-4	23976	02/01/94	02/02/94
MW-20B	23977	02/01/94	02/02/94
MW-20	23978	02/01/94	02/02/94
Trip Blank	23979	02/01/94	02/02/94

Fifteen water samples were received and analyzed for Free and Total Cyanide. Samples were distilled 02/05/94 through 02/14/94 and analyzed on 02/15/94.

This report consists of tabulated sample results and a Quality Control Report Summary.

Report Released By: Rhonda Green-Barron
Rhonda Green-Barron
General Chemistry Laboratory Manager

PFE
ORIGINAL
(Red)

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road, Suite 150
Columbia, MD 21045-1992
(410) 730-8525 FAX: (410) 997-2586

Report Number: 9402026
Report To: Geraghty & Miller, Inc.
Project: MD0057.009, Norfolk, VA
Date: February 18, 1994
Analysis: Free Cyanide (EPA 335.1), Total Cyanide (EPA 335.2)

Client ID	AENI ID	Date Sampled	Date Received
MW-13C	24019	02/02/94	02/03/94

One water sample was received and analyzed for Free and Total Cyanide. The sample was distilled 02/11/94 and analyzed on 02/14/94.

This report consists of tabulated sample results and a Quality Control Report Summary.

Report Released By: Rhonda Green-Barron
General Chemistry Laboratory Manager

PFE

ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road, Suite 150
Columbia, MD 21045-1992
(410) 730-8525 FAX: (410) 997-2586

Report Number: 9402012
Report To: Geraghty & Miller, Inc.
Project: MD0057.009, Norfolk, VA
Date: February 18, 1994
Analysis: Free Cyanide (EPA 335.1), Total Cyanide (EPA 335.2)

Client ID	AENI ID	Total Cyanide	Free Cyanide
MW-8	23965	<0.02	<0.02
MW-17	23966	<0.02	<0.02
MW-15	23967	0.18	<0.02
MW-12	23968	1.7	<0.02
MW-14	23969	0.13	<0.02
Field Blank	23970	<0.02	<0.02
MW-18	23971	<0.02	<0.02
MW-13	23972	0.30	0.13
MW-13MS	23973	*	*
MW-13MSD	23974	*	*
MW-4B	23975	0.10	<0.02
MW-4	23976	0.29	0.13
MW-20B	23977	<0.02	<0.02
MW-20	23978	<0.02	<0.02
Trip Blank	23979	<0.02	<0.02

*See QC Summary Report for Percent Recoveries
Results reported in mg/L.

ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road, Suite 150
Columbia, MD 21045-1992
(410) 730-8525 FAX: (410) 997-2586

Report Number: 9402026
Report To: Geraghty & Miller, Inc.
Project: MD0057.009, Norfolk, VA
Date: February 18, 1994
Analysis: Free Cyanide (EPA 335.1), Total Cyanide (EPA 335.2)

Client ID	AENI ID	Total Cyanide	Free Cyanide
MW-13C	24019	<0.02	<0.02

Results reported in mg/L.

PFE
ORIGINAL
CORRECTION

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road, Suite 150
Columbia, MD 21045-1992
(410) 730-8525 FAX: (410) 997-2586

Report Number: 9402001
Report To: Geraghty & Miller, Inc.
Project: MD0057.009, Norfolk, VA
Date: February 18, 1994
Analysis: Free Cyanide (EPA 335.1), Total Cyanide (EPA 335.2)

Client ID	AENI ID	Total Cyanide	Free Cyanide
MW-16	23933	<0.02	<0.02
REP-1	23934	<0.02	<0.02
MW-19	23935	<0.02	<0.02
MW-19B	23936	<0.02	<0.02
MW-21	23937	<0.02	<0.02
MW-21B	23938	<0.02	<0.02

Results reported in mg/L.

PFE ORIGINAL (RED)

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road, Suite 150
Columbia, MD 21045-1992
(410) 730-8525 FAX: (410) 997-2586

Report Number: 9402001
Report To: Geraghty & Miller, Inc.
Project: MD0057.009, Norfolk, VA
Date: February 18, 1994
Analysis: Free Cyanide (EPA 335.1), Total Cyanide (EPA 335.2)

QC Summary Report

Sample ID	Total Cyanide	Free Cyanide
Blank	<0.02 mg/L	<0.02 mg/L
LCS	100% Recovery	97% Recovery
LCS-Duplicate	100% Recovery	96% Recovery
MW-13	0.30 mg/L	0.13 mg/L
MW-13MS	114% Recovery	112% Recovery
MW-13MSD	111% Recovery	100% Recovery

PFE
ORIGINAL (RED)

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road, Suite 150
Columbia, MD 21045-1992
(410) 730-8525 FAX: (410) 997-2586

Report Number: 9402026
Report To: Geraghty & Miller, Inc.
Project: MD0057.009, Norfolk, VA
Date: February 18, 1994
Analysis: Free Cyanide (EPA 335.1), Total Cyanide (EPA 335.2)

QC Summary Report

Sample ID	Total Cyanide	Free Cyanide
Blank	<0.02 mg/L	<0.02 mg/L
LCS	100% Recovery	97% Recovery
LCS-Duplicate	100% Recovery	96% Recovery
MW-13	0.30 mg/L	0.13 mg/L
MW-13MS	114% Recovery	112% Recovery
MW-13MSD	111% Recovery	100% Recovery

PFE ORIGINAL

AMERICAN ENVIRONMENTAL NETWORK, INC.

9151 Rumsey Road, Suite 150
Columbia, MD 21045-1992
(410) 730-8525 FAX: (410) 997-2586

Report Number: 9402012
Report To: Geraghty & Miller, Inc.
Project: MD0057.009, Norfolk, VA
Date: February 18, 1994
Analysis: Free Cyanide (EPA 335.1), Total Cyanide (EPA 335.2)

QC Summary Report

Sample ID	Total Cyanide	Free Cyanide
Blank	<0.02 mg/L	<0.02 mg/L
LCS	100% Recovery	97% Recovery
LCS-Duplicate	100% Recovery	96% Recovery
MW-13	0.30 mg/L	0.13 mg/L
MW-13MS	114% Recovery	112% Recovery
MW-13MSD	111% Recovery	100% Recovery

9402001 R 2/1/94 D 2/14/94 RL = 3 LOC = 41, LC

GERAGHTY & MILLER, INC.
Environmental Services

Laboratory Task Order No. _____

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number MD0057.009 Norfolk MGP

Project Location Norfolk, VA

Laboratory American Environ. Network

Sampler(s)/Affiliation Hannum G+M
Newgout G+M

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	40ml glass VOA amber VOC (HCl)	liter glass Amber BNA (semi)	liter plastic Metals RCRA (HNO3)	liter plastic Free CN NaOH	liter plastic Total CN NaOH					TOTAL
MW-16	L	1-31-94 5:25		3	1	1	1	1		001-001/23933			7
Rep-1	L	1-31-94 PM		3	1	1	1	1		-002/23934			7
MW-19	L	1-31-94 4:10		3	1	1	1	1		-003/23935			7
MW-19B	L	1-31-94 4:35		3	1	1	1	1		-004/23936			7
MW-20	L	1-31-94 2:50		3	1	1	1	1		-005/23937			7
MW-21B	L	1-31-94 2:50		3	1	1	1	1		-006/23938			7
Trip Blank	L	—		3						-007/23939			3

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers: 45

Relinquished by: [signature]	Organization: G+M	Date 1/31/94	Time 6:10 PM	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by: B. Turnbull	Organization: AENI	Date 2/1/94	Time 1000	

Special Instructions/Remarks:
For Questions call John Elstrom or Al Hannum at 410-224-8777

Delivery Method: ☐ In Person ☒ Common Carrier Fedex (SPECIFY) ☐ Lab Courier ☐ Other _____ (SPECIFY)

G&M Form 09-9-91

Southprint 91-1768

9402012 R 2/2/94 D 2/15/94 RL=3 LOC=16, LC

GERAGHTY & MILLER, INC.
Environmental Services

Laboratory Task Order No. 14131

CHAIN-OF-CUSTODY RECORD

Page ____ of ____

Project Number MD0057.009 Norfolk NGP

Project Location Norfolk, VA

Laboratory A.E.N.

Sampler(s)/Affiliation A L Hannum GTM
B. Newgart "

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	40ml VOA Amber VOC (HCl)	1ltr glass amber BNA	1ltr plastic metals RCRA (HNO3)	1ltr plastic Free CN NaOH	1ltr plastic Total CN NaOH				TOTAL
MW-8	L	2-1-94 9:25		3	1	1	1	1			012-001/23965	7
MW-17	L	2/1/94 8:45		3	1	1	1	1			-002/23966	7
MW-15	L	2/1/94 10:00		3	1	1	1	1			-003/23967	7
MW-12	L	2/1/94 11:20		3	1	1	1	1			-004/23968	7
MW-14	L	2/1/94 14:30		3	1	1	1	1			-005/23969	7
Field Blank	L	2/1/94		3	1	1	1	1			-006/23970	7
MW-18	L	2/1/94 2:20		3	1	1	1	1			-007/23971	7

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 49

Relinquished by: [signature]	Organization: GTM	Date 2/1/94	Time 6:00	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by: [signature]	Organization:	Date / /	Time	Seal Intact?
Received by: [signature]	Organization: AENE	Date 2/2/94	Time 1030	Yes No N/A

Special Instructions/Remarks:

For Questions Call Al Hannum or John Elstner at 410-224-8777

Delivery Method: ☐ In Person ☒ Common Carrier Fedex (SPECIFY) ☐ Lab Courier ☐ Other ____ (SPECIFY)

GM Form

9402012 R2/2/94 D2/15/94 RL=3 LOC=LC, 16

GERAGHTY & MILLER, INC.
Environmental Services

Laboratory Task Order No. 14131

CHAIN-OF-CUSTODY RECORD

Page ____ of ____

Project Number MD0057.009 Norfolk MGP

Project Location Norfolk, VA.

Laboratory A.E.N.

Sampler(s)/Affiliation Al Hannum GTM
Brian Newgard GTM

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	40ml glass VOA VOC (HCl)	liter glass amber BNA	liter plastic Metals RCRA (HNO3)	liter plastic Free CN NaOH	liter plastic Total CN NaOH				TOTAL
MW-13	L	2/1/94 11:50		3	1	1	1	1			-008/23972	7
MW-13M.S.	L	2/1/94 11:50		3	1	1	1	1			-009/23973	7
MW-13MSD	L	2/1/94 11:50		3	1	1	1	1			-010/23974	7
MW-4B	L	2/1/94 5:00		3	1	1	1	1			-011/23975	7
MW-4	L	2/1/94 4:50		3	1	1	1	1			-012/23976	7
MW-20B	L	2/1/94 4:00		3	1	1	1	1			-013/23977	7
MW-20	L	2/1/94 3:40		3	1	1	1	1			-014/23978	7
Trip Blank	L			3							-015/23979	3
~~Field Blank~~	~~A~~										~~-016~~	

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 52

Relinquished by: Al H	Organization: GTM	Date 2/1/94 Time 6:00	Seal Intact? (Yes) No N/A
Received by:	Organization:	Date / / Time	
Relinquished by:	Organization:	Date / / Time	Seal Intact? (Yes) No N/A
Received by: [illegible]	Organization: AENI	Date 2/2/94 Time 1045	

Special Instructions/Remarks:

For Questions call Al Hannum or John Elstow at 410-224-8777

MS = Matrix Spike MSD - Matrix spike Duplicate

Delivery Method: ☐ In Person ☑ Common Carrier Fed[illegible] ☐ Lab Courier ☐ Other ____

G&M Form 09-9-91 Southprint 91-1768

9402026 R 2/3/94 D 2/16/94 RL=3 LOC=LC,19

GERAGHTY & MILLER, INC.
Environmental Services

Laboratory Task Order No. 1431

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number MD0057.009 (Norfolk MGP)

Project Location Norfolk, VA

Laboratory A.E.N.

Sampler(s)/Affiliation Al Hannum GTM
Brian Newport GTM

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	40ml VOA Amber	VOC (HCL) Liter GLASS Amber	BNA	Liter PLASTIC METAL RCRA (HNO3)	LITER PLASTIC FREE CN NaOH	LITER PLASTIC TOTAL CN NaOH					TOTAL
MW-13C	L	2/2/94 9:45am		3	1	1	1	1			026-001	/24019		7
TRIP BLANK	L			3							026-002	/24020		3

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 10

Relinquished by: Al H	Organization: GTM	Date 2 12 94 Time 12:20	Seal Intact? Yes No N/A
Received by:	Organization:	Date / / Time	
Relinquished by:	Organization:	Date / / Time	Seal Intact? Yes No N/A
Received by: B. Tankil	Organization: AENI	Date 2 12 94 Time 1030	

Special Instructions/Remarks: For Questions call Al Hannum or John Elstner at (410) 224-8777

DR-pH off

Delivery Method: ☐ In Person ☑ Common Carrier Fedex ☐ Lab Courier ☐ Other

G&M Form 09-9-91

Southprint 91-1768

ORIGINAL
(Red)

ROUND 2 - 1991

ORIGINAL

Spectralytix

March 20, 1991

Mr. Curt Cramer
Geraghty & Miller, Inc.
180 Admiral Cochrane Drive
Suite 300
Annapolis, MD 21401

Dear Mr. Cramer:

Enclosed are the results for the analysis of six water samples submitted for the determination of various analytical parameters.

We are pleased to have been afforded the opportunity to provide your firm with analytical services. Please feel free to call me if you have any questions about these results.

Sincerely,

Joseph E. Peters

Joseph E. Peters
Project Manager

Spectralytix Project #GMI91-004

PEE
ORIGINAL

Spectralytix
ENVIRONMENTAL ANALYTICAL SERVICES

March 21, 1991

Mr. Curt Cramer
Geraghty & Miller, Inc.
180 Admiral Cochrane Drive
Suite 300
Annapolis, MD 21401

Dear Mr. Cramer:

Enclosed are the results for the analysis of eight water samples submitted for the determination of various analytical parameters.

We are pleased to have been afforded the opportunity to provide your firm with analytical services. Please feel free to call me if you have any questions about these results.

Sincerely,

Joseph E. Peters

Joseph E. Peters
Project Manager

Spectralytix Project #GMI91-005

GERAGHTY & MILLER, INC.
Environmental Services

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number 057.03

Project Location Norfolk, Va.

Laboratory Spectralytics

Sampler(s) JP

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Date Sampled	VOA 40 ml Vials	1 l. amber (BNA)	1 l. amber CN	500 ml Plastic (metals)							TOTAL
OW-1	11/26	2										2
TB-13	11/26	2										2
MW-16/II	11/26		1									1
MW-13 C	11/26	2	1	1	1 *							5

Total No. of Bottles/ Containers: 10

Relinquished by: J. Petersen	Organization: Geraghty + Miller	Date 11/26/90	Time 3:00	Seal Intact? ~~Yes~~ No N/A
Received by: [signature]	Organization: Spectralytix	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks:
metals * To be Filtered & Preserved in Lab upon Receipt.

Delivery Method: ☐ In Person ☒ Common Carrier FED-X (SPECIFY) ☐ Lab Courier ☐ Other (SPECIFY)

G&M Form 09 12 88

PFE ORIGINAL (RED)

P.O. Number _____ | 1 Of 1

Spectralytix

200 Girard Street, Suite 204, Gaithersburg, MD 20877 • (301) 869-0263 • FAX: (301) 869-8134

TURNAROUND TIME:

Project: City of Norfolk
Client: Geraghty & Miller Inc
Address: 180 Admiral Cochrane Dr. Suite 300
Phone: Annapolis MD 21401 (301) 224-8777

Sample Number	Date	Time	Matrix	No. of Containers	40 ml Glass VOA NA	60z + Xylenes	1 liter Amber glass NA	BNA 625	1 liter amber glass HNO3	Metals 206.2, 218.1, 239.1	1 liter amber glass NaOH	free cyanide 412.6	1 liter amber glass NaOH	total cyanide 335.3				
MW-13C	3-6-91		water	6	2	1	1		1		1							
MW-21	3-6-91		water	6	2	1	1		1		1							
MW-8	3-6-91		water	1		1												
Trip-3	3-6-91		water	1	1													

Note: See Task Order # 02 2290; Holding time on VOA samples is only 7 days

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:
John Ousiang	3-6-91 5:49			
Relinquished By:	Date/Time	Received By:	Date/Time / Shipper:	Airbill No.:
Relinquished By:	Date/Time	Received By:	Lab Comments:	

White - Return to Client | Yellow - Retain by Lab (Project File) | Pink Receipt for Samples | Gold - Accounting

ORIGINAL

P.O. Number _____ | 1 Of 1

Spectralytix

200 Girard Street, Suite 204, Gaithersburg, MD 20877 • (301) 869-0263 • FAX: (301) 869-8134

Project: City of Norfolk
Client: Geraghty & Miller Inc
Address: 180 Admiral Cochrane Dr. Suite 300
Phone: Annapolis MD 21401 (301) 224-8777

TURNAROUND TIME:

Preservative Used

Type of Analysis

Sample Number	Date	Time	Matrix	No. of Containers	40 ml glass VOA 602 + Xylenes (1/4)	1 liter amber glass BNA 625	1 liter Amber glass Metals 206.2, 218.1, 239.1 (HNO3)	1 liter amber glass free cyanide 412.6 (NaOH)	1 liter amber glass total cyanide 335.3 (NaOH)					
MW-8	3-6-91		water	5	2		1	1	1					
Trip-4	3-6-91		water	1	1									

Note: See Task Order # 022290; Holding time on VOA samples is only 7 Days

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:
John Ousiany	3-6-91 5:52			
Relinquished By:	Date/Time	Received By:	Date/Time Shipper:	Airbill No.:
Relinquished By:	Date/Time	Received By:	Lab Comments:	

White - Return to Client | Yellow - Retain by Lab (Project File) | Pink Receipt for Samples | Gold - Accounting

PFE ORIGINAL

GERAGHTY & MILLER, INC.
Ground-Water Consultants

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number MD057-05

Project Location: Norfolk VA

Laboratory Spectralytic

Sampler(s) J. Ouissiamy, D. O'Dell

SAMPLE IDENTITY	Date Sampled	40 ml Glass VOA unpreserved	1 liter amber glass B/NA unpreserved	1 liter amber glass w/NaOH free cyanide	1 liter amber glass w/NaOH total cyanide	1 liter amber glass Metals w/ HNO_3						TOTAL
MW-21B	3-6-91	6	3	3	3	3						18
Trip - Q	3-6-91	1										
Total No. of Bottles/ Containers												18

Relinquished by: John Ouissiamy	Organization: Geraghty & Miller Inc	Date 3/6/91	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: Task Order # 02 2290; VOAs have 7 day holding time; Note 3 bottle sets for ~~XX~~ this well are extra volumes for Lab QA/QC (MS and MSDS)

Delivery Method: [ ] In Person [X] Common Carrier Federal Express [ ] Lab Courier [ ] Other

ORIGINAL

GERAGHTY & MILLER, INC.
Ground-Water Consultants

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number: MD057.05
Project Location: Norfolk VA.
Laboratory: Spectralytic
Sampler(s): J. Owsiany, D. O'Dell

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Date Sampled	VOA 6024 Xylenes	40ml glass 625 BNA	1 litre - Amber glass 335.5 Total Cyanide	1 litre - Amber glass 4126 Free Cyanide	1 litre - Amber glass Metals	1 litre - Amber glass						TOTAL
MW-20	3-5-91	2	1	1	1	1							6
MW-20B	3-5-91	2	1	1	1	1							6
OW-1	3-5-91	2	1	1	1	1							6
												Total No. of Bottles/ Containers	~~15~~ 18

Relinquished by: John Owsiany	Organization: G+M	Date 3/5/91	Time 4:27	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: Task order# 022290 Note Only 7 day holding time on VOA samples
Fed Ex # 7814862543

Delivery Method: [ ] In Person [X] Common Carrier Fed Ex [ ] Lab Courier [ ] Other

ORIGINAL (Red)

GERAGHTY & MILLER, INC.
Ground-Water Consultants

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number MD057.05
Project Location: Norfolk VA.
Laboratory Spectralytic
Sampler(s) J. Ossiany, D. O'Dell

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Date Sampled	VOA-602 + Xylenes	40ml glass	625 BNA	1 litre-Amber-glass	335.5 Total Cyanide	1 litre-Amber-glass	412.6 Free Cyanide	1 litre-Amber-glass	Metals	1 litre-Amber-glass						TOTAL
MW-15		2	1	1	1	1											6
Replica # 1		2	1	1	1	1											6
Trip Blank		1															1
																Total No. of Bottles/ Containers	13

Relinquished by: John Ossiany Organization: G+M Inc Date 3/5/91 Time 4:26
Received by: Organization: Date / / Time
Seal Intact? Yes No N/A

Relinquished by: Organization: Date / / Time
Received by: Organization: Date / / Time
Seal Intact? Yes No N/A

Special Instructions/Remarks: Task Order # 022290 Note Only 7 day holding time on VOA samples

Fed Ex Airbill # 7814862543

Delivery Method: [ ] In Person [X] Common Carrier Fed Ex [ ] Lab Courier [ ] Other

ORIGINAL (Red)

PFE
ORIGINAL
Rec'd

Spectralytix
ENVIRONMENTAL & ANALYTICAL SERVICES

January 2,1991

Mr. Curt Cramer
Geraghty & Miller, Inc.
180 Admiral Cochrane Drive
Suite 300
Annapolis, MD 21401

Dear Mr. Cramer:

Enclosed are the results for the analysis of four water samples submitted for various analytical procedures.

On 12/04/90, your samples being analyzed for BTEX were run along with samples from another of your projects which contained high concentrations of BTEX. Considering that BTEX compounds were found in your trip blank (sample # TB-13), it cannot be ruled out that these results were not due to contamination.

We are pleased to have been afforded the opportunity to provide your firm with analytical services. Please feel free to call me if you have any questions about these results.

Sincerely,

Joseph E. Peters

Joseph E. Peters
Project Manager

Spectralytix Project #GM021

PFE
ORIGINAL
(Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK-VA POWER
Client Sample ID: OW-1
SPECTRALYTIX Sample ID: GM021-011531 Sample Type: Water
Date Sampled : 11/26/90 Date Received: 11/27/90
Date Analyzed: 12/04/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	17	1	µg/L
Ethylbenzene	34	1	µg/L
Total Xylenes	79	1	µg/L

Diflourobenzene (Surrogate) Recovery 82%

ND = Compound not detected at or above the listed detection limit.

P.E.
ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK-VA POWER
Client Sample ID: TB-13
SPECTRALYTIX Sample ID: GM021-011532 Sample Type: Water
Date Sampled : 11/26/90 Date Received: 11/27/90
Date Analyzed: 12/04/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	14	1	µg/L
Ethylbenzene	13	1	µg/L
Total Xylenes	42	1	µg/L

Diflourobenzene (Surrogate) Recovery 96%

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK-VA POWER
Client Sample ID: MW-16/II
SPECTRALYTIX Sample ID: GM021-011533 Sample Type: Water
Date Sampled : 11/26/90 Date Received: 11/27/90
Date Extracted: 11/30/90 Date Analyzed: 12/04/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM021-011533

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFL
ORIGINAL (Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK-VA POWER
Client Sample ID: MW-13C
SPECTRALYTIX Sample ID: GM021-011534 Sample Type: Water
Date Sampled : 11/26/90 Date Received: 11/27/90
Date Analyzed: 12/04/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	20	1	µg/L
Ethylbenzene	17	1	µg/L
Total Xylenes	45	1	µg/L

Diflourobenzene (Surrogate) Recovery 100%

ND = Compound not detected at or above the listed detection limit.

PEE ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK-VA POWER
Client Sample ID: MW-13C
SPECTRALYTIX Sample ID: GM021-011534 Sample Type: Water
Date Sampled : 11/26/90 Date Received: 11/27/90
Date Extracted: 11/30/90 Date Analyzed: 12/04/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PEE
ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM021-011534

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

Dissolved Arsenic, Lead, and Chromium

Client: GERAGHTY & MILLER/NORFOLK-VA POWER
Client Sample ID: MW-13C
SPECTRALYTIX Sample ID: GM021-011534 Sample Type: Water
Date Sampled : 11/26/90 Date Received: 11/27/90

Analyte	Result	Detection Limit	Units
Arsenic	0.006	0.005	mg/L
Chromium	ND	0.020	mg/L
Lead	0.24	0.005	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

Cyanides

Client: GERAGHTY & MILLER/NORFOLK-VA POWER
Client Sample ID: MW-13C
SPECTRALYTIX Sample ID: GM021-011534 Sample Type: Water
Date Sampled : 11/26/90 Date Received: 11/27/90

Analyte	Result	Detection Limit	Units
Cyanide, Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

Quality Assurance
Semivolatile Organics - EPA Method 8270/625
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER/NORFOLK-VA POWER
SPECTRALYTIX ID: GM021 Sample Type: Reagent Water
Date Analyzed: 12/03/90

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Phenol	200	ND	76	38	12-89
2-Chlorophenol	200	ND	120	60	27-123
1,4-Dichlorobenzene	100	ND	58	58	36-97
Di-n-propylnitrosamine	100	ND	64	64	41-116
1,2,4-Trichlorobenzene	100	ND	62	61	39-98
4-Chloro-3-methylphenol	200	ND	126	63	23-97
Acenaphthene	100	ND	70	70	46-118
4-Nitrophenol	200	ND	110	55	10-80
2,4-Dinitrotoluene	100	ND	60	60	24-96
Pentachlorophenol	200	ND	152	76	9-103
Pyrene	100	ND	88	88	26-127

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	200	80	40	5	42	12-89
2-Chlorophenol	200	122	61	1	40	27-123
1,4-Dichlorobenzene	100	58	58	0	28	36-97
Di-n-propylnitrosamine	100	62	62	3	38	41-116
1,2,4-Trichlorobenzene	100	60	60	1	28	39-98
4-Chloro-3-methylphenol	200	122	61	3	42	23-97
Acenaphthene	100	68	68	3	31	46-118
4-Nitrophenol	200	102	51	7	50	10-80
2,4-Dinitrotoluene	100	58	58	3	38	24-96
Pentachlorophenol	200	150	75	1	50	9-103
Pyrene	100	84	84	5	31	26-127

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

PFE ORIGINAL

Quality Assurance
BTEX - EPA Method 8020
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER
SPECTRALYTIX ID: GM021 Sample Type: Reagent Water
Date Analyzed: 12/03/90

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Benzene	50	ND	46	93	73-129
Toluene	50	ND	46	93	65-137
Ethylbenzene	50	ND	45	91	80-119
Xylenes	150	ND	145	97	45-132
DFB (Surrogate)	50	NA	50	101	55-126

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Benzene	50	53	106	1	*	73-129
Toluene	50	52	105	1	*	65-137
Ethylbenzene	50	56	103	1	*	80-119
Xylenes	150	157	105	8	*	45-132
DFB (Surrogate)	50	50	101	0	*	55-126

BLANK = ND for all compounds
(DFB)Surrogate recovery on blank = 116%

BTEX Standard from Ultra Scientific Lot No. D-1063
DFB (Surrogate) from Suplo Lot No. LA24097

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

* RPD limits have not been established for these compounds.

ORIGINAL

METALS QA/QC REPORT

Client: GERAGHTY & MILLER
Spectralytix Project GM021

ANALYTE	METHOD BLANK	QC% (LCS)	ICV%	SPIKE % REC	RPD
Arsenic	ND	105%	100%	82%	12%
Lot # 6919-01					
Spike Value = 0.030					
Spike True Value = 0.030					
Chromium	ND	82%	93%	105%	0
Lot # 6926-01					
Spike Value = 2.1					
Spike True Value = 2					
Lead	ND	108%	108%	87%	8%
Lot # 6930-01					
Spike Value = 0.464					
Spike True Value = 0.030					

PFE
ORIGINAL

QA/QC REPORT

Client: GERAGHTY & MILLER
Spectralytix Project GM021
Date Analyzed: 12/11/90

ANALYTE	METHOD BLANK	ICV%
Cyanide	1.93 µg CN	110%

Lot # 851058
Spike Value = 44.99 µg CN
Spike True Value = 40.0 µg CN

PEE ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW21-B
SPECTRALYTIX Sample ID: GMI91-005-9103133 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/11/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

Difluorobenzene (surrogate) recovery = 64%

ND = Compound not detected at or above the listed detection limit.

PFE

ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW21-B
SPECTRALYTIX Sample ID: GMI91-005-9103133 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/13/91

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GMI91-005-9103133

Analyte	Result	Detection Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

Total Metals

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW21-B
SPECTRALYTIX Sample ID: GMI91-005-9103133 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91

Analyte	Result	Detection Limit	Units	Method
Arsenic	ND	0.0050	mg/L	7060
Chromium	ND	0.0050	mg/L	6010
Lead	ND	0.0050	mg/L	6010

ND = Not detected at or above the listed detection limit.

PFE ORIGINAL

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW21-B
SPECTRALYTIX Sample ID: GMI91-005-9103133 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91

Analyte	Result	Detection Limit	Units
Cyanide, Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (RED)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: TRIP 2
SPECTRALYTIX Sample ID: GMI91-005-9103134 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/11/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

Difluorobenzene (surrogate) recovery = 64%

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-8
SPECTRALYTIX Sample ID: GMI91-005-9103135 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/11/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	2	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	1	1	µg/L

Difluorobenzene (surrogate) recovery = 110%

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

Total Metals

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-8
SPECTRALYTIX Sample ID: GMI91-005-9103135 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91

Analyte	Result	Detection Limit	Units	Method
Arsenic	0.0068	0.0050	mg/L	7060
Chromium	ND	0.0050	mg/L	6010
Lead	ND	0.0050	mg/L	6010

ND = Not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-8
SPECTRALYTIX Sample ID: GMI91-005-9103135 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91

Analyte	Result	Detection Limit	Units
Cyanide, Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: TRIP 4
SPECTRALYTIX Sample ID: GMI91-005-9103136 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/11/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

Difluorobenzene (surrogate) recovery = 98%

ND = Compound not detected at or above the listed detection limit.

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-13C
SPECTRALYTIX Sample ID: GMI91-005-9103137 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/11/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	2	1	µg/L
Ethylbenzene	1	1	µg/L
Total Xylenes	3	1	µg/L

Difluorobenzene (surrogate) recovery = 58%

ND = Compound not detected at or above the listed detection limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-13C
SPECTRALYTIX Sample ID: GMI91-005-9103137 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/13/91

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GMI91-005-9103137

Analyte	Result	Detection Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL FILE

Total Metals

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-13C
SPECTRALYTIX Sample ID: GMI91-005-9103137 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91

Analyte	Result	Detection Limit	Units	Method
Arsenic	ND	0.0050	mg/L	7060
Chromium	ND	0.0050	mg/L	6010
Lead	ND	0.0050	mg/L	6010

ND = Not detected at or above the listed detection limit.

ORIGINAL (RED)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-13C
SPECTRALYTIX Sample ID: GMI91-005-9103137 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91

Analyte	Result	Detection Limit	Units
Cyanide, Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-21
SPECTRALYTIX Sample ID: GMI91-005-9103138 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/11/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

Difluorobenzene (surrogate) recovery = 58%

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-21
SPECTRALYTIX Sample ID: GMI91-005-9103138 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/13/91

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (RED)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GMI91-005-9103138

Analyte	Result	Detection Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

Total Metals

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-21
SPECTRALYTIX Sample ID: GMI91-005-9103138 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91

Analyte	Result	Detection Limit	Units	Method
Arsenic	0.0050	0.0050	mg/L	7060
Chromium	ND	0.0050	mg/L	6010
Lead	ND	0.0050	mg/L	6010

ND = Not detected at or above the listed detection limit.

PFE ORIGINAL

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-21
SPECTRALYTIX Sample ID: GMI91-005-9103138 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91

Analyte	Result	Detection Limit	Units
Cyanide, Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: MW-8
SPECTRALYTIX Sample ID: GMI91-005-9103139 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/13/91

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GMI91-005-9103139

Analyte	Result	Detection Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/CITY OF NORFOLK
Client Sample ID: TRIP 3
SPECTRALYTIX Sample ID: GMI91-005-9103140 Sample Type: Water
Date Sampled : 03/06/91 Date Received: 03/07/91
Date Analyzed: 03/11/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

* Vial broke-confirmation run had already been setup so these results are by EPA Method 8240 only.

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

Quality Assurance
BTEX - EPA Method 8020
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER
SPECTRALYTIX Project ID: GMI91-005 Sample Type: 9103133 MS/MSD
Date Analyzed: 03/13/91

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Benzene	50	ND	40	81	73-129
Toluene	50	ND	43	85	65-137
Ethylbenzene	50	ND	42	84	80-119
Xylenes	150	ND	129	86	45-132
DFB (Surrogate)	50	NA	56	111	55-126

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Benzene	50	38	76	6	*	73-129
Toluene	50	40	80	6	*	65-137
Ethylbenzene	50	40	80	5	*	80-119
Xylenes	150	123	82	5	*	45-132
DFB (Surrogate)	50	49	98	12	*	55-126

BLANK = ND for all compounds

BTEX Standard from Ultra Scientific Lot No. D-0710
DFB (Surrogate) from Suplo Lot No. LA21149

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

* RPD limits have not been established for these compounds.

ORIGINAL (Red)

Quality Assurance
BTEX - EPA Method 8020
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER
SPECTRALYTIX Project ID: GMI91-005 Sample Type: Reagent Water
Date Analyzed: 03/13/91

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Benzene	50	ND	55	110	73-129
Toluene	50	ND	57	114	65-137
Ethylbenzene	50	ND	57	114	80-119
Xylenes	150	ND	172	115	45-132
DFB (Surrogate)	50	NA	59	118	55-126

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Benzene	50	55	110	0	*	73-129
Toluene	50	57	114	0	*	65-137
Ethylbenzene	50	56	112	2	*	80-119
Xylenes	150	169	113	2	*	45-132
DFB (Surrogate)	50	60	120	2	*	55-126

BLANK = ND for all compounds

BTEX Standard from Ultra Scientific Lot No. D-0710
DFB (Surrogate) from Suplo Lot No. LA21149

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

* RPD limits have not been established for these compounds.

PFE ORIGINAL

Quality Assurance
Semivolatile Organics - EPA Method 8270/625
Surrogate Recoveries

Client: GERAGHTY & MILLER
SPECTRALYTIX ID: GMI91-005 Sample Type: Water

	Blank Reagent Water	MS Sample 9103133	MSD Sample 9103133	Sample # 9103133	Sample # 9103137
2-Florophenol	41	66	65	42	32
Phenol-D5	35	59	60	36	27
2,4,6-Tribromophenol	69	71	65	58	48
Nitrobenzene	60	62	60	60	46
2-Fluorobiphenyl	60	60	56	56	48
Terphenyl-D14	68	112	90	60	54

	Sample # 9103138	Sample # 9103139	Reagent Water MS
2-Florophenol	40	37	61
Phenol-D5	37	34	56
2,4,6-Tribromophenol	63	56	62
Nitrobenzene	58	54	58
2-Fluorobiphenyl	56	48	58
Terphenyl-D14	56	54	100

Blank showed ND for all components.

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

PFE ORIGINAL

Quality Assurance
Semivolatile Organics - EPA Method 8270/625
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER
SPECTRALYTIX Project ID: GMI91-005 Sample Type: Water
Date Analyzed: 03/19/91

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Phenol	100	ND	64	64	12-89
2-Chlorophenol	100	ND	70	70	27-123
1,4-Dichlorobenzene	50	ND	28	56	36-97
Di-n-propylnitrosamine	50	ND	27	54	41-116
1,2,4-Trichlorobenzene	50	ND	26	52	39-98
4-Chloro-3-methylphenol	100	ND	79	79	23-97
Acenaphthene	50	ND	29	58	46-118
4-Nitrophenol	100	ND	54	54	10-80
2,4-Dinitrotoluene	50	ND	27	54	24-96
Pentachlorophenol	100	ND	69	69	9-103
Pyrene	50	ND	49	97	26-127

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	100	62	62	3	42	12-89
2-Chlorophenol	100	71	71	1	40	27-123
1,4-Dichlorobenzene	50	27	54	4	28	36-97
Di-n-propylnitrosamine	50	28	56	4	38	41-116
1,2,4-Trichlorobenzene	50	26	52	0	28	39-98
4-Chloro-3-methylphenol	100	78	78	1	42	23-97
Acenaphthene	50	29	58	0	31	46-118
4-Nitrophenol	100	46	46	16	50	10-80
2,4-Dinitrotoluene	50	25	50	8	38	24-96
Pentachlorophenol	100	59	59	~~16~~	50	9-103
Pyrene	50	35	70	32	31	26-127

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

PFE
ORIGINAL
(Red)

METALS QA/QC REPORT

Client: GERAGHTY & MILLER
Spectralytix Project GMI91-005

ANALYTE	METHOD BLANK	QC% (LCS)	ICV%	SPIKE % REC	RPD
Arsenic	ND	109%	92%	115%	2
Lot # 6919-04					
Spike Value = 0.0394					
Spike True Value = 0.0300					
Chromium	ND	82%	96%	79%	0
Lot # 6926-04					
Spike Value = 0.0079					
Spike True Value = 0.0100					
Lead	ND	103%	105%	79%	0
Lot # 6930-01					
Spike Value = 0.0158					
Spike True Value = 0.0200					

PFE
ORIGINAL

CYANIDE QA/QC REPORT

Client: GERAGHTY & MILLER
Spectralytix Project GMI91-005

ANALYTE	METHOD BLANK	QC% (LCS)	SPIKE % REC	RPD
Cyanide, Total	ND	93.39%	89.98%	0
Lot # 851058				
Spike Value = 35.93				
Spike True Value = 40				
Cyanide, Free	ND	100.7%	102%	0
Lot # 851058				
Spike Value = 40.8				
Spike True Value = 40				

PFE ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-15
SPECTRALYTIX Sample ID: GMI91-004-9103127 Sample Type: Water
Date Sampled : UNKNOWN Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

Difluorobenzene (surrogate) recovery = 108%

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-15
SPECTRALYTIX Sample ID: GMI91-004-9103127 Sample Type: Water
Date Sampled : UNKNOWN Date Received: 03/06/91
Date Extracted: 03/11/91 Date Analyzed: 0/14/91

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	27	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	36	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	17	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GMI91-004-9103127

Analyte	Result	Detection Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	23	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	103	10	µg/L
Anthracene	37	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	73	10	µg/L
Pyrene	71	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	38	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	32	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	43	10	µg/L
Benzo(k)fluoranthene	14	10	µg/L
Benzo(a)pyrene	29	10	µg/L
Indeno(1,2,3-cd)pyrene	17	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	13	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-15
SPECTRALYTIX Sample ID: GMI91-004-9103127 Sample Type: Water
Date Sampled : UNKNOWN Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Cyanide, Total	0.33	0.01	mg/L
Cyanide, Free	0.05	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

Total Metals

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-15
SPECTRALYTIX Sample ID: GMI91-004-9103127 Sample Type: Water
Date Sampled : UNKNOWN Date Received: 03/06/91

Analyte	Result	Detection Limit	Units	Method
Arsenic	ND	0.0050	mg/L	7060
Chromium	ND	0.0050	mg/L	6010
Lead	ND	0.0050	mg/L	6010

ND = Not detected at or above the listed detection limit.

PFE

ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: REPLICA #1
SPECTRALYTIX Sample ID: GMI91-004-9103128 Sample Type: Water
Date Sampled : UNKNOWN Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

Difluorobenzene (surrogate) recovery = 66%

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: REPLICA #1
SPECTRALYTIX Sample ID: GMI91-004-9103128 Sample Type: Water
Date Sampled : UNKNOWN Date Received: 03/06/91
Date Extracted: 03/11/91 Date Analyzed: 03/14/91

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GMI91-004-9103128

Analyte	Result	Detection Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	12	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: REPLICA #1
SPECTRALYTIX Sample ID: GMI91-004-9103128 Sample Type: Water
Date Sampled : UNKNOWN Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Cyanide, Total	0.35	0.01	mg/L
Cyanide, Free	0.03	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

Total Metals

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: REPLICA #1
SPECTRALYTIX Sample ID: GMI91-004-9103128 Sample Type: Water
Date Sampled : UNKNOWN Date Received: 03/06/91

Analyte	Result	Detection Limit	Units	Method
Arsenic	ND	0.0050	mg/L	7060
Chromium	ND	0.0050	mg/L	6010
Lead	ND	0.0050	mg/L	6010

ND = Not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: TRIP BLANK
SPECTRALYTIX Sample ID: GMI91-004-910329 Sample Type: Water
Date Sampled : UNKNOWN Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

Difluorobenzene (surrogate) recovery = 70%

ND = Compound not detected at or above the listed detection limit.

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-20
SPECTRALYTIX Sample ID: GMI91-004-9103130 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

Difluorobenzene (surrogate) recovery = 60%

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (RED)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-20
SPECTRALYTIX Sample ID: GMI91-004-9103130 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91
Date Extracted: 03/11/91 Date Analyzed: 03/13/91

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GMI91-004-9103130

Analyte	Result	Detection Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-20
SPECTRALYTIX Sample ID: GMI91-004-9103130 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Cyanide, Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

Total Metals

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-20
SPECTRALYTIX Sample ID: GMI91-004-9103130 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91

Analyte	Result	Detection Limit	Units	Method
Arsenic	0.0055	0.0050	mg/L	7060
Chromium	ND	0.0050	mg/L	6010
Lead	ND	0.0050	mg/L	6010

ND = Not detected at or above the listed detection limit.

PFE ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-20 B
SPECTRALYTIX Sample ID: GMI91-004-9103131 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1 u J	µg/L
Toluene	ND	1 u J	µg/L
Ethylbenzene	ND	1 u J	µg/L
Total Xylenes	ND	1 u J	µg/L

Difluorobenzene (surrogate) recovery = 46%

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-20 B
SPECTRALYTIX Sample ID: GMI91-004-9103131 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91
Date Extracted: 03/11/91 Date Analyzed: 03/14/91

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GMI91-004-9103131

Analyte	Result	Detection Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-20 B
SPECTRALYTIX Sample ID: GMI91-004-9103131 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Cyanide, Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

Total Metals

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: MW-20 B
SPECTRALYTIX Sample ID: GMI91-004-9103131 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91

Analyte	Result	Detection Limit	Units	Method
Arsenic	ND	0.0050	mg/L	7060
Chromium	ND	0.0050	mg/L	6010
Lead	ND	0.0050	mg/L	6010

ND = Not detected at or above the listed detection limit.

PFE ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: OW-1
SPECTRALYTIX Sample ID: GMI91-004-9103132 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

Difluorobenzene (surrogate) recovery = 92%

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: OW-1
SPECTRALYTIX Sample ID: GMI91-004-9103132 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91
Date Extracted: 03/11/91 Date Analyzed: 03/14/91

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	71	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	11	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	53	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	38	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (RED)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GMI91-004-9103132

Analyte	Result	Detection Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	32	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	127	10	µg/L
Anthracene	46	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	92	10	µg/L
Pyrene	73	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	39	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	34	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	44	10	µg/L
Benzo(k)fluoranthene	12	10	µg/L
Benzo(a)pyrene	29	10	µg/L
Indeno(1,2,3-cd)pyrene	14	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	12	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: OW-1
SPECTRALYTIX Sample I1: GMI91-004-9103132 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91

Analyte	Result	Detection Limit	Units
Cyanide, Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

Total Metals

Client: GERAGHTY & MILLER/MD057.05, NORFOLK VA
Client Sample ID: OW-1
SPECTRALYTIX Sample ID: GMI91-004-9103132 Sample Type: Water
Date Sampled : 03/05/91 Date Received: 03/06/91

Analyte	Result	Detection Limit	Units	Method
Arsenic	ND	0.0050	mg/L	7060
Chromium	ND	0.0050	mg/L	6010
Lead	ND	0.0050	mg/L	6010

ND = Not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

Quality Assurance
BTEX - EPA Method 8020
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER
SPECTRALYTIX Project ID: GMI91-004 Sample ID: 9103133 MS/MSD
Date Analyzed: 03/13/91

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Benzene	50	ND	40	81	73-129
Toluene	50	ND	43	85	65-137
Ethylbenzene	50	ND	42	84	80-119
Xylenes	150	ND	129	86	45-132
DFB (Surrogate)	50	NA	56	111	55-126

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Benzene	50	38	76	6	*	73-129
Toluene	50	40	80	6	*	65-137
Ethylbenzene	50	40	80	5	*	80-119
Xylenes	150	123	82	5	*	45-132
DFB (Surrogate)	50	49	98	12	*	55-126

BLANK = ND for all compounds

BTEX Standard from Ultra Scientific Lot No. D-0710
DFB (Surrogate) from Suplo Lot No. LA21149

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

* RPD limits have not been established for these compounds.

PFE ORIGINAL (B-81)

Quality Assurance
BTEX - EPA Method 8020
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER
SPECTRALYTIX Project ID: GMI91-004 Sample Type: Reagent Water
Date Analyzed: 03/13/91

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Benzene	50	ND	55	110	73-129
Toluene	50	ND	57	114	65-137
Ethylbenzene	50	ND	57	114	80-119
Xylenes	150	ND	172	115	45-132
DFB (Surrogate)	50	NA	59	118	55-126

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Benzene	50	55	110	0	*	73-129
Toluene	50	57	114	0	*	65-137
Ethylbenzene	50	56	112	2	*	80-119
Xylenes	150	169	113	2	*	45-132
DFB (Surrogate)	50	60	120	2	*	55-126

BLANK = ND for all compounds

BTEX Standard from Ultra Scientific Lot No. D-0710
DFB (Surrogate) from Suplo Lot No. LA21149

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

* RPD limits have not been established for these compounds.

PFE
ORIGINAL
ORIGINAL
(Red)

Quality Assurance
Semivolatile Organics - EPA Method 8270/625
Surrogate Recoveries

Client: GERAGHTY & MILLER
SPECTRALYTIX ID: GMI91-004 Sample Type: Water

	Blank Reagent Water	MS Sample 9103133	MSD Sample 9103133	Sample # 9103127	Sample # 9103128
2-Florophenol	41	66	65	37	44
Phenol-D5	35	59	60	33	36
2,4,6-Tribromophenol	69	71	65	50	74
Nitrobenzene	60	62	60	60	64
2-Fluorobiphenyl	60	60	56	54	66
Terphenyl-D14	68	112	90	58	74

	Sample # 9103130	Sample # 9103131	Sample # 9103132	Reagent Water MS
2-Florophenol	45	44	40	61
Phenol-D5	39	40	38	56
2,4,6-Tribromophenol	61	73	55	62
Nitrobenzene	62	60	50	58
2-Fluorobiphenyl	62	64	48	58
Terphenyl-D14	72	70	48	100

Blank showed ND for all components.

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

PFE ORIGINAL (Red)

Quality Assurance
Semivolatile Organics - EPA Method 8270/625
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER
SPECTRALYTIX Project ID: GMI91-004 Sample ID: 9103133
Date Analyzed: 03/19/91

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Phenol	100	ND	64	64	12-89
2-Chlorophenol	100	ND	70	70	27-123
1,4-Dichlorobenzene	50	ND	28	56	36-97
Di-n-propylnitrosamine	50	ND	27	54	41-116
1,2,4-Trichlorobenzene	50	ND	26	52	39-98
4-Chloro-3-methylphenol	100	ND	79	79	23-97
Acenaphthene	50	ND	29	58	46-118
4-Nitrophenol	100	ND	54	54	10-80
2,4-Dinitrotoluene	50	ND	27	54	24-96
Pentachlorophenol	100	ND	69	69	9-103
Pyrene	50	ND	49	97	26-127

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	100	62	62	3	42	12-89
2-Chlorophenol	100	71	71	1	40	27-123
1,4-Dichlorobenzene	50	27	54	4	28	36-97
Di-n-propylnitrosamine	50	28	56	4	38	41-116
1,2,4-Trichlorobenzene	50	26	52	0	28	39-98
4-Chloro-3-methylphenol	100	78	78	1	42	23-97
Acenaphthene	50	29	58	0	31	46-118
4-Nitrophenol	100	46	46	16	50	10-80
2,4-Dinitrotoluene	50	25	50	8	38	24-96
Pentachlorophenol	100	59	59	16	50	9-103
Pyrene	50	35	70	32	31	26-127

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

PFE ORIGINAL (Red)

Quality Assurance
Semivolatile Organics - EPA Method 8270/625
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER
SPECTRALYTIX Project ID: GMI91-004 Sample Type: Reagent Water
Date Analyzed: 03/19/91

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Phenol	100	ND	66	66	12-89
2-Chlorophenol	100	ND	72	72	27-123
1,4-Dichlorobenzene	50	ND	27	54	36-97
Di-n-propylnitrosamine	50	ND	27	54	41-116
1,2,4-Trichlorobenzene	50	ND	26	52	39-98
4-Chloro-3-methylphenol	100	ND	75	75	23-97
Acenaphthene	50	ND	29	58	46-118
4-Nitrophenol	100	ND	61	61	10-80
2,4-Dinitrotoluene	50	ND	27	54	24-96
Pentachlorophenol	100	ND	74	74	9-103
Pyrene	50	ND	73	146	26-127

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

PFE ORIGINAL (Red)

METALS QA/QC REPORT

Client: GERAGHTY & MILLER
Spectralytix Project GMI91-004

ANALYTE	METHOD BLANK	QC% (LCS)	ICV%	SPIKE % REC	RPD
Arsenic	ND	109%	92%	115%	2
Lot # 6919-04					
Spike Value = 0.0394					
Spike True Value = 0.0300					
Chromium	ND	82%	96%	79%	0
Lot # 6926-04					
Spike Value = 0.0079					
Spike True Value = 0.0100					
Lead	ND	103%	105%	79%	0
Lot # 6930-01					
Spike Value = 0.0158					
Spike True Value = 0.0200					

PFE ORIGINAL

CYANIDE QA/QC REPORT

Client: GERAGHTY & MILLER
Spectralytix Project GMI91-004

ANALYTE	METHOD BLANK	QC% (LCS)	SPIKE % REC	RPD
Cyanide, Total	ND	93.39%	89.98%	0
Lot # 851058				
Spike Value = 35.93				
Spike True Value = 40				
Cyanide, Free	ND	100.7%	102%	0
Lot # 851058				
Spike Value = 40.8				
Spike True Value = 40				

PEF
ORIGINAL
ORIGINAL

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PFE

ORIG.ORIGINAL (Red/Red)

Spectralytix
ENVIRONMENTAL & ANALYTICAL SERVICES

November 8, 1990

Ms. Laurie Haines
Geraghty & Miller, Inc.
180 Admiral Cochrane Drive
Suite 300
Annapolis, MD 21401

Dear Ms. Haines:

Enclosed are the results for the analysis of seven water samples submitted for various analytical procedures.

We are pleased to have been afforded the opportunity to provide your firm with analytical services. Please feel free to call me if you have any questions about these results.

Sincerely,

Joseph E. Peters

Joseph E. Peters
Project Manager

Spectralytix Project #GM013

BTEX
EPA Method 602

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-16
SPECTRALYTIX Sample ID: GM013-010431 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Signed)

Lead, Arsenic and Chromium

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-16
SPECTRALYTIX Sample ID: GM013-010431 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Lead	ND	0.05	mg/L
Arsenic	0.007	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-16
SPECTRALYTIX Sample ID: GM013-010431 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Cyanide (CN)	ND	10	µg/L
Free Cyanide	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PEE ORIGINAL

BTEX
EPA Method 602

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-17
SPECTRALYTIX Sample ID: GM013-010432 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-17
SPECTRALYTIX Sample ID: GM013-010432 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90
Date Analyzed: 11/04/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

Lead, Arsenic and Chromium

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-17
SPECTRALYTIX Sample ID: GM013-010432 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Lead	0.06	0.05	mg/L
Arsenic	ND	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-17
SPECTRALYTIX Sample ID: GM013-010432 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Cyanide (CN)	ND	10	µg/L
Free Cyanide	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

BTEX
EPA Method 602

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-18
SPECTRALYTIX Sample ID: GM013-010433 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red) ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-18
SPECTRALYTIX Sample ID: GM013-010433 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90
Date Analyzed: 11/04/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM013-010433

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

Lead, Arsenic and Chromium

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-18
SPECTRALYTIX Sample ID: GM013-010433 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Lead	ND	0.05	mg/L
Arsenic	0.030	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red) ORIGINAL Red

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-18
SPECTRALYTIX Sample ID: GM013-010433 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Cyanide (CN)	ND	10	µg/L
Free Cyanide	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

BTEX
EPA Method 602

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-19
SPECTRALYTIX Sample ID: GM013-010434 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-19
SPECTRALYTIX Sample ID: GM013-010434 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/25/90
Date Analyzed: 11/04/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM013-010434

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

Lead, Arsenic and Chromium

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-19
SPECTRALYTIX Sample ID: GM013-010434 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Lead	ND	0.05	mg/L
Arsenic	ND	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-19
SPECTRALYTIX Sample ID: GM013-010434 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Cyanide (CN)	ND	10	µg/L
Free Cyanide	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

BTEX
EPA Method 602

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-19B
SPECTRALYTIX Sample ID: GM013-010435 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-19B
SPECTRALYTIX Sample ID: GM013-010435 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90
Date Analyzed: 11/04/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
ORIGINAL
(Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM013-010435

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

Lead, Arsenic and Chromium

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-19B
SPECTRALYTIX Sample ID: GM013-010435 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Lead	ND	0.05	mg/L
Arsenic	0.005	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-19B
SPECTRALYTIX Sample ID: GM013-010435 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Cyanide (CN)	ND	10	µg/L
Free Cyanide	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PEE ORIGINAL

BTEX
EPA Method 602

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-20
SPECTRALYTIX Sample ID: GM013-010436 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-20
SPECTRALYTIX Sample ID: GM013-010436 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90
Date Analyzed: 11/04/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM013-010436

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

Lead, Arsenic and Chromium

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-20
SPECTRALYTIX Sample ID: GM013-010436 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Lead	ND	0.05	mg/L
Arsenic	0.011	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-20
SPECTRALYTIX Sample ID: GM013-010436 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Cyanide (CN)	ND	20	µg/L
Free Cyanide	ND	20	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL

BTEX
EPA Method 602

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: TRIP BLANK
SPECTRALYTIX Sample ID: GM013-010437 Sample Type: Water
Date Sampled : 10/24/90 Date Received: 10/25/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (RED)

Quality Assurance
BTEX - EPA Method 8020
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: REAGENT WATER MS
SPECTRALYTIX Sample ID: REAGENT WATER MS Sample Type: Water
Date Sampled : 11/01/90 Date Received: 10/25/90
Date Analyzed: 11/01/90

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Benzene	50	ND	50.4	101	73-129
Toluene	50	ND	49.7	100	65-137
Ethylbenzene	50	ND	48.3	97	80-119
Xylenes	150	ND	143.3	96	45-132

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Benzene	50	50.0	100	1	*	73-129
Toluene	50	49.4	99	1	*	65-137
Ethylbenzene	50	48.4	97	0	*	80-119
Xylenes	150	144.1	96	0	*	45-132

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

* RPD limits have not been established for these compounds.

Quality Assurance
Semivolatile Organics - EPA Method 8270/625
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER/NORFOLK VA
SPECTRALYTIX ID: GM013
Date Sampled : 10/24/90
Date Analyzed: 11/03/90

Sample Type: Water
Date Received: 10/24/90

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Phenol	200	ND	156	78	12-89
2-Chlorophenol	200	ND	182	91	27-123
1,4-Dichlorobenzene	100	ND	56	56	36-97
Di-n-propylnitrosamine	100	ND	68	68	41-116
1,2,4-Trichlorobenzene	100	ND	60	60	39-98
4-Chloro-3-methylphenol	200	ND	186	93	23-97
Acenaphthene	100	ND	77	77	46-118
4-Nitrophenol	200	ND	120	60	10-80
2,4-Dinitrotoluene	100	ND	63	63	24-96
Pentachlorophenol	200	ND	108	54	9-103
Pyrene	100	ND	75	75	26-127

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	200	135	68	14	42	12-89
2-Chlorophenol	200	144	72	23	40	27-123
1,4-Dichlorobenzene	100	66	66	16	28	36-97
Di-n-propylnitrosamine	100	51	51	28	38	41-116
1,2,4-Trichlorobenzene	100	47	47	24	28	39-98
4-Chloro-3-methylphenol	200	157	78	17	42	23-97
Acenaphthene	100	70	70	9	31	46-118
4-Nitrophenol	200	107	54	11	50	10-80
2,4-Dinitrotoluene	100	58	58	8	38	24-96
Pentachlorophenol	200	148	74	31	50	9-103
Pyrene	100	73	73	4	31	26-127

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

QA/QC Summary Various Analyses

Client: GERAGHTY & MILLER/NORFOLK VA
SPECTRALYTIX Project ID: GM013

Analyte	QC Recovery (%)	Duplicate RPD (%)	Spike Recovery (%)
Arsenic	114	0	117
Chromium	87	0	101
Lead	90	0	98
Cyanide, total	110	0	94
Cyanide, free	110	0	94

	QC Limits (%)
QC Recovery	80-120
Sample Duplicate RPD	< 30
Sample Spike Recovery	75-125
Check Standard	90-110

RPD = Relative Percent Difference
N/A = Not Applicable
QC = Laboratory Quality Control

GERAGHTY & MILLER, INC.
Environmental Services

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number 057-03

Project Location Norfolk, Va.

Laboratory Spectralytics

Sampler(s) J. Petersen
DPO

SAMPLE IDENTITY	Date Sampled	1 L. amber glass (CN)*	1 L. amber glass (BNA 625)	500 ml. plastic (metals)**	VOA vials (VOA-6)							TOTAL
MW-13B	10/26	1	1	1	2							5
MW-4B	"	1	1	1	2							5
MW-4	"	1	1	1	2							5
Field Blank	"	1	1	1	2							5
Trip Blank	"				1							1
											Total No. of Bottles/ Containers	21

Relinquished by: James Petersen	Organization: Geraghty + Miller	Date 10/26/0	Time 5:00 p.	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: * Cyanide (CN) samples must be preserved in the lab upon arrival of NaOH @ Lab
** Metals samples must be filtered & preserved (HNO3) upon arrival @ Lab.

Delivery Method: ☐ In Person ☒ Common Carrier Fed-X (SPECIFY) ☐ Lab Courier ☐ Other _____ (SPECIFY)

ORIGINAL

GERAGHTY & MILLER, INC.
Environmental Services

CHAIN-OF-CUSTODY RECORD

Project Number MP057.03

Project Location Norfolk VA

Laboratory Spectralytrix

Sampler(s) T. Owsiany
D. Odell

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Date Sampled	40 ml glass VOA	1 liter amber glass	500 ml plastic w/ HNO3								TOTAL
MW-16	10-29-90	2	2	1								5
MW-17	↓	2	2	1								5
MW-18		2	2	1								5
MW-19		2	2	1								5
MW-19B		2	2	1								5
MW-20		2	2	1								5
Trip Blank 1		1										1

Total No. of Bottles/ Containers: 31

Relinquished by: John Owsiany	Organization: Geraghty & Miller Inc.	Date 10/24/90	Time 6:03 PM	Seal Intact? (Yes) No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: Cyanide Sample must Be Preserved By Lab Upon Arrival, w/ NaOH
See Task Order # 101790

Delivery Method: ☐ In Person ☒ Common Carrier Federal Express (SPECIFY) ☐ Lab Courier ☐ Other _____ (SPECIFY)

Southpoint 89 1951

PFE
GERAGHTY & MILLER ORIGINAL (Red)

Spectralytix
ENVIRONMENTAL & ANALYTICAL SERVICES

November 19, 1990

Mr. Kurt Kramer
Geraghty & Miller, Inc.
180 Admiral Cochrane Drive
Suite 300
Annapolis, MD 21401

Dear Mr. Kramer:

Enclosed are the results for the analysis of six water samples and associated trip and field blanks submitted for various analytical procedures.

We are pleased to have been afforded the opportunity to provide your firm with analytical services. Please feel free to call me if you have any questions about these results.

Sincerely,

Joseph E. Peters

Joseph E. Peters
Project Manager

Spectralytix Project #GM014

PFE ORIGINAL (Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: ~~MW-1~~ OW-1
SPECTRALYTIX Sample ID: GM014-010478 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Benzene	ND	20	µg/L
Toluene	ND	20	µg/L
Ethylbenzene	ND	20	µg/L
Total Xylenes	ND	20	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: ~~MW-1~~ OW-1
SPECTRALYTIX Sample ID: GM014-010478 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90
Date Analyzed: 11/07/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	92	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	22	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	82	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	60	10	µg/L

ND = Compound not detected at or above the listed detection limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM014-010478

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	56	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	240	10	µg/L
Anthracene	110	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	230	10	µg/L
Pyrene	210	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	120	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	110	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	120	10	µg/L
Benzo(k)fluoranthene	42	10	µg/L
Benzo(a)pyrene	170	10	µg/L
Indeno(1,2,3-cd)pyrene	50	10	µg/L
Dibenz(a,h)anthracene	14	10	µg/L
Benzo(g,h,i)perylene	42	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

Total Lead, Chromium and Arsenic

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: ~~MW-1~~ OW-1
SPECTRALYTIX Sample ID: GM014-010478 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Lead	0.13	0.05	mg/L
Arsenic	ND	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: ~~MW-1~~ OW-1
SPECTRALYTIX Sample ID: GM014-010478 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Cyanide, Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-12
SPECTRALYTIX Sample ID: GM014-010479 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Benzene	ND	10	µg/L
Toluene	97	10	µg/L
Ethylbenzene	ND	10	µg/L
Total Xylenes	230	10	µg/L

ND = Compound not detected at or above the listed detection limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-12
SPECTRALYTIX Sample ID: GM014-010479 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90
Date Analyzed: 11/07/90

Analyte	Result	Detection Limit	Units
Phenol	46	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	200	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	82	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	88	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM014-010479

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	54	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	170	10	µg/L
Anthracene	54	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	60	10	µg/L
Pyrene	80	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	40	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	38	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	36	10	µg/L
Benzo(k)fluoranthene	14	10	µg/L
Benzo(a)pyrene	60	10	µg/L
Indeno(1,2,3-cd)pyrene	16	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	14	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red/Red)

Total Lead, Chromium and Arsenic

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-12
SPECTRALYTIX Sample ID: GM014-010479 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Lead	ND	0.05	mg/L
Arsenic	ND	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
Original
(Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-12
SPECTRALYTIX Sample ID: GM014-010479 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Cyanide,Total	1.7	0.01	mg/L
Cyanide, Free	0.78	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PEF ORIGINAL (Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-13
SPECTRALYTIX Sample ID: GM014-010480 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Benzene	1600	40	µg/L
Toluene	ND	40	µg/L
Ethylbenzene	1400	40	µg/L
Total Xylenes	190	40	µg/L

ND = Compound not detected at or above the listed detection limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-13
SPECTRALYTIX Sample ID: GM014-010480 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90
Date Analyzed: 11/07/90

Analyte	Result	Detection Limit	Units
Phenol	17	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	12	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	570	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	160	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	130	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM014-010480

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	130	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	62	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	120	10	µg/L
Anthracene	34	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	40	10	µg/L
Pyrene	50	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	22	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	20	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	16	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	30	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

Total Lead, Chromium and Arsenic

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-13
SPECTRALYTIX Sample ID: GM014-010480 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Lead	0.08	0.05	mg/L
Arsenic	0.007	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-13
SPECTRALYTIX Sample ID: GM014-010480 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Cyanide,Total	0.53	0.01	mg/L
Cyanide, Free	0.30	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-14
SPECTRALYTIX Sample ID: GM014-010481 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Benzene	8300	40	µg/L
Toluene	ND	40	µg/L
Ethylbenzene	1600	40	µg/L
Total Xylenes	ND	40	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-14
SPECTRALYTIX Sample ID: GM014-010481 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90
Date Analyzed: 11/07/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	360	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	110	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	36	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	270	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	38	10	µg/L

ND = Compound not detected at or above the listed detection limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM014-010481

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	150	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	280	10	µg/L
Anthracene	100	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	140	10	µg/L
Pyrene	170	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	90	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	90	10	µg/L
Benzo(k)fluoranthene	40	10	µg/L
Benzo(a)pyrene	140	10	µg/L
Indeno(1,2,3-cd)pyrene	40	10	µg/L
Dibenz(a,h)anthracene	10	10	µg/L
Benzo(g,h,i)perylene	40	10	µg/L

ND = Compound not detected at or above the listed detection limit.

FILE ORIGINAL

Total Lead, Chromium and Arsenic

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-14
SPECTRALYTIX Sample ID: GM014-010481 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Lead	0.05	0.05	mg/L
Arsenic	0.012	0.005	mg/L
Chromium	0.020	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-14
SPECTRALYTIX Sample ID: GM014-010481 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Cyanide,Total	0.53	0.01	mg/L
Cyanide, Free	0.21	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-15
SPECTRALYTIX Sample ID: GM014-010482 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-15
SPECTRALYTIX Sample ID: GM014-010482 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90
Date Analyzed: 11/07/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	20	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM014-010482

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	30	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	12	10	µg/L
Pyrene	12	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

Total Lead, Chromium and Arsenic

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-15
SPECTRALYTIX Sample ID: GM014-010482 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Lead	0.26	0.05	mg/L
Arsenic	0.008	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-15
SPECTRALYTIX Sample ID: GM014-010482 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Cyanide,Total	0.52	0.01	mg/L
Cyanide, Free	0.31	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-20B
SPECTRALYTIX Sample ID: GM014-010483 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (RED)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-20B
SPECTRALYTIX Sample ID: GM014-010483 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90
Date Analyzed: 11/07/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	14	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM014-010483

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

Total Lead, Chromium and Arsenic

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-20B
SPECTRALYTIX Sample ID: GM014-010483 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Lead	ND	0.05	mg/L
Arsenic	ND	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-20B
SPECTRALYTIX Sample ID: GM014-010483 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Cyanide,Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: TRIP BLANK
SPECTRALYTIX Sample ID: GM014-010484 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: FIELD BLANK
SPECTRALYTIX Sample ID: GM014-010485 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	10	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PEF ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: FIELD BLANK
SPECTRALYTIX Sample ID: GM014-010485 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90
Date Analyzed: 11/06/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	14	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM014-010485

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL

Total Lead, Chromium and Arsenic

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: FIELD BLANK
SPECTRALYTIX Sample ID: GM014-010485 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Lead	0.05	0.05	mg/L
Arsenic	ND	0.005	mg/L
Chromium	ND	0.020	mg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: FIELD BLANK
SPECTRALYTIX Sample ID: GM014-010485 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90

Analyte	Result	Detection Limit	Units
Cyanide,Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL (Red)

Quality Assurance
BTEX - EPA Method 8020
Matrix Spike Recovery and Precision

Client:GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: REAGENT WATER MS
SPECTRALYTIX Sample ID: REAGENT WATER MS Sample Type: Water
Date Sampled :11/01/90 Date Received: 10/25/90
Date Analyzed: 11/01/90

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Benzene	50	ND	50.4	101	73-129
Toluene	50	ND	49.7	100	65-137
Ethylbenzene	50	ND	48.3	97	80-119
Xylenes	150	ND	143.3	96	45-132

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Benzene	50	50.0	100	1	*	73-129
Toluene	50	49.4	99	1	*	65-137
Ethylbenzene	50	48.4	97	0	*	80-119
Xylenes	150	144.1	96	0	*	45-132

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

* RPD limits have not been established for these compounds.

PFE ORIGINAL (Red)

Quality Assurance
Semivolatile Organics - EPA Method 8270/625
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER/NORFOLK VA
SPECTRALYTIX ID: GM014 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90
Date Analyzed: 11/03/90

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Phenol	200	ND	156	78	12-89
2-Chlorophenol	200	ND	182	91	27-123
1,4-Dichlorobenzene	100	ND	56	56	36-97
Di-n-propylnitrosamine	100	ND	68	68	41-116
1,2,4-Trichlorobenzene	100	ND	60	60	39-98
4-Chloro-3-methylphenol	200	ND	186	93	23-97
Acenaphthene	100	ND	77	77	46-118
4-Nitrophenol	200	ND	120	60	10-80
2,4-Dinitrotoluene	100	ND	63	63	24-96
Pentachlorophenol	200	ND	108	54	9-103
Pyrene	100	ND	75	75	26-127

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	200	135	68	14	42	12-89
2-Chlorophenol	200	144	72	23	40	27-123
1,4-Dichlorobenzene	100	66	66	16	28	36-97
Di-n-propylnitrosamine	100	51	51	28	38	41-116
1,2,4-Trichlorobenzene	100	47	47	24	28	39-98
4-Chloro-3-methylphenol	200	157	78	17	42	23-97
Acenaphthene	100	70	70	9	31	46-118
4-Nitrophenol	200	107	54	11	50	10-80
2,4-Dinitrotoluene	100	58	58	8	38	24-96
Pentachlorophenol	200	148	74	31	50	9-103
Pyrene	100	73	73	4	31	26-127

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

PFE
ORIGINAL
(RED)

Metals QA/QC Report

Client: GERAGHTY & MILLER/NORFOLK VA
Spectralytix Project: GM014

ANALYSIS	QC REC %	DUP REC	RPD	SPIKE % REC
Arsenic	114	0		117
Chromium	95	0		106
Lead	100	33		115

PEE
ORIGINAL
(Red)

QA/QC Summary Cyanide

Client: GERAGHTY & MILLER/NORFOLK VA
SPECTRALYTIX Project ID: GM014

Analyte	QC Recovery (%)	Duplicate RPD (%)	Spike Recovery (%)
Cyanide, Total	102	5	94
Cyanide, Free	102	5	94

	QC Limits (%)
QC Recovery	80-120
Sample Duplicate RPD	< 30
Sample Spike Recovery	75-125
Check Standard	90-110

RPD = Relative Percent Difference
N/A = Not Applicable
QC = Laboratory Quality Control

GARAGHTY & MILLER, INC.
Environmental Services

Little Cooler

Page 1 of 1

CHAIN-OF-CUSTODY RECORD

Project Number 057.03

Project Location Norfolk, Va

Laboratory [illegible]

Sampler(s) JP
[illegible]

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Date Sampled	1 L. amber (CN)	1 L. Amber (BNA-625)	500 ml.	(metals)-Preserved HNO_3 VOA Vials (VOA-602)							TOTAL
MW-14	10/25	1	1	1	2							5
MW-13	10/25	1	1	1	2							5
Trip Blank	"				1							1
MW-12	"	1	1	1	2							5

Total No. of Bottles/ Containers 116

Relinquished by: J Petersen	Organization: Garaghty & Miller	Date 10/25/90	Time 6:30 p	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization: [signature]	Date 10/26/90	Time 1330	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: Cyanide (CN) samples must be preserved in the Lab upon Arrival w/ NaOH

Delivery Method: ☐ In Person ☒ Common Carrier Fed-X (SPECIFY) ☐ Lab Courier ☐ Other (SPECIFY)

G&M Form 09 12 88

PFE

GERAGHTY & MILLER, INC.
Environmental Services

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number [illegible]

Project Location [illegible]

Laboratory Spectrolytics

Sampler(s) JP
DPC

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Date Sampled	1 L. amber (CN)	1 L. amber (BNA-625)	500 ml plastic (metals) - HNO3 Pres.	VOA Vials (VOA-602)							TOTAL
MW-15	10/25	1	1	1	2							5
MW-1	"	1	1	1	2							5
Replicate	"	1	1	1	2							5
MW-20B	"	1	1	1	2							5
Field Blank	"	1	1	1	2							5
Trip Blank	"	0	0	0	1							1

Total No. of Bottles/ Containers 26

Relinquished by: J Peterson	Organization: Geraghty & Miller	Date 10/25/90	Time 6:30 p	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization: [signature]	Date 10/26/90	Time 1330	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: Cyanide must be preserved in the lab upon arrival - NaOH.

Delivery Method: ☐ In Person ☒ Common Carrier Fed-X (SPECIFY) ☐ Lab Courier ☐ Other _____ (SPECIFY)

G&M Form 09 12 88

PEE
ORIGINAL
(Red)

PFE
ORIGINAL

Spectralytix
ENVIRONMENTAL & ANALYTICAL SERVICES

November 19, 1990

Mr. Kurt Kramer
Geraghty & Miller, Inc.
180 Admiral Cochrane Drive
Suite 300
Annapolis, MD 21401

Dear Mr. Kramer:

Enclosed are the results for the analysis of three water samples and associated trip and field blanks submitted for various analytical procedures.

We are pleased to have been afforded the opportunity to provide your firm with analytical services. Please feel free to call me if you have any questions about these results.

Sincerely,

Joseph E. Peters

Joseph E. Peters
Project Manager

Spectralytix Project #GM015

PEE
ORIGINAL
ORIGINAL
(Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-13B
SPECTRALYTIX Sample ID: GM015-010509 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90
Date Analyzed: 10/30/90

Analyte	Result	Detection Limit	Units
Benzene	48,000	400	µg/L
Toluene	15,000	400	µg/L
Ethylbenzene	19,000	400	µg/L
Total Xylenes	24,000	400	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-13B
SPECTRALYTIX Sample ID: GM015-010509 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90
Date Analyzed: 11/07/90

Analyte	Result	Detection Limit	Units
Phenol	ND	240	µg/L
Bis(2-Chloroethyl) Ether	ND	240	µg/L
2-Chlorophenol	ND	240	µg/L
1,3-Dichlorobenzene	ND	240	µg/L
1,4-Dichlorobenzene	ND	240	µg/L
Benzyl Alcohol	ND	240	µg/L
1,2-Dichlorobenzene	ND	240	µg/L
2-Methylphenol	ND	240	µg/L
Bis(2-Chloroisopropyl) Ether	ND	240	µg/L
4-Methylphenol	ND	240	µg/L
N-Nitroso-di-n-propylamine	ND	240	µg/L
Hexachloroethane	ND	240	µg/L
Nitrobenzene	ND	240	µg/L
Isophorone	ND	240	µg/L
2-Nitrophenol	ND	240	µg/L
2,4-Dimethylphenol	ND	240	µg/L
Benzoic Acid	ND	240	µg/L
Bis(2-Chloroethoxy)methane	ND	240	µg/L
2,4-Dichlorophenol	ND	240	µg/L
1,2,4-Trichlorobenzene	ND	240	µg/L
Naphthalene	320,000	4800	µg/L
4-Chloroaniline	ND	240	µg/L
Hexachlorobutadiene	ND	240	µg/L
4-Chloro-3-methylphenol	ND	240	µg/L
2-Methylnaphthalene	220,000	4800	µg/L
Hexachlorocyclopentadiene	ND	240	µg/L
2,4,6-Trichlorophenol	ND	240	µg/L
2,4,5-Trichlorophenol	ND	240	µg/L
2-Chloronaphthalene	ND	240	µg/L
2-Nitroaniline	ND	240	µg/L
Dimethyl Phthalate	ND	240	µg/L
Acenaphthylene	9,000	240	µg/L
3-Nitroaniline	ND	240	µg/L
Acenaphthene	47,000	240	µg/L
2,4-Dinitrophenol	ND	240	µg/L
4-Nitrophenol	ND	240	µg/L
Dibenzofuran	4,500	240	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM015-010509

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	240	µg/L
2,6-Dinitrotoluene	ND	240	µg/L
Diethyl Phthalate	ND	240	µg/L
4-Chlorophenyl Phenyl Ether	ND	240	µg/L
Fluorene	34,000	240	µg/L
4-Nitroaniline	ND	240	µg/L
4,6-Dinitro-2-methylphenol	ND	240	µg/L
N-Nitrosodiphenylamine	ND	240	µg/L
4-Bromophenyl Phenyl Ether	ND	240	µg/L
Hexachlorobenzene	ND	240	µg/L
Pentachlorophenol	ND	240	µg/L
Phenanthrene	130,000	4800	µg/L
Anthracene	29,000	240	µg/L
Di-n-butyl Phthalate	ND	240	µg/L
Fluoranthene	28,000	240	µg/L
Pyrene	40,000	240	µg/L
Butylbenzyl Phthalate	ND	240	µg/L
3,3'-Dichlorobenzidene	ND	240	µg/L
Benzo(a)anthracene	23,000	240	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	240	µg/L
Chrysene	21,000	240	µg/L
Di-n-octyl Phthalate	ND	240	µg/L
Benzo(b)fluoranthene	16,000	240	µg/L
Benzo(k)fluoranthene	5,100	240	µg/L
Benzo(a)pyrene	16,000	240	µg/L
Indeno(1,2,3-cd)pyrene	4,900	240	µg/L
Dibenz(a,h)anthracene	1,800	240	µg/L
Benzo(g,h,i)perylene	5,500	240	µg/L

ND = Compound not detected at or above the listed detection limit.

PEE
ORIGINAL
(Red)

Total Arsenic, Chromium and Lead

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-13B
SPECTRALYTIX Sample ID: GM015-010509 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90

Analyte	Result	Detection Limit	Units
Arsenic	0.013	0.005	mg/L
Chromium	ND	0.020	mg/L
Lead	ND	0.05	mg/L

ND = Compound not detected at or above the listed detection limit.

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-13B
SPECTRALYTIX Sample ID: GM015-010509 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90

Analyte	Result	Detection Limit	Units
Cyanide, Total	0.16	0.01	mg/L
Cyanide, Free	0.10	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

DEE
ORIGINAL
(Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-4B
SPECTRALYTIX Sample ID: GM015-010510 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90
Date Analyzed: 10/30/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-4B
SPECTRALYTIX Sample ID: GM015-010510 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90
Date Analyzed: 11/07/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM015-010510

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (Red)

Total Arsenic, Chromium and Lead

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-4B
SPECTRALYTIX Sample ID: GM015-010510 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90

Analyte	Result	Detection Limit	Units
Arsenic	0.010	0.005	mg/L
Chromium	ND	0.020	mg/L
Lead	ND	0.05	mg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-4B
SPECTRALYTIX Sample ID: GM015-010510 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90

Analyte	Result	Detection Limit	Units
Cyanide, Total	0.19	0.01	mg/L
Cyanide, Free	0.10	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-4
SPECTRALYTIX Sample ID: GM015-010511 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90
Date Analyzed: 10/30/90

Analyte	Result	Detection Limit	Units
Benzene	37,000	100	µg/L
Toluene	13,000	100	µg/L
Ethylbenzene	4,700	100	µg/L
Total Xylenes	10,000	100	µg/L

ND = Compound not detected at or above the listed detection limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-4
SPECTRALYTIX Sample ID: GM015-010511 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90
Date Analyzed: 11/07/90

Analyte	Result	Detection Limit	Units
Phenol	130	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	32	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	32	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	34	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	26	10	µg/L
Benzoic Acid	31	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	3,700	20	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	550	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	68	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	15	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM015-010511

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	31	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	48	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	11	10	µg/L
Pyrene	15	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (Red)

Total Arsenic, Chromium and Lead

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-4
SPECTRALYTIX Sample ID: GM015-010511 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90

Analyte	Result	Detection Limit	Units
Arsenic	0.068	0.005	mg/L
Chromium	0.030	0.020	mg/L
Lead	ND	0.05	mg/L

ND = Compound not detected at or above the listed detection limit.

PEE
ORIGINAL
(Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: MW-4
SPECTRALYTIX Sample ID: GM015-010511 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90

Analyte	Result	Detection Limit	Units
Cyanide, Total	0.68	0.01	mg/L
Cyanide, Free	0.56	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: FIELD BLANK
SPECTRALYTIX Sample ID: GM015-010512 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90
Date Analyzed: 10/30/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

PFE ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: FIELD BLANK
SPECTRALYTIX Sample ID: GM015-010512 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90
Date Analyzed: 11/07/90

Analyte	Result	Detection Limit	Units
Phenol	ND	10	µg/L
Bis(2-Chloroethyl) Ether	ND	10	µg/L
2-Chlorophenol	ND	10	µg/L
1,3-Dichlorobenzene	ND	10	µg/L
1,4-Dichlorobenzene	ND	10	µg/L
Benzyl Alcohol	ND	20	µg/L
1,2-Dichlorobenzene	ND	10	µg/L
2-Methylphenol	ND	10	µg/L
Bis(2-Chloroisopropyl) Ether	ND	10	µg/L
4-Methylphenol	ND	10	µg/L
N-Nitroso-di-n-propylamine	ND	10	µg/L
Hexachloroethane	ND	10	µg/L
Nitrobenzene	ND	10	µg/L
Isophorone	ND	10	µg/L
2-Nitrophenol	ND	10	µg/L
2,4-Dimethylphenol	ND	10	µg/L
Benzoic Acid	ND	50	µg/L
Bis(2-Chloroethoxy)methane	ND	10	µg/L
2,4-Dichlorophenol	ND	10	µg/L
1,2,4-Trichlorobenzene	ND	10	µg/L
Naphthalene	ND	10	µg/L
4-Chloroaniline	ND	20	µg/L
Hexachlorobutadiene	ND	10	µg/L
4-Chloro-3-methylphenol	ND	20	µg/L
2-Methylnaphthalene	ND	10	µg/L
Hexachlorocyclopentadiene	ND	10	µg/L
2,4,6-Trichlorophenol	ND	10	µg/L
2,4,5-Trichlorophenol	ND	10	µg/L
2-Chloronaphthalene	ND	10	µg/L
2-Nitroaniline	ND	50	µg/L
Dimethyl Phthalate	ND	10	µg/L
Acenaphthylene	ND	10	µg/L
3-Nitroaniline	ND	50	µg/L
Acenaphthene	ND	10	µg/L
2,4-Dinitrophenol	ND	50	µg/L
4-Nitrophenol	ND	50	µg/L
Dibenzofuran	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (Red)

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 625
(continued)

SPECTRALYTIX Sample ID: GM015-010512

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	ND	10	µg/L
2,6-Dinitrotoluene	ND	10	µg/L
Diethyl Phthalate	ND	10	µg/L
4-Chlorophenyl Phenyl Ether	ND	10	µg/L
Fluorene	ND	10	µg/L
4-Nitroaniline	ND	50	µg/L
4,6-Dinitro-2-methylphenol	ND	50	µg/L
N-Nitrosodiphenylamine	ND	10	µg/L
4-Bromophenyl Phenyl Ether	ND	10	µg/L
Hexachlorobenzene	ND	10	µg/L
Pentachlorophenol	ND	50	µg/L
Phenanthrene	ND	10	µg/L
Anthracene	ND	10	µg/L
Di-n-butyl Phthalate	ND	10	µg/L
Fluoranthene	ND	10	µg/L
Pyrene	ND	10	µg/L
Butylbenzyl Phthalate	ND	10	µg/L
3,3'-Dichlorobenzidene	ND	20	µg/L
Benzo(a)anthracene	ND	10	µg/L
Bis(2-Ethylhexyl) Phthalate	ND	10	µg/L
Chrysene	ND	10	µg/L
Di-n-octyl Phthalate	ND	10	µg/L
Benzo(b)fluoranthene	ND	10	µg/L
Benzo(k)fluoranthene	ND	10	µg/L
Benzo(a)pyrene	ND	10	µg/L
Indeno(1,2,3-cd)pyrene	ND	10	µg/L
Dibenz(a,h)anthracene	ND	10	µg/L
Benzo(g,h,i)perylene	ND	10	µg/L

ND = Compound not detected at or above the listed detection limit.

PCE
ORIGINAL
(Red)

Total Arsenic, Chromium and Lead

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: FIELD BLANK
SPECTRALYTIX Sample ID: GM015-010512 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90

Analyte	Result	Detection Limit	Units
Arsenic	ND	0.005	mg/L
Chromium	ND	0.020	mg/L
Lead	ND	0.05	mg/L

ND = Compound not detected at or above the listed detection limit.

PFE
ORIGINAL
(Red)

Cyanides
Via EPA Method 335.3

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: FIELD BLANK
SPECTRALYTIX Sample ID: GM015-010512 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90

Analyte	Result	Detection Limit	Units
Cyanide, Total	ND	0.01	mg/L
Cyanide, Free	ND	0.01	mg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL

BTEX
EPA Method 8020 Via EPA Method 8240

Client: GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: TRIP BLANK
SPECTRALYTIX Sample ID: GM015-010513 Sample Type: Water
Date Sampled : 10/26/90 Date Received: 10/27/90
Date Analyzed: 10/30/90

Analyte	Result	Detection Limit	Units
Benzene	ND	1	µg/L
Toluene	ND	1	µg/L
Ethylbenzene	ND	1	µg/L
Total Xylenes	ND	1	µg/L

ND = Compound not detected at or above the listed detection limit.

ORIGINAL (Red)

Quality Assurance
BTEX - EPA Method 8020
Matrix Spike Recovery and Precision

Client:GERAGHTY & MILLER/NORFOLK VA
Client Sample ID: REAGENT WATER MS
SPECTRALYTIX Sample ID:GM015 REAGENT WATER MS Sample Type: Water
Date Sampled :11/01/90 Date Received: 10/25/90
Date Analyzed: 11/01/90

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Benzene	50	ND	50.4	101	73-129
Toluene	50	ND	49.7	100	65-137
Ethylbenzene	50	ND	48.3	97	80-119
Xylenes	150	ND	143.3	96	45-132

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Benzene	50	50.0	100	1	*	73-129
Toluene	50	49.4	99	1	*	65-137
Ethylbenzene	50	48.4	97	0	*	80-119
Xylenes	150	144.1	96	0	*	45-132

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

* RPD limits have not been established for these compounds.

ORIGINAL (Red)

Quality Assurance
Semivolatile Organics - EPA Method 8270/625
Matrix Spike Recovery and Precision

Client: GERAGHTY & MILLER/NORFOLK VA
SPECTRALYTIX ID: GM0154 Sample Type: Water
Date Sampled : 10/25/90 Date Received: 10/26/90
Date Analyzed: 11/03/90

Compound	Spike Added (µg/L)	Sample Conc. (µg/L)	MS Conc. (µg/L)	MS % Rec	QC Limits % Rec
Phenol	200	ND	156	78	12-89
2-Chlorophenol	200	ND	182	91	27-123
1,4-Dichlorobenzene	100	ND	56	56	36-97
Di-n-propylnitrosamine	100	ND	68	68	41-116
1,2,4-Trichlorobenzene	100	ND	60	60	39-98
4-Chloro-3-methylphenol	200	ND	186	93	23-97
Acenaphthene	100	ND	77	77	46-118
4-Nitrophenol	200	ND	120	60	10-80
2,4-Dinitrotoluene	100	ND	63	63	24-96
Pentachlorophenol	200	ND	108	54	9-103
Pyrene	100	ND	75	75	26-127

Compound	Spike Added (µg/L)	MSD Conc. (µg/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	200	135	68	14	42	12-89
2-Chlorophenol	200	144	72	23	40	27-123
1,4-Dichlorobenzene	100	66	66	16	28	36-97
Di-n-propylnitrosamine	100	51	51	28	38	41-116
1,2,4-Trichlorobenzene	100	47	47	24	28	39-98
4-Chloro-3-methylphenol	200	157	78	17	42	23-97
Acenaphthene	100	70	70	9	31	46-118
4-Nitrophenol	200	107	54	11	50	10-80
2,4-Dinitrotoluene	100	58	58	8	38	24-96
Pentachlorophenol	200	148	74	31	50	9-103
Pyrene	100	73	73	4	31	26-127

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

PEE
ORIGINAL
(Red)

Metals QA/QC Report

Client: GERAGHTY & MILLER/NORFOLK VA
Spectralytix Project: GM015

ANALYSIS	QC REC %	DUP REC	RPD	SPIKE % REC
Arsenic	110	0		76
Chromium	103	0		108
Lead	110	0		75

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(Red)

QA/QC Summary Cyanide

Client: GERAGHTY & MILLER/NORFOLK VA
SPECTRALYTIX Project ID: GM015

Analyte	QC Recovery (%)	Duplicate RPD (%)	Spike Recovery (%)
Cyanide, Total	99.5	0	102.5
Cyanide, Free	99.5	0	102.5

	QC Limits (%)
QC Recovery	80-120
Sample Duplicate RPD	< 30
Sample Spike Recovery	75-125
Check Standard	90-110

RPD = Relative Percent Difference
N/A = Not Applicable
QC = Laboratory Quality Control

GERAGHTY & MILLER, INC.
Environmental Services

CHAIN-OF-CUSTODY RECORD

Project Number ______

Project Location [illegible]

Laboratory [illegible]

Sampler(s) [illegible]

SAMPLE IDENTITY	Date Sampled	1 l. amber glass (CN)*	1 l. amber glass (BNA 625)	500 ml. plastic (metals)**	VOA Vials (VOA-602)							TOTAL
MW-13B	[illegible]	1	1	1	2							5
MW-4B	"	1	1	1	2							5
MW-4	"	1	1	1	2							5
[illegible] Blank	"	1	1	1	2							5
Trip Blank					1							1

Total No. of Bottles/Containers: 21

Relinquished by: [signature]	Organization: Geraghty & Miller	Date 10/26/90	Time 5 [illegible]	Seal Intact? Yes No N/A
Received by:	Organization: [signature]	Date 10/29/90	Time 1 AM	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: * Cyanide (CN) samples must be preserved in the lab upon arrival w/ NaOH @ lab
** Metal samples must be filtered & preserved (HNO₃) upon arrival @ lab

Delivery Method: ☐ In Person ☑ Common Carrier Fed-X (SPECIFY) ☐ Lab Courier ☐ Other ______ (SPECIFY)

7030[illegible]

G&M Form 09 12 88

Southpoint 89 1951

ORIGINAL

ORIGINAL
(Red)

APPENDIX L

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ORIGINAL
(Red)

APPENDIX L

MICROBIOLOGICAL EVALUATION

PFE

ORIGINAL (Red)

GERAGHTY & MILLER TREATABILITY LABORATORY

Microbiological Evaluation
Norfolk Gas Plant Site
Norfolk, Virginia

Introduction

A treatability study was conducted to evaluate soil samples collected from the Norfolk Gas Plant site. The evaluation was conducted to determine if the soils harbor a microbial population capable of using coal tar from the site as a carbon source with the possibility of enhancing the population to remediate the source material.

The objectives of the study were as follows: (1) determine if aerobic microbes are present in representative soils, (2) determine if the microbes have adapted to degrade selected organic compounds, (3) determine if the environmental conditions (pH and moisture content) are conducive to support microbes, and (4) determine if soluble inorganic nutrients (ammonia and ortho-phosphate) are present in sufficient quantities for bioremediation of the contaminants.

Evaluation of the results from the Norfolk Gas Plant site indicates the presence of an aerobic microbial population that has adapted to degrade constituents in the site product. The pH is within the optimal range for all samples. The moisture content is within the optimal range except for sample VM-3A "Dirty" which has a slightly elevated moisture content. Nutrients are present and available to the microbes. The respirometer results indicate bioactivity is occurring at the site.

Methodology

Total heterotrophic aerobic microbes were determined using Standard Methods Procedures 9215 C (1989) spread plate procedure. The samples were serially diluted in a mineral nutrient buffer solution and 0.1 ml of the diluted sample plated in duplicate on Standard Plate Count (SPC) agar plates. The plates were incubated in the dark at ambient temperature. The number of Colony Forming Units (CFU) were determined after five days of incubation.

Heterotrophic aerobic microbes capable of degrading coal tar from the site were determined using a modification of the above procedure. The samples were serially diluted in a mineral nutrient buffer solution and 0.1 ml of the diluted sample was plated in duplicate onto Noble agar plates containing 100 mg/l of coal tar from the site. The plates were incubated in the dark at ambient temperature in a desiccator and the colony forming units were counted after fourteen days of incubation.

Soil respiration was determined using a Micro Oxymax respirometer. The procedure was based on recommendations suggested by the manufacturer. Approximately 100 grams of sample as received was placed in a closed chamber. The concentration of oxygen and carbon dioxide in the chamber headspace was measured every hour for 24 hours. The

difference in oxygen and carbon dioxide concentrations were graphed and may be correlated with the rate of respiration.

The soil pH was determined using U.S. Environmental Protection Agency (USEPA) SW846 Method 9045 (1986). The soil moisture was determined using Standard Methods procedure 2540 G (1989). The Total Petroleum Hydrocarbons were determined using a modified USEPA Method 418.1.

The soluble ammonia and ortho-phosphate concentrations were determined using an aliquot from the sample extract used to determine the pH. Ammonia was analyzed using Hach Inc. Method 380 which is based on USEPA Method 350.2 colorimetric procedure, nitrogen-ammonia nesslerization. The ortho-phosphate was analyzed using Hach Inc. method 490 which is based on USEPA Method 365.2 colorimetric ascorbic acid, single reagent.

Results & Discussion

Table 1 presents the results of the total heterotrophic microbial and coal tar degrading microbial plating studies. The total heterotrophic microbial population values ranged from less than 9.3×10^4 CFU/g to 4.4×10^5 CFU/g. Coal tar degrading microbial population values ranged from 3.1×10^5 CFU/g to 9.4×10^5 CFU/g. The results show that a viable microbial population is present in the samples and the microbes have adapted to degrade the coal tar residue at the site.

Microbial populations in environmental samples are variable and can range from less than 1×10^2 to greater than 1×10^9 CFU/g. Typical soil populations range from 1×10^4 to 1×10^6 CFU/g. These values are interpreted broadly as they are numbers associated with viable microbes that have been extracted from the soil and are capable of growing on a general nutrient medium. There is no medium capable of supporting microbial growth of all potential microorganisms indigenous to soil. Microbial spores, if present, require a period of acclimation before growth will commence. Therefore, these numbers should be interpreted as a population minimum with true microbial numbers potentially one to two orders of magnitude greater.

Table 2 presents the results of the environmental conditions analyses including TPH, pH, percent moisture, soluble ammonia and o-phosphate. The TPH values ranged from 21 to 950 mg/kg. The soil pH ranged from 7.5 to 7.9. The soil pH is within the optimal range of 6 to 8 for microbial growth. Relatively neutral soil pH is important for the microbial population to maintain biological processes. The moisture content ranged from 55.2 to 80.9 percent of the soil holding capacity. The suggested moisture content for optimal growth is between 40 and 70 percent of the soil holding capacity except for sample VM-3A "Dirty" which was above the optimal range. This range is important to maintain cellular turgidity, transport nutrients, and maintain biological processes. The soluble ammonia values ranged from 0.8 mg/kg to 9.7 mg/kg. The soluble ortho-phosphate values were 0.1 mg/kg in all the samples. These ions are present and are available to the microbial population.

PFE
ORIGINAL

The 24-hour respirometer study results are shown in Figures 1 through 4. The respirometer measures changes in oxygen and carbon dioxide in an enclosed chamber.

The highest respiration rates were occurring in samples VM-3A (Dirty) and VM-2A. The respiration in samples VM-1A and VM-2A (Clean) were significantly lower. The spikes observed in the respirometer data at 10, 18, and 24 hours occurs whenever the instrument refreshes the air in the flasks in order to maintain sufficient oxygen.

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Table 1. Microbial Enumeration Results, Norfolk Gas Plant Site, Norfolk, VA, Project No. MD05708.

Sample I.D.	Total Heterotrophic Microbes	Coal Tar Degrading Microbes	Coal Tar Degrading Microbes Percent(%)
	Microbes X 10^4 CFU/g (Dry Weight)		
VM-1A (2-3')	42	94	NA
VM-2A (3-5')	15	31	NA
VM-3A (0-1') "Clean"	9.3	41	NA
VM-3A "Dirty"	44	49	NA

NA = Not applicable.

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Table 2. Environmental Conditions Analyses, Norfolk Gas Plant Site, Norfolk, VA, Project No. MD05708.

Sample I.D.	T.P.H. (mg/kg)	Ammonia (mg/kg)[1]	o-Phosphate (mg/kg)	Percent Moisture (%)	Moisture as a Percent of Holding Capacity (%)	pH (s.u.)
VM-1A (2-3')	290	6.3	0.1	13.3	61.2	7.8
VM-2A (3-5')	430	9.7	0.1	14.4	71.4	7.5
VM-3A (0-1') "Clean"	21	0.8	0.1	7.1	55.2	7.9
VM-3A "Dirty"	950	6.0	0.1	21.7	80.9	7.5

T.P.H. = Total Petroleum Hydrocarbons
[1] = As Ammonia-Nitrogen

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FIGURE 1. RESPIROMETER STUDY, SAMPLE VM-1A(2-3'). NORFOLK GAS PLANT. PROJECT NO.MD05708.

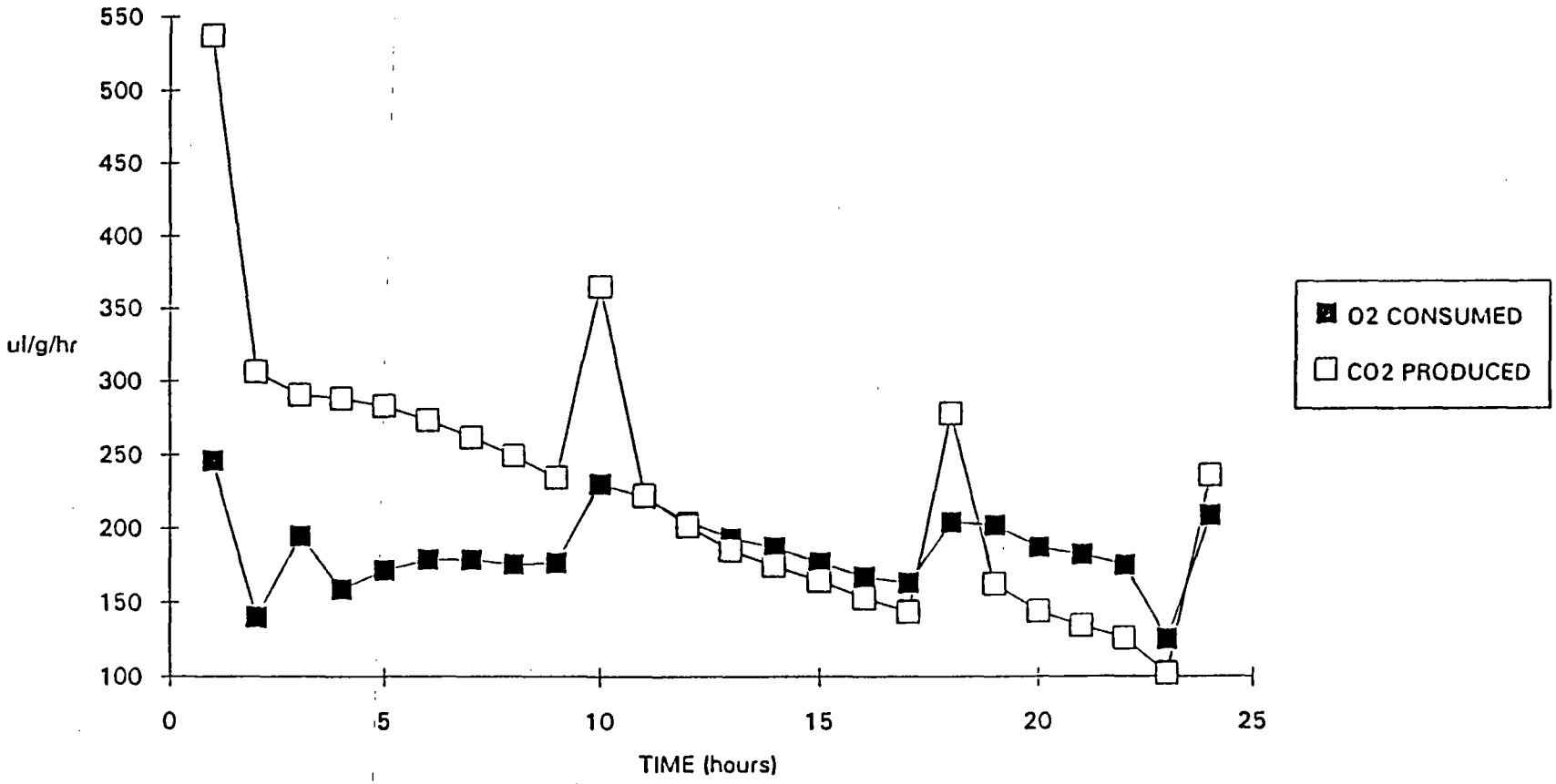
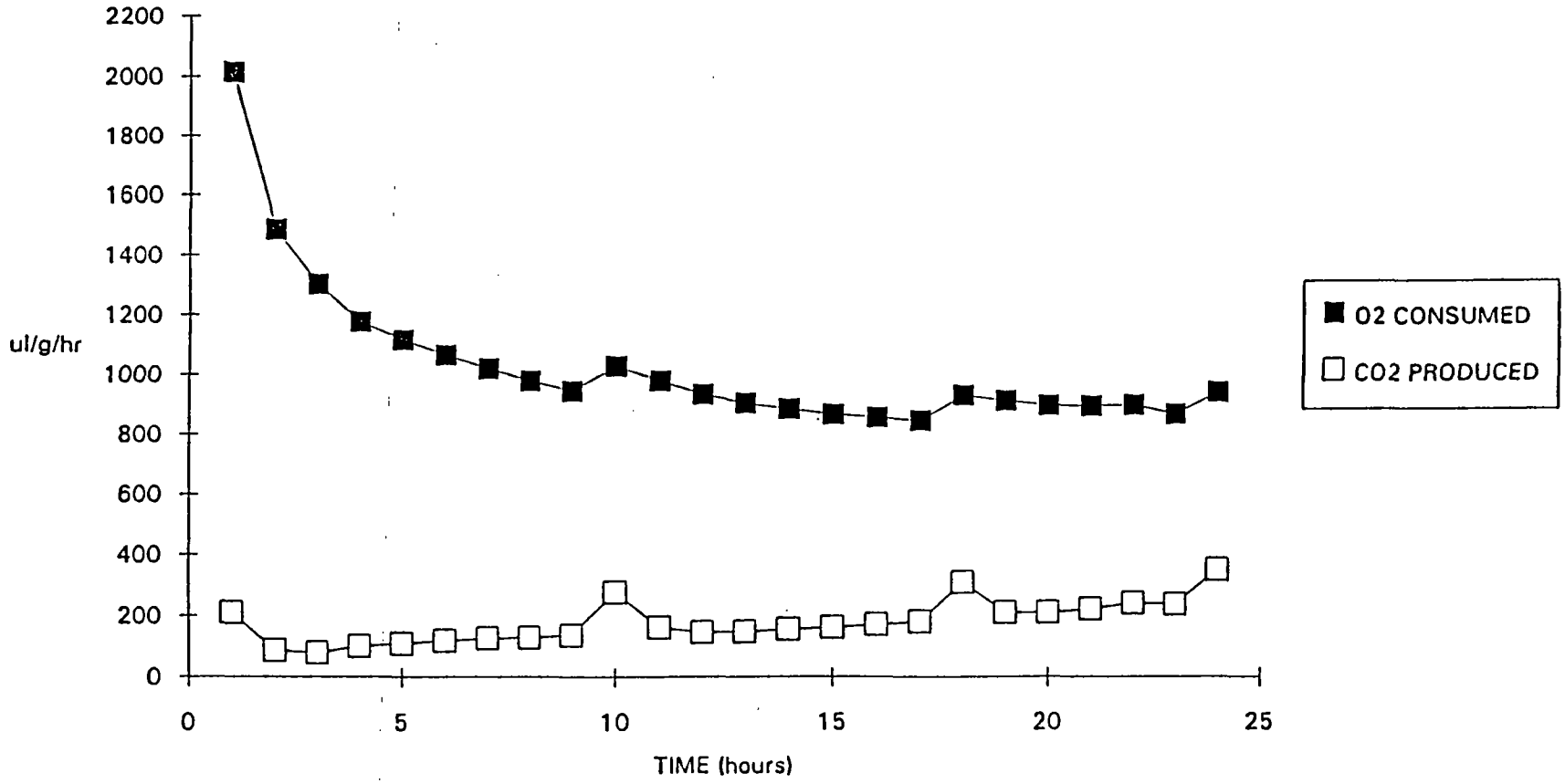


FIGURE 2. RESPIROMETER STUDY, SAMPLE VM-2A (3-5'). NORFOLK GAS PLANT. PROJECT NO.MD05708.



ORIGINAL (Red)

FIGURE 3. RESPIROMETER STUDY, SAMPLE VM-3A (0-1'). NORFOLK GAS PLANT. PROJECT NO.MD05708.

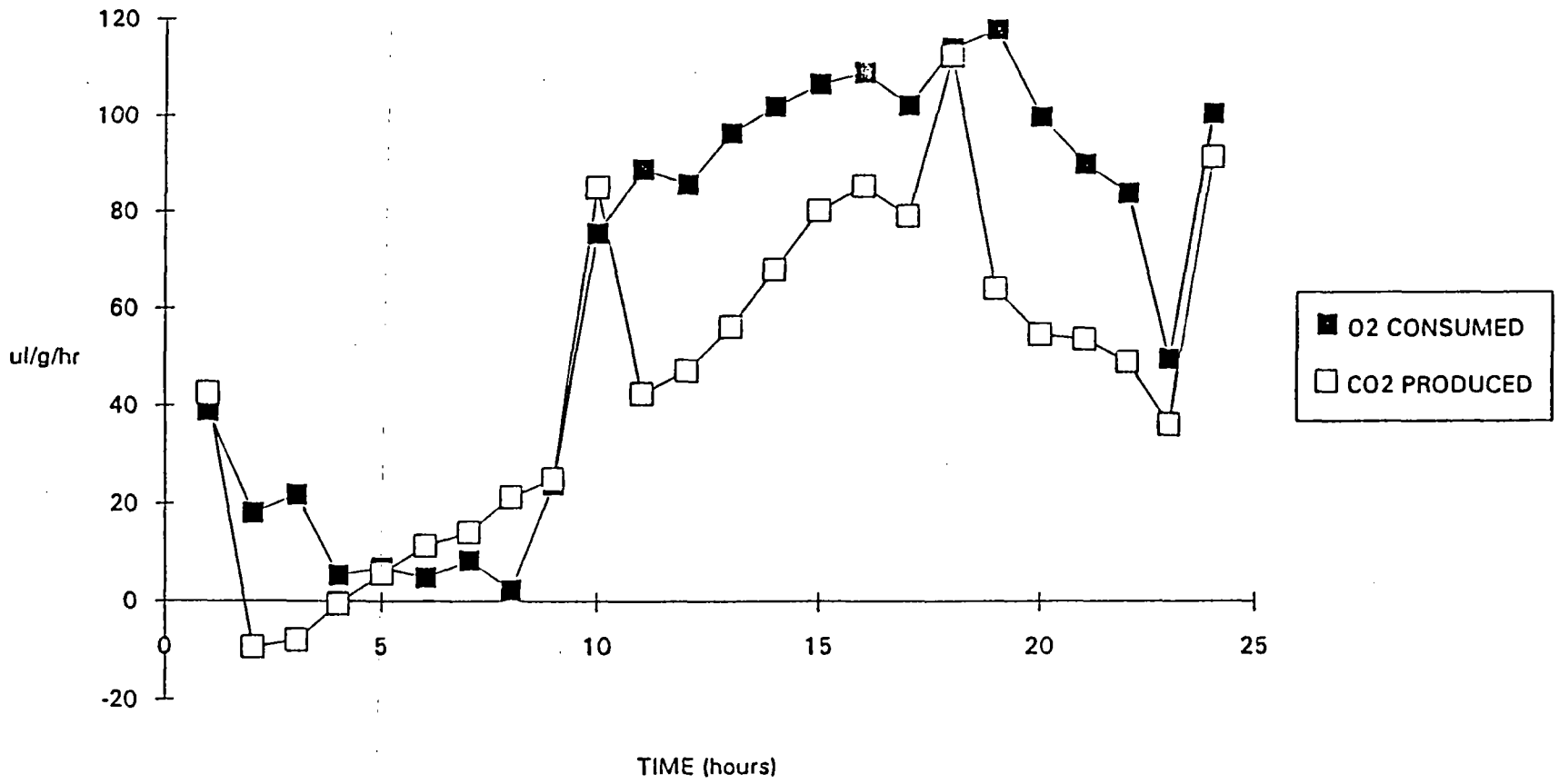
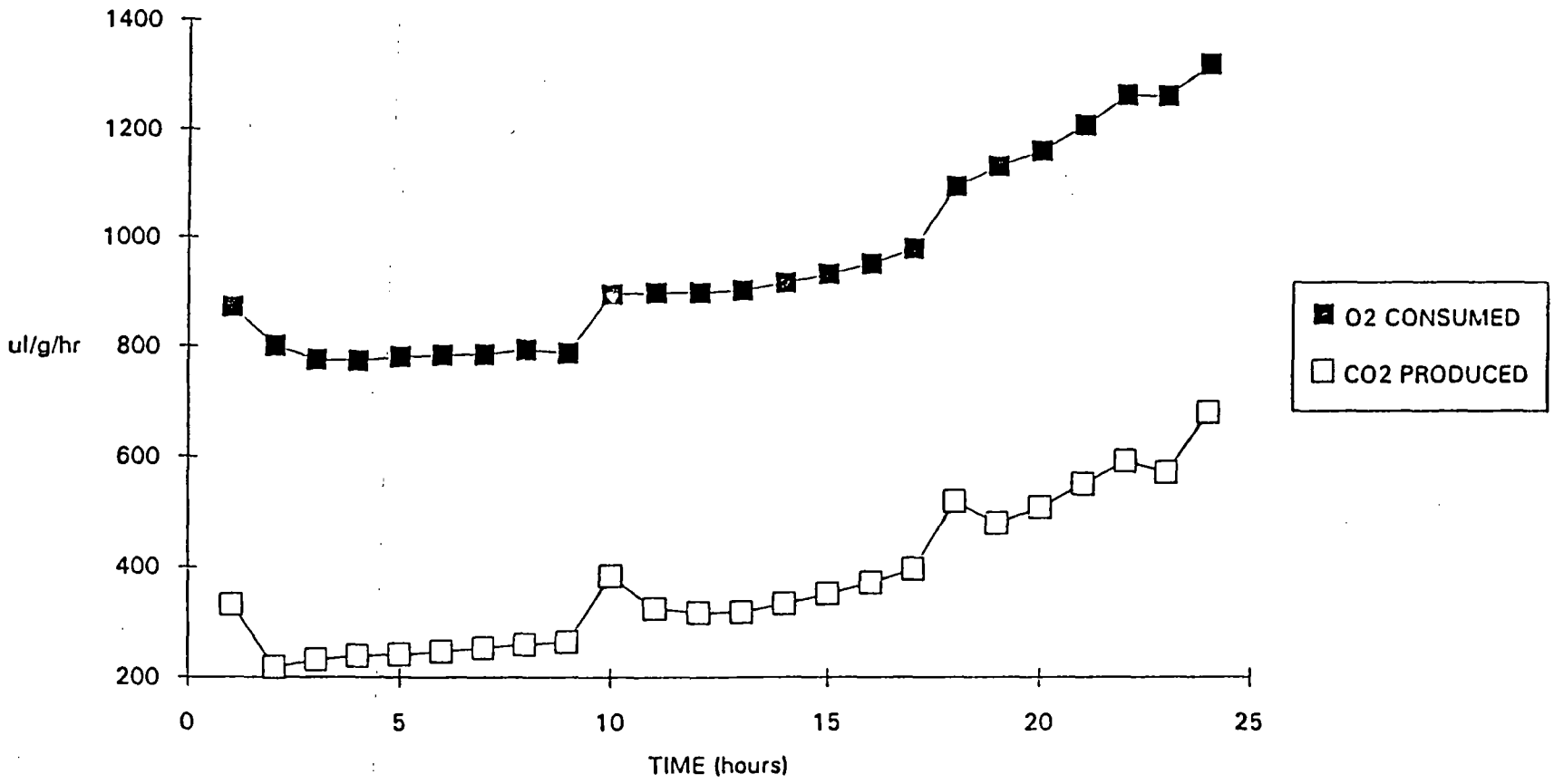


FIGURE 4. RESPIROMETER STUDY, SAMPLE VM-3A (DIRTY). NORFOLK GAS PLANT. PROJECT NO. MD05708.



ORIGINAL

APPENDIX M

PFE

ORIGINAL
(Red)

APPENDIX M

RISK ASSESSMENT

D FT

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Table 4-1. Occurrence Summary for Constituents Detected in Zone 2 Soil Samples, Norfolk Gas Plant, Norfolk, Virginia.

Constituent	Frequency Detects / Total	Range of Detects Min - Max	Total Range Min - Max	Mean	UCL	EPC	USEPA Region III Risk-Based Concentration	
VOCs								
Benzene	13 / 14	0.089 - 29	0.025 - 29	6.6	11	11	22	
Ethylbenzene	12 / 14	0.26 - 72	0.025 - 72	19	30	-	7,800	
Toluene	12 / 14	0.05 - 54	0.025 - 54	10	18	-	16,000	
Xylenes (total)	12 / 14	0.068 - 82	0.025 - 82	27	41	-	160,000	
Semi-VOCs								
Acenaphthene	13 / 14	0.82 - 1,300	0.05 - 1,300	130	290	-	4,700	
Acenaphthylene	14 / 14	0.28 - 660	0.28 - 660	89	170	170	NA	
Anthracene	14 / 14	0.47 - 490	0.47 - 490	73	140	-	23,000	
Benzo(a)anthracene	14 / 14	0.45 - 290	0.45 - 290	48	86	86	0.88	
Benzo(b+k)fluoranthene	14 / 14	1 - 210	1 - 210	56	91	91	0.88	
Benzo(g,h,i)perylene	13 / 14	0.5 - 120	0.05 - 120	28	46	46	NA	
Benzo(a)pyrene	12 / 14	0.3 - 230	0.05 - 230	42	73	73	0.088	
Chrysene	14 / 14	0.59 - 390	0.59 - 390	59	110	110	88	
Dibenzo(a,h)anthracene	8 / 14	0.74 - 43	0.05 - 43	7.7	14	14	0.088	
2,4-Dimethylphenol	2 / 14	0.5 - 9.8	0.05 - 9.8	0.81	2.0	-	1,600	
Fluoranthene	14 / 14	1.2 - 650	1.2 - 650	110	200	-	3,100	
Fluorene	12 / 14	0.92 - 540	0.05 - 540	72	140	-	3,100	
Indeno(1,2,3-cd)pyrene	13 / 14	0.52 - 120	0.05 - 120	29	47	47	0.88	
Naphthalene	14 / 14	0.82 - 7,000	0.82 - 7,000	720	1,600	1,600	3,100	
Phenanthrene	14 / 14	2.5 - 1,900	2.5 - 1,900	230	470	470	NA	
Phenol	2 / 14	1.5 - 4.4	0.05 - 4.4	0.50	1.1	-	47,000	
Pyrene	13 / 14	1.2 - 1,200	0.05 - 1,200	160	320	-	2,300	
Inorganics								
Arsenic	5 / 5	1.8 - 10	1.8 - 10	3.5	7.0	7.0	0.68, 23	[a]
Barium	5 / 5	0.25 - 63	0.25 - 63	21	48	-	5,500	
Cadmium	1 / 5	2 - 2	0.5 - 2	0.80	1.4	-	39	
Chromium	5 / 5	5.9 - 9	5.9 - 9	7.2	8.4	-	390	
Lead (total)	5 / 5	40 - 385	40 - 385	180	350	-	825	[b]
Mercury	5 / 5	0.1 - 9.3	0.1 - 9.3	2.4	6.2	-	23	

Concentrations are reported in milligrams per kilogram (mg/kg).

Soil samples include B-1, B-2, B-3, B-4, B-5, B-9, B-10, MW-10, MW-12, and MW-14 collected from 0-6 feet below land surface.

[a] Evaluation of arsenic as a potential carcinogen results in a value of 0.68 mg/kg. This value is below normal soil background levels of arsenic. The RBC based on non-carcinogenic effects is 23.

[b] RBC for lead is derived from the United States Environmental Protection Agency Uptake Biokinetic model.

\- The maximum detected concentration is less than the USEPA Region III risk-based concentration for residential soil.

EPC Exposure point concentration for constituents of concern.

Mean Arithmetic average of the total number of samples, using proxy concentrations for non-detects.

NA Not available.

RBC Risk-based concentration.

UCL 95 percent upper confidence limit (one-tailed) on the mean, assuming a normal distribution.

VOCs Volatile organic compounds.

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Table 4-2. Reference Doses, Target Sites, and Confidence Levels for Constituents of Concern, Norfolk Gas Plant, Norfolk, Virginia.

Constituent	RfDo (mg/kg/day)		RfDi (mg/kg/day)		Target Sites		Confidence Level/ Uncertainty Factor
	Subchronic	Chronic	Subchronic	Chronic	Oral	Inhalation	
VOCs							
Benzene	NA	NA	NA	1.4E-04	NA	hematological	medium/100
Semi-VOCs*							
Acenaphthylene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000
Benzo(a)anthracene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000
Benzo(b)fluoranthene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000
Benzo(k)fluoranthene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000
Benzo(g,h,i)perylene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000
Benzo(a)pyrene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000
Chrysene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000
Dibenzo(a,h)anthracene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000
Indeno(1,2,3-c,d)pyrene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000
Naphthalene**	4.0E-02	4.0E-02	NA	NA	GI system, anemia	NA	low/1000
Phenanthrene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000
Inorganics							
Arsenic	3.0E-04	3.0E-04	NA	NA	skin	NA	medium/3

References: IRIS, 1994; USEPA, 1993b; USEPA, undated for: RfDi for benzene.

* All of the semi-VOCs are polycyclic aromatic hydrocarbons (PAHs). Except for naphthalene, the oral RfD for pyrene is used as a surrogate for all PAH RfDs.

** The oral RfD for naphthalene has been withdrawn pending further review. The value listed is the last published value.

mg/kg/day Milligrams per kilogram per day.

NA Not available.

RfDi Inhalation reference dose.

RfDo Oral reference dose.

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Table 4-3. Cancer Slope Factors, Tumor Sites, and USEPA Cancer Classifications for Constituents of Concern, Norfolk Gas Plant, Norfolk, Virginia.

Constituent	CSF (kg-day/mg)		TEF	Tumor site		USEPA Classification
	Oral	Inhalation		Oral	Inhalation	
VOCs						
Benzene	2.9E-02	2.9E-02	NAP	leukemia	leukemia	A
Semi-VOCs*						
Benzo(a)anthracene	7.3E+00	NA	0.1	stomach	NA	B2
Benzo(b)fluoranthene	7.3E+00	NA	0.1	stomach	NA	B2
Benzo(k)fluoranthene	7.3E+00	NA	0.1	stomach	NA	B2
Benzo(a)pyrene	7.3E+00	6.1E+00**	1.0	stomach	respiratory tract	B2
Chrysene	7.3E+00	NA	0.01	stomach	NA	B2
Dibenzo(a,h)anthracene	7.3E+00	NA	1.0	stomach	NA	B2
Indeno(1,2,3-c,d)pyrene	7.3E+00	NA	0.1	stomach	NA	B2
Inorganics						
Arsenic	1.75E+00	5.0E+01	NAP	skin	respiratory tract	A

References: ATSDR for Arsenic, 1991; IRIS, 1994; USEPA,1993b.

* All of the semi-VOCs are polycyclic aromatic hydrocarbons (PAHs). Benzo(a)pyrene is used as a surrogate for all carcinogenic PAHs.

** The inhalation slope factor has been withdrawn pending further review. The value listed is the last published value.

CSF Cancer slope factor.
kg-day/mg Kilograms-day per milligram.
NAP Not applicable.
TEF Toxicity equivalency factor for oral exposure to carcinogenic PAHs.

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Table 4-4. Adjusted Toxicity Values Used to Assess Dermal Exposure for Constituents of Concern, Norfolk Gas Company, Norfolk, Virginia.

Constituent	RfDo (mg/kg/day) Subchronic	RfDo (mg/kg/day) Chronic	CSFo (kg-day/mg)	Oral Absorption Efficiency		RfDa (mg/kg/day) Subchronic	RfDa (mg/kg/day) Chronic	CSFa (kg-day/mg)
VOCs								
Benzene	NA	NA	2.9E-02	1.00	a	NA	NA	2.9E-02
Semi-VOCs*								
Acenaphthylene	3.0E-01	3.0E-02	NC	0.85	b	2.6E-01	2.6E-02	NC
Benzo(a)anthracene	3.0E-01	3.0E-02	7.3E+00	0.85	b	2.6E-01	2.6E-02	NAP
Benzo(b)fluoranthene	3.0E-01	3.0E-02	7.3E+00	0.85	b	2.6E-01	2.6E-02	NAP
Benzo(k)fluoranthene	3.0E-01	3.0E-02	7.3E+00	0.85	b	2.6E-01	2.6E-02	NAP
Benzo(g,h,i)perylene	3.0E-01	3.0E-02	NC	0.85	b	2.6E-01	2.6E-02	NC
Benzo(a)pyrene	3.0E-01	3.0E-02	7.3E+00	0.85	b	2.6E-01	2.6E-02	NAP
Chrysene	3.0E-01	3.0E-02	7.3E+00	0.85	b	2.6E-01	2.6E-02	NAP
Dibenzo(a,h)anthracene	3.0E-01	3.0E-02	7.3E+00	0.85	b	2.6E-01	2.6E-02	NAP
Indeno(1,2,3-c,d)pyrene	3.0E-01	3.0E-02	7.3E+00	0.85	b	2.6E-01	2.6E-02	NAP
Naphthalene	4.0E-02	4.0E-02	NC	0.85	b	3.4E-02	3.4E-02	NC
Phenanthrene	3.0E-01	3.0E-02	NC	0.85	b	2.6E-01	2.6E-02	NC
Inorganics								
Arsenic	3.0E-04	3.0E-04	1.75E+00	0.95	c	2.9E-04	2.9E-04	1.8E+00

* All of the semi-VOCs are polycyclic aromatic hydrocarbons (PAHs). Except for naphthalene, pyrene is used as a surrogate for PAH RfDs; benzo(a)pyrene is used as a surrogate for carcinogenic PAHs.

CSF Cancer slope factor.
mg/kg/day Milligrams per kilogram per day.
NA Not available.
RfD Reference dose.
NC Not evaluated as a carcinogen.

a Assumed.
b ATSDR (1990).
c ATSDR (1991).

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Table 4-5. Physical and Chemical Properties of Organic Constituents of Concern, Norfolk Gas Plant Site, Norfolk, Virginia.

Constituent	Molecular Weight (g/mol)	Water Solubility (mg/L 25 °C)	Specific Gravity	Vapor Pressure (mm Hg 25 °C)	Henry's Law Constant (atm-m³/mol) (25 °C)	Diffusivity (cm²/sec)	Koc (mL/g)	Log Kow	Fish BCF (L/kg)	Groundwater T ½ (days) Low	Groundwater T ½ (days) High	Soil T ½ (days) Low	Soil T ½ (days) High
VOCs													
Benzene	78	1,780	0.88	9.5E+01	5.48E-03	0.09320	49 - 100	1.56 - 2.15	5.2	10	720	5	16
Semi-VOCs													
Acenaphthylene	152	3.93	0.898	2.9E-02 (20 °C)	1.14E-04	0.06703	4,790	4.1	30	85	120	43	60
Benzo(a)anthracene	228	0.0094 - 0.014	1.274	1.1E-07	8.00E-06	0.04564	1,400,000	5.61 - 5.91	30	204	1,361	102	679
Benzo(b)fluoranthene	252	0.0012	ND	5.0E-07	1.20E-05	0.04392	550,000	6.57	30	719	1,219	360	610
Benzo(k)fluoranthene	252	0.00055	ND	9.6E-11	1.04E-03	0.04392	4,400,000	6.85	30	1,821	4,271	909	2,139
Benzo(g,h,i)perylene	276	0.00026	ND	1.0E-10	1.40E-07	0.04197	7,800,000	7.1	30	1,168	1,314	590	650
Benzo(a)pyrene	252	0.0038 - 0.004	1.35	5.5E-09	2.40E-06	0.04653	398,000 - 1,900,000	5.81 - 6.50	30	114	1,059	57	529
Chrysene	228	0.0018 - 0.006	1.27	6.3E-09	3.15E-07	0.04531	240,000	5.60 - 5.91	30	745	2,000	372	993
Dibenzo(a,h)anthracene	278	0.00249 - 0.005	1.28	10E-10 (20 °C)	7.33E-09	0.05707	1,700,000	5.97 - 6.50	30	723	1,880	361	942
Indeno(1,2,3-c,d)pyrene	276	0.062	ND	1.0E-09	2.96E-20	0.05728	31,000,000	5.91 - 7.70	30	1,201	1,460	599	730
Naphthalene	128	30 - 34	1.16	2.3E-01 - 8.7E-01	4.60E-04	0.08205	550 - 3,160	3.2 - 4.7	10.5	1	258	17	48

References: Howard et al., 1991; Lugg, 1968; Lyman et al., 1982; Montgomery and Welkom, 1990; Shen, 1982; and USEPA, 1991d.

atm-m³/mol	Atmospheres-cubic meters per mole.
BCF	Bioconcentration factor.
°C	Degrees Celsius.
cm²/sec	Square centimeters per second.
g/mol	Grams per mole.
Koc	Organic carbon partition coefficient.
Kow	Octanol-water partition coefficient.
L/kg	Liters per kilogram.
mg/L	Milligrams per liter.
mL/g	Milliliters per gram.
mm Hg	Millimeters of mercury.
ND	No data.
T ½	Half-life.

Table 4-6. Soil Exposure Dose and Risk Equations, Former Norfolk Gas Plant Site, Norfolk, Virginia.

Equation Definitions:

$$SExD_o = \frac{C_s \times IR \times EF \times ED \times FI \times UC_1}{BW \times AP} \quad [\text{ mg/kg-day }]$$

$$SExD_d = \frac{C_s \times SSA \times SAR \times ABS \times EF \times ED \times UC_1}{BW \times AP} \quad [\text{ mg/kg-day }]$$

$$SExD_i = \frac{C_s \times BR \times (1/VF + 1/PEF) \times ET \times EF \times ED}{BW \times AP} \quad [\text{ mg/kg-day }]$$

$$VF = Q/C \times \frac{(3.1416 \times \alpha \times T)^{1/2}}{2 \times Dei \times Pa \times Kas} \times UC_2 \quad [\text{ m}^3\text{/kg }]$$

$$PEF = Q/C \times \frac{UC_3}{0.036 \times (1-G) \times (Um/Ut)^3 \times F} \quad [\text{ m}^3\text{/kg }]$$

$$Q/C = \left(\exp[\,(0.1004 \times \ln[A]) - 5.3466 + (2.92 \times sY)\,]\right)^{-1} \quad [\text{ (g/m}^2\text{-sec)/(kg/m}^3\text{) }]$$

$$sY = 0.02685 \times \left[0.25 + \frac{[\ln(A) - 11.0509]^2}{26.3608}\right] \quad [\text{ unitless }]$$

$$\alpha = \frac{Dei \times Pa}{Pa + [\rho s \times (1-Pa)/Kas]} \quad [\text{ cm}^2\text{/sec }]$$

$$Dei = Di \times (Pa^{3.33}/Pt^2) \quad [\text{ cm}^2\text{/sec }]$$

$$ELCR = (SExD_o \times CSF_o) + (SExD_d \times CSF_a) + (SExD_i \times CSF_i) \quad [\text{ unitless }]$$

$$HQ = \frac{SExD_o}{RfD_o} + \frac{SExD_d}{RfD_a} + \frac{SExD_i}{RfD_i} \quad [\text{ unitless }]$$

where:

α	Intermediate value (cm^2/s).
A	Contiguous area of contamination (m^2); 13.4 acres (54,000 m^2).
ABS	Dermal absorption efficiency (unitless; constituent-specific).

Table 4-6. Soil Exposure Dose and Risk Equations, Former Norfolk Gas Plant Site, Norfolk, Virginia.

PFE ORIGINAL (Red)

AP	Averaging period (days).
β	Soil bulk density (1.92 g/cm^3).
BR	Breathing rate (m^3/hour).
BW	Body weight (kg).
C_s	Constituent concentration in the soil (mg/kg) (Table 4-1).
CSF	Cancer slope factor for oral (CSF_o), dermal (CSF_d), or inhalation (CSF_i) intake (mg/kg-day)$^{-1}$.
Dei	Effective diffusivity (cm^2/sec).
Di	Diffusivity in air (constituent-specific; cm^2/sec) (Table 4-5).
ED	Exposure duration (weeks).
EF	Exposure frequency (days/week).
ELCR	Excess lifetime cancer risk (unitless).
ET	Exposure time (hours/day).
F	Function of Ut/Um (0.1265) (unitless); $F = 0.18\ [\ 8x^3 + 12x \times \exp(-x^2)\ ]$, where $x = 0.886$ (Ut/Um).
FI	Fraction ingested from the site (1) (unitless).
Foc	Fraction organic carbon in soil (0.02).
G	Fraction of vegetative cover (0) (unitless).
H	Henry's Law Constant (constituent-specific; atm-m^3/mol) (Table 4-5).
HQ	Hazard quotient (unitless).
IR	Incidental ingestion rate for soil (mg/day).
Kas	Soil-air partition coefficient (g soil/cm^3 air); calculated as (41 mol/atm-m^3) $\times$ H / (Koc $\times$ Foc).
Koc	Organic carbon partition coefficient (constituent-specific; cm^3/g or mL/g) (Table 4-5).
Pa	Air-filled soil porosity (0.0835) (Pt-$\theta\beta$) (unitless).
PEF	Particulate emission factor (site-specific) (9.14×10^8 m^3/kg).
Pt	Total soil porosity (0.275) (1-$\beta/\rho s$) (unitless).
ρs	True soil or particle density (2.65 g/cm^3).
Q/C	Emission flux per unit concentration (g/m^2 - s/Kg/m^3).
RfD	Reference dose for oral (RfD_o), dermal (RfD_d), or inhalation (RfD_i) intake (mg/kg-day).
SAR	Soil adherence rate (1 mg/cm^2-day) (USEPA, 1992a).
SExD	Soil exposure dose from oral ($SExD_o$), dermal ($SExD_d$), or inhalation ($SExD_i$) exposure (mg/kg-day).
SSA	Exposed skin surface area (cm^2).
sY	Intermediate value (unitless).
θ	Soil moisture content (0.1 cm^3 water/g soil) (60 percent saturated).
T	Exposure interval (sec) (7.9×10^8 sec).
UC_1	Unit conversion (10^{-6} kg/mg).
UC_2	1×10^{-4} m^2/cm^2.
UC_3	3,600 seconds per hour.
Um	Wind speed (5 m/sec [NOAA, 1974]).
Ut	Equivalent threshold value of windspeed at 10 meters (12.8 m/sec).
VF	Volatilization factor (site- and constituent-specific) (m^3/kg).

Sample Calculation: Cancer Effects of Chrysene

$$SExD_o = \frac{(110\ \text{mg/kg}) \times (480\ \text{mg/day}) \times (5\ \text{day/wk}) \times (13\ \text{wks}) \times (1) \times (10^{-6}\ \text{kg/mg})}{(70\ \text{kg}) \times (25{,}550\ \text{days})}$$

$$= 1.9 \times 10^{-6}\ \text{mg/kg-day}$$

Table 4-6. Soil Exposure Dose and Risk Equations, Former Norfolk Gas Plant Site, Norfolk, Virginia.

$$SExD_d = \frac{(110\ mg/kg) \times (3{,}160\ cm^2) \times (1\ mg/cm^2\text{-}day) \times (0.03) \times (5\ days/wk) \times (13\ wks) \times (10^{-6}\ kg/mg)}{(70\ kg) \times (25{,}550\ days)}$$

$$= 3.8 \times 10^{-7}\ mg/kg\text{-}day$$

$$Dei = (0.04531\ cm^2/sec) \times (0.0835^{3.33}/0.275^2) = 1.53 \times 10^{-4}\ cm^2/sec$$

$$Kas = \frac{(41\ mol/atm\text{-}m^3) \times (3.15 \times 10^{-7}\ atm\text{-}m^3/mol)}{(240{,}000\ cm^3/g) \times (0.02)} = 2.69 \times 10^{-9}\ g/cm^3$$

$$\alpha = \frac{(1.53 \times 10^{-4}\ cm^2/sec) \times 0.0835}{0.0835 + [\,(2.65\ g/cm^3) \times (1 - 0.0835)/(2.69 \times 10^{-9}\ g/cm^3)\,]} = 1.42 \times 10^{-14}\ cm^2/sec$$

$$sY = 0.02685 \times \left[0.25 + \frac{[\ln(54{,}000\ m^2) - 11.0509]^2}{26.3608}\right] = 0.006737$$

$$Q/C = \left(\exp[\,(0.1004 \times \ln[54{,}000\ m^2]) - 5.3466 + (2.92 \times 0.006737)\,]\right)^{-1}$$

$$= 68.92\ (g/m^2\text{-}sec)/(kg/m^3)$$

$$VF = \left[68.92\ \frac{g/m^2\text{-}sec}{kg/m^3}\right] \times \frac{[3.1416 \times (1.42 \times 10^{-14}\ cm^2/sec) \times (7.9 \times 10^8\ sec)]^{1/2}}{2 \times (1.53 \times 10^{-4}\ cm^2/sec) \times 0.0835 \times (2.69 \times 10^{-9}\ g/cm^3)} \times (10^{-4}\ m^2/cm^2)$$

$$= 5.94 \times 10^8\ m^3/kg$$

$$PEF = \left[68.92\ \frac{g/m^2\text{-}sec}{kg/m^3}\right] \times \frac{3{,}600\ sec/hour}{(0.036\ g/m^2/hr) \times (1 - 0) \times [(5\ m/sec)/(12.8\ m/sec)]^3 \times 0.1265}$$

$$= 9.14 \times 10^8\ m^3/kg$$

$$SExD_i = \frac{(110\ mg/kg) \times (2.5\ m^3/hr) \times [(1/5.94 \times 10^8\ m^3/kg) + (1/9.14 \times 10^8\ m^3/kg)] \times (8\ hr/day) \times (5\ days/wk) \times (13\ wks)}{(70\ kg) \times (25{,}550\ days)}$$

$$= 2.2 \times 10^{-10}\ mg/kg\text{-}day$$

$$ELCR = (1.9 \times 10^{-6}\ mg/kg\text{-}day) \times (7.3 \times 10^{-3}\ kg\text{-}day/mg)$$

$$= 1.4 \times 10^{-8}$$

(CSF$_i$ and CSF$_o$ are not available for chrysene.)

Table 4-6. Soil Exposure Dose and Risk Equations, Former Norfolk Gas Plant Site, Norfolk, Virginia.

PFE
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Sample Calculation: Non-Cancer Effects of Arsenic

$$SExD_o = \frac{(7.0\ mg/kg) \times (480\ mg/day) \times (5\ days/wk) \times (13\ wks) \times (10^{-6}\ kg/mg)}{(70\ kg) \times (91\ days)}$$

$$= 3.4 \times 10^{-5}\ mg/kg\text{-}day$$

$$SExD_d = \frac{(7.0\ mg/kg) \times (3{,}160\ cm^2) \times (1\ mg/cm^2\text{-}day) \times 0.01 \times (5\ days/wk) \times (13\ wks) \times (10^{-6}\ kg/mg)}{(70\ kg) \times (91\ days)}$$

$$= 2.3 \times 10^{-6}\ mg/kg\text{-}day$$

$$SExD_i = \frac{(7.0\ mg/kg) \times [0 + (1/9.14 \times 10^8\ m^3/kg)] \times (2.5\ m^3/hr) \times (8\ hr/day) \times (5\ days/wk) \times (13\ wks)}{(70\ kg) \times (91\ days)}$$

$$= 1.5 \times 10^{-9}\ mg/kg\text{-}day$$

$$HQ = \frac{3.4 \times 10^{-5}\ mg/kg\text{-}day}{3.0 \times 10^{-4}\ mg/kg\text{-}day} + \frac{2.3 \times 10^{-6}\ mg/kg\text{-}day}{2.9 \times 10^{-4}\ mg/kg\text{-}day}$$

$$= 0.12$$

(RfD_i is not available for arsenic; therefore, inhalation exposure is not included in the HQ calculation.)

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Table 4-7. Inhalation, Oral, and Dermal Soil Exposure Doses and Risk Calculations for a Hypothetical Future Utility Worker, Former Norfolk Gas Plant Site, Norfolk, Virginia.

Constituent	Cs (mg/kg)	ABS	SExDo (mg/kg-day)	SExDi (mg/kg-day)	SExDd (mg/kg-day)	Toxicity Values Oral	Toxicity Values Inhalation	Toxicity Values Adjusted	Calculated Risk
CANCER EFFECTS									
						CSF (kg-day/mg)			ELCR
VOCs									
Benzene	11	0.25 a	1.9E-07	1.4E-07	3.2E-07	2.9E-02	2.9E-02	2.9E-02	1.9E-08
Semi-VOCs									
Benzo(a)anthracene	86	0.03 b	1.5E-06	2.9E-10	3.0E-07	7.3E-01	NA	NAP	1.1E-06
Benzo(b)fluoranthene	91	0.03 b	1.6E-06	5.2E-10	3.1E-07	7.3E-01	NA	NAP	1.2E-06
Benzo(a)pyrene	73	0.03 b	1.3E-06	1.7E-10	2.5E-07	7.3E+00	6.1E+00	NAP	9.3E-06
Chrysene	110	0.03 b	1.9E-06	2.2E-10	3.8E-07	7.3E-02	NA	NAP	1.4E-07
Dibenzo(a,h)anthracene	14	0.03 b	2.4E-07	1.2E-11	4.8E-08	7.3E+00	NA	NAP	1.8E-06
Indeno(1,2,3-c,d)pyrene	47	0.03 b	8.2E-07	3.7E-11	1.6E-07	7.3E-01	NA	NAP	6.0E-07
Inorganics									
Arsenic	7.0	0.01 a	1.2E-07	5.6E-12	8.0E-09	1.75E+00	5.0E+01	1.8E+00	2.3E-07
								Total ELCR	1E-05
NON-CANCER EFFECTS									
						Subchronic RfD (mg/kg-day)			HQ
VOCs									
Benzene	11	0.25 a	5.4E-05	4.1E-05	8.9E-05	NA	1.4E-04 *	NA	2.9E-01
Semi-VOCs									
Acenaphthylene	170	0.03 b	8.3E-04	9.6E-06	1.6E-04	3.0E-01 **	NA	2.6E-01	3.4E-03
Benzo(a)anthracene	86	0.03 b	4.2E-04	8.1E-08	8.3E-05	3.0E-01 **	NA	2.6E-01	1.7E-03
Benzo(b)fluoranthene	91	0.03 b	4.5E-04	1.5E-07	8.8E-05	3.0E-01 **	NA	2.6E-01	1.8E-03
Benzo(g,h,i)perylene	46	0.03 b	2.3E-04	1.2E-08	4.4E-05	3.0E-01 **	NA	2.6E-01	9.2E-04
Benzo(a)pyrene	73	0.03 b	3.6E-04	4.8E-08	7.1E-05	3.0E-01 **	NA	2.6E-01	1.5E-03
Chrysene	110	0.03 b	5.4E-04	6.2E-08	1.1E-04	3.0E-01 **	NA	2.6E-01	2.2E-03
Dibenzo(a,h)anthracene	14	0.03 b	6.9E-05	3.4E-09	1.4E-05	3.0E-01 **	NA	2.6E-01	2.8E-04
Indeno(1,2,3-c,d)pyrene	47	0.03 b	2.3E-04	1.0E-08	4.5E-05	3.0E-01 **	NA	2.6E-01	9.4E-04
Naphthalene	1,600	0.03 b	7.8E-03	2.9E-04	1.5E-03	4.0E-02	NA	3.4E-02	2.4E-01
Phenanthrene	470	0.03 b	2.3E-03	5.4E-06	4.5E-04	3.0E-01 **	NA	2.6E-01	9.4E-03
Inorganics									
Arsenic	7.0	0.01 a	3.4E-05	1.6E-09	2.3E-06	3.0E-04	NA	2.9E-04	1.2E-01
								HI	0.7

Footnotes appear on page 2.

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Table 4-7. Inhalation, Oral, and Dermal Soil Exposure Doses and Risk Calculations for a Hypothetical Future Utility Worker, Former Norfolk Gas Plant Site, Norfolk, Virginia.

a	Ryan et al., 1987.
b	ATSDR, 1990.
*	Subchronic RfD not available for benzene, chronic RfD used as a surrogate.
**	Oral reference dose was not available; subchronic reference dose for pyrene used as a surrogate.

ABS	Dermal absorption efficiency.	mg/kg-day	Milligrams per kilogram per day.
Cs	Constituent concentration in surface and subsurface soil.	NA	Not available.
CSF	Cancer slope factor.	NAP	Nor applicable.
HI	Hazard index (sum of HQs).	RfD	Reference dose.
HQ	Hazard quotient.	SExDd	Soil exposure dose for dermal contact.
ELCR	Excess lifetime cancer risk.	SExDi	Soil exposure dose for inhalation of particulates and vapors.
kg-day/mg	Kilogram-day/milligram.		
mg/kg	Milligrams per kilogram.	SExDo	Soil exposure dose for incidental ingestion.

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