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Administrative Record

**DATA SUMMARY REPORT
VANPORT, PENNSYLVANIA
WESTINGHOUSE ELECTRIC CORPORATION**

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**PAUL C. RIZZO ASSOCIATES, INC.
300 OXFORD DRIVE
MONROEVILLE, PENNSYLVANIA 15146
PHONE: (412) 856-9700
TELEFAX: (412) 856-9749**



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**DATA SUMMARY REPORT
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EXECUTIVE SUMMARY

Paul C. Rizzo Associates, Inc. (Rizzo Associates), on behalf of Westinghouse Electric Corporation (Westinghouse), has prepared this Data Summary Report for submittal to the Pennsylvania Department of Environmental Resources (PADER).

The field work proposed in the Work Plan dated May 1990 and the Addendum dated June 21, 1990, was initiated July 23, 1990. Both of these documents were approved by PADER in a letter dated July 18, 1990.

Upon completion of field activities outlined in the Work Plan, and review of analytical results, it is apparent that certain data gaps still remain and additional work must be accomplished before a hydrogeologic report can be prepared. Therefore, this report is designed to present the data, identify data gaps, and propose additional investigative work which is necessary to define groundwater conditions in the area.

This report describes the results of the work performed pursuant to the Work Plan and Addendum. Section 1.0 defines the investigation objectives. Section 2.0 describes the investigative field work performed, including the methods used to gather data. Section 3.0 presents the physical characteristics of the study area. Section 4.0 is a presentation of the data from environmental sampling and analyses. Section 5.0 presents recommendations for future activities which will address existing data gaps.

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1.0 INVESTIGATION OBJECTIVES

The objectives of this investigation were to obtain information necessary to assess the nature and extent of the compounds of interest (COI) in the saturated alluvium and to identify source areas (Figure 1). The specific tasks of this investigation were directly oriented to filling gaps in the existing data so that the objectives of the investigation could be fulfilled.

The information needed in order to understand the sources and nature and extent of the COI in the alluvial aquifer is as follows:

- Configuration of the aquifer near the well field;
- Groundwater levels and gradients;
- Hydraulic characteristics of the aquifer;
- Portion of the well field yield obtained via recharge from the Ohio River;
- Presence of COI in portions of the aquifer potentially affecting the Vanport Township Municipal Authority (VTMA) water supply;
- The potential for sources of COI in the fill placed in the Beaver Sand Company Quarry and near the well field; and
- The potential for sources of COI, both at the Westinghouse facility and areas west of the Westinghouse plant.

The investigation objectives were pursued by soil sampling and analysis, monitoring well installation, measurement of groundwater levels, sampling and analysis of groundwater from new and existing wells, excavation of test pits and collection and analysis of soil samples in the Beaver Sand Company Quarry, and an aquifer performance evaluation undertaken by monitoring surface water and groundwater levels at the VTMA well field. Section 2.0 describes in detail how the required information was obtained.



2.0 FIELD ACTIVITIES

The field activities planned to address the data gaps are described in the May 1990 Work Plan (Rizzo Associates, 1990) and the Addendum dated June 21, 1990. Aerial mapping, subsurface exploration (soil sampling by means of borings and test pits), monitoring well installation, surveying, groundwater sampling, water level measurement, and aquifer testing have been conducted in accordance with the approved Work Plan and Addendum and are discussed in detail in the following sections.

2.1 AERIAL MAPPING

A detailed base map of the study area was constructed using 1990 aerial photographs (Figure 2). The map has a scale of 200 feet per inch, with ground surface contours at two-foot intervals. The coordinate grid system established for horizontal control was tied into the State Plan Coordinate System. All elevations are relative to mean sea level (MSL).

2.2 SUBSURFACE EXPLORATION

Due to delays associated with obtaining landowner access agreements, the subsurface exploration program was conducted in three phases. A total of 24 borings were drilled, and monitoring wells were constructed in 13 of these borings. The location of the borings, including borings conducted by the PADER and borings conducted by Rizzo Associates as part of the remedial design investigation for the Westinghouse facility, are shown on Figure 3. The basis for boring and well locations was provided in the Work Plan and included a review of available historic aerial photographs. Boring logs and monitoring well installation details are included in Appendix A.

All borings were drilled by Pennsylvania Drilling Company of Pittsburgh, Pennsylvania. All drilling-related activities were performed under the guidance of a geologist or engineer from Rizzo Associates.

2.2.1 First Phase

The first phase of subsurface exploration was conducted on Westinghouse property between July 23, 1990 and August 7, 1990. A total of fifteen borings were drilled with six monitoring wells constructed.

An Acker Model AD-II and a CME Model 75 truck mounted drill rig were used for drilling, soil sampling and well installation. Drill cuttings were collected in 55-gallon drums when either volatile organic compounds (VOCs) were detected or their disposal at the boring location would have been visually obtrusive. Level D personal protection was employed for all activities. All personnel were trained in accordance with Occupational Safety and Health Administration (OSHA) requirements and were prepared to upgrade to Level C if necessary.

Borings were advanced with 8-inch outer diameter and 4 1/4-inch inner diameter hollow stem augers. Soil samples were collected using two-inch outer diameter split-barrel soil samplers driven with a 140-pound or 300-pound hammer. Soil samples recovered were collected in glass jars. The jars were covered tightly with aluminum foil and the lids secured. After at least one minute, the lid was removed and the foil was punctured with the probe of an HNU photo ionization detector (PID) equipped with a 10.2 eV lamp, drawing the air in the headspace of the jar through the PID. This test provided an estimate of total VOCs for the soil being tested. Elevated soil headspace readings that were above background were interpreted as potential contaminant source areas. Soil samples with headspace readings above background were placed in 80-ml glass jars provided by Wadsworth/ALERT Laboratories, and analyzed for VOCs and cyanide.

The respective methods of analysis of soils were:

- VOCs - USEPA SW846 Method 8240, and
- Cyanide - USEPA SW846 Method 9012.

After arriving on site, between every boring, and before leaving the site, all equipment was decontaminated with a high-pressure steam cleaner. Monitoring well screens and casings were also steam cleaned before installation. All decontamination was monitored by Rizzo Associates and conducted on a temporary decontamination pad constructed

on Westinghouse property for this purpose. Water from decontamination activities was collected, pumped into 55-gallon drums, and staged on Westinghouse property for proper disposal.

Cleaning of split-barrel soil samplers was performed at each boring location. The split-barrel samplers were scrubbed between sampling intervals with an Alconox soap solution, rinsed with potable water, and sprayed with methanol and deionized water. The samplers were allowed to air dry prior to reuse. All fluids generated by the decontamination procedure were collected in 55-gallon drums, sealed, and staged for proper disposal.

All monitoring wells constructed during the first phase were installed at the soil-bedrock interface and screened in the bottom ten feet of the boring, except MW 61A which is discussed below. These wells were designed to monitor groundwater present at the soil-bedrock interface.

Monitoring wells were constructed of two-inch inside diameter, Schedule 40 polyvinylchloride (PVC) casing with flush-threaded joints. The well screens were constructed of mechanically slotted (0.01 inch) PVC pipe. A sand filter pack was placed around the screened section to a depth a few feet above the top of the well screen. A bentonite seal was placed above the sand filter pack, and the remainder of the boring was tremie grouted with cement-bentonite grout. Each well was protected with a locking steel casing or a flush-mount road box and locking pressure cap. Upon completion, all wells were developed by bailing. Water from development was collected in 55-gallon drums, sealed, and staged for proper disposal.

Monitoring Wells MW 40, MW 41, and MW 42 (Figure 3) were installed northwest of the Beaver Sand Company Quarry. The borings were advanced to bedrock, and soil samples were collected at five-foot intervals. These borings and wells were installed to characterize the bedrock surface and to investigate the possibility of sources of VOCs northwest of the gravel pit.

Monitoring Well MW 52 (Figure 3) was installed north of the Westinghouse plant. The boring was advanced to bedrock, and soil samples were collected at 2.5-foot intervals. Well MW 52 was installed to investigate the possibility of a source of VOCs north of the plant.

Nine borings (B 53, B 54, B 55, B 56, B 57, B 58, B 59, B 60, and B 61) were installed to investigate the possibility of sources of VOCs southwest of the Westinghouse plant (Figure 3). The borings were advanced to bedrock, and soil samples were collected at 2.5-foot intervals. Upon completion, these borings were backfilled with cement-bentonite grout using the tremie method.

At boring location B 61, elevated soil headspace readings were observed in a shallow, partially saturated zone. A shallow monitoring well, MW 61A, was installed approximately 15 feet south of Boring B 61 to monitor the partially saturated zone. Monitoring Well MW 62 was installed at the northern limits of the parking lot area. Soil samples were taken at five-foot intervals. The boring was advanced to bedrock, and well screen was placed in the bottom ten feet of the well.

The boring and monitoring well locations are provided on Figure 3.

2.2.2 Second Phase

Upon receipt of additional landowner access agreements, the second phase of subsurface exploration was conducted near the VTMA well field between September 4, 1990 and October 5, 1990. Five monitoring wells were installed at the soil-bedrock interface. The borings for Monitoring Wells MW 47, MW 48, MW 49, MW 50 and MW 51 (Figure 3) were advanced to bedrock and soil samples collected at five-foot intervals.

The drilling, drill cutting disposal, soil sampling, decontamination, and well installation methods were the same as described for the first phase. However, no soil samples were sent to the laboratory for analysis because headspace readings above background were not encountered.

This phase was conducted to characterize aquifer conditions and groundwater quality and to evaluate the possibility of VOC sources in the vicinity of the well field. Monitoring Wells MW 47, MW 48, MW 49, and MW 50 were designed to communicate with the same stratigraphic unit as the VTMA pumping wells.

2.2.3 Third Phase

The third phase of subsurface exploration was conducted in the vicinity of the Beaver Sand Company Quarry (Figure 2) between August 27, 1991 and October 2, 1991. Four borings were advanced with monitoring wells installed in two of these borings. The purpose of the borings was to investigate the possibility of VOC sources in or near the fill along the walls of the former gravel pit. The monitoring wells were installed to characterize aquifer conditions and groundwater quality. Borings B 43 and B 44 were advanced to the water table with soil samples collected continuously. Upon completion, Borings B 43 and B 44 were backfilled with cement-bentonite grout using the tremie method. Borings for MW 45 and MW 46 were advanced to bedrock with soil samples collected continuously. Monitoring wells were screened in the bottom 20 feet of the boring across the soil-bedrock interface. The borings and monitoring well locations are shown on Figure 3.

The drilling, soil sampling, and well installation methods were the same as that described for the first and second phases of the subsurface exploration. Laboratory analyses for VOCs and cyanide were conducted on two samples of fill material for each of Borings B 43, B 44, and MW 45. However, the boring for Well MW 46 was advanced through natural soil, without observing headspace readings above background. Therefore, no laboratory analyses were conducted for soils from Boring MW 46.

Duplicate soil samples from Boring MW 45 were mailed to the Gannet-Fleming Environmental Engineers Laboratory on behalf of Mr. Crivelli, the owner of the property where the well was installed.

In addition to the borings, 20 test pits were excavated to evaluate the possibility of sources of VOCs and cyanide in the bottom of the Beaver Sand Company Quarry. The locations of these pits are shown on Figure 3. Locations were determined based on visual reconnaissance and review of historical aerial photographs of the former quarry. The test pits were excavated to a maximum depth of eight feet or to the top of the water table, if shallower, with the exception of Test Pit TP-20 which encountered concrete slabs at 1.0 foot and was terminated at that depth. A Caterpillar 384 backhoe was used to excavate the test pits and a Case 450 bulldozer was used to provide access for the backhoe. Test pits were backfilled with the excavated soil immediately after completion.

Soil samples were collected for each test pit at two-foot intervals and placed in jars covered with aluminum foil. Soil headspace readings were recorded using the same technique used for borings. Soil headspace readings above background were observed at only one test pit location (TP-13). Soil samples were collected from ten test pits and sent for laboratory analysis of VOCs and cyanide. A log of each test pit is provided in Appendix A.

2.3 GROUND SURVEYING

The existing PADER wells, VTMA Monitoring Wells V-1 and V-2, and all new borings, monitoring wells and test pits were surveyed for horizontal and vertical control. For monitoring wells, vertical elevations of the top of the protective casing, top of PVC riser pipe, and ground surface were determined to the nearest 0.01 foot. The results for ground surveying are presented on the representative boring log, test pit log or well installation detail (Appendix A).

2.4 GROUNDWATER SAMPLING AND ANALYSIS

October 16 through 18, 1991 groundwater samples were collected from 28 monitoring wells at the Vanport study area. Groundwater samples were delivered to Wadsworth/ALERT Laboratories where they were analyzed for VOCs and cyanide. The respective methods of analysis of groundwater were:

- VOCs - USEPA SW846 Method 624, and
- Cyanide - ASTM Method D-2036.

Prior to sampling, the water levels for all monitoring wells in the study area were obtained and well casing volumes were calculated. Each well was purged by bailing three well casing volumes of groundwater from the well with a clean bailer. The following wells were found to be dry and could not be sampled:

- MW 20,
- MW 41,
- MW 61A, and
- MW 5.

Also, Well MW 62 was found to have an obstruction at approximately 35.5 feet and could not be sampled. Well MW 62 was apparently vandalized as the locking protective cap was damaged.

After purging, VOC samples from each well were first collected in labeled sample bottles from a stainless steel bailer which was lowered to the bottom of the well. Cyanide samples were then collected in labeled sample bottles. Sodium hydroxide was added to the cyanide samples as a preservative. Finally, the field measurements of pH, conductivity, and temperature were recorded for each well using a Myron meter.

Samples collected for VOCs from Wells MW 47, MW 48, and MW 49 were split with Mr. Warren Clark, a representative of the VTMA. Also, VOC samples from Wells DER 3, DER 4, DER 6, DER 8, and DER 10 were split with Mr. Jeff Jones, a representative of the PADER.

Prior to sampling, between monitoring well samples, and at the conclusion of sampling, all stainless steel bailers were decontaminated by cleaning with an Alconox (soap) solution, rinsing with potable water, followed by a methanol spray and a deionized water spray. The bailers were then wrapped in aluminum foil.

For quality control measures, a duplicate sample was collected at Well MW 49. A matrix spike/matrix spike duplicate sample was collected at Well MW 17. A field blank was also collected from a decontaminated bailer using deionized water. An aqueous VOC trip blank accompanied each shipment of groundwater samples to Wadsworth/ALERT Laboratories.

Chain-of-custody procedures were maintained throughout the groundwater sampling activities. A water sample collection report was completed for each well and is included as Appendix B to this report. At the conclusion of sampling, another complete round of water levels was taken at all wells that were sampled during this sampling event (Table 1). The results from this sampling event were validated to assure that the data are accurate. The data validation results along with the analytical results are presented as Appendix C to this report.

2.5 WATER LEVEL MEASUREMENT

Water levels for all monitoring wells communicating with the saturated alluvium were measured prior to groundwater sampling on October 16 and 17, 1991, upon completion of groundwater sampling on October 18, 1991 and on January 31, 1992. Water levels were measured using calibrated electronic water level meters. All water levels were measured to the nearest 0.01 foot from the top of PVC casing. The water levels were converted to elevations in feet MSL. The results are presented in Table 1.

2.6 AQUIFER TESTING

An incremental aquifer performance test was performed at the VTMA well field in Vanport, Pennsylvania from October 29 through November 8, 1990. The location of the VTMA well field is shown on Figure 2.

The purpose of the test was to determine the transmissivity and storativity of the aquifer without disrupting the water supply function of the well field. During the test, Well VTMA-6 was pumped continuously from October 25, 1990 through 10:15 on November 2, 1990. At that point, VTMA-6 was turned off while VTMA-2 was simultaneously turned on. Throughout both portions of the test, Well VTMA-1 was turned on and off to keep up with demand on the system.

Table 2 presents a schedule of the times when the various pumps were turned on and off during the test, normalized to a time of zero at 10:15 on November 2, 1990. Well VTMA-1 most likely was turned on and off a few times between -8.0 and -3.5 days, although there is no record of these events. Although there was a period of time where data were not available, this did not prevent the performance of a complete or thorough analysis.

During the test, from 12:40 on October 29, 1990 through approximately 14:45 on November 8, 1990, water level changes in six wells (V-1, V-2, and MW 47 through MW 50) were monitored using pressure transducers connected to an In-Situ Model SE2000 environmental data logger. Water level changes in VTMA-1 were monitored from 10:00 on November 2, 1990 through 12:45 on November 8, 1990, also using pressure transducers connected to the SE2000. Hand measurements of water levels were taken throughout the test in these and other nearby wells to provide reference elevations

for the pressure transducer readings. In addition, water level changes in the Ohio River were monitored using a pressure transducer connected to an In-Situ Model SE1000B data logger. The reference elevation for the Ohio River readings was obtained through a direct survey of the water level in the river at the measurement point.

Figure 4 presents hydrographs of the eight stations monitored electronically. Several features are apparent in these hydrographs. First, many of the wells responded to the intermittent pumping from VTMA-1, particularly VTMA-1 itself, MW 48, MW 49, and MW 50. Second, the fluctuation of the water level in the Ohio River was not manifested in the monitoring wells. Finally, after 10:15 on November 2, 1990, some wells experienced an overall increase in water level (MW 47, MW 48, and V-2), while others experienced a decline (VTMA-1 and MW-49). Those that experienced an increase were closer to VTMA-6 than to VTMA-2, while the reverse was true for the wells in which water levels declined. Obviously, these changes were due to a net recovery or drawdown after the change in location of pumping.

The test was analyzed using a superposition solution of drawdowns due to the actual pumping wells and temporal and spatial image wells to account for the various wells turning on and off and recharge from the Ohio River. The superposition was carried out using a custom computer program written in Fortran and executed on Rizzo Associates' Sun Microsystems Unix workstation. The program was validated by comparing results for simple situations with hand calculations.

The analysis assumes that the alluvial aquifer at the well field has a uniform transmissivity and storativity. The procedure consisted of assuming a value for the transmissivity and storativity of the aquifer, calculating the response of the water table at each well using the superposition program, and comparing the calculated response to the measured response at each well. This process was repeated using different values of transmissivity and storativity until the best possible match was obtained between measured and calculated water table responses. In comparing the calculated and measured responses, emphasis was given to reproducing the response to the switch from pumping at VTMA-6 to pumping at VTMA-2 over reproducing the effects of intermittent pumping at VTMA-1 because the former effect is more representative of the overall large-scale properties of the aquifer.

The best fit between measured and calculated responses was obtained by using a transmissivity of 22,500 ft²/d and a storativity of 0.05. These are reasonable parameters for this aquifer. Figure 4 shows the calculated versus measured water table responses for the monitored wells. As these graphs show, the qualitative features of the water table response are able to be reproduced by the simulated curves for most of the wells. Two notable exceptions occur with VTMA Monitoring Wells V-1 and V-2. Well V-1 did not respond at all; given its proximity to the pumping wells it would be expected to respond strongly, as shown on Figure 4. This lack of response possibly indicates a lack of proper well development, and further water level and quality data from this well should be viewed as suspect. Well V-2 (Figure 4) exhibited a steady decline in water levels while pumping was occurring from VTMA-6, whereas the calculated water levels were in steady state during that time. However, both the measured and the calculated responses at time zero were similar, indicating that the well is probably functioning properly. The calculated drawdown in Well VTMA-1 was lower than measured (Figure 4). However, there are undoubtedly significant well losses in VTMA-1 as the pumping rate is quite large. This was not accounted for in the analysis.

The simulated capture zones were determined for different pumping scenarios as shown on Figure 5. Based upon the configuration and area of the capture zone, approximately 40 percent of the recharge to the VTMA well field comes from the Ohio River.

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

3.1 PHYSIOGRAPHY AND TOPOGRAPHY

The town of Vanport, Pennsylvania is located on a large alluvial terrace overlooking the Ohio River. Vanport is situated within the unglaciated portion of the Appalachian Plateaus Physiographic Province. Glacial ice sheets terminated their southern movement about ten miles north of the study area. Glacial till is not a constituent of the terrace and nearly all of the sediments are alluvial in nature.

Surface topography within the study area varies from relatively flat to steep, with an elevation ranging from approximately 682 to over 900 feet above MSL.

The bedrock wall of the Ohio River Valley rises to the north and northwest of the study area reaching an elevation of over 1,100 feet MSL in Brighton Township. The normal pool elevation of the Ohio River is 682 feet MSL. Two Mile Run, a small stream, flows southwest from the northeast corner of the township, discharging to the Ohio River (Figure 2).

3.2 GEOLOGY

Stratigraphic units above bedrock include fine-grained alluvial deposits, coarse-grained alluvial deposits with fine-grained lenses, and varying thicknesses of artificial fill. These units are discussed individually in the following sections.

3.2.1 Bedrock

Bedrock in the area includes shale, sandstone, and siltstone of the Pennsylvanian age Lower Allegheny Group and/or Upper Pottsville Group. Of these, shale was the predominant rock encountered in borings penetrating the uppermost bedrock unit. The numerous borings performed as part of this investigation and past investigations have identified a bedrock valley buried beneath unconsolidated deposits (Figure 6). This bedrock valley traverses the town of Vanport, Pennsylvania. The head of the bedrock valley is located at the Westinghouse facility. The axis of the bedrock valley is oriented N 15°E. Geologic cross sections depicting the shape of the bedrock valley are presented on Figures 7, 8, and 9.

3.2.2 Unconsolidated Deposits

Numerous borings and test pits performed at the study area as part of this investigation and previous studies have allowed for a detailed description of the large deposits of unconsolidated Quaternary alluvium, colluvium, and unnatural fill material present. Each of the stratigraphic units encountered at the site, including the fill material, is shown on Figures 7, 8 and 9 and described below.

3.2.2.1 Fine-Grained Deposits

Thin fine-grained deposits consisting of silty clay, clayey silt, and angular rock fragments lie above bedrock in the deepest portions of the bedrock valley. At the northeast portion of the Westinghouse property, fine-grained deposits are approximately 80 feet thick and represent the majority of natural soils present between bedrock and the ground surface. These deposits are believed to be colluvial in nature.

3.2.2.2 Coarse-Grained Deposits

In the well field and gravel pit areas and areas proximal to the Ohio River, coarse-grained deposits are encountered above fine-grained deposits overlying bedrock. These coarser deposits are comprised principally of sand and gravel with lenses of silt and clay and numerous angular rock fragments. Near the top of this unit, the sands are primarily fine-to-medium grained, orange to light brown in color, and contain smaller amounts of gravel than at deeper portions of this unit. These alluvial deposits represent the most extensive unit of unconsolidated deposits at the site (Figures 7, 8 and 9).

3.2.2.3 Fill

Fill is present at the ground surface in varying thicknesses across much of the study area. At the Westinghouse plant, fill is thickest along Two Mile Run, at up to 22 feet. The fill consists of cinders, slag, brick fragments, rock fragments, and variable amounts of sand, silt, and clay. The current slopes of the Beaver Sand Company Quarry also consist of fill, including construction debris, tar, household trash, ash, and granular material.

3.3 HYDROGEOLOGY

Groundwater levels in all monitoring wells were measured on October 16 and 17, 1991, October 18, 1991, and on January 31, 1992. Groundwater levels were consistent for all dates measured. These data are presented in Table 1. Depths to groundwater were converted to water table elevations and contoured. The resulting potentiometric surface map is shown on Figure 10.

Groundwater within the saturated alluvium contained in the bedrock valley is part of an unconfined aquifer which flows southwest with a hydraulic gradient of 0.0016 ft/ft. The approximate limit of the saturated alluvial zone is shown on Figure 10. The aerial extent of the saturated zone is controlled primarily by bedrock elevation. Groundwater present at the soil-bedrock interface outside the limits of the saturated alluvial zone follows the slope of the bedrock surface, eventually providing recharge to the alluvial aquifer.

Groundwater within the saturated alluvial aquifer discharges to the Ohio River, or, as shown on Figure 10, provides recharge to the VTMA production wells.

3.4 GROUNDWATER USAGE

The town of Vanport, Pennsylvania is currently supplied by five active groundwater wells operated by the VTMA. Presently, Well VTMA-3 is not utilized. The VTMA wells are located between the Beaver Sand Company Quarry and the Ohio River as shown on Figure 3.

4.0 PRESENTATION OF DATA

4.1 SOILS

A total of 26 subsurface soil samples were collected for laboratory analysis as part of this investigation. Soil samples were analyzed for VOCs and, in some instances, cyanide. The results are presented in Table 3.

Analytical results for soil samples indicate that VOCs were reported in a few locations at concentrations at or slightly above detection levels. Methylene chloride was the most prevalent compound detected. However, methylene chloride was present in numerous blank samples and is a known laboratory contaminant, especially at the observed low levels. Low levels of toluene, ethyl-benzene, and xylene (total) were also detected at a few locations at levels slightly above detection limits.

Chlorinated aliphatics, the primary COI in groundwater at the site, were present above method detection levels in only one soil sample. Soil Sample S-3 from Test Pit TP-13 (Figure 3) contained trichloroethene at 370 ug/kg; tetrachloroethane at 14 ug/kg; and 1,1,1-trichloroethane at 28 ug/kg. This test pit is located in the bottom of the eastern end of the Beaver Sand Company Quarry. The soil sample was collected six feet below ground surface.

Results for soil samples analyzed for cyanide indicate that cyanide was present in two soil samples above method detection limits. Sample S-12 of Boring B 44 was found to contain 1.8 ug/kg cyanide. This sample was collected from 22 to 24 feet below ground surface within the backfilled portion of the Beaver Sand Company Quarry. A soil sample collected beneath an existing storm sewer outlet within the backfilled portion of the Beaver Sand Company Quarry (TP-20, S-1) contained 0.87 ug/kg of cyanide. The remaining 14 soil samples analyzed for cyanide did not contain cyanide above method detection levels.

Boring B 43 was located adjacent to Monitoring Well DER 5 in an attempt to sample and analyze sludge reportedly encountered at a depth of 15.8 feet. No sludge was observed in samples collected from Boring B 43. A soil sample collected from 16 to 18 feet below ground surface did not contain VOCs or cyanide above method detection limits.

4.2 GROUNDWATER

As previously discussed, 28 monitoring wells were sampled and analyzed as part of this investigation. Groundwater samples were analyzed for VOCs and cyanide. A total of 10 wells sampled (MW 40, MW 13, MW 15A, DER 3, MW 47, MW 48, MW 49, MW 50, MW 51 and MW 52) were below method detection limits for all parameters analyzed. Wells MW 41, MW 5, MW 20 and MW 61A were dry and therefore could not be sampled. Well MW 62 has been vandalized and was also unable to be sampled. Groundwater analytical results are presented in Table 4.

Analytical results indicate that trichloroethene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA) were the primary compounds present in a number of the groundwater samples (Figure 11). Other VOCs were generally below method detection limits. Results for cyanide analyses indicate that only Well MW 12A contained cyanide above method detection limits. The reported level of cyanide in Well MW 12A was 0.02 mg/l, slightly above the method detection limit of 0.01 mg/l.

5.0 RECOMMENDATIONS

Rizzo Associates has performed the field work associated with the hydrogeologic investigation for Vanport, Pennsylvania. This entailed monitoring well drilling and installation, test pit excavation, soil sampling and analysis, aerial mapping, surveying, water level measurement, groundwater sampling and analysis, and data validation.

The results of activities conducted as part of this investigation indicate additional data gaps exist which must be addressed prior to forming conclusions related to groundwater conditions within the study area. The chlorinated aliphatics present in the groundwater consist of dense non-aqueous phase liquids (DNAPLs) which have a higher specific gravity than water. Therefore, there is a tendency for concentrations of these DNAPLs to sometimes stratify with depth and also to be higher in concentration along geologic contacts with varying permeability. This would include the soil/bedrock interface, as well as the contact between coarse and fine-grained (alluvium/colluvium) soils.

Many of the monitoring wells installed as part of the PADER investigation were screened at the top of the water table. The majority of monitoring wells installed as part of this investigation were screened at the bottom of the aquifer in order to communicate with the soil-bedrock interface. Given the nature of chlorinated aliphatics in groundwater, and analytical results from nested Wells DER 3 and DER 6 (Figure 11), it is apparent that additional assessment of contaminant stratification in the alluvial aquifer is necessary.

Based on these findings, Rizzo Associates is proposing to install two additional monitoring wells to communicate with the soil-bedrock interface at well locations DER 5 and DER 4 (Figure 3). These wells will more accurately characterize the concentrations of chlorinated aliphatics in groundwater at these locations at the soil/bedrock interface, which will be consistent with previously placed wells at this interval. This will provide necessary information in analyzing groundwater conditions within the study area.

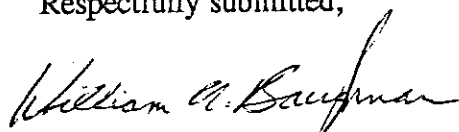
In addition to the two deep monitoring wells, Rizzo Associates is proposing to properly abandon damaged Well MW 62 and replace it with a new well identified as MW 62R (Figure 3). Also, in an effort to more thoroughly understand groundwater conditions

northwest of the Beaver Sand Company Quarry, we propose an additional monitoring well (MW-63) north of test Boring B 55 and three additional test borings (B 66, B 67 and B 68) northwest of MW-40 (Figure 3).

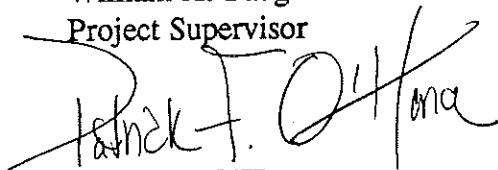
All of the proposed monitoring wells, along with wells MW 41, MW 61A, MW 20, and MW 5 which were dry during the previous sampling event in October, will be sampled, in accordance with the Work Plan. Soil samples exhibiting elevated headspace readings from Borings B 66, B 67, and B 68 will be analyzed for VOCs in accordance with the Work Plan.

These additional data will be used to aid in assessing the hydrogeologic conditions in the study area.

Respectfully submitted,



William A. Baughman
Project Supervisor



Patrick F. O'Hara
Vice President - Mid-Atlantic Region

WAB/PFO/jmc

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- Rizzo Associates, 1985, "Evaluation of Existing Conditions, Westinghouse Plant, Area A-9."
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- Rizzo Associates, 1990A, "Remedial Design Investigation, Westinghouse Electric Corporation, Beaver Facility."
- USGS, 1979, Topographic Map of the Beaver Quadrangle, 7.5 minute series.
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TABLES

TABLE 1
GROUNDWATER LEVELS
HYDROGEOLOGIC INVESTIGATION
VANPORT, PENNSYLVANIA

WELL NUMBER	WATER LEVEL ELEVATION (10-16/17-91)	WATER LEVEL ELEVATION (10-18-91)	WATER LEVEL ELEVATION (1-31-92)
PW 1	685.65 ^(a)	685.69	683.45
MW 5	Dry	Dry	699.63
MW 12A	686.59	686.57	* ^(c)
MW 13	761.63	761.69	761.13
MW 15A	736.92	735.75	736.45
MW 16A	712.50	712.77	712.65
MW 17	685.56	685.48	685.12
MW 18	709.38	709.32	709.22
MW 19	744.35	744.22	744.32
MW 20	Dry	Dry	Dry
MW 28	711.19	711.34	711.02
MW 40	749.83	749.82	750.40
MW 41	DRY	DRY	708.76
MW 42	718.49	718.45	718.20
MW 45	682.50	682.39	681.97
MW 46	682.78	682.64	682.40
MW 47	682.07	681.55	681.49
MW 48	681.04	680.83	681.07
MW 49	680.03	681.17	680.91
MW 50	681.68	681.76	681.52
MW 51	682.10	681.90	681.50
MW 52	785.30	785.38	785.73
MW 61A	Dry	Dry	Dry
MW 62 ^(b)	*	*	*
DER 1	682.34	682.24	681.93
DER 2	683.79	683.68	683.06
DER 3	682.14	682.11	681.79
DER 4	682.37	682.30	681.99
DER 5	684.23	684.19	683.77
DER 6	682.08	682.06	681.88
DER 7	696.20	696.19	696.14
DER 8	683.28	683.19	* ^(c)
DER 10	685.32	685.41	684.96

- a. Elevations are in feet above mean sea level.
b. Well MW-62 was damaged. No water level available.
c. Well was inaccessible. No water level available.

TABLE 2
SCHEDULE OF PUMPING - AQUIFER PERFORMANCE TEST
HYDROGEOLOGIC INVESTIGATION
VANPORT, PENNSYLVANIA

EVENT	TIME(DAYS) *
VTMA-6 ON	-8.000
VTMA-1 ON	-3.455
VTMA-1 OFF	-3.288
VTMA-1 ON	-2.823
VTMA-1 OFF	-2.726
VTMA-1 ON	-2.503
VTMA-1 OFF	-2.295
VTMA-1 ON	-1.955
VTMA-1 OFF	-1.872
VTMA-1 ON	-1.503
VTMA-1 OFF	-1.434
VTMA-1 ON	-0.997
VTMA-1 OFF	-0.830
VTMA-1 ON	-0.497
VTMA-1 OFF	-0.330
VTMA-6 OFF	0.000
VTMA-2 ON	0.000
VTMA-1 ON	0.165
VTMA-1 OFF	0.244
VTMA-1 ON	3.303
VTMA-1 OFF	3.383
VTMA-1 ON	3.470
VTMA-1 OFF	3.626
VTMA-1 ON	5.196
VTMA-1 OFF	5.283
VTMA-1 ON	5.571
VTMA-1 OFF	5.731

* Time 0.00 = 10:15 on November 2, 1990.

TABLE 3
SUMMARY OF ANALYTICAL RESULTS
SOIL SAMPLES (a)
VANPORT SITE

PARAMETER (b) Collection Date Sample Depth	UNITS (c) feet	MW 41,S-3 07/25/90 10-12	MW 41,S-9 07/25/90 40-41.5	MW 42,S-3 07/24/90 10-12	MW 42,S-9 07/24/90 40-40.1	B 53,S-5 07/25/90 10-12	B 53,S-21 07/25/90 50-50.3
Volatile Organic Compounds							
ACETONE	ug/kg	-- (d)	--	--	--	--	--
BENZENE	ug/kg	--	--	--	--	--	--
BROMODICHLOROMETHANE	ug/kg	--	--	--	--	--	--
BROMOFORM	ug/kg	--	--	--	--	--	--
BROMOMETHANE	ug/kg	--	--	--	--	--	--
2-BUTANONE	ug/kg	--	--	--	--	--	--
CARBON DISULFIDE	ug/kg	--	--	--	--	--	--
CARBON TETRACHLORIDE	ug/kg	--	--	--	--	--	--
CHLOROBENZENE	ug/kg	--	--	--	--	--	--
CHLORODIBROMOMETHANE	ug/kg	NA(e)	NA	NA	NA	NA	NA
CHLOROETHANE	ug/kg	--	--	--	--	--	--
CHLOROFORM	ug/kg	--	--	--	--	--	--
CHLOROMETHANE	ug/kg	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	ug/kg	--	--	--	--	--	--
1,1-DICHLOROETHANE	ug/kg	--	--	--	--	--	--
1,2-DICHLOROETHANE	ug/kg	--	--	--	--	--	--
1,1-DICHLOROETHENE	ug/kg	--	--	--	--	--	--
1,2-DICHLOROETHENE (total)	ug/kg	--	--	--	--	--	--
1,2-DICHLOROPROPANE	ug/kg	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	ug/kg	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	ug/kg	--	--	--	6 J	--	--
HYLBENZENE	ug/kg	--	--	--	--	--	--
1-HEXANONE	ug/kg	--	--	--	--	--	--
4-METHYL-2-PENTANONE	ug/kg	--	--	--	--	--	--
METHYLENE CHLORIDE	ug/kg	[1] B (f,g)	--	[4] B	[2] B	[5] B	--
STYRENE	ug/kg	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	ug/kg	--	--	--	--	--	--
TETRACHLOROETHENE	ug/kg	--	--	--	15 J	--	--
TOLUENE	ug/kg	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	ug/kg	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	ug/kg	--	--	--	--	--	--
TRICHLOROETHENE	ug/kg	--	--	--	--	--	--
VINYL ACETATE	ug/kg	--	--	--	--	--	--
VINYL CHLORIDE	ug/kg	--	--	--	15 J	--	--
XYLENE (total)	ug/kg	--	--	--	--	--	--
Inorganics							
CYANIDE	mg/kg	NA	NA	NA	NA	NA	NA

TABLE 3
(continued)

PARAMETER (b)	UNITS (c)	B 61,S-3	B 61,S-10	B 43,S-9	B 43,S-12	B 44,S-9	B 44,S-12
Collection Date		08/01/90	08/01/90	09/04/91	09/04/91	09/06/91	09/06/91
Sample Depth	feet	5-7	22.5-24.5	16-18	22-24	16-18	22-24
Volatile Organic Compounds							
ACETONE	ug/kg	18 B	--	[21]	--	110	--
BENZENE	ug/kg	--	--	--	--	--	--
BROMODICHLOROMETHANE	ug/kg	--	--	--	--	--	--
BROMOFORM	ug/kg	--	--	--	--	--	--
BROMOMETHANE	ug/kg	--	--	--	--	--	--
2-BUTANONE	ug/kg	--	--	--	--	--	--
CARBON DISULFIDE	ug/kg	--	--	--	--	--	--
CARBON TETRACHLORIDE	ug/kg	--	--	--	--	--	--
CHLOROBENZENE	ug/kg	--	--	--	--	--	--
CHLORODIBROMOMETHANE	ug/kg	NA	NA	--	--	--	--
CHLOROETHANE	ug/kg	--	--	--	--	--	--
CHLOROFORM	ug/kg	--	--	--	--	--	--
CHLOROMETHANE	ug/kg	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	ug/kg	--	--	NA	NA	NA	NA
1,1-DICHLOROETHANE	ug/kg	--	--	--	--	--	--
1,2-DICHLOROETHANE	ug/kg	--	--	--	--	--	--
1,1-DICHLOROETHENE	ug/kg	--	--	--	--	--	--
1,2-DICHLOROETHENE (total)	ug/kg	--	--	--	--	--	--
1,2-DICHLOROPROPANE	ug/kg	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	ug/kg	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	ug/kg	--	--	--	--	--	--
ETHYLBENZENE	ug/kg	--	--	--	--	--	--
HEXANONE	ug/kg	--	--	--	--	--	--
4-METHYL-2-PENTANONE	ug/kg	--	--	--	--	--	--
METHYLENE CHLORIDE	ug/kg	--	--	[3.6] B	--	--	--
STYRENE	ug/kg	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	ug/kg	--	--	--	--	--	--
TETRACHLOROETHENE	ug/kg	--	--	--	--	--	--
TOLUENE	ug/kg	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	ug/kg	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	ug/kg	--	--	--	--	--	--
TRICHLOROETHENE	ug/kg	--	--	--	--	--	--
VINYL ACETATE	ug/kg	--	--	NA	NA	NA	NA
VINYL CHLORIDE	ug/kg	--	--	--	--	--	--
XYLENE (total)	ug/kg	--	--	--	--	--	--
Inorganics							
CYANIDE	mg/kg	NA	NA	--	--	--	1.8

TABLE 3
(continued)

PARAMETER (b)	UNITS (c)	MW 45,S-2	MW 45,S-4	MW 45,S-13	MW 45,S-15	TP-2,S-3	TP-4,S-4	TP-6,S-1
Collection Date		09/10/91	09/10/91	09/10/91	09/10/91	09/30/91	09/30/91	09/30/91
Sample Depth	feet	2-4	6-8	24-26	28-30	4-6	6-8	0-2
Volatile Organic Compounds								
ACETONE	ug/kg	[20]	NA	--	NA	--	--	--
BENZENE	ug/kg	--	NA	--	NA	--	--	--
BROMODICHLOROMETHANE	ug/kg	--	NA	--	NA	--	--	--
BROMOFORM	ug/kg	--	NA	--	NA	--	--	--
BROMOMETHANE	ug/kg	--	NA	--	NA	--	--	--
2-BUTANONE	ug/kg	--	NA	--	NA	--	--	--
CARBON DISULFIDE	ug/kg	--	NA	--	NA	--	--	--
CARBON TETRACHLORIDE	ug/kg	--	NA	--	NA	--	--	--
CHLORO BENZENE	ug/kg	--	NA	--	NA	--	--	--
CHLORODIBROMOMETHANE	ug/kg	--	NA	--	NA	--	--	--
CHLOROETHANE	ug/kg	--	NA	--	NA	--	--	--
CHLOROFORM	ug/kg	--	NA	--	NA	--	--	--
CHLOROMETHANE	ug/kg	--	NA	--	NA	--	--	--
DIBROMOCHLOROMETHANE	ug/kg	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	ug/kg	--	NA	--	NA	--	--	--
1,2-DICHLOROETHANE	ug/kg	--	NA	--	NA	--	--	--
1,1-DICHLOROETHENE	ug/kg	--	NA	--	NA	--	--	--
1,2-DICHLOROETHENE (total)	ug/kg	--	NA	--	NA	--	--	--
1,2-DICHLOROPROPANE	ug/kg	--	NA	--	NA	--	--	--
CIS-1,3-DICHLOROPROPENE	ug/kg	--	NA	--	NA	--	--	--
TRANS-1,3-DICHLOROPROPENE	ug/kg	--	NA	--	NA	--	[2.5]	--
HYLBENZENE	ug/kg	--	NA	--	NA	--	--	--
HEXANONE	ug/kg	--	NA	--	NA	--	--	--
4-METHYL-2-PENTANONE	ug/kg	--	NA	--	NA	--	--	--
METHYLENE CHLORIDE	ug/kg	--	NA	--	NA	[4.8] B	[7.3] B	[7.1] B
STYRENE	ug/kg	--	NA	--	NA	--	--	--
1,1,2,2-TETRACHLOROETHANE	ug/kg	--	NA	--	NA	--	--	--
TETRACHLOROETHENE	ug/kg	--	NA	--	NA	[3.1]	14	9.6
TOLUENE	ug/kg	--	NA	--	NA	--	--	--
1,1,1-TRICHLOROETHANE	ug/kg	--	NA	--	NA	--	--	--
1,1,2-TRICHLOROETHANE	ug/kg	--	NA	--	NA	--	--	--
TRICHLOROETHENE	ug/kg	[4]	NA	--	NA	--	--	--
VINYL ACETATE	ug/kg	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	ug/kg	--	NA	--	NA	--	--	--
XYLENE (total)	ug/kg	--	NA	--	NA	[4.2]	6.1	--
Inorganics								
CYANIDE	mg/kg	NA	--	NA	--	--	--	--

TABLE 3
(continued)

PARAMETER (b)	UNITS (c)	TP-8,S-4	TP-11,S-4	TP-13,S-3	TP-15,S-4	TP-17,S-3	TP-19,S-3	TP-20,S-1
Collection Date		09/30/91	10/01/91	10/01/91	10/01/91	10/01/91	10/01/91	10/01/91
Sample Depth	feet	6-8	6-8	4-6	6-8	4-6	4-6	0-1
Volatile Organic Compounds								
ACETONE	ug/kg	--	--	--	--	--	--	[13]
BENZENE	ug/kg	--	--	--	--	--	--	--
BROMODICHLOROMETHANE	ug/kg	--	--	--	--	--	--	--
BROMOFORM	ug/kg	--	--	--	--	--	--	--
BROMOMETHANE	ug/kg	--	--	--	--	--	--	--
2-BUTANONE	ug/kg	--	--	--	--	--	--	--
CARBON DISULFIDE	ug/kg	--	--	--	--	--	--	--
CARBON TETRACHLORIDE	ug/kg	--	--	--	--	--	--	--
CHLOROENZENE	ug/kg	--	--	--	--	--	--	--
CHLORODIBROMOMETHANE	ug/kg	--	--	--	--	--	--	--
CHLOROETHANE	ug/kg	--	--	--	--	--	--	--
CHLOROFORM	ug/kg	--	--	--	--	--	--	--
CHLOROMETHANE	ug/kg	--	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	ug/kg	NA	NA	NA	NA	NA	NA	NA
1,1-DICHLOROETHANE	ug/kg	--	--	--	--	--	--	--
1,2-DICHLOROETHANE	ug/kg	--	--	--	--	--	--	--
1,1-DICHLOROETHENE	ug/kg	--	--	--	--	--	--	--
1,2-DICHLOROETHENE (total)	ug/kg	--	--	--	--	--	--	--
1,2-DICHLOROPROPANE	ug/kg	--	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	ug/kg	--	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	ug/kg	--	--	--	--	--	--	--
ETHYLBENZENE	ug/kg	--	--	--	--	--	--	[2.3]
n-HEXANONE	ug/kg	--	--	--	--	--	--	--
4-METHYL-2-PENTANONE	ug/kg	--	--	--	--	--	--	--
METHYLENE CHLORIDE	ug/kg	[3.8] B	[6.1] B	[20] B	[3.7] B	[4.1] B	[4.1] B	24 B
STYRENE	ug/kg	--	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	ug/kg	--	--	--	--	--	--	--
TETRACHLOROETHENE	ug/kg	--	--	[14]	--	--	--	--
TOLUENE	ug/kg	7.4	8.3	[28]	--	--	--	6.8
1,1,1-TRICHLOROETHANE	ug/kg	--	--	[28]	--	--	--	--
1,1,2-TRICHLOROETHANE	ug/kg	--	--	--	--	--	--	--
TRICHLOROETHENE	ug/kg	11	--	370	--	--	--	--
VINYL ACETATE	ug/kg	NA	NA	NA	NA	NA	NA	NA
VINYL CHLORIDE	ug/kg	--	--	--	--	--	--	--
XYLENE (total)	ug/kg	[2.3]	--	--	--	--	--	[3.2]
Inorganics								
CYANIDE	mg/kg	--	--	--	--	--	--	0.87

- Results reported on a dry-weight basis. Dry-weight equals as-received value divided by D, where D=(100-moisture content)/100.
- Soil samples collected between 07/24/90 and 08/01/90 were analyzed by Contract Laboratory Program (CLP) protocol for volatile organics. Volatile organic compound soil samples collected between 09/04/91 and 10/01/91 were analyzed by USEPA SW846 Method 8240. Cyanide soil samples collected between 09/04/91 and 10/01/91 were analyzed by USEPA SW846 Method 9012.
- "mg/kg" indicates milligrams per kilogram or parts per million (ppm); and "ug/kg" indicates micrograms per kilogram or parts per billion (ppb).
- "--" indicates the parameter was analyzed but not detected in the sample above quantitation limits.
- "NA" indicates the sample was not analyzed for this parameter.
- "[]" indicates the value reported approaches the instrument detection limit, value considered an estimate.
"B" indicates the parameter was not found substantially above the level detected in the blank.

TABLE 4
SUMMARY OF ANALYTICAL RESULTS
GROUNDWATER SAMPLES
VANPORT SITE

PARAMETER (a) Collection Date	UNITS (b)	WELL DER 1 10/17/91	WELL DER 2 10/18/91	WELL DER 3 10/17/91	WELL DER 4 10/17/91	WELL DER 5 10/18/91	WELL DER 6 10/17/91
Field Parameters (c)							
pH	SU	7.20	7.00	7.30	7.40	6.80	6.90
Conductivity	umhos/cm	840	1000	570	660	920	830
Temperature	°C	15.0	17.0	15.0	17.5	16.0	14.0
Volatile Organic Compounds							
ACROLEIN	ug/l	--(d)	--	--	--	--	--
ACRYLONITRILE	ug/l	--	--	--	--	--	--
BENZENE	ug/l	--	--	--	--	--	--
BROMODICHLOROMETHANE	ug/l	--	--	--	--	--	--
BROMOFORM	ug/l	--	--	--	--	--	--
BROMOMETHANE	ug/l	--	--	--	--	--	--
CARBON TETRACHLORIDE	ug/l	--	--	--	--	--	--
CHLOROBENZENE	ug/l	--	--	--	--	--	--
CHLOROETHANE	ug/l	--	--	--	--	--	--
2-CHLOROETHYLVINYL ETHER	ug/l	--	--	--	--	--	--
CHLOROFORM	ug/l	--	--	--	--	--	--
CHLOROMETHANE	ug/l	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	ug/l	--	--	--	--	--	--
1,2-DICHLOROBENZENE	ug/l	[4](e)	--	--	--	--	--
1,3-DICHLOROBENZENE	ug/l	--	--	--	--	--	--
1,4-DICHLOROBENZENE	ug/l	--	--	--	--	--	--
1,1-DICHLOROETHANE	ug/l	--	--	--	--	--	--
1,2-DICHLOROETHANE	ug/l	--	--	--	--	--	--
1,1-DICHLOROETHENE	ug/l	--	--	--	--	--	--
1,2-DICHLOROETHENE (total)	ug/l	--	--	--	--	--	--
1,2-DICHLOROPROPANE	ug/l	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	ug/l	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	ug/l	--	--	--	--	--	--
ETHYLBENZENE	ug/l	--	[45]	--	--	--	--
METHYLENE CHLORIDE	ug/l	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	ug/l	--	--	--	--	--	--
TETRACHLOROETHENE	ug/l	--	--	--	--	--	--
TOLUENE	ug/l	66	83	--	8.8	57	--
1,1,1-TRICHLOROETHANE	ug/l	--	--	--	--	--	--
1,1,2-TRICHLOROETHANE	ug/l	39	820	--	56	680	550
TRICHLOROETHENE	ug/l	--	--	--	--	--	--
TRICHLOROFUOROMETHANE	ug/l	--	--	--	--	--	--
VINYL CHLORIDE	ug/l	--	--	--	--	--	--
XYLENE (total)	ug/l	--	--	--	--	--	--
Inorganics							
CYANIDE	mg/l	--	--	--	--	--	--

TABLE 4
(continued)

PARAMETER (a)	UNITS (b)	WELL DER 7 10/17/91	WELL DER 8 10/17/91	WELL DER 10 10/17/91	WELL MW 12A 10/18/91	WELL MW 13 10/16/91	WELL MW 15A 10/16/91
Collection Date							
Field Parameters (c)							
pH	SU	7.30	6.75	6.80	6.20	6.25	6.50
Conductivity	umhos/cm	940	760	650	600	680	1600
Temperature	°C	15.0	15.0	16.0	18.0	18.0	14.0
Volatile Organic Compounds							
ACROLEIN	ug/l	--	--	--	--	--	--
ACRYLONITRILE	ug/l	--	--	--	--	--	--
BENZENE	ug/l	--	--	--	--	--	--
BROMODICHLOROMETHANE	ug/l	--	--	--	--	--	--
BROMOFORM	ug/l	--	--	--	--	--	--
BROMOMETHANE	ug/l	--	--	--	--	--	--
CARBON TETRACHLORIDE	ug/l	--	--	--	--	--	--
CHLOROBENZENE	ug/l	--	--	--	--	--	--
CHLOROETHANE	ug/l	--	--	--	--	--	--
2-CHLOROETHYLVINYL ETHER	ug/l	--	--	--	--	--	--
CHLOROFORM	ug/l	--	--	--	--	--	--
CHLOROMETHANE	ug/l	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	ug/l	--	--	--	--	--	--
1,2-DICHLOROBENZENE	ug/l	--	--	--	--	--	--
1,3-DICHLOROBENZENE	ug/l	--	--	--	--	--	--
1,4-DICHLOROBENZENE	ug/l	--	--	--	--	--	--
1,1-DICHLOROETHANE	ug/l	--	--	--	--	--	--
1,2-DICHLOROETHANE	ug/l	--	--	--	--	--	--
1,1-DICHLOROETHENE	ug/l	15	--	--	--	--	--
1,2-DICHLOROETHENE (total)	ug/l	--	--	--	--	--	--
1,2-DICHLOROPROPANE	ug/l	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	ug/l	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	ug/l	--	--	--	--	--	--
ETHYLBENZENE	ug/l	--	--	--	--	--	--
METHYLENE CHLORIDE	ug/l	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	ug/l	--	--	--	--	--	--
TETRACHLOROETHENE	ug/l	--	--	--	--	--	--
TOLUENE	ug/l	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	ug/l	320	--	--	--	--	--
1,1,2-TRICHLOROETHANE	ug/l	--	--	--	--	--	--
TRICHLOROETHENE	ug/l	42	220	17	680	--	--
TRICHLOROFLUOROMETHANE	ug/l	--	--	--	--	--	--
VINYL CHLORIDE	ug/l	--	--	--	--	--	--
XYLENE (total)	ug/l	--	--	--	--	--	--
Inorganics							
CYANIDE	mg/l	--	--	--	0.02	--	--

TABLE 4
(continued)

PARAMETER (a) Collection Date	UNITS (b)	WELL MW 16A 10/16/91	WELL MW 17 10/18/91	WELL MW 18 10/17/91	WELL MW 19 10/17/91	WELL MW 28 10/17/91	WELL MW 40 10/16/91
Field Parameters (c)							
pH	SU	6.85	6.50	6.30	6.20	7.20	6.05
Conductivity	umhos/cm	465	900	940	700	1130	475
Temperature	°C	14.0	16.0	14.0	18.0	15.0	15.0
Volatile Organic Compounds							
ACROLEIN	ug/l	--	--	--	--	--	--
ACRYLONITRILE	ug/l	--	--	--	--	--	--
BENZENE	ug/l	--	--	--	--	--	--
BROMODICHLOROMETHANE	ug/l	--	--	--	--	--	--
BROMOFORM	ug/l	--	--	--	--	--	--
BROMOMETHANE	ug/l	--	--	--	--	--	--
CARBON TETRACHLORIDE	ug/l	--	--	--	--	--	--
CHLOROENZENE	ug/l	--	--	--	--	--	--
CHLOROETHANE	ug/l	--	--	--	--	--	--
2-CHLOROETHYL VINYL ETHER	ug/l	--	--	--	--	--	--
CHLOROFORM	ug/l	--	--	--	--	--	--
CHLOROMETHANE	ug/l	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	ug/l	--	--	--	--	--	--
1,2-DICHLOROENZENE	ug/l	--	--	--	--	--	--
1,3-DICHLOROENZENE	ug/l	--	--	--	--	--	--
1,4-DICHLOROENZENE	ug/l	--	--	[4.1]	--	--	--
1,1-DICHLOROETHANE	ug/l	--	--	--	--	--	--
1,2-DICHLOROETHANE	ug/l	--	--	13	31	--	--
1,1-DICHLOROETHENE	ug/l	--	--	--	--	--	--
1,2-DICHLOROETHENE (total)	ug/l	--	--	--	--	--	--
1,2-DICHLOROPROPANE	ug/l	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	ug/l	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	ug/l	--	--	--	--	--	--
ETHYLBENZENE	ug/l	--	--	--	--	--	--
METHYLENE CHLORIDE	ug/l	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	ug/l	--	--	--	--	--	--
TETRACHLOROETHENE	ug/l	--	--	--	--	--	--
TOLUENE	ug/l	--	--	--	--	[18]	--
1,1,1-TRICHLOROETHANE	ug/l	--	130	130	320	--	--
1,1,2-TRICHLOROETHANE	ug/l	--	--	--	--	--	--
TRICHLOROETHENE	ug/l	8.2	3100	11	[13]	300	--
TRICHLOROFLUOROMETHANE	ug/l	--	--	--	--	--	--
VINYL CHLORIDE	ug/l	--	--	--	--	--	--
XYLENE (total)	ug/l	--	--	--	--	--	--
Inorganics							
CYANIDE	mg/l	--	--	--	--	--	--

TABLE 4
(continued)

PARAMETER (a) Collection Date	UNITS (b)	WELL	WELL	WELL	WELL	WELL	FB 1 10/17/91
		MW 49D 10/16/91	MW 50 10/17/91	MW 51 10/17/91	MW 52 10/16/91	PW 1 10/18/91	
Field Parameters (c)							
pH	SU	7.80	7.00	7.00	7.20	6.30	5.30
Conductivity	umhos/cm	580	410	975	500	560	9.5
Temperature	°C	18.0	13.0	18.0	14.0	16.0	13.0
Volatile Organic Compounds							
ACROLEIN	ug/l	--	--	--	--	--	--
ACRYLONITRILE	ug/l	--	--	--	--	--	--
BENZENE	ug/l	--	--	--	--	--	--
BROMODICHLOROMETHANE	ug/l	--	--	--	--	--	--
BROMOFORM	ug/l	--	--	--	--	--	--
BROMOMETHANE	ug/l	--	--	--	--	--	--
CARBON TETRACHLORIDE	ug/l	--	--	--	--	--	--
CHLORO BENZENE	ug/l	--	--	--	--	--	--
CHLOROETHANE	ug/l	--	--	--	--	--	--
2-CHLOROETHYL VINYL ETHER	ug/l	--	--	--	--	--	--
CHLOROFORM	ug/l	--	--	--	--	--	--
CHLOROMETHANE	ug/l	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	ug/l	--	--	--	--	--	--
1,2-DICHLORO BENZENE	ug/l	--	--	--	--	--	--
1,3-DICHLORO BENZENE	ug/l	--	--	--	--	--	--
1,4-DICHLORO BENZENE	ug/l	--	--	--	--	--	--
1,1-DICHLOROETHANE	ug/l	--	--	--	--	--	--
1,2-DICHLOROETHANE	ug/l	--	--	--	--	--	--
1,1-DICHLOROETHENE	ug/l	--	--	--	--	--	--
1,2-DICHLOROETHENE (total)	ug/l	--	--	--	--	--	--
1,2-DICHLOROPROPANE	ug/l	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	ug/l	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	ug/l	--	--	--	--	--	--
ETHYLBENZENE	ug/l	--	--	--	--	--	--
METHYLENE CHLORIDE	ug/l	--	--	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	ug/l	--	--	--	--	--	--
TETRACHLOROETHENE	ug/l	--	--	--	--	--	--
TOLUENE	ug/l	--	--	--	--	--	--
1,1,1-TRICHLOROETHANE	ug/l	--	--	--	--	[4.4]	--
1,1,2-TRICHLOROETHANE	ug/l	--	--	--	--	--	--
TRICHLOROETHENE	ug/l	--	--	--	--	200	--
TRICHLOROFLUOROMETHANE	ug/l	--	--	--	--	--	--
VINYL CHLORIDE	ug/l	--	--	--	--	--	--
XYLENE (total)	ug/l	--	--	--	--	--	--
Inorganics							
CYANIDE	mg/l	--	--	--	--	--	--

- a. Analysis of volatile organic compounds utilized USEPA SW846 Method 624. Analysis of cyanide utilized ASTM method D2
- b. "SU" indicates standards units; "umhos/cm" indicates micromhos per centimeter; "°C" indicates degrees centigrade; "mg/l" indicates milligrams per liter or parts per million (ppm); and "ug/l" indicates micrograms per liter or parts per billion (ppb).
- c. Reported values are field measurements.
- d. "--" indicates the parameter was analyzed but not detected in the sample above quantitation limits.
- e. "[]" indicates the value reported approaches the instrument detection limit, value considered an estimate.
- f. "B" indicates the parameter was not found substantially above the level detected in the blank.

TABLE 4
(continued)

PARAMETER (a)	UNITS (b)	WELL MW 42 10/16/91	WELL MW 45 10/18/91	WELL MW 46 10/18/91	WELL MW 47 10/16/91	WELL MW 48 10/16/91	WELL MW 49 10/16/91
Collection Date							
Field Parameters (c)							
pH	SU	7.10	7.00	7.50	7.65	7.90	7.80
Conductivity	umhos/cm	800	1000	1000	650	500	580
Temperature	°C	13.0	16.0	11.0	14.0	14.0	13.0
Volatile Organic Compounds							
ACROLEIN	ug/l	--	--	--	--	--	--
ACRYLONITRILE	ug/l	--	--	--	--	--	--
BENZENE	ug/l	--	--	--	--	--	--
BROMODICHLOROMETHANE	ug/l	--	--	--	--	--	--
BROMOFORM	ug/l	--	--	--	--	--	--
BROMOMETHANE	ug/l	--	--	--	--	--	--
CARBON TETRACHLORIDE	ug/l	--	--	--	--	--	--
CHLOROBENZENE	ug/l	--	--	--	--	--	--
CHLOROETHANE	ug/l	--	--	--	--	--	--
2-CHLOROETHYLVINYL ETHER	ug/l	--	--	--	--	--	--
CHLOROFORM	ug/l	--	--	--	--	--	--
CHLOROMETHANE	ug/l	--	--	--	--	--	--
DIBROMOCHLOROMETHANE	ug/l	--	--	--	--	--	--
1,2-DICHLOROBENZENE	ug/l	--	--	--	--	--	[3.1]
1,3-DICHLOROBENZENE	ug/l	--	--	--	--	--	--
1,4-DICHLOROBENZENE	ug/l	--	--	--	--	--	--
1,1-DICHLOROETHANE	ug/l	--	--	--	--	--	--
1,2-DICHLOROETHANE	ug/l	--	--	--	--	--	--
1,1-DICHLOROETHENE	ug/l	12	--	--	--	--	--
1,2-DICHLOROETHENE (total)	ug/l	--	--	--	--	--	--
1,2-DICHLOROPROPANE	ug/l	--	--	--	--	--	--
CIS-1,3-DICHLOROPROPENE	ug/l	--	--	--	--	--	--
TRANS-1,3-DICHLOROPROPENE	ug/l	--	--	--	--	--	--
ETHYLBENZENE	ug/l	--	--	--	--	--	--
METHYLENE CHLORIDE	ug/l	[11] B	[4.9] B	--	--	--	--
1,1,2,2-TETRACHLOROETHANE	ug/l	--	--	--	--	--	--
TETRACHLOROETHENE	ug/l	--	--	--	--	--	--
TOLUENE	ug/l	--	[3.1]	--	--	--	--
1,1,1-TRICHLOROETHANE	ug/l	340	10	62	--	--	--
1,1,2-TRICHLOROETHANE	ug/l	--	--	--	--	--	--
TRICHLOROETHENE	ug/l	11	8.1	740	--	--	--
TRICHLOROFLUOROMETHANE	ug/l	--	--	--	--	--	--
VINYL CHLORIDE	ug/l	--	--	--	--	--	--
XYLENE (total)	ug/l	--	--	--	--	--	--
Inorganics							
CYANIDE	mg/l	--	--	--	--	--	--