Project No. 88-537
May 1989

Paul C. Rizzo Associates, Inc.
CONSULTANTS

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Report

Hydrogeologic Study
Area A-9

Beaver Facility

Westinghouse Electric Corporation
Pittsburgh, Pennsylvania

Paul C. Rizzo Associates, Inc.
CONSULTANTS

May 12, 1989

Project No. 88-537

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Transmittal
Report
Hydrogeologic Study
Area A-9, Beaver Facility

Dear Ms. LeGoullon:

We are hereby transmitting ten copies of the above-cited report. Please contact me should you have any questions or comments.

Respectfully submitted,

Patrick F. O'Hara
Vice President

PFO/dlm
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REPORT
HYDROGEOLOGIC STUDY
AREA A-9 - BEAVER FACILITY
WESTINGHOUSE ELECTRIC CORPORATION

PROJECT NO. 88-537
MAY 11, 1989

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TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF TABLES
(Continued)

LIST OF FIGURES

REPORT
HYDROGEOLOGIC STUDY
AREA A-9 - BEAVER FACILITY
WESTINGHOUSE ELECTRIC CORPORATION

1.0 INTRODUCTION

This report summarizes the results of a field investigation conducted by Paul C. Rizzo Associates, Inc. (Rizzo Associates) in Area A-9 of Westinghouse Electric Corporation's Beaver facility. Previous studies (Rizzo Associates, 1985 and 1986a) documented the presence of localized perched zones of both high-pH and low-pH groundwater containing silver and cyanide. Groundwater samples collected by the Pennsylvania Department of Environmental Resources (PADER) and Westinghouse during June and July 1988 indicate that volatile organic compounds (VOCs) are also present in the subsurface in Area A-9.

The scope of work for this study was consistent with the March 12, 1987 Revised Remedial Action Plan (Rizzo Associates, 1987) and Modifications to Revised Remedial Action Plan (Rizzo Associates, 1988). The purpose of the investigation was to:

- Acquire information on the nature and extent of inorganic constituents in the subsurface of the A-9 area;
- Obtain data on the groundwater flow direction in the deep saturated unit associated with the soil-bedrock interface;
- Gather data on the nature and extent of VOCs in soil and perched groundwater in the A-9 area; and
- Obtain information on the occurrence of VOCs in the saturated unit associated with the soil-bedrock interface.

Included in the investigation were drilling, sampling, and chemical analysis of soils samples from ten borings; installation of five new monitoring wells; chemical analysis of groundwater samples from new and existing wells; and the abandonment of two wells.

2.0 SITE HISTORY AND RESULTS FROM PREVIOUS INVESTIGATIONS

The Beaver facility was originally operated by Curtiss Wright during World War II to manufacture airplane propellers. In the area currently known as A-9, a building bay existed which was used to access railroad cars outside the actual plant structure. After purchase of the plant by Westinghouse, Area A-9 was constructed in 1953 by placing a floor over approximately four feet of backfill and enclosing the area.

Although it is currently used as a steel drum staging area, Area A-9 was once used by Westinghouse for electroplating copper and aluminum bus bars with silver. Wastes from the operation were temporarily stored in five brick-lined, reinforced concrete holding tanks located approximately 20 feet outside of the plant, south of Area A-9. The acid and cyanide rinsewaters were piped directly to separate tanks which functioned as equalizer tanks prior to piping the rinse water to the on-site treatment facility. Acid, cyanide, and alkaline wastes were also piped to separate holding tanks and collected by a transporter for off-site disposal.

In 1983 seepage of acidic liquid was noted in the vicinity of the acid waste tank and in October 1983 a subsurface investigation was conducted around the tanks to investigate the leakage. Analysis of samples taken from one of the borings, B-4 (Figure 1), detected low pH (<3) groundwater adjacent to the acid waste tank (see Table 11). In a fifth boring drilled during November 1983 (Boring B-1A), a high (>10) pH groundwater containing cyanide was encountered.

In January 1984 the outside storage tanks were emptied and their use was discontinued. Two additional borings were drilled during February 1984, one encountering high pH fluids (Boring B-1B) and the other showing no anomalies (Boring B-2B). During July 1984, the pipelines connecting the plant facilities with these tanks were either plugged or removed and new PVC lines were installed to convey acid and cyanide rinsewater directly from the sumps to the wastewater treatment plant bypassing tank storage.

The outside storage tanks were removed during June of 1985. Following removal, the soil under the tanks was sampled, analyzed, and found to contain cyanide. As a result of these findings, an investigation of the area was undertaken to assess conditions of concern more fully. A deep boring (B-5) and three shallow borings (B-6, B-7, and B-8) were drilled during October 1985. Results from this study are presented in Rizzo Associates' May 28, 1986 report (Rizzo Associates, 1986a) which was submitted to PADER in June of 1988. Principal findings of this investigation were:

- Two distinct water-bearing zones underlie the A-9 Area. These zones are 1) a zone of perched groundwater at depths from 10 to 25 feet having highly variable characteristics over very short horizontal distances; and 2) a zone of saturation associated with the soil-bedrock interface at a depth of approximately 70 feet.

- Two distinct types of highly localized effects were confirmed in the perched groundwater zone. The findings of the earlier investigations regarding two distinct types of effected perched water ("high pH and low pH") were confirmed.

- The horizontal and vertical extent of the perched water having constituents of concern were further defined but not fully bounded.

- Groundwater samples from the zone of apparent continuous saturation associated with the soil-bedrock interface (Well B-5) were not adversely impacted by the inorganic constituents detected in the overlying perched groundwater zone.

In order to mitigate the potential for off-site transport of contaminants in the perched groundwater zone, long-term pumping of Wells B-1B, B-4, and B-6 began in June 1986. A comprehensive remedial action plan was prepared by Rizzo Associates (Rizzo Associates, 1986b) and submitted to PADER in July 1986. At the request of PADER, a revised remedial action plan was prepared (Rizzo Associates, 1987) and submitted to PADER in March 1987. The revised plan included an investigative portion to define the extent of inorganic contamination and a section identifying remedial actions. PADER did not approve or provide comments on the revised remedial plan.

Groundwater samples from both groundwater zones were collected and analyzed for organic compounds by the PADER and Westinghouse during June and July 1988. VOCs were detected in samples taken from wells which monitor perched groundwater and from the zone of continuous saturation associated with the soil-bedrock interface. Because of the occurrence of VOCs, a modification to the investigative portion of the Revised Remedial Action Plan (Rizzo Associates, 1988) was made to include an assessment of VOCs. This report presents the results of that investigation.

3.0 DESCRIPTION OF FIELD INVESTIGATION

The field investigation was performed following procedures described in the Revised Remedial Action Plan (Rizzo Associates, 1987) and Modifications to Revised Remedial Action Plan (Rizzo Associates, 1988) as conditionally approved by PADER on August 10, 1988. The planned investigation included drilling borings to better define the thickness and extent of the perched water bearing zones encountered in previous investigations. Initial boring locations were to the south and southwest of Area A-9 in what was believed to be the fringe of the area of inorganic interest. Field tests were performed on soil samples to determine pH and the presence of cyanide and VOCs. If field tests indicated subsurface cyanide and/or VOCs, additional boring(s) were to be drilled on Westinghouse property further from the A-9 area, to attempt to delineate limits of contamination.

At the outer limits of contamination (or edge of the property line), shallow wells were planned to be installed to monitor the perched groundwater. Wells were not to be installed when there was contamination as determined by the field screening tests or when there were no water bearing zones encountered. Borings at which no wells were to be installed were sealed by tremie grouting.

In addition to the shallow wells, two monitor wells were planned to be installed to define and monitor groundwater quality in the first zone of continuous saturation, i.e., the zone monitored by Well B-5 associated with the soil-bedrock interface. These wells were located such they could be used in conjunction with existing Well B-5 to determine the hydraulic gradient in the saturated zone overlying bedrock.

Selected soil samples collected during the field investigation were analyzed at NUS Laboratories for inorganic and volatile organic parameters. Groundwater samples were also collected from existing and newly-installed monitoring wells during the investigation and analyzed at the laboratory.

The investigation was completed as planned with minor exceptions to accommodate conditions as actually encountered. This section describes the actual performance of the field investigation.

3.1 DRILLING AND SOIL SAMPLING

The drilling program consisted of a total of 10 soil borings. Three of these were drilled to bedrock. The remaining seven were shallow borings intended to define conditions in shallow subsurface. Boring locations are shown on Figures 1 and 2. Drilling was performed by Terra Testing and supervised by Rizzo Associates.

3.1.1 Drilling and Soil Sampling Methods

A CME 55 truck-mounted drill rig was used to advance 4 1/4-inch I.D., eight-inch O.D. continuous flight hollow-stem augers. Soil samples were collected with two-inch diameter split barrel Standard Penetration Test (SPT) samplers driven with a 140-pound hammer falling freely through a height of 30 inches. The number of blows required to drive the sampler each six inches for a total depth of 24 inches was recorded.

Geotechnical samples were collected on 2.5-foot centers from ground surface to the bottom of each boring. At Boring B-12, samples were collected at five-foot centers after the first 20 feet. The riser on Well B-12 was inadvertently damaged after well construction. Because the well could not be properly sampled, a replacement well (B-12A) was drilled 11 feet away. Soil samples were taken at 10-foot centers from Boring B-12A.

3.1.2 Soil Sample Collection and Analysis

After visual inspection and geotechnical classification of the split barrel soil samples, a geotechnical sample was collected and placed in a properly labeled glass jar. Geotechnical descriptions are summarized in the boring logs included as Appendix A. A sample jar from the analytical laboratory, NUS, was also filled for selected soil samples to analyze for soil pH, cyanide, silver, sulfate, nitrate, and chloride concentrations in accordance with the Revised Remedial Action Plan.

In addition to laboratory testing, field tests were performed on the soil samples. An approximate soil pH was determined on a 1:1 soil/water slurry. The slurry was prepared by combining roughly 15 ml of soil and 15 ml of distilled water and shaking the mixture in a closed jar for approximately two minutes. Litmus paper was then used to determine the soil pH.

For soil samples with a pH greater or equal to seven, a 1:10 soil/NaOH solution slurry was prepared for cyanide analysis by combining 10 ml of soil with 100 ml of 0.01 Molar NaOH and mixing in a closed jar for approximately two minutes. The mixture was then allowed to settle for several minutes prior to filtering through a 0.5 micron filter using a hand operated vacuum pump. Hach Cyanide Test Kit procedures were followed on the filtered water. The color of the water after adding the reagents was compared to the value on the color comparator disc. The color disc reads values from 0 to 0.3 mg/l of free cyanide. A few cyanide tests were also performed on soil samples with pH less than seven as a spot check.

A field headspace reading was also performed on each soil sample by placing a piece of aluminum foil tightly over the lip of the sample jar, waiting approximately two minutes, breaking the aluminum foil seal with the HNu probe, and recording the peak response from the instrument. The soil sample having the highest headspace reading from each boring was sent to NUS labs to be analyzed for the VOCs on the Target Compound List. All samples for laboratory analysis were placed in a cooler on ice and delivered to the NUS laboratory for analysis.

3.1.3 Equipment Decontamination

he drilling rig, tools, augers and related equipment were cleaned upon entering the site at an on-site decontamination area. The decontamination area consisted of several layers of plastic sheeting placed on concrete. Water falling on the sheeting drained into a sump and from there was pumped into barrels. The decontamination procedure consisted of steam cleaning with a Liquinox detergent solution followed by steam cleaning with potable water. Potable water used on site was obtained from the water system serving Terra Testing's shop. The steam cleaning procedure was performed as needed to ensure that clean augers, rods, and drill bits were used at each boring. Steam cleaning was also performed at the end of the job on all equipment.

Split barrel samplers were cleaned at the drill site after each use. The procedure consisted of a Liquinox detergent solution scrub, spraying with methanol, a potable water rinse, and spraying the sampler with distilled water.

3.2 MONITORING WELL INSTALLATION

Six monitoring wells were installed as part of this investigation. Installation diagrams for these wells provided in Appendix B. Three of these (B-9B, B-10A, and B-11) were installed to monitor the perched water zone. It was recognized during drilling that these wells would be marginal in terms of yield. However, they were installed to document the limits of perched water and could yield representative samples of the perched zone in "non drought" conditions. Borings B-12 (and its replacement B-12A) and B-13 were completed as wells to monitor the groundwater zone associated with the soil-bedrock interface. No wells were installed at Borings B-9, B-9A, B-10, and B-14. Borings B-9 and B-10 were grouted because soil headspace readings indicated that they were not beyond the limits of VOC contamination. Borings B-9A and B-14 were grouted because of insufficient water to set a well.

Monitoring wells were constructed with two-inch I.D., threaded, flush joint, Schedule 40 PVC riser pipe and two-inch I.D., threaded, flush joint, Schedule 40 well screen with No. 10 (0.010-inch) slots. The PVC pipe at Boring B-12 was damaged at a depth of 11.5 feet from the ground surface after well construction. Therefore, when replacing the damaged well with B-12A, a 20-foot section of stainless steel riser pipe was joined to the PVC riser adjacent to the depth where damage occurred.

A bentonite seal was installed at the bottom of Borings B-9B, B-10A, and B-11 prior to placement of well screen and riser pipe to mitigate the potential carry-down of chemical constituents. Well screen and riser pipe were lowered inside the hollow-stem augers. After the riser pipe and well screen were positioned at the appropriate depth, Best Sand's No. 430 coarse silica sand was placed to a depth of one to two feet above the top of the well screen. A three-foot bentonite seal was placed above the sand pack. The remaining annular space was tremie grouted with a cement bentonite mixture consisting of one 94-pound bag of cement, seven gallons of water and between three and five pounds of bentonite. This mixture was also used for grouting in borings where wells were not set. A locking six-inch I.D. steel protective casing set in a concrete pad completed the installation. For Well B-12A a 7 1/2-inch I.D. flush mounted steel protective casing with locking PVC cap was used due to traffic.

Monitoring wells were developed by bailing with stainless steel bailers. Complete well evacuation was achieved or a minimum of seven well volumes were removed from each well. Bailers used for well development were cleaned prior to each use with a Liquinox detergent scrub, a potable water rinse, spraying with methanol, followed by spraying with distilled water.

3.3 WELL ABANDONMENT

Wells B-8 and B-12 were abandoned during the installation program. Well B-8 had been installed as part of the previous investigation and never yielded sufficient water for sampling. Well B-12 was damaged and could not be properly sampled. The abandonment procedure consisted of pulling out the protective steel casing, PVC riser, and PVC screen; drilling out the hole with hollow-stem augers; and tremie grouting the hole with cement-bentonite grout. Because the PVC riser and screen could not be pulled out at Well B-12, it was drilled out with a hollow-stem auger and the hole was tremie grouted.

3.4 GROUNDWATER SAMPLING

After the new monitoring wells were installed, groundwater samples were collected from Wells B-1, B-1A, B-4, B-5, B-6, B-7, B-12A, and B-13 (October 13, 1988). Samples were not collected from Wells B-1B, B-2B, B-9B, B-10A, and B-11 because of insufficient water encountered during this sampling event. A sampling team from the PADER was present to collect split samples.

Prior to sample collection three well volumes were removed from Wells B-12A and B-13. Because B-4 and B-6 are routinely pumped and the water treated by Westinghouse, purging was not performed prior to sampling. Wells B-1, B-1A, B-5, and B-7 were not purged prior to sampling because they contained a very small amount of water and they recharge very slowly. Before removing water from the wells, the static water level in each well was measured with an M-scope to establish the potentiometric surface and to determine the well volume. The M-scope was cleaned after each use by spraying with distilled water and wiping with a paper towel.

Purging and sampling equipment consisted of stainless steel bailers lowered and raised using polypropylene rope. Each bailer was decontaminated prior to use by first wiping its surface with an acetone saturated cloth, followed by a Liquinox detergent solution scrub, a potable water rinse, spraying with methanol and spraying with distilled water. Bailers were wrapped in aluminum foil immediately after decontamination and were unwrapped just prior to use. The sample from Well B-4 was obtained by means of peristaltic pump tubing because the blocked casing prohibited lowering a bailer into the well.

Samples from Wells B-12A and B-13 were analyzed for sulfate, nitrate, chloride, and Priority Pollutants excluding herbicides, pesticides, and PCBs. Because of the small volume of water in Wells B-4, B-6, and B-7, only VOA vials could be filled and were analyzed for Priority Pollutant VOCs. Well B-1 had sufficient water to analyze for Priority Pollutant Metals and VOCs. Well B-1A had sufficient water to analyze for cyanide, and sulfate. Water from Well B-5 was analyzed for Priority Pollutant VOCs and cyanide. Samples were also analyzed in the field for pH, specific conductance, and temperature when there was sufficient volume to do so.

A field blank was collected on site by filling a clean bailer with distilled water. The water (rinsate) was then transferred to the sample bottle. This procedure was repeated until all bottles were filled. Specific conductance, pH, and temperature were measured and recorded at the time of collection. A trip blank for VOC analysis was prepared by the lab and was stored with the other samples. A duplicate sample was collected from Well B-13. All samples were stored in a cooler on ice immediately after sample collection and delivered to the NUS lab on the same day as sample collection.

A second sampling round occurred approximately six weeks after the first round (December 1, 1988). Samples were collected from the newly-installed wells. Wells B-9 and B-10A were dry. Samples were collected from Wells B-12A and B-13 using the same procedure as for the first round and were analyzed for Priority Pollutant VOCs. In addition, Westinghouse opted to collect samples from Wells B-1 and B-1A. PADER representatives collected a split sample from Well B-12A.

3.5 HEALTH AND SAFETY

To protect against equipment hazards and possible dermal exposure to hazardous substances during drilling, well installation, and well abandonment, site personnel wore disposable coveralls, steel toe boots, boot covers, inner gloves, outer gloves, safety glasses, and a hard hat. Boot covers and outer gloves were decontaminated after use with a soapy water scrub. Disposable coveralls and inner gloves were double bagged and were disposed in accordance with applicable requirements.

To monitor possible inhalation exposure, an HCN gas monitor and an HNu meter were used to monitor the breathing zone in the work area during drilling operations. No HCN or organic vapors were measured in the breathing zone, therefore, respiratory protection was not utilized.

3.6 MANAGEMENT OF RESIDUE

Drill cuttings, decontamination water, and purge water were collected and placed in labeled 55-gallon drums, sealed, and transported to an on-site staging area in the hazardous materials section of the plant. Material determined to be hazardous based upon laboratory analysis will be transported to a licensed waste disposal facility.

4.0 HYDROGEOLOGIC ANALYSIS

4.1 HYDROGEOLOGICAL SETTING

The Westinghouse Plant in Beaver, Pennsylvania is located adjacent to a large alluvial terrace overlooking the Ohio River. As the glacial ice sheets terminated their southern movement about 10 miles north, glacial till is not a constituent of the terrace and nearly all of the sediments are alluvial in nature. Regional information concerning terraces along the Ohio River indicates that the terrace deposits consist of sand and gravel capped with about a 50-foot thickness comprised predominantly of silt. The alluvial aquifer associated with this terrace does not appear to be directly under the plant, but is reportedly present between the plant and the Ohio River, where the alluvium may be in excess of 150 feet thick.

4.2 SITE STRATIGRAPHY

The ten borings performed as part of this study allow for a more refined interpretation of site conditions than that presented in previous reports (Rizzo Associates, 1985 and 1986). Each of the stratigraphic units encountered at the site are described below.

4.2.1 Fill

Silt and clay to a thickness of 8 to 15 feet appear to be present irregularly across much of the plant, including Area A-9. Based on the visual classification of soil samples, the presence of rock fragments, cinders, brick fragments, etc., indicate that much of this surficial material is fill. Some sand and gravel beneath this material is also probably fill. Total fill thickness in Area A-9 ranges between 13 and 21 feet.

4.2.2 Fine Sand

A layer of orange to light brown, fine to medium sand found in all of the Area A-9 borings appears to represent the top of natural ground. This material is silty in places and occasionally contains rounded pebbles. The thickness of this unit varies between 13 and 19 feet.

4.2.3 Sand and Gravel

The bedrock surface under the site is blanketed by a layer of sand and gravel which contains some silt, clay, and abundant angular rock fragments. This material is poorly sorted and may in part be colluvial in nature (i.e., material that has moved down slope from surrounding hillsides).

4.2.4 Bedrock

Borings to bedrock in different parts of the plant have encountered either sandstone or shale of the Pennsylvanian age Allegheny Group. Bedrock is frequently within 20 feet of the surface along the northwestern side of the plant. Sporadic borings in other parts of the plant indicate the bedrock surface is irregular, but generally deepens toward the Ohio River. Borings in Area A-9 indicated depths to bedrock of 63.5 feet at Boring B-5 and 88.5 feet at Boring B-12.

4.3 SITE HYDROGEOLOGY

Groundwater occurrence in the A-9 area includes both a perched water zone (<35 feet deep) and a saturated zone (60-80 feet) that occurs at or near bedrock. Hydrogeologic characteristics of these two zones are discussed below.

4.3.1 Perched Groundwater

The occurrence of perched groundwater in Area A-9 is erratic. The presence of between 10 and 20 feet of fill in Area A-9 helps explain the highly variable soil conditions and sporadic occurrence of perched groundwater. Most of the perched groundwater encountered appears to be present within the fill. It is probable that a very thin layer of relatively low permeability material separates these two zones, although such a layer was not confirmed during this investigation. In several borings, wet sand and gravel was observed to directly overlie essentially dry natural soils.

Water levels in perched zones are currently significantly lower than those measured during December 1985 (Table 21 indicates measured depths to groundwater). This is likely the result of the continuous pumping and treating of the perched water that began in June 1986 as well as a decrease in precipitation over the past year.

4.3.2 Deep Saturated Unit

A deep saturated unit beneath Area A-9 occurs in silty and clayey sand and gravel immediately above the bedrock. The saturated thickness is less than 10 feet. Water level measurements from the three deep borings indicate that the groundwater flows in a southerly direction (toward the Ohio River) with possible discharge being into the alluvial aquifer mentioned in Section 4.1.

5.0 CHEMICAL ANALYSIS RESULTS

5.1 SUBSURFACE SOIL

Selected soil samples were analyzed for the parameters described in Section 3.1.2. Tables 1 through 10 summarize the results from these analysis. The results of the analyses are discussed by type of parameter.

5.1.1 Volatile Organic Compounds (VOCs)

One or more of the VOCs 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (TCA), and trichloroethene (TCE) were found in samples taken from three of the ten site borings. Acetone and methylene chloride were also detected in several samples, but these substances are common laboratory contaminants and were often detected in laboratory blanks.

The highest TCE concentration was found in Boring B-9A in the wet sand fill above the dry natural sand. Also found in this sample were low concentrations of 1,1-DCE and TCA. In a sample 10 feet lower, within the dry natural sand layer, no TCE; 1,1-DCE; or TCA were detected. Headspace readings were higher in the natural sand layer, indicating VOCs occur in their gaseous state in this layer. TCA and TCE were also detected in the sand fill of Boring B-10. Levels just above the TCE detection limit were found in the sand and gravel fill of B-11.

5.1.2 Cyanide

Cyanide was detected in samples from the sand fill zone of Borings B-9 and B-11. These concentrations were significantly lower than those measured in samples taken from B-6 and B-7 during the previous investigation (Rizzo Associates, 1986a). Borings on the outer fringes of the study area (B-9A, B-9B, B-10, B-10A, B-12, B-12A, and B-14) showed no evidence of cyanide contamination. Figure 3 shows the approximate limit of anomalous cyanide concentrations in the soil.

5.1.3 Silver

The highest silver concentration was measured in a sample taken from the fill layer in Boring B-11. All of the other soil samples showed concentrations less than or slightly above the detection limit.

5.1.4 pH

Soil pH values were consistent in samples taken from most of the new borings. A majority of soil samples pH values indicated slightly acidic conditions in the primarily dry silty clay/clayey silt fill. Neutral conditions occur in the wet sand and gravel fill and in the natural soil zones.

The only boring with unusual soil pH values was B-11. In this boring all samples, except one, were slightly basic. The sample taken in the moist sand and gravel fill was acidic.

5.1.5 Sulfate

Soil sulfate concentrations measured during this study were higher than for previous investigations. For most borings, concentrations were highest in the fill layer and decreased significantly in the natural sand layer. The upgradient boring, B-13, also had high soil sulfate concentrations, indicating that the values detected are probably not indicative of environmental contamination.

5.1.6 Nitrate

A few anomalously high nitrate values were measured in the fill material of Borings B-9A, B-12, and B-14.

5.1.7 Chloride

The only chloride concentration above the detection limit was found in the first two feet of the upgradient Boring B-13.

5.2 GROUNDWATER

Section 3.4 describes the methods used to collect groundwater samples and the parameters for sample analysis. Results of these analysis are given in Tables 18 and 19. Analytical results for sampling performed by NUS during July 1988 are presented in Tables 16 and 17. Groundwater sampling data from previous investigations is given in Tables 11 through 15. The results of these analyses are discussed by type of parameter.

5.2.1 VOCs

TCE was detected in samples from all of the perched zone monitoring wells, with the highest occurrences in Wells B-1 and B-7. TCE was also detected in Wells B-5 and B-12A which monitor the deep saturated zone.

Other VOCs detected in most of the perched zone monitoring wells were 1,1-DCA; 1,1-DCE; and TCA. In addition to these compounds 1,1-dichloroethane (1,1-DCA); 1,2-dichloroethane (1,2-DCA); 1,2-dichloroethene (1,2-DCE); methyl chloride; methylene chloride; and toluene were erratically detected in perched zone monitoring wells. Methyl chloride, methylene chloride and toluene were detected infrequently and at low concentrations.

Because all of the wells sampled in the A-9 area contained TCE and related VOCs, the limits of occurrence could not be determined. Shallow wells on the fringes of the monitored area (B-9B, B-10A, and B-11) yielded insufficient water for sampling.

TCE was the only contaminant detected in the deep saturated zone (Wells B-5 and B-12A).

5.2.2 Cyanide

In previous studies, cyanide was detected in all of the wells monitoring the shallow perched water zone. No samples from new shallow wells were collected for cyanide analysis during this study because there was insufficient water in the new shallow wells (B-9B, B-10A, and B-11). The samples collected from the deep wells detected no cyanide.

5.2.3 Other Parameters

Other analysis performed on samples from the new wells included acid and base neutral extractables, metals, chloride, nitrate, and sulfate. Results from these analysis showed no anomalous concentrations.

5.3 PADER SAMPLING OF VANPORT WELLS

PADER provided analytical results of the sampling of production and test wells in the Vanport Municipal Authority well field, and are presented in Table 20. This table shows concentrations of VOCs detected using a GC/MS scan. Results from the test wells differ significantly from the production wells. Test well samples contain ethyl benzene, methylene chloride, toluene, and xylene in addition to TCA and TCE. The methods PADER used to collect samples from the test and production wells are not known.

6.0 SUMMARY OF FINDINGS

A summary of the findings of this investigation is as follows:

- The perched groundwater zone appears to be very limited in extent in the A-9 Area. Of the 10 wells which monitor this zone, four are dry. Most of the remaining water producing wells can be bailed dry after removal of a very small quantity of water (less than 0.25 liters). This is believed to be a result of the ongoing pumping and treatment program for Wells B-1B, B-4, and B-6 and/or lack of precipitation.

- Chemical constituents of interest were detected primarily in moist or wet sand and gravel fill. This material is generally found at a depth of 10 to 20 feet from the ground surface. Analytical data do not indicate migration of inorganic constituents of interest into the unsaturated sand found beneath the fill.

- Various VOCs were detected in the perched groundwater zone. In addition to TCE and TCA, related compounds such as 1,1,-DCE; 1,1-DCA; 1,2-DCA; and 1,2-DCE were detected in the shallow wells. As VOCs were detected in a soil sample from the fill from Boring B-9A, the extent of this occurrence south of Area A-9 is not apparent. The shallow occurrence of VOCs appears to be bounded east of Area A-9 by Boring B-14 and to the west by Boring B-12.

- Cyanide appears not to have migrated from the plant site. The area currently known to be contaminated is a localized perched zone surrounded by borings showing no anomalous cyanide concentrations (B-9A, B-9B, B-10A, B-12, B-12A, and B-14). The approximate limit of anomalous cyanide concentrations is shown on Figure 3. Cyanide was not detected in the zone of continuous saturation associated with the soil-bedrock interface.

- Flow direction in the zone of continuous saturation is generally towards the river. The Vanport Water Authority well field is located adjacent to the bank of the Ohio River.

- Groundwater samples from the zone of continuous saturation in Area A-9 contain TCE at less than 1 ppm. Other VOC constituents detected in the perched groundwater were not detected in the zone of continuous saturation.
- VOCs were not detected in soil samples taken from the natural soil layers beneath the fill.
- Ethyl benzene was detected in the Vanport Municipal Authority wells in addition to toluene, xylene, TCE and related compounds. Ethyl benzene was not detected in any of the samples collected from the A-9 area. Of all the VOC constituents reported in the municipal well field, only TCE was detected in the zone of continuous saturation at Area A-9 of the Westinghouse property.

In summary, the occurrence of inorganic groundwater contamination in Area A-9 appears to be highly localized and has not been detected in continuous groundwater units. The inorganic constituents do not appear to extend to the property line. Past and ongoing remediation appears successful.

The occurrence of VOCs in shallow, discontinuous groundwater has been detected in Area A-9. The units monitored are highly localized both laterally and vertically, and the full extent of apparent contamination has not been bounded in one direction.

The occurrence of VOCs has been confirmed with respect to TCE. TCE was detected in the zone of continuous saturation beneath Area A-9. The samples obtained from this zone at the A-9 Area do not indicate the presence of other VOCs detected in the Vanport Municipal Wellfield nor in the overlying zone of perched groundwater.

Respectfully submitted,

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Asst. Project Engineer

Patrick F. O'Hara
Vice President

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Rizzo Associates, 1987, "Revised Remedial Action Plan, Westinghouse Plant, Area A-9," report prepared for Westinghouse Electric Corporation, Paul C. Rizzo Associates, Inc., Pittsburgh, PA, March 12.

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TABLES

TABLES

TABLE 1

ANALYTICAL RESULTS OF SOIL SAMPLES TAKEN FROM BORING B-9

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)(1)	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)(2)
1	0 - 2	<200	0.72	<10	500	<1	5.1	N/A(3)
2	2.5 - 4.5	<200	0.37	<10	440	<1	5.4	N/A
3	5 - 7	<200	0.38	14	860	<1	4.5	N/A
4	7.5 - 9.5	<200	0.71	<10	640	<1	4.9	N/A
5	10 - 12	<200	24	<10	1060	<1	6.7	N/A
6	12.5 - 14.5	<200	0.71	<10	960	<1	6.6	Methylene Chloride 11B(4)
7	15 - 17	<200	0.48	<10	1230	<1	6.5	N/A
8	17.5 - 19.5	<200	0.27	<10	750	<1	6.3	N/A
9	20 - 22	<200	<0.25	13	480	<1	6.4	N/A

---

1. mg/kg = milligrams per kilogram or parts per million.
2. ug/kg = micrograms per kilogram or parts per billion.
3. N/A = Not Analyzed.
4. B indicates compound was detected in laboratory blank.

TABLE 2

ANALYTICAL RESULTS OF SOIL SAMPLES TAKEN FROM BORING B-9A

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)(1)	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)(2)
1	0 - 2	<200	<0.25	26	1410	<1	7.1	N/A(3)
2	2.5 - 4.5	<200	<0.25	72	240	<1	4.4	N/A
3	5 - 7	<200	<0.25	13	630	1	4.5	N/A
4	7.5 - 9.5	<200	0.35	<10	2000	<1	4.5	N/A
5	10 - 12	<200	<0.25	<10	620	<1	6.5	N/A
6	12.5 - 14.5	<200	0.30	<10	1000	<1	6.3	Acetone 42 1,1-Dichloroethene 5 Methylene Chloride 16B(4) 1,1,1-Trichloroethane 8 Trichloroethene 230
7	15 - 17	<200	0.30	<10	<400	<1	7.9	N/A
8	17.5 - 19.5	<200	<0.25	11	<400	1	7.2	N/A
9	20 - 22	<200	<0.25	<10	<400	<1	6.8	N/A
10	22.5 - 24.5	<200	0.28	12	440	1	6.7	Methylene Chloride 9B

---

1. mg/kg = milligrams per kilogram or parts per million.
2. ug/kg = micrograms per kilogram or parts per billion.
3. N/A = Not Analyzed.
4. B indicates compound was detected in laboratory blank.

TABLE 3

ANALYTICAL RESULTS OF SOIL SAMPLES TAKEN FROM BORING B-9B

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)(1)	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)(2)
1	10 - 12	<200	0.63	<10	950	1	4.8	N/A(3)
2	12.5 - 14.5	<200	0.25	<10	<400	1	6.3	Acetone 120B(4) Methylene Chloride 26B

---

1. mg/kg = milligrams per kilogram or parts per million.
2. ug/kg = micrograms per kilogram or parts per billion.
3. N/A = Not Analyzed.
4. B indicates compound was detected in laboratory blank.

TABLE 4

ANALYTICAL RESULTS OF SOIL SAMPLES TAKEN FOR BORING B-10

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)(1)	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)(2)
1	0 - 2	<200	0.90	<10	3900	4	7.5	N/A(3)
2	2.5 - 4.5	<200	<0.25	<10	1100	<1	5.6	N/A
3	5 - 7	<200	<0.25	<10	780	1	4.6	N/A
4	7.5 - 9.5	<200	<0.25	<10	770	2	4.5	N/A
5	10 - 12	<200	1.4	26	1900	1	6.6	1,1,1-Trichloroethane 22 Trichloroethene 75
6	12.5 - 14.5	<200	0.31	32	1300	<1	6.4	N/A

---

1. mg/kg = milligrams per kilogram or parts per million.
2. ug/kg = micrograms per kilogram or parts per billion.
3. N/A = Not Analyzed.

TABLE 5

ANALYTICAL RESULTS OF SOIL SAMPLES TAKEN FROM BORING B-10A

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)[1]	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)[2]
1	0 - 2	<200	0.48	36	1500	<1	7.2	N/A[3]
2	2.5 - 4.5	<200	<0.25	23	1100	<1	5.4	N/A
3	5 - 7	<190	0.35	20	850	<1	4.6	N/A
4	7.5 - 9.5	<190	0.25	14	540	<1	4.6	N/A
5	10 - 12	<190	0.55	50	310	<1	5.3	N/A
6	12.5 - 14.5	<200	0.49	<10	1200	<1	6.7	N/A
7	15 - 17	<200	<0.25	10	390	<1	6.2	N/A
8	17.5 - 19.5	<200	0.30	10	600	<1	6.5	N/A
9	20 - 22	<200	0.26	14	720	<1	6.3	N/A
10	25 - 27	<200	<0.25	10	1200	<1	6.5	N.D.[4]
11	27.5 - 29.5	<200	0.59	12	930	<1	6.3	N/A

---

1. mg/kg = milligrams per kilogram or parts per million.
2. ug/kg = micrograms per kilogram or parts per billion.
3. N/A = Not Analyzed.
4. N.D. = No Target Compound List volatiles detected.

TABLE 6

ANALYTICAL RESULTS OF SOIL SAMPLES TAKEN FROM BORING B-11

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)(1)	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)(2)
1	0 - 2	<200	4.7	<10	1400	<1	8.0	N/A(3)
2	2.5 - 4.5	<200	0.29	<10	1800	<1	8.3	N/A
3	5 - 7	<200	0.51	<10	1100	3.9	8.4	N/A
4	7.5 - 9.5	<200	0.45	<10	1400	<1	8.2	N/A
5	10 - 12	<200	0.37	<10	1200	<1	8.2	N/A
6	12.5 - 14.5	<200	0.37	<10	2000	<1	8.2	N/A
7	15 - 17	<200	2.7	<10	1600	12	8.1	N/A
8	17.5 - 19.5	<200	18	<10	1100	1	3.8	Trichloroethene 8
9	20 - 22	<200	0.55	<10	400	1	8.0	N/A

---

1. mg/kg = milligrams per kilogram or parts per million.
2. ug/kg = micrograms per kilogram or parts per billion.
3. N/A = Not Analyzed.

TABLE 7

ANALYTICAL RESULTS OF SOIL SAMPLES TAKEN FROM BORING B-12

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)(1)	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)(2)
1	2.5 - 4.5	<190	<0.3	14	350	<1	8.9	N/A(3)
2	5 - 7	<200	0.3	18	580	<1	4.4	N/A
3	7.5 - 9.5	<200	<0.3	<10	600	<1	4.8	N/A
4	10 - 12	<200	0.4	140	320	<1	5.0	N/A
5	12.5 - 14.5	<180	<0.3	<10	530	<1	5.7	Acetone 35 Methylene Chloride 38B(4)
6	15 - 17	<180	<0.3	<10	610	<1	6.0	N/A
7	17.5 - 19.5	<200	0.6	<10	270	<1	5.7	N/A
8	20 - 22	<190	<0.3	22	160	<1	6.3	N/A
9	25 - 27	<180	<0.3	15	180	<1	6.5	N/A
10	30 - 32	<200	<0.3	11	270	<1	7.1	N/A
11	35 - 37	<200	<0.3	12	240	<1	6.6	N/A

TABLE 7
(Continued)

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)(1)	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)(2)
12	40 - 42	<190	<0.3	19	160	<1	6.6	N/A
13	45 - 47	<190	<0.3	36	170	<1	7.2	N/A
14	50 - 52	<190	<0.3	13	190	<1	6.7	N/A
15	55 - 57	<200	<0.3	<10	270	<1	6.2	N/A
16	60 - 62	<200	<0.3	<10	340	<1	6.1	N/A
17	65 - 67	<190	<0.3	<10	220	<1	6.0	N/A
18	70 - 72	<190	<0.3	12	200	<1	6.2	N/A
19	75 - 77	<200	<0.3	<10	250	<1	6.3	N/A
20	80 - 82	<200	<0.3	30	280	<1	6.1	N/A
21	85 - 87	<200	<0.5	<10	2100	<1	7.2	Acetone 12B Methylene Chloride 9B

---

1. mg/kg = milligrams per kilogram or parts per million.
2. ug/kg = micrograms per kilogram or parts per billion.
3. N/A = Not Analyzed.
4. B indicates compound was detected in laboratory blank.

TABLE 8

ANALYTICAL RESULTS OF SOIL SAMPLES TAKEN FROM BORING B-12A

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)(1)	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)(2)
1	10 - 12	<200	<0.25	<10	<400	<1	6.3	N/A(3)
2	20 - 22	<200	0.35	<10	470	<1	6.2	N/A
3	30 - 32	<200	0.15	<10	1270	<1	7.5	N/A
4	40 - 42	<200	0.64	<10	1580	<1	8.5	N/A
5	50 - 52	<200	0.24	<10	610	<1	6.9	N/A
6	60 - 62	<200	0.15	16	830	<1	6.4	N/A
7	70 - 72	<200	0.20	18	560	<1	6.7	N/A
8	80 - 82	<200	0.16	<10	<400	<1	6.9	N/A
9	85 - 87	<200	0.50	13	<400	<1	6.7	Acetone 73B(4) Methylene Chloride 9B
10	87.5 - 88.8	<200	0.19	<10	<400	<1	6.8	N/A

---

1. mg/kg = milligrams per kilogram or parts per million.
2. ug/kg = micrograms per kilogram or parts per billion.
3. N/A = Not Analyzed.
4. B indicates compound was detected in laboratory blank.

TABLE 9

ANALYTICAL RESULTS OF SOIL SAMPLES TAKEN FROM BORING B-13

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)(1)	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)(2)
1	0 - 2	360	<0.25	<10	2100	<1	5.8	N/A(3)
2	2.5 - 4.5	<200	<0.25	<10	2000	<1	6.4	N/A
3	5 - 7	<200	0.42	<10	4100	6	6.5	N/A
4	7.5 - 9.5	<200	0.43	<10	4600	<1	6.5	N/A
5	10 - 12	<200	<0.25	<10	1600	<1	7.0	N/A
6	12.5 - 14.5	<200	<0.25	<10	890	<1	6.8	N/A
7	15 - 17	<200	<0.25	<10	1000	<1	6.2	Acetone 18B(4)

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1. mg/kg = milligrams per kilogram or parts per million.
2. ug/kg = micrograms per kilogram or parts per billion.
3. N/A = Not Analyzed.
4. B indicates compound was detected in laboratory blank.

TABLE 10

ANALYTICAL RESULTS OF SOIL SAMPLES TAKEN FROM BORING B-14

SAMPLE NUMBER	DEPTH (feet)	CHLORIDE (mg/kg)(1)	CYANIDE (mg/kg)	NITRATE (mg/kg as N)	SULFATE (mg/kg)	SILVER (mg/kg)	pH (in water)	TARGET COMPOUND LIST VOLATILES DETECTED (ug/kg)(2)
1	0 - 2	<200	4.2	37	950	<1	6.0	N/A(3)
2	2.5 - 4.5	<200	0.34	43	480	<1	4.3	N/A
3	5 - 7	<200	<0.25	25	550	6.0	5.0	N/A
4	7.5 - 9.5	<200	<0.25	<10	1500	<1	5.4	N/A
5	10 - 12	<200	1.50	<10	800	1	6.4	N/A
6	12.5 - 14.5	<200	<0.25	32	390	<1	5.9	N/A
7	15 - 17	<200	0.31	44	790	<1	5.5	N.D.(4)
8	17.5 - 19.5	<200	0.27	70	310	<1	4.8	N/A

---

1. mg/kg = milligrams per kilogram or parts per million.
2. ug/kg = micrograms per kilogram or parts per billion.
3. N/A = Not Analyzed.
4. N.D. = No Target Compound List volatiles detected.

TABLE 11

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES COLLECTED DURING 1983

	WELL			
PARAMETER(1)	B-1 (10/83)	B-4 (2) (10/83)	B-4 (3) (10/83)	B-4 (11/83)
pH	7.4	2.6/3.2(4)	2.1	3.0
Residual Chlorine	N/A(5)	N/A	160	650
Cyanide	N/A	11	49	250
Nitrate	N/A	N/A	N/A	6440
Sulfate	N/A	N/A	N/A	1160
Arsenic	N/A	N/A	N/A	0.33
Barium	N/A	N/A	N/A	3.0
Cadmium	0.06	0.73	0.64	0.38
Chromium	<0.05	0.19	2.6	0.55
Copper	N/A	N/A	N/A	198
Lead	3.8	4.2	1.1	0.11
Mercury	N/A	0.013	0.011	0.003
Nickel	N/A	N/A	N/A	1.42
Selenium	N/A	N/A	N/A	<0.02
Silver	0.72	3.3	2.2	0.08
Zinc	0.19	64	75	N/A

---

1. All results, except pH, are in units of mg/l (milligrams per liter or parts per million).
2. Before purging.
3. After purging.
4. Duplicate analysis performed.
5. N/A = Not Analyzed.

TABLE 12

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES COLLECTED DURING 1984

PARAMETER(1)	WELL		
	B-1A (6/84)	B-1A (8/84)	B-4 (5/84)
pH	10.6	10.8	2.7
Residual Chlorine	N/A(2)	N/A	<1
Cyanide	950	1050	2.3
Nitrate	450	156	825
Sulfate	910	1240	5600
Chromium	N/A	0.40	N/A
Copper	170	1000	190
Nickel	1.0	N/A	0.59
Silver	0.4	0.08	0.05
Zinc	N/A	37	N/A

---

1. All results, except pH, are in units of mg/l (milligrams per liter or parts per million).
2. N/A = Not Analyzed.

TABLE 13

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES COLLECTED DURING MAY 1985

PARAMETER(1)	WELL			
	B-1A	B-1B	B-2B	B-4
pH	10.7	10.3	7.5	2.8
Ammonia	140	76	3.5	2.0
Chloride	585	3500	390	490
Cyanide	210	2300	1.5	11
Nitrate	33	390	160	520
Sulfate	650	345	260	340
Copper	110	1600	3.4	130
Silver	38	2.3	0.39	1.5

---

1. All results, except pH, are in units of mg/l (milligrams per liter or parts per million).

TABLE 14

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES COLLECTED DURING NOVEMBER 1985

	WELL						
PARAMETER(1)	B-1	B-1A	B-1B	B-4	B-5	B-6	B-7
pH	7.95	10.4	9.9	3.15	7.45	9.1	8.3
Ammonia	49	41	85	40/44 (2)	0.83	59	N/A(3)
Chloride	140	120	2700	380/370	15	270	370
Cyanide	45	61/58	1100	18	<0.02	120	180
Nitrate	180	32	570	1960/1970	1.9/1.9	180	220
Sulfate	220	180	640	820	20	150	530
Copper	43	34	1100	250	0.06/0.06	150/160	290
Silver	0.035	37	0.013/0.004	0.008	<0.001/<0.001	0.027/0.021	0.075

---

1. All results, except pH, are in units of mg/l (milligrams per liter or parts per million).
2. Duplicate analysis performed.
3. N/A = Not Analyzed.

TABLE 15

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES COLLECTED DURING DECEMBER 1985

	WELL					
PARAMETER(1)	B-1A	B-1B	B-4	B-5	B-6	B-7
pH	11.3	10.5	3.7	7.3	9.1	7.4
mmonia	18	46	1.4	4.5	41/38(2)	30
Chloride	76	2400	330/350	17	180	700
Cyanide	38	1400	31/25	0.03	91	290
Nitrate	22	870	1800	2.6/2.8	120	400
Sulfate	98	230	710/780	16	170	280
Copper	11/10	1000	270	0.17	120	700
Silver	17/16	0.1	0.06	0.02	0.04	0.02

---

1. All results, except pH, are in units of mg/l (milligrams per liter or parts per million).
2. Duplicate analysis performed.

TABLE 16

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES COLLECTED JULY 6 THROUGH 8, 1988

	WELL		
PARAMETER	B-1	B-1A	B-5
Cyanide	N/A(1)	N/A	<0.005
Priority Pollutant Volatiles (ug/l)(2)			
Acrolein	<10000	<100	<100
Acrylonitrile	<10000	<100	<100
Benzene	<500	<5	<5
Bromodichloromethane	<500	8	<5
Bromoform	<500	<5	<5
Carbon Tetrachloride	<500	<5	<5
Chlorobenzene	<500	<5	<5
Chloroethane	<1000	<10	<10
2-Chloroethylvinyl Ether	<1000	<10	<10
Chloroform	<500	17	<5
Dibromochloromethane	<500	7	<5
1,1-Dichloroethane	<500	<5	<5
1,2-Dichloroethane	900	<5	<5
1,1-Dichloroethene	<500	<5	<5
1,2-Dichloropropane	<500	<5	<5
1,3-Dichloropropene	<500	<5	<5
Ethyl Benzene	<500	<5	<5
Methyl Bromide	<1000	<10	<10
Methyl Chloride	<1000	<10	<10
Methylene Chloride	<500	6	<5
1,1,2,2-Tetrachloroethane	<500	<5	<5
Tetrachloroethene	<500	<5	<5
Toluene	<500	<5	<5
1,1,1-Trichloroethane	10000	<5	<5
1,1,2-Trichloroethane	<500	<5	<5
Trichloroethene	14000	<5	170
Trichlorofluoromethane	<500	<5	<5
Vinyl Chloride	<1000	<10	<10
Priority Pollutant Acid Extractables (ug/l)			
2-Chlorophenol	<10	N/A	<10
2,4-Dichlorophenol	<10	N/A	<10
2,4-Dimethylphenol	<10	N/A	<10
4,6-Dinitro-o-cresol	<50	N/A	<50
2,4-Dinitrophenol	57	N/A	<50
2-Nitrophenol	<10	N/A	<10
4-Nitrophenol	<50	N/A	<50
p-Chloro-n-cresol	<10	N/A	<10
Pentachlorophenol	<50	N/A	<50
Phenol	<10	N/A	<10
2,4,6-Trichlorophenol	<10	N/A	<10

TABLE 16
(Continued)

PARAMETER	WELL B-1	 B-1A	 B-5
Priority Pollutant Base/Neutral Extractables (ug/l)			
Acenaphthene	<10	N/A	<10
Acenaphthylene	<10	N/A	<10
Anthracene	<10	N/A	<10
Benzidine	<50	N/A	<50
Benzo(a)Anthracene	<10	N/A	<10
Benzo(a)Pyrene	<10	N/A	<10
3,4-Benzofluoranthene	<10	N/A	<10
Benzo(ghi)Perylene	<10	N/A	<10
Benzo(k)Fluoranthene	<10	N/A	<10
Bis(2-Chloroethoxy)Methane	<10	N/A	<10
Bis(2-Chloroethyl)Ether	<10	N/A	<10
Bis(2-Chloroisopropyl)Ether	<10	N/A	<10
Bis(2-Ethylhexyl)Phthalate	23B(3)	N/A	<10
4-Bromophenyl Phenyl Ether	<10	N/A	<10
Butyl Benzyl Phthalate	<10	N/A	<10
2-Chloronaphthalene	<10	N/A	<10
4-Chlorophenyl Phenyl Ether	<10	N/A	<10
Chrysene	<10	N/A	<10
Dibenzo(a,h)Anthracene	<10	N/A	<10
1,2-Dichlorobenzene	<10	N/A	<10
1,3-Dichlorobenzene	<10	N/A	<10
1,4-Dichlorobenzene	<10	N/A	<10
3,3'-Dichlorobenzidine	<20	N/A	<20
Diethyl Phthalate	<10	N/A	<10
Dimethyl Phthalate	<10	N/A	<10
Di-n-Butyl Phthalate	<10	N/A	<10
2,4-Dinitrotoluene	<10	N/A	<10
2,6-Dinitrotoluene	<10	N/A	<10
Di-n-Octyl Phthalate	<10	N/A	<10
1,2-Diphenylhydrazine	<20	N/A	<20
Fluoranthene	<10	N/A	<10
Fluorene	<10	N/A	<10
Hexachlorobenzene	<10	N/A	<10
Hexachlorobutadiene	<10	N/A	<10
Hexachlorocyclopentadiene	<10	N/A	<10
Hexachloroethane	<10	N/A	<10
Indeno(1,2,3-cd)Pyrene	<10	N/A	<10
Isophorone	<10	N/A	<10
Naphthalene	<10	N/A	<10
Nitrobenzene	<10	N/A	<10
N-Nitrosodimethylamine	<10	N/A	<10
N-Nitrosodi-n-Propylamine	<10	N/A	<10
N-Nitrosodiphenylamine	<10	N/A	<10
Phenanthrene	<10	N/A	<10
Pyrene	<10	N/A	<10
1,2,4-Trichlorobenzene	<10	N/A	<10

TABLE 16
(Continued)

PARAMETER	WELL B-1	WELL B-1A	WELL B-5
Metals (mg/1)(4)			
Cadmium	0.026	0.14	<0.005
Chromium	0.03	0.44	<0.01
Copper	5.8	5.2	0.05
Lead	0.17	0.59	<0.05
Nickel	0.12	0.12	0.07
Silver	0.03	0.33	<0.01

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1. N/A = Not Analyzed.
2. ug/1 = micrograms per liter or parts per billion.
3. B indicates substance was detected in laboratory blank.
4. mg/1 = milligrams per liter or parts per million.

TABLE 17

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES
COLLECTED JULY 14, 1988

	WELL						
PARAMETER	B-1	B-1A	B-1B	B-4	B-5	B-6	B-7
pH	7.3	11.0	10.3	3.4	7.2	9.6	N/A(1)
Specific Conductance (umhos/cm)(2)	2250	1100	>10000	1600	390	2100	N/A
Priority Pollutant Volatiles (ug/l)(3)							
Acrolein	<12500	<100	<2500	<500	<100	<170	<10000
Acrylonitrile	<12500	<100	<2500	<500	<100	<170	<10000
Benzene	<625	<5	<125	<25	<5	<8.5	<500
Bromodichloromethane	<625	<5	<125	<25	<5	<8.5	<500
Bromoform	<625	<5	<125	<25	<5	<8.5	<500
Carbon Tetrachloride	<625	<5	<125	<25	<5	<8.5	<500
Chlorobenzene	<625	<5	<125	<25	<5	<8.5	<500
Chloroethane	<1250	<10	<250	<50	<10	<17	<1000
2-Chloroethylvinyl Ether	<1250	<10	<250	<50	<10	<17	<1000
Chloroform	<625	<5	<125	<25	<5	<8.5	<500
Dibromochloromethane	<625	<5	<125	<25	<5	<8.5	<500
1,1-Dichloroethane	<625	6	330	<25	<5	93	640
1,2-Dichloroethane	<625	<5	<125	<25	<5	17	<500
1,1-Dichloroethene	<625	<5	<125	<25	<5	<8.5	<500
1,2-Dichloroethene	<625	7	<125	<25	<5	<8.5	<500
1,2-Dichloropropane	<625	<5	<125	<25	<5	<8.5	<500
1,3-Dichloropropene	<625	<5	<125	<25	<5	<8.5	<500
Ethyl Benzene	<625	<5	<125	<25	<5	<8.5	<500
Methyl Bromide	<1250	<10	<250	<50	<10	<17	<1000
Methyl Chloride	<1250	<10	<250	<50	<10	<17	<1000
Methylene Chloride	<625	<5	<125	<25	<5	<8.5	<500
1,1,2,2-Tetrachloroethane	<625	<5	<125	<25	<5	<8.5	<500
Tetrachloroethene	<625	<5	<125	<25	<5	<8.5	<500
Toluene	<625	13	<125	<25	<5	<8.5	<500
1,1,1-Trichloroethane	7900	19	1900	540	<5	250	<500
1,1,2-Trichloroethane	<625	<5	<125	<25	<5	<8.5	<500
Trichloroethene	12000	64	350	88	140	210	20000
Trichlorofluoromethane	<625	<5	<125	<25	<5	<8.5	<500
Vinyl Chloride	<1250	<10	<250	<50	<10	<17	<1000

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1. N/A = Not Analyzed.
2. umhos/cm = micromhos per centimeter.
3. ug/l = micrograms per liter or parts per billion.

TABLE 18

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES COLLECTED OCTOBER 13, 1988

	WELL										
PARAMETER	B-1	B-1A	B-4	B-5	B-6	B-7	B-12A	B-13	B-13 (dup)	FIELD BLANK	TRIP BLANK
pH	N/A(1)	10.62	2.48	N/A	N/A	N/A	5.96	6.07	6.07	4.32	N/A
Specific Conductance (umhos/cm)(2)	N/A	6890	1737	N/A	N/A	N/A	579	676	676	48	N/A
Chloride (mg/l)(3)	N/A	N/A	N/A	N/A	N/A	N/A	35	51	55	<1	N/A
Cyanide (mg/l)	N/A	220	N/A	<0.01	N/A	N/A	<0.01	<0.01	<0.01	<0.01	N/A
Nitrate (mg/l)	N/A	N/A	N/A	N/A	N/A	N/A	11.6	1.6	1.6	<0.1	N/A
Sulfate (mg/l)	N/A	500	N/A	N/A	N/A	N/A	130	110	110	<1	N/A
Priority Pollutant Volatiles (ug/l)(4)											
Acrolein	<5000	N/A	<100	<100	<100	<100	<100	<100	<100	<100	<100
Acrylonitrile	<5000	N/A	<100	<100	<100	<100	<100	<100	<100	<100	<100
Benzene	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromodichloromethane	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromoform	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon Tetrachloride	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroethane	<500	N/A	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Chloroethylvinyl Ether	<500	N/A	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloroform	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dibromochloromethane	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethane	1100	N/A	<5	<5	15	1000	<5	<5	<5	<5	<5
1,2-Dichloroethane	300	N/A	<5	<5	<5	60	<5	<5	<5	<5	<5
1,1-Dichloroethene	5500	N/A	6	<5	<5	480	<5	<5	<5	<5	<5
Trans-1,2-Dichloroethene	<250	N/A	<5	<5	<5	270	<5	<5	<5	<5	<5
1,2-Dichloropropane	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cis-1,3-Dichloropropene	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trans-1,3-Dichloropropene	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethyl Benzene	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methyl Bromide	<500	N/A	<10	<10	<20	<10	<10	<10	<10	<10	<10
Methyl Chloride	<500	N/A	<10	<10	<10	130	<10	<10	<10	<10	<10

TABLE 18
(Continued)

	WELL										
PARAMETER	B-1	B-1A	B-4	B-5	B-6	B-7	B-12A	B-13	B-13 (dup)	FIELD BLANK	TRIP BLANK
Methylene Chloride	<250	N/A	6	<5	7	290	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	350	N/A	<5	<5	<5	27	<5	<5	<5	<5	<5
1,1,1-Trichloroethane	26000	N/A	130	<5	47	630	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	<250	N/A	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	58000	N/A	34	190	120	2300	1000	<5	<5	<5	<5
Vinyl Chloride	<500	N/A	<10	<10	<10	<10	<10	<10	<10	<10	<10
Priority Pollutant Acid Extractables	N/A	N/A	N/A	N/A	N/A	N/A	N.D.(5)	N.D.	N.D.	N.D.	N/A
Priority Polltuant Base/ Neutral Extractables	N/A	N/A	N/A	N/A	N/A	N/A	N.D.	N.D.	N.D.	N.D.	N/A
Priority Pollutant Metals (mg/l)											
Antimony	<0.2	N/A	N/A	N/A	N/A	N/A	<0.2	<0.2	N/A	N/A	<0.2
Arsenic	0.032	N/A	N/A	N/A	N/A	N/A	<0.005	<0.005	N/A	N/A	0.018
Beryllium	<0.005	N/A	N/A	N/A	N/A	N/A	<0.005	<0.005	N/A	N/A	<0.005
Cadmium	0.027	N/A	N/A	N/A	N/A	N/A	<0.005	<0.005	N/A	N/A	<0.005
Chromium	0.12	N/A	N/A	N/A	N/A	N/A	<0.03	<0.03	N/A	N/A	<0.06
Copper	13	N/A	N/A	N/A	N/A	N/A	<0.02	<0.02	N/A	N/A	<0.02
Lead	0.16	N/A	N/A	N/A	N/A	N/A	<0.05	<0.05	N/A	N/A	<0.05
Nickel	0.08	N/A	N/A	N/A	N/A	N/A	<0.03	<0.03	N/A	N/A	<0.03
Selenium	<0.005	N/A	N/A	N/A	N/A	N/A	<0.005	<0.005	N/A	N/A	<0.005
Silver	0.07	N/A	N/A	N/A	N/A	N/A	<0.02	0.02	N/A	N/A	<0.02
Thallium	<0.2	N/A	N/A	N/A	N/A	N/A	<0.2	<0.2	N/A	N/A	<0.2
Zinc	2.0	N/A	N/A	N/A	N/A	N/A	0.06	0.03	N/A	N/A	0.01

---

1. N/A = Not Analyzed.
2. umhos/cm = micromhos per centimeter.
3. mg/l = milligrams per liter or parts per million.
4. ug/l = micrograms per liter or parts per billion.
5. N.D. = None Detected.

TABLE 19

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES
COLLECTED DECEMBER 1, 1988

	WELL			
PARAMETER	B-1	B-1A	B-12A	B-13
pH	N/A(1)	10.76	6.38	6.11
Specific Conductance (umhos/cm)(2)	N/A	6700	606	662
Priority Pollutant Volatiles (ug/l)(3)				
Acrolein	<25000	<100	<100	<100
Acrylonitrile	<25000	<100	<100	<100
Benzene	<1200	<5	<5	<5
Bromodichloromethane	<1200	<5	<5	<5
Bromoform	<1200	<5	<5	<5
Carbon Tetrachloride	<1200	<5	<5	<5
Chlorobenzene	<1200	<5	<5	<5
Chloroethane	<2500	<10	<10	<10
2-Chloroethylvinyl Ether	<2500	<10	<10	<10
Chloroform	<1200	<5	<5	<5
Dibromochloromethane	<1200	<5	<5	<5
1,1-Dichloroethane	<1200	10	<5	<5
1,2-Dichloroethane	<1200	<5	<5	<5
1,1-Dichloroethene	3200	<5	<5	<5
1,2-Dichloroethene (total)	<1200	12	<5	<5
1,2-Dichloropropane	<1200	<5	<5	<5
1,3-Dichloropropene (total)	<1200	<5	<5	<5
Ethyl Benzene	<1200	<5	<5	<5
Methyl Bromide	<2500	<10	<10	<10
Methyl Chloride	<2500	<10	<10	<10
Methylene Chloride	<1200	14B(4)	10B	10B
1,1,2,2-Tetrachloroethane	<1200	<5	<5	<5
Tetrachloroethene	<1200	<5	<5	<5
Toluene	<1200	19	<5	<5
1,1,1-Trichloroethane	26000	24	<5	<5
1,1,2-Trichloroethane	<1200	<5	<5	<5
Trichloroethene	47000	94	460	<5
Trichlorofluoromethane	<1200	<5	<5	<5
Vinyl Chloride	<2500	<10	<10	<10
Xylenes (total)	<1200	<5	<5	<5
Mercury (mg/l)(5)	N/A	N/A	<0.0002	<0.0002

---

1. N/A = Not Analyzed.
2. umhos/cm = microhmos per centimeter
3. ug/l = micrograms per liter
4. B indicates substance was detected in laboratory blank.
5. mg/l = milligrams per liter

TABLE 20

RESULTS OF PADER ANALYSIS OF SAMPLES FROM VANPORT MUNICIPAL AUTHORITY WELL FIELD

						TEST	TEST	TEST	TEST	TEST	TEST	TEST
WELL	1	2	4	5	6	WELL #1	WELL #1	WELL #1	WELL #2	WELL #2	WELL #2	WELL #2
DATE	6/16/88	6/16/88	6/16/88	6/16/88	6/16/88	8/30/88	8/30/88	8/31/88	9/7/88	9/7/88	9/8/88	9/8/88
DEPTH (feet)						93.8	103.9	130	86	100	110	120
PARAMETER												
Ethyl Benzene												1.2
Methylene Chloride						12	9.6	2.7	30	10		16
Toluene						60	17	14	58	45	18	105
1,1,1-Trichloroethane	2.8	2.5	3.1	14	2.6	1.6			1.9	1.0	1.5	1.0
Trichloroethene	55	100	36	59	32		3.8	1.2				
Xylene (total)											3.0	8.2

All concentrations have units of micrograms per liter or parts per billion. Where blanks are present on the table, the compound was not analyzed for or was not detected.

TABLE 21

GROUNDWATER LEVELS

WELL NUMBER	DATE 10/30/85	11/25/85	07/14/88	10/13/88	12/01/88
B-1	16.36	17.6	16.25	19.8	19.6
B-2	--	--	--	--	--
B-3	--	--	--	--	--
B-4	8.75	8.5	10.33	--	--
B-1A	--	6.3	7.17	7.6	7.55
B-1B	10.75	9.8	14.66	14.8	--
B-2B	Dry	Dry	Dry	Dry	--
B-5	--	63.0	63.83	63.9	--
B-6	12.07	10.5	19.33	19.8	--
B-7	16.2	17.5	18.58	18.5	--
B-8	41.35	Dry	Dry	--	--
B-9B	--	--	--	14.8	--
B-10A	--	--	--	Dry	--
B-11	--	--	--	Dry	--
B-12A	--	--	--	77.6	77.55
B-13	--	--	--	9.6	9.85

All depths to water measurements were measured from the top of the protective casing and are reported in feet. Wells B-5, B-12A, and B-13 were surveyed in April 1989. Any future reporting for these and other wells monitoring zones of relatively continuous saturation will be in feet above means sea level.

FIGURES

FIGURES

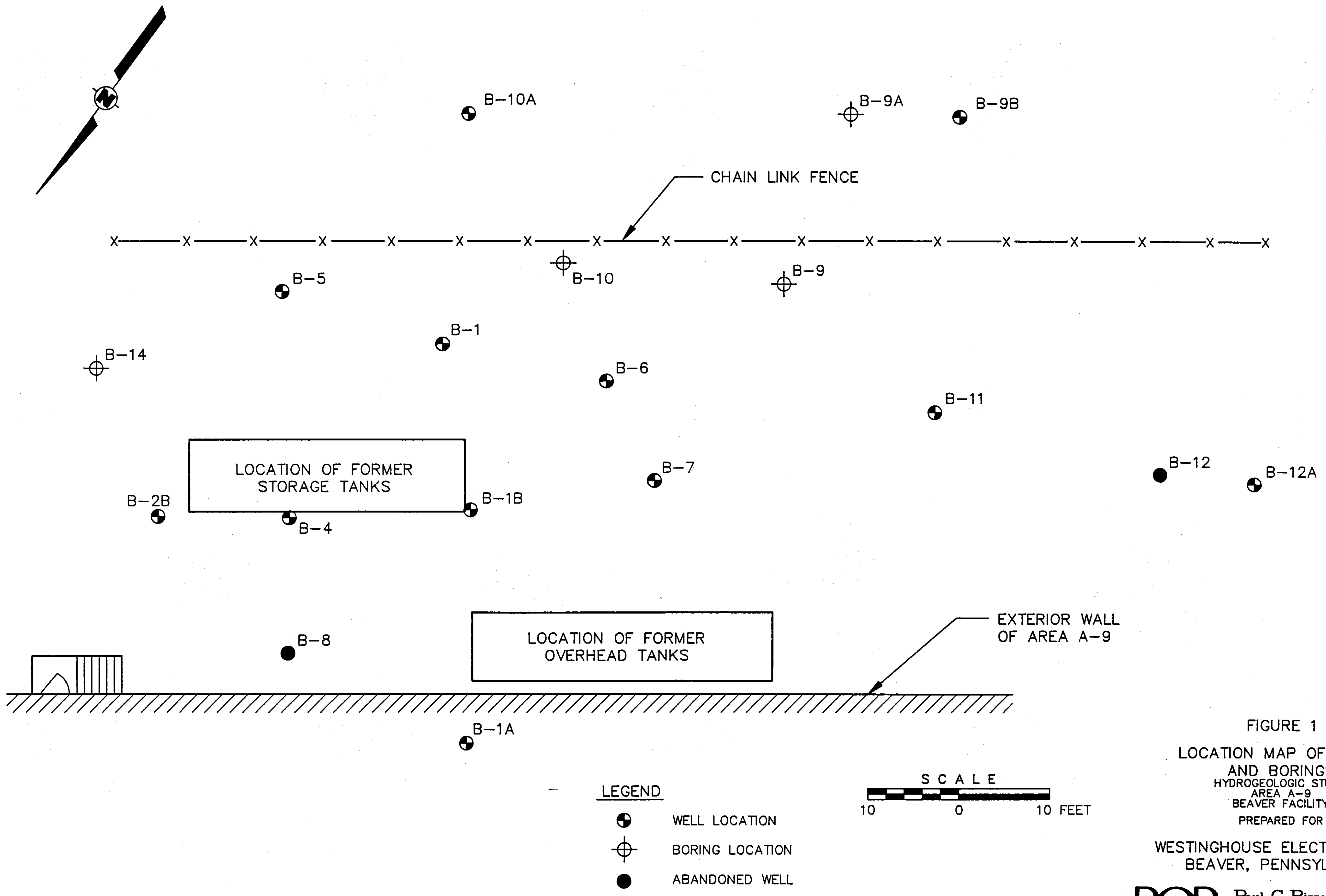


FIGURE 1

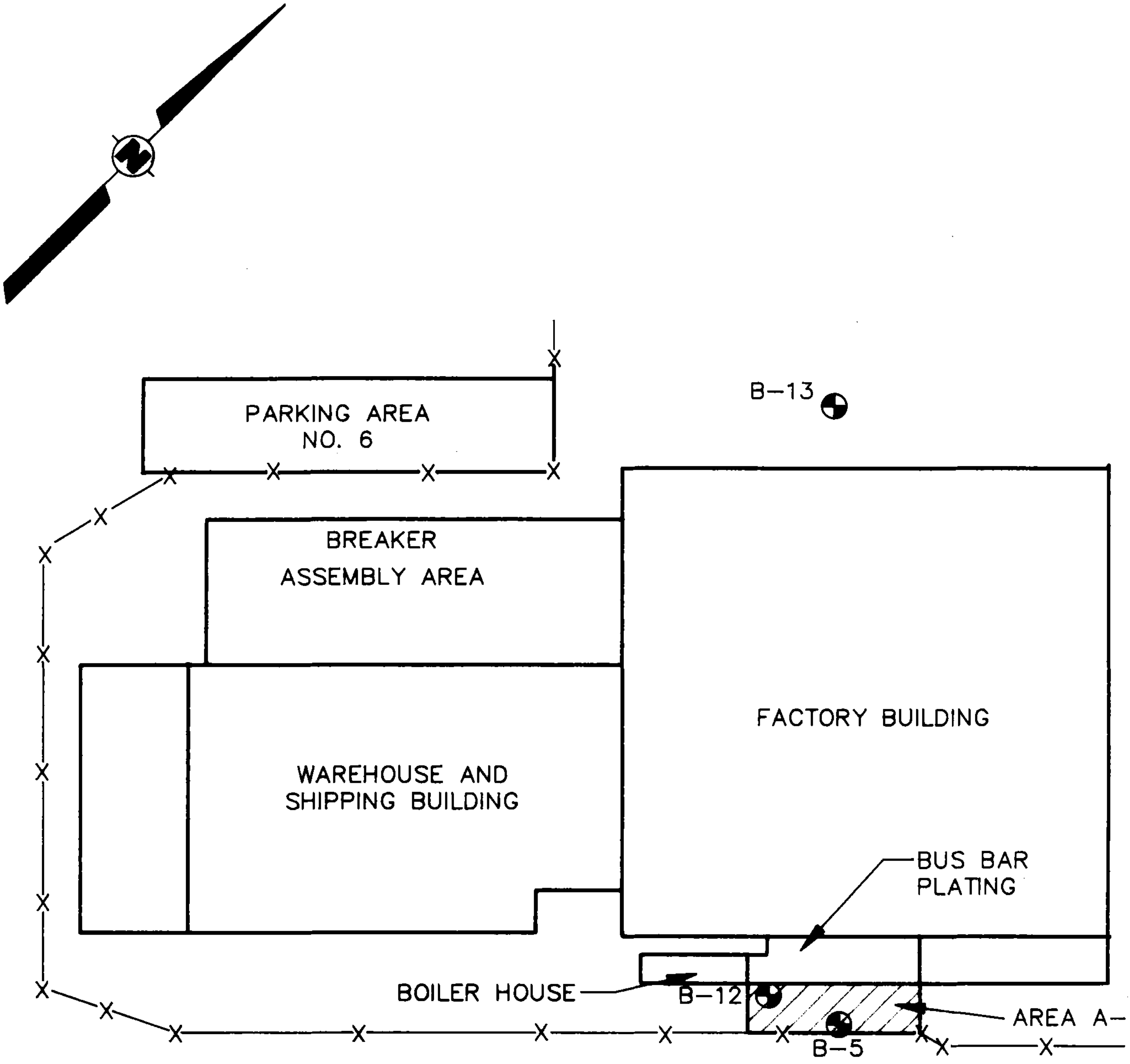
LOCATION MAP OF WELLS AND BORINGS
HYDROGEOLOGIC STUDY
AREA A-9
BEAVER FACILITY
PREPARED FOR

WESTINGHOUSE ELECTRIC CORP.
BEAVER, PENNSYLVANIA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

DRAWN BY	DWD 10-24-88	CHECKED BY APPROVED BY	map PFO
11/10/88 11/16/88	DRAWING NUMBER	88-537-B1	

DRAWN BY	PRH	CHECKED BY	PFO	8/MAY/89	DRAWING NUMBER	88-537-A6
	11-25-86	APPROVED BY	PFO	8/MAY/89		



N.T.S.

LEGEND:

B-5 ● DEEP WELL LOCATION

FIGURE 2

LOCATION MAP OF DEEP WELLS

HYDROGEOLOGIC STUDY
AREA A-9
BEAVER FACILITY

PREPARED FOR

WESTINGHOUSE ELECTRIC CORPORATION
BEAVER, PENNSYLVANIA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

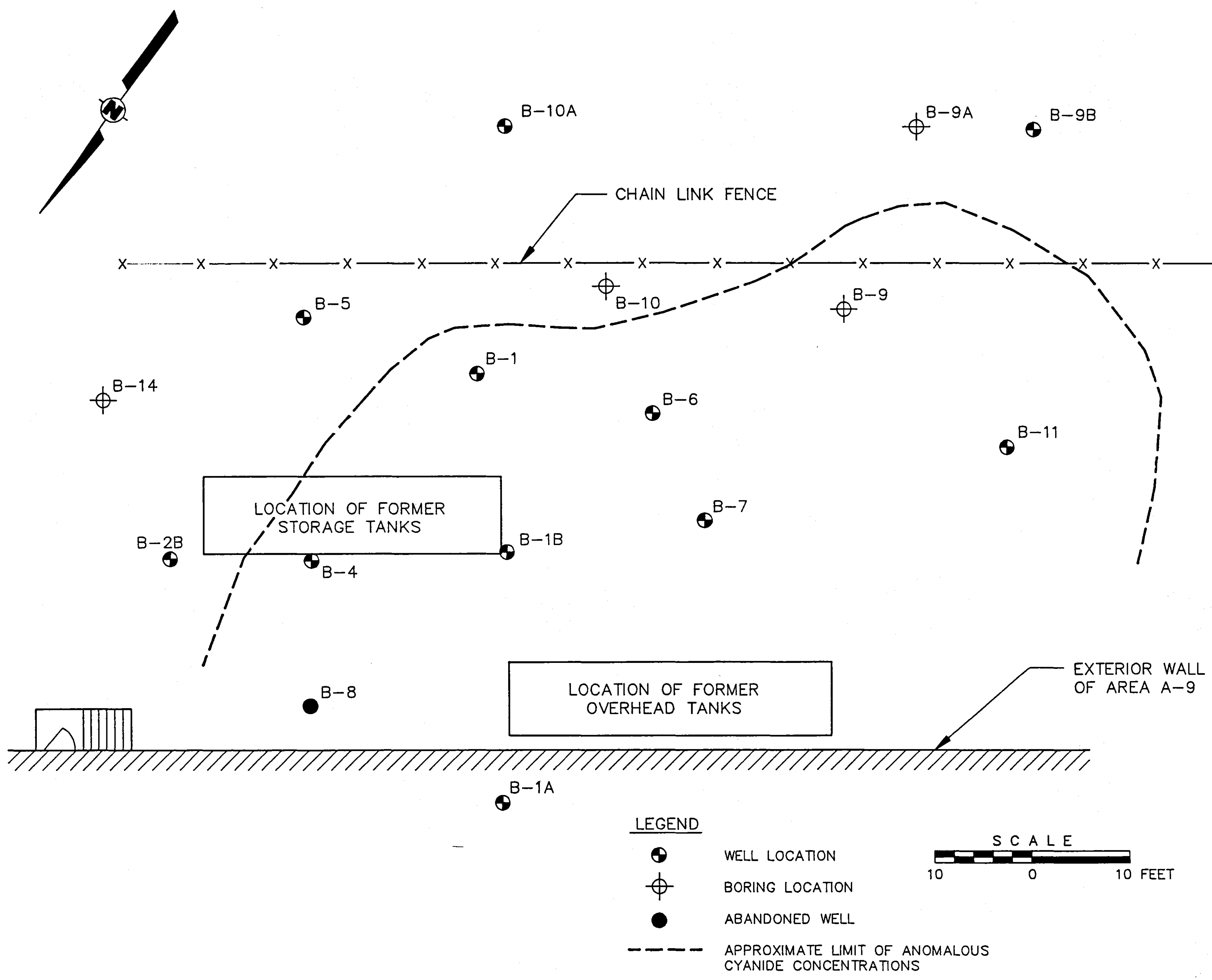


FIGURE 3

APPROXIMATE LIMIT OF ANOMALOUS
CYANIDE CONCENTRATIONS
HYDROGEOLOGIC STUDY
AREA A-9
BEAVER FACILITY
PREP-RED FOR

WESTINGHOUSE ELECTRIC CORP.
BEAVER, PENNSYLVANIA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

DRAWN BY BBO 2-21-89
CHECKED BY BFO 8 may 89
APPROVED BY BFO 8 may 89
DRAWING NUMBER 88-537-B2

APPENDIX A

DATE STARTED: 10-4-88
DATE FINISHED: 10-5-88
GROUND SURFACE EL. ——

WESTINGHOUSE BEAVER
BORING B-12A

N ______ E ______

PROJECT NO. 88-537
FIELD ENGINEER: MAP
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
	5								PIECES OF WOOD IN CUTTINGS.
	10	S 1	16	3-3 3-6		MEDIUM STIFF TO STIFF, BROWN SILTY CLAY/CLAYEY SILT, SOME SAND AND GRAVEL, BLACK CINDERS BETWEEN 21.0' AND 21.3' (FILL)	0.5	6	DAMP
	15								
	20	S 2	24	5-8 8-9		21.3'	1	5	MOIST TO WET DRY
	25								
						LOOSE TO MEDIUM DENSE, LIGHT BROWN SILTY FINE SAND, TRACE PEBBLES			
	30	S 3	24	2-3 3-6			0	6	DRY
	35								
						40.0'			
	40	S 4	13	3-5 4-5		LOOSE BROWN SANDY GRAVEL, SOME SILT/CLAY	1	6	WET
	45								

BORING NO. B-12A
SHEET 1 OF 3

DATE STARTED: 10-4-88
DATE FINISHED: 10-5-88
GROUND SURFACE EL. ______

WESTINGHOUSE BEAVER
BORING B-12A

N ______ E ______

PROJECT NO. 88-537
FIELD ENGINEER: MAP
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
						LOOSE BROWN SANDY GRAVEL, SOME SILT/CLAY 50.0'			
	50	S 5	18	6-8 8-7			0	6	DRY TO WET
	55								
						MEDIUM DENSE TO DENSE, BROWN SAND AND GRAVEL, TRACE TO SOME ROCK FRAGMENTS, TRACE SILT AND CLAY			
	60	S 6	20	8-16 26-9			<0.5	6	DAMP
	65								
	70	S 7	24	8-10 11-16			<0.5	6	DAMP
	75								
						80.0'			
	80	S 8	24	7-13 14-18			1	6	DAMP
						VERY STIFF TO HARD, BROWN SILTY CLAY/CLAYEY SILT, TRACE TO SOME GRAVEL AND ROCK FRAGMENTS, TRACE SAND AFTER 85.0'			
	85	S 9	24	5-16 23-27			1	6	DAMP TO MOIST, SAMPLE S-9 ANALYZED FOR VOLATILES
						87.5'			
		S 10	15	12-17 50/0.3		MEDIUM DENSE BROWN SAND AND GRAVEL, LAYERS OF SILTY CLAY/ CLAYEY SILT	1	6	DAMP TO WET
	90					90.0'			

DATE STARTED: 10-4-88
DATE FINISHED: 10-5-88
GROUND SURFACE EL. ____

WESTINGHOUSE BEAVER
BORING B-12A

N ____ E ____

PROJECT NO. 88-537
FIELD ENGINEER: MAP
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
		S-11	2	50/0.2		SILTSTONE - BROWN AND GRAY, WEATHERED BOTTOM OF BORING ● 90.2' MONITORING WELL INSTALLED WITH SCREEN FROM 80.3' TO 90.0'			TOP OF BEDROCK = 90.0'
	95								
	100								
	105								
	110								
	115								
	120								
	125								
	130								
	135								

BORING NO. B-12A
SHEET 3 OF 3

DATE STARTED: 9-23-88
DATE FINISHED: 9-23-88
GROUND SURFACE EL. ______

WESTINGHOUSE BEAVER
BORING B-13

N ______ E ______

PROJECT NO. 88-537
FIELD ENGINEER: GLK
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	HNu READING (ppm)	FIELD pH	REMARKS
		S 1	19	2-2 4-5	▨	MEDIUM STIFF TO STIFF, LIGHT BROWN TO DARK BROWN SILTY CLAY/CLAYEY SILT, TRACE SAND AND ROCK FRAGMENTS (FILL) 10.0'	0.5	6	DRY, SOME ROOTS AND WOOD PIECES
		S 2	24	5-6 7-8	▨		0	5	DRY
	5	S 3	20	5-5 7-9	▨		0.5	6	DAMP, SOME ROOTS AND WOOD PIECES
		S 4	24	4-4 5-13	▨		0	6	DAMP
	10	S 5	24	1-1 2-3		VERY LOOSE TO MEDIUM DENSE, LIGHT TO DARK BROWN, SILTY SAND, TRACE GRAVEL AND ROCK FRAGMENTS AFTER 12.5' 16.3'	0	5	WET
		S 6	24	1-1 5-7			0	5	WET
	15	S 7	24	7-9 13-22			0	6	WET, SAMPLE S-7 ANALYZED FOR VOLATILES
						SILTSTONE, LIGHT GRAY			TOP OF BEDROCK= 16.3'
	17.7	S-8	2	50/0.2		BOTTOM OF BORING = 17.7' MONITORING WELL INSTALLED WITH SCREEN FROM 10.9' TO 15.9'			
	20								
	25								
	30								
	35								
	40								
	45								

BORING NO. B-13
SHEET 1 OF 1

DATE STARTED: 10-3-88
DATE FINISHED: 10-3-88
GROUND SURFACE EL ______

WESTINGHOUSE BEAVER
BORING B-14

N ______ E ______

PROJECT NO. 88-537
FIELD ENGINEER: MAP
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
		S 1	23	3-6 5-5	▨	MEDIUM STIFF TO STIFF, LIGHT BROWN TO BROWN, SILTY CLAY/CLAYEY SILT, TRACE TO SOME ROCK FRAGMENTS INCLUDING COAL (FILL)	0	6	DRY
		S 2	22	3-4 4-6	▨	5.0'	0	6	DRY
	5	S 3	19	8-12 11-10	▨	MEDIUM DENSE, ORANGISH BROWN SAND, GRAVEL AND ROCK FRAGMENTS, SOME SILT AND CLAY(FILL) 7.5'	0	6	DRY
		S 4	24	6-4 5-8	▨	MEDIUM STIFF, BROWN SILTY CLAY/CLAYEY SILT, SOME GRAVEL AND ROCK FRAGMENTS (FILL) 10.7'	<0.5	5	DAMP
	10	S 5	24	3-4 5-7	▨	LOOSE BROWN SAND (FILL) 11.4' MEDIUM STIFF BROWN SILT, TRACE CLAY (FILL) 11.7'	1.5	5	MOIST TO WET
		S 6	19	3-4 5-4	▨	STIFF BROWN SILTY CLAY/CLAYEY SILT, SOME GRAVEL (FILL) 12.5'	6	6	DRY TO DAMP, TRACE WOOD PIECES.
	15	S 7	24	3-4 4-6	▨	LOOSE ORANGISH BROWN SAND, TRACE COAL FRAGMENTS FROM 15'-17' (FILL) 18.4'	17	6	DRY TO DAMP, SAMPLE S-7 ANALYZED FOR VOLATILES
		S 8	24	2-2 4-5	▨	MEDIUM STIFF BROWN SILT (FILL) 18.7' LOOSE, ORANGISH BROWN SAND, TRACE COAL FRAGMENTS (FILL) 20.0'	12	6	DAMP WET DAMP
	20 22	S 9	24	3-4 4-5	░	LOOSE, LIGHT BROWN FINE SAND, TRACE SILT	4	6	DAMP
	25 30 35 40 45					BOTTOM OF BORING = 22.0' BORING GROUTED IN BECAUSE OF INSUFFICIENT WATER TO SET WELL.			

BORING NO. B-14
SHEET 1 OF 1

APPENDIX A

BORING LOGS

DATE STARTED: 9-26-88
DATE FINISHED: 9-26-88
GROUND SURFACE EL. ———

WESTINGHOUSE BEAVER
BORING B-9

N ——— E ———

PROJECT NO. 88-537
FIELD ENGINEER: MAP
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
		S 1	21	1-5 5-6	▨	MEDIUM STIFF BROWN SILTY CLAY/ CLAYEY SILT, TRACE SAND (FILL) 2.5'	0	6	DRY
		S 2	21	1-2 2-3	▨	VERY LOOSE BROWN SAND (FILL) 3.3'	0	5	DRY
	5	S 3	13	3-4 13-14	▨	SOFT TO STIFF BROWN AND GRAY SILTY CLAY/CLAYEY SILT (FILL)	0	5	DRY
		S 4	24	4-6 6-5	▨	8.8'	0	5	DAMP
	10	S 5	24	4-4 4-4	▨	LOOSE BROWN SAND, TRACE TO SOME SILT AND CLAY, SOME PEBBLES AND ROCK FRAGMENTS (FILL)	2	5	DAMP
		S 6	24	1-2 3-3	▨		5	5	MOIST, SAMPLE S-6 ANALYZED FOR VOLATILES
	15	S 7	24	4-4 6-7	▨	16.1'	5	5	WET DRY
		S 8	24	3-4 6-9	░	LOOSE TO MEDIUM DENSE, LIGHT BROWN FINE SAND	5	5	DRY
	20 22	S 9	24	2-3 4-5	░		12	5	DRY
	25 30 35 40 45					BOTTOM OF BORING = 22.0' BORING GROUTED BECAUSE OF HIGH HEADSPACE READINGS			

BORING NO. B-9
SHEET 1 OF 1

DATE STARTED: 9-29-88
DATE FINISHED: 9-30-88
GROUND SURFACE EL. ———

WESTINGHOUSE BEAVER
BORING B-9A

N ——— E ———

PROJECT NO. 88-537
FIELD ENGINEER: MAP
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
		S 1	21	3-6 8-6		MEDIUM STIFF LIGHT BROWN SANDY SILT, TRACE PEBBLES (FILL) 0.8' MEDIUM DENSE BLACK SLAG (FILL) 2.5'	0.5	6	DRY, SOME ROOTS
		S 2	24	2-3 2-4		LOOSE BROWN SAND (FILL) 4.0'	0.5	6	DRY
	5	S 3	18	3-4 5-11		MEDIUM STIFF TO STIFF, MOTTLED GRAY, ORANGE AND LIGHT BROWN SILTY CLAY/CLAYEY SILT, BECOMES SANDY AT 8.5' (FILL) 10.0'	0	6	DRY
		S 4	24	7-8 11-11			0.5	6	DRY
	10	S 5	21	2-3 3-3		LOOSE BROWN SAND, TRACE SILT, CLAY, AND ROCK FRAGMENTS, CLAY LAYER FROM 10.6' TO 11.0', GRAVELLY AFTER 12.5' (FILL) 13.8'	1	6	DAMP, BECOMES MOIST AT 11'
		S 6	21	1-2 4-3			1.5	6	WET, SAMPLE S-6 ANALYZED FOR VOLATILES DRY TO DAMP
	15	S 7	19	5-4 4-6		LOOSE TO MEDIUM DENSE, LIGHT BROWN FINE SAND, TRACE TO SOME SILT 28.4'	6	6	DRY TO DAMP
		S 8	24	3-4 5-4			3	6	DRY TO DAMP
	20	S 9	24	3-6 4-4			9	6	DRY TO DAMP
		S 10	24	3-4 7-8			12	6	DRY TO DAMP, SAMPLE S-10 ANALYZED FOR VOLATILES
	25	S 11	24	2-4 7-7			3	6	DRY TO DAMP
		S 12	11	3-2 3-4		LOOSE ROCK FRAGMENTS 30.0'	1	6	DAMP WET
	30	S 13	13	4-4 8-11		LOOSE TO MEDIUM DENSE BROWN AND ORANGE SAND AND GRAVEL, TRACE ROCK FRAGMENTS, TRACE SILT AND CLAY	0	6	MOIST, WET BETWEEN 30.6' AND 30.8'
	34.5	S 14	18	4-6 6-8			0	6	DRY WITH MOIST LENSES
	40 45					BOTTOM OF BORING = 34.5' BORING GROUTED			

BORING NO. B-9A
SHEET 1 OF 1

DATE STARTED: 10-3-88
DATE FINISHED: 10-3-88
GROUND SURFACE EL. ——

WESTINGHOUSE BEAVER
BORING B-9B

N ——— E ———

PROJECT NO. 88-537
FIELD ENGINEER: MAP
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
	5								NO SAMPLES COLLECTED BETWEEN 0' AND 10.0'
						10.0'			
	10	S 1	17	3-3 4-2		LOOSE BROWN SAND AND GRAVEL, TRACE SILT AND CLAY (FILL)	<0.5	6	DAMP TO MOIST
						12.5'			
	14.5'	S 2	22	2-4 4-6		LOOSE GRAVEL AND ROCK FRAGMENTS, TRACE SILT, CLAY AND SAND (FILL) 13.6' LOOSE ORANGISH BROWN FINE SAND	1.5	6	WET, SAMPLE S-2 ANALYZED FOR VOLATILES DRY TO DAMP
	15					BOTTOM OF BORING = 14.5' MONITORING WELL INSTALLED WITH SCREEN FROM 8.4' TO 13.4'			
	20								
	25								
	30								
	35								
	40								
	45								

BORING NO. B-9B
SHEET 1 OF 1

DATE STARTED: 9-28-88
DATE FINISHED: 9-28-88
GROUND SURFACE EL. ———

WESTINGHOUSE BEAVER
BORING B-10

N ——— E ———

PROJECT NO. 88-537
FIELD ENGINEER: MAP
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
		S 1	19	2-5 5-6	▨	MEDIUM STIFF BROWN SILTY CLAY/ CLAYEY SILT, TRACE COAL AND PEBBLES (FILL) 2.5'	0	5	DRY, SOME ROOTS
		S 2	22	2-3 2-2	▨	LOOSE BROWN SAND AND GRAVEL, TRACE CLAY (FILL) 3.7'	0	6	DRY DAMP
	5	S 3	10	4-6 7-10	▨	SOFT TO STIFF, LIGHT BROWN TO MOTTLED BROWN AND GRAY, SILTY TO SANDY CLAY, SOME ROCK FRAGMENTS (FILL)	0	5	DAMP
		S 4	24	6-9 9-6	▨	10.0'	0.5	6	DAMP
	10	S 5	24	4-5 6-4	▨	LOOSE TO MEDIUM DENSE BROWN CLAYEY SAND, SOME ROCK FRAGMENTS, GRAVELLY AFTER 12.5' (FILL)	9	7	MOIST, CYANIDE NOT DETECTED WITH HACH TEST, SAMPLE S-5 ANALYZED FOR VOLATILES
	14.5	S 6	19	1-4 4-6	▨ ⁘	13.5' LOOSE LIGHT BROWN FINE SAND	4	6	WET DAMP
	15					BOTTOM OF BORING = 14.5' BORING GROUTED BECAUSE OF HIGH HEADSPACE READINGS			
	20								
	25								
	30								
	35								
	40								
	45								

BORING NO. B-10
SHEET 1 OF 1

DATE STARTED: 9-28-88
DATE FINISHED: 9-28-88
GROUND SURFACE EL. ——

WESTINGHOUSE BEAVER
BORING B-10A

N —— E ——

PROJECT NO. 88-537
FIELD ENGINEER: MAP
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
		S 1	20	4-6 8-4			0	6	DRY
		S 2	24	3-2 3-5			0	5	DRY, TRACE WOOD CHIPS
	5	S 3	14	4-5 5-8		SOFT TO STIFF, LIGHT BROWN TO MOTTLED GRAY AND BROWN SILTY CLAY/CLAYEY SILT, TRACE TO SOME SAND, GRAVEL AND ROCK FRAGMENTS (FILL) LOOSE LIGHT BROWN SAND 2.5'-3.0'	0	6	DRY
		S 4	24	5-7 10-14			0	5	DRY
	10	S 5	24	4-7 5-6		12.5'	1	5	DRY TO MOIST
		S 6	22	2-2 4-3			<0.5	5	DRY TO DAMP
	15	S 7	24	2-2 4-3			1.5	6	DRY TO DAMP
		S 8	24	2-3 5-4		LOOSE TO MEDIUM DENSE LIGHT BROWN TO BROWN FINE SAND	5	6	DRY TO DAMP
	20	S 9	24	4-4 4-5			9	6	DRY TO DAMP, CYANIDE NOT DETECTED WITH HACH TEST
	25	S 10	24	2-4 7-8			9	6	DRY TO DAMP, SAMPLE S-10 ANALYZED FOR VOLATILES
		S 11	15	2-2 4-5		28.5'	1	6	DAMP TO MOIST, WET BETWEEN 28.0' AND 28.5'
	30					LOOSE COARSE SAND AND GRAVEL, TRACE SILT AND CLAY AFTER 31.3'			WET
	32.1'	S-12	4	2-4			1	–	DAMP
	35					BOTTOM OF BORING = 32.1' MONITORING WELL INSTALLED WITH SCREEN FROM 24.1' TO 29.1'			
	40								
	45								

BORING NO. B-10A
SHEET 1 OF 1

DATE STARTED: 9-26-88
DATE FINISHED: 9-26-88
GROUND SURFACE EL. ———

WESTINGHOUSE BEAVER
BORING B-11

N ——— E ———

PROJECT NO. 88-537
FIELD ENGINEER: MAP
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
		S 1	15	2-2 4-3	▨	TOPSOIL (FILL) 0.4' MEDIUM STIFF BROWN TO GRAY SILTY CLAY/CLAYEY SILT, TRACE TO SOME SAND, PEBBLES AND ROCK FRAGMENTS (FILL) 3.5'	0	6	SOME GRASS AND ROOTS DAMP
		S 2	18	3-3 4-4	▨	LOOSE BROWN SAND (FILL) 5.2'	0	6	DAMP DRY
	5	S 3	7	5-13 12-5	▨	MEDIUM STIFF TO STIFF, LIGHT BROWN TO GRAY, CLAYEY TO SANDY SILT, TRACE TO SOME PEBBLES AND ROCK FRAGMENTS (FILL) 15.2'	0	6	DRY DAMP TO MOIST
		S 4	24	3-4 4-5	▨		0	6	DAMP
	10	S 5	24	3-3 3-3	▨		0.5	6	DAMP
		S 6	24	1-3 3-2	▨		<0.5	6	DAMP
	15	S 7	16	2-2 1-1	▨	VERY LOOSE TO LOOSE, BROWN SAND AND GRAVEL, TRACE SILT (FILL) 19.0'	<0.5	6	DAMP MOIST, CYANIDE NOT DETECTED WITH HACH TEST
		S 8	24	2-3 4-6	▨		0.5	6	MOIST, SAMPLE S-8 ANALYZED FOR VOLATILES
	20 22	S 9	24	3-5 6-8	░	MEDIUM DENSE, LIGHT BROWN FINE SAND	0	6	DRY DRY
	25 30 35 40 45					BOTTOM OF BORING = 22.0' MONITORING WELL INSTALLED WITH SCREEN FROM 13.9' TO 18.9'			

BORING NO. B-11
SHEET 1 OF 1

DATE STARTED: 9-20-88
DATE FINISHED: 9-21-88
GROUND SURFACE EL. ———

WESTINGHOUSE BEAVER
BORING B-12

N ——— E ———

PROJECT NO. 88-537
FIELD GEOLOGIST WJJ
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
						ASPHALT 0.5'			
						STIFF DARK BROWN SILTY CLAY/ CLAYEY SILT AND ANGULAR ROCK FRAGMENTS. (FILL) 2.9'			
		S 1	10	4-3 2-1		VERY LOOSE DARK BROWN MEDIUM SAND (FILL) 5.0'	0	8	DRY, CYANIDE NOT DETECTED WITH HACH TEST
	5	S 2	20	5-6 7-7		STIFF MOTTLED BROWN AND LIGHT GRAY SILTY CLAY/CLAYEY SILT, TRACE SAND AND ANGULAR ROCK FRAGMENTS (FILL) 7.5'	0	5	DRY
		S 3	24	7-5 5-7		LOOSE TO MEDIUM DENSE, DARK BROWN MOTTLED SAND AND ANGULAR ROCK FRAGMENTS, SOME CLAY, SOME ROUNDED PEBBLES BETWEEN 10' AND 12' (FILL) 12.5'	<1	6	DRY
	10	S 4	24	3-5 7-7			0	5.5	MOIST
		S 5	16	3-4 3-5		VERY LOOSE TO LOOSE, DARK BROWN SAND AND GRAVEL, TRACE TO SOME CLAY, WITH BOTH ANGULAR AND ROUNDED PEBBLES (FILL) 17.0'	1	5	WET, SAMPLE S-5 ANALYZED FOR VOLATILES
	15	S 6	24	1-1 1-1			0	5	WET
		S 7	24	5-4 4-5		LOOSE TO MEDIUM DENSE LIGHT BROWN FINE SAND, SILTY AFTER 22.0' 30.0'	0	5	DRY
	20	S 8	24	3-5 6-8			0	6	DRY
	25	S 9	24	12-12 5-6			0	6	MOIST
	30	S 10	16	5-5 6-5		MEDIUM DENSE LIGHT BROWN COARSE SAND, SOME SILT AND PEBBLES 35.0'	0	5	MOIST
	35	S 11	20	5-5 4-5		LOOSE TO MEDIUM DENSE, BROWN SILTY, SANDY FINE TO COARSE GRAVEL	0	5	MOIST
	40	S 12	10	5-6 9-6			0	5	MOIST
	45								

BORING NO. B-12
SHEET 1 OF 2

DATE STARTED: 9-20-88
DATE FINISHED: 9-21-88
GROUND SURFACE EL. ______

WESTINGHOUSE BEAVER
BORING B-12

N ______ E ______

PROJECT NO. 88-537
FIELD GEOLOGIST WJJ/GLK
CHECKED BY: WJJ

ELEV. (FEET)	DEPTH (FEET)	SAMPLE TYPE	SAMPLE RECOVERY (IN.)	BLOWS PER 6 IN. INCREMENT	PROFILE	DESCRIPTION	Hnu READING (ppm)	FIELD pH	REMARKS
		S 13	6	5-5 5-9		LOOSE TO MEDIUM DENSE, BROWN SILTY SANDY FINE TO COARSE GRAVEL 50.0'	0	5	MOIST
	50	S 14	24	4-7 7-10		MEDIUM DENSE BROWN FINE TO MEDIUM SAND, SOME GRAVEL PEBBLES, TRACE TO SOME SILT	0	5	MOIST
	55	S 15	24	4-6 7-7		60.0'	0	5	MOIST
	60	S 16	24	8-6 8-10		MEDIUM DENSE, BROWN FINE TO COARSE SILTY SAND AND GRAVEL, SOME ROCK FRAGMENTS INCLUDING SANDSTONE	0.5	5	MOIST
	65	S 17	24	10-12 17-29		70.0'	0	5	DRY TO MOIST
	70	S 18	24	7-7 12-8		STIFF BROWN SANDY SILT AND ANGULAR ROCK FRAGMENTS 75.0'	0	5	DRY TO MOIST
	75	S 19	24	10-9 12-18		VERY STIFF DARK BROWN SANDY/CLAYEY SILT AND ANGULAR ROCK FRAGMENTS	0	5	DRY
	80	S 20	24	12-13 15-24		85.0'	1	5	DRY TO MOIST
	85	S 21	24	12-17 28-40		HARD, DARK BROWN, SANDY SILTY CLAY WITH ANGULAR ROCK FRAGMENTS 88.5'	2	5	WET, SAMPLE S-21 ANALYZED FOR VOLATILES TOP OF BEDROCK = 88.5'
		5-22	7	12-50/0.1		SHALE - GRAY 89.1'			
	90					BOTTOM OF BORING = 89.1'			

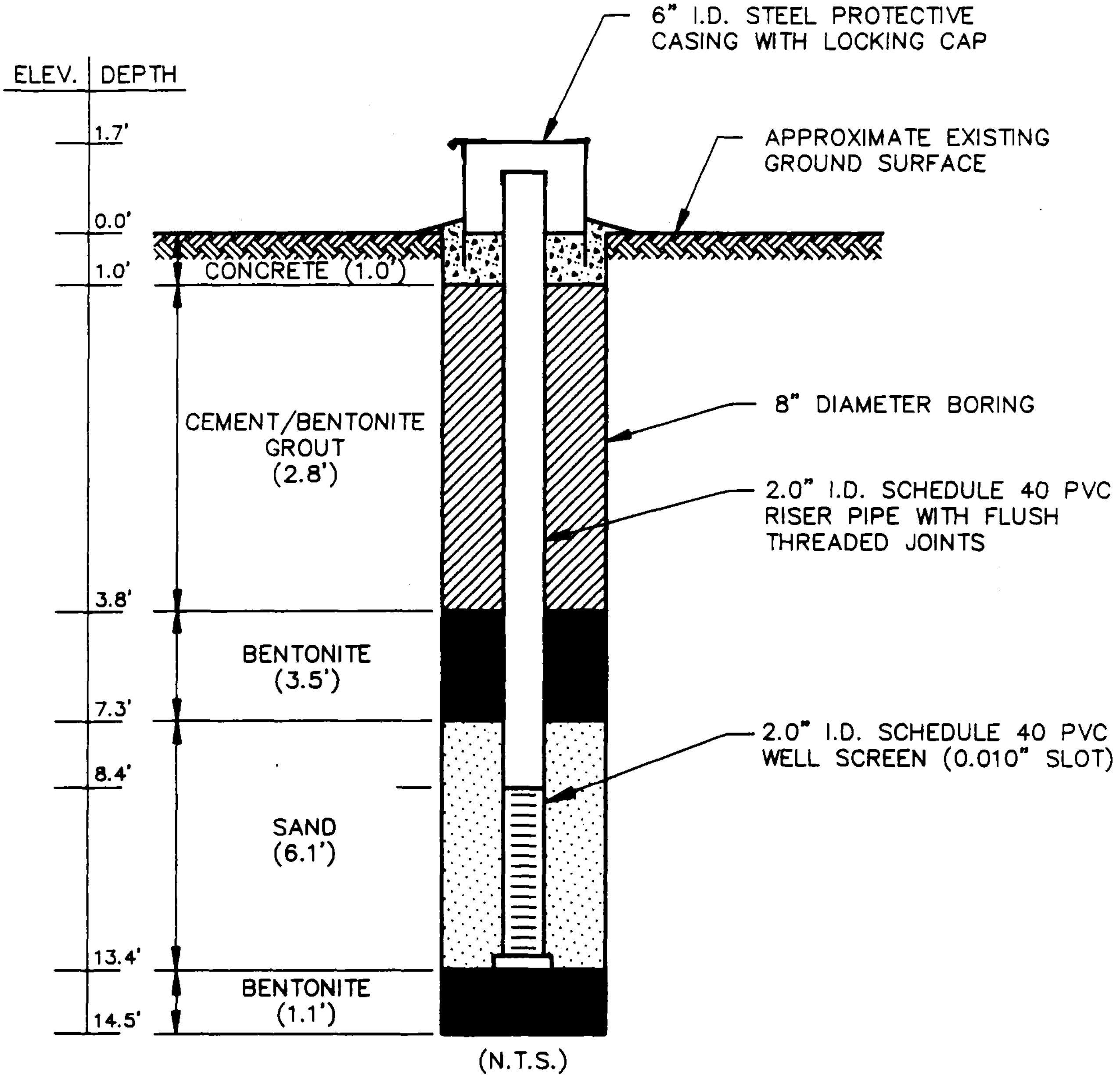
BORING NO. B-12
SHEET 2 OF 2

APPENDIX B

APPENDIX B

WELL INSTALLATION DETAILS

DRAWN BY	DWD	CHECKED BY	map	11/10/88	DRAWING NUMBER
	10-26-88	APPROVED BY		11/10/88	88-537-A1



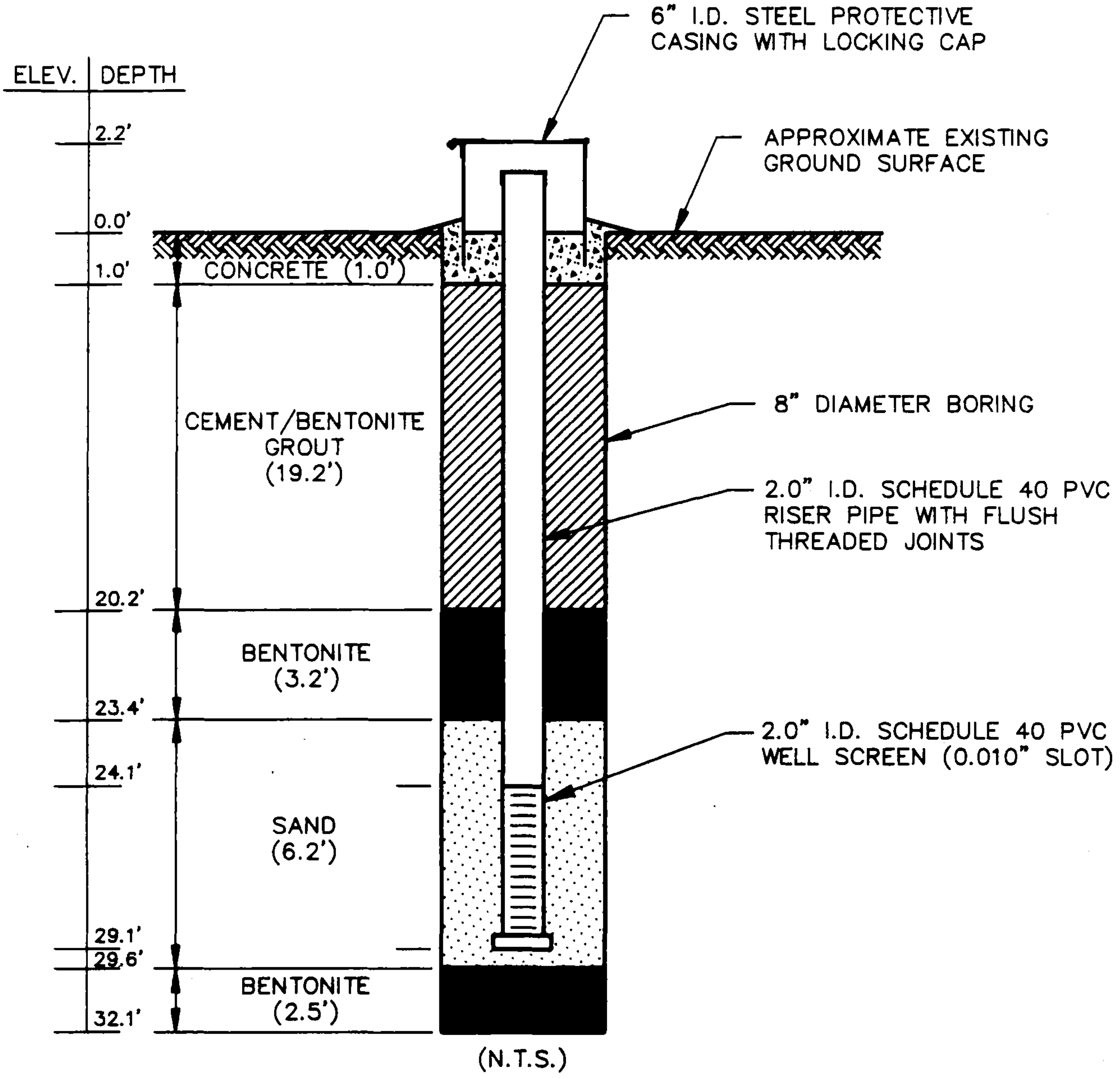
MONITORING WELL NO. B-9B
INSTALLATION DETAILS

HYDROGEOLOGIC STUDY
AREA A-9
BEAVER FACILITY

PREPARED FOR

WESTINGHOUSE ELECTRIC CORPORATION
BEAVER, PENNSYLVANIA

Paul C. Rizzo Associates, Inc.
CONSULTANTS



DRAWN BY	DWD	CHECKED BY	map	11/10/88
	10-26-88	APPROVED BY		11/16/88

DRAWING NUMBER 88-537-A2

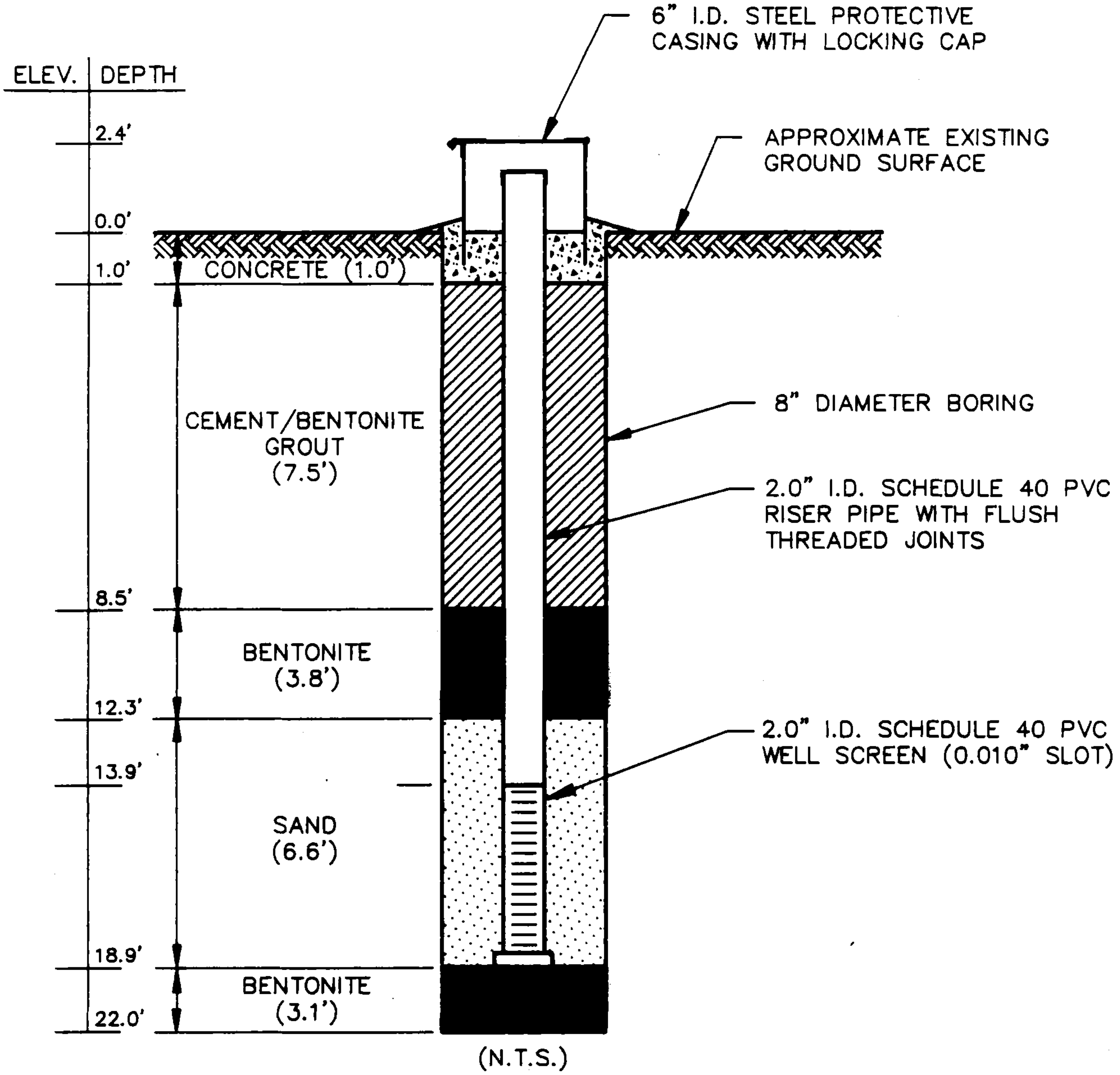
MONITORING WELL NO. B-10A INSTALLATION DETAILS

HYDROGEOLOGIC STUDY
AREA A-9
BEAVER FACILITY

PREPARED FOR

WESTINGHOUSE ELECTRIC CORPORATION
BEAVER, PENNSYLVANIA

Paul C. Rizzo Associates, Inc.
CONSULTANTS



MONITORING WELL NO. B–11
INSTALLATION DETAILS

HYDROGEOLOGIC STUDY
AREA A–9
BEAVER FACILITY

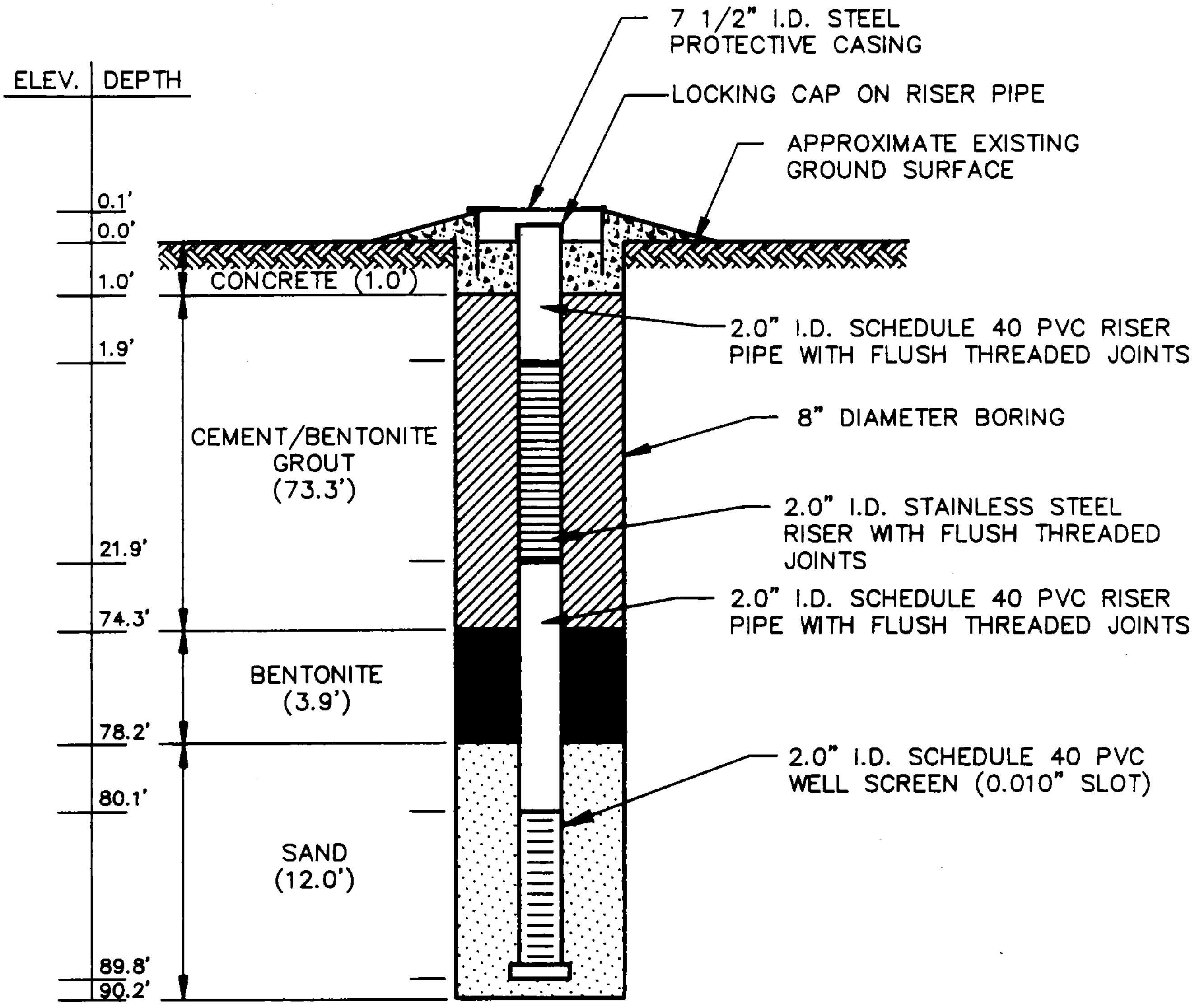
PREPARED FOR

WESTINGHOUSE ELECTRIC CORPORATION
BEAVER, PENNSYLVANIA

Paul C. Rizzo Associates, Inc.
CONSULTANTS

DRAWING NUMBER 88–537–A3
CHECKED BY mgp 11/10/88
APPROVED BY 11/10/88
DRAWN BY DWD 10–26–88

DRAWN BY	DWD	10-26-88	
CHECKED BY	MAP	11/10/88	DRAWING NUMBER
APPROVED BY	PFO	11/10/88	88-537-A4



(N.T.S.)

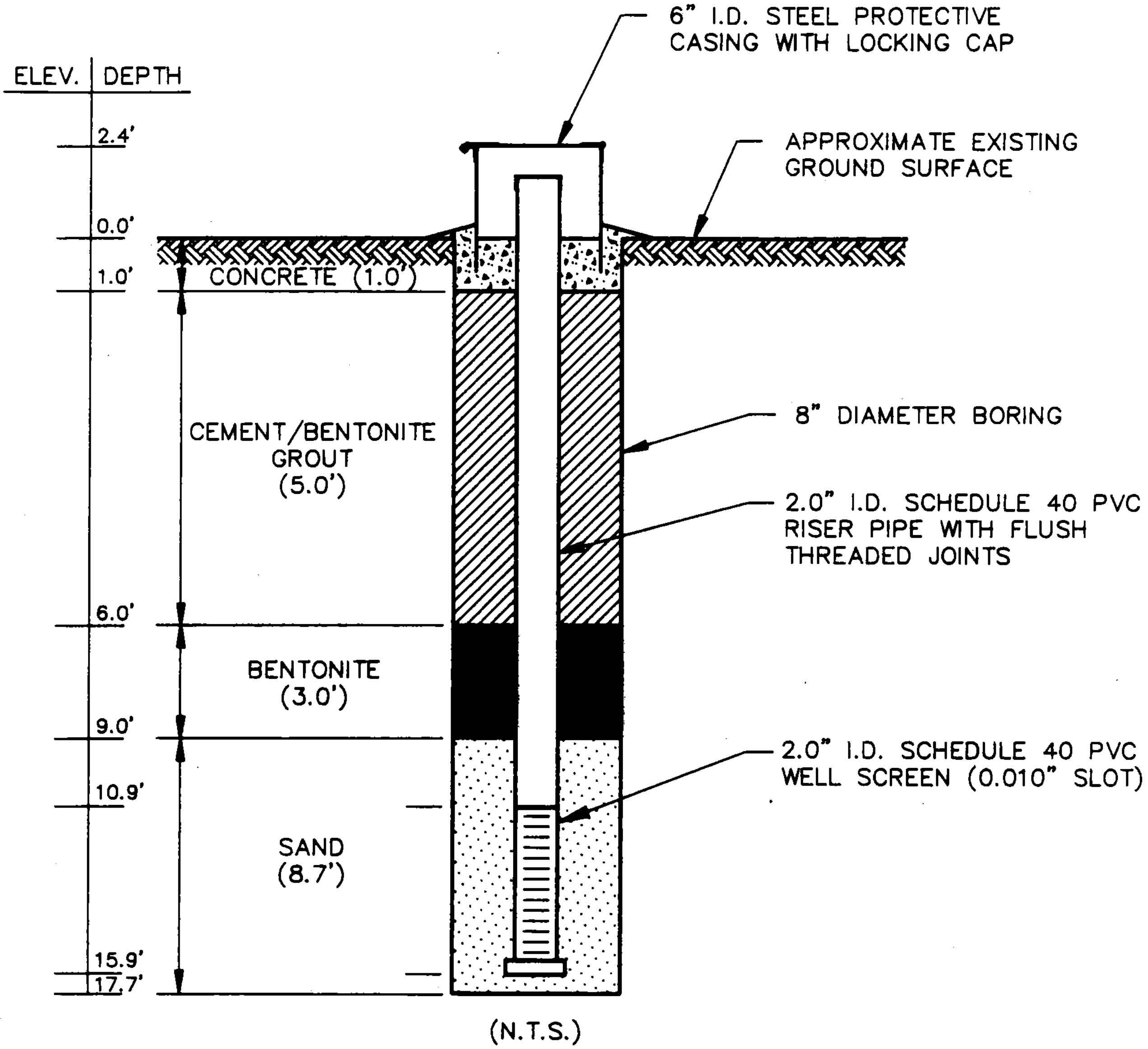
MONITORING WELL NO. B-12A INSTALLATION DETAILS

HYDROGEOLOGIC STUDY
AREA A-9
BEAVER FACILITY

PREPARED FOR

WESTINGHOUSE ELECTRIC CORPORATION
BEAVER, PENNSYLVANIA

Paul C. Rizzo Associates, Inc.
CONSULTANTS



MONITORING WELL NO. B-13
INSTALLATION DETAILS
HYDROGEOLOGIC STUDY
AREA A-9
BEAVER FACILITY

PREPARED FOR

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