CUMMINGS
RITER
CONSULTANTS, INC.

March 22, 2002
Project No. 93111.60/08

Mr. Victor Janosik
U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029

RE: TRANSMITTAL - REPORT - TECHNICAL IMPRACTICABILITY OF GROUNDWATER RESTORATION EVALUATION
WESTINGHOUSE ELECTRIC SHARON PLANT - SHARON, PENNSYLVANIA

Dear Mr. Janosik:

Cummings/Riter Consultants, Inc., on behalf of Viacom Inc. hereby transmits six copies of the Technical Impracticability of Groundwater Restoration Evaluation Report for the Westinghouse Electric Sharon Plant located in Sharon, Pennsylvania. The report has been revised to reflect comments received from the U.S. Environmental Protection Agency in letters dated February 7, 2002 and March 18, 2002, and our discussions related to the USEPA comments.

Please call me at (412) 373-5240 or Mr. Richard Smith of Viacom at (412) 642-3285 if you have any questions.

Sincerely,
Cummings/Riter Consultants, Inc.

William A. Baughman, P.G.
Project Manager

Received
3-28-02 by
V. Janosik, RPM

WAB/cls
Enclosure

pc: Mr. Richard Smith – Viacom Inc.
Mr. Charles Tordella – Pennsylvania Department of Environmental Protection

339 Haymaker Road • Parkway Building • Suite 201 • Monroeville, PA 15146
(412) 373-5240 • FAX (412) 373-5242 • E-Mail: crc@cummingsriter.com

111/L259

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

DATE: April 1, 2002

SUBJECT: Westinghouse Sharon Site
Technical Impracticability Of Ground Water Restoration Evaluation

FROM: Victor J. Janosik, RPM
Western PA Section (3HS22)
Vic

TO: Ken Lovelace, Hydrologist
USEPA (5202G)

Enclosed for your review are two copies of a report titled **"Technical Impracticability of Ground Water Restoration Evaluation..."** pertaining to the Westinghouse Electric (Sharon) Site, Sharon, Mercer County, PA. This document was prepared by Cummings Riter Consultants, Inc. on behalf of the primary PRP, Viacom Inc. EPA, Region 3, reviewed two drafts of the document prior to submitting this final version to you for your review. I would appreciate the completion of your review within 30 days of your receiving this document.

Should you have any questions regarding this document or the Site, please contact Mr. Bill McKenty, P.G. of Region 3 at 215-814-3331, or myself at 215-814-3217.

Thank you for your attention to this matter.

CC: Gregg Crystall (3HS22)
Bill McKenty (3HS41)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

July 22, 2002

Mr. Richard K. Smith
Viacom Inc.
11 Stanwix Street
Pittsburgh, PA 15222-1384

RE: Westinghouse Sharon Site
Ground Water TI Document

Dear Mr. Smith:

EPA Region 3 personnel and EPA Headquarters personnel have reviewed the "Technical Impracticability Of Groundwater Restoration Evaluation" report dated March 22, 2002, as well as the "Addendum" to that report received under a cover letter dated July 18, 2002. These documents were generated for Viacom Inc. by Cummings/Riter Consultants, Inc. EPA accepts the report and the Addendum as final and agrees that the technical impracticability waiver of drinking water standards (ARARs) is appropriate for the Site. We will incorporate the technical impracticability waiver of drinking water standards into the upcoming Proposed Remedial Action Plan for Operable Unit Two.

If you wish to discuss this matter, please contact me at 215-814-3217.

Sincerely,

Victor J. Janosik

Victor J. Janosik
Remedial Project Manager

CC: Charles Tordella, PADEP

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

July 22, 2002

OFFICE OF
SOLID WASTE AND
EMERGENCY
RESPONSE

Victor J. Janosik, RPM
Western PA Section (3HS22)
Environmental Protection Agency
Region 3

Dear Victor,

I have received and reviewed the Addendum to the Technical Impracticability Evaluation for the Westinghouse Sharon Site. OERR is satisfied with the comments and those incorporated changes referenced in the Addendum. This Technical Impracticability Waiver should be referenced in the Record of Decision when addressing the remedial actions for groundwater.

Thank you for your attention to detail on this Addendum. It is well presented. If you have any other questions or concerns, please feel free to contact me.

Sincerely,

Jen Jones
EPA Headquarters
(703) 603-9042

cc: Kenneth Lovelace, Robin M. Anderson

449525

CUMMINGS
RITER
CONSULTANTS, INC.

REPORT
TECHNICAL IMPRACTICABILITY OF GROUNDWATER RESTORATION EVALUATION
WESTINGHOUSE ELECTRIC (SHARON PLANT)
SHARON, PENNSYLVANIA

PREPARED FOR:

VIACOM INC.
WESTINGHOUSE BUILDING
11 STANWIX STREET
PITTSBURGH, PA 15222

Approved as Final
V. Janosik
7-22-02

Received
3-28-02 by
V. Janosik, RPM

PROJECT NO. 93111.60/08
MARCH 22, 2002

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CUMMINGS
RITER
CONSULTANTS, INC.

July 18, 2002
Project No. 93111.60/08

Mr. Victor Janosik
U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029

Received 7-19-02
by V. Janosik, RPM

**RE: TRANSMITTAL - ADDENDUM - TECHNICAL IMPRACTICABILITY OF GROUNDWATER RESTORATION EVALUATION
WESTINGHOUSE ELECTRIC SHARON PLANT - SHARON, PENNSYLVANIA**

Dear Mr. Janosik:

Cummings/Riter Consultants, Inc., on behalf of Viacom Inc. hereby transmits five copies of the Addendum - Technical Impracticability of Groundwater Restoration Evaluation Report for the Westinghouse Electric Sharon Plant located in Sharon, Pennsylvania for your review. The Addendum provides responses to comments received from the U.S. Environmental Protection Agency - Office of Emergency and Remedial Response in a letter dated June 12, 2002, as discussed with you on June 13, 2002. This revised Addendum also addresses comments received from USEPA Region III in a letter dated July 3, 2002, and our discussions on July 8 and July 17, 2002.

I have enclosed with the Addendum the revised text pages for insertion in the previously submitted copies of the report. The pages being replaced may be discarded.

Please call me at (412) 373-5240 if you have any questions.

Sincerely,
Cummings/Riter Consultants, Inc.

William A. Baughman

William A. Baughman, P.G.
Project Manager

WAB/cls
Enclosure

pc: Mr. Richard Smith – Viacom Inc.
Mr. Charles Tordella – Pennsylvania Department of Environmental Protection

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111/L267

CUMMINGS
RITER
CONSULTANTS, INC.

REPORT
TECHNICAL IMPRACTICABILITY OF GROUNDWATER RESTORATION EVALUATION
WESTINGHOUSE ELECTRIC (SHARON PLANT)
SHARON, PENNSYLVANIA

PREPARED FOR:

VIACOM INC.
WESTINGHOUSE BUILDING
11 STANWIX STREET
PITTSBURGH, PA 15222

Received
3-28-02 by
V. Janosik, RPM

Approved as Final
V. Janosik, RPM
7-22-02

PROJECT NO. 93111.60/08
MARCH 22, 2002

EXECUTIVE SUMMARY

This document constitutes the Technical Impracticability (TI) Evaluation of groundwater restoration at the former Westinghouse Transformer Plant Site (Sharon Plant) in Sharon, Pennsylvania. The purpose of the TI evaluation is to allow the U.S. Environmental Protection Agency (USEPA) to formulate a determination of whether maximum contaminant levels (MCLs) and non-zero maximum contaminant level goals (MCLGs) should be waived as applicable or relevant and appropriate requirements (ARARs) for groundwater. It comprises the data and analyses necessary for the USEPA to consider a TI determination regarding whether it is technically feasible to attain MCLs and non-zero MCLGs under the Federal Safe Drinking Water Act for the groundwater at the site.

The former Sharon Plant is located on Sharpsville Avenue in downtown Sharon, Mercer County, Pennsylvania. The Sharon Plant occupies nearly 58 acres, approximately one-quarter mile east of the Shenango River. The area between the site and the Shenango River has been the site of commercial, rail, and industrial activities since the mid-1800s. The hydrogeologic setting includes alluvial deposits atop a dense glacial till, which acts as an aquitard between the alluvial aquifer and the underlying bedrock aquifer.

For over 60 years, ending with the Sharon Plant's shutdown in 1985, Westinghouse primarily produced distribution and power transformers and related electrical apparatus. The U.S. Department of the Navy took over control and operations of the Sharon Plant during World War II.

One of the chemicals used at the site was Inerteen®, a dielectric fluid consisting of a mixture of polychlorinated biphenyls (PCBs) and trichlorobenzene, manufactured by Monsanto for use in transformers. Other chemicals known to have been used at the Sharon Plant were ethyl acetate, methyl ethyl ketone, toluene, xylene, trichloroethylene, and 1,1,1-trichloroethane.

The presence of substantial NAPLs (both floating and sinking) in the alluvial aquifer, in the general vicinity of the former Tank Farm located along the western portion of the

Sharon Plant's Middle Sector, is clearly documented. This NAPL source zone is acting as a latent source for dissolved phase contamination of the alluvial aquifer. This aquifer is vertically and laterally heterogeneous with respect to its hydraulic properties and sedimentary textures. There are no indications that the NAPL constituents (PCBs and trichlorobenzene) have migrated downward through the glacial drift aquitard to the bedrock aquifer, and lateral downgradient migration has been demonstrated to be limited due to the hydrophobic nature of the constituents and natural attenuation processes. Substantial monitoring data obtained over a number of years support these findings.

The groundwater contamination at the Sharon Plant has no human receptors, and thus poses no threat to human health. A public water supply is readily available. The City of Sharon enacted an ordinance in December 2000 prohibiting the installation and use of groundwater supply wells. In addition, monitoring data from downgradient of the source zone indicate that hydrogeologic contaminant migration to the Shenango River has not occurred and is not expected to occur.

Aquifer restoration to drinking water quality is technically impracticable within a reasonable or foreseeable timeframe. This conclusion is based upon experience at other sites, where it has been demonstrated that aquifer restoration has never been accomplished if NAPL source zones cannot be removed or contained.

NAPL containment, removal, and treatment methods to address NAPLs were evaluated. Containment using slurry walls, sheet piling, or other structures was determined to be technically impracticable due to the large area requiring containment and the presence of active off-property industrial buildings and an active railroad line within the NAPL source area.

Removal and in-situ treatment of NAPLs is technically impracticable due to the heterogeneity of the alluvial aquifer, and the lack of technologies with a demonstrated ability to remove or treat more than about 60 percent of NAPLs. Such methods do not provide an increase in protectiveness of human health that is proportionate to the associated increase in cost. Active remedial approaches may prove to be less protective to the environment due to the increased potential for contaminant migration through NAPL disturbance.

The proposed TI zone fully encompasses the extent of non-aqueous phase liquid (NAPL), where MCLs and non-zero MCLGs might be exceeded in the foreseeable future, whether or not an attempt would be made to directly remediate NAPLs. The TI zone is bounded to the north by Clark Street, to the east by Sharpsville Avenue, and to the south by Wishart Court continuing west to the intersection of Reno Street and Shenango Avenue (from Reno Street) north to Broad Street, then due east to the Norfolk Southern railroad tracks, and finally, north along the railroad tracks to Clark Street (see Figure 4-2).

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TECHNICAL IMPRACTICABILITY OF GROUNDWATER RESTORATION EVALUATION
WESTINGHOUSE ELECTRIC (SHARON PLANT)
SHARON, PENNSYLVANIA

1.0 INTRODUCTION

1.1 GENERAL

This Technical Impracticability (TI) of Groundwater Restoration Evaluation Report has been prepared by Cummings/Riter Consultants, Inc. (Cummings/Riter) on behalf of Viacom Inc., successor in interest to CBS Corporation (CBS), formerly Westinghouse Electric Corporation (Westinghouse), for the former Westinghouse Transformer Plant Site (Sharon Plant) located in Sharon, Pennsylvania (Figure 1-1). This report augments the Remedial Investigation (RI) Report (Cummings/Riter, 1996), and the Feasibility Study (FS) Report – Operable Unit 2 (Cummings/Riter, 2000) which have been approved by the U. S. Environmental Protection Agency (USEPA) and the Pennsylvania Department of Environmental Protection (PADEP). Although this TI Evaluation has been formatted as a stand-alone document for ease of review, it is submitted as a component of the Agency-approved RI and FS Reports.

This report has been prepared using data collected during the RI, FS and a Removal Response Action for light non-aqueous phase liquids (LNAPL). The TI Evaluation has been performed in accordance with the *Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration – Interim Final* (USEPA, September, 1993). A TI Evaluation of groundwater restoration for the Sharon Plant is considered appropriate based on hydrogeologic and contaminant-related factors (USEPA, September, 1993), specifically the presence of both dense non-aqueous phase liquids (DNAPL) and LNAPL in an alluvial aquifer comprised of complex sedimentary deposits. Most of the sites where USEPA has determined that groundwater restoration is technically impracticable have DNAPLs present (USEPA, September, 1993).

1.2 PURPOSE FOR TECHNICAL IMPRACTICABILITY EVALUATION

The purpose of this TI Evaluation is to assess from an engineering perspective the practicability of achieving applicable or relevant and appropriate requirements (ARARs) with regard to restoration of groundwater within a timeframe that is reasonable given the circumstances of this particular site. The principal issues of concern in connection with this evaluation are the practicability of achieving relevant groundwater cleanup standards (i.e., USEPA Maximum Contaminant Levels [MCLs]) for chemicals of potential concern (COPCs). The results of this evaluation will be used to support the USEPA in making a TI determination to approve a waiver of specific ARARs for which it would be technically impracticable to achieve.

1.3 REPORT ORGANIZATION

The TI Evaluation components presented in this document are consistent with relevant guidance (USEPA, September 1993) and have been organized accordingly. This report is largely based on the Final Feasibility Study for OU-2 (Cummings/Riter, 2000). The introductory section of this document identifies the basis for implementing this TI Evaluation and establishes the purpose for the evaluation. Relevant background information pertaining to the site is presented in Section 2.0 of this document.

Section 3.0 identifies the site-specific ARARs for which a waiver is requested. A detailed discussion of the basis for establishing the spatial extent of the TI zone over which the TI decision would apply is presented in Section 4.0. Section 5.0 presents the current understanding of the site conceptual model components, including the geology and hydrogeology of the site and vicinity, the nature and extent of COPCs in soil and groundwater, migration and exposure processes, and potential receptors. The restoration potential for the site is evaluated in Section 6.0. Estimated costs for remedial alternatives are summarized in Section 7.0. Section 8.0 evaluates the protectiveness of the remedial alternatives. A summary and conclusions of the TI Evaluation are presented in Section 9.0.

2.0 SITE BACKGROUND

This section presents a description of the Sharon Plant's regulatory history, the plant location, the physical characteristics of the site, the general site development history, the history of Westinghouse and government operations, and a summary of previous investigation and remediation activities that have been conducted. The operations' history is an overview of the growth and the eventual discontinuation of the former Sharon Transformer Plant operations. The information in this section serves as background for the discussion of specific historical manufacturing processes and plant systems provided in subsequent sections of this report.

2.1 REGULATORY HISTORY

In November 1980, the facility qualified for Interim Status under Subtitle C of the Resource Conservation Recovery Act (RCRA) when Westinghouse filed a Notification of Hazardous Waste Activity and Part A of a RCRA Permit Application to treat, store or dispose of hazardous waste. Westinghouse withdrew the Part A Permit Application in July 1983 and converted to generator-only status.

Westinghouse originally submitted a National Pollutant Discharge Elimination System (NPDES) permit application in 1972. Section 1.5.1 of the RI Report contains a detailed discussion of the NPDES permitted outfalls since 1981.

In April 1985, Pennsylvania Department of Environmental Resources (PADER), now PADEP, issued Westinghouse an Administrative Order to undertake a subsurface investigation to determine the horizontal and vertical extent of impacted groundwater and soil (final report submitted by Westinghouse in September 1986), and to submit a Proposed Plan and Schedule for the cleanup of any identified impacted soils and groundwater (submitted by Westinghouse in October 1986).

The site was proposed for inclusion on the National Priorities List (NPL) in June 1988 and was listed on the NPL in August 1990.

In September 1988, Westinghouse entered into a Consent Order and Agreement with PADER to conduct an RI/FS to determine the nature and extent of contamination at the site. In May 1990, Westinghouse requested permission to extract and dispose of LNAPL at the site. As a follow-up to this request, in February 1994, the USEPA issued a Unilateral Administrative Order (UAO) for the development and implementation of a Response Action Plan for the removal of LNAPL from groundwater underneath the Tank Farm in the Middle Sector in order to reduce the threat of off-site migration. A Pilot Study report and addendum letter were approved by the USEPA in August 1995. LNAPL recovery and disposal are ongoing removal actions under the UAO.

On March 20, 1996 Westinghouse submitted the final site RI Report (approved by PADEP on May 24, 1996). On June 6, 1997 Westinghouse submitted a final site Screening-Level Ecological Risk Assessment (approved by PADEP on August 7, 1997), and on April 7, 1998 CBS submitted the final site Baseline Human Health Risk Assessment (approved by PADEP on April 22, 1998). ChemRisk prepared both risk assessments under contract with Westinghouse/CBS.

The "Final FS Report for Operable Unit One (OU1) (Soils)" was submitted by CBS on November 17, 1998, and approved by PADEP on December 17, 1998. The FS for OU2 (groundwater and sediments) was submitted on June 26, 2000 with an addendum addressing bedrock groundwater and storm sewer sediments submitted on May 18, 2001. The OU2 FS and addendum were approved by PADEP on May 30, 2001,

USEPA issued a Record of Decision (ROD) for OU1 in February 2000 describing the selected remedy for site soils, including excavation and disposal or covering of soils impacted primarily by polychlorinated biphenyls (PCBs). USEPA issued a Unilateral Administrative Order to Viacom, Winner Development Company, L.L.C. (Winner) and AK Steel Corporation (AK Steel) on September 29, 2000 requiring the performance of remedial design/remedial action activities addressing impacted soil. The final remedial design reports were submitted by Viacom in July 2001 and approved by USEPA on August 2, 2001.

2.2 SITE DESCRIPTION

The Westinghouse Electric (Sharon) Superfund site includes the former Westinghouse Transformer Plant property, the adjoining Norfolk Southern Railroad property, contaminated groundwater at and west of the former plant, contaminated storm water drainageways, and contaminated sediments in the nearby Shenango River. The Sharon Plant is a former electrical transformer manufacturing plant located along Sharpsville Avenue in the city of Sharon, Pennsylvania, near the western border of Pennsylvania in Mercer County (Figure 1-1). The Sharon Plant occupies nearly 58 acres and is located within the Shenango River Valley. The Shenango River is located 800 to 2,000 feet west of the site. The former plant property approaches the city of Sharpsville to the north and is bounded on the east by Sharpsville Avenue, on the south by Wishart Court, and on the west by Norfolk Southern (formerly Conrail) tracks and AK Steel (formerly ARMCO, Inc.). The former plant property is approximately one mile in length along a north-south axis and between 200 and 800 feet wide. The entire site and the area between the site and the Shenango River are shown on Figure 2-1.

The ground surface of the former plant property is generally flat with a gentle slope from north to south, and ranges in elevation between 860 and 900 feet above mean sea level (MSL). Currently, most of the former plant property surface is under roof or is covered with pavement and/or concrete building foundations, except for a narrow vegetated area in the southwest portion (the former Moat Area). The former plant property is divided into three areas: the South, Middle and North Sectors (Figure 2-1).

The area east of the former plant property is primarily urban residential, while the area to the west, between the former plant property and the Shenango River, varies from commercial, institutional, recreational and light to heavy industrial. This area has been the site of commercial, rail, and industrial activities since the mid-1800s. Today the area is part of an industrial expansion program under the direction of the Shenango Valley Industrial Development Corporation and Penn Northwest Development Corporation.

2.3 PRE-WESTINGHOUSE SITE HISTORY

The history of the former Westinghouse transformer plant property, as detailed in the RI Report (Cummings/Riter, 1996), indicates that the property was used for industrial purposes since the mid-1800s. During this early period, a branch of the Erie Canal passed through the site. A portion of the canal was located along what was subsequently called the moat (Figure 2-1) prior to plant operations by Westinghouse. Two businesses were located in the vicinity of the south end of the Middle Sector and the north end of the South Sector during that time. These were the Atlantic Nail Works and Kimberly and Carnes. It is believed that a flour mill was located at the very south end of the site near a lock in the canal. Just across State Street, south of the site, there was a large basin in the canal. Following the demise of the canal, the basin was reported to be backfilled with slag and the area used for other purposes.

The canal served various industries in the area. Both the railroad and the canal served the Westerman Iron Company, which occupied much of the area between the site and the Shenango River. Operation of the canal ceased in late 1871.

Subsequently, the former plant property was used for other industrial purposes. A mill of some type was once located where the Y Building now stands. A 1908 postcard shows a picture of the Driggs, Seabury Ordnance Company, which was apparently located in the South Sector. Prior to ownership by Westinghouse, Savage Arms Company was located at the former plant property.

A review of historical Westinghouse property plans, building plans, site pictorials/photographs, periodic/annual floor area reports and various other documents have provided a general overview of the physical development of the site since the time of its purchase by Westinghouse from Savage Arms Corporation in 1922. The site development history covers the 62-year period that the former Sharon Transformer Plant was in operation, 1922 through 1984, and the subsequent period since site manufacturing operations ceased.

The recent history of the former Westinghouse plant property development can be divided into five major time periods, which represent distinct stages in the development and closure of the transformer plant. These time periods are discussed in detail in the Remedial Investigation Report (Cummings/Riter, 1996).

2.3.1 Westinghouse Operation History

Prior to its shutdown, for a period of over 60 years, the former Sharon Transformer Plant primarily produced distribution transformers, power transformers, and related electrical apparatus. The distribution transformers included both pole-type and pad-mounted distribution transformers; the power transformers included a wide range of small, medium, and larger power transformers. In addition, the related electrical apparatus included reactors, regulators, rectifiers, and mobile transformers.

Raw materials were generally received at the southern end of the plant and the manufacturing processes progressed as the product moved through the plant to the north. The bulk of the manufacturing, assembly, and testing took place in the Middle Sector with final packaging and shipment operations being performed in the North Sector.

The primary materials in both the transformers and the related electrical apparatus were essentially the same. These materials included:

- Silicon steel for the cores,
- Copper or aluminum for the coils,
- Paper or varnish for insulation,
- Carbon steel for the tanks, and
- Oil, silicone, or Inerteen® dielectric fluids for liquid-cooled designs.

Some of the designs, however, did not use liquid dielectric fluids. Instead, these dry-type designs were cooled with pressurized gas, convected air, or forced air. In addition, some of the very small transformers involved the use of molded rubber and/or other encapsulating solids.

Most of the liquid-cooled designs (approximately 98 percent) were filled with non-PCB containing transformer oil, which is a highly refined mineral oil. A small percentage (approximately 2 percent) of the liquid-cooled designs were filled with either a silicone fluid or Inerteen®. Inerteen® is a registered trademark of Westinghouse for a special dielectric fluid. This fluid is nonflammable and was either undiluted PCBs or a mixture of PCBs and trichlorobenzene. The manufacturer of Inerteen® used the trade name "Aroclor" in conjunction with a four-digit number to identify different blends of PCB compounds.

The use of Inerteen® was first introduced at the former Sharon Plant in 1936. This type of Inerteen® consisted of a 60/40 mixture of Aroclor-1260 and trichlorobenzene. The next type of Inerteen®, introduced in January 1965, was a 70/30 mixture of Aroclor-1254 and trichlorobenzene. The last type of Inerteen®, introduced in January 1968, was Aroclor-1242, which was not mixed with trichlorobenzene. The Sharon Plant discontinued all use of Inerteen® by the end of 1976. Inerteen® was not manufactured or formulated by Westinghouse; all Inerteen® formulations were purchased from the manufacturer. These fluids were typically received and stored in tanks at the former Tank Farm Area located in the middle of the plant (Figure 2-1). Inerteen was also stored in an underground tank (closed and filled in-place) adjacent to Well S-7.

In addition to Inerteen® and transformer oil, several other chemicals are known to have been used at the site. These include six volatile organic compounds (VOCs):

- Ethyl acetate,
- Methyl ethyl ketone,
- Toluene,
- Xylene,
- Trichloroethylene, and
- 1,1,1-Trichloroethane.

The latter two were used in metal cleaning and degreasing operations at several locations on the site. Metal cleaning was also accomplished by acid or phosphatizing-bath processes. Leftover material from these processes was piped to the neutralization facility where it was treated. Other materials that were used at the site included paints, varnishes, various small quantities of flammable liquids and cyanide.

More detailed information regarding specific manufacturing processes, materials, and chemicals used at the facility is provided in Section 2.4 of the Field Sampling Plan (FSP) (Rizzo Associates, 1992).

2.3.2 Government Operations History

During World War II, in addition to its commercial transformer business, Westinghouse developed and produced for the Navy underwater ordnance (torpedoes and related equipment) and radio and radar transformers and transformer cores.

2.4 ENVIRONMENTAL REMEDIATION ACTIVITIES

During the 25 years since the use of Inerteen® was discontinued in 1976, Westinghouse has decontaminated, removed and/or scrapped the entire Inerteen® storage and distribution system. Also, from 1976 through 1986 the following remedial actions were undertaken:

- The containment, recovery, and incineration of approximately 6,750 gallons of a PCB-contaminated mixture of transformer oil and a petroleum distillate that was involved in a spill.
- The removal, drying, and landfill disposal of 60 cubic yards of PCB-contaminated flyash that were present in two settling tanks and a hot well.
- The recovery and incineration of 104 gallons of a PCB liquid that were discovered in the bottom of a concrete sump.

According to Westinghouse records, all materials recovered during these remedial actions were transported to a Toxic Substance Control Act (TSCA) disposal facility in Model City, New York for incineration or landfilling.

In addition, over 4,500 PCB capacitors have been removed, shredded and incinerated. PCB transformers were removed and disposed of in a secure chemical waste landfill. The liquid, including the flush from the PCB transformers, was removed and incinerated.

Westinghouse also has completed a number of cleanups that involved various surface areas in/on sundry pits, basements, floors, cisterns, hot wells and cold wells. These cleanups were undertaken to reduce or eliminate concentrations of any residual PCBs. In addition, sometime prior to 1985, four varnish storage tanks (surface) were removed and scrapped, and four dump/storage tanks (underground) utilized for fire prevention related to varnish operations were closed and filled with inert materials, i.e., either sand or a mixture of sand and cement. These cleanups include the moat and spill areas as well as certain other areas in the South and Middle Sectors.

Within the Middle Sector of the facility, there were three 200,000-gallon (approximate) above ground storage tanks (ASTs) which formerly contained transformer (mineral) oil;

two former ASTs for Inerteen® (approximately 30,000 gallons each); one former oil pumphouse; seven former 15,000 gallon (approximate) underground storage tanks (USTs) for waste solvents and waste oil; one former oil/water separator; and a rail spur for delivery and removal of oil. In the 1940s, two of the USTs were filled with sand and closed in-place. In 1985, Westinghouse completed the removal and disposal of the rail spur and surrounding soils, the oil/water separator and five of the original seven USTs from the midwestern portion of the Middle Sector of the Sharon facility. Approximately 3,300 tons of impacted soil and debris were generated during the excavation of the tanks and apparently disposed of at the SCA Model City, New York landfill. The area was then returned to grade with clean fill and paved with concrete. In addition, a pipe trench and the pumphouse basement were cleaned and backfilled with concrete. One 30,000-gallon AST, which formerly contained Inerteen®, was removed in 1977. The other 30,000-gallon AST was decontaminated and left in-place. The three 200,000-gallon ASTs were used until 1985, when all residual material (oil) was removed. These tanks were removed from the site in the fall of 1999.

Up until the suspension of manufacturing operations in January 1985, the Sharon Plant had three treatment systems to process waste water prior to discharge:

- A settler for flyash,
- An oil/water separator, and
- A neutralization plant.

These treatment systems have been scrapped and/or sold. Current discharges include storm water runoff, non-contact cooling water (municipal water used in air conditioners), and sanitary discharges from the custodial offices.

A pilot program to remove oil floating on top of the groundwater table in the former Tank Farm Area has been underway since early 1994 as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Removal Response Action. This program is still underway (see Section 6.3).

At the present time, portions of the former Sharon Plant have been successfully redeveloped for industrial purposes (see Figure 2-1). The North Sector building is currently owned by AK Steel and is being utilized for pipe storage and manufacturing. The South and Middle Sector buildings are currently owned by Winner International, which currently utilizes the buildings for a zinc-pot plating mill and steel coil storage. The Y-Building (South Sector) is currently owned by the Shenango Valley Industrial Development Corporation and leased to American Industries for refurbishing railroad wheels.

2.5 SURFACE WATER HYDROLOGY

The regional area surface waters drain to the Upper Ohio River Basin. The main tributaries to the Upper Ohio River Basin are the Beaver, Mahoning, and Shenango Rivers. The Shenango River is the dominant surface drainage feature in the immediate site area. The Shenango River flows south from the Shenango River Reservoir, located approximately 3.5 miles to the north, past the site to the confluence with the Mahoning River to form the Beaver River south of New Castle, Pennsylvania.

Uses of the Shenango River in the vicinity of the site include recreation and fishing. Additionally, the Consumers Pennsylvania Water Company, Shenango Valley Division (Consumers Pennsylvania, formerly the Shenango Valley Water Authority) draws water from the river approximately 1,600 feet downstream from the Clark Street Bridge. The median and mean flow rates of the Shenango River at the Clark Street Bridge are 398 and 797 cubic feet per second, respectively, as measured by the U.S. Geological Survey.

Storm sewers control surface water drainage in the areas adjacent to the site and on the site itself. The site is largely paved or under roof, and thus infiltration of rainwater is limited.

2.6 SURFACE FEATURES

The former Sharon Plant site is located in an area of low to moderate relief. The ground surface of the site is generally flat with a gentle slope from north to south, and ranges in elevation between 860 and 900 feet above MSL. The approximate surface water elevation of the Shenango River is 849 feet MSL in the vicinity of the Sharon Plant. The Shenango River, at its closest approach, lies approximately 800 feet west of the Sharon Plant. The area between the Sharon Plant and the river is primarily light to heavy industrial. The area to the east of the site is urban residential in character and rises moderately to elevations exceeding 1,000 feet MSL one-half mile to the east. A topographic map of the site and immediately surrounding areas is provided as Figure 2-1.

2.7 REGIONAL GEOLOGY

The former Sharon Plant is located in the glaciated section of the Appalachian Plateau physiographic province. The area is a maturely dissected plateau consisting of highlands separated by deep broad valleys. The glaciation of the area masks the preglacial topography without completely hiding it. The effect of glaciation was to smooth and erode hills and partially infill valleys, although many pre-existing features are still evident. The stratigraphy of the region includes both unconsolidated deposits and bedrock.

Unconsolidated Deposits: The former Sharon Plant is located in an area of northwestern Pennsylvania which is blanketed with unconsolidated surface deposits. The unconsolidated surface deposits consist of Pleistocene Age glacial material, which overlie bedrock. Holocene Age alluvial material can be found overlying unconsolidated Pleistocene deposits in larger stream valleys.

During the Pleistocene epoch, ice sheets in the form of glaciers occupied northwestern Pennsylvania. The advances occurred from northwest to southeast over the region. Glacial deposits in the region appear to have been largely deposited as ground moraine, which was deposited directly by the glacier in the form of glacial till. Individual glacial till units are characterized as heterogeneous and unstratified in nature, consisting of a mixture of clay, silt, sand, gravel, and boulders. Fluctuations in the advance and retreat of ice sheets produced distinct layers of till (Shepps, et al., 1959 and White, et al., 1969). The glacial drift is generally found to be less than 50 feet thick, but has been found to be as much as 400 feet thick in major stream valleys.

A map showing the surface distribution of various glacial tills is presented as Figure 2-2. A section showing the vertical extent of glacial deposits at nearby Sharpsville, Pennsylvania, located approximately one mile north of the former Sharon Plant, is shown as Figure 2-3.

The stream valley bottoms consist of Holocene Age alluvial deposits comprised of sand, gravel, silt, and clay. The alluvium has been deposited primarily during flood stage of the larger creeks and rivers. During flood stage, streams carry heavy sediment loads. As flooding subsides the sediment is deposited in the stream valley. Migration of the stream across the valley results in the deposition of discontinuous beds of fine to coarse sediment. The deposits are likely to consist of reworked glacial deposits. The alluvium is typically poorly sorted and stratified. Individual layers are thin, lenticular and may overlie glacial till or outwash deposits. Site-specific information on the unconsolidated deposits present at the Sharon Plant is provided in Section 5.2.

Bedrock Formations: Northwestern Pennsylvania lies within the Pittsburgh-Huntington Synclinorium (Figure 2-5). The Pittsburgh-Huntington Synclinorium is a large spoon-shaped basin which extends southwestward from New York to Kentucky and lies between the Allegheny Front and the Cincinnati Arch. Bedrock surfaces within the basin dip radially toward the center of the basin. The basin contains a number of secondary flexures trending northeast/southwest, which decrease in number and intensity westward away from the Allegheny Front. The center of the basin is located near the southwest corner of Pennsylvania. Bedrock in the region reportedly dips to the south and southwest at a rate of 1 to 20 feet per mile.

Bedrock formations in the region consist of shale, siltstone, and sandstone of the Pennsylvanian and Mississippian Systems. Bedrock formations of the Mississippian System (320 to 360 million years) are present in the extreme western edge of Mercer County along the Shenango River Valley. The Mississippian bedrock conformably overlies the Devonian Age strata.

The Sharpsville Sandstone and the Orangeville Shale members are included as part of the Cuyahoga Group. A generalized hydrostratigraphic cross section depicting these stratigraphic units in a section of the Shenango River Valley, approximately one mile south-southeast of the former Sharon Plant, is presented as Figure 2-4. Site-specific information on the bedrock formations encountered beneath the Sharon Plant is provided in Section 5.2.

2.8 REGIONAL HYDROGEOLOGY

Water in the unconsolidated deposits in the region occurs primarily in the sand and gravel laid down in the valley as glacial outwash or ordinary alluvium. Schiner and Kimmel (1976) have found that well yields generally range between about 7 and 30 gallons per minute per foot (gpm/ft) of drawdown in the alluvial sand and gravel deposits in northern Mercer County. The glacial till is described by Shepps (1959) as being impermeable and yielding very little water. However, lenses of sand and gravel interbedded in the till and the course material at the till-bedrock interface are potentially water bearing.

Consolidated deposits in the Sharon area are an important source of groundwater, but no potable usage in the vicinity of the Sharon Plant has been identified. Carswell and Bennett (1963) found that the sandstones have a much higher transmissivity than the shales. For example, the transmissivity of the Sharpsville Sandstone can range from 5 to 50 gallons per day per square foot (gpd/ft^2) with most wells yielding between 20 and 50 gpm. The Berea Sandstone is reported to have a transmissivity ranging between 0 and 10 gpd/ft^2 and a well yield of approximately 10 gpm. The Cussewago Sandstone has a transmissivity ranging from 10 to 40 gpd/ft^2. Carswell and Bennett (1963) report a transmissivity value of 25 gpd/ft^2 for a well in West Middlesex (a few miles southeast of Sharon) which was screened in the Cussewago Sandstone. Neither the Orangeville Shale nor the Bedford Shale are known to produce significant quantities of water.

Carswell and Bennett (1963) state that the Shenango River is a natural avenue for local discharge of groundwater. Upland regions intercept most of the precipitation which subsequently infiltrates downward into the formations and then flows horizontally toward the river valley. A study by SRW (1984) for the ARMCO (currently AK Steel) plant indicates that the direction of groundwater flow is to the west, toward the Shenango River.

2.9 GROUNDWATER AND SURFACE WATER USERS

The former Sharon Plant site is located in an area of limited groundwater usage. Consumers Pennsylvania provides potable water for the immediate Sharon area, obtaining water from a surface source located on the Shenango River approximately

1,600 feet downstream from the Clark Street Bridge and about 1,600 feet west of the site (Figure 2-1). Areas outside of the Consumers Pennsylvania distribution system reportedly rely on groundwater wells for water supplies.

A survey for residential and industrial wells located between the Sharon Plant and the Shenango River (Figure 2-6) was performed in 1994 as part of the RI to obtain information concerning the use, construction and depths of any existing groundwater supply wells. One hundred ten landowners located within the area depicted on Figure 2-6 were sent a Well Survey Form to be completed and returned to Westinghouse. The area east of the site was not surveyed because all residents and businesses were determined to be using city water based on water line maps from the Shenango Valley Water Authority. Also, the Shenango Valley Water Authority did not recognize any wells in the area east of the site, which is upgradient of the former Sharon Plant. All 28 responses returned by residents indicated that no groundwater supply wells were currently in use in the area between the former Sharon Plant and the Shenango River. According to the site inspection report of the ARMCO plant prepared by NUS (1990), the nearest known drinking water wells are located about 0.5 mile north of Clark Street in Hickory Township.

The alluvial groundwater unit at the Site is classified under USEPA's "Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy" (USEPA, 1986) as Subclass IIB – Potential Source of Drinking Water. The Subclass IIB designation is based on the following:

- According to USEPA (1986), the sufficient yield criterion for an average family has been established at 150 gallons per day. According to PADEP (2002), indoor home water consumption averages about 62 gallons per person per day, or approximately 250 gallons per day for a family of four. Portions of the alluvial aquifer where the coarse sand and gravels have been deposited will be expected to meet the minimum yield requirements for at least 150 gallons per day.

- The City of Sharon enacted an Ordinance prohibiting the installation and use of groundwater wells in the area potentially effected by the former transformer plant. This Ordinance was deemed necessary due to the potential for development of alluvial and/or bedrock groundwater supply wells.

- There is no information available to suggest that the groundwater associated with the alluvial aquifer could not be treated using methods reasonably employed in a public water supply system. Therefore, it remains a potential source of drinking water.

- A groundwater use survey was conducted in 1994. At the time, there were no reported users of groundwater in the area between the Sharon Transformer Plant and the Shenango River. Based on this survey, the aquifer is not a current source of groundwater.

Based on information from the 1994 groundwater use survey which indicated there was no groundwater usage in the survey area, and the City of Sharon Ordinance prohibiting the installation and use of groundwater wells, groundwater could be classified as a non-use aquifer following a demonstration in writing in accordance with the Pennsylvania Code (Title 25, Chapter 250, Section 303).

2.10 SUMMARY OF REMEDIAL INVESTIGATION

The RI Report (Cummings/Riter, 1996) provides an overview of the site history and previous investigations at the Sharon Plant, details the procedures used in conducting the remedial investigations, presents findings on the physical and chemical characteristics of the site, and provides an overview of the fate and transport processes and the delineation of media of interest for risk assessment. Based on the studies conducted during the RI, the following findings have been established:

- The area east of the former Westinghouse plant property is primarily urban residential, while the area to the west, between the site and the Shenango River, varies from commercial, institutional, recreational and light to heavy industrial.

- Numerous studies, inspections, sampling programs and remediation projects have been completed at and in the vicinity of the former Sharon Plant site.

- The stratigraphic units associated with the former Sharon Plant site consist of varying thicknesses of artificial fill, alluvium, and glacial till overlying bedrock formations corresponding to the Orangeville Shale Formation.

- Groundwater in the alluvium at the site occurs under unconfined conditions. The groundwater flow direction in the alluvium, as determined by groundwater level measurements, is generally in the west-southwesterly direction toward the Shenango River.

- Groundwater in site bedrock occurs under confined conditions. The groundwater flow direction in the bedrock, as determined by groundwater level measurements, is generally in the west-southwesterly direction towards the Shenango River.

- A layer of glacial till is present beneath the alluvium and directly above bedrock which ranges from 8 to 80 feet thick across the site. The glacial till acts as an aquitard between the overlying unconfined alluvial aquifer and the underlying confined bedrock aquifer. The glacial till has apparently limited vertical migration of constituents of interest (COI) at the site.

- Comparison of alluvium groundwater levels and bedrock groundwater levels for the shallow and deep groundwater monitoring well clusters indicates that a downward vertical hydraulic gradient exists between the alluvium and bedrock over the majority of the site. The exception is at the southern limit of the site, where the vertical hydraulic gradient is reversed, with flow potential from the bedrock to the alluvium. Glacial till deposits were encountered between the alluvium and bedrock at each location investigated during the RI.

- LNAPL (mineral oil with PCBs) was identified at three locations (South and Middle Sectors). An LNAPL recovery pilot study was performed as an initial Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) removal at the on-site location near the former Tank Farm Area west of the Middle Sector buildings. Based on the results of the pilot study, an LNAPL recovery system has been installed to control potential LNAPL migration in the former Tank Farm Area.

- An area of DNAPL (a mixture of trichlorobenzene and PCBs) has been identified at the bottom of the alluvial aquifer near the western portion of the Middle Sector near the Tank Farm Area. The vertical and horizontal extent of the DNAPL have been defined. DNAPLs are pooled in a depression in the top of the glacial till approximately 35 feet below ground surface.

- Groundwater in the alluvium is impacted by COI (primarily PCBs, chlorinated benzenes, trichloroethene [TCE] and 1,2-dichloroethene [DCE]) both on and off site. Two off-site soil and groundwater remediation programs are currently or were previously conducted adjacent to the site by Roemer Industries and AK Steel.

- Based on the available data at the time of the RI, groundwater in bedrock does not appear to be significantly impacted by the COI of this site. The reported detection of PCBs in one bedrock well (7 micrograms per liter [µg/l]) should be evaluated. (See Section 5.4.1 for more recent data.)

- A residential/industrial well survey was performed in the vicinity of the former Sharon Plant facility in 1994. At the time of the survey, no residential or industrial groundwater supply wells were identified within the area surveyed (generally between the site and the Shenango River).

- An ecological assessment of the major vegetative communities was performed in the area surrounding the former Sharon Plant facility. None of the plant communities present in the study area were determined to be regionally significant nor do they provide exceptional wildlife habitat value.

- Fish samples collected by PADER have historically indicated the presence of PCBs in fish tissue in the Shenango River adjacent to, upstream, and downstream of the site.

- Most of the site is paved, and therefore limited surficial soils exist. Surface soils sampled in the North Sector as part of the SRW investigation in 1985 have since been paved with asphalt.

- In the Moat Area, PCBs were detected in 7 surface soil samples and in 54 of 89 subsurface soil samples. Access to the Moat Area is currently restricted by a fence, as required by the RI/FS Consent Order.

- On-site subsurface soils were found to contain levels of COI that warranted evaluation in the risk assessment to assess controls for future site development. Subsurface soils will be a consideration in future uses of the site.

- Surficial soils on Norfolk Southern property immediately west of the North and Middle Sectors contain COIs at levels that warranted evaluation during the risk assessment. The means by which these soils became impacted are not currently known. Access to this area is currently not restricted.

- Subsurface soils on the Norfolk Southern and AK Steel properties west of the site are impacted by DNAPL that underlie the western portion of the Middle Sector of the site at a depth of approximately 35 feet. There is no current direct contact exposure potential.

- Sediments below the Clark Street sewer outfall into the Shenango River and specific areas downstream therefrom, contain site-specific COI above the levels of the upstream sample. PADER split sediment samples also indicated the presence of several polycyclic aromatic hydrocarbons (PAHs) and metals; however, many of these compounds may be associated with anthropogenic background conditions or off-site sources.

- In final summary, the following media of interest were identified for quantitative evaluation in the baseline risk assessment:
  - On-site surface and subsurface soils,
  - Off-site surface and subsurface soils,
  - Groundwater,
  - Shenango River sediments and biota, and
  - Subsurface soil and groundwater beneath the buildings on site.

3.0 SITE-SPECIFIC ARARS FOR WHICH WAIVER IS REQUESTED

Under certain circumstances, a remedial alternative that does not meet an ARAR may be selected, and a waiver of the necessity to comply with the ARAR may be granted. Of the six sets of circumstances described in Section 300.430(f)(l)(ii)(c) of the National Contingency Plan (NCP) (40 CFR Part 300) for which waivers may be granted, one is considered applicable to the Sharon Plant site:

> "Compliance with the requirements is technically impracticable from an engineering perspective."

ARARs potentially applicable to this site include the Safe Drinking Water Act (SDWA) MCL for chemicals of concern, which has at times in the CERCLA remedy selection process been interpreted to require restoration of groundwater to drinking water quality levels. However, it has been documented that DNAPL is present in groundwater at the site (Cummings/Riter, 1996). When large pools of DNAPL are present at the bottom of an aquifer, meeting drinking water standards is unachievable at almost any cost (Feenstra, Mackay, and Cherry, 1991, and Freeze and Cherry, 1989).

According to the document, *Estimating Potential for Occurrence of DNAPL at Superfund Sites*: "Although many DNAPL removal strategies are currently being tested, to date there have been no field demonstrations where sufficient DNAPL has been successfully recovered from the subsurface to return the aquifer to drinking water quality" (USEPA, 1992). Furthermore, "most of the sites where USEPA already has determined that groundwater restoration is technically impracticable have DNAPL present" (USEPA, 1993, p. 2). As a result, it may be necessary to invoke a waiver under CERCLA Section 121 (d)(4) of provisions related to aquifer restoration.

Therefore, this TI Evaluation Report requests that USEPA consider a waiver of the SDWA MCLs and non-zero MCLGs for chemicals of concern with regard to the portion of aquifer inclusive of and downgradient from this site; as defined in Section 4.0. The chemicals of concern are listed on Tables 3-1 through 3-3 for the South Sector alluvial groundwater, Middle Sector alluvial groundwater, and bedrock groundwater, respectively. The tables also include the USEPA reference standards (discussed above).

It is understood that the request for a TI waiver will be evaluated in consideration of the USEPA's *Guidance for Evaluating the Technical Impracticability of Groundwater Restoration* (USEPA, September 1993).

Although a TI waiver is requested only for the ARAR pertaining specifically to PCBs and chlorinated benzenes (the demonstrated DNAPL constituents), implementing active remedial measures to achieve ARARs pertaining to other COPCs within the Probable DNAPL Zone would not add additional benefit given the technical impracticability of achieving the ARAR pertaining to PCBs and chlorinated benzenes. Similarly, active remedial measures to address the limited area of soil contamination above the Probable DNAPL Zone would have no additional benefit, as the contribution of dissolved constituents to groundwater associated with these contaminated soils are negligible in comparison to contributions from the DNAPL within the Probable DNAPL Zone.

4.0 SPATIAL EXTENT OF TECHNICAL IMPRACTICABILITY ZONE

Establishing an appropriate spatial extent of the TI Zone for this site begins with delineating the Probable DNAPL Zone. Delineation of the Probable DNAPL Zone is important because USEPA recognizes that restoration of groundwater is technically impracticable at sites where DNAPL is present, and USEPA has stated that ARAR waivers will generally be appropriate for these sites (USEPA, 1993).

A detailed site characterization has been performed at the Sharon Plant to assess the lateral and vertical extent of DNAPL, as well as LNAPL and aqueous phase chemicals of concern. The site characterization included monitoring well design and installation, quarterly product level monitoring, soil borings for the purpose of screening for the presence of NAPLs, and soil/groundwater analytical testing.

The estimated boundaries of the Probable DNAPL Zone are based on the distribution of locations where DNAPL was directly observed based on visual determination (direct visual identification). The surface of the glacial till unit defines the vertical extent of DNAPL (Figure 4-1). In addition, the depressed surface (i.e., "bowl") in the low-permeability glacial till has defined the lateral extent in the area of the former Middle Sector Tank Farm Area. The estimated horizontal extent of the Probable DNAPL Zone, as measured in December 1993 and June 1999, is illustrated on Figure 4-2.

Additionally, groundwater downgradient of the Probable DNAPL Zone has been assessed with respect to constituent concentrations which exceed MCLs and non-zero MCLGs. Data obtained over the past 13 years do not indicate expansion of this area; but to assure protectiveness, institutional controls restricting groundwater use extend to the discharge point of the alluvial aquifer (the Shenango River). The proposed spatial extent of the TI Zone is as shown on Figure 4-2. This area fully encompasses the LNAPL and DNAPL zones and downgradient areas where MCLs and non-zero MCLGs might be exceeded in the foreseeable future. The basis for the inclusion of these areas in the TI Zone is provided in Sections 5.0 and 6.0.

5.0 SITE CONCEPTUAL MODEL

5.1 SOURCE OF CHEMICALS OF CONCERN

Prior to its shutdown, for a period of over 60 years, the former Sharon Plant primarily produced distribution transformers, power transformers, and related electrical apparatus. The primary materials in both the transformers and the related electrical apparatus were essentially the same. These materials included:

- Silicon steel for the cores,
- Copper or aluminum for the coils,
- Paper or varnish for insulation,
- Carbon steel for the tanks, and
- Oil, silicone, or Inerteen® dielectric fluids for liquid-cooled designs.

Some of the designs, however, did not use liquid dielectric fluids. Instead, these dry-type designs were cooled with pressurized gas, convected air, or forced air. In addition, some of the very small transformers involved the use of molded rubber and/or other encapsulating solids.

Most of the liquid-cooled designs (approximately 98 percent) were filled with non-PCB containing transformer oil, which is a highly refined mineral oil. A small percentage (approximately 2 percent) of the liquid-cooled designs were filled with either a silicone fluid or Inerteen®. Inerteen® is a registered trademark of Westinghouse for a special dielectric fluid. This fluid is nonflammable and was either undiluted PCBs or a mixture of PCBs and trichlorobenzene. The manufacturer of Inerteen® used the trade name "Aroclor" in conjunction with a four-digit number to identify different blends of PCB compounds.

The use of Inerteen® was first introduced at the former Sharon Plant in 1936. This type of Inerteen® consisted of a 60/40 mixture of Aroclor-1260 and trichlorobenzene. The next type of Inerteen®, introduced in January 1965, was a 70/30 mixture of Aroclor-1254 and trichlorobenzene. The last type of Inerteen®, introduced in January 1968, was Aroclor-1242, which was not mixed with trichlorobenzene. The plant discontinued all use of Inerteen® by the end of 1976. Inerteen® was not manufactured or formulated by Westinghouse; all Inerteen® formulations were purchased from the manufacturer. These fluids were typically received and stored in tanks at the former Tank Farm Area located in the middle of the plant (Figure 2-1). Inerteen was also stored in an underground tank (closed and filled in place) adjacent to Well S-7.

In addition to Inerteen® and transformer oil, several other chemicals are known to have been used at the site. These include six volatile organic compounds (VOCs):

- Ethyl acetate,
- Methyl ethyl ketone,
- Toluene,
- Xylene,
- Trichloroethylene, and
- 1,1,1-Trichloroethane.

The latter two were used in metal cleaning and degreasing operations at several locations on the site. Metal cleaning was also accomplished by acid or phosphatizing-bath processes. Leftover material from these processes was piped to the neutralization facility where it was treated. Other materials that were used at the site included paints, varnishes, various small quantities of flammable liquids and cyanide.

Known sources of chemicals of concern observed in groundwater beneath the Sharon Plant primarily relates to leakage and spills from AST and UST locations. Westinghouse files and consultants reports provided information relative to spills and accidental discharges as follows:

- ***1963:*** Two incidents of transformer oil spillage are known to have occurred during 1963, but the exact dates are unknown. The first incident involved leakage from a horizontal vacuum tank in Section HT-60 (Middle Sector). Oil spilled out of the tank when the vacuum was lost during a check of the oil level. The situation was remedied by adding clamps to the tank doors for use during loss of vacuum and adding a sight gage so that the oil level could be checked without opening the tank. Any effects of the spill were not documented.

  A second incident involved transformer oil spillage from the Vapotherm treatment tank in Section TM-2 (Middle Sector). The spillage resulted from a blocked drain line, which caused a false indication that the tank was empty. The problem was corrected by back-flushing the drain line and adding an oil-level sight gage. Any effects of the spillage were not described.

- *1968:* Transformer oil spillage occurred from an oil filling station in Section Y-10 (South Sector) in 1968. A hose burst when a valve at the end was suddenly closed. A valve was added to the supply pipe so that the hose was no longer pressurized and the sewer in the floor was sealed so that spilled oil could not get into it. The effects of the spillage were not documented.

- *June 18, 1973:* On June 18, 1973, a sampling pump picked up oil in the storm sewer in the R-Building. The source of the oil was traced to the vacuum processing system in the H-40 Section (Middle Sector) of the plant. Oil trap tanks in the piping system between the vacuum pumps and tanks overflowed and the excess oil was pumped to the roof through vent pipes. From the roof, the oil got into the sewer through the roof drains. Subsequently, the oil reached the Shenango River. No estimate of the quantity of oil involved is available. Following this incident, Westinghouse implemented procedures to prevent a recurrence of a similar incident.

- *January 1984:* In January 1984 a spill of approximately 6,750 gallons of petroleum distillate mixture occurred northwest of the moat and the Powerhouse Building. This material was subsequently contained, recovered, and incinerated.

Sources of contamination other than the Westinghouse facility, including impacts related to former owners of the AK Steel facility and Roemer Industries are not itemized in this report.

5.2 SITE GEOLOGIC SETTING

Following is a description of the local geologic setting, as provided in the RI Report (Cummings/Riter, 1996). Section 3.3 of the RI Report and Section 2.7 of this report provide a detailed discussion of the regional geologic setting. The monitoring wells referred to in this section are shown on Figure 5-1.

The presence of variable amounts of artificial fill is indicated by site borings. The thickness of the fill across the site ranges from nonexistent to a maximum of approximately 20 feet. Fill was not encountered in borings along much of the eastern portion of the site (Figure 5-2). In the North Sector, the fill reaches a maximum thickness of 12 feet in Monitoring Well N-1. The maximum thickness of the fill is 19 feet, achieved in the southwest corner of the Middle Sector (Monitoring Well M-5).

A review of logs for borings encountering fill conducted during the comprehensive subsurface study (Rizzo Associates, 1986) and the RI indicates the fill is primarily comprised of loose to dense, gray, black, and brown cinders and slag with some wood and brick fragments, and trace amounts of sand and silt.

Based on the results of site borings, alluvial deposits are present across the site. The alluvial deposits at the site are composed of reworked glacial material. The alluvium thins along the eastern portion of the site (Figure 5-3). Based on field observations and data from borings, it is unlikely that the alluvial deposits extend beyond Sharpsville Avenue, except in the southeastern and northeastern limits of the site. Alluvial deposits obtain maximum thickness in the area along the western limits of the Middle Sector and the area east of the former moat in the vicinity of Monitoring Wells S-7 and S-13 (Figure 5-3).

The alluvial deposits consist of a heterogeneous mixture of gravel, sand, silt and clay-sized particles which were deposited by the Shenango River. Grain-size analyses were performed on 15 samples of alluvial soil collected from site borings (Rizzo Associates, 1986). The composition of the samples varied widely with a range of 3.4 to 56.7 percent silt and clay-sized particles. The lowest percentage of fines was obtained from two samples in a probable zone of glacial outwash deposits (Boring N-3). More typically, the fines averaged about 15 percent with 50 percent or more of the material grading medium sand or coarser.

The thickness of the alluvial deposits is quite variable, as shown by Figure 5-3. Because the material is river deposited, there can be considerable variation (i.e., heterogeneity) in a vertical column at any given point, i.e., lenses of silt and clay or coarse material can be found.

Unconsolidated deposits of Pleistocene Age glacial till are present across the former Sharon Plant site. The glacial till is present between the alluvial deposits and bedrock. The glacial material encountered at the site is believed to correspond to the Titusville and Mapledale Tills (Shepps, et. al., 1959 and White, et. al., 1969). The glacial till at the site ranges in thickness from less than 10 feet to more than 80 feet thick. The thickness of the glacial till at the site is depicted on Figure 5-4.

The surface elevation (feet MSL) of the glacial till (alluvium/glacial till contact) was determined for each boring and the results contoured (Figure 5-5). The surface of the glacial till, as inferred from site borings, generally slopes from east to west across the site. Two depressions are present in the glacial till surface; in the South Sector near Monitoring Well S-7 and also along the western portion of the Middle Sector building, in the area of Monitoring Wells M-5, M-12 and MW-14B (Figure 5-5). These depressions in the surface of the glacial till generally correspond to areas where the overlying alluvial deposits are thickest.

A review of logs for borings encountering glacial till conducted during the comprehensive subsurface study (Rizzo Associates, 1986) and the RI indicates that glacial till is primarily comprised of hard, gray to brown silt and clay with some very dense, fine to coarse sand, gravel and rock fragments.

Bedrock underlying the former Sharon Plant is blanketed by unconsolidated deposits of Holocene Age (alluvium) and Pleistocene Age (till). The bedrock beneath the site consists of shale, siltstone and sandstone of the Mississippian System. The bedrock units encountered in site borings include the Orangeville Shale and the underlying Berea Sandstone. Bedrock of the Pennsylvanian System subcrops in the upland area immediately east of the site.

A review of site borings that were advanced to bedrock indicates that the Orangeville Shale subcrops beneath most of the immediate site area. If present, the Sharpsville Sandstone is likely to be slightly east of Sharpsville Avenue. The Berea Sandstone was apparently encountered in two site borings, N-3B and R-1.

The surface of site bedrock was altered during the Pleistocene epoch by the advance and retreat of the glaciers, which scoured the bedrock surface. The approximate existing bedrock surface, as inferred by site borings, is presented on Figure 5-6. As shown on that figure, the bedrock surface ranges in elevation from 830 to 780 feet MSL on the former Sharon Plant site. The bedrock surface is quite variable, with the highest elevations in the southern portion of the site. The bedrock surface generally slopes north and west from the South Sector. The depth to bedrock ranges from 31 feet (Borings S-2B and S-10) to 108 feet (Boring N-3B) below ground surface.

A review of logs for borings encountering bedrock conducted during the comprehensive subsurface study (Rizzo Associates, 1986) indicates that bedrock encountered was generally comprised of medium to dark gray, soft-to-hard shale and siltstone, with thin gray, medium hard sandstone layers.

According to Carswell and Bennett (1963), Mississippian bedrock units underlying the site area dip south and southwest at the rate of approximately 15 feet per mile.

Five geologic cross-sections (Figures 5-7, 5-8, and 5-9) have been constructed to depict each of the stratigraphic units listed above. The cross-section locations are provided on Figure 5-1.

5.3 SITE GROUNDWATER

Major and minor stream valleys dissect bedrock of the region. The bedding of the bedrock is relatively flat lying. Water entering the bedrock system near the top of the ridges tends to move downward and outward toward the stream valleys. The hydraulic head within the ridge areas decreases with depth. Groundwater may emerge as springs and seeps associated with aquitards along the valley walls. Some groundwater emerges as base flow to small streams in the valleys. In addition, some groundwater continues to move downward and emerge in the glacial drift along the axis of the major stream valleys (Schiner and Kimmel, 1976). Groundwater flow in bedrock tends to flow along fractures within the bedrock. Two primary joint sets have been identified by Carswell and Bennett (1963) as trending N40-45°E and N40°W.

Groundwater associated with the unconsolidated deposits occurs primarily in the sand and gravel laid down in the valley as glacial outwash or alluvium in the region. Schiner and Kimmel (1976) report that well yields generally range between approximately 7 to 30 gpm/ft of drawdown in the alluvial sand and gravel deposits of the Shenango River in northern Mercer County. A discussion of the alluvium, glacial till and bedrock and how each relates to site hydrogeology is presented in the following subsections. Hydrostratigraphic cross-sections are provided on Figures 5-7, 5-8, and 5-9.

5.3.1 Alluvium

Grain-size analyses were performed on 15 samples of alluvial material collected from the site borings during the subsurface investigation (Rizzo Associates, 1986). The results of the grain-size analyses indicate the composition of the samples varied widely, with a range of silt and clay-sized particles of 3.4 to 56.7 percent. The lowest percentage of fines was obtained from two samples in a probable zone of glacial outwash gravel (Boring N-3). More typically, the fines averaged about 15 percent with 50 percent or more of the material grading medium sand or coarser. A typical permeability range for this material would be approximately 10^{-3} to 10^{-4} centimeters per second (cm/sec) with higher values in areas of diminished fines content (Rizzo Associates, 1986).

Groundwater in the alluvium occurs under unconfined conditions across the site. The depth to groundwater in the alluvium generally ranges from 2 to 20 feet below ground surface. Groundwater associated with the alluvium generally flows west-southwest toward the Shenango River. The groundwater piezometric surface map for alluvial water levels measured on June 30, 1999 is included as Figure 5-10. This figure is representative of other water level monitoring events. Historical water levels are summarized in Table 5-1.

A groundwater study was conducted by SRW on the property currently owned by AK Steel (formerly ARMCO) just west of the former Sharon Plant site (SRW, 1984). A groundwater-pumping test was conducted as part of the study to estimate the properties of the alluvium aquifer. The aquifer test findings were reportedly used in design of a groundwater remediation system.

A six-inch diameter groundwater recovery well (PW-1) was reportedly installed by SRW to a depth of 55 feet. Two, two-inch diameter observation wells were reportedly installed to a depth of 30 feet.

A 72-hour pumping test was conducted at Well PW-1 by SRW with an average reported flow rate of one gallon per minute (gpm). Transmissivity values ranging from 550 to 1,200 gpd/ft of drawdown and hydraulic conductivity estimates of 6×10^{-4} to 1×10^{-3} cm/sec were reported (SRW, 1984).

The hydraulic gradient for the alluvial aquifer is variable across the site, but averages approximately 0.015 foot per foot (ft/ft). The average linear groundwater flow velocity in the alluvial aquifer beneath the site has been estimated using a form of Darcy's Law, $V = (Ki)/n$ (Freeze and Cherry, 1979); where V is the average linear groundwater velocity, K is the hydraulic conductivity (assume 8×10^{-4} cm/sec based on SRW, 1984), i is the hydraulic gradient (assume 0.015 ft/ft; using groundwater elevations recorded in June 1994 for Wells M-18, 878.05 feet MSL and MW-3A, 866.25 feet MSL), and n is the porosity (assume 0.25 for sand and gravel aquifer). The average linear groundwater velocity for the alluvial aquifer, based on the above parameters, is estimated to average 50 feet per year. Transport of constituents dissolved in the groundwater usually occurs at rates less than the calculated average linear velocity based on variable aquifer conditions, constituent characteristics (Cummings/Riter, 1996), and the occurrence of other multiple natural attenuation mechanisms (Cummings/Riter, 1999).

5.3.2 Glacial Till

Glacial till of the Shenango River Valley is described by Shepps, et al. (1959) as being generally impermeable and yields very little water. However, lenses of sand and gravel may be interbedded in the till and the coarse material at the till/bedrock interface (when present) is potentially water bearing.

Grain-size analyses were performed on seven samples of glacial till from the site. Generally, the fines content was 50 percent or greater. Given the high Standard Penetration Test (SPT) values (ASTM D 1586-84) observed during the drilling, it is expected that the permeability of the glacial till is less than 10^{-6} cm/sec (Rizzo Associates, 1986).

The glacial till is expected to act as an aquitard between the alluvium and bedrock, based on the fine-grained texture, density and thickness of the till. Thin discontinuous sand and/or gravel seams will have minimal effect on vertical groundwater movement. Vertical movement within the glacial till will be controlled by the overall impermeability of the till.

5.3.3 Bedrock

Groundwater flow in site bedrock is controlled primarily by fractures. Two primary sets of fractures are present in sandstones and shales in the area. One primary fracture set is oriented approximately northwest-southeast and the other primary fracture set is oriented almost 90° from the first set (Schiner and Kimmel, 1976).

Groundwater associated with the uppermost bedrock unit, the Orangeville Shale, occurs under confined conditions. Groundwater associated with the Orangeville Shale Formation generally flows west-southwest toward the Shenango River. The Orangeville Shale exhibits limited primary porosity, and groundwater storage and movement occur in the secondary fracture openings. Groundwater associated with the Orangeville Shale bedrock unit will generally follow the path that represents the least resistance in the direction of decreasing head potential. Groundwater flow may exhibit localized variances due to anisotropic conditions created by variations in lithology, fracture density, or structural features. The groundwater potentiometric surface for bedrock water levels measured on June 30, 1999 is included as Figure 5-11. This figure is representative of other water level monitoring events. Historical water levels are summarized in Table 5-1.

Carswell and Bennett (1963) found that the sandstones have a much higher permeability than the shales in the area. For example, the permeability of the Sharpsville Sandstone can range from 5 to 50 gpd/ft^2 with most wells yielding between 20 and 50 gpm. The Berea Sandstone is reported to have a permeability ranging between 0 and 10 gpd/ft^2 and a well yield of approximately 10 gpm. The Cussewago Sandstone has a permeability ranging from 10 to 40 gpd/ft^2. Carswell and Bennett (1963) report a value of 25 gpd/ft^2 for a well in West Middlesex (a few miles southeast of Sharon), which was screened in the Cussewago Sandstone. Neither the Orangeville Shale nor the Bedford Shale is kno to produce significant quantities of water.

Carswell and Bennett (1963) also state that the Shenango River is a natural avenue for the discharge of groundwater. Upland regions intercept most of the precipitation which infiltrates downward into the shallow bedrock (at the surface) and then flows toward the valley and into the unconsolidated section within the valley.

Field permeability testing (pump-in packer testing) of the Orangeville Shale was performed using the methodology described in the comprehensive subsurface study (Rizzo Associates, 1986). Reported results obtained from the tests indicate a range from not measurable (impermeable) to greater than 10^{-4} cm/sec. A significant number of the tests resulted in no measurable intake of water by the formation. This is reflective of very low permeability zones in the rock or closure of the water bearing rock fractures by cuttings during coring. The results for zones that took water are very consistent.

5.4 MIGRATION AND FATE OF CHEMICALS OF CONCERN

The migration and fate of chemicals of concern at the Sharon Plant is controlled by the depth and size of the source areas; the subsurface variability, including the presence of low permeability glacial till beneath the alluvial deposits, and the tendency for chemicals of concern released at the Sharon Plant to adsorb, volatilize and degrade. This section reviews the current extent of chemicals of concern, historical trends in concentrations, specific transport mechanisms, and the eventual fate of the chemicals of concern derived from source areas. The primary chemicals of concern identified at the Sharon Plant include PCBs, chlorinated benzenes, and chlorinated solvents (such as TCE) and their degradation products. The subsequent discussion focuses on these compounds. A complete list of chemicals of concern for which the TI Waiver is being sought is provided in Tables 3-1, 3-2, and 3-3.

5.4.1 Current Extent of Chemicals of Concern

LNAPL Zone Boundaries: The extent of LNAPL (a mixture of mineral oil and PCBs) has been delineated through product and groundwater level monitoring. The results for the historical LNAPL measurements are summarized in Table 5-2. Seventeen alluvial monitoring wells have had measurable thicknesses of LNAPL, including Wells M-2, M-7, M-10, M-12, S-4, S-5, MW-7, MW-14A, MW-15A, MW-15B, GM-1A, GM-2A, GM-3A, GM-4A, GM-5A, GM-5B, and GM-6A. Areas of historical occurrences of LNAPL are provided on Figure 5-12.

LNAPL has been observed in four separate locations in the vicinity of the Sharon Plant. LNAPL was detected in South Sector Monitoring Well S-4. Two separate areas of LNAPL were identified in the Middle Sector. LNAPL has been detected in Monitoring Well M-2, and in a series of monitoring wells associated with the former Middle Sector Tank Farm Area, including Well MW-14A located west of the Norfolk Southern railroad tracks on AK Steel property (Figure 5-12). LNAPL has also been observed in off-site Well MW-7, located on AK Steel property (Figure 5-12). Analytical testing performed during the Phase II RI identified oil sampled from Well MW-7 as lubricating oil, and oil from Well M-7 (Middle Sector Tank Farm) as mineral oil. Based on this testing, it is believed that the LNAPL present at Well MW-7 is not related to the former Sharon Plant.

Based on available measurement data, the estimated volume of LNAPL in the subsurface is approximately 60,000 gallons (Cummings/Riter, 2000).

DNAPL Zone Boundaries: The extent of DNAPL (a mixture of PCBs and trichlorobenzene) has been delineated through product and groundwater level monitoring. The results for historical DNAPL measurements are summarized in Table 5-3. Thirteen alluvial monitoring wells have had measurable thicknesses of DNAPL, including Wells M-1, M-7, M-10, M-11A, M-12, MW-15B, GM-1B, GM-2B, GM-3B, GM-4B, GM-5B, GM-6B and GM-7B. Areas of historical occurrences of DNAPL are provided on Figure 5-13.

DNAPL has been observed in alluvial monitoring wells in an area approximately 900 feet (north-south) by 100 to 200 feet (east to west) located along the western portion of the Middle Sector, and across the Norfolk Southern railroad tracks onto the eastern limits of the AK Steel property (Figure 5-13). A series of test borings (TB-14 through TB-20) and monitoring wells (OS-3B, MW-14B, MW-3B, GM-8B, M-13B, and M-6) which did not encounter DNAPL, bound the extent of DNAPL. The extent of DNAPL is controlled by the structure of the top of the glacial fill, due to the lower permeability of this unit in relation to the overlying alluvial deposits. A depression in the surface of the glacial till along the western portion of the Middle Sector, extending on the AK Steel property, has apparently limited the movement of DNAPL, which appears to be confined to the limits of the depression (Figure 5-5).

Based on available measurement data, the estimated volume of DNAPL in the subsurface is approximately 500,000 to 1.2 million gallons (Cummings/Riter, 2000).

Dissolved-Phase Chemicals of Concern Boundaries: The extent of organic compounds in alluvial groundwater from the most recent sampling event is shown on Figures 5-14, 5-15, and 5-16. The extent of these organic compounds is limited to the areas near the originally suspected source areas at the former Sharon Plant. Source areas consisting of former USTs and associated soils were removed in 1977. Non-aqueous phase liquids (NAPLs) are present in the Middle Sector former storage tank area within the alluvial aquifer and act as a continuing source for groundwater impact. However, the aqueous phase plumes associated with these source areas are substantially less in extent than would be expected based on the estimated groundwater flow velocity, due to the physical characteristics of the constituents (example: PCB's attraction to solid materials and relative insolubility limit infiltration to groundwater) and significant attenuation mechanisms.

The historical groundwater sampling and analysis results for the alluvial and bedrock aquifers are provided in Tables 5-4 through 5-8. Following is a brief summary of the field observations and analytical data based on the most recent field activities:

- ALLUVIUM
  - There appear to be three distinct plumes with significant concentrations of organic compounds present in alluvial groundwater:

    1. PCBs and chlorinated benzenes have been consistently detected in alluvial monitoring wells in the general vicinity of the former USTs and ASTs located in the southern and western portions of the Middle Sector. These two groups of compounds are considered to be distinct plumes related to the same source area. The PCB plume is clearly immobile, while the chlorinated benzene plume appears to be relatively stable. The source area for these constituents in groundwater is believed to be NAPLs located in the former Tank Farm Area of the Middle Sector. Additional detections of PCBs have also been identified in areas to the east and north of the primary source area (Tank Farm Area). These detections are believed to be related to historical uses of PCBs at the site, and possibly,

to the transportation and handling practices of PCBs near the railroad spur in the northern portion of the Middle Sector. These areas are believed to be limited in extent and have lower concentrations than those related to the primary source area. Downgradient monitoring wells have delineated the extent of PCBs and chlorinated benzenes.

2. Chlorinated VOCs (trichloroethene and its daughter products) have been consistently detected in the vicinity of the former Y-Building in the southwest portion of the site. The primary source area for this plume is unknown as there were no known former uses of solvents in this area by Westinghouse. Groundwater sampled from Well S-10 had the highest reported concentration of 1,2-Dichloroethene (3,300 µg/l). A remedial action was performed in the early 1990s at the adjacent former Roemer Industries (Roemer) facility to address VOC releases. Chlorinated solvents were present in one of the Roemer monitoring wells. This plume has not been completely bounded south of Well OS-1A and south and west of the OS-7 well cluster.

3. TCE has been consistently detected near the northwest portion of the Middle Sector (Wells M-17 and M-16, and MW-3B). The primary source area for this plume is unknown. This plume has been delineated by downgradient alluvium Monitoring Wells MW-17AR, OS-4A, OS-4B, OS-5A, and OS-5B (Figure 5-15). The TCE plume may have a source unrelated to the transformer plant. This assumption is based on the relative concentrations of TCE at Well M-16 located at the furthest downgradient location at the Sharon Transformer Plant relative to Well MW-3B, located on AK Steel property west of the railroad tracks. The TCE concentration for samples collected in 1999 were two to three orders of magnitude lower for Wells M-16 and M-17 on the former Sharon plant facility compared to Well MW-3B. The location of Well M-16 between M-17 and MW-3B indicates two separate TCE source areas may exist.

- With respect to alluvium groundwater, compared to VOC data obtained in 1992 during the RI, the supplemental sampling results for trichloroethene in the OS-1 and OS-2 series wells are 70 to 90 percent lower, while the vinyl chloride concentrations increased by 20 to 115 percent and chlorobenzene concentrations are 3 to 22 times higher (indicating that substantial biodegradation is occurring). Otherwise, the supplemental VOC data are generally consistent with the RI data.

- The supplemental results for dissolved semivolatile organic compounds (SVOCs) in groundwater associated with the alluvium were generally consistent with results obtained in 1992 during the RI. SVOCs in alluvial groundwater are defined and limited in extent due to natural attenuation of these compounds in the dissolved phase (Cummings/Riter, 1999).

- PCBs were detected in groundwater samples collected from three alluvial monitoring wells in the vicinity of known or suspected source areas. PCBs were not detected in samples collected from the remaining on-site nor in any of the off-site alluvial monitoring wells sampled during the supplemental sampling event. These results are consistent with (in the case of the off-site wells) or up to three orders of magnitude lower (for the on-site wells) than PCB results obtained in 1992 during the RI. These results appear to confirm the immobility of the PCB plume.

- Concentrations of dissolved inorganics in the alluvial monitoring wells are characterized as random and sporadic, probably indicative of background conditions in this aquifer. Because of their relative immobility, the inorganic compounds detected in alluvial monitoring wells do not appear to pose a significant risk to potential receptors.

- **BEDROCK**
  - No site-related VOCs were detected in any of the 11 site bedrock monitoring wells in 1992. The VOC results for sampling conducted in 1999 were consistent with the 1992 results, with the exception of chlorobenzene in Well M-11B.

  - SVOCs and PCBs were detected in bedrock Well M-11B during the July 1999 supplemental sampling event. However, enhanced purging of the wells followed by subsequent sampling and analysis (conducted approximately three months later) reduced these reported SVOCs and PCBs two orders of magnitude. Well M-11B is located within the area where DNAPLs are known to exist. Our interpretation of these results is that the laboratory analyses of samples from these wells do not represent conditions in the aquifer beyond the immediate proximity of Well M-11B. These results indicate migration within the well boring itself. Two new bedrock wells (MW-14C and OS-3C) were installed downgradient of Well M-11B and did not contain site-related constituents. Well M-11B was properly decommissioned using procedures which were reviewed and approved by the PADEP and the USEPA.

- PCBs were detected at a concentration near the method detection limit in one other bedrock monitoring well (S-1B) during the July 1999 supplemental sampling event. However, subsequent sampling in October 1999 indicated Well S-1B did not have PCBs above the method detection limit.

- Dissolved inorganic compounds identified in bedrock groundwater during the supplemental groundwater sampling event conducted in July 1999 were generally consistent with previous sampling data collected in 1992 during the RI.

- Based on the findings of the July 1999 supplemental sampling activities, including the installation and sampling of two new bedrock monitoring wells (MW-14C and OS-3C) located adjacent to and downgradient of the Middle Sector former storage tank area, organic COPCs identified in the alluvial aquifer do not appear to be consistently present in the bedrock aquifer at concentrations which may pose a risk to hypothetical receptors. Glacial drift, exhibiting low permeability, acts as a confining layer which inhibits the vertical migration of COPCs from the alluvium to the bedrock aquifer.

- Concentrations of inorganic COPCs show no apparent pattern; rather, detections of the inorganic compounds appear to be random and sporadic. For example, the highest arsenic concentration in the bedrock aquifer has been found at Well M-9, located along the upgradient edge of the site. As there were no known uses at the facility for many of these inorganic compounds, including arsenic and manganese, these concentrations may be representative of background or regional aquifer conditions, rather than of a release from the site. Because of their relative immobility, the inorganic compounds detected at the site do not appear to pose a significant risk to hypothetical receptors.

5.4.2 Historical Trends of Chemicals of Concern

Based on the results of an initial natural attenuation screening process (USEPA, 1998), there is evidence that natural attenuation is occurring at the former Sharon Plant. By comparing the 1992 and 1999 analytical results, several wells are believed to demonstrate that significant biodegradation processes are at work at the site. Monitoring Wells OS-1A, OS-2A, and OS-2B show a reduction in trichloroethene and/or 1,2-DCE concentrations while the vinyl chloride concentrations increased. Monitoring Well M-2 shows an increase in concentrations of dichlorobenzene, chlorobenzene, and benzene, indicating degradation of trichlorobenzene found in that portion of the site.

Significant attenuation of COPCs has been observed in groundwater immediately downgradient of the former Sharon Plant. Numerous monitoring wells exist between the former Sharon Plant and the Shenango River which do not contain COPCs. In the absence of attenuation mechanisms these wells would be expected to contain COPCs. The combination of the contaminant characteristics, and the presence of natural attenuation processes in the aquifer, is effectively limiting COPCs in groundwater at the former Sharon Plant, and mitigates potential for impact to the Shenango River from site groundwater.

5.4.3 Solute Transport

The data gathered during the RI provides information on the geotechnical, geological and hydrological characteristics of the former Sharon Plant site, identified the types of compounds present and the extent of their distribution, and identified compounds of interest (COI). A brief outline of transport mechanisms is discussed in the following paragraphs.

COI at the site can be broken down into four groups: 1) VOCs, which include chlorinated aliphatic hydrocarbons; 2) metals, which include lead; 3) aromatic hydrocarbons, which include chlorinated benzenes, PCBs, dioxins/furans, and PAHs; and 4) NAPL. Pesticides were detected in some samples at the site, but are not believed to be site-related and are thus not included in this discussion. There is no record of pesticide use by Westinghouse at the site; however, pesticides have commonly been used by railroad companies along their rights-of-way. Processes affecting the transport of COI in groundwater include advection, diffusion, dispersion, dilution, degradation, volatilization, adsorption, particulate transport, bioaccumulation and gravity flow, and are described as follows:

- Advection is the process by which moving groundwater carries with it dissolved solutes.

- Diffusion is a mechanism whereby solute distributions within water spread due to random molecular movements. The overall effect is that the solute moves from areas of higher concentrations to areas of lower concentrations.

- Dispersion is an analogous spreading mechanism produced by random velocity variations in the movement of water. In surface water, these variations are produced by turbulence. In groundwater such variations are produced by the movement of groundwater around localized regions of lower hydraulic conductivity. Dispersion can cause mixing of contaminated groundwater with uncontaminated groundwater, and hence dispersion is a mechanism for dilution.

- Dilution is the process whereby the mixing of two streams of water containing unequal concentrations of dissolved species produces a single stream with an average concentration. For example, a small discharge of groundwater containing high concentrations of a chemical constituent into an uncontaminated stream with a relatively high flow would produce a low concentration of that chemical constituent in the stream.

- Degradation is the process whereby compounds undergo transformation or other biological or chemical reactions which destroy the compounds.

- Volatilization is the evaporation of light compounds from water and soil into the gaseous phase, which can be either to the atmosphere or to soil gas.

- Adsorption is the process whereby dissolved compounds in fluids in contact with solid media become attached to the surface of the solid. Adsorption is often reversible. In groundwater, equilibrium reversible adsorption is responsible for the phenomenon known as retardation.

- Particulate transport is the movement of absorbed compounds by virtue of the movement of the particles to which they are attached. Examples include the movement of dust by wind, sediment transport by surface water, and the transport of colloidal particles by groundwater.

- Bioaccumulation is the process whereby compounds concentrate within the tissue of living organisms, particularly in an aquatic environment. Chemicals with high bioaccumulation rates are typically characterized by high partition coefficients and resistance to degradation.

- Gravity flow is a possible flow mechanism where DNAPL exists in undissolved form. The DNAPL, having a higher density than water, will tend to flow vertically until a less permeable zone is encountered. The DNAPL will then pool and flow to low spots along the surface of the lower permeability unit.

The applicability of these transport mechanisms to each of the groups of COI is discussed in the following paragraphs.

Volatile Organic Compounds: Where the VOCs are exposed to the atmosphere, as in surface soil from source areas and surface water, some volatilization will tend to occur. Once in the atmosphere, these compounds are quickly degraded via photolysis and photo-oxidation. In the absence of other processes, volatilization would be detected as a gradual decline in concentration. However, this process cannot be distinguished from other attenuation factors.

The primary transport mechanism for VOCs is advection via groundwater. VOCs in the alluvial aquifer beneath the site will be transported generally to the west, in the direction of the hydraulic gradient measured at the site. The alluvial aquifer discharges to the Shenango River from which the VOCs, if present, will then volatilize. In the bedrock aquifer, groundwater flow is controlled by the location and occurrence of bedding plane partings and joint openings. VOCs in the bedrock aquifer, if present, would be transported generally to the west, in the direction of the hydraulic gradient. The bedrock aquifer is separated from the overlying alluvial aquifer by the presence of a thick, low permeable glacial till.

VOCs will adsorb to soil particles and sediments, although with differing equilibrium partitioning and degrees of reversibility for different compounds. Adsorption to rock surfaces can also occur. The net effect of this adsorption and its counter process, desorption, is to retard the effective rate of both advection and dispersion.

Degradation of the chlorinated aliphatic hydrocarbons has been reported by researchers. Under anaerobic conditions, they report that microbes sometimes slowly dechlorinate these compounds (Cline and Viste, 1984) producing dichloroethenes and vinyl chloride from TCE and dichloroethanes, and chloroethane from 1,1,1-trichloroethane (1,1,1-TCA). Cline and Viste (1984) also reported that field studies have shown that the presence of the degradation products relative to the parent compounds (i.e., 1,1,1-TCA and TCE) increases as distance increases downgradient from the sources.

Metals: In general, metals tend to remain tightly bound to soil particles unless they encounter low pH conditions. Metals concentrations in groundwater samples collected from the site and adjacent areas are highest in the vicinity of the former waste acid lagoon on AK Steel property where the pH has been documented to be as low as 1.7. Therefore, the primary transport mechanism is likely to be particulate transport. This can take the form of fugitive dust emissions or sediment transport. To the extent that low concentrations of metals have been detected in surface water, they will be affected by advection, dispersion, and dilution as the streams flow and merge. However, it is likely that contact with sediments downstream with the potential for action exchange will cause the metals to become readsorbed.

Volatilization is not a significant transport mechanism for metals. Metals do not degrade, although their speciation can change, often as a result of exposure to oxygen.

Overall, the transport mechanisms for the metals at the site are comparatively slow, with the exception of storm water/sediment transport, as indicated by the presence of metals in the Shenango River sediment samples collected by PADER.

Aromatic Hydrocarbons: Three classes of aromatic hydrocarbons present in site media at the former Sharon Plant include chlorinated benzenes, PCBs/dioxins, and PAHs.

Chlorinated Benzenes: Chlorinated benzenes are benzenes with one or more of the hydrogens replaced with chlorine. Chlorinated benzenes identified at the former Sharon Plant site include chlorobenzene; 1,2,4-trichlorobenzene; 1,2-dichlorobenzene; 1,3-dichlorobenzene; and 1,4-dichlorobenzene. Chlorinated benzenes are fairly volatile, slightly to moderately soluble, and hydrophobic. Advection via groundwater appears to be a potential migration mechanism at the site, considering the presence of these compounds in some of the off-site monitoring wells, including Wells OS-3A and OS-3B.

Polychlorinated Biphenyls: PCBs are a class of 209 organic compounds called congeners, in which two or more chlorine atoms have been substituted for hydrogen atoms on biphenyl molecules. PCBs are nonpolar organic compounds, meaning they have low water solubility and high solubility in oil, fat and other nonpolar matrices. PCBs are chemically stable, high molecular weight, low volatility compounds. Most PCBs occur as oily liquids of varying color and viscosity depending on chlorine content.

PCBs are relatively immobile in the environment. The general pattern of transport of PCBs is through adsorption onto solids. Because of this attraction to solid materials, infiltration into the groundwater is limited. PCBs are also relatively insoluble in water and have very low vapor pressures. These characteristics reduce the susceptibility of PCBs to be transported in the hydrologic cycle (PCBs in the western portion of the Middle Sector have apparently not migrated beyond the extent of NAPL). Soil erosion and bioaccumulation constitute the primary potential migration and fate mechanisms for PCBs, as indicated by the presence of PCBs in the Shenango River sediments and fish tissue.

Dioxins/Furans: Dioxins/furans are a class of chlorinated compounds which are similar in nature to PCBs and are a by-product from the manufacturing of certain pesticides and from a variety of combustion processes, including the burning of fuel in vehicles. As such, the presence of trace levels of these compounds in the environment is not unusual. As with PCBs, sediment transport and bioaccumulation constitute the primary potential migration and fate mechanisms for these compounds. Dioxins tend to remain bound to soils, and photochemical degradation is a potentially significant fate.

Polycyclic Aromatic Hydrocarbons: PAHs are persistent, nonvolatile compounds found in coal and tar, and are formed from the combustion of organic material. PAHs are commonly occurring anthropogenic chemicals, particularly along roads and railroads. Particulate transport is expected to be a primary migration mechanism for PAHs. Bioaccumulation potential is limited as aquatic organisms are able to extensively metabolize PAHs.

Non-Aqueous Phase Liquids: Select monitoring wells installed in the alluvial aquifer underlying the former Sharon Plant encountered DNAPL (mixture of PCBs and trichlorobenzene) at the alluvium/glacial till contact in the vicinity of the Middle Sector Tank Farm, and LNAPL (mixture of mineral oil and PCBs) at the top of the alluvial aquifer at three separate on-site locations. DNAPLs are hydrocarbon liquids which are heavier (denser) than water and immiscible with water. Gravity flow is the primary transport mechanism for product in the DNAPL state. The DNAPL will tend to distribute itself as residual globules and flow vertically until encountering a unit of low permeability. Upon reaching the low permeability unit, the DNAPL will tend to spread laterally and form pools. Residual DNAPL exists as relatively immobile globules which have sorbed onto the host medium or are held in place by surface tension.

Pooled DNAPL is much more responsive to hydraulic gradients and will migrate in response to changes in hydraulic gradient. Migration of the DNAPL is not expected to be a significant transport mechanism at the former Sharon Plant site due to the relatively flat hydraulic gradient and the presence of a depression in the surface of the glacial till in the area of known DNAPL. There is an elongate north-south depression in the surface of the glacial till which coincides with the DNAPL area (Figure 5-5).

LNAPL transport can be divided into four processes: .infiltration, mound formation, spreading in the direction of groundwater flow, and migration of dissolved LNAPL in the saturated zone. An LNAPL mound will occur in the saturated zone/capillary fringe due to density effects and pressure build-up due to liquid accumulation. The spreading of LNAPL on the water table occurs at the end of mound development, due to water table gradient and pressure gradient, the latter caused by LNAPL accumulation on top of the capillary fringe.

5.4.4 Fate of Chemicals of Concern

Information on the environmental fate of chemicals of concern identified at the Sharon Plant was obtained from the USEPA web-site (Technical Drinking Water and Health Contaminant Specific Fact Sheets) and is discussed separately below.

PCBs: PCBs are mixtures of different congeners of chlorobiphenyl and the relative importance of the environmental fate mechanisms generally depends on the degree of chlorination. In general, the persistence of PCBs increases with an increase in the degree of chlorination. Mono-, di- and trichlorinated biphenyls biodegrade relatively rapidly, tetrachlorinated biphenyls biodegrade slowly, and higher chlorinated biphenyls are resistant to biodegradation. Although biodegradation of higher chlorinated congeners may occur very slowly on an environmental basis, no other degradation mechanisms have been shown to be important in natural water and soil systems; therefore, biodegradation may be the ultimate degradation process in water and soil.

If released to soil, PCBs experience tight adsorption with adsorption generally increasing with the degree of chlorination of the PCB. PCBs will generally not leach significantly in aqueous soil systems; the higher chlorinated congeners will have a lower tendency to leach than the lower chlorinated congeners. In the presence of organic solvents PCBs may leach quite rapidly through soil. Vapor loss of PCBs from soil surfaces appears to be an important fate mechanism with the rate of volatilization decreasing with increasing chlorination. Although the volatilization rate may be low, the total loss by volatilization over time may be significant because of the persistence and stability of PCBs.

If released to water, adsorption to sediment and suspended matter will be an important fate process; PCB concentrations in sediment and suspended matter have been shown to be greater than in the associated water column. Although adsorption can immobilize PCBs (especially the higher chlorinated congeners) for relatively long periods of time, eventual resolution into the water column has been shown to occur. The PCB composition in the water will be enriched in the lower chlorinated PCBs because of their greater water solubility, and the least water soluble PCBs will remain adsorbed. In the absence of adsorption, PCBs volatilize relatively rapidly from water. However, strong PCB adsorption to sediment significantly competes with volatilization, with the higher chlorinated PCBs having longer half-lives than the lower chlorinated PCBs. Although the resulting volatilization rate may be low, the total loss by volatilization over time may be significant because of the persistence and stability of the PCBs.

If released to the atmosphere, PCBs will primarily exist in the vapor-phase; the tendency to become associated with the particulate-phase will increase as the degree of chlorination of the PCB increases. The dominant atmospheric transformation process is probably the vapor-phase reaction with hydroxyl radicals which has estimated half-lives ranging from 12.9 days for monochlorobiphenyl to 1.31 years for heptachlorobiphenyl. Physical removal of PCBs from the atmosphere, which is very important environmentally, is accomplished by wet and dry deposition.

Dioxin: Dioxin is one of the most environmentally stable tricyclic aromatic compounds of its structural class.

Due to its very low water solubility, most of the 2,3,7,8- tetrachlorodibenzo-p-dioxin (TCDD) occurring in water is expected to be associated with sediments or suspended material. Aquatic sediments may be an important, and ultimate, environmental sink for all global releases of TCDD. Two processes which may be able to remove TCDD from water are photolysis and volatilization.

The photolysis half-life at the water's surface has been estimated to range from 21 hour (hr) in summer to 118 hr in winter; however, these rates will increase significantly as water depth increases. Many bottom sediments may therefore not be susceptible to significant photodegradation.

The volatilization half-life from the water column of an environmental pond has been estimated to be 46 days; however, when the effects of adsorption to sediment are considered, the volatilization model predicts an overall volatilization removal half-life of over 50 years.

Various biological screening studies have demonstrated that TCDD is generally resistant to biodegradation. The persistence half-life of TCDD in lakes has been estimated to be in excess of 1.5 year.

If released to soil, TCDD is not expected to leach. As a rule, the amount of TCDD detected more than 8 cm below the surface has been approximately 1/10 or less than that detected down to 8 cm. Being only slightly soluble in water, its migration in soil may have occurred along with soil colloids and particles to which it may have been bound. Tests conducted by the U.S. Department of Agriculture determined that vertical movement of 2,3,7,8-TCDD did not occur in a wide range of soil types.

Being only slightly soluble in water, its migration in soil may have occurred along with soil colloids and particles to which it may have been bound. Photodegradation on terrestrial surfaces may be an important transformation process. Volatilization from soil surfaces during warm conditions may be a major removal mechanism. The persistence half-life of TCDD on soil surfaces may vary from less than 1 year to 3 years, but half-lives in soil interiors may be as long as 12 years. Screening studies have shown that TCDD is generally resistant to biodegradation.

If released to the atmosphere, vapor-phase TCDD may be degraded by reaction with hydroxyl radicals and direct photolysis. Particulate-phase TCDD may be physically removed from air by wet and dry deposition.

1,2,4-Trichlorobenzene: If 1,2,4-trichlorobenzene (1,2,4-TCB) is released to the soil it will probably adsorb to the soil and therefore will not leach appreciably to the groundwater. However, 1,2,4-TCB has been detected in some groundwater samples which indicates that it can be transported there by some process. 1,2,4-TCB will not hydrolyze or biodegrade in groundwater, but it may biodegrade slowly in the soil based upon the data from one experiment.

If released to water it will adsorb to the sediments. It will not hydrolyze in surface waters but it may be subject to significant biodegradation. It is expected to significantly evaporate from water with half-lives of 11 to 22 days for evaporation from a seawater microcosm and a half-life of 4.2 hr predicted for evaporation from a model river. Adsorption to sediments or absorption by microorganisms may minimize the rate of evaporation. A half-life of 450 years has been reported for sunlight photolysis in surface waters at 40° latitude in summer.

If 1,2,4-TCB is released to the atmosphere, it may react with photochemically produced hydroxyl radicals with a resulting estimated vapor phase half-life in the atmosphere of 18.5 days.

Exposure to 1,2,4-TCB will result mainly from occupational exposure during its manufacture and use, while general population exposure will result from the ingestion of contaminated drinking water and food, especially contaminated fish.

Trichloroethene: Trichloroethene is highly water soluble, highly volatile in aqueous solutions, and poorly adsorbed to soil. It has a specific gravity of 1.46 and therefore will act as a DNAPL in groundwater if present in the pure phase. Trichloroethene released to soil will either evaporate or leach into groundwater. If released to water, it will also quickly evaporate. It has only a moderate potential to accumulate in aquatic life. Trichloroethene can be reductively dechlorinated to *cis*-1,2-DCE. Reductive dechlorination processes are described in detail in Section 5.5.1.

cis-1,2-Dichlorethene: *cis*-1,2-DCE is highly soluble in water, highly volatile in aqueous solutions, and poorly adsorbed to soils. It has specific gravity of 1.28 and therefore will act as a DNAPL in groundwater if present in the pure phase.

The reduction of *cis*-1,2-DCE to vinyl chloride requires a methanogenic anaerobic environment which is highly reducing.

Vinyl Chloride: Vinyl chloride (chloroethene) is highly soluble in water, extremely volatile in aqueous solutions, and poorly adsorbed to soils. It has a specific gravity of 0.91. Vinyl chloride can be degraded by both aerobic and anaerobic bacteria to primarily form ethene, and to a lesser extent ethane, both of which are essentially harmless.

5.5 MONITORED NATURAL ATTENUATION EVALUATION

In this section, background and theoretical information regarding natural attenuation is presented. Following this discussion, we present our procedures for evaluating natural attenuation at the former Sharon Plant. The methods described in the USEPA document *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in*

Ground Water (1998) were followed in our assessment of the site. It is noted that this natural attenuation assessment primarily focuses on the chlorinated aliphatic hydrocarbon plumes that are known to exist at the site. Groundwater impacted with chlorinated aromatic hydrocarbons (chlorinated benzenes and polychlorinated biphenyls) has been identified at the site. A discussion regarding the biodegradation of chlorinated aromatic hydrocarbons is presented in Section 5.5.3.

5.5.1 Background and Theory

Natural attenuation is defined by USEPA as the biodegradation, dispersion, dilution, sorption, volatilization and/or chemical and biochemical stabilization of contaminants to effectively reduce contaminant toxicity, mobility, or volume to levels that are protective of human health and the ecosystem.

The term "monitored natural attenuation" (MNA) (USEPA, 1998) refers to the reliance on natural attenuation processes (within the context of a carefully controlled and monitored clean-up approach) to achieve site-specific remedial objectives within a time frame that is reasonable compared to other methods.

Groundwater sampling and analysis were performed to evaluate the occurrence of intrinsic biodegradation of COI, primarily chlorinated aliphatic hydrocarbons, and to further evaluate the natural attenuation trends in groundwater analytical results. Data collected during the 1999 groundwater sampling event were used to assess the feasibility of including natural attenuation as a component of the groundwater remedy, either in part or in whole. The groundwater analytical parameters for assessing natural attenuation are from Wiedemeier, 1996.

As part of this task, the occurrence of intrinsic biodegradation was evaluated for site groundwater. Chlorinated aliphatic hydrocarbons biodegrade in one of the following ways:

- Used as an electron acceptor,
- Used as an electron donor, or
- Through cometabolism.

At a given site, one or all of these processes may be operating. However, under natural conditions the use of chlorinated aliphatic hydrocarbons as electron acceptors appears to be most important.

Under natural conditions, organic carbon is the electron donor and dissolved oxygen is the first electron acceptor. The biodegradation of chlorinated aliphatic hydrocarbons is mainly an electron donor limited process. In most hydrogeologic environments, there tends to be an inexhaustible supply of available electron acceptors for biodegradation to occur. Biodegradation of chlorinated compounds produce chemical changes in groundwater within the area in which biodegradation is occurring. Biodegradation can, therefore, be quantified by measuring these chemical changes. Natural attenuation analytical parameters that were analyzed are discussed below.

The most important process for natural biodegradation of the more highly chlorinated solvents is reductive dechlorination. During this process, the chlorinated hydrocarbon is used as an electron acceptor (not as a source of carbon), as a chlorine atom is removed and replaced with a hydrogen atom. In general, reductive dechlorination occurs by sequential dechlorination from perchloroethene (PCE) to TCE to 1,2-DCE to vinyl chloride to ethene. Depending upon environmental conditions, this sequence may be interrupted, with other processes then acting upon the products. During reductive dechlorination, all three isomers of DCE can theoretically be produced; however, Bouwer (1994) reports that under the influence of biodegradation, *cis*-1,2-DCE is a more common intermediate than *trans*-1,2-DCE and that 1,1-DCE is the least prevalent of the three DCE isomers when they are present as daughter products. Reductive dechlorination of chlorinated solvent compounds is associated with the accumulation of daughter products and an increase in the concentration of chloride ions.

Reductive dechlorination will not occur if dissolved oxygen concentrations are greater than 0.5 milligrams per liter (mg/l). Dissolved oxygen is the most favored electron acceptor used by microbes in the biodegradation of organic carbon. Therefore, it is important to have a source of carbon to be used by aerobic microorganisms as a primary substrate. Aerobic respiration by microorganisms decreases dissolved oxygen levels. The free-electrons must be accepted by the dissolved oxygen in order to create a chemically stable environment. Subsequently, depressed concentrations of dissolved oxygen, compared to background concentrations, indicate that natural attenuation processes are occurring.

As the available oxygen is depleted in the subsurface areas of microbial activity, conditions change from an aerobic environment to an anaerobic environment. Under strict anaerobic conditions and with the presence of nitrate (NO_3), the process of denitrification occurs. During anaerobic biodegradation of organic carbon through the process of denitrification, nitrate can be used as an electron acceptor. Denitrification is the process by which nitrate is reduced through nitrite (NO_2) to nitric oxide (NO) to nitrous oxide (N_2O) to molecular nitrogen. In addition, as a result of denitrification, carbon dioxide and water are formed. Therefore, if natural attenuation is occurring via denitrification, concentrations of nitrate will decrease as concentrations of carbon dioxide and molecular nitrogen increase, relative to background concentrations. Nitrate concentrations in contaminated groundwater areas must be <1.0 mg/l for reductive dechlorination to occur by denitrification.

After the available oxygen and nitrate have been depleted from the microbiota, ferric iron (Fe^{3+}) can be utilized as an electron acceptor during the biodegradation of carbon. Ferric iron is utilized in biodegradation as it is reduced to ferrous iron (Fe^{2+}) via microbial mediated oxidation of organic carbon. Therefore, if ferric iron reduction is occurring, increases in ferrous iron will be observed in the contaminated area as compared to background levels.

Sulfate can also act as an electron acceptor for anaerobic biodegradation of carbon. Conditions are favorable to sulfate-reducing bacteria when there is a decrease in oxidation-reduction potential (ORP) and the depletion of oxygen and nitrate has occurred. The sulfate-reducing bacteria convert sulfate into sulfide via reduction. Sulfate-reducing biodegradation may exist if decreasing concentrations of sulfate and increasing sulfide concentrations are observed relative to background concentrations.

Methanogenesis is a process where acetate is split to form carbon dioxide and methane or carbon dioxide acts as an electron acceptor and is reduced to produce methane gas. Methanogenesis will generally occur only after the dissolved oxygen, nitrate, iron and sulfate constituents have been reduced. Increases in methane concentrations as compared to background levels would indicate that methanogenesis is occurring within the microbiota.

The ORP of groundwater is a measure of electron activity and indicates the relative tendency of water to transfer electrons. Certain biological processes only function within a prescribed range of ORP values. ORP values are generally reduced in areas of biological activity.

The following discussion of dissolved hydrogen is modified from USEPA, 1998. Concentrations of dissolved hydrogen have been used to evaluate reduction/oxidation processes and, therefore, the efficiency of reductive dechlorination in groundwater systems. Dissolved hydrogen is continuously produced in anaerobic groundwater systems by fermentative microorganisms that decompose natural and anthropogenic organic matter. This hydrogen can then be consumed by microorganisms that use nitrate, iron (III), sulfate, or carbon dioxide as terminal electron acceptors. Each of these terminal electron accepting processes has a characteristic dissolved hydrogen concentration. Therefore, dissolved hydrogen can be an indicator of the predominant reduction/oxidation processes that may be occurring within a specific groundwater system. The following table summarizes the range of hydrogen concentrations for given terminal electron accepting processes:

Terminal Electron Accepting Process	**Hydrogen (H_2) Concentration (nanomoles per liter)**
Denitrification	< 0.1
Iron (III) Reduction	0.2 – 0.8
Sulfate Reduction	1 – 4
Reductive Dechlorination	> 1
Methanogenesis	5 – 20

5.5.2 Natural Attenuation Screening Process

According to USEPA (1998), an accurate assessment of the potential for natural biodegradation of chlorinated compounds should be made before investing in a detailed study of natural attenuation. The objective of sampling for natural attenuation parameters was to provide data which could be used to evaluate the feasibility of including natural attenuation as a component of the groundwater remedy, either in part or in whole

(Cummings/Riter, 1998). By reviewing both the empirical VOC concentration data from the monitoring wells (discussed in Section 4.0) and the natural attenuation parameter results, it is apparent that the potential for natural attenuation exists at the Sharon Plant site. The procedures described in USEPA, 1998 were used to screen the data to further evaluate the potential for natural attenuation. The screening process involves six steps:

- Step 1 - Determine if biodegradation is occurring;
- Step 2 - Determine groundwater flow and solute parameters from representative field data;
- Step 3 - Locate sources and potential points of exposure;
- Step 4 - Estimate a biodegradation rate constant for the site;
- Step 5 - Compare the rate of transport to the rate of attenuation; and
- Step 6 - Determine if the screening criteria are met.

The results for each of the six MNA screening steps are discussed below.

Step 1 - Determine if Biodegradation is Occurring: The methodology for determining whether or not biodegradation is occurring at the site involves screening the natural attenuation analytical results from the groundwater samples collected from the site monitoring wells. Table 2.3 in USEPA, 1998 provides a standardized screening method that assigns points for specific geochemical parameter results from samples collected from the site monitoring wells. The screening procedure was conducted for both the alluvial and the bedrock aquifers.

Groundwater samples were collected from a total of 38 monitoring wells across the site (Cummings/Riter, 1999). The screening protocol suggests the use of selected monitoring wells that bisect the contaminant plume upgradient, downgradient, and cross-gradient of known source areas, as well as within the source area itself. However, analytical results indicate that there are two separate chlorinated aliphatic hydrocarbon plumes with unknown source areas. Sporadic concentrations of various organic compounds have also been detected in areas not associated with any known source. Therefore, each of the 38 monitoring wells that were sampled as part of the most recent sampling event was screened individually using the USEPA method (Tables 5-9 and 5-10).

After the initial evaluation of the data, monitoring wells were separated along flow paths in target areas. Three areas were further evaluated to determine if there is a potential for natural attenuation processes to be occurring. Using the defined screening process, monitoring wells installed in the alluvium aquifer in three areas of the site were further evaluated. These areas include: the northern portion of the Middle Sector [utilizing (from upgradient to downgradient) Monitoring Wells M-18, M-17, M-16, MW-3AR, MW-3B, OS-4A, and OS-4B]; the southern portion of the Middle Sector [utilizing (from upgradient to downgradient) Monitoring Wells M-4A, M-2, M-1, OS-3A, OS-3B, OS-6A, and OS-6B]; and the South Sector [utilizing (from upgradient to downgradient) Monitoring Wells S-6, S-1A, S-2A, S-8A, OS-2A, OS-2B, OS-1A, OS-1B, OS-7A, and OS-7B]. Monitoring wells installed in the bedrock or located outside of these areas were not further evaluated.

For the northern portion of the Middle Sector, two monitoring wells (OS-4A and OS-4B) that are located furthest downgradient were found to provide limited evidence (6 to 14 points) that natural attenuation processes are occurring. The remaining five wells in this area did not provide adequate evidence (5 or fewer points) that natural attenuation processes are occurring. It is noted that five of the seven wells included in this area either did not detect VOCs (above the method detection limits) or detected low concentrations of VOCs (2 µg/l). None of the wells in this area detected SVOCs above the method detection limit.

For the southern portion of the Middle Sector, five of seven monitoring wells (M-2, M-1, OS-3A, OS-3B, and OS-6A) that were evaluated were also found to provide limited evidence that natural attenuation processes are occurring. Samples from the two remaining wells in this area did not detect either VOCs or SVOCs above method detection limits and do not indicate that natural attenuation processes are occurring.

For the South Sector, three wells were found to provide adequate evidence (15 to 20 points) that natural attenuation processes were occurring. Furthermore, five wells in this area provided limited evidence that natural attenuation processes are occurring. The remaining two wells in this area did not provide adequate evidence that natural attenuation processes are occurring.

Table 5-11 is a summary of the final point totals for the screening process.

As an additional evaluation step, groundwater samples from monitoring wells that detected either VOCs or SVOCs at concentrations above 100 µg/l were evaluated. The intention was to assess the potential for natural attenuation processes in the most highly impacted wells. A total of nine wells (M-1, M-2, M-11B, OS-1A, OS-2A, OS-2B, OS-3A, OS-3B, and MW-3B) were found to maintain elevated concentrations (above 100 µg/l). Eight of these nine wells indicated that there was either limited or adequate evidence that natural attenuation was occurring at the site. Only Well MW-3B did not provide such evidence.

Based on the results of this initial screening process, there is evidence that biodegradation is potentially occurring at the site. Therefore, the guidance document suggests proceeding to the next step in the screening process.

Step 2 - Determine Groundwater Flow and Solute Parameters from Representative Field Data: As discussed in Section 5.3.1, the average groundwater flow velocity for the alluvial aquifer at the Sharon Plant site is estimated to be 50 feet per year (based on a combination of site-specific data and reference values, as discussed in Section 5.3.1). Parameters necessary for solute transport modeling are included in Tables A-1 through A-3 (Appendix A) for the specific target areas. These parameters will be used as input into a modeling program (Step 5) to assess the effectiveness of using natural attenuation as part of the overall site remedy.

Step 3 - Locate Sources and Receptor Exposure Points: As previously discussed, three target areas were further evaluated for natural attenuation. Limited information is available regarding the specific source in each of these target areas. The source of the plume in the northern portion of the Middle Sector is believed to be related to past handling practices of solvents, possibly related to the railroad spur formerly located in that area. The source of the plume in the southern portion of the Middle Sector is likely related to the historical use of solvents in that area. The source of the plume in the South

Sector is assumed to be located in the vicinity of the "former moat" (near Monitoring Well S-10). The TCE plume extends to Wells OS-7A and OS-7B. The presence of TCE in Wells OS-7A and OS-7B may be related to an off-site TCE source located immediately upgradient from these wells.

Groundwater and soil samples were collected during an assessment related to a reported spill at the Roemer property. Sample results were found to contain measurable concentrations of ethylbenzene, toluene, xylenes, acetone, 1,2-DCE, and TCE. Concentrations in downgradient Roemer Monitoring Well MW-4 have typically been at least five times higher than in upgradient Roemer Monitoring Well MW-1 (Cummings/Riter, 1996). The Roemer monitoring well locations are shown on Figures 4-2 and 5-1. A letter from PADEP to Roemer Industries dated December 1, 1994 indicated the soil-vapor extraction (SVE) remediation at the Roemer property was effective for site soils. However, the PADEP indicated that groundwater still contains significant concentrations of (at least) two species of chlorinated hydrocarbons: 1,2-DCE and TCE.

Based on a water well survey conducted in 1994, there are no known users of groundwater (for use as potable or drinking water) between the site and the Shenango River. The primary point for potential receptor exposure for plumes in each of the target areas is the Shenango River, located approximately 800 feet west of the Sharon Plant site at its closest approach (Section 2.6).

Step 4: Estimate the Biodegradation Rate Constant for the Site: After reviewing the analytical data for the Sharon Plant site (Figures 5-15 and 5-16), it was determined that a specific compound could be selected to determine a biodegradation rate constant for each of the target areas. For the northern portion of the Middle Sector, TCE was used to represent the source area contaminant. For the southern portion of the Middle Sector, chlorobenzene was selected while 1,2-dichloroethene (1,2-DCE) was used to represent the source area contaminant for the South Sector plume.

Since site-specific biodegradation rates are not able to be calculated, the USEPA guidance document suggests the use of values published in the literature. Several literature sources were reviewed to determine an appropriate range of values for the first-order decay constant (which is used as the biodegradation rate constant). Wiedemeier (1996), Howard (1991), and values published in Table 5 of Pennsylvania Department of Environmental Protection's Act 2 regulations were used for this purpose.

TCE was detected in Monitoring Well MW-3B (northern portion of the Middle Sector) at a concentration of 830 μg/l during the most recent sampling event. Chlorobenzene was detected at a concentration of 5,400 μg/l in Well M-2 (southern portion of the Middle Sector). The compound, 1,2-DCE was detected in Monitoring Well S-10 (South Sector) at a concentration of 3,300 μg/l. From a review of the literature, the first-order decay constant for TCE ranged from 0.05 to 1.28 years^{-1} (yr^{-1}); the chlorobenzene first-order decay constant ranged from 0.84 to 2.15 yr^{-1}; and the first-order decay constant for 1,2-DCE ranged from 0.01 to 4.52 yr^{-1}. These concentrations and first-order decay constants were used as the source concentrations and biodegradation rate constants for each of the models completed for Step 5.

Model input parameters are summarized on Tables A-1 through A-3 in Appendix A.
Step 5: Compare the Rate of Transport to the Rate of Attenuation: The purpose of this step is to evaluate whether the rate of attenuation is fast enough to prevent VOC plume migration and restore the VOC plume to appropriate levels (USEPA, 1989). The USEPA guidance document recommends the use of a model for the purpose of this comparison. Site-specific data was used (where available) to model the advective transport with three dimensional dispersion and first-order decay and retardation using the PADEP software program, *Quick Domenico* (P.A. Domenico, 1987). The summaries of input parameters are provided for each of the three target areas in Appendix A (Tables A-1 through A-3).

Three iterations of each model were performed as a sensitivity analysis in each target area. Model calibration was performed by varying the range of biodegradation rate constants from the literature until the model matched the specified parameter concentration in a selected downgradient monitoring well. The output sheets for the sensitivity analysis for each of the three target areas are provided as Tables A-4 through A-12.

For the northern portion of the Middle Sector, the model was calibrated using TCE in Well MW-3B as the source and adjusting the biodegradation rate constant to 2.0×10^{-4}

day^{-1} (or 0.073 yr^{-1}) which allowed the model results to correspond with the TCE result in downgradient Well MW-17AR. The calibrated biodegradation rate constant was found to be within the published literate range of 0.05 to 1.28 yr^{-1}.

For the southern portion of the Middle Sector, the model was calibrated using chlorobenzene in Well M-2 as the source and adjusting the biodegradation rate constant to 8.22 x 10^{-4} day^{-1} (or 0.30 yr^{-1}) which allowed the model results to correspond with the chlorobenzene result in downgradient Well M-1. The calibrated biodegradation rate constant was found to be slightly lower than the published literate range of 0.84 to 2.15 yr^{-1}.

For the South Sector, the model was calibrated using 1,2-DCE in Well S-10 as the source and adjusting the biodegradation rate constant to 5.0 x 10^{-3} day^{-1} (or 1.83 yr^{-1}) which allowed the model results to correspond to the 1,2-DCE result in downgradient Well S-8A. The calibrated biodegradation rate constant was found to be within the published literate range of 0.01 to 4.52 yr^{-1}.

A groundwater use restriction has been placed on the area located between the Site and the Shenango River. Therefore, the point of compliance for alluvial groundwater at the Site is the Shenango River. The results of the modeling show that no impacted groundwater from the three target areas will reach the Shenango River at concentrations above method detection limits. These model results are consistent with historical sampling and analysis data which suggest that the rate of attenuation is fast enough to prevent VOC plume migration to the Shenango River.

Step 6: Determine if Screening Criteria are Met: There are two questions that have to be answered before proceeding with a full-scale natural attenuation assessment:

Has the plume moved a shorter distance than would be expected based on the estimated time since the contaminant release and the contaminant velocity in groundwater, as calculated from site-specific measurements of hydraulic conductivity and hydraulic gradient, and estimates of porosity and contaminant retardation?

Yes. If it is assumed that the release occurred approximately 30 years ago and the average linear velocity of groundwater is approximately 50 feet/year, the plume would be expected to have migrated approximately 1500 feet downgradient. However, as previously discussed, Monitoring Well OS-7A is located 680 feet downgradient and has a detected 1,2-DCE concentration of only 8 µg/l which is below the regulatory limit of 70 µg/l (for *cis*-1,2-DCE). Therefore, it can be concluded that the rate of attenuation is faster than the rate of solute transport.

Is it likely that site contaminants are attenuating at rates sufficient to meet remediation objectives for the site in the time period that is reasonable compared to other alternatives?

Yes. As previously discussed, the empirical data from the site indicates that the rate of attenuation is fast enough to prevent VOC plume migration to the Shenango River.

5.5.3 Biodegradation of Chlorinated Aromatic Hydrocarbons

Chlorinated aromatic hydrocarbons are believed to have been released at the Sharon Plant site. There are two isomers of the same organic compound that have been detected in groundwater samples at the site (1,2,3-trichlorobenzene and 1,2,4-trichlorobenzene). The biodegradation of these compounds has not been researched as extensively as the chlorinated aliphatic hydrocarbons (PCE, TCE, etc.) that were discussed previously in this section. However, the general degradation series (and resulting byproducts) is fairly well understood.

Based on the initial screening of the site groundwater conditions (discussed above) and a review of the results of the natural attenuation evaluation, it is assumed that aerobic (oxidizing) conditions are somewhat prevalent across the site property (outside the source areas). This assumption is based on the finding that the dissolved oxygen concentrations found in 26 of 27 monitoring wells exceed 0.5 milligrams per liter. However, groundwater samples for analysis of natural attenuation parameters were not collected in the Tank Farm source area due to the presence of NAPL. It is understood that trichlorobenzene was a source product historically used at the site. Furthermore, daughter products of trichlorobenzene (including dichlorobenzene and chlorobenzene) have been detected in groundwater samples collected from monitoring wells located within and downgradient from the source area. Therefore, it is believed that anaerobic (reducing conditions) are likely to be present within the source area.

Under reducing conditions, several biodegradation processes (including reductive dechlorination) are believed to be occurring within the NAPL source area at the site. Reductive dechlorination will cause the isomers of trichlorobenzene to biodegrade and generate daughter products in the process (as have been detected in samples from monitoring wells located within and downgradient of the source area). The sequential dehalogenation process for trichlorobenzene is provided on the University of Minnesota's Biocatalysis/Biodegradation Database internet web site: http://www.labmed.umn.edu as follows:

trichlorobenzene → dichlorobenzene → chlorobenzene → benzene

There are three isomers of dichlorobenzene (1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene) that have been detected in groundwater samples from the site monitoring wells (Cummings/Riter, 1996). Additionally, both chlorobenzene and benzene have been detected. Figure 5-16 summarizes the analytical results for groundwater samples collected in 1992 and 1999 for each of the four compounds included in the above process.

While dichlorobenzene and chlorobenzene are believed to be daughter products generated by the biodegradation of trichlorobenzene, the occurrence of benzene may be a result of biodegradation or of separate releases (for example, gasoline) from unknown sources.

The biodegradation of chlorinated aromatic hydrocarbons is different under aerobic (oxidizing) conditions. Several studies have found that oxidation occurs rapidly for polychlorinated benzenes (including trichlorobenzene isomers) when these compounds are sorbed on different soil matrices. The following description is modified from Geo-Cleanse, 1999. The oxidation pathways for the isomers of trichlorobenzene and dichlorobenzene are not well known, but are expected to be similar to the pathways for chlorobenzene and benzene (which are better understood). The oxidation pathway for benzene produces phenol and then benzoquinone while the pathway for chlorobenzene is believed to produce chlorophenol and chlorobenzoquinone. The reason for this process is that "hydroxyl radicals preferentially attack aromatic ring structures (dechlorination occurs by other mechanisms) and rate constants are not strongly affected by the degree of chlorination"(Geo-Cleanse, 1999). Therefore, it can be assumed that the oxidation pathways for dichlorobenzene produce dichlorophenol and dichlorobenzoquinone while trichlorobenzene produces trichlorophenol and trichlorobenzoquinone.

For the two sampling rounds conducted in 1992 and 1999 at the Sharon Plant site, there has only been one unqualified detection of any of the oxidation pathway degradation products (Well S-10 detected 2,4-dichlorophenol at a concentration of 12 µg/l in 1992). These data further support earlier findings that reducing conditions are prevalent across the site.

5.5.4 Summary of Natural Attenuation Evaluation

Based on the results of the initial screening process for MNA (USEPA, 1998), there is evidence that natural attenuation is occurring. Using the defined USEPA screening process, three of the sampled wells monitoring the alluvial aquifer were found to provide adequate evidence that natural attenuation processes are occurring. Furthermore, 12 wells provide limited evidence that natural attenuation processes are occurring in alluvium at the site. The data indicate that natural attenuation processes are effective in attenuating migration of COPCs in groundwater, but are not expected to be effective in completely "cleaning up" groundwater in all site areas in the foreseeable future.

The computed average linear velocity for the alluvial aquifer was estimated to be 50 feet per year (Cummings/Riter, 1999) based on a combination of site-specific data and referenced information. This estimated velocity does not take into account attenuation effects such as advection, dilution, dispersion, diffusion, biodegradation, volatilization, and/or adsorption. The use of Inerteen was discontinued at the site in 1976. Therefore, in the 25 years that have passed since the use of the product was terminated, related compounds (PCBs and chlorinated benzenes) potentially impacting groundwater would have traveled a minimum of 950 feet as some releases undoubtedly occurred substantially more than 25 years ago (Section 5.1). However, these compounds are not present in off-plant alluvial groundwater monitoring wells (OS-7A, OS-7B, OS-6A, OS-6B, OS-4A, OS-4B, and MW-17AR) located 400 to 500 feet downgradient of the former Sharon Plant, providing very substantial empirical evidence of natural attenuation. The extent of PCBs in groundwater is largely limited to the alluvial aquifer in the immediate vicinity of the NAPLs identified in the Middle Sector former storage tank area (Figure 5-14).

The extent of organic compounds in alluvial groundwater from the most recent sampling event is shown on Figures 5-14, 5-15, and 5-16. The extent of these organic compounds is limited to the areas near the originally suspected source areas at the former Sharon Plant. Source areas consisting of former USTs and associated soils were removed in 1977. NAPLs are present in the Middle Sector former storage tank area within the alluvial aquifer and act as a continuing source for COPCs in groundwater. However, the aqueous phase plumes associated with these source areas are substantially smaller in extent than would be expected based on the estimated groundwater flow velocity due to significant attenuation mechanisms.

Implementation of full-scale monitored natural attenuation would require:

- Installation of additional groundwater performance evaluation wells southwest (downgradient) of Monitoring Wells OS-1A/1B, and OS-7A/7B.

- Quarterly groundwater monitoring of select long-term monitoring wells and performance evaluation wells[1] in accordance with USEPA Guidance on Monitored Natural Attenuation (USEPA, 1998). The analytical parameters and final number of long-term monitoring wells and performance evaluation wells will be finalized based on regulatory negotiation.

5.6 MIGRATION POTENTIAL OF COPCS

Plumes of site-related contamination by chlorinated benzenes, PCBs and other organic substances have been carefully studied for an extended period of time. Substantial

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[1] The long-term monitoring plan includes two types of monitoring wells. Long-term monitoring wells are intended to determine if the behavior of the plume is changing. Performance evaluation wells are intended to confirm that contaminant concentrations meet regulatory acceptance levels, and to trigger an action to manage potential expansion of the plume. Long-term monitoring wells will be analyzed for COPC, dissolved oxygen, nitrate, iron (II), sulfate, and methane. Groundwater analyses for performance evaluation wells will be for COPC (USEPA, 1998).

occurrences of LNAPL and DNAPL have been documented in the on-site source areas for these plumes. Groundwater monitoring data obtained over a period spanning 13 years indicate the groundwater plumes are stable to shrinking, due to multiple natural attenuation mechanisms identified at the site (Cummings/Riter, 1999).

The glacial till unit separating the alluvial aquifer from the underlying bedrock aquifer has effectively limited vertical migration of DNAPL and COPCs. COPCs identified in alluvial groundwater have generally been absent in bedrock groundwater. Results for MNA and groundwater analytical test results indicate the lateral migration potential of chemicals of concern is limited to areas in close proximity to the NAPL source areas, with the exception of degradation products of trichloroethene, (*cis*-1,2-DCE and vinyl chloride) west of the South Sector area.

5.7 POTENTIAL FUTURE RECEPTORS

There are currently no groundwater supply wells in use at the former Sharon Plant. Viacom has properly abandoned former groundwater supply wells identified on the property, will implement institutional controls in the form of deed restrictions for properties under their administrative control, and will request that owners of other site properties implement similar institutional controls. Site deed restrictions restrict site groundwater use for purposes other than environmental testing. In addition, on November 29, 2000, the City of Sharon passed an ordinance (Sharon, 2000) prohibiting the drilling or use of private groundwater wells as a source of water for either potable or industrial purposes within the limits of the former transformer Plant property and the area between the former Sharon Plant and the Shenango River (Figure 5-1).

Because of these actions, the primary point for hypothetical receptor exposure to groundwater impacted with COPC from the former Sharon Plant is the Shenango River. However, extensive groundwater monitoring data indicate COPCs have not extensively migrated from the suspected source areas and are not currently impacting the Shenango River. Future migration of impacted groundwater from the former Sharon Plant is not expected to impact the Shenango River due to the physical nature of the contaminants and natural attenuation mechanisms. Long-term groundwater monitoring of the alluvial and bedrock aquifers is appropriate as a confirmatory mechanism to assure that site groundwater conditions do not adversely vary from historical and current conditions.

6.0 RESTORATION POTENTIAL FOR SITE

This section presents an evaluation of the restoration potential for the site and provides the basis for the interpretation that groundwater restoration is technically impracticable due to the substantial presence of DNAPL within the Proposed TI Zone. Following a general discussion of the challenges to remediating the Sharon Plant groundwater, this section includes discussions of the source materials (Section 6.2), the LNAPL Removal Response Action (Section 6.3), DNAPL bench-scale test results (Section 6.4), potential remedial technologies and their limitations to use at the Sharon site (Section 6.5), and a remedial time frame analysis (Section 6.6). These discussions, as summarized in Section 6.7, provide the basis for the position that groundwater restoration at the site is technically impracticable.

6.1 GENERAL

The technical challenges to remediating contaminated groundwater include many complex factors related to site hydrogeology and chemistry. One of the most difficult of these challenges is the problem presented by DNAPLs. A recent USEPA study indicates that DNAPLs may be present at up to 60 percent of NPL sites, are often very difficult to locate and remove from the subsurface environment and are expected to continue to contaminate groundwater for many hundreds of years despite best efforts to remedy them. The prevalence and intractability of DNAPL contamination are among the principal reasons the TI guidance document was developed by USEPA (USEPA, September 1993).

Most saturated overburden and bedrock deposits contaminated by DNAPLs cannot be remediated to typical concentration-based cleanup goals (USEPA, September 1993), which would require that virtually all of the DNAPL be removed from a site. Research and experience acquired during the past 10 years have shown that while partial DNAPL removal may be possible at some sites, removing sufficient DNAPL to achieve concentration-based cleanup goals is not technically practicable due to an inability to contact hydraulically all residual and pooled DNAPL present in the subsurface. This inability stems from the fact that natural deposits are in general heterogeneous, resulting in preferential flow paths for injected fluids and incomplete contact with the target DNAPL. In fractured porous media, the process of matrix diffusion also serves to impede the effectiveness of remedial technologies further. At present, in situ groundwater cleanup technologies to restore groundwater to MCLs have not been successfully applied at sites with known moderate to large quantities of DNAPL present below the water table.

In support of the TI Evaluation, a presentation of data relevant to the TI Evaluation, including the estimated three-dimensional volume of the probable LNAPL and DNAPL present at the Sharon Plant, has been provided in Section 5.5.1 and 5.5.2, respectively. Given the field observations and laboratory confirmation of DNAPL in the alluvial aquifer, groundwater restoration within the DNAPL Zone can be considered technically impracticable. This judgment is based on the presence of a large volume of DNAPL believed to exist within the alluvial aquifer underlying the Middle Sector building area.

DNAPL Zone restoration can be considered especially difficult due to the nature of the DNAPL release. In qualitative terms, the release of DNAPL at the Sharon Plant can be classified as a large-volume, long duration, continual release to a heterogeneous, low to moderate permeability medium. According to the USEPA TI guidance document (USEPA, September 1993) and other sources (WCGR, 1991; Cohen and Mercer, 1993; Pankow and Cherry, 1996), these characteristics increase the difficulty of groundwater restoration and merit a TI decision for the Proposed TI Zone.

Inability to restore or contain the NAPL zone also precludes the ability to restore downgradient portions to the aquifer to ARAR-based goals. NAPL constituents will continue to be slowly released to the dissolved phase. While monitoring has indicated that the extent of NAPL constituents in the dissolved phase downgradient of the source zone is limited due to attenuation processes (as discussed in Section 5.0), it is expected that ARARs will be exceeded in these areas as long as NAPLs are present in the source zone.

The Proposed TI Zone includes the alluvial aquifer where the presence of DNAPLs has been documented, as well as downgradient areas where MCLs might be exceeded for the foreseeable future due to the presence of the NAPL source zone.

6.2 ASSESSMENT OF SOURCE MATERIAL

The suspected source of chemicals of concern observed in groundwater beneath the Sharon Plant primarily relate to leakage and spills from ASTs and USTs and chemical use areas (Section 5.1). The source of much of the dissolved constituents of concern observed in groundwater is related to the presence of DNAPL beneath the Middle Sector building area (Figure 4-2). For the purpose to the proposed ARAR wavier, the source area for DNAPL present beneath the former Middle Sector Tank Farm Area is considered the DNAPL zone, which is described in detail in Section 5.4.1. The estimated mass of DNAPL present at the bottom of the alluvial aquifer is approximately 3,000 to 7,300 tons, based on the measured density (Applied Hydrology, 1999) and estimated volume (Cummings/Riter, 2000). The composition of the DNAPL is trichlorobenzene and PCB compounds. In addition to the DNAPL source, which will require an indeterminate period of time to dissolve, chemicals diffused into the alluvial matrix will require an additional period of time to diffuse back out of the matrix and cleanup to groundwater regulatory criteria, even after the DNAPL is completely dissolved.

LNAPL has been observed in three separate areas within the Sharon Plant boundary. The estimated volume of LNAPL in the subsurface is approximately 60,000 gallons (Cummings/Riter, 2000). The LNAPL consists of a mixture of mineral oil and PCBs. LNAPL constituents have not been observed in groundwater beyond the immediate limits of LNAPL.

6.3 LNAPL REMOVAL RESPONSE ACTION

Westinghouse voluntarily retained Geraghty & Miller, Inc. in 1991 to design and install six large diameter potential LNAPL recovery wells (GM-1A through GM-6A) and eight, two-inch diameter groundwater monitoring wells (GM-1B through GM-8B) in the Middle Sector Tank Farm Area (Figure 4-2). Although Westinghouse proposed an interim remedial measure under the RI/FS Consent Order, the USEPA, on February 11, 1994, issued Westinghouse a Unilateral Administrative Order (UAO) which required the development and implementation of an LNAPL recovery action for the Middle Sector Tank Farm Area.

In response to the UAO, a Response Action Plan was submitted to the USEPA (Cummings/Riter, 1994). As part of an Interim Action Source Control (IASC) Program Pilot Test Work Plan (Groundwater Technology, 1994), a pilot study was conducted using select GM-series wells to evaluate applicable LNAPL recovery technologies prior to implementing an interim LNAPL removal response action. The LNAPL recovery pilot study was performed from September 2 to December 9, 1994 by Groundwater Technology. The study was completed in accordance with the approved IASC Program Pilot Test Work Plan.

During the pilot study, manual bailing and an active recovery system were used to remove LNAPL from Wells GM-4A and GM-5A, in order to evaluate LNAPL recovery rates and determine the most suitable removal response action. Four LNAPL samples were analyzed for viscosity, specific gravity, and vapor pressure. Additionally, an LNAPL sample from GM-4A was analyzed for dioxins (none detected), furans (several detected at up to 120 µg/l), trichlorobenzene (not detected), and various disposal parameters, including PCBs (30,900 mg/l) and 12 metals (only barium, chromium and selenium were detected) (Groundwater Technology, 1995).

Based on the results of the pilot study, a passive LNAPL recovery system using Soak Ease™ oil absorbent tubes was recommended for six wells (GM-2A, GM-3A, GM-4A, GM-5A, M-7, and M-10).

USEPA approval to proceed with the LNAPL response action was received by Viacom on September 6, 1994. Since receipt of approval, LNAPL recovery has been implemented in Wells M-2, M-7, M-10, GM-2A, GM-3A, GM-4A, and GM-5A using a combination of hand pumping/bailing, belt skimmer, and SoakEase™ absorption techniques. As of the date of this report, SoakEase™ tubes have recovered approximately 110 gallons of LNAPL, pumping/bailing has recovered approximately 274 gallons of LNAPL, and belt skimmer operations at Well GM-4A have recovered approximately 264 gallons of LNAPL, resulting in a total of 648 gallons of LNAPL recovered in 6.5 years of operation, or approximately 1 percent of the total LNAPL mass present at the site. The rate of LNAPL recovery for the second quarter of 2001 was estimated to be 0.03 gallons per day.

6.4 DNAPL BENCH SCALE TEST RESULTS

As a third part of the supplemental FS activities, Viacom and Cummings/Riter reviewed various sources of available information on potential remedial technologies for NAPLs containing PCBs and chlorinated benzenes. Because physical removal methods had been evaluated as part of the ongoing LNAPL removal action, it was decided the supplemental activities would focus on potential in-situ remediation methods. In particular, three treatment methods were identified as being potentially applicable to the site: in-situ oxidation using Fenton's reagent, in-situ biological degradation, and the use of electrical heating or cosolvent flooding to increase NAPL solubility (thereby improving the efficiency of physical removal methods). These methods were subjected to bench-scale treatability testing to assess whether they were capable of remediating the specific contaminants and concentrations found in site media. The final bench-scale test reports were submitted to the agencies on November 11, 1999, and the findings of each are summarized herein.

In-situ Oxidation: Geo-Cleanse International, Inc. was provided with two samples of DNAPL-saturated subsurface soils in order to conduct lab testing of their Geo-Cleanse® treatment process, in which organic contaminants are chemically oxidized using a mixture of hydrogen peroxide and ferrous iron (Fenton's reagent). The results of the testing indicated that the Geo-Cleanse® process can effectively oxidize chlorinated benzenes, but the oxidation of PCBs was dependent on the soil grain size, with more efficient oxidation occurring in coarser-grained soils. No hazardous intermediate or final oxidation byproducts were observed to have been formed during the testing. These findings are generally consistent with published findings from other studies of Fenton's reagent oxidation of these compounds (Geo-Cleanse, 1999). This process would be implemented in the field by injecting the hydrogen peroxide/ferrous iron solution directly into the NAPLs and associated groundwater.

In-Situ Bioremediation: Environmental Remediation Consultants, Inc. (ERC) was provided with approximately two gallons of DNAPL and LNAPL-impacted groundwater in order to assess the degradative capabilities of their Bio-Integration™ process under bench-scale conditions. After initial difficulties, the test media was eventually homogenized and diluted such that testing using biotic and abiotic co-treatments could proceed. Test results indicated that trichlorobenzene concentrations in the homogenized mixtures were reduced by 66 percent within 7 days, and PCB concentrations were reduced by up to 89 percent within 14 days. No hazardous intermediate or final degradation products were observed to have been formed during the testing (ERC, 1999).

The desirability and practicality of creating the homogenous mixture of NAPL and groundwater required by a full-scale implementation of this process within the confines of the alluvial aquifer at the site is uncertain.

Solubility Testing and Soil Washing: Applied Hydrology Associates, Inc. (AHA) was provided with approximately four gallons each of DNAPL and LNAPL in order to evaluate NAPL solubility in various solvents and viscosity at various temperatures. Based on the preliminary findings, additional testing was performed on DNAPL and LNAPL-impacted soils to evaluate the effects of washing the soil with a solvent (isopropanol) to remove NAPL constituents. The findings of the testing indicate that NAPL viscosity can be substantially reduced through electrical resistivity heating or by injecting isopropanol, thereby improving the efficiency of extraction methods such as pumping. Chemical analysis of impacted soil washed with isopropanol indicated that 51 to 88 percent of the contaminant mass was transferred from the soil to the solvent during washing tests (AHA, 1999). In a field implementation, this solvent/NAPL/water mixture would be pumped to the surface for subsequent treatment, potentially including phase separation and solvent recycling.

6.5 POTENTIAL GROUNDWATER REMEDIAL TECHNOLOGIES

It is currently recognized that most saturated unconsolidated deposits and bedrock contaminated by DNAPLs cannot be remediated to typical concentration-based clean-up goals (USEPA, September 1993). Research and experience acquired during the past 10 years has shown that while partial DNAPL removal may be possible at some sites, removing sufficient DNAPL to achieve concentration-based clean-up goals is not technically practicable. The primary reason for this is an inability to hydraulically contact all residual and pooled DNAPL present in the subsurface. This inability stems from the fact that natural deposits are in general heterogeneous, resulting in preferential flow of injected fluids and incomplete contact with the target DNAPL. At present, there have been no successful applications of in-situ groundwater clean-up technologies where it is known that moderate to large quantities of DNAPL are present below the water table and groundwater was restored to SDWA MCLs.

At the Sharon Plant, DNAPL-Zone restoration can be considered especially difficult due to the nature of the DNAPL release. In qualitative terms, the release of DNAPL at the

Sharon Plant site can be classified as a large-volume, long-duration, continual release to a heterogeneous medium. According to the USEPA TI guidance document (USEPA, September 1993), these characteristics increase the difficulty of groundwater restoration.

Potential remedial options that have been considered for removing mass from the probable DNAPL zone and/or for restoration of associated groundwater at the Sharon Plant include the following:

- Institutional Controls,
- Monitored Natural Attenuation,
- Physical Containment Methods,
- Groundwater Recovery and Treatment,
- NAPL Recovery Techniques, and
- In-Situ Groundwater/NAPL Treatment.

A description of each technology class listed above and their effectiveness at probable DNAPL Zone restoration are presented below.

6.5.1 Institutional Controls

Institutional controls could include municipal ordinances and/or easements, covenants, title notices and land use restrictions through orders from or agreements with the USEPA. These institutional controls would prevent the installation or use of groundwater wells at the site, unless otherwise necessary for the implementation of the remedy, in order to reduce unacceptable exposures to potential human receptors.

Institutional controls do not directly address impacted media, and thus by themselves cannot restore an aquifer to the extent necessary to meet certain ARARs. However, institutional controls are an effective means of reducing or eliminating the potential exposure of receptors to impacted groundwater or NAPLs by prohibiting the installation and use of supply wells in the affected area.

The City of Sharon enacted an ordinance in November 2000 restricting the use of groundwater in the downgradient vicinity of the Sharon Plant. Additionally, the placement of deed restrictions on each of the site properties is required by the ROD for Operable Unit One (soils).

6.5.2 Monitored Natural Attenuation

MNA is defined as *the use of natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remedial objectives within a time frame that is reasonable compared to other methods* (USEPA, 1998). Natural attenuation processes include a variety of physical, chemical, or biological processes that, under favorable conditions, will act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil and groundwater. These processes include biodegradation, dispersion, dilution, sorption, volatilization, and chemical or biological stabilization or destruction of contaminants (USEPA, 1998).

MNA consists of periodic sampling and analysis of the site groundwater to assess migration, degradation, and changes in COPC concentrations. Groundwater samples may or may not be analyzed for natural attenuation parameters. This process involves a detailed evaluation of the fate and transport of contaminants and associated degradation of products along the flow path. A detailed discussion of the potential occurrence of MNA at the site in included in Section 5.5.

MNA is generally a moderate to long-term process that may be effective in addressing dissolved-phase constituents in groundwater in combination with control of the source of the constituents. However, there is very little evidence to suggest that sufficient remediation of DNAPL source areas can restore the aquifer within predictable time frames. Natural attenuation should not be evaluated further as a means of restoring groundwater within the potential DNAPL zone.

6.5.3 Physical Containment Methods

Physical containment refers to the placement of hydraulic barriers, such as sealable joint sheet piling, slurry walls, or injection grout walls around the zone of technical impracticability. Physical barrier systems typically require small to moderate amounts of groundwater pumping (and subsequent treatment) from within the enclosure to offset infiltration and to ensure that no outward leakage occurs. Physical barriers can also be constructed without a barrier at the upgradient side of the zone. In such cases, a larger amount of groundwater pumping will be required to offset both infiltration and upgradient groundwater flow.

Installation of physical containment barriers does not directly address impacted media, and thus cannot restore an aquifer to the extent necessary to meet certain ARARs within the DNAPL Zone. However, the use of physical barriers can be evaluated as a means of eliminating mass flux leaving the DNAPL zone.

The use of physical containment barriers at the Sharon Plant is not a feasible approach, due in part to the presence of active industrial buildings and other surface and subsurface features. Along the downgradient edge of the DNAPL Zone, the containment barrier would have to be installed through two active manufacturing buildings owned and operated by AK Steel. Along the upgradient edge of the DNAPL Zone, the containment barrier would have to be installed through an active industrial building owned and operated by Winner Steel. An active railroad line operated by Norfolk Southern also runs through the area, providing additional interference to construction of a containment barrier. Storm and sanitary sewers within the AK Steel and Winner properties present a further obstacle to barrier installation.

The use of physical barriers would not result in increased protectiveness above baseline conditions. Further, while a containment barrier, if it could be installed, would limit horizontal migration of COIs, the barrier would not reduce the potential for vertical migration of NAPL constituents to the bedrock aquifer.

6.5.4 Groundwater Recovery and Treatment

For this option, a series of groundwater recovery wells (either vertical or directional) are drilled and installed in the alluvial aquifer. Submersible pumps are then installed into the wells which deliver groundwater to the surface for subsequent treatment and/or disposal. The recovery wells are screened in selected zones containing high concentrations of COPCs. This process may be used to establish hydraulic control within the portions of the alluvial aquifer impacted with COPCs, or as an aggressive aquifer remediation where numerous wells are installed to pump large volumes of impacted groundwater for treatment. Various types of enhanced groundwater recovery methods may also have application at the Sharon Plant site, including hydraulic or pneumatic fracturing. These techniques generate enhanced fracture networks which can increase soil permeability to liquids and vapor, therefore potentially accelerating contaminant removal.

Operational procedures can include continuous or pulsed pumping which may optimize groundwater/contaminant recovery. There are various options regarding treatment and/or disposal of the groundwater once it is pumped to the surface. For the specific dissolved phase contaminants at the site, potential treatment technologies could include ion exchange, aqueous-phase carbon adsorption, and/or chemical oxidation.

Pump and treat remedies can sometimes be effective in restoring some portions of an aquifer impacted by dissolved constituents once the source (e.g., the DNAPL Zone) has been isolated. However, this technology is ineffective at restoring groundwater in the presence of DNAPL because of the long time periods required to dissolve residual and pooled DNAPL, particularly considering the hydrophobic nature of PCBs. This conclusion holds regardless of the rate of groundwater recovery.

Numerous groundwater recovery wells would be required to maintain hydraulic control of the aqueous phase groundwater plume due to the heterogeneous nature of the alluvial aquifer. Groundwater pumping outside the NAPL source areas could exacerbate groundwater conditions by causing COPCs to migrate from the NAPL source areas towards the recovery wells. Groundwater recovery wells located downgradient of the Sharon Plant site could interfere with the already-established groundwater remedial activity being conducted by AK Steel related to inorganics.

6.5.5 NAPL Recovery Techniques

A wide variety of NAPL recovery techniques are available, including belt skimmers, passive absorbent tubes, and pumping from large-diameter recovery wells, potentially with surfactants, cosolvents, or thermal enhancements to improve product recovery. Horizontal and vertical recovery wells could be installed to enable the collection of NAPLs from the subsurface using specialized skimmers, pumps, or other collection devices installed in the completed wells. Subsequent treatment and/or disposal of the recovered material would be required.

Belt-type oil skimmers (such as the unit currently being used at the site as part of the LNAPL removal action) can be placed in vertical recovery wells to continuously extract product from the subsurface. NAPL, but not water, adheres to the belt and is drawn to the surface where the NAPL is scraped off the belt into a container, and the belt returns to the subsurface.

Passive absorbent tubes are also currently being used at the site. This method consists of the placement of tubes filled with absorbent material into vertical recovery wells. NAPLs pass through a hydrophobic screen in the tube and are absorbed by the material. Once the tubes are saturated with oil they must be removed from the wells, properly disposed of and replaced.

Low-volume pumping and reinjection of groundwater via a dual-well recovery system could be used to enhance NAPL production at the recovery wells. Various enhancements of this technique are possible. An appropriate solvent could be injected into the NAPL layers to mix with the NAPL, reducing the NAPL viscosity and interfacial tension, and thereby potentially improving NAPL flow toward recovery wells.

Likewise, an appropriate surfactant could be injected into the NAPL layers, potentially in combination with a cosolvent. The surfactant attaches to and solubilizes the NAPL in a microemulsion, improving subsequent recovery via pumping or skimming.

A third potential enhancement is the use of electrical resistivity heating, either alone or in combination with the other enhancement methods. This option consists of installing single-phase electrodes in borings to electrically heat the subsurface, targeting the depths where NAPLs are present. As the NAPLs are heated, their viscosity and solubility improve, thereby potentially increasing flow toward recovery wells.

As described in Section 6.3, the methods currently being used for LNAPL recovery at the site (belt skimmer and absorbent tubes) have resulted in minimal LNAPL recovery. Less than approximately 1 percent of the total LNAPL mass has been removed from the subsurface in 6.5 years of removal activities. It is anticipated that these very low-volume recovery methods would be similarly ineffective in recovering DNAPL mass at the site, given the estimated mass of DNAPL present in the subsurface. Further, these technologies have a relatively limited radius of influence, so a large number of closely spaced recovery wells would be required within the probable DNAPL Zone.

Bench-scale tests were performed of the pumping enhancement methods described above, as discussed in Section 6.4. These laboratory tests indicated that several solvents, most notably isopropyl alcohol, as well as electrical heating, may potentially reduce the viscosity and interfacial tension of site NAPLs, thereby possibly improving the recovery of NAPLs from the subsurface. To date, however, there have been no large-scale real-world implementations of these technologies. The alcohols suitable for DNAPL removal are less dense than water, making delivery of the solvents to the lowermost pooled DNAPLs difficult unless injection well spacings are very small. Also, the high degree of heterogeneity present in the alluvial aquifer will hinder the ability of injected fluids and heat to impact all regions of the Probable DNAPL Zone.

Given the difficulty in capturing NAPLs from all regions of the impacted zone, and bench-scale test results which indicate contaminant mass recovery of less than 90 percent in a controlled laboratory environment, it is unlikely that these enhancements will result in complete NAPL recovery, thereby reducing the likelihood of aquifer restoration to ARAR-dictated levels. Further, by reducing the solubility and viscosity of the NAPLs, the ability of the NAPLs to migrate both laterally and vertically to areas currently unimpacted is substantially increased over the current conditions, where the NAPLs have shown essentially no migration over at least the last ten years.

6.5.6 In-Situ Groundwater/NAPL Treatment

Potential in-situ groundwater treatment technologies include enhanced biodegradation, permeable reactive barriers, and chemical oxidation. Enhanced biodegradation typically involves the injection of compound-specific microorganisms and/or hydrogen or oxygen release compounds in order to enhance the natural biodegradation of COPCs to less toxic compounds. Permeable reactive barriers are barriers filled with zero-valent metals (typically iron), chelators, sorbents, or microbes, installed across the flow path of a contaminant plume. The materials in the barrier act to degrade or retain the contaminants as they pass through the barrier. In-situ chemical oxidation involves injecting oxidants, such as hydrogen peroxide or potassium permanganate, into the impacted groundwater. The COPCs are either completely oxidized to carbon dioxide and water, or are converted to less toxic compounds.

Permeable reactive barriers have been demonstrated to be effective in treating certain classes of contaminants, but only address the dissolved-phase COPCs. This technology would not reduce the mass or lifespan of residual and pooled DNAPL, and cannot be regarded as a DNAPL remediation technology. Further, construction of such a barrier at the Sharon Plant site would be difficult due to the presence of active industrial buildings and an active railroad line.

Likewise, in-situ biodegradation and chemical oxidation technologies have been demonstrated to be effective for dissolved-phase contaminants, both at other sites and for bench-scale tests performed for the Sharon Plant site. However, there is little evidence that sufficient biodegradation can occur to significantly reduce the lifespan of DNAPLs in the subsurface. This was demonstrated during the bench-scale biodegradation tests, as the DNAPLs had to be diluted by a factor of at least 100 in order to show significant concentration reductions.

The success of in-situ chemical oxidation (and in-situ biodegradation) is subject to the ability to deliver the injected chemicals to the target NAPL zones, as demonstrated in the bench-scale tests performed for the Sharon Plant site. Subsurface heterogeneity will limit the effectiveness of oxidant flooding, making complete NAPL treatment and aquifer restoration to ARAR-based goals unlikely.

6.5.7 Potential Antagonistic Efforts

Application of an invasive technology with the intent of removing some DNAPL mass and/or reducing DNAPL mobility could have less than desirable results. Routine monitoring of NAPLs since 1988 has indicated that the NAPLs have remained relatively immobile. However, any technology requiring the injection of chemicals or otherwise attempting to reduce the viscosity of NAPLs could result in the adverse remobilization of NAPLs. Forced injection of materials into the source zone may fracture the aquifer material or otherwise create preferential flow paths, which could enhance NAPL mobility and reduce efficiency of the remedial effort. Reducing NAPL viscosity may also increase the potential for downward migration of the NAPLs through the glacial fill to the bedrock aquifer. In addition to NAPL mobilization, it must be recognized that modifying the solubility of the NAPLs can also significantly increase the dissolved-phase concentrations of the COPCs and increasing the potential for lateral migration of NAPL constituents downgradient of the site, thus potentially increasing the risk of exposure.

Groundwater recovery and treatment of aqueous-phase COPCs could exacerbate groundwater conditions by causing COPCs to migrate from the NAPL source areas towards the recovery wells. In addition, groundwater recovery wells located downgradient of the Sharon Plant site could interfere with the already-established groundwater remedial activity being conducted by AK Steel related to inorganics.

6.6 REMEDIAL TIME FRAME ANALYSIS

As stated in the TI guidance document (USEPA, September 1993), estimates of the time frame required to achieve groundwater restoration may be considered in TI evaluations. While restoration time frames may be an important consideration in remedy selection, no single time frame can be specified during which restoration must be achieved to be considered technically practicable. However, extensive restoration time frames (e.g., longer than 100 years) may be indicative of hydrogeologic or contaminant-related constraints to remediation. While predictions of restoration time frames may be useful in illustrating the effects of such constraints, USEPA will base TI decisions on an overall demonstration of the extent of such physical constraints at a site, not on restoration time frame analyses alone. A further consideration regarding the usefulness of restoration time frame predictions in TI evaluations is the uncertainty inherent in such analyses.

We are not aware of any publications reporting representative mass-removal rates for innovative or emerging DNAPL treatment technologies (particularly the in-situ technologies). Therefore, it is not possible to extrapolate remedial time frame estimates for these technologies, if they were attempted at the Sharon Plant site. However, based on the mass of COPCs in NAPLs within the source area at the site (on the order of millions of kilograms) and the stable and hydrophobic nature of PCBs, there is no reasonable basis to expect that these NAPL zones can be remediated to ARAR-based criteria in any time frame less than hundreds of years. Of the thousands of sites that are contaminated with DNAPLs in North America, none has yet been fully restored to drinking water standards (Pankow and Cherry, 1996).

Under a remedial alternative that involves recovery of NAPLs from the subsurface, even assuming a recovery rate five times greater than that realized for the ongoing LNAPL remedial action at the site, it would take at least 100 years to recover all of the NAPLs from the subsurface. Considering that recovery efficiencies would likely decrease over time, a much greater time frame would be expected for aquifer restoration.

6.7 SUMMARY

Several of the remedial technologies described in Section 6.5 have been demonstrated successfully at full-scale field applications for remediation of dissolved-phase COPC plumes, including physical containment, permeable treatment barriers, biodegradation, pump-and-treat, and natural attenuation. However, these technologies are not effective at remediating DNAPL source zones. Some of these technologies are currently being researched at the laboratory or pilot scale in the field for DNAPL remediation. In general, though, these pilot-scale demonstrations are performed in shallow, relatively homogeneous formations over a limited area. The NAPL source zone at Sharon, however, is classified as a large volume release to a heterogeneous formation over a large active industrial area.

A review of the potential remedial options indicates that no technology currently exists that can cleanup or contain NAPLs at the Sharon Plant site, and therefore also cannot cleanup dissolved phase contaminants. Groundwater within and downgradient of the Probable DNAPL Zone will not be remediated to ARAR-based standards within a reasonable time frame. Physical containment of the NAPLs is not feasible due to anthropologic conditions (two active industrial plants and an active railroad line within the Probable DNAPL Zone). The problem with any injection or enhanced recovery method will be the inability to effectively access NAPLs in the subsurface due to geologic heterogeneity and the hydrophobic nature of PCBs, as discussed in Section 5.0. Further, remediation methods which involve the injection of chemical and/or the extraction of NAPLs may serve to remobilize or resolubilize the NAPL constituents into the dissolved phase, potentially causing further degradation of groundwater downgradient of the source zone.

Even if removing a significant fraction of the COPC mass, rather than achieving groundwater ARARs, was the primary goal, the likelihood of success at the site would be limited. The petroleum industry has been using many of these methods over periods of decades, with typical removal efficiencies on the order of 20 to 70 percent, and pilot scale field demonstrations in homogeneous formations show a similar range of removal efficiencies (USDOD, 1997). The effectiveness of the LNAPL Removal Response Action (one percent of the total mass recovered in 6.5 years) further illustrates the limited potential for success.

7.0 COST ESTIMATE FOR PROPOSED REMEDIAL ALTERNATIVES

As discussed in the FS (Cummings/Riter, 1999), in addition to being protective to human health and the environment, complying with ARARs (unless waived), utilizing permanent remedies, and satisfying a preference for treatment, the National Contingency Plan requires the consideration of cost. As stated in the USEPA's guidance *The Role of Cost in the Superfund Remedy Selection Process* (USEPA, 1996) regarding the consideration of cost during the detailed analysis of alternatives and the identification of a preferred alternative "cost is a critical factor in the process of identifying a preferred remedy. In fact, CERCLA and the NCP require that every remedy selected must be cost effective." Cost estimates for the five remedial alternatives for alluvial groundwater and NAPLs developed for the site are provided in the FS and summarized below. Pursuant to CERCLA guidance these cost estimates are expected to provide an accuracy of +50 percent to –30 percent.

Note that for the remedial alternatives which include NAPL treatment or enhanced recovery technologies, costs are based on estimates provided by technology vendors after performance of bench-scale testing. The ability of these technologies to achieve complete aquifer restoration for the estimated costs provided is uncertain and, as discussed in Section 6.5, unlikely.

A significant consideration in developing remedial alternatives for groundwater at the site is the presence of NAPLs. Because of the presence of NAPLs in the alluvial aquifer, it is likely that an active remedy which addresses only COPCs in the dissolved phase without removing or otherwise reducing the impact of NAPLs on groundwater will not result in an improvement of aquifer quality. In fact, a recent USEPA document describes the migration of hazardous wastes in the subsurface, particularly as related to the presence of NAPLs (USEPA, 1999). As failure to recognize and address NAPL issues is a common reason for failure of groundwater remedies, this document suggests a three-phased approach for the remediation of NAPL sites. The first phase consists of direct pumping of significant accumulations of NAPLs, followed by a second phase of enhanced recovery of residual NAPLs. The concluding phase of this suggested approach is the remediation of the remaining aqueous-phase contamination, possibly including in-situ treatment, pump and treat, or MNA.

Since over 99 percent of the COPC mass in the alluvial aquifer at the site is contained in the NAPLs, this suggested three-phased approach has been incorporated into the development of remedial alternatives for alluvial groundwater and NAPLs. As discussed in Section 6.5, it is expected that any NAPL remedy will leave some product in the subsurface due to contaminant distribution, geologic heterogeneities, and technological limitations. Also, as discussed in Section 5.4, the presence of COPCs in the bedrock aquifer at the site has been sporadic and limited. Thus, the focus of the remedial alternatives is on impacted groundwater and NAPLs in the alluvial aquifer. Each alternative (except the no action alternative) includes continued monitoring of the bedrock aquifer.

It is noted that certain limited action remedies were considered alone as a potential alternative, as well as being retained as a component of other alternatives. In general, deed or groundwater use restrictions and continued groundwater monitoring are included in each alternative that involves NAPL and/or groundwater treatment, even though they are not specifically called out in the name of the alternative.

7.1 ALTERNATIVE 1 – NO ACTION

Under this alternative, no action would be taken to reduce the potential for unacceptable exposures of humans to impacted groundwater or minimize further aquifer degradation. This alternative is retained for comparison with the other alternatives as required by the NCP.

7.2 ALTERNATIVE 2 – INSTITUTIONAL CONTROLS WITH MONITORED NATURAL ATTENUATION

Alternative 2 for alluvial groundwater and NAPLs includes the implementation of institutional controls for site properties, including a municipal ordinance restricting the use of groundwater within a designated area (enacted by the City of Sharon in December 2000), installation of additional performance evaluation wells and implementation of a long-term groundwater monitoring program (USEPA, 1998) in support of demonstrating the occurrence of natural attenuation of COPCs in the aquifer. This alternative does not include the active extraction or treatment of COPCs present in the aquifer.

Capital costs for implementing this alternative would consist primarily of legal, filing fees and associated costs. Long-term costs associated with continued monitoring of groundwater conditions are dependent on the sampling frequency and parameter list. The estimated net present worth is $2,150,000.

7.3 ALTERNATIVE 3 – NAPL SOURCE REMOVAL WITH MONITORED NATURAL ATTENUATION

This alternative includes the removal of NAPLs from the subsurface using one or more of several options. For Alternative 3A, direct and/or enhanced recovery methods, potentially including dual-well systems, solvent flushing, or electrical heating along with pumping or passive absorption of product, would be implemented to collect NAPLs for appropriate off-site treatment and disposal. For Alternative 3B, an in-situ treatment method such as enhanced biodegradation would be used to destroy the NAPL constituents in the ground. The groundwater use restrictions and continued monitoring of groundwater for natural attenuation of residual COPCs, as described for Alternative 2, would also be included in each of these alternatives.

The preliminary objective of the NAPL removal or treatment process would be to reduce the volume of NAPLs which accumulate in the collection and monitoring wells to immeasurable levels. This objective may be refined based on the demonstrated performance of the remedy, the feasibility of achieving the objective, and the current state of technology. It is unlikely that any remedy could remove or destroy all NAPLs in the subsurface. Experience suggests that the maximum amount of NAPL which can be effectively removed from the subsurface, as required by either Alternative 3A or 3B, is approximately 30 to 50 percent.

The estimated net present worth of Alternative 3A1 (direct recovery) is $5,970,000, and for Alternative 3A2 (direct and enhanced recovery) is $9,860,000. The estimated net present worth of Alternative 3B (in-situ treatment) is $10,500,000.

7.4 ALTERNATIVE 4 – NAPL SOURCE REMOVAL WITH GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE

This alternative includes the removal of NAPLs from the subsurface using enhanced recovery methods described in Alternative 3A. In addition, impacted groundwater from non-NAPL areas in the South and/or Middle Sectors would be extracted and pumped to a new on-site facility for treatment by aqueous-phase carbon adsorption and ultimate discharge to the Shenango River. The groundwater use restrictions and continued monitoring of groundwater for natural attenuation of residual COPCs, as described for Alternative 2, would also be included in this alternative.

For the purposes of this discussion, extraction of groundwater would be limited to the portions of each of the three dissolved-phase plumes with the highest COPC concentrations, with MNA implemented for the remaining impacted portions of the aquifer. Groundwater extraction and treatment for full aquifer restoration will not be considered, as this would involve extraction of very large volumes of water with relatively low concentrations of COPCs over a wide-spread area. Thus, the extraction and treatment of this additional groundwater would be extremely inefficient relative to the additional COPC mass treated, particularly in light of the institutional controls which are also part of this remedy.

The estimated net present worth of Alternative 4 is $17,300,000, including estimated costs associated with NAPL enhanced recovery activities.

7.5 ALTERNATIVE 5 – NAPL SOURCE REMOVAL WITH IN-SITU GROUNDWATER TREATMENT

This alternative includes the in-situ treatment of NAPLs within the aquifer as described for Alternative 3B. In addition, impacted groundwater from non-NAPL areas in the South and/or Middle Sectors would also be subject to in-situ treatment via enhanced biodegradation methods. The groundwater use restrictions and continued monitoring of groundwater for natural attenuation of residual COPCs, as described for Alternative 2, would also be included in this alternative. As described for Alternative 4, treatment of dissolved-phase COPCs would be limited to portions of the plumes with the highest COPC concentrations, with MNA implemented for the remaining impacted portions of the aquifer.

The estimated net present worth of Alternative 5 is $12,000,000, including estimated costs associated with in-situ NAPL treatment.

8.0 PROTECTIVENESS OF PROPOSED REMEDIAL ALTERNATIVES

In accordance with the NCP each of the five alternatives retained for the detailed analysis of alternatives was evaluated in terms of its ability to provide overall protection of human health and the environment. The Human Health Risk Assessment concluded that the only unacceptable risk associated with site groundwater is human exposure (via direct contact, ingestion, or inhalation) to COPC s present in groundwater (ChemRisk, 1998). To address this risk, an appropriate remedy must provide exposure control for human exposure to groundwater. Environmental risks are limited to further degradation of groundwater quality and potential migration of COPCs to the Shenango River (which, as described in Section 5.7, is not expected). The protectiveness of each of the groundwater alternatives considered for the site is summarized below. It is noted that upon demonstration of NAPL remediation impractibility, and therefore impractibility of remediating the downgradient plume(s), the remedial strategy then focuses on prevention of further plume migration, further risk reduction, and prevention of exposure.

8.1 ALTERNATIVE 1 – NO ACTION

Health risks posed by current and reasonably anticipated future land use in the vicinity of the site are not expected to be significant due to the lack of exposure to the groundwater and the presence of a public water supply system throughout the subject area. However, the HHRA determined that hypothetical future uses of impacted groundwater from both the Middle and South Sectors resulted in an unacceptable risk to human receptors. No institutional controls would be in place to prevent the use of groundwater in such a manner. The no-action alternative would not alleviate potential risks to human health or the environment posed by contact with impacted groundwater and/or NAPLs. Natural processes such as dispersion and degradation may gradually reduce COPC concentrations in the aqueous phase downgradient of the site, as may be indicated by recent groundwater sampling data, however no monitoring would be performed to confirm this reduction.

8.2 ALTERNATIVE 2 – INSTITUTIONAL CONTROLS WITH MONITORED NATURAL ATTENUATION

Health risks posed by current and reasonably anticipated future land use in the vicinity of the site are not expected to be significant, however, the HHRA determined that hypothetical future uses of impacted groundwater resulted in an unacceptable risk to human receptors. This alternative would prevent these risks, especially in consideration of the existing public water supply and the recent enactment of an ordinance prohibiting the use of groundwater at and downgradient of this site. Institutional controls would help provide a level of assurance that human receptors are not being exposed to impacted groundwater. Natural processes such as dispersion and degradation may gradually reduce COPC concentrations in the aqueous phase downgradient of the site. Groundwater sampling performed at the site in 1999 indicated that natural attenuation processes are occurring at portions of the site. However, it cannot be assumed that this alternative would attain ARAR-based criteria within a reasonable time frame.

Additional groundwater monitoring wells would be installed southwest of Wells OS-1A, 1B, 7A, and 7B to assess the extent of chlorinated solvents in groundwater downgradient of the south sector of the Sharon Plant. Long-term, quarterly monitoring would be conducted to support the occurrence of natural attenuation and to verify the historical results which indicate that COPCs in groundwater are stable, or decreasing in size. Monitoring data would be reported on a regular (annual) frequency. The need for and frequency of continued groundwater monitoring will be evaluated as part of the five-year project review.

8.3 ALTERNATIVE 3 – NAPL SOURCE REMOVAL WITH MONITORED NATURAL ATTENUATION

Health risks posed by current and reasonably anticipated future land use in the vicinity of the site are not expected to be significant, however, the HHRA determined that hypothetical future uses of impacted groundwater resulted in an unacceptable risk to human receptors. Groundwater use restrictions would help provide a level of assurance that human receptors are not being exposed to impacted groundwater, and natural processes may gradually reduce COPC concentrations in the aqueous phase downgradient of the site, to be confirmed by occasional monitoring of groundwater quality. Reducing the mass of DNAPL may lessen the likelihood that the DNAPL would gradually migrate vertically to the bedrock aquifer.

This alternative may result in recovery of a substantial mass of COPCs from the aquifer, however, based on technological limitations and subsurface conditions, it is likely that a substantial COPC mass would remain in the subsurface, even after several years of removal. Thus, it is not likely that groundwater quality will improve significantly under this alternative. Alternative 3B involves thoroughly mixing NAPLs into the aqueous phase, thereby substantially increasing aqueous-phase COPC concentrations and potential downgradient migration within the NAPL areas.

8.4 ALTERNATIVE 4 – NAPL SOURCE REMOVAL WITH GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE

Health risks posed by current and reasonably anticipated future land use in the vicinity of the site are not expected to be significant, however, the HHRA determined that hypothetical future uses of impacted groundwater resulted in an unacceptable risk to human receptors. By reducing the mass of NAPLs present in the alluvial aquifer, a significant source of groundwater COPCs would be addressed, and the likelihood that the DNAPL would gradually migrate vertically to the bedrock aquifer would be lessened. Extraction of impacted groundwater would reduce the volume of COPCs migrating downgradient of the site, although currently there appears to be minimal COPC migration. Groundwater use restrictions would further help prevent human exposure to impacted groundwater, and natural processes may gradually reduce residual COPC concentrations (and associated risk) in the aqueous phase downgradient of the groundwater extraction areas.

As noted for Alternative 3, technological limitations and subsurface conditions make it likely that a substantial mass of NAPLs would remain in the subsurface. As the NAPLs contain the majority of the COPCs in the subsurface, the additional extraction and treatment of groundwater would not significantly improve overall groundwater quality at the site.

8.5 ALTERNATIVE 5 – NAPL SOURCE REMOVAL WITH IN-SITU GROUNDWATER TREATMENT

Health risks posed by current and reasonably anticipated future land use in the vicinity of the site are not expected to be significant. By treating the mass of NAPLs present in the alluvial aquifer, a significant source of groundwater COPCs would be addressed, and the likelihood that the DNAPL would gradually migrate vertically to the bedrock aquifer may be lessened. However, current technologies for removal will still result in substantial NAPL mass remaining in the alluvium. Removal may accelerate contaminant mobility, and this alternative is not viewed as being more protective than Alternative 2. The cost and risks are substantially greater than Alternative 2. Additional in-situ treatment of impacted groundwater could also reduce the volume of COPCs migrating downgradient of the site. However, such migration appears to be quite limited. Groundwater use restrictions prevent human exposure to impacted groundwater, and natural attenuation processes gradually reduce residual COPC concentrations (and associated risk) in the aqueous phase downgradient of in-situ treatment areas.

As noted previously, technological limitations and subsurface conditions make it likely that a substantial mass of NAPLs will remain in the subsurface, thus making attainment of ARAR-based cleanup criteria unlikely within the foreseeable future for this (or any other) remedial alternative.

9.0 SUMMARY AND CONCLUSIONS

A TI determination is appropriate for the Sharon Plant site due to the presence of substantial quantities of DNAPL in the subsurface, and the heterogeneous nature of the alluvial deposits where the DNAPL is located.

The horizontal and vertical limits of DNAPL are illustrated on Figures 4-1 and 4-2. The approximate source area is estimated to be approximately 900 feet long, up to 200 feet wide and up to 8 feet thick. The estimated volume of DNAPL source material exceeds 500,000 gallons. Based on previous investigations, the COPC mass appears to be stable.

Detailed hydrogeologic characterization of the overburden and bedrock units, including their hydraulic conductivity, indicate that these units are highly heterogeneous and complex at a small scale.

LNAPL removal activities, consisting of a belt skimmer and absorbent tubes, have been performed since 1994, with a total recovery in seven years of 650 gallons of LNAPL, or approximately 1 percent of the total LNAPL mass in the subsurface during seven years of LNAPL recovery.

No existing technology is capable of remediating all groundwater at the Sharon Plant to ARAR-based cleanup levels (e.g., MCLs). Some technologies may be capable of removing some COPC mass, but may also pose increased risk of contaminant mobilization. Technologies focusing on hydraulic removal of NAPLs may cause the remobilization of currently immobile COPCs. Hydraulic enhancements such as heating or solvent flooding to increase recovery rates by increasing NAPL solubility may also enable the vertical and lateral migration of COPCs by molecular diffusion.

Due to the heterogeneous nature of the subsurface and the wide lateral extent of DNAPL, any technology requiring injection and/or extraction wells for delivery of treatment agents or recovery of NAPLS would need hundreds of closely spaced wells. The injection of substances into the subsurface and pumping of material from the subsurface on this scale may cause gradient changes or other changes in the physical properties of the NAPLs (solubility and viscosity, for example), which may cause the migration of COPCs to currently unimpacted portions of the subsurface. Such efforts would be further complicated by the presence of an active railroad and active industrial facilities within the TI Zone.

Minimizing the risk of NAPL mobilization and reducing or eliminating the potential for exposure of humans to subsurface COPCs are appropriate remedial action objectives. The DNAPL and geologic characteristics at the site suggest that the DNAPL is currently in a stable distribution, and will likely remain in that state unless it is disturbed. Institutional controls would reduce the potential exposure of humans to groundwater impacted by NAPLs. Further, natural attenuation processes, which appear to be occurring at the site, provide additional protectiveness by serving to control dissolved-phase COPC concentrations in groundwater downgradient of the site.

There are no receptors of impacted groundwater in the site vicinity, no threats posed to human health, and no threats posed to the environment from groundwater discharge to the Shenango River. Remedial Alternatives 3, 4, and 5 do not provide an increase in protectiveness proportionate with the associated increased costs, and may, in fact, prove to be less protective than other, less aggressive alternatives due to the increased potential for COPC migration.

The TI Zone fully encompasses the extent of DNAPL, where MCL and non-zero MCLGs might be exceeded for an indeterminate period, whether or not an attempt is made to reduce COPC mass in the subsurface. A TI waiver is proposed from MCLs for organics and inorganics, including those not related to the identified DNAPL constituents. There is no discernable benefit in attempting to remediate the non-NAPL organic plumes (i.e., chlorinated aliphatic hydrocarbons) which contain limited COPC mass relative to the NAPL-related plume.

Restoration of the aquifer is technically impracticable, and attempts to do so would not result in increased protectiveness. Such attempts might reduce protectiveness. A TI Waiver of MCLs and non-zero MCLGs as ARAR is therefore respectfully requested on behalf of our client.

Respectfully submitted,
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TABLES

TABLE 3-1
CHEMICALS OF CONCERN
SOUTH SECTOR ALLUVIAL GROUNDWATER

Chemicals of Concern for which the TI Waiver is being Sought	**USEPA MCL (in µg/L)**	**USEPA MCLG (in µg/L)**
1,4-Dichlorobenzene	75	75
1,2-Dichloroethene	70 (cis-)	70
2,3,7,8-TCDD (teq)	3.00E-05	0
1,2,4-Trichlorobenzene	70	70
Aroclor-1254	0.5	0
Trichloroethene	5	0
Vinyl chloride	2	0
Arsenic	10	--
Chromium	100	100
Cadmium	5	5
Beryllium	4	4

TABLE 3-2
CHEMICALS OF CONCERN
MIDDLE SECTOR ALLUVIAL GROUNDWATER

Chemicals of Concern for which the TI Waiver is being Sought	USEPA MCL (in µg/L)	USEPA MCLG (in µg/L)
1,2-Dichlorobenzene	600	600
1,4-Dichlorobenzene	75	75
1,2-Dichloroethane	5	0
1,2,4-Trichlorobenzene	70	70
Aroclor-1242	0.5	0
Aroclor-1248	0.5	0
Aroclor-1254	0.5	0
Aroclor-1260	0.5	0
Tetrachloroethene	5	0
Trichloroethene	5	0
Benzene	5	0
Cadmium	5	5
Arsenic	10	--
Chromium	100	100
Mercury	2	2
Beryllium	4	4
Cyanide	200	200

TABLE 3-3
CHEMICALS OF CONCERN
BEDROCK GROUNDWATER

Chemicals of Concern	**USEPA MCL (in µg/L)**	**USEPA MCLG (in ug/L)**
Aroclor-1254	0.5	0
Aroclor-1260	0.5	0
Bis(2-ethylhexyl)phthalate	6	0
Arsenic	10	--
Barium	2,000	2,000

TABLE 5-1
HISTORICAL GROUNDWATER ELEVATIONS
WESTINGHOUSE - SHARON TRANSFORMER PLANT

Well Number	TOC (1) Elevation	TOR (2) Elevation	Water Elevation (3)							
DATE:			5/30/90 (4)	6/29/92 (5)	7/10/92 (5)	8/27/92 (5)	12/16/92 (5)	3/30/93 (5)	5/27/93 (5)	9/27/93 (5)
N-1 +	884.45	884.24	865.80	868.06	867.85	868.18	868.41	868.80	868.12	868.43
N-2A	890.60	890.46	---	885.24	885.19	---	885.56	---	885.29	885.34
N-2B	890.50	890.04	---	875.99	875.64	876.53	875.80	---	875.08	875.22
N-3A	886.80	886.69	868.38	867.69	867.60	867.99	868.09	868.55	867.79	868.14
N-3AR		886.93	---	---	---	---	---	---	---	---
N-3B	887.50	887.40	853.98	852.83	851.52	848.23	850.91	845.22	834.20	832.80
N-5	890.80	890.65	---	882.60	882.58	882.80	882.71	882.75	882.62	882.71
N-6A +	891.48	---	869.93	WA (6)	WA	WA	WA	WA	WA	WA
N-6B +	891.44	890.57	---	868.63	861.12	868.39	868.89	---	867.50	---
N-6BR		891.33	---	---	---	---	---	---	---	---
N-7A	895.80	895.66	884.22	883.67	883.56	883.38	883.97	884.75	883.72	883.91
N-7AR	892.88	892.60	---	---	---	---	---	---	---	---
N-7B	895.50	895.38	876.30	875.29	875.28	875.86	876.18	876.98	874.58	873.83
* M-1 +	879.95	879.77	861.13	859.30	859.55	860.70	861.04	861.75	859.87	860.36
* M-2 +	876.38	875.86	---	855.91	855.70	857.14	857.39	858.08	856.50	856.76
M-4A +	877.63	876.54	869.81	868.73	868.66	868.92	867.84	868.64	868.65	868.88
M-4B +	877.65	877.14	860.96	858.60	857.98	855.90	858.43	853.86	848.79	848.07
M-5	877.89	877.51	863.01	862.48	861.59	863.30	862.88	863.91	862.65	863.20
M-6 +	878.93	878.53	---	869.23	868.59	869.52	869.47	869.65	869.39	869.52
* M-7	880.20	879.99	855.62	855.29	858.97	865.39	858.48	859.29	858.44	858.59
M-8 +	882.04	881.95	870.73	869.95	870.53	870.83	870.48	870.68	870.69	870.93
M-9 +	882.10	881.99	869.77	869.59	868.76	868.60	869.09	869.10	867.17	867.46
* M-10 +	879.63	879.17	---	843.17	843.27	847.67	847.02	851.00	849.51	848.95
* M-11A	880.70	880.55	---	863.63	863.75	865.35	864.95	865.95	864.82	865.39
M-11B	880.70	880.61	863.50	862.85	864.74	863.96	863.61	864.50	862.81	863.13
* M-12 +	879.87	879.24	---	864.28	863.34	865.86	865.43	866.42	865.21	865.82
M-13 +	883.30	883.19	866.92	867.19	867.17	867.86	867.50	867.71	867.35	867.63
M-14 +	882.69	882.51	867.77	867.31	866.75	868.13	867.88	868.09	867.81	868.18
M-15 +	881.13	879.99	867.35	866.71	865.59	867.58	866.13	866.49	865.95	867.29
M-16	882.60	882.49	865.52	864.78	866.77	865.62	865.51	866.21	865.21	865.58
M-17 +	882.07	881.34	869.64	868.08	867.32	868.53	868.51	869.02	868.26	868.55
M-18 +	884.40	884.15	878.00	874.15	877.67	877.82	877.45	877.74	877.86	877.79
S-1A +	863.30	862.97	853.78	852.47	852.50	853.00	852.93	857.19	852.40	852.61
S-1B +	863.62	863.29	857.69	856.54	856.26	856.89	857.06	857.49	856.37	856.40
S-2A +	859.40	858.60	855.64	853.57	852.74	854.62	854.40	854.95	853.62	853.95
S-2B +	859.37	858.72	855.02	852.93	852.17	853.46	854.03	852.99	851.67	852.77
S-3 +	864.00	863.68	855.99	840.38	854.38	855.22	855.28	855.83	854.43	854.71
* S-4 +	869.33	869.20	---	---	855.90	---	850.03	849.83	850.02	849.95
S-5 +	864.03	863.33	856.62	851.60	854.03	855.57	854.80	856.34	854.04	855.18
S-5R		863.80	---	---	---	---	---	---	---	---
S-6 +	869.77	869.47	---	855.23	855.26	856.09	856.14	856.71	855.28	855.66
S-7 +	866.18	865.91	856.75	856.64	855.24	856.06	856.09	856.68	855.26	855.61
S-8A +	864.15	864.13	---	854.65	854.70	855.55	855.60	856.15	854.86	855.23
S-8B +	864.54	863.93	---	853.60	848.14	850.30	851.58	850.67	843.13	843.42
S-9	861.20	860.58	---	856.32	856.27	857.11	857.13	857.56	856.33	855.63
S-10	861.10	860.92	---	856.54	856.42	857.42	857.32	857.82	856.50	857.07
S-11 +	869.85	868.85	867.35	---	864.91	866.03	865.38	866.06	864.90	867.33
S-12	873.40	873.40	859.49	WA	WA	WA	WA	WA	WA	WA
S-12R	870.50	870.01	---	855.68	855.59	856.97	856.96	857.57	856.47	856.38
S-13 +	872.34	872.02	857.90	859.30	---	857.52 #	857.82 #	858.68 #	856.89 #	---(8)

TABLE 5-1
HISTORICAL GROUNDWATER ELEVATIONS
WESTINGHOUSE - SHARON TRANSFORMER PLANT

Well Number	TOC (1) Elevation	TOR (2) Elevation	Water Elevation (3)							
DATE:			12/16/93 (5)	3/21/94 (5)	6/14/94 (5)	9/21/94 (5)	12/8/94 (5)	3/2/95 (5)	11/4&6/98 (5)	6/30/99 (5)
N-1 +	884.45	884.24	---	---(7)	868.49	868.25	868.70	868.66	867.98	868.08
N-2A	890.60	890.46	---	885.58	885.33	885.24	885.64	885.56	884.98	884.98
N-2B	890.50	890.04	875.43	875.87	875.46	875.63	875.09	874.91	874.98	875.29
N-3A	886.80	886.69	868.20	868.58	868.06	867.88	868.43	868.30	867.50	WA
N-3AR		886.93	---	---	---	---	---	---	---	865.49
N-3B	887.50	887.40	834.02	836.01	835.03	830.85	830.38	831.26	830.62	834.91
N-5	890.80	890.65	882.70	882.83	882.76	---	882.80	882.76	882.61	882.70
N-6A +	891.48	---	WA	WA	WA	WA	WA	WA	WA	WA
N-6B +	891.44	890.57	867.11	---(7)	867.03	---(7)	---(7)	---(7)	---(7)	---(7)
N-6BR		891.33	---	---	---	---	---	---	---	859.49
N-7A	895.80	895.66	883.95	884.51	883.84	WA	WA	WA	WA	WA
N-7AR	892.88	892.60	---	---	---	883.39	884.74	884.45	---(7)	883.79
N-7B	895.50	895.38	874.77	875.68	874.63	874.19	874.74	874.76	873.78	874.87
* M-1 +	879.95	879.77	860.56	861.85	860.66	860.23	861.31	861.15	---	859.62
* M-2 +	876.38	875.86	857.16	857.02	857.21	856.94	858.10	857.56	869.23	---
M-4A +	877.63	876.54	868.46	869.35	869.43	869.53	869.54	869.25	848.83	869.54
M-4B +	877.65	877.14	848.86	850.59	850.27	848.21	848.10	848.20	862.33	851.83
M-5	877.89	877.51	863.52	864.37	863.33	863.44	863.66	863.00	869.48	863.11
M-6 +	878.93	878.53	869.45	869.94	869.68	869.60	869.34	869.22	864.26	866.16
* M-7	880.20	879.99	858.79	859.53	858.05	860.74	860.13	859.76	870.87	WA
M-8 +	882.04	881.95	870.52	871.56	871.26	871.17	870.78	870.53	866.70	871.58
M-9 +	882.10	881.99	867.70	868.75	868.40	867.47	867.40	867.19	---	868.08
* M-10 +	879.63	879.17	849.19	852.03	852.60	865.62	863.34	863.07	864.50	---
* M-11A	880.70	880.55	865.39	866.33	865.40	865.54	865.65	865.10	862.56	865.51
M-11B	880.70	880.61	863.54	866.03	863.49	863.35	863.21	862.88	859.44	862.82
* M-12 +	879.87	879.24	866.06	866.78	865.79	865.95	866.15	864.89	867.27	860.04
M-13 +	883.30	883.19	867.78	868.16	867.84	867.90	867.85	867.37	867.71	867.65
M-14 +	882.69	882.51	868.09	868.72	868.10	868.17	868.02	867.76	866.84	868.34
M-15 +	881.13	879.99	867.37	868.02	867.58	867.72	867.62	867.18	865.08	867.26
M-16	882.60	882.49	865.72	866.58	865.51	865.51	865.88	865.64	868.37	865.05
M-17 +	882.07	881.34	868.52	868.88	868.63	868.43	868.99	868.79	877.67	868.39
M-18 +	884.40	884.15	877.53	877.97	878.05	877.95	877.68	877.42	852.46	877.97
S-1A +	863.30	862.97	852.65	853.42	852.61	852.54	853.24	852.77	853.15	852.82
S-1B +	863.62	863.29	856.82	857.25	856.53	856.17	856.74	856.44	856.34	856.47
S-2A +	859.40	858.60	854.18	855.20	854.21	853.55	853.89	854.15	853.15	854.03
S-2B +	859.37	858.72	852.95	853.57	852.94	852.41	853.57	853.04	852.43	853.05
S-3 +	864.00	863.68	854.93	855.64	854.90	854.36	855.32	855.02	---(7)	WA
* S-4 +	869.33	869.20	848.88	850.22	849.43	849.89	850.40	850.30	850.06	850.54
S-5 +	864.03	863.33	854.68	856.21	855.93	854.75	856.00	855.51	---(7)	---(7)
S-5R		863.80	---	---	---	---	---	---	---	855.06
S-6 +	869.77	869.47	855.87	856.59	855.83	855.25	856.17	855.88	855.09	855.47
S-7 +	866.18	865.91	855.84	856.53	855.80	855.23	856.35	855.84	---(7)	---(7)
S-8A +	864.15	864.13	855.45	856.21	855.32	854.89	855.72	855.51	854.64	854.83
S-8B +	864.54	863.93	844.37	844.81	845.36	844.39	844.88	845.25	850.47	852.36
S-9	861.20	860.58	856.88	858.00	856.86	856.30	857.14	856.88	856.07	---(7)
S-10	861.10	860.92	857.34	858.21	857.36	856.77	857.50	857.25	856.56	855.21
S-11 +	869.85	868.85	866.29	866.35	866.26	866.07	866.34	866.35	866.17	865.43
S-12	873.40	873.40	WA	WA	WA	WA	WA	WA	WA	WA
S-12R	870.50	870.01	856.74	858.23	856.87	856.36	857.06	856.93	855.78	855.83
S-13 +	872.34	872.02	---(8)	---(8)	859.28	857.10	857.97	857.70	856.61	856.63

TABLE 5-1
HISTORICAL GROUNDWATER ELEVATIONS
WESTINGHOUSE - SHARON TRANSFORMER PLANT

Well Number	TOC (1) Elevation	TOR (2) Elevation	Water Elevation (3)							
DATE:			5/30/90 (4)	6/29/92 (5)	7/10/92 (5)	8/27/92 (5)	12/16/92 (5)	3/30/93 (5)	5/27/93 (5)	9/27/93 (5)
R-1	864.40	864.33	850.86	848.84	848.36	843.31	847.35	837.40	828.63	824.23
OS-1A	860.03	859.39	854.90	853.31	853.50	854.20	853.41	854.48	853.54	853.82
OS-1B	860.18	859.49	---	852.67	852.64	853.42	852.16	854.01	852.93	853.16
OS-2A	862.41	861.64	856.47	854.43	854.50	855.30	855.47	856.00	854.69	855.07
OS-2B	862.70	861.50	---	854.50	853.40	855.29	855.44	856.01	854.69	855.03
OS-3A	862.54	861.76	---	855.12	854.52	856.55	856.89	857.92	855.64	856.14
OS-3B	868.73	867.94	---	861.68	861.90	863.04	863.39	864.22	862.16	862.62
OS-3C	863.94	863.63	---	---	---	---	---	---	---	---
OS-4A	865.37	865.22	---	853.90	853.81	854.49	855.33	856.30	854.27	854.11
OS-4B	864.10	863.95	---	853.20	853.08	854.14	854.88	855.88	853.83	853.57
OS-5A	863.92	863.50	---	850.06	850.00	850.61	851.77	852.78	850.35	850.29
OS-5B	863.38	863.27	---	850.12	850.06	850.71	851.86	852.91	850.41	850.36
OS-6A		860.02	---	---	---	---	---	---	---	---
OS-6B		859.67	---	---	---	---	---	---	---	---
OS-7AR		858.88	---	---	---	---	---	---	---	---
OS-7B		858.61	---	---	---	---	---	---	---	---
MW-3A	871.46	871.07	---	864.76	864.82	866.49	866.35	867.72	865.91	866.46
MW-3AR		869.06	---	---	---	---	---	---	---	---
MW-3B	869.19	868.91	---	864.31	864.37	865.35	865.18	865.89	864.88	865.22
MW-7	870.17	869.85	---	855.85	855.39	858.60	---	858.39	---	858.94
*** MW-14A**	871.02	870.44	---	861.36	862.54	862.72	864.18	864.51	863.88	864.46
MW-14B	871.32	871.06	---	863.02	863.03	864.65	864.26	865.29	864.26	864.78
MW-14BR		871.21	---	---	---	---	---	---	---	---
MW-14C	872.84	872.47	---	---	---	---	---	---	---	---
*** MW-15A**	874.41	874.81	---	862.71	862.67	864.16	864.02	865.91	863.87	864.27
*** MW-15B**	874.94	874.75	---	860.74	859.88	862.41	862.16	860.20	861.86	862.39
MW-16A	877.33	877.21	---	860.15	859.95	862.61	862.76	864.76	862.10	862.48
*** MW-16B**	875.77	875.26	---	855.94	856.13	857.37	857.65	858.39	856.56	857.02
MW-17AR	872.77	872.38	---	---	---	---	---	---	---	---
GM-1A	880.61	880.34 (10)	---	---	---	---	866.18	867.60	865.93	866.61
*** GM-1B**	880.59	880.33	---	---	---	---	865.51	866.51	865.25	865.86
*** GM-2A**	880.31	880.07	---	---	---	---	865.23	865.81	863.98	864.67
*** GM-2B**	880.35	880.10	---	---	---	---	865.47	866.47	865.24	865.83
*** GM-3A**	880.17	879.98	---	---	---	---	864.70	865.70	864.21	864.74
*** GM-3B**	880.99	880.76	---	---	---	---	864.98	866.04	864.79	865.51
*** GM-4A**	879.80	879.53	---	---	---	---	864.46	863.96	861.44	859.04
*** GM-4B**	880.72	880.49	---	---	---	---	864.83	865.92	864.70	865.42
*** GM-5A**	880.63	880.40	---	---	---	---	861.64	866.62	864.68	858.57
*** GM-5B**	880.78	880.55	---	---	---	---	864.77	865.85	864.63	865.37
GM-6A	881.47	881.23	---	---	---	---	864.92	866.01	865.73	865.49
*** GM-6B**	881.45	881.21	---	---	---	---	864.79	865.88	864.63	865.38
*** GM-7B**	881.36	881.13	---	---	---	---	864.56	865.68	864.41	865.20
GM-8B	881.65	881.44	---	---	---	---	865.36	866.11	865.07	865.49

TABLE 5-1
HISTORICAL GROUNDWATER ELEVATIONS
WESTINGHOUSE - SHARON TRANSFORMER PLANT

Well Number	TOC (1) Elevation	TOR (2) Elevation	Water Elevation (3)							
DATE:			12/16/93 (5)	3/21/94 (5)	6/14/94 (5)	9/21/94 (5)	12/8/94 (5)	3/2/95 (5)	11/4&6/98 (5)	6/30/99 (5)
R-1	864.40	864.33	825.89	828.03	826.99	822.52	822.36	823.09	823.76	828.94
OS-1A	860.03	859.39	854.04	854.54	853.81	853.47	854.16	853.26	853.46	853.50
OS-1B	860.18	859.49	853.44	853.89	853.11	852.87	853.54	853.88	852.64	852.80
OS-2A	862.41	861.64	855.28	856.04	855.15	854.75	855.58	855.35	854.47	854.67
OS-2B	862.70	861.50	855.27	855.75	855.12	854.70	855.54	855.43	854.45	854.59
OS-3A	862.54	861.76	856.68	857.06	856.48	856.01	857.18	856.89	855.43	855.42
OS-3B	868.73	867.94	862.53	864.26	862.99	862.54	863.66	863.35	861.93	858.90
OS-3C	863.94	863.63	---	---	---	---	---	---	---	---
OS-4A	865.37	865.22	854.80	855.47	854.03	854.04	855.28	854.87	853.77	853.92
OS-4B	864.10	863.95	854.29	854.95	853.55	853.46	854.22	854.13	853.08	853.26
OS-5A	863.92	863.50	851.34	851.85	850.28	850.23	851.05	851.81	850.75	850.86
OS-5B	863.38	863.27	851.43	851.97	850.37	850.35	851.23	851.68	850.70	850.94
OS-6A		860.02	---	---	---	---	---	---	---	---
OS-6B		859.67	---	---	---	---	---	---	---	---
OS-7AR		858.88	---	---	---	---	---	---	---	848.87
OS-7B		858.61	---	---	---	---	---	---	---	848.85
MW-3A	871.46	871.07	866.84	867.59	866.26	866.37	866.95	866.43	865.67	WA
MW-3AR		869.06	---	---	---	---	---	---	---	864.05
MW-3B	869.19	868.91	865.34	865.84	865.50	---(7)	865.53	865.16	864.60	864.69
MW-7	870.17	869.85	857.46	---(9)	---(9)	---(9)	---(9)	---(9)	---(9)	WA
* MW-14A	871.02	870.44	864.78	865.42	864.48	864.38	864.40	864.37	863.16	---
MW-14B	871.32	871.06	865.07	865.73	864.82	865.31	865.40	---(7)	862.53	WA
MW-14BR		871.21	---	---	---	---	---	---	---	844.38
MW-14C	872.84	872.47	---	---	---	---	---	---	---	---
* MW-15A	874.41	874.81	864.95	865.86	864.41	864.43	865.47	864.46	864.22	864.10
* MW-15B	874.94	874.75	862.76	863.41	862.71	862.63	862.94	862.37	861.70	860.75
MW-16A	877.33	877.21	863.69	864.66	861.64	861.73	863.37	862.25	861.76	860.99
* MW-16B	875.77	875.26	857.26	858.17	856.34	856.93	857.95	857.56	856.31	856.30
MW-17AR	872.77	872.38	---	---	---	---	860.32	860.36	860.16	860.26
GM-1A	880.61	880.34 (10)	866.96	867.74	866.43(11)	866.58	867.18	866.12	---	865.77
* GM-1B	880.59	880.33	866.13	866.54	865.80	866.01	866.29	---(7)	---	865.06
* GM-2A	880.31	880.07	864.28	865.49	863.09	863.26	863.46	862.46	865.02	864.88
* GM-2B	880.35	880.10	866.10	866.77	865.79	866.00	866.27	865.53	864.90	865.01
* GM-3A	880.17	879.98	864.62	868.42	863.31	863.00	862.77	860.96	864.28	864.42
* GM-3B	880.99	880.76	865.82	866.50	865.52	865.77	865.93	865.01	864.41	864.50
* GM-4A	879.80	879.53	860.02	860.36	858.63	860.05	865.62	858.57	---	---
* GM-4B	880.72	880.49	865.73	866.42	865.43	865.72	865.85	864.94	864.25	864.28
* GM-5A	880.63	880.40	858.48	858.55	857.60	865.84	866.74	865.33	864.10	863.63
* GM-5B	880.78	880.55	865.68	866.38	865.39	865.67	865.85	864.90	864.23	864.30
GM-6A	881.47	881.23	865.83	865.91	865.52	865.80	865.90	864.83	864.33	864.40
* GM-6B	881.45	881.21	865.71	865.82	865.41	865.73	865.80	864.83	864.11	864.24
* GM-7B	881.36	881.13	865.57	865.72	865.23	865.57	865.64	864.62	863.95	864.04
GM-8B	881.65	881.44	865.70	866.21	865.40	865.50	865.86	865.49	864.88	864.86

TABLE 5-1
HISTORICAL GROUNDWATER ELEVATIONS
WESTINGHOUSE - SHARON TRANSFORMER PLANT

NOTES:

(1) TOC = Top of Protective Casing (in feet above MSL).
(2) TOR = Top of Riser Pipe (in feet above MSL).
(3) All water elevations are in feet above MSL.
(4) This round of water levels was measured from the TOC and are in feet.
(5) This round of water levels was measured from the TOR unless otherwise indicated and are in feet.
(6) WA = Well has been abandoned
(7) Well could not be located - no level determined.
(8) Well had been damaged - water level probe could not be advanced beyond 11.85'. Well depth is 32.0' (B.G.S). Well was repaired in August 1994.
(9) Well has been damaged - no level could be determined.
(10) TOR elevations for the GM A-series wells were revised to reflect the addition of sanitary seals on these wells.
(11) Measurements for the GM-series wells for this quarter were collected on 6/20/94.

--- = No data available for this well.

= This water level was measured from the ground surface (G.S. = 872.30 feet).
+ = Well was modified during site remediation and related activities. The TOC and TOR elevations provided in this table reflect current elevations, and may differ from well installation details provided in the RI.
Shaded wells are screened in the bedrock aquifer. All other wells are screened in the alluvial aquifer.

TABLE 5-2
HISTORICAL LNAPL THICKNESS IN MONITORING WELLS
WESTINGHOUSE - SHARON TRANSFORMER FACILITY

Well Number	PRODUCT THICKNESS (feet)															
DATE:	5/13/86	6/24/86	3/29/90	5/30/90	6/29/92	7/10/92	8/27/92	9/18/92	9/25/92	10/2/92	10/8/92	10/16/92	10/22/92	10/28/92	11/6/92	11/19/92
M-2	2.50	3.00	0.77	---	---	---	0.26	---	---	---	---	---	---	0.50	---	---
M-7	1.10	4.10	---	9.22	7.70	---	0.20	---	---	---	---	---	---	6.16	6.38	6.44
M-10	7.30	12.70	---	18.84	21.00	13.61	18.61	18.11	17.94	15.24	17.70	17.59	17.87	17.91	18.01	18.02
M-12	---	---	---	---	---	---	7.42	---	---	---	---	---	---	---	---	---
S-4	6.90	7.80	7.17	---	---	6.07	---	---	---	---	---	---	---	18.82	---	---
S-5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-7	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-14A	---	---	---	---	2.00	2.60	1.41	---	---	---	---	---	---	0.95	---	---
MW-15A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-15B	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
GM-1A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
GM-2A	---	---	---	---	---	---	---	---	---	---	---	Film	---	Film	---	0.11
GM-3A	---	---	---	---	---	---	---	---	---	---	0.07	0.32	0.46	0.48	0.55	0.55
GM-4A	---	---	---	---	---	---	---	---	---	---	---	---	---	0.01	0.30	0.11
GM-5A	---	---	---	---	---	---	---	---	---	---	0.02	0.60	0.93	1.24	1.62	2.28
GM-5B	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
GM-6A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

TABLE 5-2
HISTORICAL LNAPL THICKNESS IN MONITORING WELLS
WESTINGHOUSE - SHARON TRANSFORMER FACILITY

Well Number	PRODUCT THICKNESS (feet)												
DATE:	12/4/92	12/17/92	1/26/93	3/30/93	5/27/93	9/27/93	12/16/93	3/21/94	6/14/94	9/21/94 #	12/8/94 #	3/2/95 #	11/4&6/98 #
M-2	---	0.17	---	0.25	0.16	0.13	0.15	1.00	0.10	0.07	0.01	0.02	---
M-7	6.66	6.50	6.89	6.76	6.43	7.01	7.11	7.06	7.55	5.05	5.82	5.37	0.05
M-10	18.22	18.50	18.70	15.44	15.70	17.03	17.10	14.93	13.23	0.29	2.68	1.89	---
M-12	---	0.00	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S-4	---	6.81	---	7.38	5.70	6.19	7.51	7.08	6.91	5.78	6.31	6.10	5.64
S-5	---	---	---	---	---	---	0.73	---	---	---	---	---	---
MW-7	---	---	---	---	---	0.50	0.60	---*	---*	---*	0.75	---*	---
MW-14A	---	0.08	---	1.31	0.49	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
MW-15A	---	---	---	---	---	---	0.01	0.01	0.00	0.00	0.00	0.00	0.00
MW-15B	---	---	---	---	---	---	0.01	0.00	0.00	0.00	0.00	0.00	0.00
GM-1A	---	---	---	---	---	---	---	---	0.01**	0.01	0.00	0.00	---
GM-2A	0.32	0.40	0.45	0.90	1.50	1.45	2.07	1.56	2.97	2.99	3.07	3.35	0.06
GM-3A	0.70	0.72	0.89	0.93	0.94	1.24	1.62	2.58	2.80	3.41	4.01	4.72	0.43
GM-4A	0.32	0.76	1.40	2.46	3.90	7.36	6.62	7.08	7.83	6.65	0.37	6.97	---
GM-5A	3.20	3.63	5.10	6.53	NM	7.66	8.08	8.78	8.73	0.14	0.01	0.12	0.41
GM-5B	---	---	---	---	---	---	---	0.01	0.00	0.00	0.00	0.00	0.00
GM-6A	---	---	---	---	---	---	---	0.01	0.00	0.00	0.00	0.00	0.00

NOTES:

NM - Interface probe was not functioning properly when measuring this well.

--- = Data not available for this well.

Wells M-7 and M-10 have both a light phase (LNAPL) and a dense phase (DNAPL).

* - Well MW-7 was damaged - product thickness could not be determined.

** - The measurements for the GM-series wells for this quarter were collected on 6/20/94.

\# - The pilot program for LNAPL removal was in progress at the time of this round of measurements.

TABLE 5-3
HISTORICAL DNAPL THICKNESS IN MONITORING WELLS
WESTINGHOUSE - SHARON TRANSFORMER FACILITY

Well Number	PRODUCT THICKNESS (feet)															
DATE:	8/27/92	9/3&4/92	9/10/92	9/18/92	9/25/92	10/2/92	10/8/92	10/16/92	10/22/92	10/28/92	11/6/92	11/19/92	12/4/92	12/17/92	1/26/93	3/30/93
M-1	---	---	---	---	---	---	---	---	---	0.60	---	---	---	---	---	1.27
M-7	0.30	---	---	---	---	---	---	---	---	14.85	---	---	---	0.00	---	0.00
M-10	4.96	---	---	4.45	3.97	3.58	2.91	3.50	2.53	12.40	3.23	3.28	3.18	3.25	2.91	2.83
M-11A	3.02	---	---	---	---	---	---	---	---	0.66	0.52	0.65	0.75	0.74	0.52	Trace
M-12	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
MW-15B	1.80	---	---	---	---	---	---	---	---	3.60	---	---	---	3.38	---	1.65
MW-16B	16.16	---	---	---	---	---	---	---	---	5.40	---	---	---	5.36	---	4.88
GM-1B	---	5.54	---	4.70	4.00	3.60	3.75	3.87	3.64	3.37	3.35	2.75	2.75	2.95	2.90	2.53
GM-2B	---	---	1.31	3.09	3.85	3.87	4.16	4.29	3.96	3.76	4.04	3.41	3.01	3.26	2.86	2.48
GM-3B	---	---	5.43	5.14	5.11	5.03	5.12	4.93	4.88	4.92	5.65	5.40	5.48	5.58	5.15	5.30
GM-4B	---	---	---	19.50	19.50	19.28	23.41	9.88	9.78	9.68	9.66	9.43	9.15	8.99	7.28	6.95
GM-5B	---	---	---	---	1.90	2.13	1.73	1.48	1.63	1.67	2.19	2.13	0.50	2.23	1.35	1.38
GM-6B	---	---	---	---	8.17	8.05	8.16	8.03	7.83	8.06	8.33	7.93	7.93	7.93	1.94	7.93
GM-7B	---	---	---	---	---	---	---	---	---	3.32	3.77	3.84	3.72	3.97	3.15	2.85

TABLE 5-3
HISTORICAL DNAPL THICKNESS IN MONITORING WELLS
WESTINGHOUSE - SHARON TRANSFORMER FACILITY

Well Number	PRODUCT THICKNESS (feet)								
DATE:	5/27/93	9/27/93	12/16/93	3/21/94	6/14/94	9/21/94	12/8/94	3/2/95	11/4&6/98
M-1	2.75	2.66	---	3.00	2.29	3.55	2.70	3.23	2.73
M-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M-10	2.46	3.22	3.25	2.98	1.18	6.61	NM	5.06	---
M-11A	0.00	0.00	---	0.00	Trace	6.83	NM	1.73	1.69
M-12	---	---	---	3.67	0.00	12.47	NM	6.07	4.24
MW-15B	1.65	3.90	2.92	2.31	3.36	3.71	3.46	4.01	NM
MW-16B	5.85	4.34	4.44	0.50	4.74	5.47	5.69	3.89	4.33
GM-1B	2.89	2.96	2.85	3.37	2.78**	2.80	2.48	---	---
GM-2B	2.81	2.72	2.64	2.54	2.44	2.30	2.11	2.40	1.88
GM-3B	5.57	5.41	5.30	4.93	5.09	4.72	2.97	5.54	3.80
GM-4B	7.03	6.64	6.57	6.36	6.30	6.14	6.06	6.39	5.55
GM-5B	2.21	1.67	1.84	1.99	1.88	1.82	1.89	2.24	2.15
GM-6B	8.18	8.09	7.90	9.00	7.46	7.70	7.61	7.66	4.31
GM-7B	2.45	2.03	1.94	2.20	1.65	1.54	1.62	1.97	1.32

NOTES:

--- = Data not available for this well.

** - The measurements for the GM-series wells for this *quarter* were collected on 6/20/94.

NM = Interface probe was not *functioning* properly when measuring this well.

AR303246

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	M-1		M-2		M-4A		M-5	M-6	M-7	M-8	M-10
Collection Date:	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/92	7/92	7/92	7/92
Volatile Organics (ug/l)											
Chloromethane	20 U	10 U	1000 U	500 U	10 U	10 U	10 U	10 U	500 U	10 U	1000 U
Bromomethane	20 U	10 U	1000 U	500 U	10 U	10 U	10 U	10 U	500 U	10 U	1000 U
Vinyl Chloride	20 UJ	10 U	1000 UJ	500 U	10 U	10 U	10 UJ	10 U	500 UJ	10 U	1000 UJ
Chloroethane	20 U	10 U	1000 U	500 U	10 U	10 U	10 U	10 U	500 U	10 U	1000 U
Methylene Chloride	12 JB	16 B	980 J	3,100 B	10 U	14 B	2.8 JB	10 U	460 BJ	6.8 BJ	980 J
Acetone	100 U	10 U	5000 U	590 B	50 U	7 BJ	50 U	50 U	2500 U	50 U	5000 U
Carbon Disulfide	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
1,1-Dichloroethene	10 UJ	10 U	500 UJ	500 U	5.0 U	10 U	5.0 UJ	5.0 U	250 U	5.0 U	500 UJ
1,1-Dichloroethane	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 UJ	250 UJ	5.0 UJ	500 U
1,2-Dichloroethene (total)	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
Chloroform	10 UJ	10 U	500 UJ	500 U	5.0 U	10 U	5.0 UJ	5.0 U	250 UJ	5.0 U	500 UJ
1,2-Dichloroethane	10 UJ	10 U	500 UJ	500 U	5.0 U	10 U	5.0 UJ	5.0 U	250 UJ	5.0 U	500 UJ
2-Butanone	100 U	10 U	5000 U	500 U	50 U	10 U	50 U	50 U	2500 U	50 U	5000 U
1,1,1-Trichloroethane	10 UJ	10 U	500 UJ	500 U	5.0 U	10 U	5.0 UJ	5.0 U	250 U	5.0 U	500 UJ
Carbon Tetrachloride	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
Bromodichloromethane	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
1,2-Dichloropropane	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
cis-1,3-Dichloropropene	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
Trichloroethene	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
Dibromochloromethane	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
1,1,2-Trichloroethane	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
Benzene	20 B	8 J	500 U	200 J	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	340 J
trans-1,3-Dichloropropene	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
Bromoform	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
4-Methyl-2-Pentanone	100 U	10 U	5000 U	500 U	50 U	10 U	50 U	50 U	2500 U	50 U	5000 U
2-Hexanone	100 R	10 U	5000 R	500 U	50 U	10 U	50 R	50 U	2500 R	50 U	5000 R
Tetrachloroethene	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
1,1,2,2-Tetrachloroethane	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
Toluene	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
Chlorobenzene	140	100	1300	5400	5.0 U	10 U	160	5.0 U	1600	5.0 U	2200
Ethylbenzene	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
Styrene	10 U	10 U	500 U	500 U	5.0 U	10 U	5.0 U	5.0 U	250 U	5.0 U	500 U
Xylenes (total)	10 UJ	10 U	500 UJ	500 U	5.0 UJ	10 U	5.0 UJ	5.0 UJ	250 UJ	5.0 UJ	500 UJ

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	M-1		M-2		M-4A		M-5	M-6	M-7	M-8	M-10
Collection Date:	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/92	7/92	7/92	7/92
Semivolatile Organics (ug/l)											
Phenol	2400 UJ	10 U	3200 UJ	10 U	2.6 BJ	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
bis(2-Chloroethyl) ether	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2-Chlorophenol	2400 UJ	10 U	3200 UJ	3 J	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
1,3-Dichlorobenzene	2400 R	78	3200 UJ	3 J	11 U	10 U	72 J	1000 U	1400 J	11 U	150,000 J
1,4-Dichlorobenzene	2400 R	49	3200 UJ	16	11 U	10 U	24 J	1000 U	2500 J	11 U	250,000 J
1,2-Dichlorobenzene	260 J	170 D	3200 UJ	10 U	11 U	10 U	4.9 J	1000 U	2200 UJ	11 U	570,000 UJ
2-Methylphenol	2400 UJ	2 J	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2,2'-oxybis-1-Chloropropane	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
4-Methylphenol	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
N-Nitroso-di-n-propylamine	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Hexachloroethane	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Nitrobenzene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Isophorone	2400 UJ	10 U	3200 UJ	3 J	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2-Nitrophenol	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2,4-Dimethylphenol	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
bis(2-Chloroethoxy) methane	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2,4-Dichlorophenol	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
1,2,4-Trichlorobenzene	8200 J	3700 D	3200 UJ	10 U	11 U	10 U	23 J	1000 U	1100 J	11 U	1,200,000 J
Naphthalene	2400 UJ	10 U	3200 UJ	3 J	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
4-Chloroaniline	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Hexachlorobutadiene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
4-Chloro-3-methylphenol	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2-Methylnaphthalene	2400 UJ	10 U	3200 UJ	6 J	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Hexachlorocyclopentadiene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2,4,6-Trichlorophenol	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2,4,5-Trichlorophenol	2400 UJ	25 U	3200 UJ	25 U	11 U	25 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2-Chloronaphthalene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2-Nitroaniline	5900 UJ	25 U	8000 UJ	25 U	27 U	25 U	31 UJ	2500 U	5400 UJ	27 U	1400000 UJ
Dimethylphthalate	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Acenaphthylene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2,6-Dinitrotoluene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
3-Nitroaniline	5900 UJ	25 U	8000 UJ	25 U	27 U	25 U	31 UJ	2500 U	5400 UJ	27 U	1400000 UJ
Acenaphthene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	M-1		M-2		M-4A		M-5	M-6	M-7	M-8	M-10
Collection Date:	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/92	7/92	7/92	7/92
2,4-Dinitrophenol	5900 UJ	25 U	8000 UJ	25 U	27 U	25 U	31 UJ	2500 U	5400 UJ	27 U	1400000 UJ
4-Nitrophenol	5900 UJ	25 U	8000 UJ	25 U	27 U	25 U	31 UJ	2500 U	5400 UJ	27 U	1400000 UJ
Dibenzofuran	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
2,4-Dinitrotoluene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Diethylphthalate	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
4-Chlorophenyl-phenylether	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Fluorene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
4-Nitroaniline	5900 UJ	25 U	8000 UJ	25 U	27 U	25 U	31 UJ	2500 U	5400 UJ	27 U	1400000 UJ
4,6-Dinitro-2-methylphenol	5900 UJ	25 U	8000 UJ	25 U	27 U	25 U	31 UJ	2500 U	5400 UJ	27 U	1400000 UJ
N-Nitrosodiphenylamine	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
4-Bromophenyl-phenylether	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Hexachlorobenzene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Pentachlorophenol	5900 UJ	25 U	8000 UJ	25 U	27 U	25 U	31 UJ	2500 U	5400 UJ	27 U	1400000 UJ
Phenanthrene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	380 J	11 U	570000 UJ
Anthracene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Carbazole	NA	10 U	NA	10 U	NA	10 U	NA	NA	NA	NA	NA
Di-n-butylphthalate	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Fluoranthene	2400 R	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	250 J	11 U	570000 UJ
Pyrene	2400 R	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	280 J	11 U	570000 UJ
Butylbenzylphthalate	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
3,3'-Dichlorobenzidine	5900 UJ	10 U	8000 UJ	10 U	27 U	10 U	31 UJ	2500 U	5400 UJ	11 U	1400000 UJ
Benzo(a)anthracene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Chrysene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
bis(2-Ethylhexyl) phthalate	2400 R	1 J	3200 UJ	3 J	10 J	10 U	12 UJ	1000 U	2200 UJ	6.0 J	570000 UJ
Di-n-octylphthalate	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Benzo(b)fluoranthene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Benzo(k)fluoranthene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Benzo(a)pyrene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Indeno(1,2,3-cd)pyrene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Dibenzo(a,h)anthracene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ
Benzo(g,h,i)perylene	2400 UJ	10 U	3200 UJ	10 U	11 U	10 U	12 UJ	1000 U	2200 UJ	11 U	570000 UJ

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	M-1		M-2		M-4A		M-5	M-6	M-7	M-8	M-10
Collection Date:	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/92	7/92	7/92	7/92
PCBs (ug/l)											
Aroclor-1016	NA	1 U	NA	100 U	NA	1 U	NA	NA	NA	NA	NA
Aroclor-1221	NA	2 U	NA	200 U	NA	2 U	NA	NA	NA	NA	NA
Aroclor-1232	NA	1 U	NA	100 U	NA	1 U	NA	NA	NA	NA	NA
Aroclor-1242	10,000 U	1.6	10,000 U	100 U	10 U	1 U	10 U	10 U	10,000 U	1.0 U	150,000 U
Aroclor-1248	10,000 U	1U	10,000 U	100 U	10 U	1 U	10 U	10 U	350,000	1.0 U	6,900,000
Aroclor-1254	7800 B	1.9	10,000 U	100 U	10 U	1 U	25 B	10 U	59,000	0.88 J	6,500,000
Aroclor-1260	10,000 U	1 U	68,000	230	10 U	1 U	10 U	10 U	46,000	1.0 U	150,000 U
Dioxins/Furans (ng/l) (2)											
Total TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Equiv. 2378-TCDD (ng/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Miscellaneous (mg/l)											
Total Organic Carbon	NA	19.6	NA	25.1	NA	5.5	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons	1.0 U	NA	1800	NA	2.2	NA	1.0 U	7.7	6200	1.0 U	33,000

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	M-11A	M-12	M-13	M-14	M-15	M-16		M-17		M-18		N-1
Collection Date:	7/92	7/92	7/92	7/92	7/92	7/92	7/99	7/92	7/99	7/92	7/99	7/92
Volatile Organics (ug/l)												
Chloromethane	100U/100U	10 U	10 U	10U/10U	50 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	100U/100U	10 U	10 U	10U/10U	50 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	100UJ/100UJ	10 UJ	10 UJ	10U/10U	50 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U
Chloroethane	100U/100U	10 U	10 U	10U/10U	50 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	120/110	4.7 J	4.2 BJ	10U/10U	51	10 U	12 B	3.7 BJ	13 B	5.9 BJ	15 B	37 B
Acetone	500U/500U	50 U	50 U	50U/50U	250 U	50 U	10 U	50 U	10 U	50 U	9 BJ	6.3 J
Carbon Disulfide	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
1,1-Dichloroethene	50UJ/50UJ	5.0 UJ	5.0 UJ	10.0U/10.0U	25 UJ	5.0 U	10 U	5.0 UJ	10 U	5.0 U	10 U	5.0
1,1-Dichloroethane	50U/50U	5.0 U	5.0 U	5.0UJ/5.0UJ	25 U	5.0 UJ	10 U	5.0 U	10 U	5.0 UJ	10 U	5.0 U
1,2-Dichloroethene (total)	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	9.0	10 U	5.0 U	10 U	5.0 U
Chloroform	50UJ/50UJ	5.0 UJ	5.0 UJ	5.0U/5.0U	25 UJ	5.0 U	10 U	5.0 UJ	10 U	5.0 U	10 U	5.0 U
1,2-Dichloroethane	50UJ/50UJ	5.0 UJ	5.0 UJ	5.0U/5.0U	25 UJ	5.0 U	10 U	5.0 UJ	10 U	5.0 U	10 U	5.0 U
2-Butanone	500U/500U	50 U	50 U	50U/50U	250 U	50 U	10 U	50 U	10 U	50 U	2 B	50 U
1,1,1-Trichloroethane	50UJ/50UJ	5.0 UJ	5.0 UJ	10.0U/10.0U	25 UJ	5.0 U	10 U	5.0 UJ	10 U	5.0 U	10 U	98
Carbon Tetrachloride	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
Bromodichloromethane	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
1,2-Dichloropropane	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
cis-1,3-Dichloropropene	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
Trichloroethene	50U/50U	5.0 U	5.0 U	10.0U/10.0U	25 U	6.6	2 J	250	51 J	5.0 U	10 U	10 U
Dibromochloromethane	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
1,1,2-Trichloroethane	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
Benzene	94/110	5.0 U	5.0 U	10.0U/10.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	10 U
trans-1,3-Dichloropropene	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
Bromoform	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
4-Methyl-2-Pentanone	500U/500U	50 U	50 U	50U/50U	250 U	50 U	10 U	50 U	10 U	50 U	10 U	50 U
2-Hexanone	500R/500R	50 R	50 R	50R/50R	250 R	50 U	10 U	50 R	10 U	50 U	10 U	50 U
Tetrachloroethene	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	25	9 J	5.0 U	10 U	5.0 U
1,1,2,2-Tetrachloroethane	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
Toluene	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
Chlorobenzene	1400/770	33	45	10.0U/10.0U	63	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	10 U
Ethylbenzene	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
Styrene	50U/50U	5.0 U	5.0 U	5.0U/5.0U	25 U	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	5.0 U
Xylenes (total)	50UJ/50UJ	5.0 UJ	5.0 UJ	5.0UJ/5.0UJ	25 UJ	5.0 UJ	10 U	5.0 UJ	10 U	5.0 UJ	10 U	5.0 UJ

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	M-11A	M-12	M-13	M-14	M-15	M-16		M-17		M-18		N-1
Collection Date:	7/92	7/92	7/92	7/92	7/92	7/92	7/99	7/92	7/99	7/92	7/99	7/92
Semivolatile Organics (ug/l)												
Phenol	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
bis(2-Chloroethyl) ether	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2-Chlorophenol	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
1,3-Dichlorobenzene	910 J/680J	10 J	41 UJ	11U/11U	390 J	11 U	10 U	43 UJ	10 U	10 U	10 U	220 R
1,4-Dichlorobenzene	1100 J/830J	10 J	41 UJ	11U/11U	150 J	11 U	10 U	43 UJ	10 U	10 U	10 U	220 R
1,2-Dichlorobenzene	270 J/130 J	42 UJ	41 UJ	11U/11U	150 J	11 U	10 U	43 UJ	10 U	10 U	10 U	220 R
2-Methylphenol	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2,2'-oxybis-1-Chloropropane	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
4-Methylphenol	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
N-Nitroso-di-n-propylamine	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Hexachloroethane	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Nitrobenzene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Isophorone	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2-Nitrophenol	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2,4-Dimethylphenol	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
bis(2-Chloroethoxy) methane	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2,4-Dichlorophenol	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
1,2,4-Trichlorobenzene	5200J/1700J	25 J	41 UJ	11U/11U	3600	11 U	10 U	71	10 U	10 U	10 U	220 R
Naphthalene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
4-Chloroaniline	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Hexachlorobutadiene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
4-Chloro-3-methylphenol	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2-Methylnaphthalene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Hexachlorocyclopentadiene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2,4,6-Trichlorophenol	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2,4,5-Trichlorophenol	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	25 U	43 UJ	25 U	10 U	25 U	220 U
2-Chloronaphthalene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2-Nitroaniline	5300UJ/1300UJ	110 UJ	100 UJ	27U/110U	3200 UJ	28 U	25 U	110 UJ	25 U	25 U	25 U	560 U
Dimethylphthalate	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Acenaphthylene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2,6-Dinitrotoluene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
3-Nitroaniline	5300UJ/1300UJ	110 UJ	100 UJ	27U/110U	3200 UJ	28 U	25 U	110 UJ	25 U	25 U	25 U	560 U
Acenaphthene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	M-11A	M-12	M-13	M-14	M-15	M-16		M-17		M-18		N-1
Collection Date:	7/92	7/92	7/92	7/92	7/92	7/92	7/99	7/92	7/99	7/92	7/99	7/92
2,4-Dinitrophenol	5300UJ/1300UJ	110 UJ	100 UJ	27U/110U	3200 UJ	28 U	25 U	110 UJ	25 U	25 U	25 U	560 U
4-Nitrophenol	5300UJ/1300UJ	110 UJ	100 UJ	27U/110U	3200 UJ	28 U	25 U	110 UJ	25 U	25 U	25 U	560 U
Dibenzofuran	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
2,4-Dinitrotoluene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Diethylphthalate	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
4-Chlorophenyl-phenylether	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Fluorene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
4-Nitroaniline	5300UJ/1300UJ	110 UJ	100 UJ	27U/110U	3200 UJ	28 U	25 U	110 UJ	25 U	25 U	25 U	560 U
4,6-Dinitro-2-methylphenol	5300UJ/1300UJ	110 UJ	100 UJ	27U/110U	3200 UJ	28 U	25 U	110 UJ	25 U	25 U	25 U	560 U
N-Nitrosodiphenylamine	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
4-Bromophenyl-phenylether	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Hexachlorobenzene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Pentachlorophenol	5300UJ/1300UJ	110 UJ	100 UJ	27U/110U	3200 UJ	28 U	25 U	110 UJ	25 U	25 U	25 U	560 U
Phenanthrene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Anthracene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Carbazole	NA	NA	NA	NA	NA	NA	10 U	NA	10 U	NA	10 U	NA
Di-n-butylphthalate	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Fluoranthene	2100UJ/530UJ	42 UJ	41 UJ	11U/11U	1300 R	11 U	10 U	43 UJ	10 U	10 U	10 U	15 J
Pyrene	2100UJ/530UJ	42 UJ	41 UJ	11U/11U	1300 R	11 U	10 U	43 UJ	10 U	10 U	10 U	13 J
Butylbenzylphthalate	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
3,3'-Dichlorobenzidine	5300UJ/1300UJ	110 UJ	100 UJ	27U/110U	3200 UJ	28 U	10 U	110 UJ	10 U	10 U	10 U	220 U
Benzo(a)anthracene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Chrysene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
bis(2-Ethylhexyl) phthalate	2100UJ/530UJ	42 UJ	41 UJ	11U/11U	1300 R	11 U	10 U	43 UJ	10 U	10 U	10 U	220 R
Di-n-octylphthalate	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Benzo(b)fluoranthene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Benzo(k)fluoranthene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Benzo(a)pyrene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Indeno(1,2,3-cd)pyrene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Dibenzo(a,h)anthracene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U
Benzo(g,h,i)perylene	2100UJ/530UJ	42 UJ	41 UJ	11U/46U	1300 UJ	11 U	10 U	43 UJ	10 U	10 U	10 U	220 U

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	M-11A	M-12	M-13	M-14	M-15	M-16		M-17		M-18		N-1
Collection Date:	7/92	7/92	7/92	7/92	7/92	7/92	7/99	7/92	7/99	7/92	7/99	7/92
PCBs (ug/l)												
Aroclor-1016	NA	NA	NA	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	2 U	NA	2 U	NA	2 U	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	1 U	NA	1 U	NA	1 U	NA
Aroclor-1242	10,000U/10,000U	100 U	1.0 R	5.655/11 U	10,000 U	1.1 U	1 U	1000 U	1 U	10 U	1 U	1.0 U
Aroclor-1248	13,000/11,000 J	150	1.0 R	10 U/10 U	10,000 U	1.1 U	1 U	1000 U	1 U	10 U	1 U	1.0 U
Aroclor-1254	14,000/10,000U	130	1.0 R	4.6/11 U	7900 B	0.59 J	1 U	590 B	2.6	10 U	1 U	0.77 J
Aroclor-1260	16,000/13,000	100 U	5.6	10 U/10 U	10,000 U	1.1 U	1 U	1000 U	1 U	10 U	1 U	1.0 U
Dioxins/Furans (ng/l) (2)			8/94									
Total TCDD	NA	NA	0.0070	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDD	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDD	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDD	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDD	NA	NA	0.073B	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total TCDF	NA	NA	0.0200	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PeCDF	NA	NA	0.0450	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HxCDF	NA	NA	0.1000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total HpCDF	NA	NA	0.2700	NA	NA	NA	NA	NA	NA	NA	NA	NA
OCDF	NA	NA	0.5600	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Equiv. 2378-TCDD (ng/l)	NA	NA	0.0095	NA	NA	NA	NA	NA	NA	NA	NA	NA
Miscellaneous (mg/l)												
Total Organic Carbon	NA	NA	NA	NA	NA	NA	3.1	NA	3.8	NA	3.0	NA
Total Petroleum Hydrocarbons	20U/5.7	1.0 U	1.0 U	2.7/18	1.0 U	1.0 U	NA	1.0 U	NA	9.8	NA	24

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	N-2A	N-3A/N-3AR		N-5		N-7A/N-7AR				S-1A		S-2A	
Collection Date:	7/92	7/92	7/99	7/92	7/99	7/92	8/94	12/94	7/99	7/92	7/99	7/92	7/99
Volatile Organics (ug/l)													
Chloromethane	10 UJ	10 U	10 U	10 U	10 U	10 U	NA	NA	10 U	10 U	10 U	10 U	10U / 10U
Bromomethane	10 UJ	10 U	10 U	10 U	10 U	10 U	NA	NA	10 U	10 U	10 U	10 U	10U / 10U
Vinyl Chloride	10 UJ	10 U	10 U	10 U	10 U	10 U	NA	NA	10 U	10 U	10 U	10 U	10U / 10U
Chloroethane	10 UJ	10 U	10 U	10 U	10 U	10 U	NA	NA	10 U	10 U	10 U	10 U	10U / 10U
Methylene Chloride	4.0 BJ	14 B	14 B	10 B	28 B	13 B	NA	NA	15 B	10 U	21 B	10 U	7BJ / 5BJ
Acetone	50 UJ	50 U	8 BJ	50 U	9 BJ	50 U	NA	NA	10 B	50 U	13 B	50 U	6BJ / 7BJ
Carbon Disulfide	5.0 UJ	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
1,1-Dichloroethene	5.0 UJ	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
1,1-Dichloroethane	5.0 UJ	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 UJ	10 U	5.0 UJ	10U / 10U
1,2-Dichloroethene (total)	5.0 UJ	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	2J / 1J
Chloroform	5.0 UJ	10	2 J	5.0 U	10 U	5.0 U	NA	NA	40	5.0 U	10 U	5.0 U	10U / 10U
1,2-Dichloroethane	5.0 UJ	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
2-Butanone	50 UJ	50 U	3 B	50 U	10 U	50 U	NA	NA	3 B	50 U	10 U	50 U	10U / 3BJ
1,1,1-Trichloroethane	5.0 UJ	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Carbon Tetrachloride	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Bromodichloromethane	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	4 J	5.0 U	10 U	5.0 U	10U / 10U
1,2-Dichloropropane	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
cis-1,3-Dichloropropene	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Trichloroethene	5.0 U	5.0 U	2 J	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Dibromochloromethane	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
1,1,2-Trichloroethane	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Benzene	5.0 U	2.0 J	10 U	5.0 U	10 U	4.0 J	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
trans-1,3-Dichloropropene	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Bromoform	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
4-Methyl-2-Pentanone	50 U	50 U	10 U	50 U	10 U	50 U	NA	NA	10 U	50 U	10 U	50 U	10U / 10U
2-Hexanone	50 R	50 U	10 U	50 U	10 U	50 U	NA	NA	10 U	50 U	10 U	50 U	10U / 10U
Tetrachloroethene	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
1,1,2,2-Tetrachloroethane	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Toluene	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Chlorobenzene	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Ethylbenzene	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Styrene	5.0 U	5.0 U	10 U	5.0 U	10 U	5.0 U	NA	NA	10 U	5.0 U	10 U	5.0 U	10U / 10U
Xylenes (total)	5.0 UJ	5.0 UJ	10 U	5.0 UJ	10 U	5.0 UJ	NA	NA	10 U	5.0 UJ	10 U	5.0 UJ	10U / 10U

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	N-2A	N-3A/N-3AR		N-5		N-7A/N-7AR				S-1A		S-2A	
Collection Date:	7/92	7/92	7/99	7/92	7/99	7/92	8/94	12/94	7/99	7/92	7/99	7/92	7/99
Semivolatile Organics (ug/l)													
Phenol	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
bis(2-Chloroethyl) ether	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2-Chlorophenol	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
1,3-Dichlorobenzene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	2J / 2J
1,4-Dichlorobenzene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
1,2-Dichlorobenzene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2-Methylphenol	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2,2'-oxybis-1-Chloropropane	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
4-Methylphenol	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
N-Nitroso-di-n-propylamine	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Hexachloroethane	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Nitrobenzene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Isophorone	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2-Nitrophenol	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2,4-Dimethylphenol	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
bis(2-Chloroethoxy) methane	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2,4-Dichlorophenol	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
1,2,4-Trichlorobenzene	12 UJ	11 U	10 U	10 U	10 U	1.3 J	NA	NA	10 U	12 U	10 U	10 U	3J / 2J
Naphthalene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
4-Chloroaniline	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Hexachlorobutadiene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
4-Chloro-3-methylphenol	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2-Methylnaphthalene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Hexachlorocyclopentadiene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2,4,6-Trichlorophenol	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2,4,5-Trichlorophenol	12 UJ	11 U	25 U	10 U	25 U	10 U	NA	NA	25 U	12 U	25 U	10 U	25U / 25U
2-Chloronaphthalene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2-Nitroaniline	29 UJ	28 U	25 U	26 U	25 U	26 U	NA	NA	25 U	30 U	25 U	25 U	25U / 25U
Dimethylphthalate	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Acenaphthylene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2,6-Dinitrotoluene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
3-Nitroaniline	29 UJ	28 U	25 U	26 U	25 U	26 U	NA	NA	25 U	30 U	25 U	25 U	25U / 25U
Acenaphthene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	N-2A	N-3A/N-3AR		N-5		N-7A/N-7AR				S-1A		S-2A	
Collection Date:	7/92	7/92	7/99	7/92	7/99	7/92	8/94	12/94	7/99	7/92	7/99	7/92	7/99
2,4-Dinitrophenol	29 UJ	28 U	25 U	26 U	25 U	26 U	NA	NA	25 U	30 U	25 U	25 U	25U / 25U
4-Nitrophenol	29 UJ	28 U	25 U	26 U	25 U	26 U	NA	NA	25 U	30 U	25 U	25 U	25U / 25U
Dibenzofuran	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
2,4-Dinitrotoluene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Diethylphthalate	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
4-Chlorophenyl-phenylether	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Fluorene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
4-Nitroaniline	29 UJ	28 U	25 U	26 U	25 U	26 U	NA	NA	25 U	30 U	25 U	25 U	25U / 25U
4,6-Dinitro-2-methylphenol	29 UJ	28 U	25 U	26 U	25 U	26 U	NA	NA	25 U	30 U	25 U	25 U	25U / 25U
N-Nitrosodiphenylamine	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
4-Bromophenyl-phenylether	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Hexachlorobenzene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Pentachlorophenol	29 UJ	28 U	25 U	26 U	25 U	26 U	NA	NA	25 U	30 U	25 U	25 U	25U / 25U
Phenanthrene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Anthracene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Carbazole	NA	NA	10 U	NA	10 U	NA	NA	NA	10 U	NA	10 U	NA	10U / 10U
Di-n-butylphthalate	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Fluoranthene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Pyrene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Butylbenzylphthalate	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
3,3'-Dichlorobenzidine	29 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	25 U	10U / 10U
Benzo(a)anthracene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Chrysene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
bis(2-Ethylhexyl) phthalate	12 UJ	11 U	10 U	3.4 J	10 U	10 U	NA	NA	10 U	12 U	5 J	1.4 J	10U / 2BJ
Di-n-octylphthalate	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Benzo(b)fluoranthene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Benzo(k)fluoranthene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Benzo(a)pyrene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Indeno(1,2,3-cd)pyrene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Dibenzo(a,h)anthracene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U
Benzo(g,h,i)perylene	12 UJ	11 U	10 U	10 U	10 U	10 U	NA	NA	10 U	12 U	10 U	10 U	10U / 10U

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	N-2A	N-3A/N-3AR		N-5		N-7A/N-7AR				S-1A		S-2A	
Collection Date:	7/92	7/92	7/99	7/92	7/99	7/92	8/94	12/94	7/99	7/92	7/99	7/92	7/99
PCBs (ug/l)													
Aroclor-1016	NA	NA	1 U	NA	1 U	NA	1.0 UJ	1.0 U	1 U	NA	1 U	NA	1U / 1U
Aroclor-1221	NA	NA	2 U	NA	2 U	NA	2.0 UJ	2.0 U	2 U	NA	2 U	NA	2U / 2U
Aroclor-1232	NA	NA	1 U	NA	1 U	NA	1.0 UJ	1.0 U	1 U	NA	1 U	NA	1U / 1U
Aroclor-1242	1.0 U	1.0 U	1 U	1.0 U	1 U	1.0 U	3.1 J	1.0 U	1 U	1.0 U	1 U	1.1 U	1U / 1U
Aroclor-1248	1.5	1.0 U	1 U	1.0 U	1 U	1.0 U	1.0 UJ	1.0 U	1 U	1.0 U	1 U	1.1 U	1U / 1U
Aroclor-1254	1.8 B	0.58 J	1 U	1.0 U	1 U	94	4.6 J	2.5	1 U	1.0 U	1 U	1.1 U	1U / 1U
Aroclor-1260	1.4	1.0 U	1 U	1.0 U	1 U	1.0 U	1.0 UJ	1.0 U	1 U	1.0 U	1 U	0.79 J	1U / 1U
Dioxins/Furans (ng/l) [(2)]	8/94	8/94						12/94				12/94	
Total TCDD	ND / ND	ND	NA	NA	NA	NA	NA	0.0087	NA	NA	NA	0.0015	NA
Total PeCDD	ND / ND	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA	ND	NA
Total HxCDD	ND / ND	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA	ND	NA
Total HpCDD	ND / ND	0.0240	NA	NA	NA	NA	NA	0.0073	NA	NA	NA	0.0066	NA
OCDD	0.0400B / 0.0290B	0.0920	NA	NA	NA	NA	NA	0.033B	NA	NA	NA	0.022B	NA
Total TCDF	0.0750 / ND	ND	NA	NA	NA	NA	NA	0.012	NA	NA	NA	0.0100	NA
Total PeCDF	ND / ND	ND	NA	NA	NA	NA	NA	0.016	NA	NA	NA	ND	NA
Total HxCDF	0.005 / 0.0028	ND	NA	NA	NA	NA	NA	0.036	NA	NA	NA	0.0100	NA
Total HpCDF	ND / ND	0.0029	NA	NA	NA	NA	NA	0.0059	NA	NA	NA	0.0022	NA
OCDF	0.0120U / 0.0052	0.0054	NA	NA	NA	NA	NA	0.012U	NA	NA	NA	0.0028	NA
Total Equiv. 2378-TCDD (ng/l)	0.0005 / 0.0003	0.0003	NA	NA	NA	NA	NA	0.0023	NA	NA	NA	0.0006	NA
Miscellaneous (mg/l)													
Total Organic Carbon	NA	NA	2.9	NA	2.7	NA	NA	NA	3.2	NA	24.1	NA	5.2 / 5.1
Total Petroleum Hydrocarbons	1.0 U	1.0 U	NA	1.0 U	NA	1.0 U	NA	NA	NA	1.0 U	NA	1.4	NA

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TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	**S-3**	**S-4**	**S-5**	**S-6**		**S-7**	**S-8A**		**S-9**	**S-10**	**S-11**	**S-12R**	**S-13**
Collection Date:	7/92	7/92	7/92	7/92	7/99	7/92	7/92	7/99	7/92	7/92	7/92	7/92	7/92
Volatile Organics (ug/l)													
Chloromethane	10 U/10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	10 U	20 U	NA
Bromomethane	10 U/10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	10 U	20 U	NA
Vinyl Chloride	10 U/10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	10 U	20 U	NA
Chloroethane	10 U/10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 U	10 U	20 U	NA
Methylene Chloride	6.8 JB/7.5 JB	10 U	7.3 BJ	6.0 BJ	17 B	7.0 BJ	10 U	43 B	10 U	50 U	21 B	20 U	NA
Acetone	50 U/50 U	12 J	50 U	50 U	10 B	50 U	50 U	22 B	50 U	250 U	50 U	100 U	NA
Carbon Disulfide	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
1,1-Dichloroethene	5.0 U/5.0 U	5.0 UJ	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	50 U	5.0 U	20 U	50 U
1,1-Dichloroethane	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 UJ	10 U	5.0 UJ	25 UJ	5.0 U	10 UJ	50 U
1,2-Dichloroethene (total)	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	3300 E	5.0 U	10 U	NA
Chloroform	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
1,2-Dichloroethane	5.0 U/5.0 U	5.0 UJ	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
2-Butanone	50 U/50 U	50 U	50 U	50 U	2 B	50 U	50 U	4 B	50 U	250 U	50 U	100 U	50 U
1,1,1-Trichloroethane	5.0 U/5.0 U	5.0 UJ	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	20 U	50 U
Carbon Tetrachloride	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
Bromodichloromethane	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
1,2-Dichloropropane	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
cis-1,3-Dichloropropene	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
Trichloroethene	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	50 U	5.0 U	20 U	50 U
Dibromochloromethane	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
1,1,2-Trichloroethane	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
Benzene	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	46 BJ	5.0 U	16 B	13 BJ
trans-1,3-Dichloropropene	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
Bromoform	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
4-Methyl-2-Pentanone	50 U/50 U	50 U	50 U	50 U	10 U	50 U	50 U	10 U	50 U	250 U	50 U	100 U	NA
2-Hexanone	50 U/50 U	50 R	50 U	50 U	10 U	50 U	50 U	10 U	50 U	250 U	50 U	100 U	NA
Tetrachloroethene	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
1,1,2,2-Tetrachloroethane	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
Toluene	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	50 U
Chlorobenzene	5.0 U/5.0 U	5.0 U	17	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	230	5.0 U	130 J	720
Ethylbenzene	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
Styrene	5.0 U/5.0 U	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	10 U	5.0 U	25 U	5.0 U	10 U	NA
Xylenes (total)	5.0 UJ/5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ	10 U	5.0 UJ	5.0 UJ	10 U	5.0 UJ	25 UJ	5.0 UJ	10 UJ	50 U

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	S-3	S-4	S-5	S-6		S-7	S-8A		S-9	S-10	S-11	S-12R	S-13
Collection Date:	7/92	7/92	7/92	7/92	7/99	7/92	7/92	7/99	7/92	7/92	7/92	7/92	7/92
Semivolatile Organics (ug/l)													
Phenol	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	6.5 JB	10 UJ	11 U	2000 U	11 U
bis(2-Chloroethyl) ether	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2-Chlorophenol	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	22
1,3-Dichlorobenzene	22 U/21 UJ	5300 UJ	170	21 U	10 U	10 U	12 U	10 U	10 U	560	11 U	250	3.0 J
1,4-Dichlorobenzene	22 U/21 UJ	5300 UJ	45	21 U	10 U	10 U	12 U	10 U	10 U	450	11 U	120	20
1,2-Dichlorobenzene	22 U/21 UJ	5300 UJ	3.8 J	21 U	10 U	10 U	12 U	10 U	10 U	152	11 U	320 J	11 U
2-Methylphenol	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2,2'-oxybis-1-Chloropropane	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
4-Methylphenol	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
N-Nitroso-di-n-propylamine	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Hexachloroethane	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Nitrobenzene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Isophorone	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2-Nitrophenol	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2,4-Dimethylphenol	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
bis(2-Chloroethoxy) methane	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2,4-Dichlorophenol	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	12	11 U	2000 U	1.1 J
1,2,4-Trichlorobenzene	4.7 J/4.7 J	5300 UJ	140	21 U	10 U	10 U	12 U	10 U	10 U	75 J	11 U	4900	11 U
Naphthalene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
4-Chloroaniline	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Hexachlorobutadiene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
4-Chloro-3-methylphenol	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2-Methylnaphthalene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Hexachlorocyclopentadiene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2,4,6-Trichlorophenol	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2,4,5-Trichlorophenol	22 U/21 UJ	5300 UJ	22 U	21 U	25 U	10 U	12 U	25 U	10 U	10 UJ	11 U	2000 U	11 U
2-Chloronaphthalene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2-Nitroaniline	56 U/53 UJ	13000 UJ	56 U	53 U	25 U	25 U	30 U	25 U	25 U	26 UJ	29 U	5100 U	27 U
Dimethylphthalate	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Acenaphthylene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2,6-Dinitrotoluene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
3-Nitroaniline	56 U/53 UJ	13000 UJ	56 U	53 U	25 U	25 U	30 U	25 U	25 U	26 UJ	29 U	5100 U	27 U
Acenaphthene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	S-3	S-4	S-5	S-6		S-7	S-8A		S-9	S-10	S-11	S-12R	S-13
Collection Date:	7/92	7/92	7/92	7/92	7/99	7/92	7/92	7/99	7/92	7/92	7/92	7/92	7/92
2,4-Dinitrophenol	56 U/53 UJ	13000 UJ	56 U	53 U	25 U	25 U	30 U	25 U	25 U	26 UJ	29 U	5100 U	27 U
4-Nitrophenol	56 U/53 UJ	13000 UJ	56 U	53 U	25 U	25 U	30 U	25 U	25 U	26 UJ	29 U	5100 U	27 U
Dibenzofuran	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
2,4-Dinitrotoluene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Diethylphthalate	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
4-Chlorophenyl-phenylether	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Fluorene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
4-Nitroaniline	56 U/53 UJ	13000 UJ	56 U	53 U	25 U	25 U	30 U	25 U	25 U	26 UJ	29 U	5100 U	27 U
4,6-Dinitro-2-methylphenol	56 U/53 UJ	13000 UJ	56 U	53 U	25 U	25 U	30 U	25 U	25 U	26 UJ	29 U	5100 U	27 U
N-Nitrosodiphenylamine	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
4-Bromophenyl-phenylether	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Hexachlorobenzene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Pentachlorophenol	56 U/53 UJ	13000 UJ	56 U	53 U	25 U	25 U	30 U	25 U	25 U	26 UJ	29 U	5100 U	27 U
Phenanthrene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Anthracene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Carbazole	NA/NA	NA	NA	NA	10 U	NA	NA	10 U	NA	NA	NA	NA	NA
Di-n-butylphthalate	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	1 J	10 U	10 UJ	11 U	2000 U	11 U
Fluoranthene	4.3 J/4.2 J	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 R	11 U
Pyrene	4.2 J/4.1 J	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 R	11 U
Butylbenzylphthalate	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
3,3'-Dichlorobenzidine	22 U/21 UJ	13000 UJ	22 U	21 U	10 U	10 U	30 U	10 U	25 U	26 UJ	11 U	5100 U	27 U
Benzo(a)anthracene	2.2 J/2.4 J	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Chrysene	3.3 J/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
bis(2-Ethylhexyl) phthalate	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 R	11 U
Di-n-octylphthalate	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Benzo(b)fluoranthene	4.6 J/4.9 J	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Benzo(k)fluoranthene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Benzo(a)pyrene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Indeno(1,2,3-cd)pyrene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Dibenzo(a,h)anthracene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U
Benzo(g,h,i)perylene	22 U/21 UJ	5300 UJ	22 U	21 U	10 U	10 U	12 U	10 U	10 U	10 UJ	11 U	2000 U	11 U

TABLE 5-4

ORGANICS IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	S-3	S-4	S-5	S-6		S-7	S-8A		S-9	S-10	S-11	S-12R	S-13
Collection Date:	7/92	7/92	7/92	7/92	7/99	7/92	7/92	7/99	7/92	7/92	7/92	7/92	7/92
PCBs (ug/l)													
Aroclor-1016	NA	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	2 U	NA	NA	2 U	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	NA	NA	NA
Aroclor-1242	10 U/1.0 U	100 U	1.0 U	10 U	1 U	1.0 U	1.0 U	1 U	1.0 U	10 U	1.0 U	1.0 U	1.0 U
Aroclor-1248	10 U/1.0 U	100 U	1.0 U	10 U	1 U	11	1.0 U	1 U	1.0 U	10 U	1.4	1.0 U	1.0 U
Aroclor-1254	10 U/1.0 U	100 U	1.0 U	10 U	1 U	1.0 U	1.4	1 U	1.0 U	14	3.1	150	1.0 U
Aroclor-1260	39/4.7	86 J	8	96	1 U	7	1.0 U	1 U	15	10 U	1.0 U	1.0 U	1.0 U
Dioxins/Furans (ng/l) (2)				<u>8/94</u>			<u>12/94</u>			<u>8/94</u>			
Total TCDD	NA	NA	NA	0.0190	NA	NA	ND	NA	NA	ND	NA	NA	NA
Total PeCDD	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA	NA
Total HxCDD	NA	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA	NA
Total HpCDD	NA	NA	NA	0.0160	NA	NA	ND	NA	NA	0.1500	NA	NA	NA
OCDD	NA	NA	NA	0.043B	NA	NA	0.018B	NA	NA	0.7700	NA	NA	NA
Total TCDF	NA	NA	NA	5.3000	NA	NA	ND	NA	NA	0.1700	NA	NA	NA
Total PeCDF	NA	NA	NA	7.7000	NA	NA	ND	NA	NA	0.2500	NA	NA	NA
Total HxCDF	NA	NA	NA	2.1000	NA	NA	ND	NA	NA	0.1300	NA	NA	NA
Total HpCDF	NA	NA	NA	0.1100	NA	NA	ND	NA	NA	0.1100	NA	NA	NA
OCDF	NA	NA	NA	0.0280	NA	NA	0.0081U	NA	NA	0.0850	NA	NA	NA
Total Equiv. 2378-TCDD (ng/l)	NA	NA	NA	0.1800	NA	NA	0.0000	NA	NA	0.0150	NA	NA	NA
Miscellaneous (mg/l)													
Total Organic Carbon	NA	NA	NA	NA	6.2	NA	NA	6.3	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons	1.0 U/1.0 U	3300	1.0 U	1.2	NA	1.0 U	1.0 U	NA	1.0 U	1.0 U	4.6	1.0 U	1.0 U

<u>Notes:</u>

1. Data qualifiers/symbols are as follows:
   - NA Sample was not analyzed for this compound.
   - B Concentration in sample is less than 5x or 10x the result in an associated blank sample.
   - J Estimated value.
   - U Compound was not detected at the given quantitation limit.
   - E Reported value exceeds calibration range.
   - x/x A duplicate sample was collected at this location.

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	OS-1A		*OS-1B*		OS-2A		*OS-2B*		OS-3A		*OS-3B*	
Sample Date:	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99
Volatile Organics (ug/l)												
1,1,1-Trichloroethane	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	20 UJ	10 U	10 UJ	10 U	50 U	20 U	10 U	20 U	10 UJ	10 U	10 UJ	10 U
1,1-Dichloroethene	20 UJ	10 U	10 UJ	10 U	50 U	20 U	2 J	20 U	10 UJ	10 U	10 U	10 U
1,2-Dichloroethane	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	100	180	10 U	10 U	500	190	560	120	10 U	10 U	10 U	10 U
1,2-Dichloropropane	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
2-Butanone	20 U	10 U	10 U	4 J	50 U	6 J	10 U	20 U	10 U	4 J	10 U	4 J
2-Hexanone	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 UJ	10 U
4-Methyl-2-Pentanone	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 UJ	10 U
Acetone	20 U	11 B	10 U	17 B	50 U	45 B	10 U	20 U	9 BJ	15 B	10 U	13 B
Benzene	20 U	2 J	10 U	10 U	50 U	5 J	3 BJ	20 U	2 J	2 J	5 BJ	4 J
Bromodichloromethane	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Bromoform	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Bromomethane	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Carbon Disulfide	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Carbon Tetrachloride	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Chlorobenzene	6 J	130	10 U	10 U	45 J	280	65	190	45	41	150	120
Chloroethane	20 U	2 J	10 U	10 U	50 U	9 J	8 J	20 U	10 U	10 U	10 U	10 U
Chloroform	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Chloromethane	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Dibromochloromethane	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Ethylbenzene	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Methylene Chloride	5 BJ	18 B	10 U	42 B	13 BJ	110 B	10 U	10 BJ	10 U	40 B	10 U	34 B
Styrene	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Tetrachloroethene	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Toluene	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U
Trichloroethene	170	10 U	10 U	10 U	56	5 J	68	20 U	10 U	10 U	10 U	10 U
Vinyl Chloride	20 U	43	10 U	10 U	50 U	61	15	18 J	10 U	10 U	10 U	10 U
Xylenes (total)	20 U	10 U	10 U	10 U	50 U	20 U	10 U	20 U	10 U	10 U	10 U	10 U

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	**OS-1A**		***OS-1B***		**OS-2A**		***OS-2B***		**OS-3A**		***OS-3B***	
Sample Date:	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99
Semivolatile Organics (ug/l)												
1,2,4-Trichlorobenzene	10 U	10 U	4 J	10 U	46	540 D	110	510 D	1000	770 D	3600	2800 D
1,2-Dichlorobenzene	10 U	13	10 U	10 U	31	61	42	58	55 J	48	240	160 DJ
1,3-Dichlorobenzene	10 U	71	10 U	10 U	180	510 D	240	470 D	36 J	38	260	140 DJ
1,4-Dichlorobenzene	10 U	21	10 U	10 U	27	140 D	50	140 D	22 J	22	150	60
2,2'-oxybis-1-Chloropropane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
2,4,5-Trichlorophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	500 U	25 U	130 U	25 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 UJ	10 U	10 U	2 J	10 U	2 J	200 U	10 U	50 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	500 U	25 U	130 U	25 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 J	200 U	10 U	50 U	2 J
2-Nitroaniline	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	500 U	25 U	130 U	25 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
3,3'-Dichlorobenzidine	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
3-Nitroaniline	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	500 U	25 U	130 U	25 U
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	500 U	25 U	130 U	25 U
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
4-Nitroaniline	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	500 U	25 U	130 U	25 U
4-Nitrophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	500 U	25 U	130 U	25 U
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	OS-1A		*OS-1B*		OS-2A		*OS-2B*		OS-3A		*OS-3B*	
Sample Date:	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
bis(2-Chloroethoxy) methane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
bis(2-Chloroethyl) ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
bis(2-Ethylhexyl) phthalate	10 U	2 J	10 U	3 J	10 U	1 J	10 U	4 J	200 U	10 U	50 U	1 J
Butylbenzylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Carbazole	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Dibenz(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Dimethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Hexachlorocyclopentadiene	10 UJ	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Nitrobenzene	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
N-Nitroso-di-n-propylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Pentachlorophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	500 U	25 U	130 U	25 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U
Phenol	10 U	10 U	10 U	10 U	10 U	10 U	3 J	10 U	200 U	10 U	50 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	200 U	10 U	50 U	10 U

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	**OS-1A**		***OS-1B***		**OS-2A**		***OS-2B***		**OS-3A**		***OS-3B***	
Sample Date:	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99
Pesticides/PCBs (ug/l)												
Aroclor-1016	1.0 U	1 U	1.0 U	R	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1221	2.0 U	2 U	2.0 U	R	2.0 U	2 U	2.0 U	2 U	2.0 U	2 U	2.0 U	2 U
Aroclor-1232	1.0 U	1 U	1.0 U	R	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1242	1.0 U	1 U	1.0 U	R	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1248	1.0 U	1 U	1.0 U	R	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1254	1.0 U	1 U	1.0 U	R	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1260	1.0 U	1 U	1.0 U	R	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U
Miscellaneous (mg/l)												
Total Organic Carbon	NA	6.7	NA	3.9	NA	7.5	NA	8.0	NA	6.0	NA	14.1
Total Petroleum Hydrocarbons	1.0 U	NA	1.0 U	NA	3.4 U	NA	1.0 U	NA	1.0 U	NA	1.0 U	NA

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	OS-4A		*OS-4B*		OS-5A	*OS-5B*	*OS-6A*	*OS-6B*	*OS-7A*	*OS-7B*	MW-3A/MW-3AR		*MW-3B*	
Sample Date:	7/92	7/99	7/92	7/99	7/92	7/92	8/99	8/99	7/99	7/99	7/92	7/99	7/92	7/99
Volatile Organics (ug/l)														
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
1,1-Dichloroethane	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 UJ	10 U
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 UJ	10 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	5 J	8 J	10 UJ	1 J	250 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
2-Butanone	10 U	2 BJ	10 U	10 U	10 U	10 U	10 U	7J / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
2-Hexanone	10 UJ	10 U	10 U	10 U	10 U	10 UJ	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
4-Methyl-2-Pentanone	10 UJ	10 U	10 U	10 U	10 U	10 UJ	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Acetone	10 U	10 U	10 U	6 BJ	10 U	10 UJ	10 U	60 / 33	7 BJ	4 BJ	10 U	14 B	250 UJ	12 B
Benzene	4 BJ	10 U	10 U	10 U	3 BJ	5 BJ	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Bromoform	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Chloroform	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Methylene Chloride	4 BJ	5 BJ	10 U	6 BJ	3 BJ	4 BJ	7 BJ	9BJ / 8BJ	6 BJ	5 BJ	10 U	31 B	250 U	20 B
Styrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	9 J
Toluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1J / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Trichloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10	25	10 UJ	10 U	5400 E	830 D
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U
Xylenes (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U / 10U	10 U	10 U	10 UJ	10 U	250 U	10 U

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	OS-4A		*OS-4B*		OS-5A	*OS-5B*	*OS-6A*	*OS-6B*	*OS-7A*	*OS-7B*	MW-3A/MW-3AR		*MW-3B*	
Sample Date:	7/92	7/99	7/92	7/99	7/92	7/92	8/99	8/99	7/99	7/99	7/92	7/99	7/92	7/99
Semivolatile Organics (ug/l)														
1,2,4-Trichlorobenzene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
2,2'-oxybis-1-Chloropropane	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25U / 25U	25 U	25 U	28 U	25 U	25 U	25 U
2,4,6-Trichlorophenol	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 UJ	10 U
2,4-Dimethylphenol	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
2,4-Dinitrophenol	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25U / 25U	25 U	25 U	28 U	25 U	25 U	25 U
2,4-Dinitrotoluene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
2-Chlorophenol	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
2-Methylphenol	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
2-Nitroaniline	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25U / 25U	25 U	25 U	28 U	25 U	25 U	25 U
2-Nitrophenol	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 UJ	10 U	10 UJ	10 U
3-Nitroaniline	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25U / 25U	25 U	25 U	28 U	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25U / 25U	25 U	25 U	28 U	25 U	25 U	25 U
4-Bromophenyl-phenylether	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
4-Chloroaniline	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
4-Methylphenol	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
4-Nitroaniline	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25U / 25U	25 U	25 U	28 U	25 U	25 U	25 U
4-Nitrophenol	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25U / 25U	25 U	25 U	28 U	25 U	25 U	25 U
Acenaphthene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Acenaphthylene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Anthracene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	OS-4A		*OS-4B*		OS-5A	*OS-5B*	*OS-6A*	*OS-6B*	*OS-7A*	*OS-7B*	MW-3A/MW-3AR		*MW-3B*	
Sample Date:	7/92	7/99	7/92	7/99	7/92	7/92	8/99	8/99	7/99	7/99	7/92	7/99	7/92	7/99
Benzo(a)anthracene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	R
Benzo(b)fluoranthene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	R
Benzo(g,h,i)perylene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	R
Benzo(k)fluoranthene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 UJ	R
bis(2-Chloroethoxy) methane	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
bis(2-Chloroethyl) ether	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
bis(2-Ethylhexyl) phthalate	10 U	3 BJ	10 U	10 U	10 U	10 U	20 U	1J / 10U	1 BJ	10 U	11 U	10 U	10 U	10 U
Butylbenzylphthalate	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Carbazole	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Chrysene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	R
Dibenzofuran	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Diethylphthalate	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Dimethylphthalate	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Di-n-butylphthalate	10 U	20 U	10 U	10 U	10 U	10 U	20 U	1J / 10U	1 J	10 U	11 U	10 U	10 U	10 U
Di-n-octylphthalate	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 UJ	10 U	10 U	R
Fluoranthene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Fluorene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 UJ	10 U
Hexachloroethane	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	R
Isophorone	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Naphthalene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Nitrobenzene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 UJ	10 U	10 UJ	10 U
N-Nitroso-di-n-propylamine	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Pentachlorophenol	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25U / 25U	25 U	25 U	28 UJ	25 U	25 U	25 U
Phenanthrene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Phenol	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U
Pyrene	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10U / 10U	10 U	10 U	11 U	10 U	10 U	10 U

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	OS-4A		*OS-4B*		OS-5A	*OS-5B*	*OS-6A*	*OS-6B*	*OS-7A*	*OS-7B*	MW-3A/MW-3AR		*MW-3B*	
Sample Date:	7/92	7/99	7/92	7/99	7/92	7/92	8/99	8/99	7/99	7/99	7/92	7/99	7/92	7/99
Pesticides/PCBs (ug/l)														
Aroclor-1016	1.0 U	2 U	1.0 U	1 U	1.0 U	1.0 U	2 U	1U / 1U	1 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1221	2.0 U	4 U	2.0 U	2 U	2.0 U	2.0 U	4 U	2U / 2U	2 U	2 U	2.0 U	2 U	2.0 U	2 U
Aroclor-1232	1.0 U	2 U	1.0 U	1 U	1.0 U	1.0 U	2 U	1U / 1U	1 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1242	1.0 U	2 U	1.0 U	1 U	1.0 U	1.0 U	2 U	1U / 1U	1 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1248	1.0 U	2 U	1.0 U	1 U	1.0 U	1.0 U	2 U	1U / 1U	1 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1254	1.0 U	2 U	1.0 U	1 U	0.38 J	1.0 U	2 U	1U / 1U	1 U	1 U	0.75 BJ	1 U	0.75	1 U
Aroclor-1260	1.0 U	2 U	1.0 U	1 U	1.0 U	1.0 U	2 U	1U / 1U	1 U	1 U	1.0 U	1 U	1.0 U	1 U
Miscellaneous (mg/l)														
Total Organic Carbon	NA	3.9	NA	6.3	NA	NA	6.4	6.6 / 6.3	3.8	2.9	NA	2.9	NA	3.0
Total Petroleum Hydrocarbons	1.0 U	NA	1.0 U	NA	3.3 U	1.0 U	NA	NA	NA	NA	1.0 U	NA	1.0 U	NA

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TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	MW-7		MW-14A	*MW-14B*	MW-15A	*MW-15B*	MW-16A	*MW-16B*	MW-17AR	PW-1
Sample Date:	7/92	12/94	7/92	7/92	7/92	7/92	7/92	7/92	12/94	7/92
Volatile Organics (ug/l)										
1,1,1-Trichloroethane	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
1,1,2,2-Tetrachloroethane	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
1,1,2-Trichloroethane	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
1,1-Dichloroethane	10 U	NA	10 UJ	10 UJ	10 UJ	20 UJ	10 UJ	20 UJ	10 U	10 UJ
1,1-Dichloroethene	10 U	NA	10 UJ	10 UJ	10 UJ	20 UJ	10 UJ	20 UJ	10 U	10 UJ
1,2-Dichloroethane	10 U	NA	10 UJ	10 U	10 U	6 J	10 UJ	4 R	2 J	10 UJ
1,2-Dichloroethene (total)	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
1,2-Dichloropropane	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
2-Butanone	10 U	NA	19 J	10 U	10 U	20 U	10 UJ	20 UJ	10 U	9 J
2-Hexanone	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 R
4-Methyl-2-Pentanone	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Acetone	10 U	NA	48 BJ	10 U	10 U	11 B	10 U	20 U	10 U	57 BJ
Benzene	10 U	NA	10 UJ	5 J	10 U	290	10 U	230	10 U	2 BJ
Bromodichloromethane	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Bromoform	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Bromomethane	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Carbon Disulfide	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Carbon Tetrachloride	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Chlorobenzene	10 U	NA	11 J	44	10 U	310	10 UJ	200 J	10 U	10 UJ
Chloroethane	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Chloroform	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Chloromethane	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
cis-1,3-Dichloropropene	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Dibromochloromethane	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Ethylbenzene	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	5 J
Methylene Chloride	10 U	NA	3 BJ	10 U	10 U	20 U	9 BJ	31 BJ	0.8 J	7 BJ
Styrene	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Tetrachloroethene	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	12	3 J
Toluene	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	5 BJ
trans-1,3-Dichloropropene	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Trichloroethene	2 J	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	2 J	5 J
Vinyl Chloride	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	10 UJ
Xylenes (total)	10 U	NA	10 UJ	10 U	10 U	20 U	10 UJ	20 UJ	10 U	6 J

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	MW-7		MW-14A	*MW-14B*	MW-15A	*MW-15B*	MW-16A	*MW-16B*	MW-17AR	PW-1
Sample Date:	7/92	12/94	7/92	7/92	7/92	7/92	7/92	7/92	12/94	7/92
Semivolatile Organics (ug/l)										
1,2,4-Trichlorobenzene	200 U	NA	210 J	680	24	48,000	10 U	36,000	10 U	3 J
1,2-Dichlorobenzene	200 U	NA	2000 U	63 J	10 U	910	10 U	10,000 U	10 U	10 U
1,3-Dichlorobenzene	200 U	NA	2000 U	260	10 U	510	10 U	10,000 U	10 U	10 U
1,4-Dichlorobenzene	200 U	NA	2000 U	89 J	10 U	360	10 U	10,000 U	10 U	10 U
2,2'-oxybis-1-Chloropropane	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
2,4,5-Trichlorophenol	500 U	NA	5000 U	500 U	25 U	500 U	25 U	25,000 U	25 U	25 U
2,4,6-Trichlorophenol	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
2,4-Dichlorophenol	200 U	NA	2000 U	200 U	10 UJ	200 U	10 U	10,000 U	10 U	10 U
2,4-Dimethylphenol	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
2,4-Dinitrophenol	500 U	NA	5000 U	500 U	25 U	500 U	25 U	25,000 U	25 U	25 U
2,4-Dinitrotoluene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
2,6-Dinitrotoluene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
2-Chloronaphthalene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
2-Chlorophenol	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
2-Methylnaphthalene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	2 J
2-Methylphenol	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
2-Nitroaniline	500 U	NA	5000 U	500 U	25 U	500 U	25 U	25,000 U	25 U	25 U
2-Nitrophenol	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
3,3'-Dichlorobenzidine	200 U	NA	2000 U	200 UJ	10 UJ	200 UJ	10 U	10,000 U	10 U	10 U
3-Nitroaniline	500 U	NA	5000 U	500 U	25 U	500 U	25 U	25,000 U	25 U	25 U
4,6-Dinitro-2-methylphenol	500 U	NA	5000 U	500 U	25 U	500 U	25 U	25,000 U	25 U	25 U
4-Bromophenyl-phenylether	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
4-Chloro-3-methylphenol	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
4-Chloroaniline	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
4-Chlorophenyl-phenylether	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
4-Methylphenol	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	3 J
4-Nitroaniline	500 U	NA	5000 U	500 U	25 U	500 U	25 U	25,000 U	25 U	25 U
4-Nitrophenol	500 U	NA	5000 U	500 U	25 U	500 U	25 U	25,000 U	25 U	25 U
Acenaphthene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Acenaphthylene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Anthracene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	MW-7		MW-14A	*MW-14B*	MW-15A	*MW-15B*	MW-16A	*MW-16B*	MW-17AR	PW-1
Sample Date:	7/92	12/94	7/92	7/92	7/92	7/92	7/92	7/92	12/94	7/92
Benzo(a)anthracene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Benzo(a)pyrene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Benzo(b)fluoranthene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Benzo(g,h,i)perylene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Benzo(k)fluoranthene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
bis(2-Chloroethoxy) methane	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
bis(2-Chloroethyl) ether	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
bis(2-Ethylhexyl) phthalate	200 U	NA	2000 U	200 U	10 U	200 U	3 J	10,000 U	10 U	16
Butylbenzylphthalate	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	0.2 J	10 U
Carbazole	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Chrysene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Dibenz(a,h)anthracene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Dibenzofuran	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Diethylphthalate	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	0.3 J	10 U
Dimethylphthalate	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Di-n-butylphthalate	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	0.4 J	10 U
Di-n-octylphthalate	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Fluoranthene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Fluorene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Hexachlorobenzene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Hexachlorobutadiene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Hexachlorocyclopentadiene	200 U	NA	2000 U	200 UJ	10 UJ	200 UJ	10 U	10,000 U	10 U	10 U
Hexachloroethane	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Isophorone	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Naphthalene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	5 J
Nitrobenzene	200 U	NA	2000 U	200 U	10 UJ	200 U	10 U	10,000 U	10 U	10 U
N-Nitroso-di-n-propylamine	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
N-Nitrosodiphenylamine	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Pentachlorophenol	500 U	NA	5000 U	500 U	25 U	500 U	25 U	25,000 U	25 U	25 U
Phenanthrene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U
Phenol	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	3 J
Pyrene	200 U	NA	2000 U	200 U	10 U	200 U	10 U	10,000 U	10 U	10 U

TABLE 5-5

ORGANICS IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	MW-7		MW-14A	*MW-14B*	MW-15A	*MW-15B*	MW-16A	*MW-16B*	MW-17AR	PW-1
Sample Date:	7/92	12/94	7/92	7/92	7/92	7/92	7/92	7/92	12/94	7/92
Pesticides/PCBs (ug/l)										
Aroclor-1016	1.0 U	1.0 U	10,000 U	1.0 U	1.0 U	10,000 U	1.0 U	10,000 U	1.0 U	1.0 U
Aroclor-1221	2.0 U	2.0 U	20,000 U	2.0 U	2.0 U	20,000 U	2.0 U	20,000 U	2.0 U	2.0 U
Aroclor-1232	1.0 U	1.0 U	10,000 U	1.0 U	1.0 U	10,000 U	1.0 U	10,000 U	1.0 U	1.0 U
Aroclor-1242	1.0 U	1.0 U	10,000 U	1.0 U	1.0 U	10,000 U	R	10,000 U	1.0 U	1.0 U
Aroclor-1248	1.0 U	1.0 U	7900 J	59 P	1.0 U	30,000	R	10,000 U	1.0 U	1.0 U
Aroclor-1254	0.74 BJ	1.0 U	10,000 U	1.0 U	4.3	47,000	R	44,000 B	1.0 U	4.7 B
Aroclor-1260	1.0 U	1.0 U	3600 J	55 P	1.0 U	10,000 U	R	10,000 U	1.0 U	1.0 U
Miscellaneous (mg/l)										
Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons	23	NA	1600	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	NA	1.0 U

Notes:

1. Monitoring well IDs which are italicized indicate wells screened across the alluvium/till interface.
2. Data qualifiers/symbols are as follows:
    - B Parameter detected in associated blank sample.
    - D Reported value determined from a diluted analysis.
    - E Reported value exceeds calibration range.
    - J Estimated value.
    - U Compound was not detected at the given quantitation limit.
    - P Reported value may be of poor precision.
    - R Result is rejected.

TABLE 5-6

ORGANICS IN BEDROCK GROUNDWATER SAMPLES

Sample ID:	M-4B		M-9		M-11B			N-2B		N-3B		N-6B/N-6BR	
Collection Date:	7/92	7/99	7/92	7/99	7/92	7/99	10/99	7/92	7/99	7/92	7/99	7/92	7/99
Volatile Organics (ug/l)													
1,1,1-Trichloroethane	5.0 UJ	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
1,1,2,2-Tetrachloroethane	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
1,1,2-Trichloroethane	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
1,1-Dichloroethane	5.0 U	10 U	5.0 UJ	10 U	5.0 UJ	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 UJ	10 U
1,1-Dichloroethene	5.0 UJ	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
1,2-Dichloroethane	5.0 UJ	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
1,2-Dichloroethene (total)	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
1,2-Dichloropropane	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
2-Butanone	50 U	2 B	50 U	10 U	50 U	10 U	NA	50 U	3 BJ	50 U	10 U	50 U	10 U
2-Hexanone	50	10 U	50 U	10 U	50 U	10 U	NA	50 U	10 U	50 U	10 U	50 U	10 U
4-Methyl-2-Pentanone	50 U	10 U	50 U	10 U	50 U	10 U	NA	50 U	10 U	50 U	10 U	50 U	10 U
Acetone	50 U	12 B	50 U	7 BJ	50 U	7 BJ	NA	50 U	7 BJ	50 U	9 BJ	50 U	7 BJ
Benzene	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Bromodichloromethane	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Bromoform	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Carbon Tetrachloride	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Chlorobenzene	5.0 U	10 U	5.0 U	10 U	5.0 U	9 J	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	5.0 UJ	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Dibromochloromethane	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Ethylbenzene	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Methylene Chloride	2.5 JB	15 B	10 U	31 B	10 U	5 BJ	NA	30 B	6 BJ	12 B	17 B	10 U	11 B
Styrene	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Tetrachloroethene	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Toluene	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
trans-1,3-Dichloropropene	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Trichloroethene	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U	NA	5.0 U	10 U	5.0 U	10 U	5.0 U	10 U
Vinyl Chloride	10 UJ	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U
Xylenes (total)	5.0 UJ	10 U	5.0 UJ	10 U	5.0 UJ	10 U	NA	5.0 UJ	10 U	5.0 UJ	10 U	5.0 UJ	10 U

TABLE 5-6

ORGANICS IN BEDROCK GROUNDWATER SAMPLES

Sample ID:	M-4B		M-9		M-11B			N-2B		N-3B		N-6B/N-6BR	
Collection Date:	7/92	7/99	7/92	7/99	7/92	7/99	10/99	7/92	7/99	7/92	7/99	7/92	7/99
Semivolatile Organics (ug/l)													
1,2,4-Trichlorobenzene	11 UJ	10 U	12 U	10 U	10 U	540 D	18	11 U	10 U	11 U	10 U	11 U	10 U
1,2-Dichlorobenzene	11 UJ	10 U	12 U	10 U	10 U	14	10 U	11 U	10 U	11 U	10 U	11 U	10 U
1,3-Dichlorobenzene	11 UJ	10 U	12 U	10 U	10 U	40	10 U	11 U	10 U	11 U	10 U	11 U	10 U
1,4-Dichlorobenzene	11 UJ	10 U	12 U	10 U	10 U	29	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2,2'-oxybis-1-Chloropropane	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2,4,5-Trichlorophenol	11 UJ	25 U	12 U	25 U	10 U	25 U	25 U	11 U	25 U	11 U	25 U	11 U	25 U
2,4,6-Trichlorophenol	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2,4-Dichlorophenol	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2,4-Dimethylphenol	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2,4-Dinitrophenol	26 UJ	25 U	29 U	25 U	26 U	25 U	25 U	27 U	25 U	27 U	25 U	26 U	25 U
2,4-Dinitrotoluene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2,6-Dinitrotoluene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2-Chloronaphthalene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2-Chlorophenol	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2-Methylnaphthalene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2-Methylphenol	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
2-Nitroaniline	26 UJ	25 U	29 U	25 U	26 U	25 U	25 U	27 U	25 U	27 U	25 U	26 U	25 U
2-Nitrophenol	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
3,3'-Dichlorobenzidine	26 UJ	10 U	29 U	10 U	26 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
3-Nitroaniline	26 UJ	25 U	29 U	25 U	26 U	25 U	25 U	27 U	25 U	27 U	25 U	26 U	25 U
4,6-Dinitro-2-methylphenol	26 UJ	25 U	29 U	25 U	26 U	25 U	25 U	27 U	25 U	27 U	25 U	26 U	25 U
4-Bromophenyl-phenylether	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
4-Chloro-3-methylphenol	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
4-Chloroaniline	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
4-Chlorophenyl-phenylether	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
4-Methylphenol	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
4-Nitroaniline	26 UJ	25 U	29 U	25 U	26 U	25 U	25 U	27 U	25 U	27 U	25 U	26 U	25 U
4-Nitrophenol	26 UJ	25 U	29 U	25 U	26 U	25 U	25 U	27 U	25 U	27 U	25 U	26 U	25 U
Acenaphthene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Acenaphthylene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Anthracene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U

TABLE 5-6

ORGANICS IN BEDROCK GROUNDWATER SAMPLES

Sample ID:	M-4B		M-9		M-11B			N-2B		N-3B		N-6B/N-6BR	
Collection Date:	7/92	7/99	7/92	7/99	7/92	7/99	10/99	7/92	7/99	7/92	7/99	7/92	7/99
Benzo(a)anthracene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	1.4 J	10 U	11 U	10 U	11 U	10 U
Benzo(a)pyrene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Benzo(b)fluoranthene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Benzo(g,h,i)perylene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Benzo(k)fluoranthene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
bis(2-Chloroethoxy) methane	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
bis(2-Chloroethyl) ether	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
bis(2-Ethylhexyl) phthalate	11 UJ	10 U	12 U	10 U	10 U	2 BJ	10 U	3.6 J	10 U	11 U	10 U	11 U	10 U
Butylbenzylphthalate	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Carbazole	NA	10 U	NA	10 U	NA	10 U	10 U	NA	10 U	NA	10 U	NA	10 U
Chrysene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	1.7 J	10 U	11 U	10 U	11 U	10 U
Dibenzo(a,h)anthracene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Dibenzofuran	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Diethylphthalate	11 UJ	10 U	12 U	10 U	10 U	5 J	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Dimethylphthalate	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Di-n-butylphthalate	11 UJ	10 U	12 U	10 U	10 U	6 J	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Di-n-octylphthalate	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Fluoranthene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	4.9 J	10 U	11 U	10 U	11 U	10 U
Fluorene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Hexachlorobenzene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Hexachlorobutadiene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Hexachlorocyclopentadiene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Hexachloroethane	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Indeno(1,2,3-cd)pyrene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Isophorone	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Naphthalene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Nitrobenzene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
N-Nitroso-di-n-propylamine	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
N-Nitrosodiphenylamine	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Pentachlorophenol	26 UJ	25 U	29 U	25 U	26 U	25 U	25 U	27 U	25 U	27 U	25 U	26 U	25 U
Phenanthrene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	1.9 J	10 U	11 U	10 U	11 U	10 U
Phenol	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U	11 U	10 U
Pyrene	11 UJ	10 U	12 U	10 U	10 U	10 U	10 U	3.3 J	10 U	11 U	10 U	11 U	10 U

TABLE 5-6

ORGANICS IN BEDROCK GROUNDWATER SAMPLES

Sample ID:	M-4B		M-9		M-11B			N-2B		N-3B		N-6B/N-6BR	
Collection Date:	7/92	7/99	7/92	7/99	7/92	7/99	10/99	7/92	7/99	7/92	7/99	7/92	7/99
PCBs (ug/l)													
Aroclor-1016	NA	1 U	NA	1 U	NA	230	5.92	NA	1 U	NA	1 U	NA	1 U
Aroclor-1221	NA	2 U	NA	2 U	NA	200 U	0.47 U	NA	2 U	NA	2 U	NA	2 U
Aroclor-1232	NA	1 U	NA	1 U	NA	100 U	0.47 U	NA	1 U	NA	1 U	NA	1 U
Aroclor-1242	1.0 U	1 U	1.0 U	1 U	10 U	100 U	0.47 U	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1248	1.0 U	1 U	1.0 U	1 U	10 U	100 U	0.47 U	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U
Aroclor-1254	1.0 U	1 U	1.0 U	1 U	10 U	100 U	0.47 U	2.0	1 U	0.52 J	1 U	0.36 J	1 U
Aroclor-1260	6.8	1 U	1.0 U	1 U	10 U	290	2.47	1.0 U	1 U	1.0 U	1 U	1.0 U	1 U
Miscellaneous (mg/l)													
Total Organic Carbon	NA	2.5	NA	2.4	NA	3.2	NA	NA	1.9	NA	3.1	NA	1.6
Total Petroleum Hydrocarbons	1.0 U	NA	1.0 U	NA	17	NA	NA	1.2	NA	1.0 U	NA	1.0 U	NA

TABLE 5-6

ORGANICS IN BEDROCK GROUNDWATER SAMPLES

Sample ID:	N-7B			S-1B				S-2B		S-8B		R-1	
Collection Date:	7/92	8/94	7/99	7/92	8/94	7/99	10/99	7/92	7/99	7/92	7/99	7/92	7/99
Volatile Organics (ug/l)													
1,1,1-Trichloroethane	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
1,1,2-Trichloroethane	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
1,1-Dichloroethane	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 UJ	10 U	5.0 UJ	10 U	10 U	10 U
1,1-Dichloroethene	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
1,2-Dichloroethane	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
1,2-Dichloropropane	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
2-Butanone	50 U	NA	2B / 10U	50 U	NA	10 U	NA	50 U	10 U	50 U	4 J	10 U	10 U
2-Hexanone	50 U	NA	10U / 10U	50 U	NA	10 U	NA	50 U	10 U	50 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	50 U	NA	10U / 10U	50 U	NA	10 U	NA	50 U	10 U	50 U	10 U	10 U	10 U
Acetone	50 U	NA	10B / 10B	50 U	NA	12 B	NA	50 U	5 BJ	50 U	22 B	10 U	5 BJ
Benzene	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	4 BJ	10 U
Bromodichloromethane	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Bromoform	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Bromomethane	10 U	NA	10U / 10U	10 U	NA	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Carbon Tetrachloride	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Chlorobenzene	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Chloroethane	10 U	NA	10U / 10U	10 U	NA	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Chloromethane	10 U	NA	10U / 10U	10 U	NA	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Dibromochloromethane	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Ethylbenzene	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Methylene Chloride	24 B	NA	15B / 15B	22 B	NA	19 B	NA	10 U	7 BJ	10 U	32 B	4 BJ	6 BJ
Styrene	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Tetrachloroethene	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Toluene	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Trichloroethene	5.0 U	NA	10U / 10U	5.0 U	NA	10 U	NA	5.0 U	10 U	5.0 U	10 U	10 U	10 U
Vinyl Chloride	10 U	NA	10U / 10U	10 U	NA	10 U	NA	10 U	10 U	10 U	10 U	10 U	10 U
Xylenes (total)	5.0 UJ	NA	10U / 10U	5.0 UJ	NA	10 U	NA	5.0 UJ	10 U	5.0 UJ	10 U	10 U	10 U

TABLE 5-6

ORGANICS IN BEDROCK GROUNDWATER SAMPLES

Sample ID:	N-7B			S-1B				S-2B		S-8B		R-1	
Collection Date:	7/92	8/94	7/99	7/92	8/94	7/99	10/99	7/92	7/99	7/92	7/99	7/92	7/99
Semivolatile Organics (ug/l)													
1,2,4-Trichlorobenzene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2,2'-oxybis-1-Chloropropane	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	11 U	NA	25U / 25U	10 U	NA	25 U	NA	11 U	25 U	10 U	25 U	25 U	25 U
2,4,6-Trichlorophenol	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	27 U	NA	25U / 25U	25 U	NA	25 U	NA	28 U	25 U	26 U	25 U	25 U	25 U
2,4-Dinitrotoluene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	27 U	NA	25U / 25U	25 U	NA	25 U	NA	28 U	25 U	26 U	25 U	25 U	25 U
2-Nitrophenol	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	11 U	NA	10U / 10U	10 U	NA	10 U	NA	28 U	10 U	26 U	10 U	10 U	10 U
3-Nitroaniline	27 U	NA	25U / 25U	25 U	NA	25 U	NA	28 U	25 U	26 U	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	27 U	NA	25U / 25U	25 U	NA	25 U	NA	28 U	25 U	26 U	25 U	25 U	25 U
4-Bromophenyl-phenylether	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	27 U	NA	25U / 25U	25 U	NA	25 U	NA	28 U	25 U	26 U	25 U	25 U	25 U
4-Nitrophenol	27 U	NA	25U / 25U	25 U	NA	25 U	NA	28 U	25 U	26 U	25 U	25 U	25 U
Acenaphthene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Anthracene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U

TABLE 5-6

ORGANICS IN BEDROCK GROUNDWATER SAMPLES

Sample ID:	N-7B			S-1B				S-2B		S-8B		R-1	
Collection Date:	7/92	8/94	7/99	7/92	8/94	7/99	10/99	7/92	7/99	7/92	7/99	7/92	7/99
Benzo(a)anthracene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy) methane	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethyl) ether	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl) phthalate	11 U	NA	2J / 10U	10	NA	2 J	NA	1.8 J	1 BJ	10 U	10 U	10 U	10 B
Butylbenzylphthalate	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Carbazole	NA	NA	10U / 10U	NA	NA	10 U	NA	NA	10 U	NA	10 U	10 U	10 U
Chrysene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Dimethylphthalate	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Di-n-butylphthalate	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Fluorene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Isophorone	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	27 U	NA	25U / 25U	25 U	NA	25 U	NA	28 U	25 U	26 U	25 U	25 U	25 U
Phenanthrene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Phenol	11 U	NA	10U / 10U	3.5 J	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U
Pyrene	11 U	NA	10U / 10U	10 U	NA	10 U	NA	11 U	10 U	10 U	10 U	10 U	10 U

TABLE 5-6

ORGANICS IN BEDROCK GROUNDWATER SAMPLES

Sample ID:	N-7B			S-1B				S-2B		S-8B		R-1	
Collection Date:	7/92	8/94	7/99	7/92	8/94	7/99	10/99	7/92	7/99	7/92	7/99	7/92	7/99
PCBs (ug/l)													
Aroclor-1016	NA	1.0 U	1U / 1U	NA	1.0U / 1.0 U	1 U	0.48 U	NA	1 U	NA	1 U	1.0 U	2 U
Aroclor-1221	NA	2.0 U	2U / 2U	NA	2.0U / 2.0 U	2 U	0.48 U	NA	2 U	NA	2 U	2.0 U	4 U
Aroclor-1232	NA	1.0 U	1U / 1U	NA	1.0U / 1.0 U	1 U	0.48 U	NA	1 U	NA	1 U	1.0 U	2 U
Aroclor-1242	10 U	1.0 U	1U / 1U	1.0 U	1.0U / 1.0 U	1 U	0.48 U	1.0 U	1 U	1.0 U	1 U	1.0 U	2 U
Aroclor-1248	10 U	1.0 U	1U / 1U	1.0 U	1.0U / 1.0 U	1 U	0.48 U	1.0 U	1 U	1.0 U	1 U	1.0 U	2 U
Aroclor-1254	6.7 J	1.0 U	1U / 1U	1.0 U	1.0U / 1.0 U	2.0	0.48 U	1.0 U	1 U	1.0 U	1 U	1.0 U	2 U
Aroclor-1260	10 U	1.0 U	1U / 1U	2.5	1.0U / 1.0 U	1.6	0.48 U	1.0 U	1 U	0.23 J	1 U	1.0 U	2 U
Miscellaneous (mg/l)													
Total Organic Carbon	NA	NA	2.7 / 2.9	NA	NA	6.1	NA	NA	3.1	NA	2.5	NA	2.0
Total Petroleum Hydrocarbons	1.0 U	NA	NA	1.0 U	NA	NA	NA	1.0 U	NA	1.0 U	NA	1.0 U	NA

Notes:

1. Data qualifiers/symbols are as follows:
   - NA Sample was not analyzed for this compound.
   - B Concentration in sample is less than 5x or 10x the result in an associated blank sample.
   - J Estimated value.
   - U Compound was not detected at the *given quantitation limit.*
   - E Reported value exceeds calibration range.
   - x/x A duplicate sample was collected at this location.

TABLE 5-7
SUMMARY OF HISTORICAL GROUNDWATER SAMPLE ANALYTICAL RESULTS INORGANICS (DISSOLVED) IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	M-1			M-2			M-4A		M-5	M-6	
Sample Date:	7/92	8/94	7/99	7/92	8/94	7/99	7/92	7/99	7/92	7/92	8/94
all units ug/l											
Aluminum	116 U	NA	34.2 U	NA	49.6B / 73.7B	61.1	NA	34.2 U	116 U	NA	51.5 B
Antimony	36 UJ	NA	2.5 U	NA	23.2U / 23.2U	2.5 U	NA	2.5 U	36 UJ	NA	23.2 U
Arsenic	NA	1.9U / 1.9U	2.8 U	NA	8 / 7.2	7.5	NA	4.1	NA	NA	9.7
Barium	74	NA	56.6 J	NA	74.7 / 79.1	102 J	NA	451	233 J	NA	187
Beryllium	1 UJ	NA	0.41 U	NA	0.3U / 0.3U	0.41 U	NA	0.41 U	1 UJ	NA	0.3 U
Cadmium	5 U	NA	0.33 U	NA	1.6U / 1.9	0.33 U	NA	0.33 U	5 U	NA	1.6 U
Calcium	69,200	NA	69,900	NA	103,000 / 105,000	104,000	NA	50,900	74,100 J	NA	157,000
Chromium	10 UJ	NA	3.5 U	NA	6.3U / 6.3U	3.5 U	NA	3.5 U	10 UJ	NA	6.3 U
Cobalt	14 U	NA	2.8 U	NA	4U / 4U	2.8 U	NA	2.8 U	14 U	NA	4.0 U
Copper	7 U	NA	3.5 U	NA	10.5 / 8.7	3.5 U	NA	4.8	7 U	NA	6.3
Iron	201	NA	305	NA	6820 / 6280	12,700	NA	159	15,700 J	NA	4,370
Lead	NA	1.0B / 1.3B	2.2 U	NA	0.6B / 0.7B	2.2 U	NA	2.2 U	NA	NA	0.5
Magnesium	21,300	NA	23,700	NA	21,800 / 22,100	26,500	NA	6,550	15,200	NA	31,000
Manganese	7,160	NA	7,750 J	NA	2970 / 3070	3,370 J	NA	458	7,150 J	NA	6,120
Mercury	NA	0.1U / 0.1U	0.05 U	NA	0.1U / 0.1U	0.05 U	NA	0.05 U	NA	NA	0.1 U
Nickel	14 UJ	NA	4.8 U	NA	13.9 / 16.2	4.8 U	NA	4.8 U	14 UJ	NA	4.1 U
Potassium	2,710	NA	2,650 J	NA	3370 / 3440	2,490 J	NA	756	4,390	NA	10,400
Selenium	NA	NA	4.0 U	NA	3.2B / 1.4U	4.0 U	NA	4.0 U	NA	NA	1.4 U
Silver	6 U	NA	2.5	NA	3.3U / 3.3U	4	NA	4.5	6 U	NA	3.3 U
Sodium	24,300	NA	23,300	NA	49,500E / 48,900E	67,100	NA	21,000	26,500	NA	53,000
Thallium	NA	NA	1.7 U	NA	1U / 1U	1.7 U	NA	1.7 U	NA	NA	1.0 U
Vanadium	9 UJ	NA	4.1 U	NA	2.4U / 2.4U	4.1 U	NA	4.1 U	9 UJ	NA	2.4 U
Zinc	6.4	NA	9	NA	12.2B / 6.9B	9.0 U	NA	29.2	15.1 J	NA	13.9
Cyanide	10.0 U	10.0 / 10.0	NA	10.0 U	14	NA	10.0 U	NA	10.0 U	10.0 U	10.0 U

TABLE 5-7
SUMMARY OF HISTORICAL GROUNDWATER SAMPLE ANALYTICAL RESULTS INORGANICS (DISSOLVED) IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	M-7		M-8	M-10		M-11A	M-12	M-13	M-14	M-15
Sample Date:	7/92	8/94	7/92	7/92	8/94	7/92	7/92	7/92	7/92	7/92
all units ug/l										
Aluminum	116 U	NA	NA	472	NA	116U / 116 U	2,600	NA	NA	116 U
Antimony	36 UJ	NA	NA	36 UJ	NA	36UJ / 36UJ	36 UJ	NA	NA	36 UJ
Arsenic	NA	5.0	NA	NA	16.4	NA	NA	NA	NA	NA
Barium	75 J	NA	NA	117 J	NA	77J / 79J	102 J	NA	NA	139 J
Beryllium	1 UJ	NA	NA	1 UJ	NA	1UJ / 1UJ	1 UJ	NA	NA	1 UJ
Cadmium	5 U	NA	NA	5 U	NA	5U / 5U	28.9	NA	NA	5 U
Calcium	131,000 J	NA	NA	127,000 J	NA	136,000 / 141,000J	157,000 J	NA	NA	90,000 J
Chromium	10 UJ	NA	NA	10 UJ	NA	10UJ / 10UJ	10 UJ	NA	NA	10 UJ
Cobalt	14 U	NA	NA	14 U	NA	14U / 14U	14 U	NA	NA	14 U
Copper	7 U	NA	NA	7 U	NA	7U / 7U	7 U	NA	NA	7 U
Iron	2,420 J	NA	NA	7,910 J	NA	2,970J / 3,380J	4,270 J	NA	NA	1,880 J
Lead	NA	1.0 B	NA	NA	2.5 B	NA	NA	NA	NA	NA
Magnesium	22,900	NA	NA	23,800	NA	22,700 / 23,800	22,000	NA	NA	19,000
Manganese	4,630 J	NA	NA	8,860 J	NA	7,540J / 7,830J	5,280 J	NA	NA	4,930 J
Mercury	NA	0.1 U	NA	NA	0.1 U	NA	NA	NA	NA	NA
Nickel	14 UJ	NA	NA	14 UJ	NA	14UJ / 14UJ	14 UJ	NA	NA	14 UJ
Potassium	4,960	NA	NA	5,020	NA	3,960 / 4,200	7,770	NA	NA	4,350
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	6 U	NA	NA	6 U	NA	6U / 6U	6 U	NA	NA	6 U
Sodium	23,700	NA	NA	40,900	NA	27,600 / 29,100	29,400	NA	NA	39,000
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	9 UJ	NA	NA	9 UJ	NA	9UJ / 9UJ	9 UJ	NA	NA	9 UJ
Zinc	97.4 J	NA	NA	15 J	NA	17.8J / 14.8 J	44.3 BJ	NA	NA	11.6 BJ
Cyanide	10.0 U	26	10.0 U	10.0 U	10.0 U	10.0U/10.0U	10.0 U	10.0 U	10 U/10 U	10.0 U

TABLE 5-7
SUMMARY OF HISTORICAL GROUNDWATER SAMPLE ANALYTICAL RESULTS INORGANICS (DISSOLVED) IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	**M-16**			**M-17**		**M-18**		**N-1**	**N-2A**	**N-3A/N-3AR**		**N-5**	**N-7AR**	
Sample Date:	7/92	8/94	7/99	7/92	7/99	7/92	7/99	7/92	8/94	8/94	7/99	7/99	8/94	7/99
all units ug/l														
Aluminum	NA	36.2 B	34.2 U	116 U	49.7	NA	34.2 U	173	38.8 B	25.2 U	34.2 U	34.2 U	81.3 B	43.1
Antimony	NA	23.2 U	2.5 U	36 UJ	2.5 U	NA	3.1	36 UJ	23.2 U	23.2 U	2.5 U	2.5 U	23.2 U	2.5 U
Arsenic	NA	1.9 U	2.8 U	NA	2.8 U	NA	12	NA	1.9 U	1.9 U	2.8 U	2.8 U	1.9 U	2.8 U
Barium	NA	40.1	323 J	16.9 J	530 J	NA	550	96.8	103	35.5	500	581	44.5	487
Beryllium	NA	0.3 U	0.41 U	1 UJ	0.41 U	NA	0.41 U	1 UJ	0.3 U	0.3 U	0.41 U	0.41 U	0.3 U	1.7 B
Cadmium	NA	1.6 U	0.45	5 U	3	NA	0.33 U	5 U	1.6 U	1.6 U	0.33 U	0.33 U	1.6 U	0.33 U
Calcium	NA	75,100	74,000	41,300 J	56,700	NA	60,000	600,000	120,000	49,900	102,000	105,000	78,900	110,000
Chromium	NA	6.3 U	3.5 U	10 UJ	3.5 U	NA	3.5 U	153 B	6.3 U	6.3 U	3.5 U	3.5 U	6.3 U	3.5 U
Cobalt	NA	4.0 U	2.8 U	14 U	2.8 U	NA	2.8 U	14 U	4.0 U	4.0 U	2.8 U	2.8 U	4.0 U	2.8 U
Copper	NA	3.5 U	3.5 U	7 U	7.1	NA	4.8	7 U	3.5 U	3.5 U	3.5 U	3.5	3.5 U	3.5 U
Iron	NA	643	11.9	48 UJ	43	NA	451	52,000	25 U	25 U	29.4	20.4	196	54.8
Lead	NA	0.7	2.2 U	NA	2.2 U	NA	2.2 U	NA	0.5 U	0.9	2.2 U	2.2 U	1.0	2.2 U
Magnesium	NA	7,760	7,550	4,450 J	5,570	NA	16,700	16,100	20,600	7,080	18,400	20,300	9,540	8,670
Manganese	NA	1,330	329 J	181 J	5.6 BJ	NA	192	2,436	3.8	0.98	17.4 B	2020	307	5.2 B
Mercury	NA	0.1 U	0.05 U	NA	0.05 U	NA	0.05 U	NA	0.1 U	0.1 U	0.05 U	0.05 U	0.1 U	0.05 U
Nickel	NA	7.1	4.8 U	14 UJ	4.8 U	NA	4.8 U	44.6 B	4.1 U	4.1 U	4.8 U	4.8 U	8.7	4.8 U
Potassium	NA	6,420	5,900 J	3,420	3,840 J	NA	3590	NA	5,630	3,110	2030	1870	7,430	8470
Selenium	NA	2.7	4.0 U	NA	4.0 U	NA	4.0 U	NA	5.7	2.2	4.0 U	4.0 U	4.2	4.0 U
Silver	NA	3.3 U	2.8	6 U	2.3 U	NA	3.9	6 U	3.3 U	3.3 U	4.5	4.2	3.3 U	4.4
Sodium	NA	28,700	20,900	136,000	29,700	NA	58,000	NA	140,000	76,700	93,600	84,800	140,000	218,000
Thallium	NA	1.0 U	1.7 U	NA	1.7 U	NA	1.7 U	NA	1.0 U	1.0 U	1.7 U	1.7 U	1.0 U	1.7 U
Vanadium	NA	2.4 U	4.1 U	9 UJ	4.1 U	NA	4.1 U	9 UJ	2.4 U	2.4 U	6.9	4.6	2.4 U	4.6
Zinc	NA	14.4	115 J	7 BJ	161 J	NA	56	1,320	28	77.9	122	175	45.3	129
Cyanide	10.0 U	10.0 U	NA	205	NA	10.0 U	NA	NA	10.0 U	13	NA	NA	10.0 U	NA

TABLE 5-7
SUMMARY OF HISTORICAL GROUNDWATER SAMPLE ANALYTICAL RESULTS INORGANICS (DISSOLVED) IN ALLUVIAL ON-SITE GROUNDWATER SAMPLES

Sample ID:	S-1A	S-2A	S-4		S-5	S-6	S-8A		S-10		S-12R
Sample Date:	7/99	7/99	7/92	8/94	7/92	7/99	8/94	7/99	7/92	8/94	7/92
all units ug/l											
Aluminum	34.2 U	34.2 U / 34.2 U	116 U	NA	116 U	34.2 U	25.2 U	34.2 U	116 U	NA	116 U
Antimony	2.5 U	2.5 U / 2.5 U	36 UJ	NA	36 UJ	2.5 U	23.2 U	2.5 U	36 UJ	NA	36 UJ
Arsenic	5.3	2.8 U / 2.8 U	NA	1.9 U	NA	21.6	36.8	46.1	NA	18.9	NA
Barium	146	201 / 407	219 J	NA	68.8	112	42.6	391	275	NA	114
Beryllium	0.41 U	0.41 U / 0.41 U	1 UJ	NA	1 UJ	0.85 B	0.3 U	0.41 U	1 UJ	NA	1 UJ
Cadmium	0.33 U	0.33 U / 0.33 U	5 U	NA	5 U	0.33 U	1.7	0.33 U	5 U	NA	5 U
Calcium	161,000	147,000 / 152,000	66,200 J	NA	139,000	164,000	108,000	111,000	133,000	NA	97,900
Chromium	3.5 U	3.5 U / 5.2	10 UJ	NA	NA	3.5 U	6.3 U	4.9 B	10 UJ	NA	10 UJ
Cobalt	2.8 U	2.8 U / 2.8 U	14 U	NA	14 U	2.8 U	4.0 U	3.2 B	14 U	NA	14 U
Copper	3.5 U	3.5 U / 3.5 U	7 U	NA	7 U	3.5 U	3.5 U	4.4	7 U	NA	7 U
Iron	2610	20.4 / 31.9	76.1 J	NA	48 U	8970	6,600	8280	639	NA	242
Lead	2.2 U	2.2 U / 2.2 U	NA	0.5 B	NA	2.2 U	1.6	2.2 U	NA	1.0 B	NA
Magnesium	32,700	18,500 / 18,900	17,100	NA	15,700	28,900	5,760	6,620	26,000	NA	21,100
Manganese	4880	12,300 / 12,500	278 J	NA	3,159	1900	3,140	4050	721	NA	9,050
Mercury	0.05 U	0.13 / 0.11	NA	0.1 U	NA	0.05 U	0.1 U	0.05 U	NA	0.1 U	NA
Nickel	4.8 U	4.8 U / 4.8 U	14 UJ	NA	14 UJ	4.8 U	4.1 U	4.8 U	14 UJ	NA	14.3
Potassium	6560	3760 / 3290	2,230	NA	6,080	3030	4,160	2080	9,290	NA	4,880
Selenium	4.3	5.7 / 6.5	NA	NA	NA	4.0 U	1.4 U	5.5	NA	NA	NA
Silver	2.3 U	3.3 B / 2.3 U	6 U	NA	6 U	4.7	3.3 U	8.2	6 U	NA	6 U
Sodium	161,000	35,900 / 39,700	69,000	NA	46,600	211,000	4,590	7,770	204,000	NA	138,000
Thallium	2.2	1.7 U / 1.7 U	NA	NA	NA	1.7 U	1.0 U	1.7 U	NA	NA	NA
Vanadium	9.7	4.1 U / 4.1 U	9 UJ	NA	9 UJ	4.1 U	2.4 U	4.1 U	12.2	NA	9 UJ
Zinc	19	28.8 / 170	85 J	NA	25.5	28.1	13.2	155	3 U	NA	13.3
Cyanide	NA	NA / NA	NA	10.0 U	NA	NA	10.0 U	NA	NA	10.0 U	NA

Notes:

1. Data qualifiers/symbols are as follows:

NA Sample was not analyzed for this compound.
B Concentration in sample is less than 5x or 10x the result in an associated blank sample.
J Estimated value.
U Compound was not detected at the given quantitation limit.
E Reported value exceeds calibration range.
x/x A duplicate sample was collected at this location.

TABLE 5-8

INORGANICS (DISSOLVED) IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	OS-1A		*OS-1B*		OS-2A		*OS-2B*		OS-3A		*OS-3B*	
Sample Date:	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99	7/92	7/99
all units ug/l												
Aluminum	116 U	34.2 U	116 U	34.2 U	116 U	34.2 U	116 U	34.2 U	121	34.2 U	116 U	34.2 U
Antimony	36.0 U	2.5 U	36.0 U	2.5 U	36.0 U	2.5 U	36.0 U	2.5 U	36.0 U	2.5 U	36.0 U	2.5 U
Arsenic	50.1 J	76	51.2 J	42.8	2.0 UJ	5.5	10.0 U	7.2	3.0 UJ	2.8 U	6.5	6.9
Barium	75.7	79.8 J	40.6	76.2 J	82.5	68.7 J	83.4	70.3 J	37.8	31.7 J	84.2	56.6 J
Beryllium	1.0 U	0.41 U	1.0 U	0.41 U	1.0 U	0.41 U	1.0 U	0.41 U	1.0 U	0.41 U	1.0 U	0.41 U
Cadmium	5.0 U	0.33 U	5.0 U	0.33 U	5.0 U	0.33 U	5.0 U	0.33 U	5.0 U	0.33 U	5.0 U	0.33 U
Calcium	108,000	90,800	159,000	152,000	127,000	102,000	124,000	92,900	101,000	128,000	80,900	83,300
Chromium	10.0 U	3.5 U	10.0 U	3.5 U	10.0 U	3.5 U	10.0 U	3.5 U	10.0 U	3.5 U	10.0 U	3.5 U
Cobalt	14.0 U	2.8 U	14.0 U	2.8 U	14.0 U	2.8 U	14.0 U	2.8 U	14.0 U	2.8 U	14.0 U	2.8 U
Copper	7.0 U	3.5 U	7.0 U	3.5 U	7.0 U	4.2	7.0 U	3.5 U	7.0 U	3.5 U	7.0 U	133
Iron	10,500 J	13,000	309 B	2,710	726	1,680	3630	2,430	221 BJ	11.9 B	3880	3,280
Lead	1.0 U	2.2 U	1.2 B	2.2 U	1.0 U	2.2 U	1.0 U	2.2 U	1.0 U	2.2 U	1.0 U	2.2 U
Magnesium	16,700	15,800	23,600	22,700	21,000	18,100	22,400	17,100	16,600	15,400	21,700	21,300
Manganese	1270	900 J	83.2	34.7 J	2780	2,260 J	2240	2,460 J	555	18.8 BJ	3280	2,840 J
Mercury	0.20 U	0.05 U	0.20 U	0.05 U	0.20 U	0.05 U	0.20 U	0.05 U	0.20 U	0.05 U	0.20 U	0.05 U
Nickel	14.0 U	4.8 U	120	4.8 U	14.0 U	4.8 U	20.1	4.8 U	14.0 U	4.8 U	14.0 U	4.8 U
Potassium	4,750	3,490 J	2,680	2,070 J	3630	3,030 J	4460	2,820 J	3940	4,590 J	4050	3,040 J
Selenium	1.0 U	4.0 U	5.0 U	4.0 U	1.0 U	4.0 U	1.0 U	4.0 U	8.0 J	5.6 B	1.0 UJ	4.0 U
Silver	6.0 UJ	5.5	6.0 UJ	3.2	6.0 U	2.8	6.0 U	2.5	6.0 UJ	3	6.0 U	2.4
Sodium	37,900	17,000	26,500	32,400	14,500	12,800	17,500	12,300	13,300	14,800	28,100	19,600
Thallium	3.0 U	1.7 U	3.0 U	1.7 U	3.0 U	1.7 U	3.0 U	1.7 U	3.0 U	1.7 U	3.0 U	1.7 U
Vanadium	9.0 U	4.1 U	9.0 U	4.1 U	9.0 U	4.1 U	9.0 U	4.1 U	9.0 U	4.1 U	9.0 U	4.1 U
Zinc	7.3	9.0 U	3.0 U	30.3	8.3 B	9.0 U	11.2 B	9.0 U	3.0	9.3	4.6	36.6
Cyanide	10.0 UJ	NA	10.0 UJ	NA	10.0 U	NA	10.0 U	NA	10.0 U	NA	10.0 U	NA

TABLE 5-8

INORGANICS (DISSOLVED) IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	OS-4A		*OS-4B*		OS-5A	*OS-5B*	OS-6A	*OS-6B*	OS-7A	*OS-7B*	MW-3A/3AR	
Sample Date:	7/92	7/99	7/92	7/99	7/92	7/92	8/99	8/99	7/99	7/99	7/92	7/99
all units ug/l												
Aluminum	116 U	64.7 JB	116 U	34.2 U	116 U	116 U	34.2 U	49.7 B / 34.2 U	34.2 U	88.1 B	116 U	34.2 U
Antimony	36.0 U	2.5 U	36.0 U	2.5 U	36.0 U	36.0 U	2.5 U	2.5 U / 2.5 U	2.5 U	2.5 U	36.0 U	2.5 U
Arsenic	2.0 U	2.8 U	2.0 U	5.7	3.3	2.0 U	2.8 U	10.9 B / 7.0 B	2.8 U	2.8 U	3.0	2.8 U
Barium	64.5	432	78.9	447	54.7 J	50.2	66.6	84.6 B / 81.4 B	440	474	32.7	365
Beryllium	1.0 U	0.41 U	1.0 U	0.41 U	1.0 U	1.0 U	0.41 U	0.41 U / 0.41 U	0.41 U	0.41 U	1.0 U	0.41 U
Cadmium	5.0 U	0.33 U	5.0 U	0.33 U	5.0 U	5.0 U	0.61 B	0.33 U / 0.33 U	0.33 U	0.33 U	5.0 U	0.33 U
Calcium	149,000	96,400	130,000	129,000	124,000	144,000	286,000	110,000 / 107,000	121,000	116,000	109,000	59,100
Chromium	10.0 U	3.5 U	10.0 U	3.5 U	10.0 U	10.0 U	3.5 U	3.5 U / 3.5 U	5.8	3.5 U	10.0 U	5.5
Cobalt	14.0 U	2.8 U	14.0 U	3.2 B	14.0 U	14.0 U	2.8 U	2.8 U / 2.8 U	2.8 U	2.8 U	14.0 U	2.8 U
Copper	7.0 U	3.5 U	7.0 U	3.5 U	7.0 U	7.0 U	3.5 U	26.4 / 3.5 U	3.5 U	3.5 U	7.0 U	3.5 U
Iron	48.0 U	135 B	729	2,570	48.0 U	48.0 U	20.6 B	411 / 421	22.1 B	108 B	48.0 UJ	38
Lead	1.0 U	2.2 U	1.0 U	2.2 U	1.0 U	1.0 U	2.2 U	2.2 U / 2.2 U	2.2 U	2.2 U	1.0 U	2.2 U
Magnesium	19,200	11,300	32,800	29,300	21,000	26,000	25,700	20,300 / 19,700	13,700	14,600	9970	14,300
Manganese	3760	2280	112	105	800	432	421	241 / 235	7 B	34.9	56.8	1400
Mercury	0.20 U	0.08	0.20 U	0.11	0.20 U	0.20 U	0.05 U	0.05 U / 0.05 U	0.1	0.1	0.20 U	0.22 B
Nickel	14.0 U	4.8 U	14.4	4.8 U	14.0 U	14.0 U	4.8 U	4.8 U / 4.8 U	4.8 U	4.8 U	14.0 U	4.8 U
Potassium	10,800	5,660	2,900	1,930	7720	4930	19,500	3130 / 3000	8,180	5,230	10,100	3,200
Selenium	4.3 J	8.4	1.0 UJ	4.0 U	1.0 U	1.0 U	23.5	4.0 U / 4.0 U	7	4.0 U	4.6 J	4.0 U
Silver	6.0 U	2.3 U	6.0 U	2.3 U	6.0 U	6.0 U	2.3	2.3 U / 2.3 U	2.3 U	2.7 B	6.0 UJ	2.7
Sodium	4,420	7,090	31,200	29,100	57,500	93,400	85,600	16,400 / 15,800	53,900	59,600	29,900	24,900
Thallium	3.0 U	1.7 U	3.0 U	1.7 U	3.0 U	3.0 U	1.7 U	1.7 U / 1.7 U	1.7 U	1.7 U	3.0 U	1.7 U
Vanadium	9.0 U	4.1 U	9.0 U	4.1 U	9.0 U	9.0 U	4.1 U	4.1 U / 4.1 U	4.1 U	4.1 U	9.0 U	4.1 U
Zinc	3.0 U	190	17.4	144	3.0 U	12.4	12 B	70.5 / 9.0 U	161	156	8.9	175
Cyanide	10.0 U	NA	10.0 U	NA	10.0 U	10.0 U	NA	NA / NA	NA	NA	10.0 UJ	NA

TABLE 5-8

INORGANICS (DISSOLVED) IN ALLUVIAL OFF-SITE GROUNDWATER SAMPLES

Sample ID:	*MW-3B*		MW-7	MW-14A	*MW-14B*	MW-15A	*MW-15B*	MW-16A	*MW-16B*	MW-17AR	PW-1
Sample Date:	7/92	7/99	7/92	7/92	7/92	7/92	7/92	7/92	7/92	12/94	7/92
all units ug/l											
Aluminum	116 U	34.2 U	116 U	174	116 U	116 U	116 U	116 U	116 U	3,990	566,000
Antimony	36.0 U	2.5 U	36.0 U	36.0 U	36.0 U	36.0 U	36.0 U	36.0 U	36.0 U	23.2 U	36.0 R
Arsenic	3.0 UJ	2.8 U	3.0 UJ	9.4 J	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	8.2	117 J
Barium	40.6	438	74.2 J	44.3 J	68.6	57.6	50.5	36.7 J	77.4 J	35.6	170 J
Beryllium	1.0 U	0.41 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.3 U	56.2 J
Cadmium	5.0 U	0.33 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.6 U	5.0 R
Calcium	118,000	105,000	104,000	212,000	155,000	98,900	97,200	140,000	95,700	120,000	525,000
Chromium	10.0 U	3.5 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	6.3 U	6670 J
Cobalt	14.0 U	2.8 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	4.0 U	417
Copper	7.0 U	3.5 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	11.2	1730 J
Iron	48.0 UJ	22	15,000 J	159 J	156 B	48.0 UJ	48.0 UJ	48.0 U	154 J	10,700	5,910,000J
Lead	1.0 U	2.2 U	1.0 UJ	1.0 UJ	1.0 B	1.2 B	1.2 B	1.0 UJ	1.0 UJ	13.3	5.0 UJ
Magnesium	27,800	18,400	19,600	6760	23,400	10,300	21,400	8530	24,500	15,200	388,000
Manganese	2750	1000	12,200 J	325 J	2640	6820	6830	3.0 U	5280 J	2,210	63,200 J
Mercury	0.20 U	0.05 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.1 U	0.20 U
Nickel	14.0 U	4.8 U	14.0 U	23.5 J	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	4.1 U	2170 J
Potassium	2800	2,610	5500	4780	6260	5560	4960	5740	3240	16,700	1560
Selenium	1.0 U	4.0 U	1.0 UJ	2.9 J	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.4 U	10.0 UJ
Silver	6.0 UJ	2.3 U	6.0 U	6.0 U	6.0 UJ	6.0 UJ	6.0 UJ	6.0 U	6.0 U	4.6 U	8.7
Sodium	39,100	24,700	14,900	9880	18,800	4380	43,400	2520	17,700	70,000	83,000
Thallium	3.0 U	1.7 U	2.0 UJ	2.0 UJ	3.0 U	3.0 U	3.0 U	2.0 UJ	2.0 UJ	5.0 U	22.0 J
Vanadium	9.0 U	6.9	9.0 U	11.2 J	11.2	9.0 U	9.0 U	9.0 U	9.0 U	3.4	666 J
Zinc	4.4	134	19.0 J	12.2 BJ	35.4	13.3	3.1	3.0 U	7.6 B	384	1,940,000
Cyanide	10.0 UJ	NA	10.0 U	10.0 U	10.0 U	10.0 UJ	10.0 UJ	10.0 U	10.0 U	10.0 U	10.0 U

Notes:

1. Well IDs which are italicized indicate wells screened across the alluvium/till interface.
2. Data qualifiers/symbols are as follows:
   - B
   - J Estimated value.
   - L Reported value may be biased low.
   - R Reported value should be rejected in making critical decisions.
   - U Compound was not detected at the given quantitation limit.

TABLE 5-9
NATURAL ATTENTUATION ASSESSMENT - GEOCHEMICAL PARAMETERS

Point Values:	<0.5= 3 ■	<1= 2	>1= 3	<20= 2	>1= 3	>0.5 mg/l =3	<50= 1 **<-100= 2**	>20= 2	>1= 3	>100= 2	Detected=2	Detected=2	Detected=2	>0.01 mg/l= 2 >0.1 mg/l=3		
WELL ID	DISSOLVED OXYGEN (mg/l)	NITRATE NITROGEN (mg/l)	FERROUS IRON (mg/l)	SULFATE (mg/l)	SULFIDE (mg/l)	METHANE (ug/l)	ORP (mV)	TOC (mg/l)	HYDROGEN (nM/L)	BTEX (ug/l)	DCE (mg/l)	VC (mg/l)	Chloroethane (mg/l)	ETHANE (ug/l)	ETHENE (ug/l)	*POINT TOTAL*
ALLUVIUM WELLS																
N-3AR	4.50	1.3	0.03	150	0.002	0.4	496	2.9	0.4	ND	ND	ND	ND	0.01	0.01	*0*
N-5	■	0.1	ND	1	0.004	3.2	486.4	2.7	2.5	ND	ND	ND	ND	ND	ND	*4*
N-7AR	■	0.9	ND	140	ND	ND	500.3	3.2	1.5	ND	ND	ND	ND	ND	ND	*2*
M-1	1.78	ND	0.13	280	ND	153.4	433.7	19.6	1.1	8	ND	ND	ND	0.23	0.05	*5*
M-2	1.33	0.5	8.60	35	0.015	6314.5	121.3	25.1	0.2	200	ND	ND	ND	ND	ND	*12*
M-4A	3.86	ND	0.16	61	0.006	180.6	**-121.6**	5.5	0.4	ND	ND	ND	ND	0.03	0.04	*2*
M-16	3.20	0.1	0.02	110	0.002	0.9	541.8	3.1	0.7	ND	ND	ND	ND	ND	ND	*2*
M-17	■	1.0	0.02	70	0.018	ND	161.9	3.8	1.8	ND	ND	ND	ND	ND	0.02	*0*
M-18	1.80	0.1	0.39	35	0.065	159.4	**-118.4**	3.0	0.4	ND	ND	ND	ND	0.04	0.03	*4*
S-1A	1.66	ND	2.18	190	ND	3.3	-53.9	24.1	1.4	ND	ND	ND	ND	ND	0.04	*11*
S-2A	1.46	ND	0.01	350	0.001	29.0	45.1	5.2	4.2	ND	2	ND	ND	0.57	0.03	*8*
S-6	0.39	0.2	7.00	170	0.003	37.8	-89.9	6.2	1.8	ND	ND	ND	ND	0.01	0.02	*10*
S-8A	3.30	0.2	7.80	250	0.028	9.2	-98.4	6.2	0.8	ND	ND	ND	ND	0.02	0.02	*6*
MW-3AR	3.51	0.6	0.08	156	0.002	2.8	526	2.9	0.5	ND	1	ND	ND	0.19	0.13	*4*
MW-3B	3.57	ND	ND	150	0.001	12.2	504.7	3.0	0.5	ND	ND	ND	ND	0.06	ND	*2*
OS-1A	3.95	0.2	9.70	90	0.001	139.1	-96.1	6.7	0.8	2	180	43	2	0.05	2.20	*12*
OS-1B	0.40	ND	2.27	250	ND	16.3	**-123.9**	3.9	2.0	ND	ND	ND	ND	ND	0.01	*13*
OS-2A	1.16	0.1	1.60	260	0.002	554.1	-29.5	7.5	2.4	5	190	61	9	0.15	4.21	*18*
OS-2B	1.00	0.1	2.32	54	0.006	732.3	58.8	8.0	1.9	ND	120	18	ND	0.22	2.58	*15*
OS-3A	3.31	0.1	0.02	210	0.006	127.0	555.9	6.0	3.4	2	ND	ND	ND	0.20	0.02	*5*
OS-3B	1.33	ND	2.90	230	ND	146.5	253.1	14.1	0.3	4	ND	ND	ND	0.23	0.07	*5*
OS-4A	2.66	0.8	ND	180	0.005	1.2	476.1	3.9	3.9	ND	ND	ND	ND	ND	ND	*5*
OS-4B	0.79	0.1	2.25	90	0.003	231.9	235.6	6.3	0.5	ND	ND	ND	ND	0.19	0.05	*5*
OS-6A	3.19	6.0	ND	410	0.003	0.8	133.1	6.4	10.4	ND	ND	ND	ND	0.05	0.04	*3*
OS-6B	0.37	0.1	0.36	220	0.004	68.7	**-216.2**	6.6	>50	ND	ND	ND	ND	1.12	0.41	*10*
OS-7A	■	3.6	ND	200	0.002	ND	165.4	3.8	1.6	ND	5	ND	ND	0.01	0.03	*2*
OS-7B	2.66	1.2	0.02	160	0.033	1.9	133.9	2.9	2.9	ND	8	ND	ND	0.01	ND	*5*
BEDROCK WELLS																
N-2B	1.77	ND	0.02	3	0.004	114.4	428.3	1.9	0.4	ND	ND	ND	ND	0.01	0.02	*4*
N-3B	2.24	ND	0.02	14	0.027	993.4	317.3	3.1	1.0	ND	ND	ND	ND	0.02	0.08	*7*
N-6BR	1.85	0.1	0.09	19	0.020	805.5	162.6	1.6	7.2	ND	ND	ND	ND	0.19	0.07	*10*
N-7B	2.26	ND	0.14	42	0.014	164.0	270.3	2.7	0.7	ND	ND	ND	ND	0.07	0.06	*2*
M-4B	1.70	ND	0.25	44	0.015	129.1	115.3	2.5	1.7	ND	ND	ND	ND	ND	0.05	*5*
M-9	1.56	ND	0.35	190	0.060	31.0	**-117.1**	2.4	0.8	ND	ND	ND	ND	ND	0.02	*4*
M-11B	2.04	0.2	0.02	2	0.058	6299.9	273.9	3.2	6.1	ND	ND	ND	ND	0.55	0.54	*10*
S-1B	1.16	0.2	0.04	42	0.013	7942.6	3.5	6.1	3.3	ND	ND	ND	ND	ND	0.03	*9*
S-2B	0.48	ND	0.39	43	0.001	4457.0	**-176.9**	3.1	1.7	ND	ND	ND	ND	0.93	ND	*13*
S-8B	2.74	0.3	* (a)	1	0.112	3839.5	**-153.9**	2.5	13.0	ND	ND	ND	ND	3.21	0.97	*12*
R-1	0.81	0.1	0.01	3	0.006	6356.0	334.4	2.0	3.7	ND	ND	ND	ND	1.12	0.09	*10*

CUMMINGS RITER

TABLE 5-10
NATURAL ATTENUATION ASSESSMENT - FINAL POINT TOTALS

WELL IDENTIFICATION	POINTS FROM GEOCHEMISTRY	POINTS FROM BACKGROUND	*FINAL NA POINT TOTAL*
ALLUVIUM WELLS			
N-3AR			
N-5	4	0	***4***
N-7AR	2	2	***4***
[illegible]	5	1	***6***
[illegible]	12	1	***13***
M-4A	2	0	***2***
M-16	2	1	***3***
M-17	0	1	***1***
M-18	4	0	***4***
[illegible]	11	3	***14***
[illegible]	8	1	***9***
[illegible]	12	3	***15***
[illegible]	6	0	***6***
MW-3AR	4	1	***5***
MW-3B	2	0	***2***
[illegible]	10	1	***11***
[illegible]	13	0	***13***
[illegible]	18	1	***19***
[illegible]	15	1	***16***
[illegible]	5	1	***6***
[illegible]	5	1	***6***
[illegible]	5	1	***6***
[illegible]	5	1	***6***
OS-6A	3	1	***4***
[illegible]	10	0	***10***
OS-7A	2	1	***3***
OS-7B	5	0	***5***
BEDROCK WELLS			
N-2B	4	0	***4***
[illegible]	7	0	***7***
[illegible]	10	0	***10***
N-7B	2	2	***4***
M-4B	5	0	***5***
M-9	4	0	***4***
[illegible]	10	2	***12***
[illegible]	9	0	***9***
[illegible]	13	0	***13***
[illegible]	12	0	***12***
[illegible]	10	2	***12***

■ - limited evidence of NA (6 - 14 pts.)

■ - adequate evidence of NA (15 - 20 pts.)

TABLE 5-11
NATURAL ATTENUATION ASSESSMENT - FINAL POINT TOTALS
ALLUVIUM WELLS sorted by PLUME

WELL IDENTIFICATION	POINTS FROM GEOCHEMISTRY	POINTS FROM BACKGROUND	*FINAL NA POINT TOTAL*
MIDDLE SECTOR - Northern Portion			
M-18	4	0	***4***
M-17	0	1	***1***
M-16	2	1	***3***
MW-3AR	4	1	***5***
MW-3B	2	0	***2***
[redacted]	5	1	***6***
[redacted]	5	1	***6***
MIDDLE SECTOR - Southern Portion			
M-4A	2	0	***2***
[redacted]	12	1	***13***
[redacted]	5	1	***6***
[redacted]	5	1	***6***
[redacted]	5	1	***6***
OS-6A	3	1	***4***
[redacted]	10	0	***10***
SOUTH SECTOR			
[redacted]	12	3	***15***
[redacted]	11	3	***14***
[redacted]	8	1	***9***
[redacted]	6	0	***6***
[redacted]	18	1	***19***
[redacted]	15	1	***16***
[redacted]	10	1	***11***
[redacted]	13	0	***13***
OS-7A	2	1	***3***
OS-7B	5	0	***5***

■ - limited evidence of NA (6 - 14 pts.)

■ - adequate evidence of NA (15 - 20 pts.)

Note: Data collected July 12 through July 16, 1999 and August 12, 1999.

FIGURES

DRAWING NUMBER 93[illegible]1A3

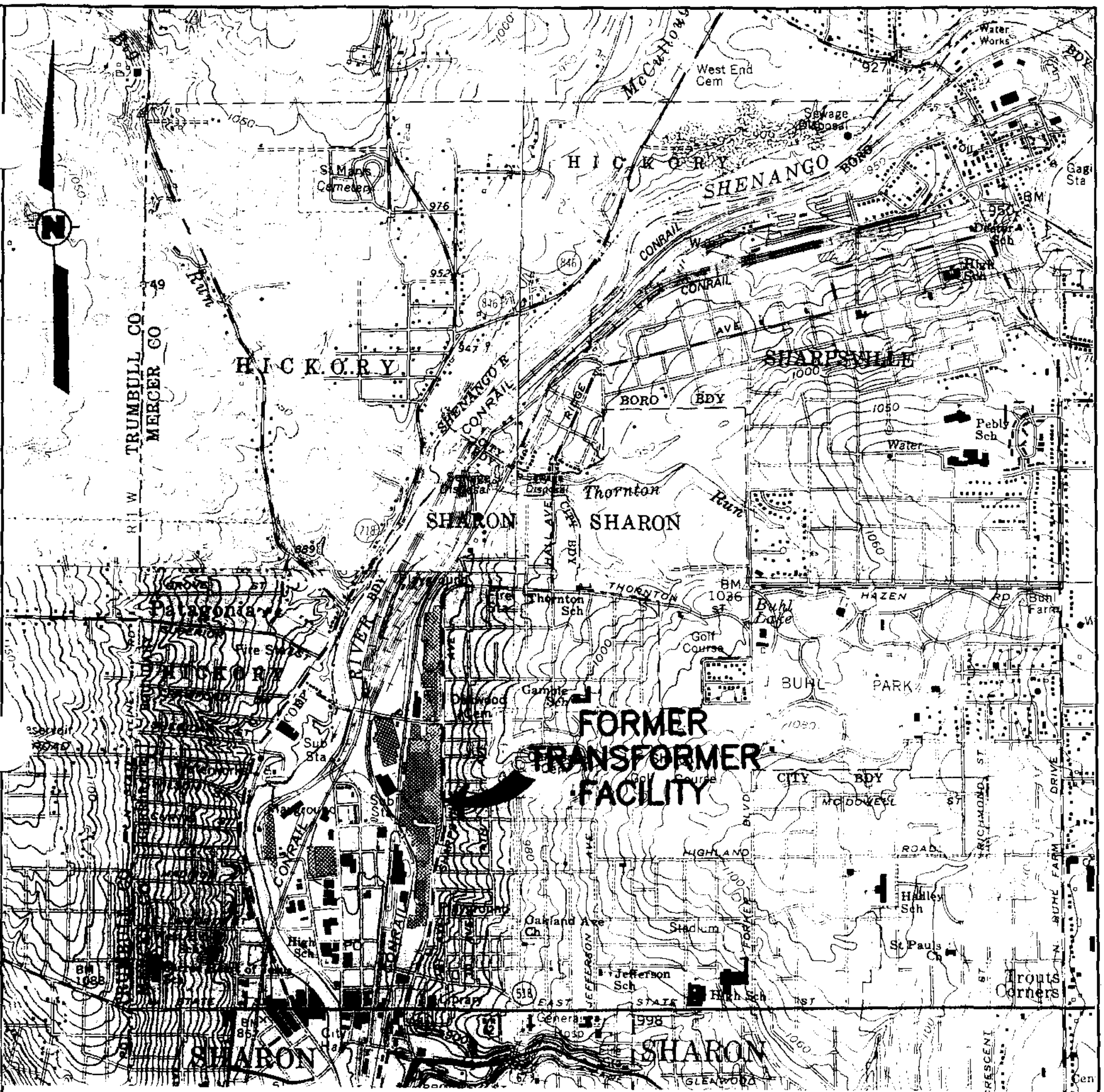


FIGURE 1–1

SITE LOCATION MAP

FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

REFERENCE:

7.5–MIN. TOPOGRAPHIC QUADRANGLE; ORANGEVILLE, OH–PA, 1961 PHOTOREVISED 1979; SHARON EAST, PA, 1958 PHOTOREVISED 1981; SHARON WEST, OH–PA, 1962 PHOTOREVISED 1979; AND SHARPSVILLE, PA, 1958 PHOTOREVISED 1981, SCALE 1:24000.

SCALE
0 2000 4000 FT.

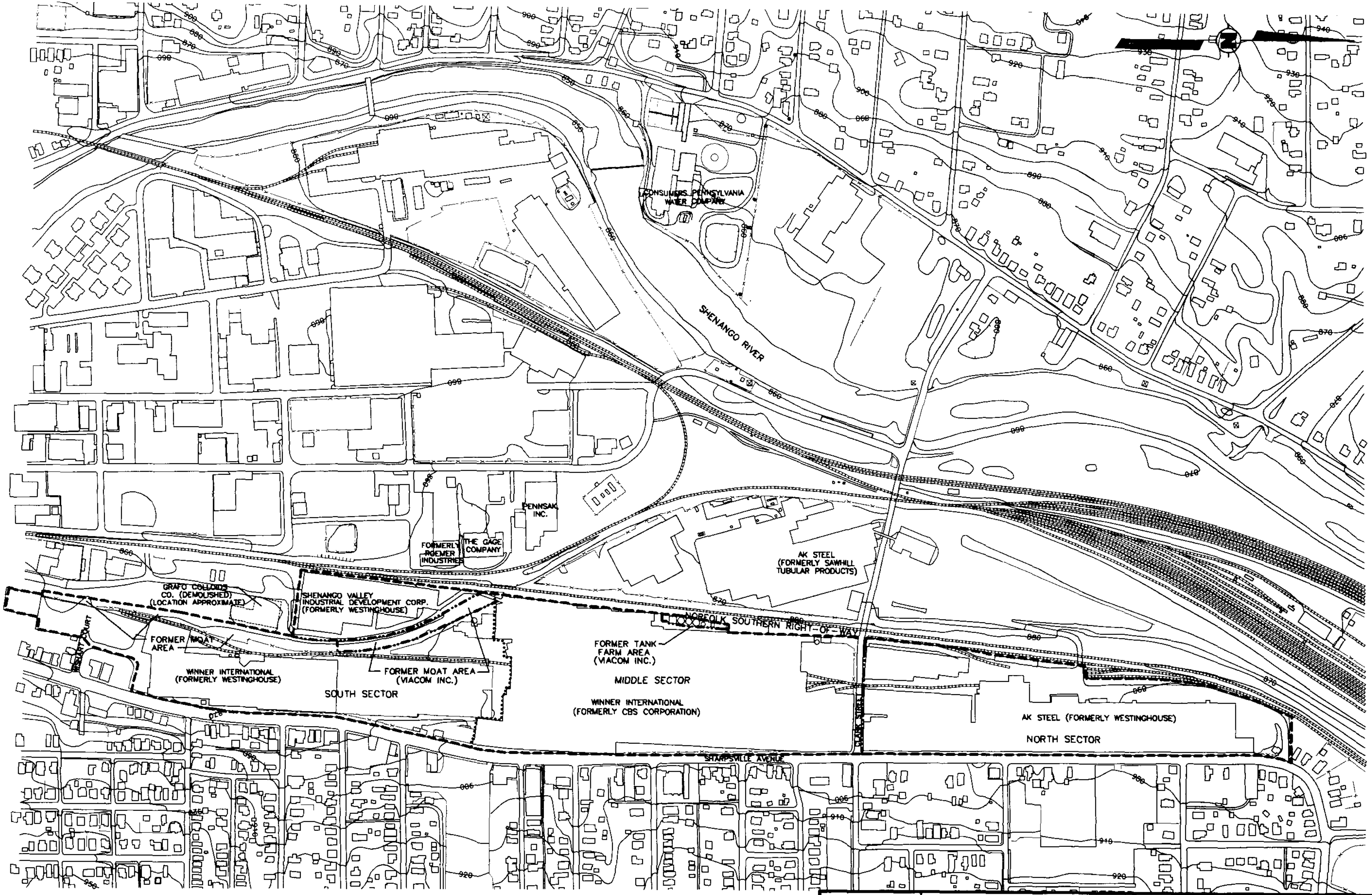
CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER
93111A3

REVISION	DATE	DESCRIPTION

DRAWN BY:	B. MAURER	DATE:	3–14–94
CHECKED BY	W. BAUGHMAN	DATE:	3–14–94
APPROVED BY:	P. O'HARA	DATE:	3–14–94

DRAWING NUMBER 93111E33



REFERENCE:

E MAP WAS GENERATED BY
TERN MAPPING, INC., 1991.

PLOT SCALE: 1=200

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.

LEGEND:

- — — — — APPROXIMATE BOUNDARY OF SITE
- —··—··— APPROXIMATE CURRENT ON-SITE PROPERTY LINE
- ·········· APPROXIMATE BOUNDARY BETWEEN SOUTH AND MIDDLE SECTORS

2' CONTOUR INTERVAL

SCALE

200 0 200 400 FEET

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REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
△	REVISED PROPERTY LINES	9/6/95	

DRAWN BY:	B. MAURER	DATE: 3/3/95
CHECKED BY:	D. SPICUZZA	DATE: 3/29/95
APPROVED BY:	W. BAUGHMAN	DATE: 3/30/95

FIGURE 2-1
TOPOGRAPHIC VICINITY MAP
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

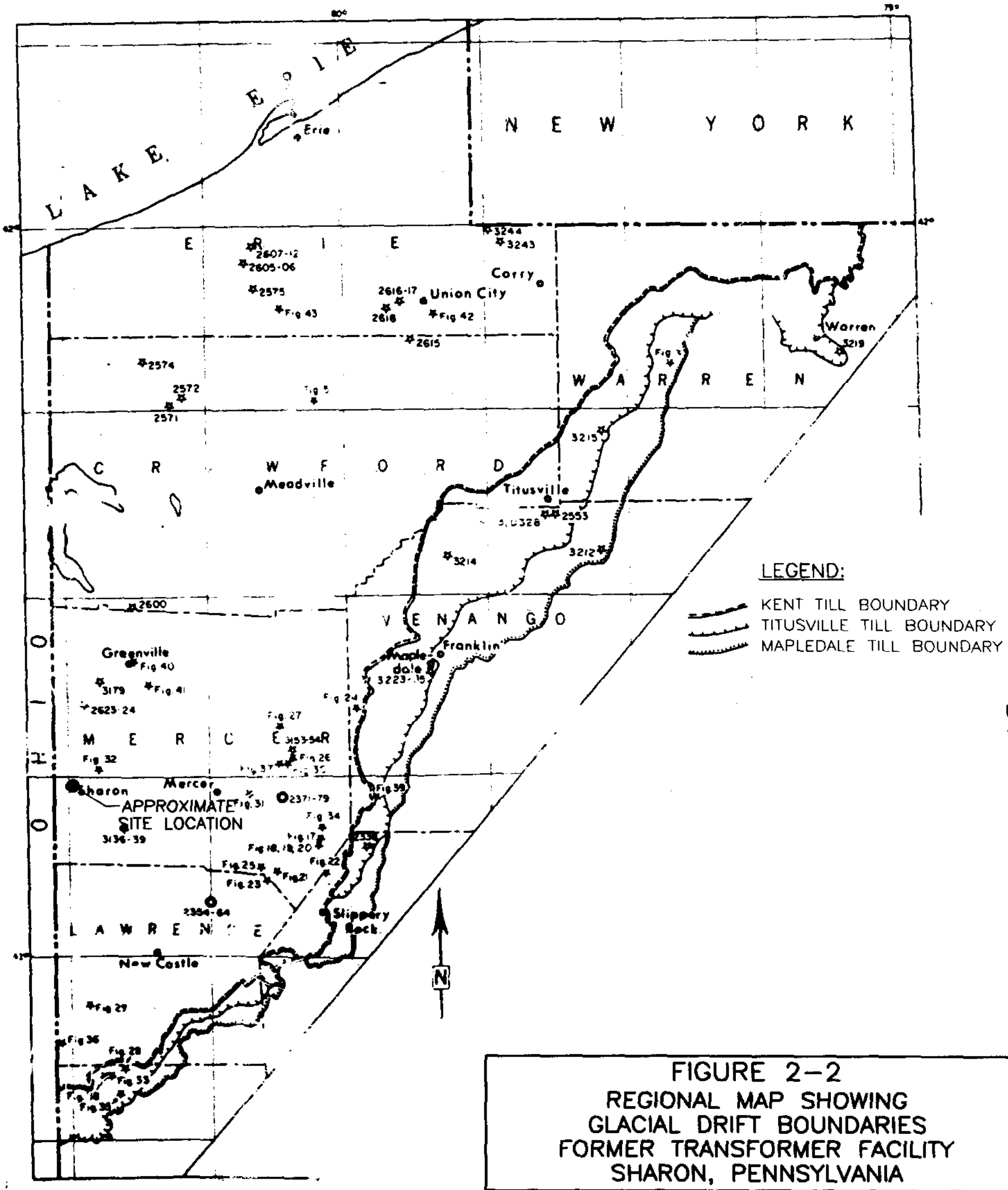
SIZE E

DRAWING NUMBER 93111E33

REV. △

SCALE: AS SHOWN

SHEET 1 OF 1



REFERENCE:
WHITE, ET. AL, 1969

FIGURE 2-2
REGIONAL MAP SHOWING GLACIAL DRIFT BOUNDARIES FORMER TRANSFORMER FACILITY SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

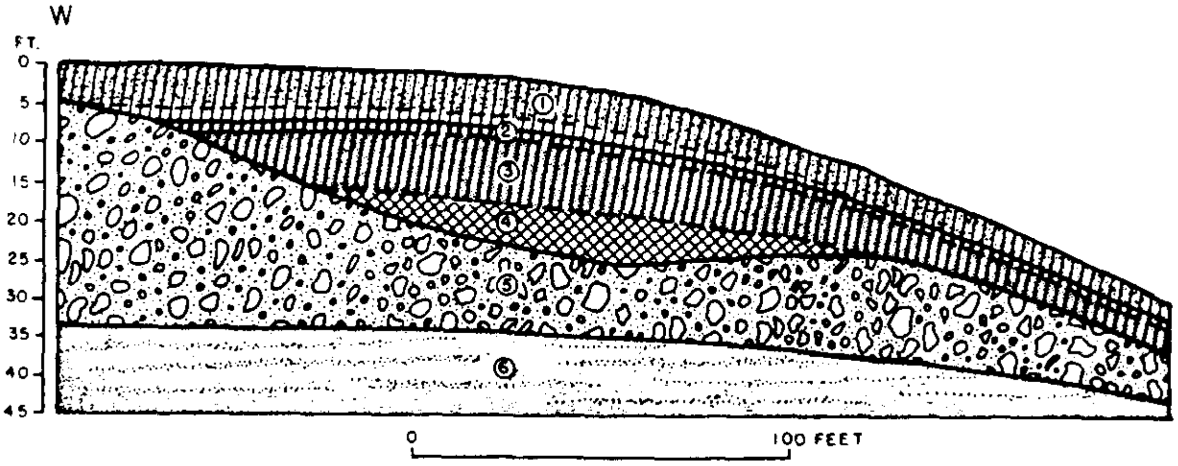
CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER
93111A6

REVISION	DATE	DESCRIPTION

DRAWN BY: J. CHIAVERINI DATE: 3-9-95
CHECKED BY B. MAURER DATE: 3-9-95
APPROVED BY: W. BAUGHMAN DATE: 3-11-95

DRAWING NUMBER 93111A5



LEGEND:

1. **Till, upper part weathered, with soil at top; lower part, fresh, yellow-brown, KENT (dashed line indicates depth of leaching).**
2. **Truncated paleosol and severely weathered till.**
3. **Till, olive-brown, weathered, TITUSVILLE.**
4. **Till, olive-brown, calcareous, TITUSVILLE.**
5. **Gravel, brown, cobbly to coarse bouldery, upper part weathered, pieces mainly sandstone, MAPLEDALE.**
6. **Sandstone and siltstone.**

REFERENCE:
WHITE, ET. AL, 1969

FIGURE 2-3
CROSS SECTION OF GLACIAL
DEPOSITS NEAR SHARPSVILLE, PA.
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

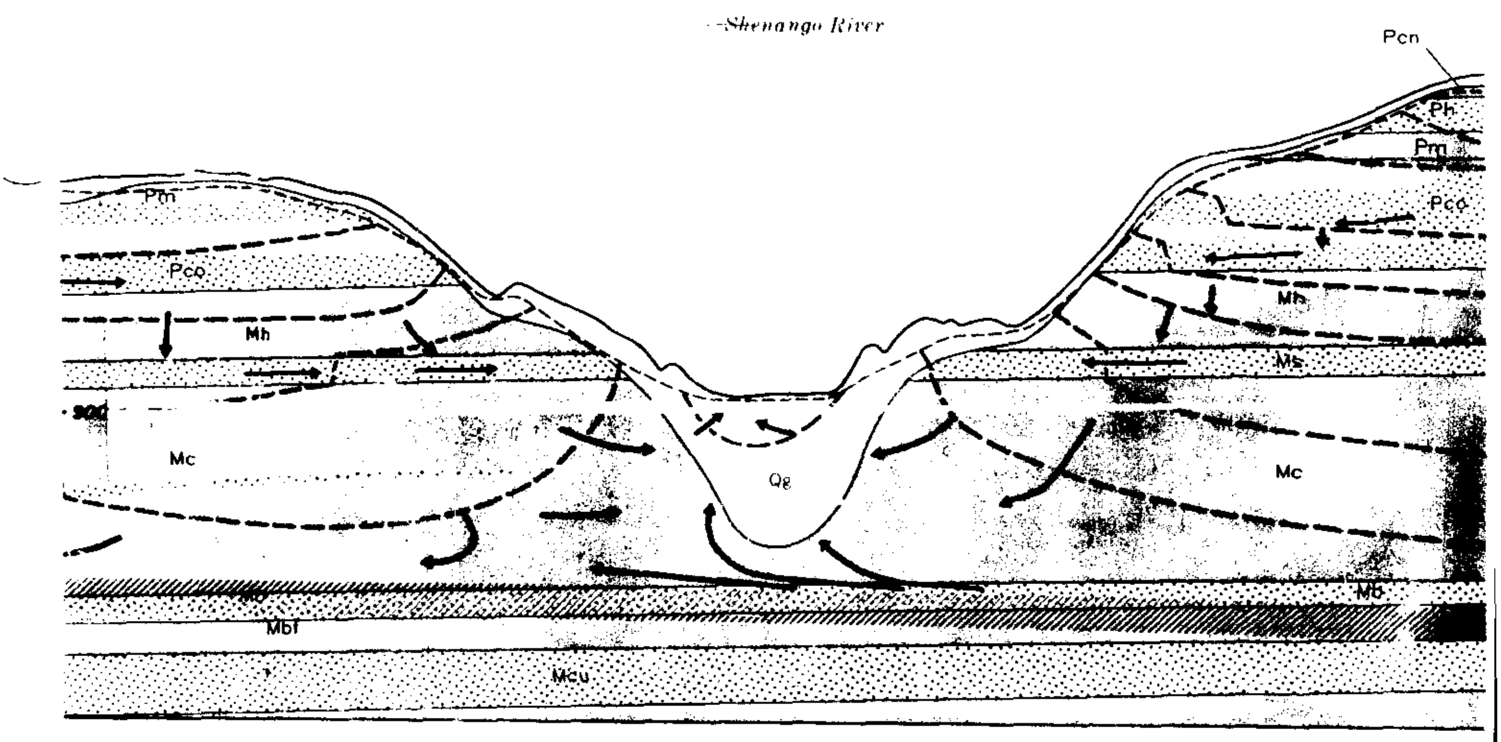
CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER
93111A5

DRAWN BY:	J. CHIAVERINI	DATE:	3-9-95
CHECKED BY	B. MAURER	DATE:	3-9-95
APPROVED BY:	W. BAUGHMAN	DATE:	3-11-95

REVISION	DATE

DRAWING NUMBER 93111A8



LEGEND:

GEOLOGIC FORMATIONS

QUATERNARY SYSTEM
Qg Unconsolidated deposits

PENNSYLVANIAN SYSTEM
ALLEGHENY GROUP
Pkl Kittanning Formation, lower member
Pv Vanport Limestone
Pcn Clarion Formation
POTTSVILLE GROUP
Ph Homewood Formation
Pm Mercer Formation
Pco Connoquenessing Formation

MISSISSIPPIAN SYSTEM
Mh Hempfield Shale
Ms Shenango Formation
Mc Cuyahoga Group undiff.
Mb Berea Sandstone
Mbf Bedford Shale
Mcu Cussewago Sandstone

LITHOLOGY

Sandstone
Limestone
Shale
Unconsolidated deposits

HYDROLOGY

- - - - - Watertable
— — — Lines of equal head shown in feet above sea level
← Arrows indicating general directions of flow
▨ Approximate position of the contact between circulating fresh water and connate brine

NOTE:
GENERALIZED HYDROSTRATIGRAPHIC CROSS SECTION LOCATED APPROXIMATELY ONE MILE SOUTH–SOUTHEAST OF THE FORMER SHARON TRANSFORMER FACILITY.

REFERENCE:
"GEOLOGY AND HYDROLOGY OF THE NESHANNOCK QUADRANGLE, MERCER AND LAWRENCE COUNTIES," CARSWELL, L.D. AND G.D.
NNETT, PENNSYLVANIA WATER RESOURCES REPORT 15, 1963,
PROXIMATE SCALE: 1" = 2300'.

FIGURE 2–4
GENERALIZED HYDROSTRATIGRAPHIC CROSS SECTION FORMER TRANSFORMER FACILITY SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER
93111A8

DRAWN BY:	B. MAURER	DATE:	3/17/95
CHECKED BY	D. SPICUZZA	DATE:	3/29/95
APPROVED BY:	W. BAUGHMAN	DATE:	3/30/95

REVISION	DATE	DESCRIPTION

DRAWING NUMBER 93111A7

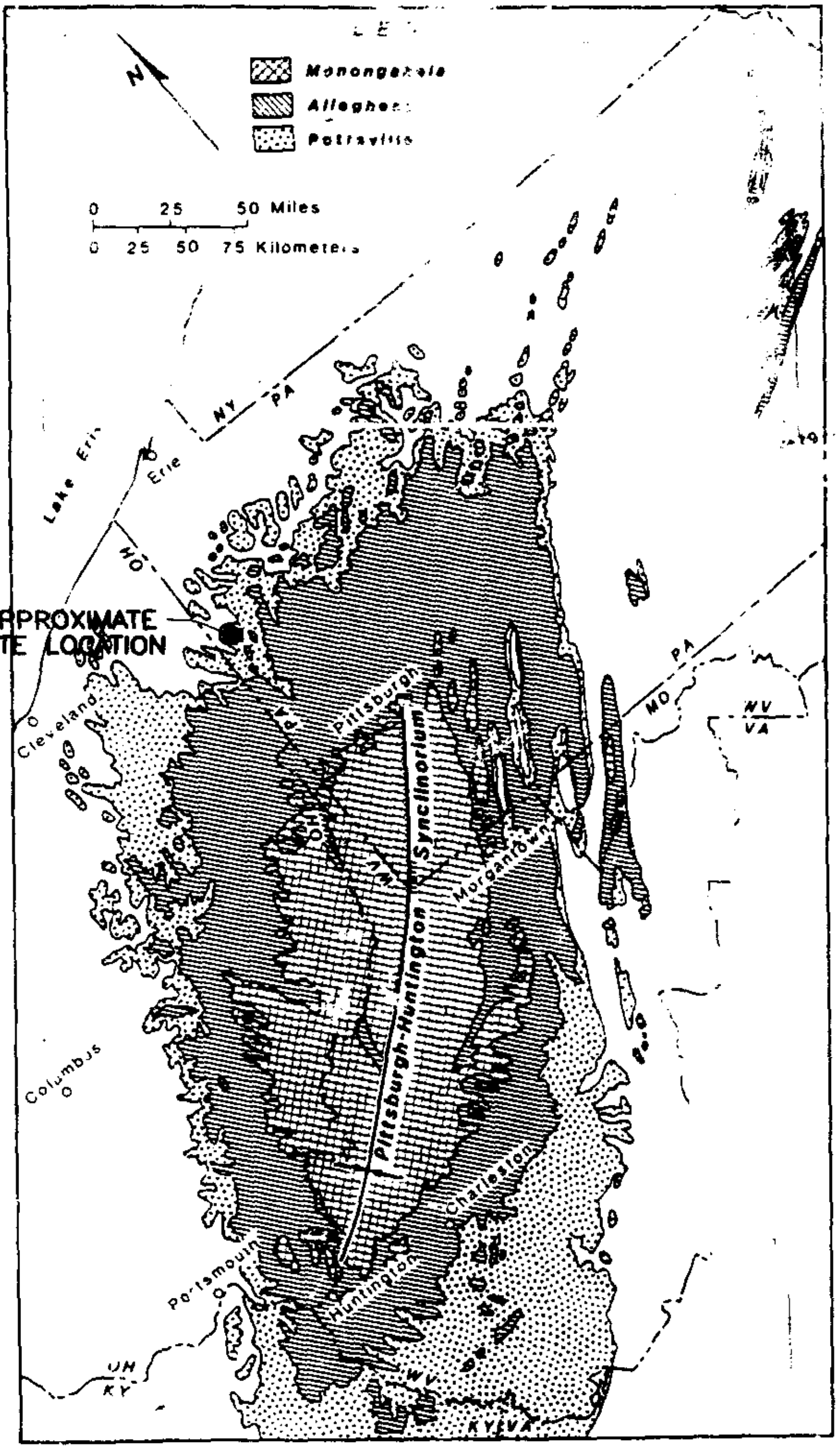


FIGURE 2–5
GENERAL FORMATION FEATURES PITTSBURGH–HUNTINGTON SYNCLINORIUM FORMER TRANSFORMER FACILITY SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

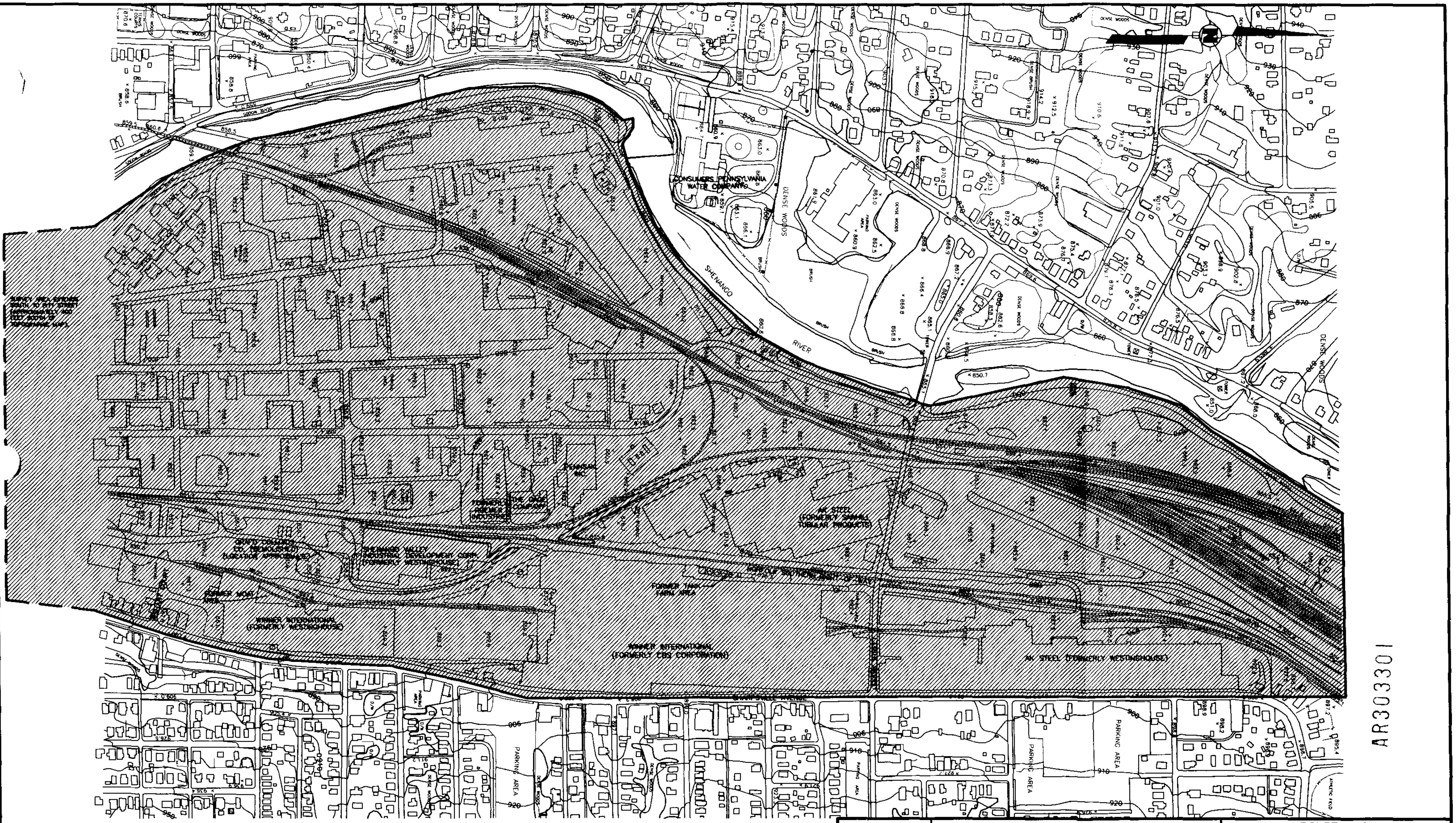
CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER
93111A7

REFERENCE:
"GELOGICAL ASPECTS OF COAL–BED METHANE OCCURRENCE IN THE NORTHERN APPALACHIAN COAL BASIN," WEST VIRGINIA OLOGICAL AND ECONOMIC SURVEY AND PENNSYLVANIA POGRAPHIC AND GEOLOGIC SURVEY, OPEN FILE REPORT, IL 1992 TO AUGUST 1993.

			DRAWN BY: *B. MAURER*	DATE: *3/17/95*
			CHECKED BY *D. SPICUZZA*	DATE: *3/29/95*
REVISION	DATE	DESCRIPTION	APPROVED BY: *W. BAUGHMAN*	DATE: *3/30/95*

DRAWING NUMBER 93111E31



AR303301

EFERENCE:
SE MAP WAS GENERATED BY
STERN MAPPING, INC., 1991.

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TEN-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.

PLOT SCALE: 1=200

LEGEND:

▨ APPROXIMATE EXTENT OF RESIDENTIAL/INDUSTRIAL WELL SURVEY

2' CONTOUR INTERVAL

SCALE

200 0 200 400 FEET

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REV.	DESCRIPTION	DATE	APPROVED

DRAWN BY: B. MAURER DATE: 2/28/95
CHECKED BY: D. SPICUZZA DATE: 3/29/95
APPROVED BY: W. BAUGHMAN DATE: 3/30/95

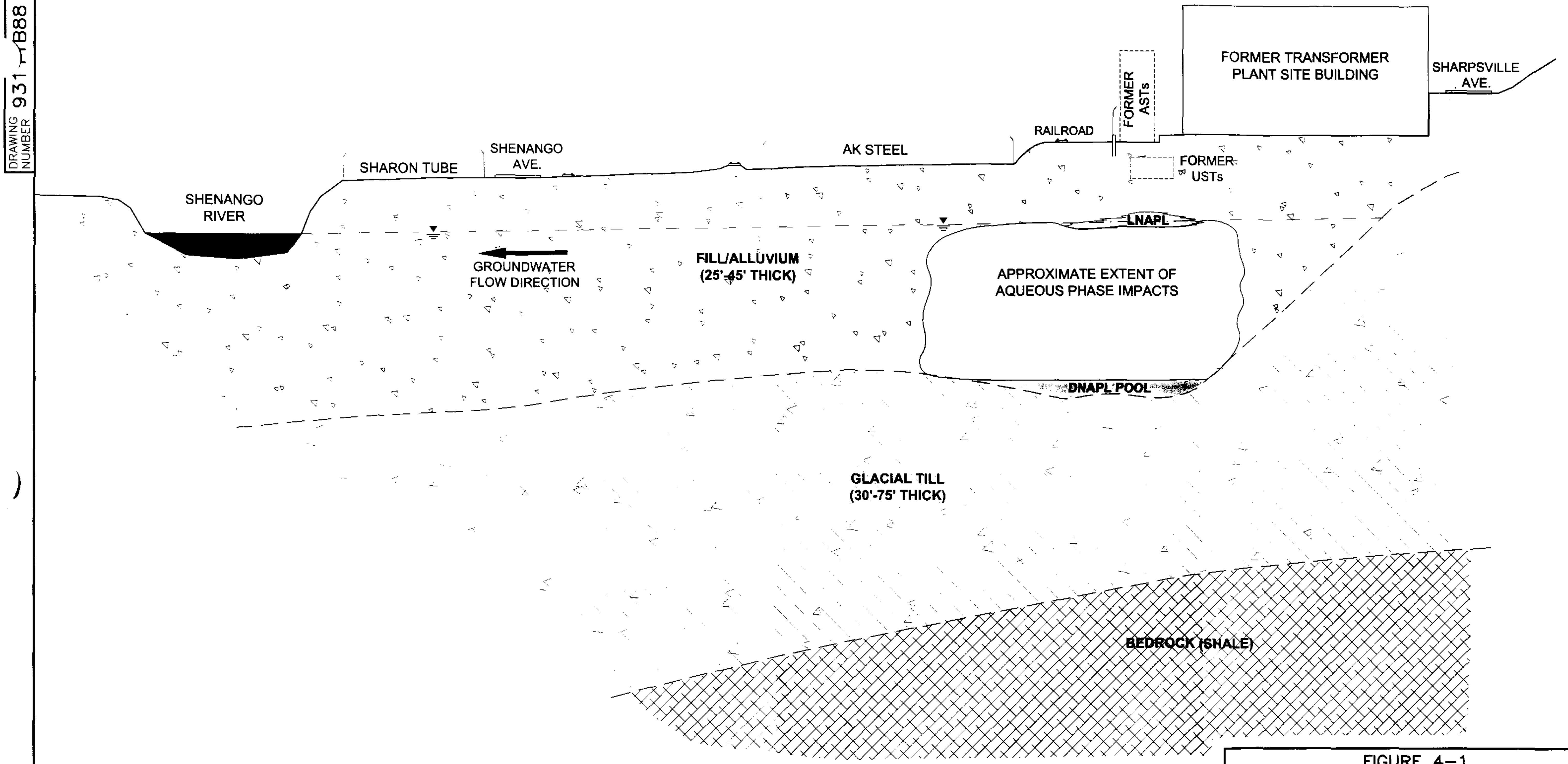
FIGURE 2-6
REMEDIAL INVESTIGATION RESIDENTIAL/INDUSTRIAL WELL SURVEY AREA FORMER TRANSFORMER FACILITY SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E
DRAWING NUMBER 93111E31
REV.
SCALE: AS SHOWN
SHEET 1 OF 1

DRAWING NUMBER 931 1B88

PLOT SCALE: 1=1



NOT TO SCALE

VIEW LOOKING NORTH–NORTHWEST

AR303302

FIGURE 4–1
SECTION – HYDROGEOLOGIC CONCEPTUAL SITE MODEL
FORMER SHARON TRANSFORMER PLANT
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

CUMMINGS RITER CONSULTANTS, INC.

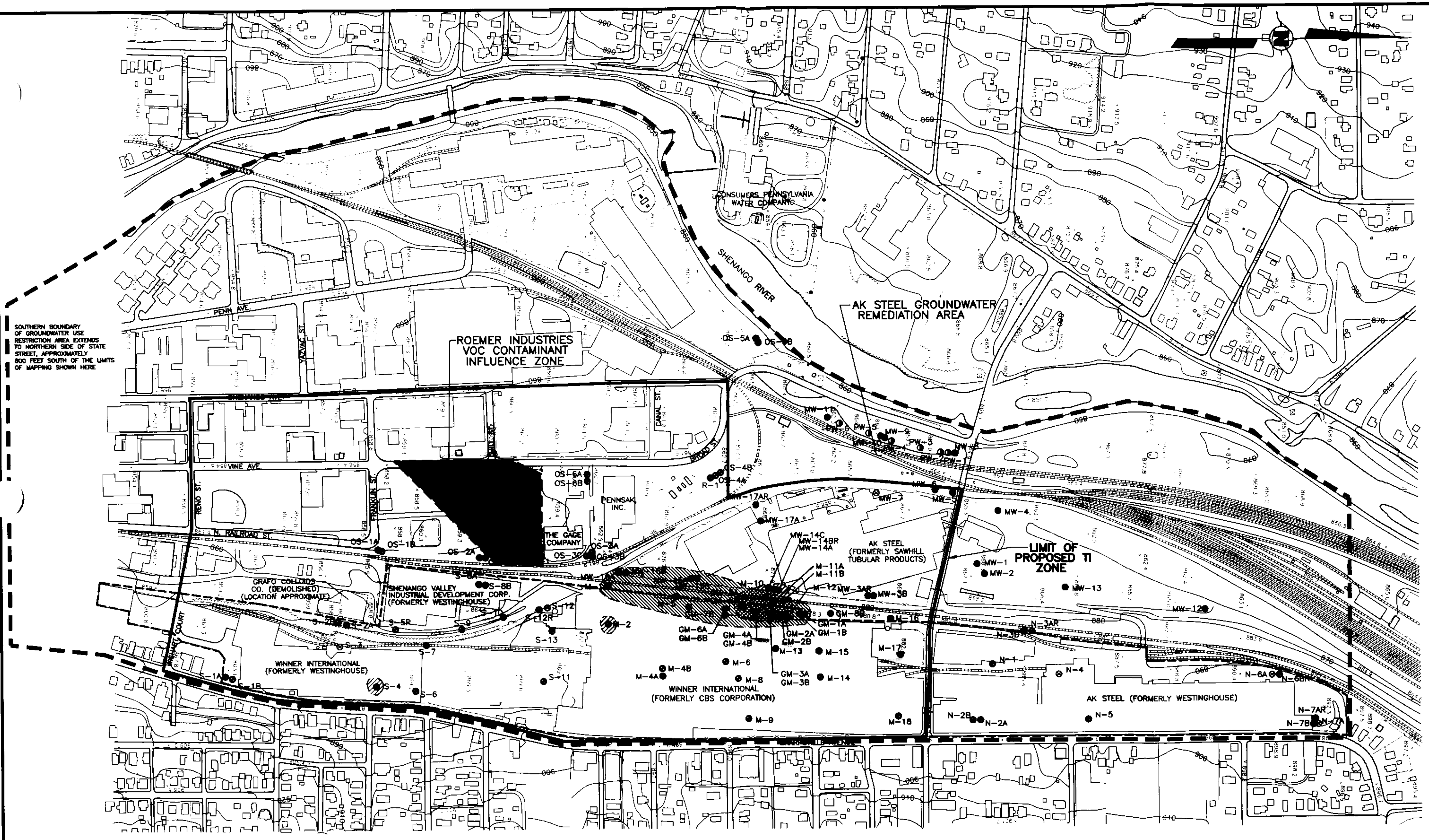
DRAWING NUMBER
93111B88

REVISION	DATE	DESCRIPTION

DRAWN BY: B. MAURER DATE: 8-30-01
CHECKED BY BRMau DATE: 3-21-02
APPROVED BY: A.A. Baughn DATE: 3-21-02

DRAWING NUMBER 93111E81

PLOT SCALE: 1=200



REFERENCE:

BASE MAP WAS GENERATED BY EASTERN MAPPING, INC., 1991.

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TEN-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.

LEGEND:

● M-9	EXISTING RI/FS MONITORING WELL
● MW-1	SAWHILL MONITORING WELL
◐ PW-1	SAWHILL PUMPING WELL
● GM-7B	INTERIM MEASURE WELLS
⊗ N-4	ABANDONED MONITORING WELL
▬ ▬	LIMIT OF GROUNDWATER USE RESTRICTION AREA
------	APPROXIMATE SITE BOUNDARY
● MW-4	APPROXIMATE ROEMER MONITORING WELL
▨	AREAS WHERE LIGHT NON-AQUEOUS PHASE LIQUIDS WERE DETECTED IN THE ALLUVIAL AQUIFER
▨	AREA WHERE DENSE NON-AQUEOUS PHASE LIQUIDS WERE DETECTED IN THE ALLUVIAL AQUIFER
■	AREAS WHERE USEPA MAXIMUM CONTAMINANT LEVEL EXCEEDANCES WERE OBSERVED IN ALLUVIAL AQUIFER (BASED ON THE 1999 SAMPLING AND ANALYSIS)
▬	LIMIT OF PROPOSED TI ZONE

SCALE

200 0 200 400 FEET

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REVISIONS

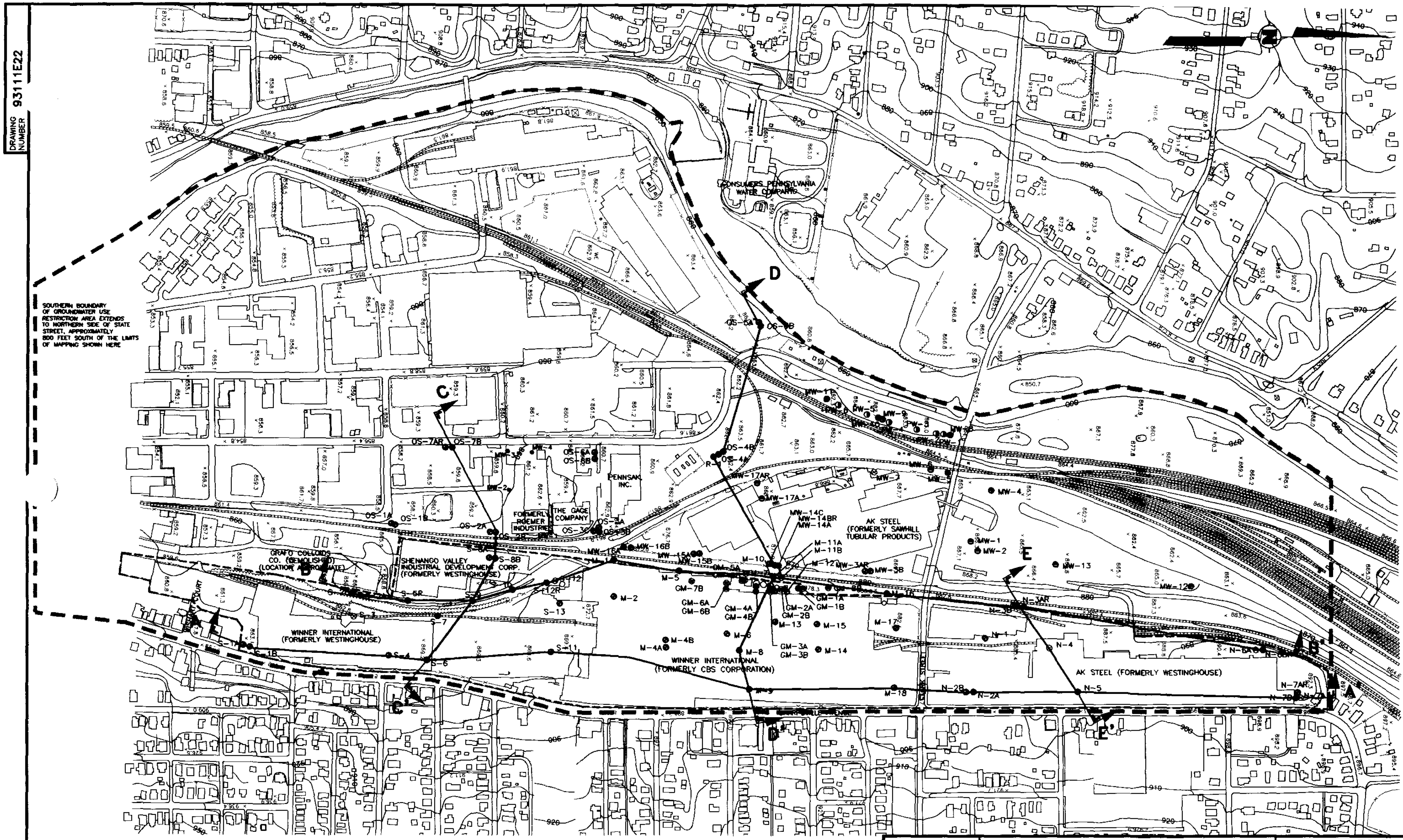
REV.	DESCRIPTION	DATE	APPROVED
1	ADDED PROPOSED TI ZONE	6-26-02	WAB

DRAWN BY:	T.E. McKee	DATE: 9-10-01
CHECKED BY:	B.R. Maurer	DATE: 3-21-02
APPROVED BY:	W.A. Baughman	DATE: 3-21-02

FIGURE 4-2
APPROXIMATE LIMITS OF NON-AQUEOUS PHASE LIQUIDS–
TECHNICAL IMPRACTICABILITY EVALUATION
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E
DRAWING NUMBER 93111E81
REV. 1
SCALE: AS SHOWN
SHEET 1 OF 1



REFERENCE:

[illegible] MAP WAS GENERATED BY [illegible]RN MAPPING, INC., 1991.

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TEN-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.

LEGEND:

- ● M-9 EXISTING RI/FS MONITORING WELL
- ● MW-1 SAWHILL MONITORING WELL
- ◐ PW-1 SAWHILL PUMPING WELL
- ◉ GM-7B INTERIM MEASURE WELLS
- ⊗ N-4 ABANDONED MONITORING WELL
- LIMIT OF GROUNDWATER USE RESTRICTION AREA
- CROSS-SECTION LOCATION
- APPROXIMATE SITE BOUNDARY
- ● MW-4 APPROXIMATE ROEMER MONITORING WELL

SCALE

200 0 200 400 FEET

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REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
⚠	REVISED SITE BOUNDARY, ADDED ROEMER WELLS	9/11/95	

DRAWN BY:	J. CHIAVERINI	DATE: 2-3-95
CHECKED BY:	B. MAURER	DATE: 2-6-95
APPROVED BY:	W. BAUGHMAN	DATE: 2-6-95

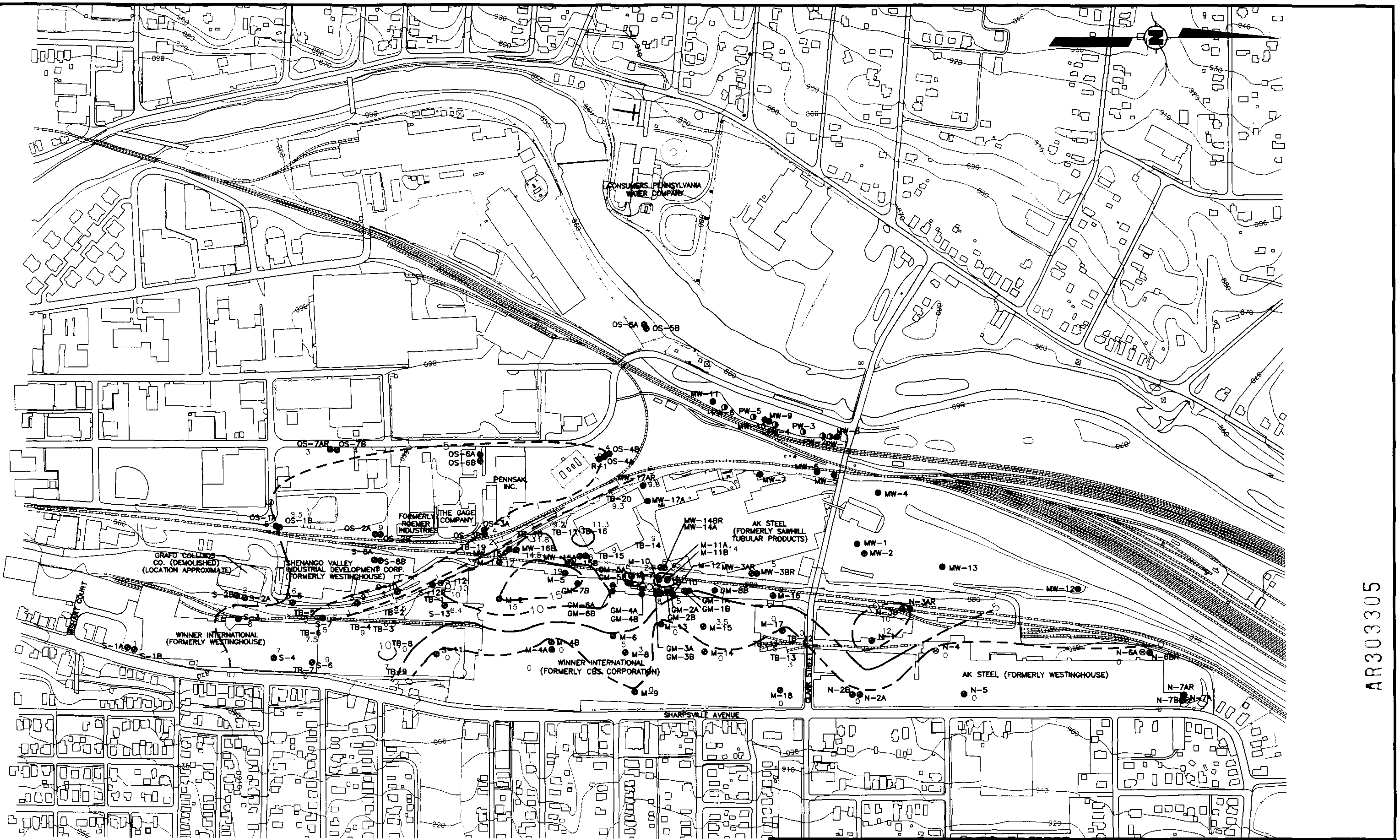
FIGURE 5-1
MONITORING WELL LOCATION MAP
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E | DRAWING NUMBER 93111E22 | REV. ⚠

SCALE: AS SHOWN | SHEET 1 OF 1

PLOT SCALE: 1=200



REFERENCE:
BASE MAP WAS GENERATED BY ASTERN MAPPING, INC., 1991.

NOTES:
1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.
2. DATA PRESENTED WAS OBTAINED FROM RIZZO 1986, AND RI INVESTIGATIONS.

LEGEND:

● M-9	EXISTING RI/FS MONITORING WELL
● MW-1	SAWHILL MONITORING WELL
◑ PW-1	SAWHILL PUMPING WELL
● GM-7B	INTERIM MEASURE WELLS
⊗ N-4	ABANDONED MONITORING WELL
5	ISOPACH CONTOUR OF FILL (FEET)

2' CONTOUR INTERVAL

SCALE

200 0 200 400 FEET

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REVISIONS

REV.	DESCRIPTION	DATE	APPROVED

DRAWN BY:	C. PAMPUCH	DATE: 2-15-95
CHECKED BY:	B. MAURER	DATE: 2-16-95
APPROVED BY:	W. BAUGHMAN	DATE:

FIGURE 5-2
ISOPACH CONTOURS OF FILL

FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

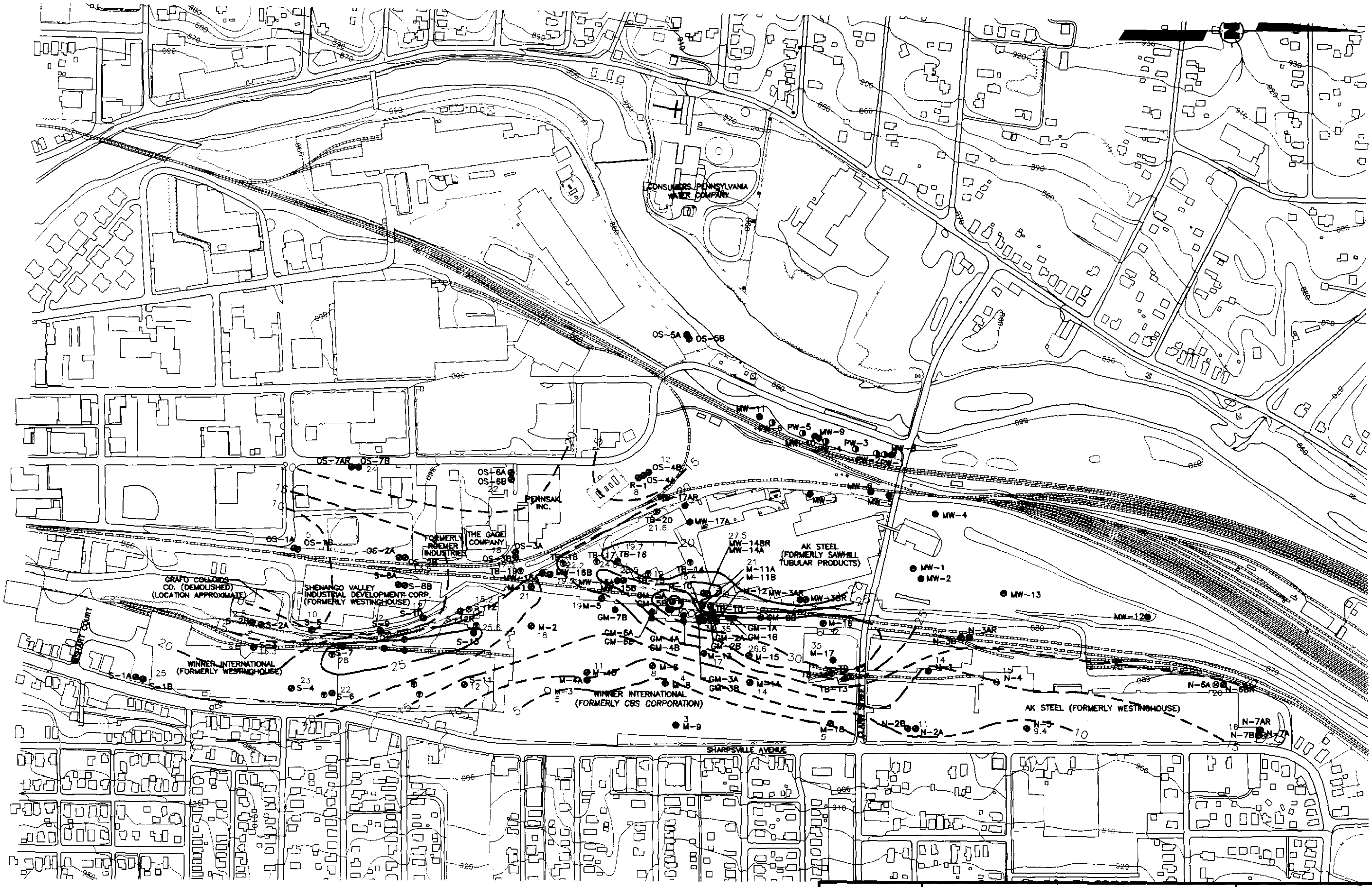
PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E DRAWING NUMBER 93111E17 REV.

SCALE: 1"=200' SHEET 1 OF 1

PLOT SCALE: 1=

DRAWING NUMBER 9?11E18



REFERENCE:
BASE MAP WAS GENERATED BY STERN MAPPING, INC., 1991.

NOTES:
1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.
2. DATA PRESENTED WAS OBTAINED FROM RIZZO 1986, AND RI INVESTIGATIONS.

PLOT SCALE: 1=?

LEGEND:

● M-9	EXISTING RI/FS MONITORING WELL
● MW-1	SAWHILL MONITORING WELL
◑ PW-1	SAWHILL PUMPING WELL
● GM-7B	INTERIM MEASURE WELLS
⊗ N-4	ABANDONED MONITORING WELL
○	TEST BORING – NO MONITORING WELL INSTALLED
◉	PHASE II RI TEST BORING
5	ISOPACH CONTOUR OF ALLUVIUM (FT.)

2' CONTOUR INTERVAL

SCALE

200 0 200 400 FEET

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Fax: (412) 828-3367

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED

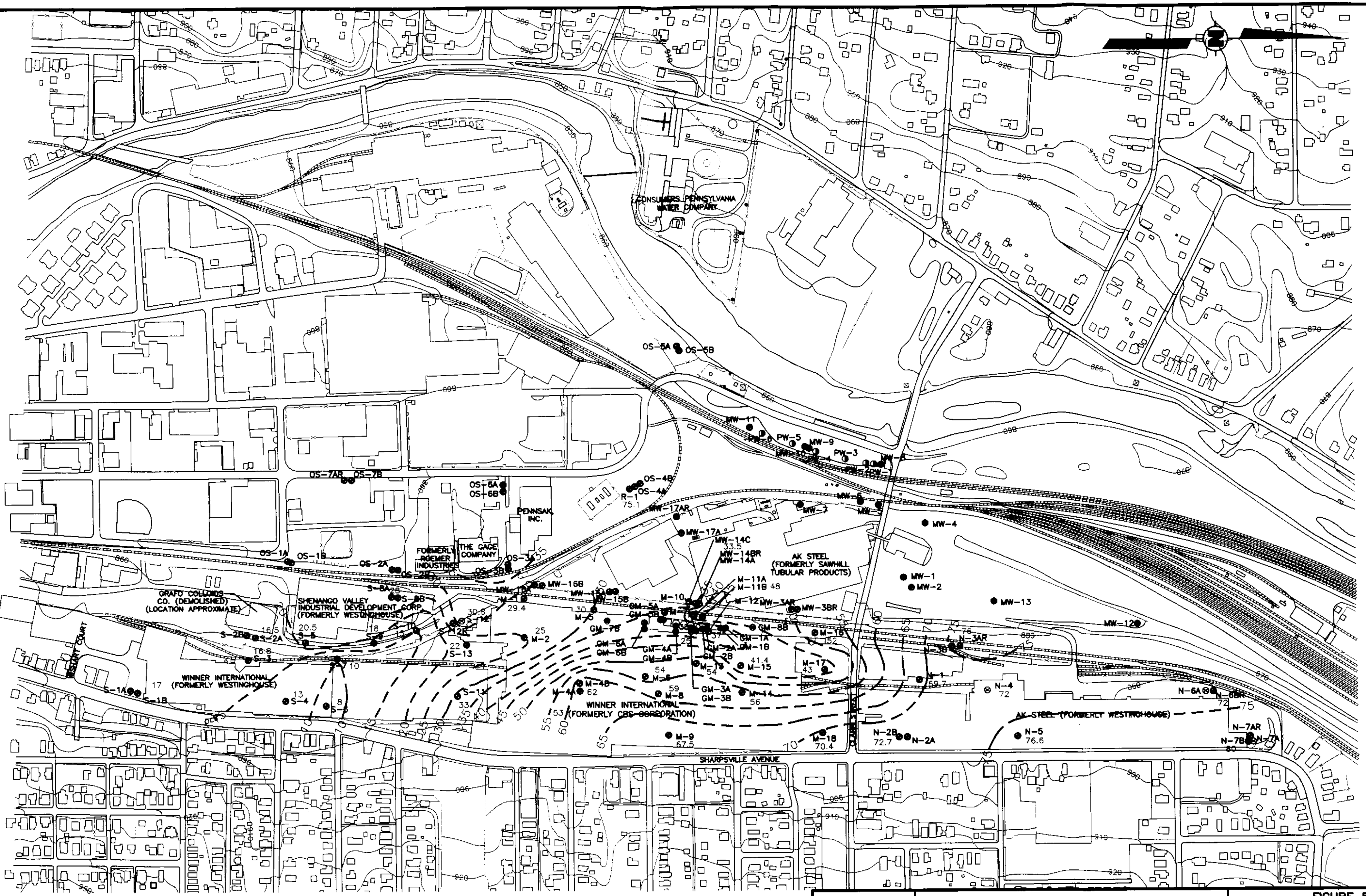
DRAWN BY:	C. PAMPUCH	DATE: 2-14-95
CHECKED BY:	B. MAURER	DATE: 2-16-95
APPROVED BY:	W. BAUGHMAN	DATE:

FIGURE 5-3
ISOPACH CONTOURS
OF ALLUVIUM
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E | DRAWING NUMBER 93111E18 | REV.
SCALE: 1"=200' | SHEET 1 OF 1

PLOT SCALE: 1=2



REFERENCE:
BASE MAP WAS GENERATED BY STERN MAPPING, INC., 1991.

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.
2. DATA PRESENTED WAS OBTAINED FROM RIZZO 1986, AND RI INVESTIGATIONS.

LEGEND:

● M-9	EXISTING RI/FS MONITORING WELL	⊗ N-4	ABANDONED MONITORING WELL
● MW-1	SAWHILL MONITORING WELL	50	ISOPACH CONTOUR OF GLACIAL TILL (FT.)
◑ PW-1	SAWHILL PUMPING WELL		
● GM-7B	INTERIM MEASURE WELLS		

2' CONTOUR INTERVAL

SCALE

200 0 200 400 FEET

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Fax: (412) 826-3367

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED

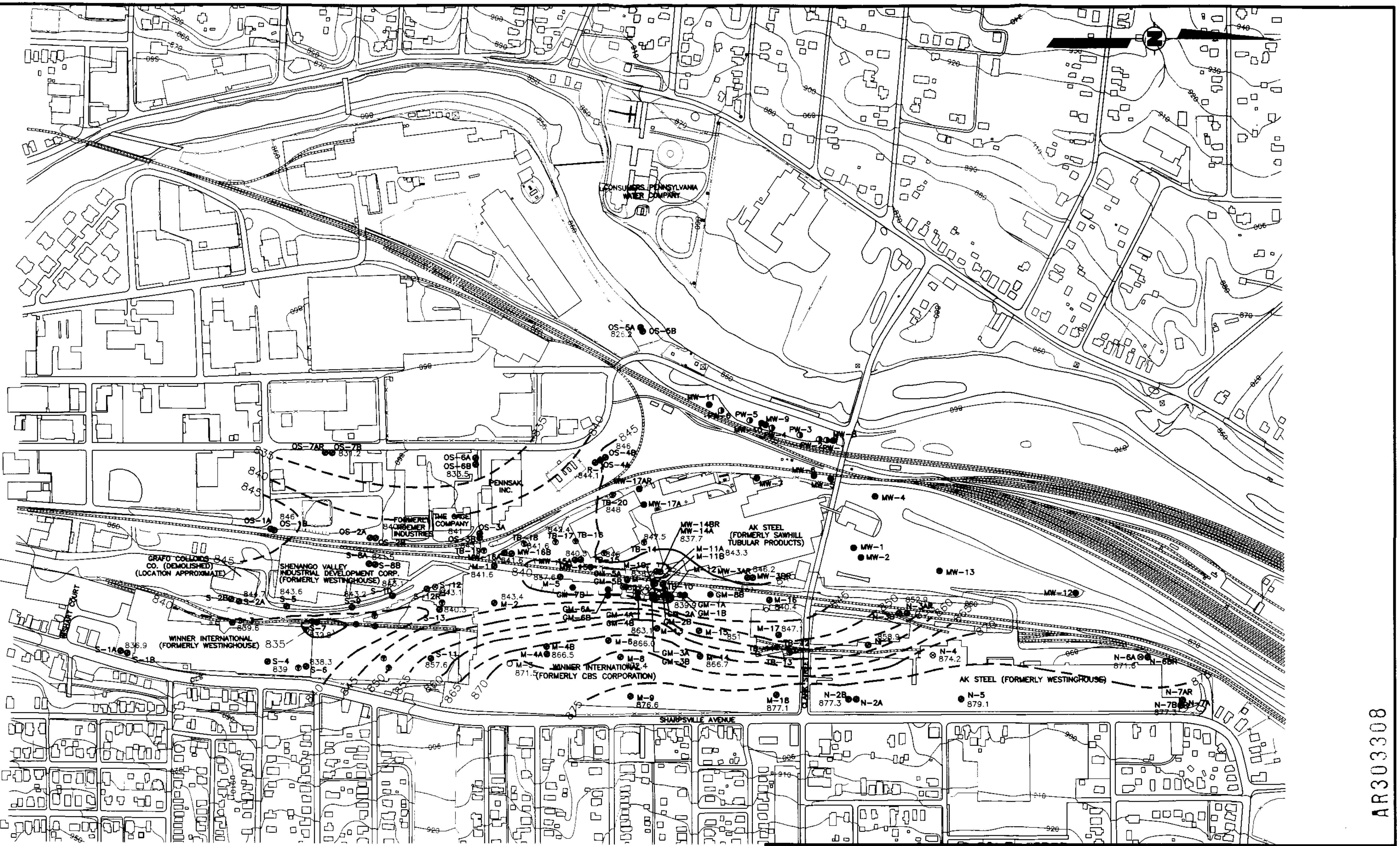
DRAWN BY:	C. PAMPUCH	DATE: 2-14-95
CHECKED BY:	B. MAURER	DATE: 2-16-95
APPROVED BY:	W. BAUGHMAN	DATE:

FIGURE 5-4
ISOPACH CONTOURS
OF GLACIAL TILL
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E DRAWING NUMBER 93111E20 REV.
SCALE: 1"=200' SHEET 1 OF 1

DRAWING NUMBER 9̶3̶111E19



REFERENCE:
BASE MAP WAS GENERATED BY
…STERN MAPPING, INC., 1991.

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.
2. DATA PRESENTED WAS OBTAINED FROM RIZZO 1986, AND RI INVESTIGATIONS.

LEGEND:

● M-9	EXISTING RI/FS MONITORING WELL	⊗ N-4	ABANDONED MONITORING WELL
● MW-1	SAWHILL MONITORING WELL	○	TEST BORING – NO MONITORING WELL INSTALLED
◑ PW-1	SAWHILL PUMPING WELL	●	PHASE II RI TEST BORING
● GM-7B	INTERIM MEASURE WELLS	850	SURFACE CONTOUR OF GLACIAL TILL (FT. MSL)

2' CONTOUR INTERVAL

SCALE

200 0 200 400 FEET

PLOT SCALE: 1=2

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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED

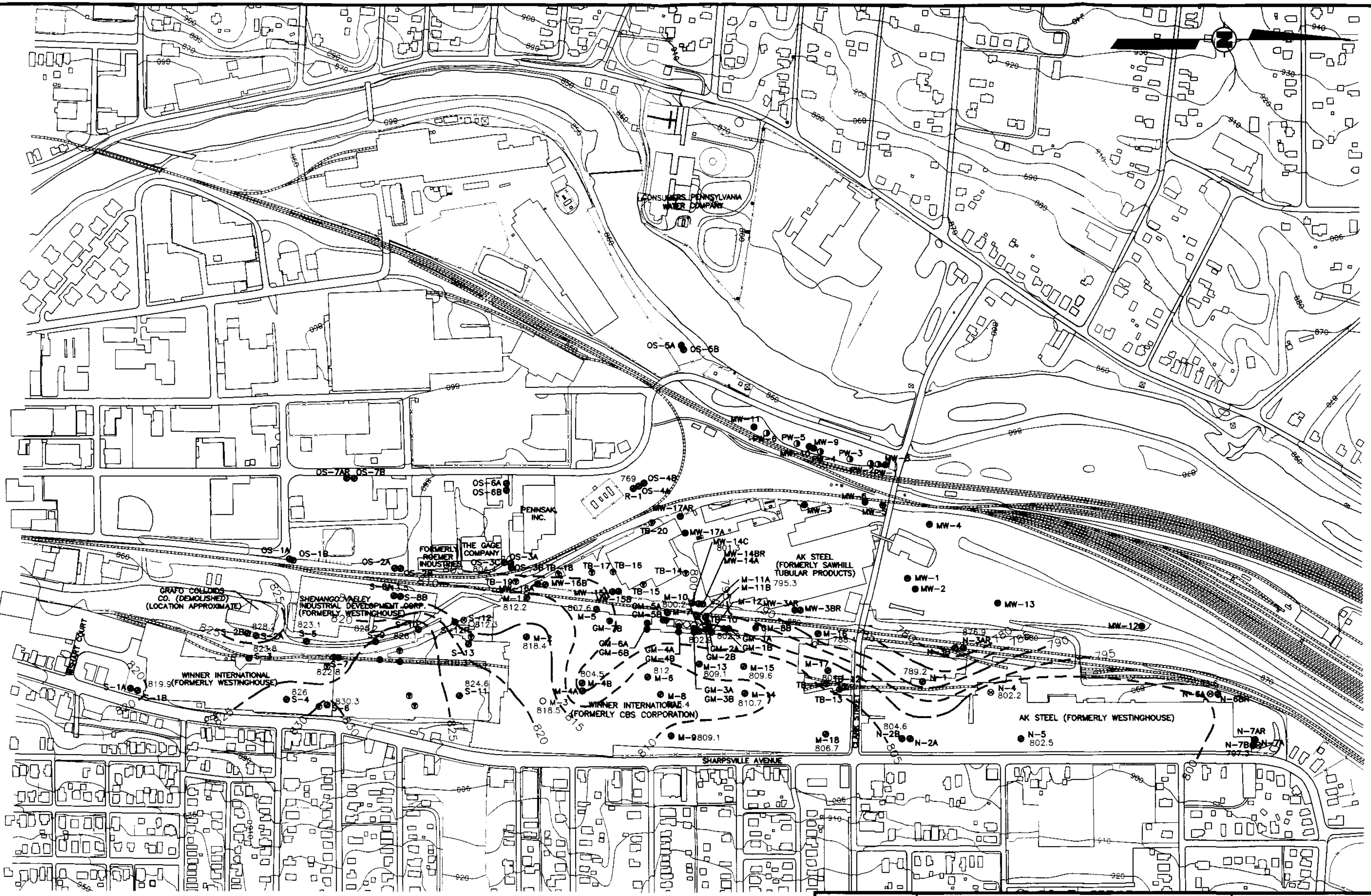
DRAWN BY:	C. PAMPUCH	DATE: 2-14-95
CHECKED BY:	B. MAURER	DATE: 2-16-95
APPROVED BY:	W. BAUGHMAN	DATE:

FIGURE 5-5
SURFACE CONTOURS
OF GLACIAL TILL
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E | DRAWING NUMBER 93111E19 | REV.

SCALE: 1"=200' SHEET 1 OF 1



REFERENCE:

SE MAP WAS GENERATED BY
TERN MAPPING, INC., 1991.

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.
2. DATA PRESENTED WAS OBTAINED FROM RIZZO 1986, AND RI INVESTIGATIONS.

LEGEND:

● M-9	EXISTING RI/FS MONITORING WELL	⊗ N-4	ABANDONED MONITORING WELL
● MW-1	SAWHILL MONITORING WELL	○	TEST BORING -- NO MONITORING WELL INSTALLED
◑ PW-1	SAWHILL PUMPING WELL	●	PHASE II RI TEST BORING
● GM-7B	INTERIM MEASURE WELLS	825 ——	SURFACE CONTOUR OF BEDROCK (FT. MSL.)

2' CONTOUR INTERVAL

SCALE

200 0 200 400 FEET

PLOT SCALE: 1=2

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REVISIONS

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DRAWN BY:	C. PAMPUCH	DATE: 2-14-95
CHECKED BY:	B. MAURER	DATE: 2-16-95
APPROVED BY:	W. BAUGHMAN	DATE:

FIGURE 5-6
SURFACE CONTOURS
OF BEDROCK
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
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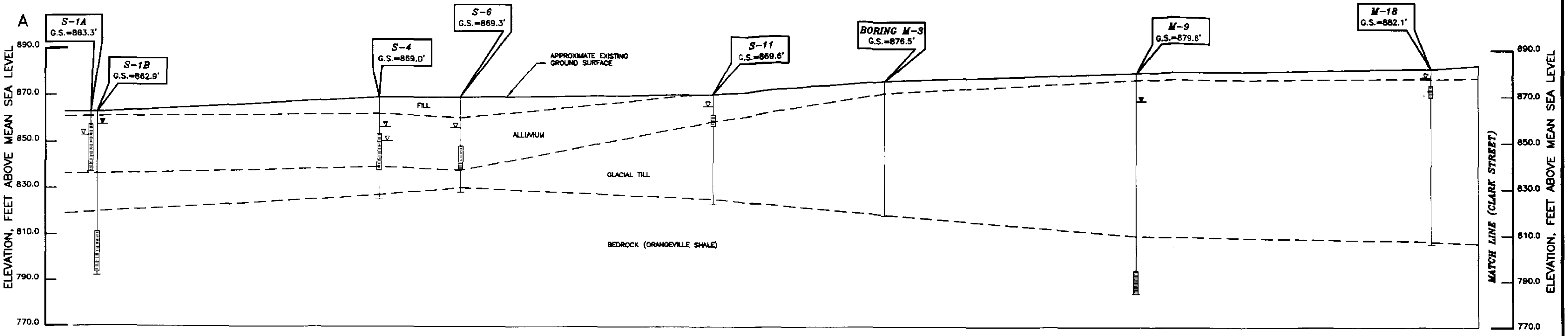
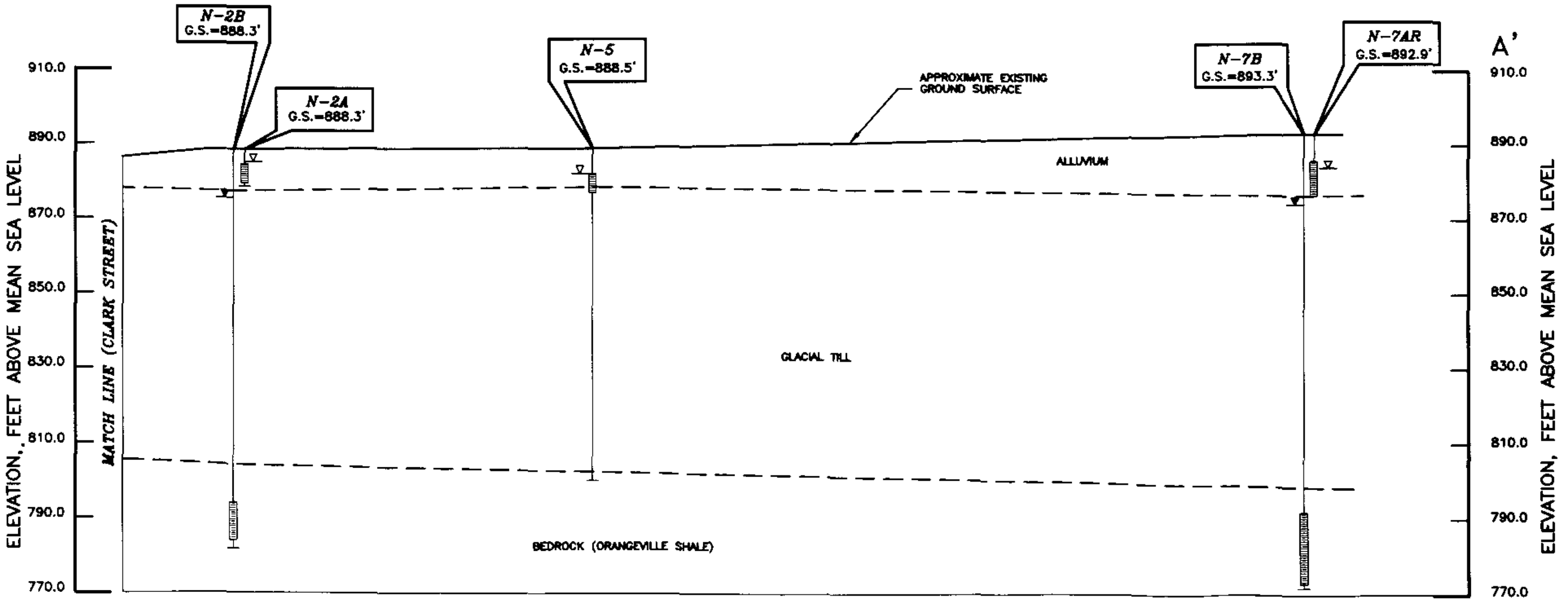
SIZE	DRAWING NUMBER	REV.
E	93111E21	

SCALE: 1"=200' SHEET 1 OF 1



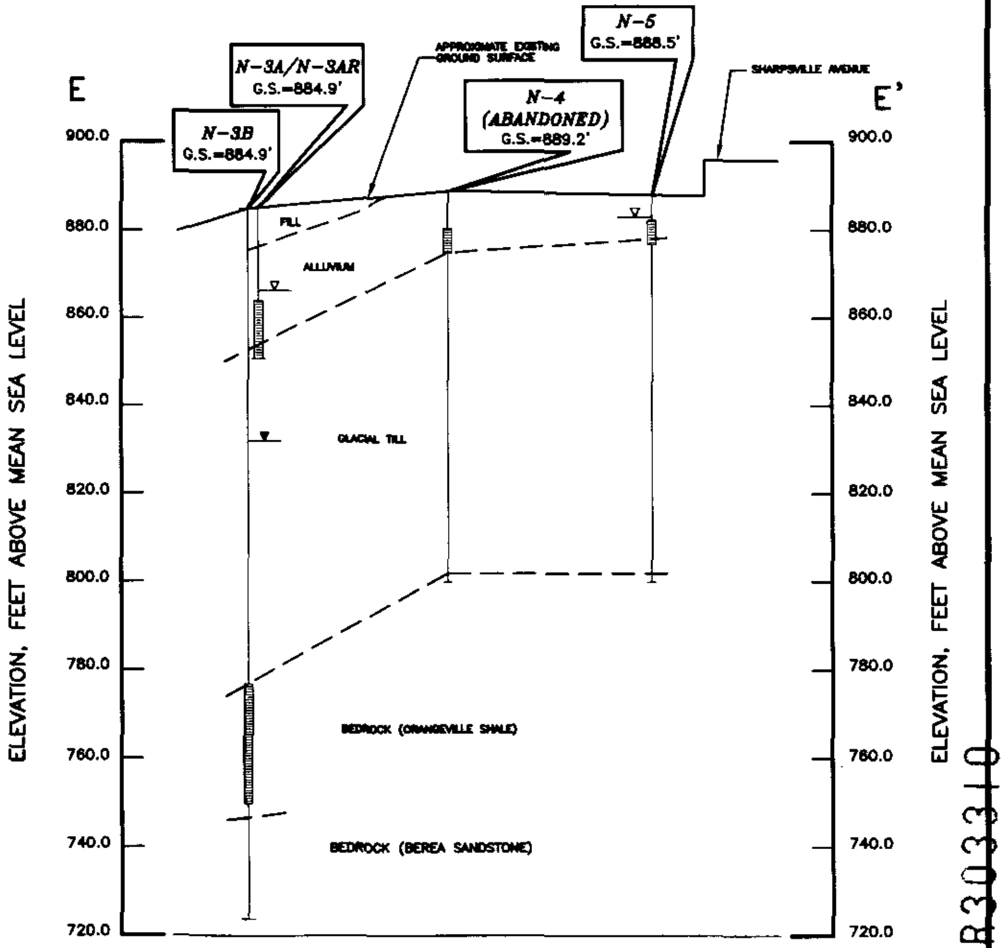
CROSS SECTION A – A'

VIEW LOOKING WEST



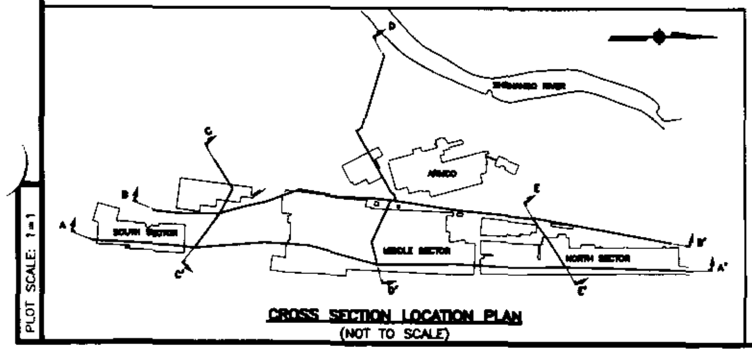
CROSS SECTION A – A'

VIEW LOOKING WEST



CROSS SECTION E – E'

VIEW LOOKING NORTH



CROSS SECTION LOCATION PLAN
(NOT TO SCALE)

NOTES:

1. THE BORING LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SOIL CONDITIONS AND WATER LEVELS AT *OTHER LOCATIONS MAY DIFFER FROM* CONDITIONS OCCURRING AT THESE BORING LOCATIONS. ALSO THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE BORING LOCATIONS.

2. THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE TEST BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATION OF THE TEST BORINGS AND IT IS POSSIBLE THAT SUBSURFACE CONDITIONS *BETWEEN THE TEST BORINGS MAY VARY FROM THOSE* INDICATED

LEGEND:

▼	BEDROCK GROUNDWATER LEVEL (6-30-99)
▽	ALLUVIUM GROUNDWATER LEVEL (6-30-99)
▼	*HISTORICAL TOP OF LNAPL IN WELL*
▥	SCREENED SECTION OF MONITORING WELL

HORIZONTAL SCALE
0 100 200 FEET

VERTICAL SCALE
0 20 40 FEET

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CHECKED BY:	*B. MAURER*	DATE: *2/3/95*
APPROVED BY:	*W. BAUGHMAN*	DATE: *3/30/95*

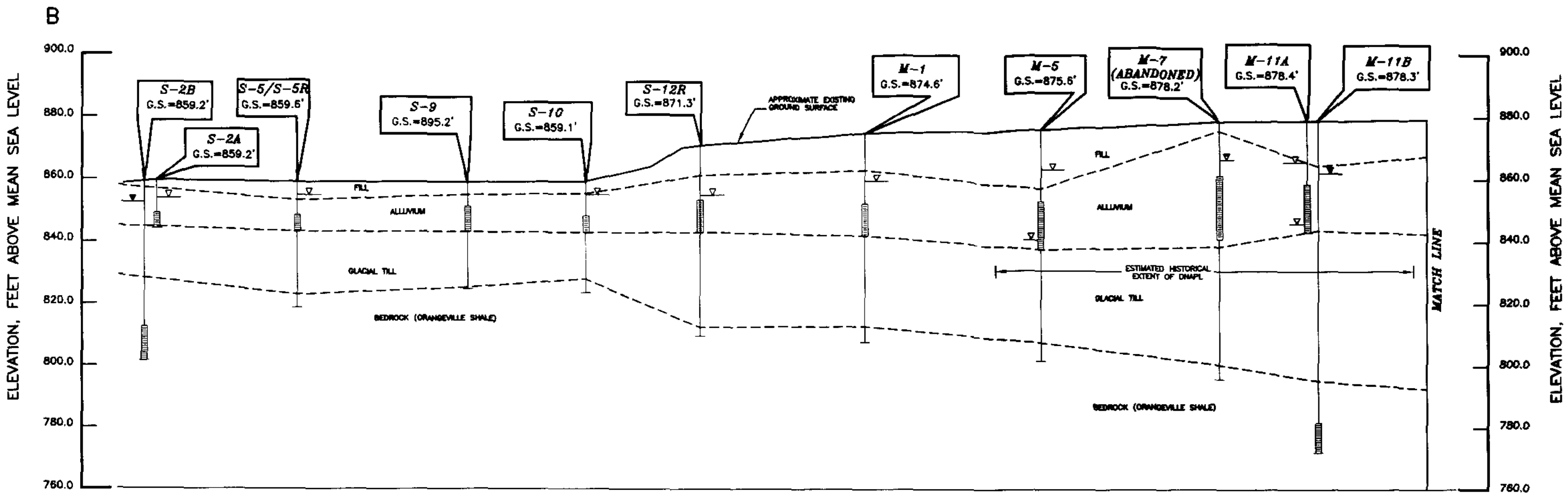
FIGURE 5-7
HYDROGEOLOGIC CROSS SECTIONS
A-A' AND E-E'
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E
DRAWING NUMBER 93111E80
REV.
SCALE: AS SHOWN
SHEET ____ OF ____

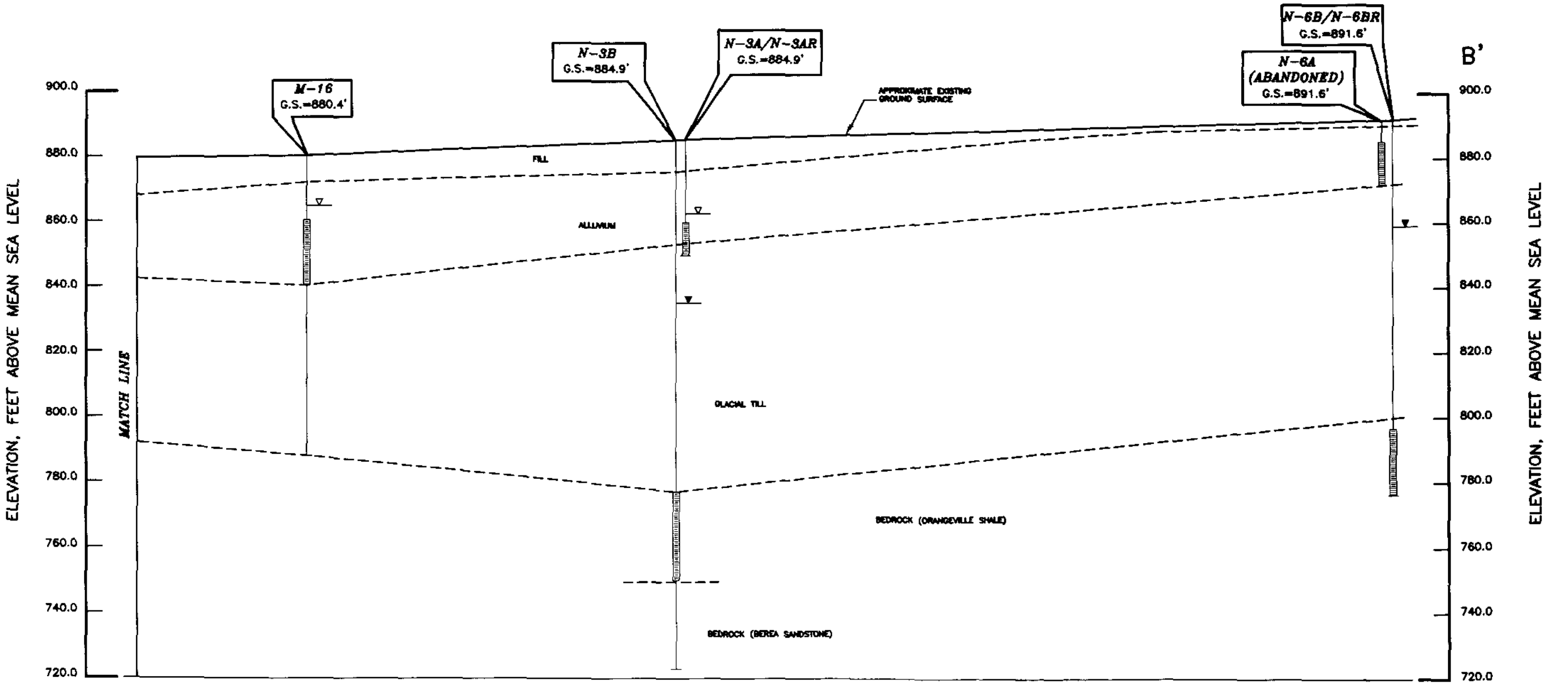
PLOT SCALE: 1=1

DRAWING NUMBER 11E78



CROSS SECTION B – B'

VIEW LOOKING WEST



CROSS SECTION B – B'

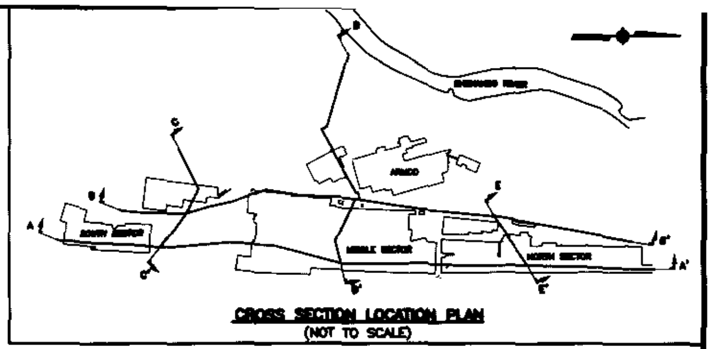
VIEW LOOKING WEST

HORIZONTAL SCALE
0 100 200 FEET

VERTICAL SCALE
0 20 40 FEET

LEGEND:

- ▼ BEDROCK GROUNDWATER LEVEL (6-30-99)
- ▽ ALLUVIUM GROUNDWATER LEVEL (6-30-99)
- ▽ HISTORICAL TOP OF LNAPL
- ▽ HISTORICAL TOP OF DNAPL
- ▯ SCREENED SECTION OF MONITORING WELL



CROSS SECTION LOCATION PLAN
(NOT TO SCALE)

NOTES:

1. THE BORING LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SOIL CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING LOCATIONS. ALSO THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE BORING LOCATIONS.

2. THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE TEST BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATION OF THE TEST BORINGS AND IT IS POSSIBLE THAT SUBSURFACE CONDITIONS BETWEEN THE TEST BORINGS MAY VARY FROM THOSE INDICATED

AR303311

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DRAWN BY:	J. CHIAVERINI	DATE: 2/3/95
CHECKED BY:	B. MAURER	DATE: 2/3/95
APPROVED BY:	W. BAUGHMAN	DATE: 3/30/95

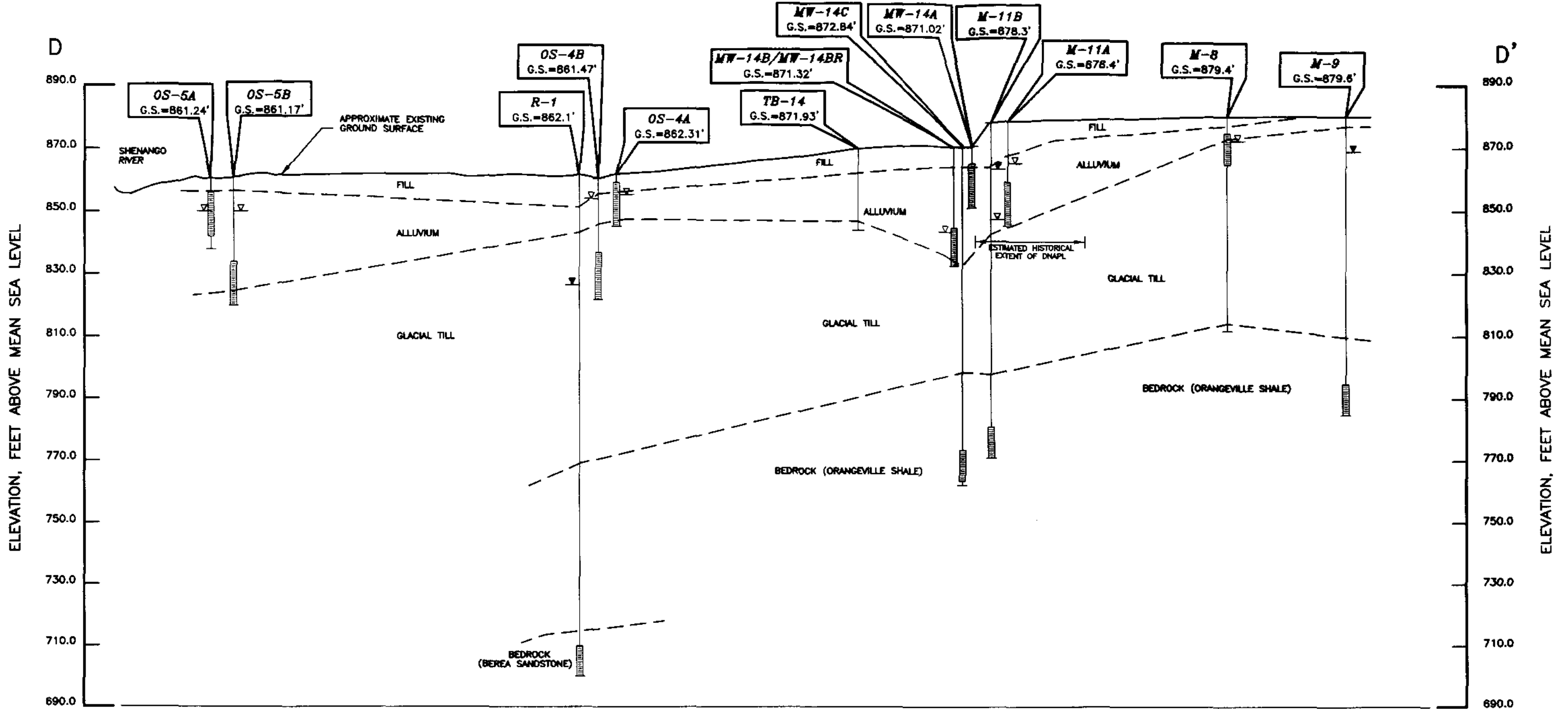
FIGURE 5-8
HYDROGEOLOGIC CROSS SECTION
B – B'
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E
DRAWING NUMBER 93111E78
REV.
SCALE: AS SHOWN
SHEET ____ OF ____

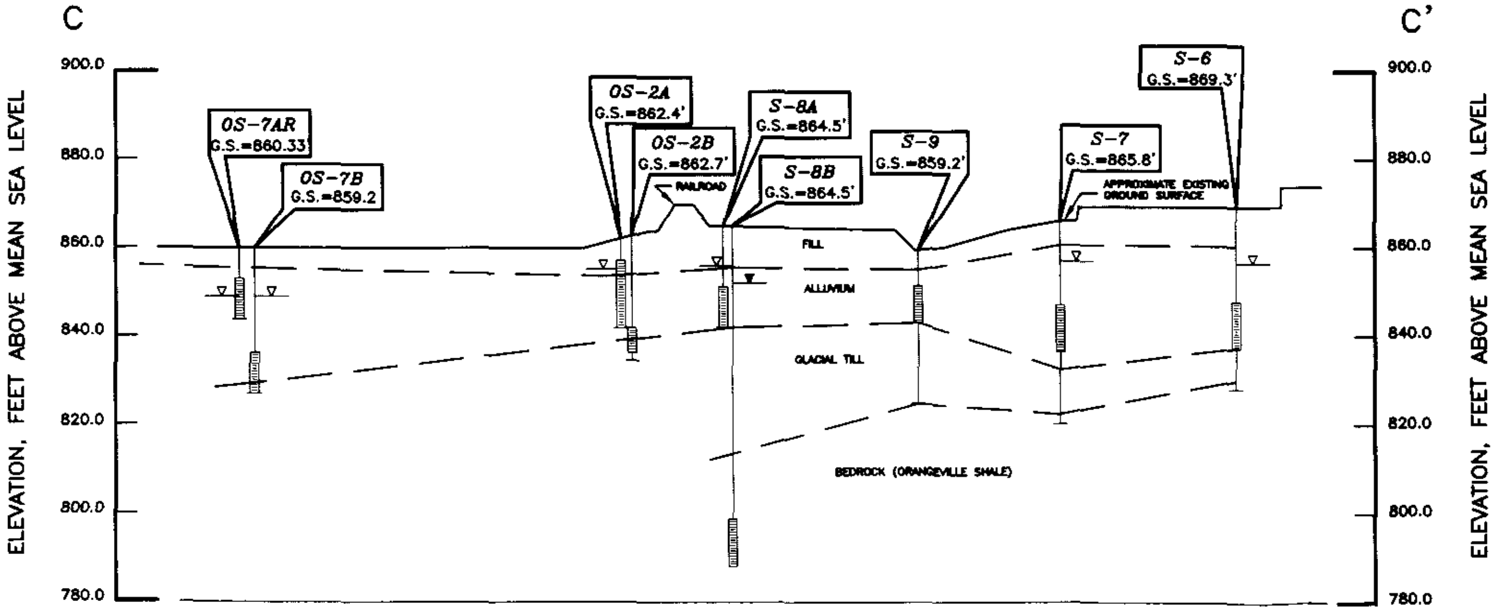
PLOT SCALE: 1=1

DRAWING NUMBER 93111E79



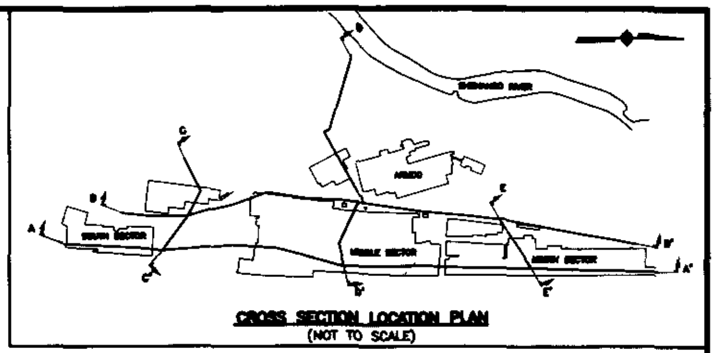
CROSS SECTION D – D'

VIEW LOOKING NORTH



CROSS SECTION C – C'

VIEW LOOKING NORTH



CROSS SECTION LOCATION PLAN
(NOT TO SCALE)

NOTES:

1. THE BORING LOGS AND RELATED INFORMATION DEPICT SUBSURFACE CONDITIONS ONLY AT THE SPECIFIC LOCATIONS AND DATES INDICATED. SOIL CONDITIONS AND WATER LEVELS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURRING AT THESE BORING LOCATIONS. ALSO THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE CONDITIONS AT THESE BORING LOCATIONS.
2. THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE TEST BORINGS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXIST ONLY AT THE LOCATION OF THE TEST BORINGS AND IT IS POSSIBLE THAT SUBSURFACE CONDITIONS BETWEEN THE TEST BORINGS MAY VARY FROM THOSE INDICATED

LEGEND:

▼ BEDROCK GROUNDWATER LEVEL (6-30-99)
▽ ALLUVIUM GROUNDWATER LEVEL (6-30-99)
▽ HISTORICAL TOP OF DNAPL
▥ SCREENED SECTION OF MONITORING WELL

HORIZONTAL SCALE 0 100 200 FEET

VERTICAL SCALE 0 20 40 FEET

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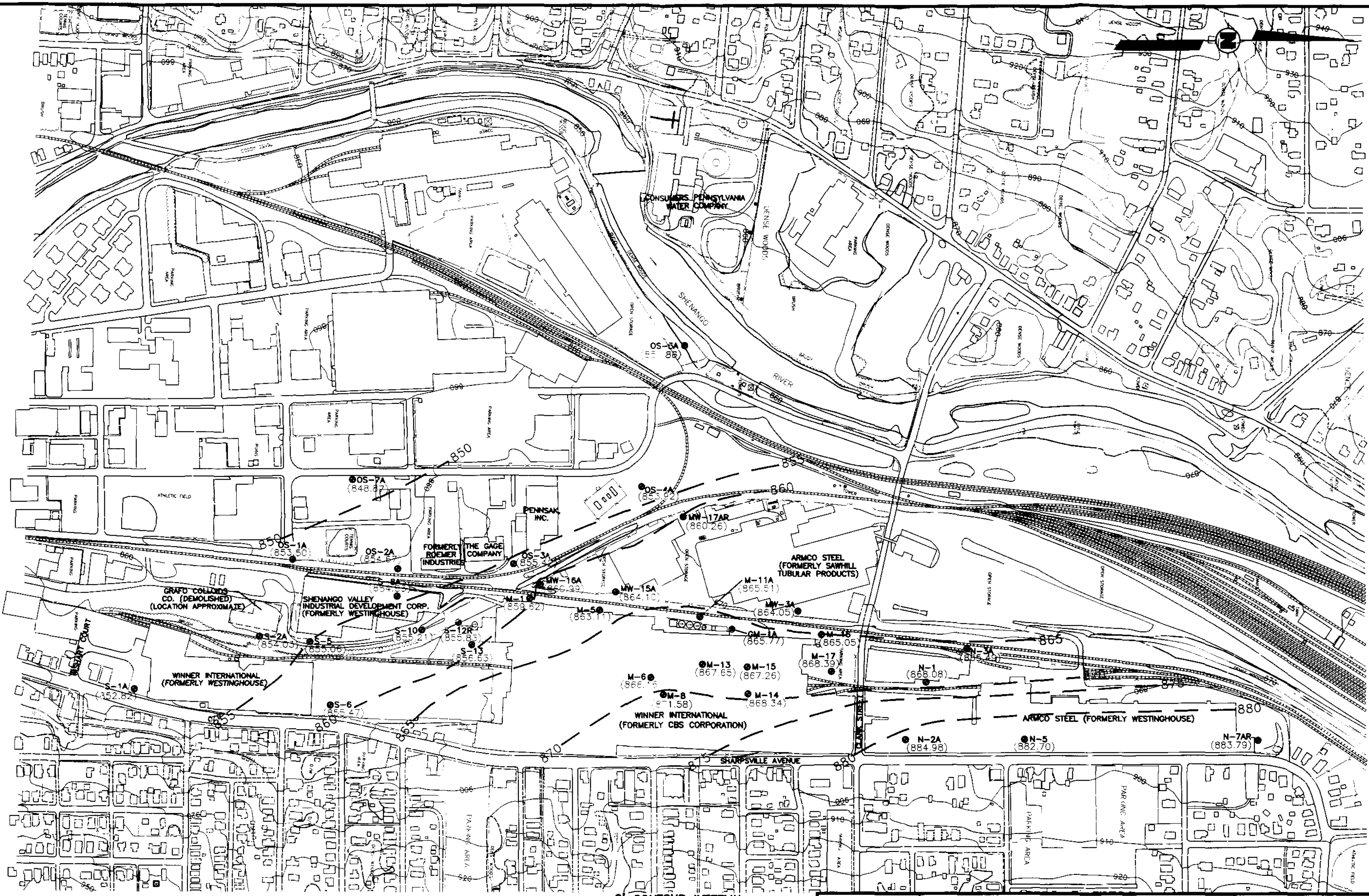
APPROVED BY:	W. BAUGHMAN	DATE: 3/30/95

FIGURE 5-9
HYDROGEOLOGIC CROSS SECTIONS
C–C' AND D–D'
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E
DRAWING NUMBER 93111E79
REV.
SCALE: AS SHOWN
SHEET ____ OF ____

PLOT SCALE: 1=1



2' CONTOUR INTERVAL

SCALE

200 0 200 400

REFERENCE:

BASE MAP WAS GENERATED BY WESTERN MAPPING, INC., 1991.

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.
2. GROUNDWATER CONTOURS PROVIDED ARE FIVE-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.

LEGEND:

● M-9	RI/FS MONITORING WELL
870 — —	GROUNDWATER CONTOUR IN FEET ABOVE MEAN SEA LEVEL
● S-6 (855.47)	ALLUVIUM MONITORING WELL WITH GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
● GM-7B	INTERIM MEASURE WELLS

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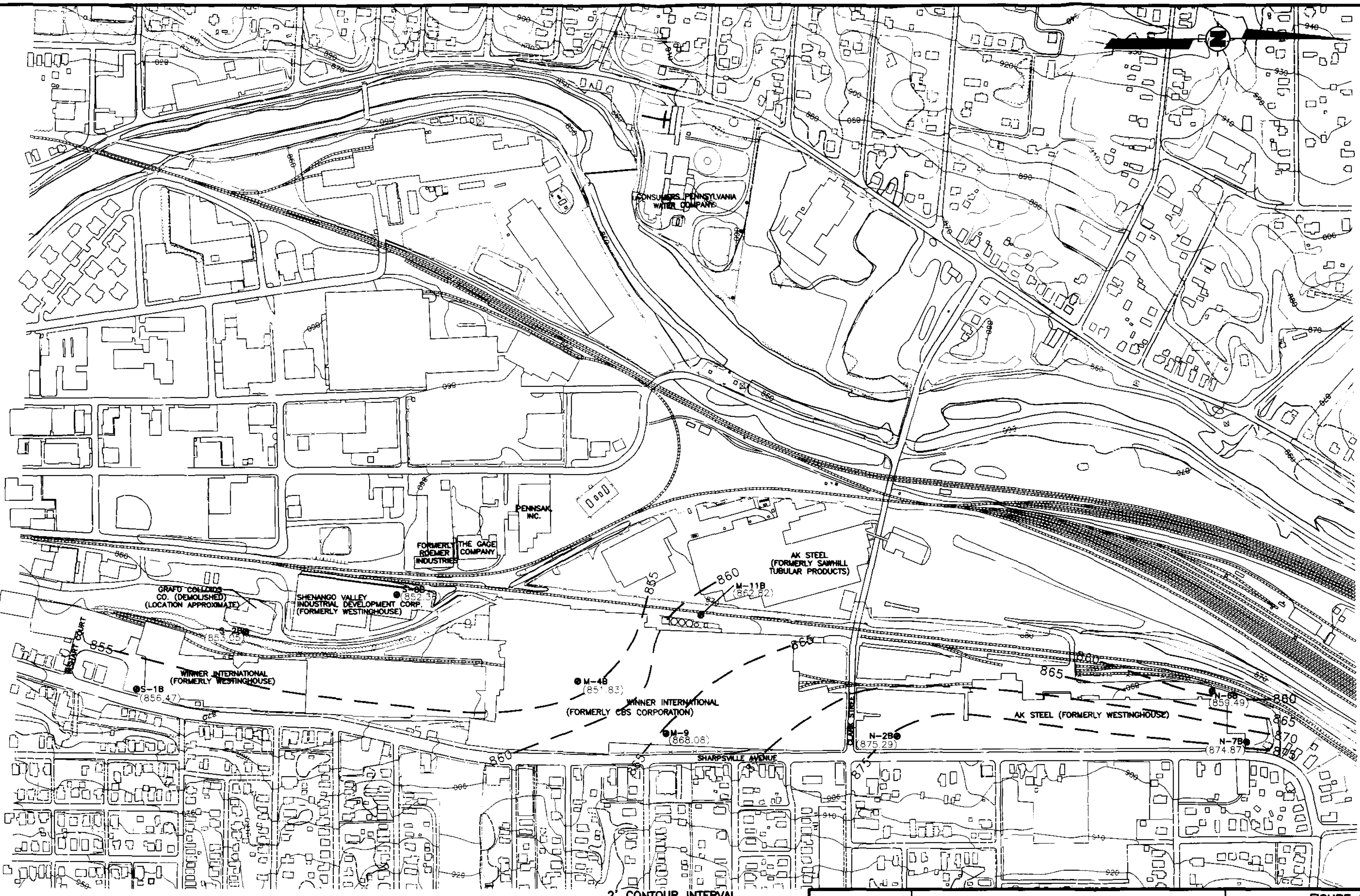
CHECKED BY: BR Mauer DATE: 3-21-02
APPROVED BY: W. a. Baughman DATE: 3-21-02

FIGURE 5-10
PIEZOMETRIC SURFACE–
ALLUVIAL AQUIFER–JUNE 30, 1999
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E DRAWING NUMBER 93111E28 REV. REV
SCALE: 1"=200' SHEET 1 OF 1

PLOT SCALE: 1"=40



REFERENCE:

BASE MAP WAS GENERATED BY
STERN MAPPING, INC., 1991.

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.
2. GROUNDWATER CONTOURS PROVIDED ARE FIVE-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.

PLOT SCALE: 1"=

LEGEND:

● M-9	RI/FS MONITORING WELL
870 — —	GROUNDWATER CONTOUR IN FEET ABOVE MEAN SEA LEVEL
● S-1B (856.47)	BEDROCK MONITORING WELL WITH GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL

2' CONTOUR INTERVAL

SCALE
200 0 200 400

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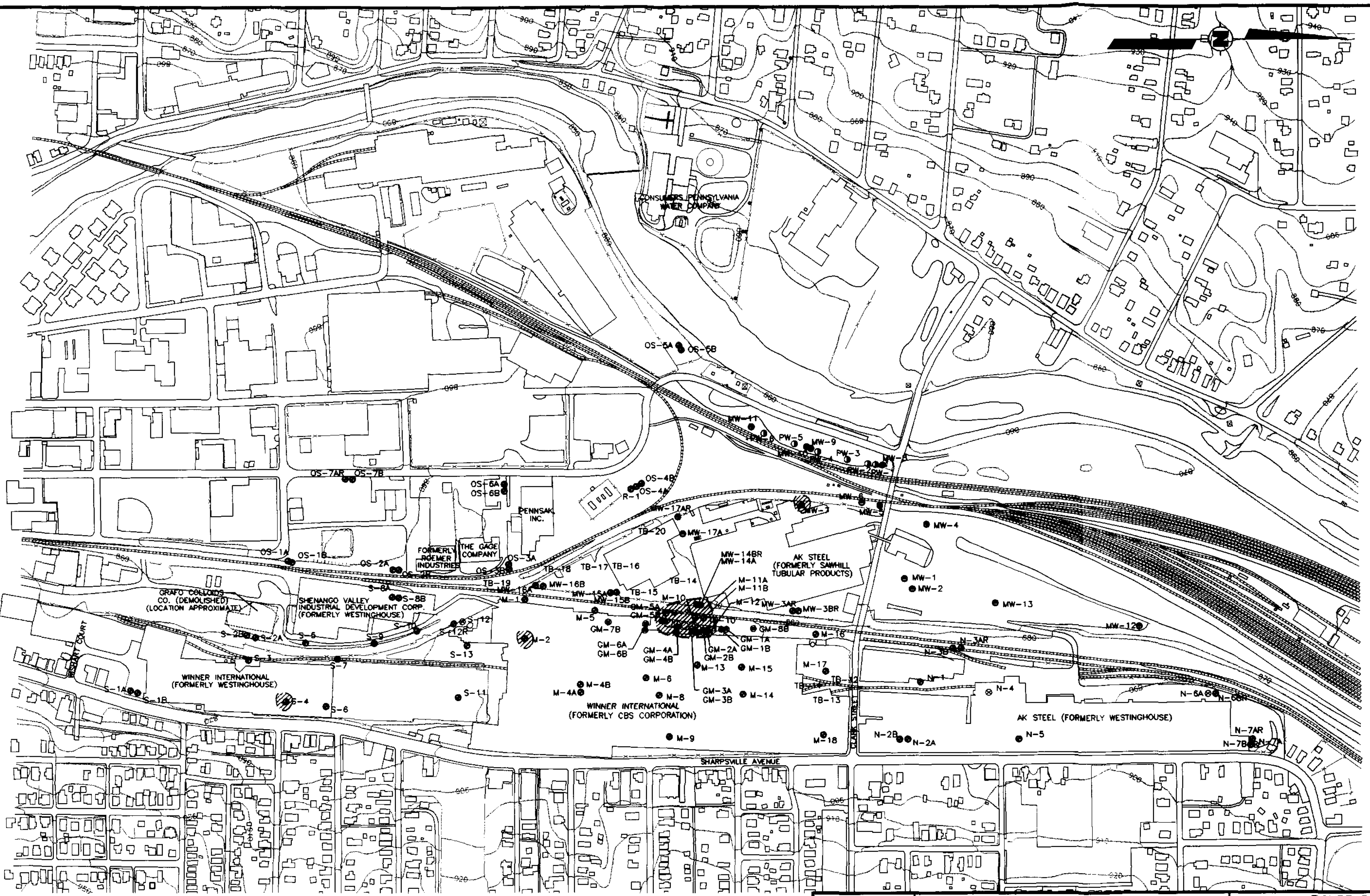
DRAWN BY: T.FITZROY DATE: 9-27-99
CHECKED BY: DATE: 3-21-02
APPROVED BY: DATE: 3-21-02

FIGURE 5-11
POTENTIOMETRIC SURFACE—BEDROCK AQUIFER—JUNE 30, 1999 FORMER TRANSFORMER FACILITY SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E
DRAWING NUMBER 93111E29
REV. REV
SCALE: 1"=400'
SHEET [illegible] OF [illegible]



REFERENCE:

SE MAP WAS GENERATED BY
STERN MAPPING, INC., 1991.

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.

LEGEND:

● M-9	EXISTING RI/FS MONITORING WELL
● MW-1	SAWHILL MONITORING WELL
◑ PW-1	SAWHILL PUMPING WELL
● GM-7B	INTERIM MEASURE WELLS
⊗ N-4	ABANDONED MONITORING WELL
▨	AREAS WHERE LIGHT NON-AQUEOUS PHASE LIQUIDS WERE DETECTED IN THE ALLUVIAL AQUIFER

2' CONTOUR INTERVAL

SCALE

200 0 200 400 FEET

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DRAWN BY:	T. GROSSO	DATE: 3-10-95
CHECKED BY:	B. MAURER	DATE: 3-11-95
APPROVED BY:	W. BAUGHMAN	DATE: 3-30-95

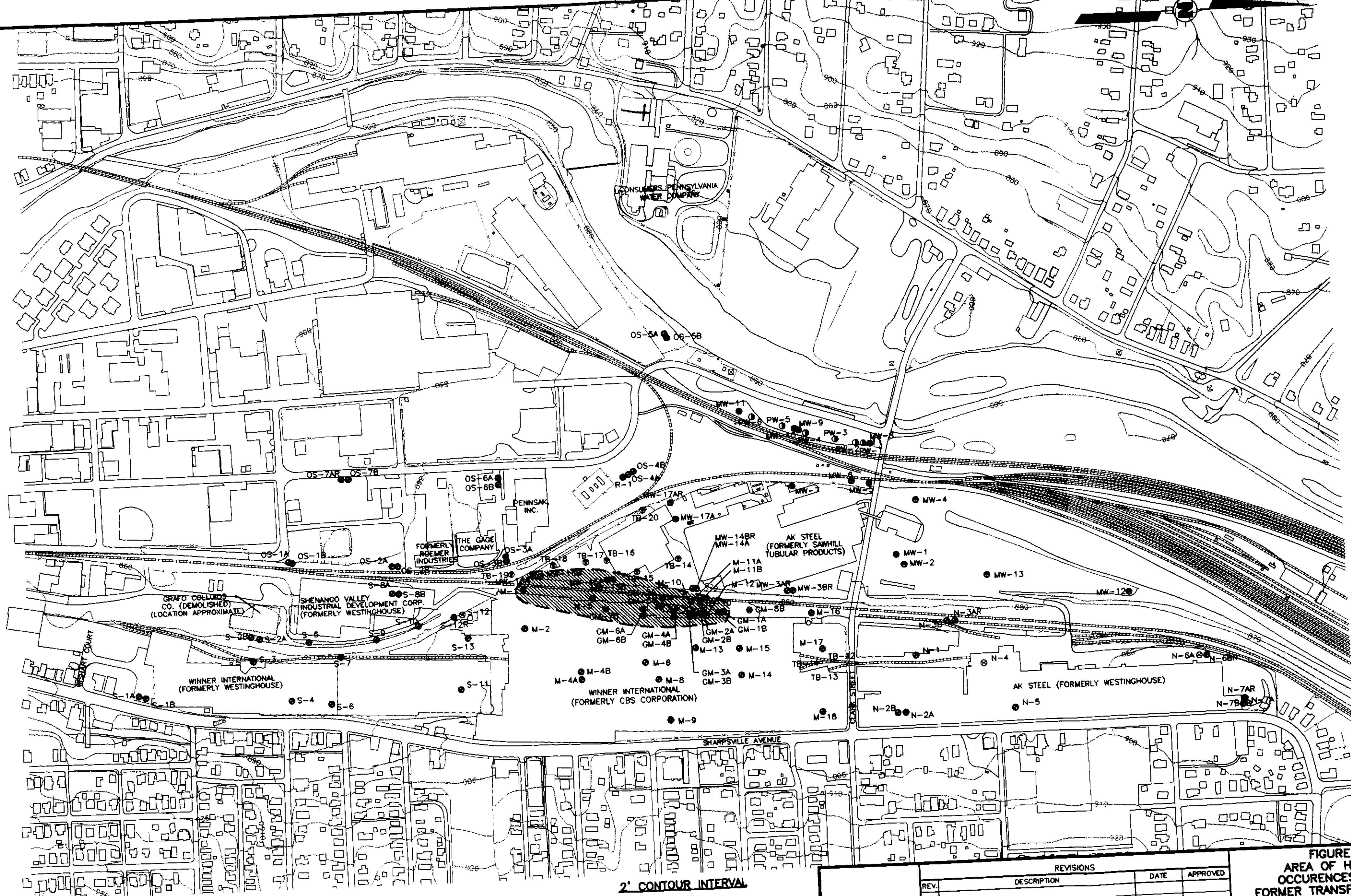
FIGURE 5-12
AREAS OF HISTORICAL OCCURENCES OF LNAPL
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE	DRAWING NUMBER	REV.
E	93111E36	

SCALE: 1"=200' SHEET 1 OF 1

PLOT SCALE: 1=2C



2' CONTOUR INTERVAL

SCALE

200 0 200 400 FEET

REFERENCE:

ASE MAP WAS GENERATED BY
STERN MAPPING, INC., 1991.

NOTES:

1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.

LEGEND:

● M-9	EXISTING RI/FS MONITORING WELL
● MW-1	SAWHILL MONITORING WELL
◑ PW-1	SAWHILL PUMPING WELL
● GM-7B	INTERIM MEASURE WELLS
⊗ N-4	ABANDONED MONITORING WELL
▨	AREA WHERE DENSE NON-AQUEOUS PHASE LIQUIDS WERE DETECTED IN THE ALLUVIAL AQUIFER

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CHECKED BY:	B. MAURER	DATE: 3-11-95
APPROVED BY:	W. BAUGHMAN	DATE: 3-30-95

FIGURE 5-13
AREA OF HISTORICAL
OCCURENCES OF DNAPL
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

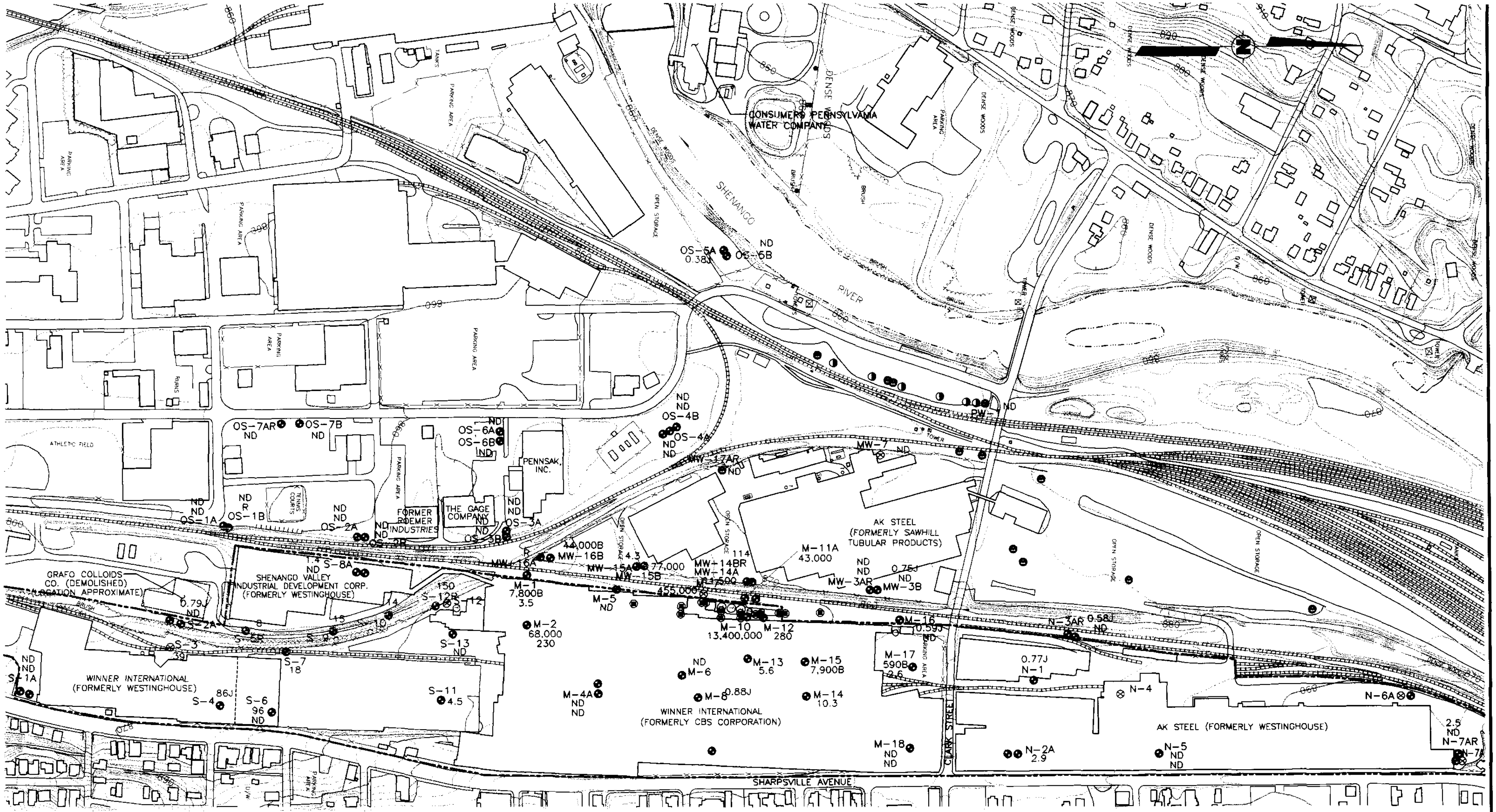
PREPARED FOR
WESTINGHOUSE ELECTRIC CORPORATION
PITTSBURGH, PENNSYLVANIA

SIZE E | DRAWING NUMBER 93111E37 | REV

SCALE: 1"=200' | SHEET 1 OF 1

PLOT SCALE: 1=2

DRAWING NUMBER '1B28



NOTES:
1. TOPOGRAPHIC CONTOURS PROVIDED ARE TWO-FOOT INTERVALS IN FEET ABOVE MEAN SEA LEVEL.

DATA ABBREVIATIONS:
B - PCBs ALSO DETECTED IN ASSOCIATED BLANK SAMPLE
ND - NOT DETECTED
J - ESTIMATED VALUE
R - DATA REJECTED DURING VALIDATION

REFERENCE:
BASE MAP WAS GENERATED BY EASTERN MAPPING, INC., 1991.

LEGEND:

● M-9	EXISTING RI/FS MONITORING WELL
● MW-1	SAWHILL MONITORING WELL
◑ PW-1	SAWHILL PUMPING WELL
● GM-7B	INTERIM MEASURE WELLS
⊗ N-4	ABANDONED MONITORING WELL
———	APPROXIMATE SITE BOUNDARY
68,000	TOTAL PCB CONCENTRATION FROM RI (ug/l) (IF MULTIPLE SAMPLES, MOST RECENT IS SHOWN)
230	TOTAL PCB CONCENTRATION FROM 1999 SUPPLEMENTAL SAMPLING EVENT (ug/l)

2' CONTOUR INTERVAL

SCALE

150 0 150 300 FEET

1R303317

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DRAWN BY: B. MAURER DATE: 10-21-99
CHECKED BY: M. VALENTINE DATE: 10-29-99
APPROVED BY: M. VALENTINE DATE: 10-29-99

FIGURE 5-14
PCB CONCENTRATIONS
ALLUVIAL AQUIFER
FORMER TRANSFORMER PLANT
SHARON, PENNSYLVANIA

PREPARED FOR
VIACOM INC.
PITTSBURGH, PENNSYLVANIA

SIZE E DRAWING NUMBER 93111B28 REV.
SCALE: AS SHOWN SHEET 1 OF 1

PLOT SCALE: 1=3

EPA REGION III
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOC ID # 449323
PAGE # AR303318

IMAGERY COVER SHEET
UNSCANNABLE ITEM

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SITE NAME Westinghouse Electric (Sharon plant OU2)

OPERABLE UNIT OU2

SECTION/BOX/FOLDER 3D

REPORT OR DOCUMENT TITLE Technical Impracticability of groundwater restoration evaluation report

DATE OF DOCUMENT March 22, 02

DESCRIPTION OF IMAGERY Oversized Map: Figure 5-15

NUMBER AND TYPE OF IMAGERY ITEM(S) 1 MAP

EPA REGION III
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOC ID # 449323
PAGE # AR303319

IMAGERY COVER SHEET
UNSCANNABLE ITEM

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SITE NAME Westinghouse Electric (Sharon Plant OU2)
OPERABLE UNIT OU2
SECTION/BOX/FOLDER 3D

REPORT OR DOCUMENT TITLE Technical Impracticability of groundwater restoration evaluation report
DATE OF DOCUMENT March 22, 02
DESCRIPTION OF IMAGERY Oversized Map: Figure 5-16

NUMBER AND TYPE OF IMAGERY ITEM(S) 1 Map

APPENDIX A

QUICK DOMENICO MODEL INPUT DATA AND RESULTS

TABLE A-1
INPUT SUMMARY FOR QUICK DOMENICO MODELS
VIACOM - SHARON (*Northern Portion of the Middle Sector*)

Input Parameter	Units	Modeled Parameter TCE		Source of Input
Source Concentration	mg/L	0.83	0.83	Analytical Results from the Monitoring Well MW-3B (July-August 1999).
Distance to Location of Concern	feet	1200	1200	Distance from Well MW-3B to the downgradient property boundary (east shoreline of the Shenango River).
Longitudinal Dispersivity (Ax)	feet	30	30	Plume Length/10 (Plume length estimated based on empirical data from and distance to Well MW-17AR).
Transverse Dispersivity (Ay)	feet	3	3	Ax / 10
Vertical Dispersivity (Az)	feet	0.001	0.001	Default Value
Biodegradation Rate Constant or lambda (λ)	years^{-1}	0.02	1.28	Range of Values from literature. Value was calibrated to 2.00E-04 using the results from Well MW-17AR.
	days^{-1}	5.48E-05	0.0035	
Source Width	feet	200	200	Estimated width based on nearby wells.
Source Thickness	feet	18.8	18.8	Estimated saturated thickness at Well MW-3B (based on depth of 23' to top of till and water level [6/30/99] of 4.22').
'ydraulic Conductivity	ft/day	2.00	2.00	As reported in Section 5.2.2 of Data Summary Report (10/29/99).
Hydraulic Gradient	ft/ft	0.015	0.015	As reported in Section 5.2.2 (July 1999 value) of Data Summary Report (10/29/99).
Porosity	%	30	30	Estimated Value (Freeze&Cherry, 1979)
Soil Bulk Density	g/cm^3	1.7	1.7	Default Value
Organic Carbon Partitioning Coefficient	--	93	93	Act 2 Regulations, Appendix A, Table 5
Fraction Organic Carbon	%	0.5	0.5	Default Value
Time	years	30	30	Direct input

TABLE A-2
INPUT SUMMARY FOR QUICK DOMENICO MODELS
VIACOM - SHARON (Southern Portion of the Middle Sector)

Input Parameter	Units	Modeled Parameter Chlorobenzene		Source of Input
Source Concentration	mg/L	5.4	5.4	Analytical Results from the Monitoring Well M-2 (July-August, 1999).
Distance to Location of Concern	feet	2200	2200	Distance from Well M-2 to the downgradient property boundary (east shoreline of the Shenango River).
Longitudinal Dispersivity (Ax)	feet	40	40	Plume Length/10 (Plume length estimated based on empirical data from downgradient monitoring wells).
Transverse Dispersivity (Ay)	feet	4	4	Ax / 10
Vertical Dispersivity (Az)	feet	0.001	0.001	Default Value
Biodegradation Rate Constant or lambda (λ)	years^{-1}	0.84	2.15	Range of Values from literature. Value was calibrated to 8.22E-04 using the results from Well M-1. The calibrated value is outside the published range.
	days^{-1}	0.0023	0.0059	
Source Width	feet	800	800	Estimated width based on nearby wells.
Source Thickness	feet	14.7	14.7	Estimated saturated thickness at Well M-2 (based on depth of 33' to top of till and water level [3/2/95] of 18.3').
ydraulic Conductivity	ft/day	2.00	2.00	As reported in Section 5.2.2 of Data Summary Report (10/29/99).
Hydraulic Gradient	ft/ft	0.015	0.015	As reported in Section 5.2.2 (July 1999 value) of Data Summary Report (10/29/99).
Porosity	%	30	30	Estimated Value (Freeze&Cherry, 1979)
Soil Bulk Density	g/cm^3	1.7	1.7	Default Value
Organic Carbon Partitioning Coefficient	--	200	200	Act 2 Regulations, Appendix A, Table 5
Fraction Organic Carbon	%	0.5	0.5	Default Value
Time	years	30	30	Direct input

TABLE A-3
INPUT SUMMARY FOR QUICK DOMENICO MODELS
VIACOM - SHARON (South Sector)

Input Parameter	Units	Modeled Parameter 1,2-Dichloroethene		Source of Input
Source Concentration	mg/L	3.3	3.3	Analytical Results from the Monitoring Well S-10 (July, 1992).
Distance to Location of Concern	feet	2100	2100	Distance from Well S-10 to the downgradient property boundary (east shoreline of the Shenango River).
Longitudinal Dispersivity (Ax)	feet	*10*	*10*	Plume Length/10 (estimated value based *on distance to Well OS-8A*).
Transverse Dispersivity (Ay)	feet	1	1	Ax / 10
Vertical Dispersivity (Az)	feet	0.001	0.001	Default Value
Biodegradation Rate Constant or lambda (λ)	years^{-1}	0.01	4.52	Range of Values from literature. Value was calibrated to 5.00E-03 using the results from Well S-8A.
	days^{-1}	2.74E-05	0.012	
Source Width	feet	300	300	Measured width between Wells S-9 and S-12R which bound the plume at Well S-10.
Source Thickness	feet	10.29	10.29	Estimated saturated thickness at Well S-10 (based on depth of 16' to top of till and water level [6/30/99] of 5.71').
ydraulic Conductivity	*ft/day*	2.00	2.00	As reported in Section 5.2.2 of Data *Summary Report (10/29/99).*
Hydraulic Gradient	ft/ft	0.015	0.015	As reported in Section 5.2.2 (July 1999 value) of Data Summary Report (10/29/99).
Porosity	%	30	30	Estimated Value
Soil Bulk Density	g/cm^3	1.7	1.7	Default Value
Organic Carbon Partitioning Coefficient	--	49	49	Act 2 Regulations, Appendix A, Table 5
Fraction Organic Carbon	%	0.5	0.5	Default Value
Time	years	30	30	Direct input

TABLE A-4

QUICK DOMENICO SPREADSHEET (Northern Portion of Middle Sector)

FORMER TRANSFORMER FACILITY

SHARON, PENNSYLVANIA

ADVECTIVE TRANSPORT WITH THREE DIMENSIONAL DISPERSION AND 1ST ORDER DECAY and RETARDATION

Project: Sharon - Northern Portion of Middle Sector

Date: 2/14/02 Prepared by: MJV

Contaminant: Trichloroethene

SOURCE CONC (MG/L)	X DISTANCE T LOCATION C CONCERN (ft)	Ax (ft)	Ay (ft)	Az (ft) >=.001	LAMBDA day-1	SOURCE WIDTH (ft)	SOURCE THICKNESS (ft)
0.83	1200	30	3	0.001	5.48E-05	200	18.8

Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm^3)	KOC	Frac. Org. Carb.	Retardation (R)	V (=K*I/n*R) (ft/day)
2.00E+00	0.015	0.3	1.7	93	5.00E-03	3.635	0.02751032

PA DEPARTMENT
OF ENVIRONMENTAL PROTECTION
QUICK_DOMENICO.XLS
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

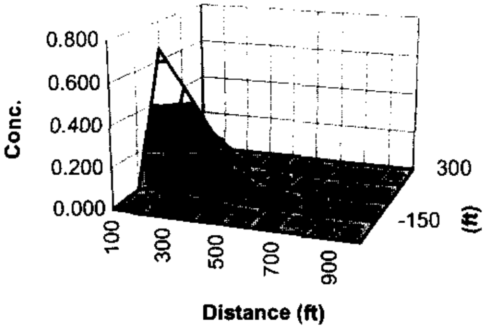
	y(ft)	z(ft)	Time (days)
1200	0	0	10950

Projected Conc. at 1200 0 0

at 10950 days

0.000 mg/l

AREAL MODEL	CALCULATION DOMAIN
Length (ft)	1000
Width (ft)	300



	100	200	300	400	500	600	700	800	900	1000
300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150	0.014	0.036	0.034	0.019	0.006	0.001	0.000	0.000	0.000	0.000
0	0.660	0.478	0.279	0.118	0.033	0.006	0.001	0.000	0.000	0.000
-150	0.014	0.036	0.034	0.019	0.006	0.001	0.000	0.000	0.000	0.000
-300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TABLE A-5
QUICK DOMENICO SPREADSHEET (Northern Portion of Middle Sector)
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

ADVECTIVE TRANSPORT WITH THREE DIMENSIONAL DISPERSION AND 1ST ORDER DECAY and RETARDATION

Project:	Sharon - Northern Portion of Middle Sector						
Date:	2/14/02	Prepared by:	MJV				
		Contaminant:	Trichloroethene				
	X						
SOURCE CONC (MG/L)	**DISTANCE T LOCATION C CONCERN (ft)**	**Ax (ft)**	**Ay (ft)**	**Az (ft) >=.001**	**LAMBDA day-1**	**SOURCE WIDTH (ft)**	**SOURCE THICKNESS (ft)**
0.83	1200	30	3	0.001	3.50E-03	200	18.8
Hydraulic Cond (ft/day)	**Hydraulic Gradient (ft/ft)**	**Porosity (dec. frac.)**	**Soil Bulk Density (g/cm^3)**	**KOC**	**Frac. Org. Carb.**	**Retard- ation (R)**	**V (=K*I/n*R) (ft/day)**
2.00E+00	0.015	0.3	1.7	93	5.00E-03	3.635	0.02751032
	y(ft)	z(ft)	Time (days)				
1200	0	0	10950				
Projected Conc. at		1200	0	0			
at	10950	days					
0.000	mg/l						

PA DEPARTMENT
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QUICK_DOMENICO.XLS
SPREADSHEET APPLICATION OF
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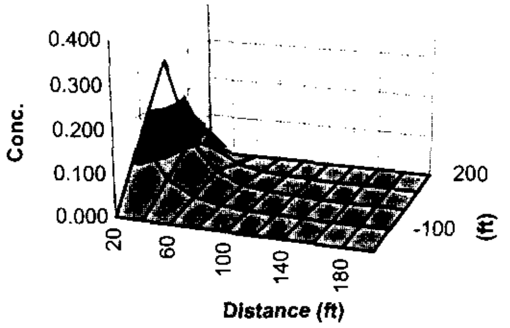
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

AREAL MODEL	**CALCULATION DOMAIN**	
Length (ft)	200	
Width (ft)	200	



	20	40	60	80	100	120	140	160	180	200
200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
100	0.151	0.055	0.020	0.007	0.003	0.001	0.000	0.000	0.000	0.000
0	0.302	0.110	0.040	0.015	0.005	0.002	0.001	0.000	0.000	0.000
-100	0.151	0.055	0.020	0.007	0.003	0.001	0.000	0.000	0.000	0.000
-200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TABLE A-6
QUICK DOMENICO SPREADSHEET (Northern Portion of Middle Sector)
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

ADVECTIVE TRANSPORT WITH THREE DIMENSIONAL DISPERSION AND 1ST ORDER DECAY and RETARDATION

Project: Sharon - Northern Portion of Middle Sector
Date: 2/14/02 Prepared by: MJV
Contaminant: **Trichloroethene**

PA DEPARTMENT
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QUICK_DOMENICO.XLS
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P.A. Domenico (1987)
Modified to Include Retardation

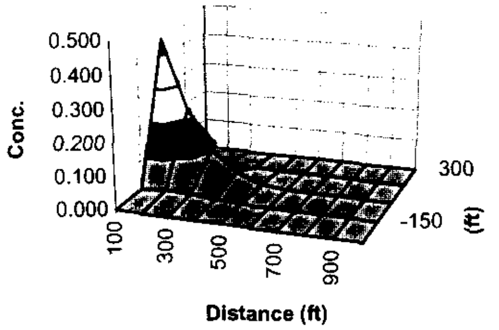
SOURCE CONC (MG/L)	X DISTANCE TO LOCATION OF CONCERN (ft)	Ax (ft)	Ay (ft)	Az (ft) >=.001	LAMBDA day-1	SOURCE WIDTH (ft)	SOURCE THICKNESS (ft)
0.83	1200	30	3	0.001	2.00E-04	200	18.8

Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm^3)	KOC	Frac. Org. Carb.	Retardation (R)	V (=K*i/n*R) (ft/day)
2.00E+00	0.015	0.3	1.7	93	5.00E-03	3.635	0.02751032

	y(ft)	z(ft)	Time (days)
1200	0	0	10950

Projected Conc. at	1200	0	0
at	10950	days	
0.000	mg/l		

AREAL MODEL	CALCULATION DOMAIN
Length (ft)	1000
Width (ft)	300



	100	*200*	*300*	*400*	*500*	*600*	*700*	*800*	*900*	*1000*
300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150	0.009	0.017	0.013	0.006	0.002	0.000	0.000	0.000	0.000	0.000
0	0.445	0.228	0.103	0.037	0.009	0.002	0.000	0.000	0.000	0.000
-150	0.009	0.017	0.013	0.006	0.002	0.000	0.000	0.000	0.000	0.000
-300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TABLE A-7
QUICK DOMENICO SPREADSHEET (Southern Portion of Middle Sector)
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

ADVECTIVE TRANSPORT WITH THREE DIMENSIONAL DISPERSION AND 1ST ORDER DECAY and RETARDATION

Project: Sharon - Southern Portion of Middle Sector
Date: 2/14/02 Prepared by: MJV
Contaminant: **Chlorobenzene**

PA DEPARTMENT
OF ENVIRONMENTAL PROTECTION
QUICK_DOMENICO.XLS
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

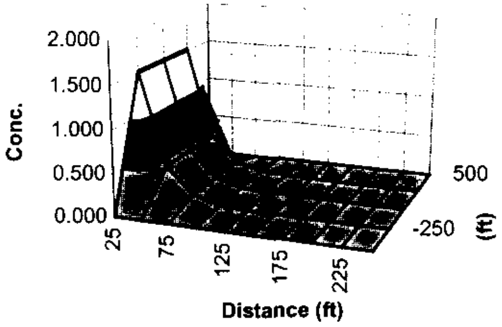
	X						
SOURCE CONC (MG/L)	**DISTANCE T LOCATION C CONCERN (ft)**	**Ax (ft)**	**Ay (ft)**	**Az (ft) >=.001**	**LAMBDA day-1**	**SOURCE WIDTH (ft)**	**SOURCE THICKNESS (ft)**
5.4	**2200**	**40**	**4**	**0.001**	**2.30E-03**	**800**	**14.7**

Hydraulic Cond (ft/day)	**Hydraulic Gradient (ft/ft)**	**Porosity (dec. frac.)**	**Soil Bulk Density (g/cm^3)**	**KOC**	**Frac. Org. Carb.**	**Retard-ation (R)**	**V (=K*i/n*R) (ft/day)**
2.00E+00	**0.015**	**0.3**	**1.7**	**200**	**5.00E-03**	**6.66666667**	**0.015**

	y(ft)	**z(ft)**	**Time (days)**
2200	**0**	**0**	**10950**

Projected Conc. at		**2200**	**0**	**0**
at	**10950**	**days**		
0.000	**mg/l**			

	AREAL MODEL	**CALCULATION DOMAIN**
	Length (ft)	250
	Width (ft)	500



	25	*50*	*75*	*100*	*125*	*150*	*175*	*200*	*225*	*250*
500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
250	1.522	0.429	0.121	0.034	0.010	0.003	0.001	0.000	0.000	0.000
0	1.522	0.429	0.121	0.034	0.010	0.003	0.001	0.000	0.000	0.000
-250	1.522	0.429	0.121	0.034	0.010	0.003	0.001	0.000	0.000	0.000
-500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TABLE A-8
QUICK DOMENICO SPREADSHEET (Southern Portion of Middle Sector)
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

ADVECTIVE TRANSPORT WITH THREE DIMENSIONAL DISPERSION AND 1ST ORDER DECAY and RETARDATION

Project: Sharon - Southern Portion of Middle Sector
Date: 2/14/02 Prepared by: MJV
Contaminant: **Chlorobenzene**

SOURCE CONC (MG/L)	**X DISTANCE TO LOCATION OF CONCERN (ft)**	**Ax (ft)**	**Ay (ft)**	**Az (ft) >=.001**	**LAMBDA day-1**	**SOURCE WIDTH (ft)**	**SOURCE THICKNESS (ft)**
5.4	2200	40	4	0.001	5.90E-03	800	14.7

Hydraulic Cond (ft/day)	**Hydraulic Gradient (ft/ft)**	**Porosity (dec. frac.)**	**Soil Bulk Density (g/cm^3)**	**KOC**	**Frac. Org. Carb.**	**Retard-ation (R)**	**V (=K*i/n*R) (ft/day)**
2.00E+00	0.015	0.3	1.7	200	5.00E-03	6.66666667	0.015

PA DEPARTMENT
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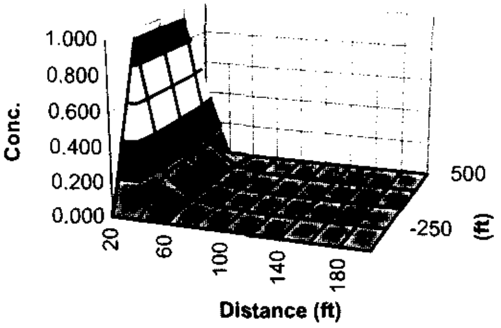
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

	y(ft)	**z(ft)**	**Time (days)**
2200	0	0	10950

Projected Conc. at 2200 0 0
at 10950 **days**
0.000 **mg/l**

AREAL MODEL **CALCULATION DOMAIN**
Length (ft) 200
Width (ft) 500



	20	*40*	*60*	*80*	*100*	*120*	*140*	*160*	*180*	*200*
500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
250	0.939	0.163	0.028	0.005	0.001	0.000	0.000	0.000	0.000	0.000
0	0.939	0.163	0.028	0.005	0.001	0.000	0.000	0.000	0.000	0.000
-250	0.939	0.163	0.028	0.005	0.001	0.000	0.000	0.000	0.000	0.000
-500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TABLE A-9
QUICK DOMENICO SPREADSHEET (Southern Portion of Middle Sector)
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

ADVECTIVE TRANSPORT WITH THREE DIMENSIONAL DISPERSION AND 1ST ORDER DECAY and RETARDATION

Project:	Sharon - Southern Portion of Middle Sector		
Date:	2/14/02	Prepared by:	MJV
		Contaminant:	**Chlorobenzene**

PA DEPARTMENT
OF ENVIRONMENTAL PROTECTION
QUICK_DOMENICO.XLS
SPREADSHEET APPLICATION OF
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DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

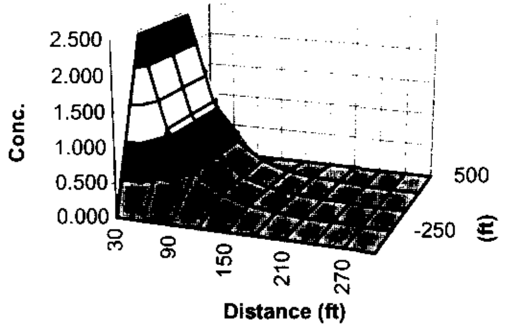
	X						
SOURCE CONC (MG/L)	**DISTANCE T LOCATION C CONCERN (ft)**	**Ax (ft)**	**Ay (ft)**	**Az (ft) >=.001**	**LAMBDA day-1**	**SOURCE WIDTH (ft)**	**SOURCE THICKNESS (ft)**
5.4	**2200**	**40**	**4**	**0.001**	**8.22E-04**	**800**	**14.7**

Hydraulic Cond (ft/day)	**Hydraulic Gradient (ft/ft)**	**Porosity (dec. frac.)**	**Soil Bulk Density (g/cm³)**	**KOC**	**Frac. Org. Carb.**	**Retard-ation (R)**	**V (=K*i/n*R) (ft/day)**
2.00E+00	**0.015**	**0.3**	**1.7**	**200**	**5.00E-03**	**6.66666667**	**0.015**

	y(ft)	**z(ft)**	**Time (days)**
2200	**0**	**0**	**10950**

Projected Conc. at		**2200**	**0**	**0**
at	**10950**	**days**		
0.000	**mg/l**			

AREAL MODEL	**CALCULATION DOMAIN**
Length (ft)	300
Width (ft)	500



	30	60	90	120	150	180	210	240	270	300
500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
250	2.434	1.097	0.494	0.223	0.100	0.045	0.020	0.009	0.004	0.002
0	2.434	1.097	0.494	0.223	0.100	0.045	0.020	0.009	0.004	0.002
-250	2.434	1.097	0.494	0.223	0.100	0.045	0.020	0.009	0.004	0.002
-500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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TABLE A-10
QUICK DOMENICO SPREADSHEET (South Sector)
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

ADVECTIVE TRANSPORT WITH THREE DIMENSIONAL DISPERSION AND 1ST ORDER DECAY and RETARDATION

Project:	Sharon - South Sector		
Date:	**2/14/02**	Prepared by:	MJV
		Contaminant:	**1,2-Dichloroethene**

	X						
SOURCE CONC (MG/L)	**DISTANCE TO LOCATION OF CONCERN (ft)**	**Ax (ft)**	**Ay (ft)**	**Az (ft) >=.001**	**LAMBDA day-1**	**SOURCE WIDTH (ft)**	**SOURCE THICKNESS (ft)**
3.3	**2100**	**10**	**1**	**0.001**	**2.74E-05**	**300**	**10.29**

Hydraulic Cond (ft/day)	**Hydraulic Gradient (ft/ft)**	**Porosity (dec. frac.)**	**Soil Bulk Density (g/cm^3)**	**KOC**	**Frac. Org. Carb.**	**Retard-ation (R)**	**V (=K*i/n*R) (ft/day)**
2.00E+00	**0.015**	**0.3**	**1.7**	**49**	**5.00E-03**	**2.38833333**	**0.0418702**

	y(ft)	**z(ft)**	**Time (days)**
2100	**0**	**0**	**10950**

Projected Conc. at		**2100**	**0**	**0**
at	**10950**	**days**		
0.000	**mg/l**			

PA DEPARTMENT
OF ENVIRONMENTAL PROTECTION
QUICK_DOMENICO.XLS
SPREADSHEET APPLICATION OF
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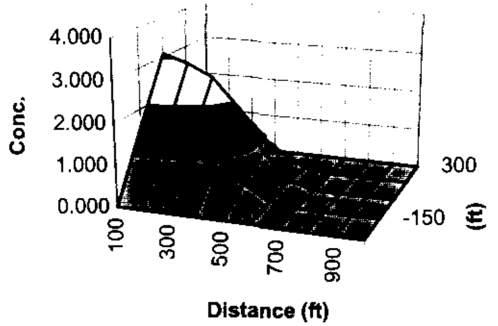
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation



	AREAL MODEL	**CALCULATION DOMAIN**
	Length (ft)	1000
	Width (ft)	300

	100	*200*	*300*	*400*	*500*	*600*	*700*	*800*	*900*	*1000*
300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150	1.546	1.445	1.299	0.953	0.423	0.088	0.007	0.000	0.000	0.000
0	3.092	2.889	2.599	1.907	0.847	0.175	0.015	0.000	0.000	0.000
-150	1.546	1.445	1.299	0.953	0.423	0.088	0.007	0.000	0.000	0.000
-300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TABLE A-11
QUICK DOMENICO SPREADSHEET (South Sector)
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

ADVECTIVE TRANSPORT WITH THREE DIMENSIONAL DISPERSION AND 1ST ORDER DECAY and RETARDATION

Project: Sharon - South Sector

Date: 2/14/02 Prepared by: MJV

Contaminant: **1,2-Dichloroethene**

PA DEPARTMENT
OF ENVIRONMENTAL PROTECTION
QUICK_DOMENICO.XLS
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
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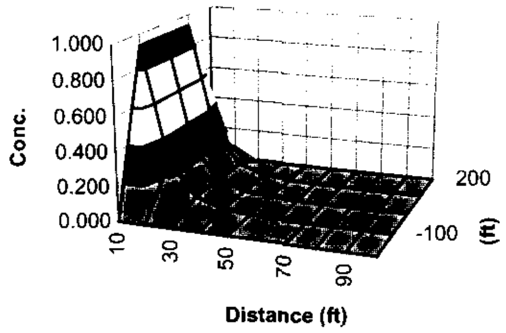
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

SOURCE CONC (MG/L)	X DISTANCE T LOCATION C CONCERN (ft)	Ax (ft)	Ay (ft)	Az (ft) >=.001	LAMBDA day-1	SOURCE WIDTH (ft)	SOURCE THICKNESS (ft)
3.3	2100	10	1	0.001	1.20E-02	300	10.29

Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm^3)	KOC	Frac. Org. Carb.	Retard-ation (R)	V (=K*i/n*R) (ft/day)
2.00E+00	0.015	0.3	1.7	49	5.00E-03	2.38833333	0.0418702

	y(ft)	z(ft)	Time (days)
2100	0	0	10950

Projected Conc. at		2100	0	0
at	10950	days		
0.000	mg/l			



AREAL MODEL	CALCULATION DOMAIN
Length (ft)	100
Width (ft)	200

	10	20	30	40	50	60	70	80	90	100
200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
100	0.931	0.263	0.074	0.021	0.006	0.002	0.000	0.000	0.000	0.000
0	0.931	0.263	0.074	0.021	0.006	0.002	0.000	0.000	0.000	0.000
-100	0.931	0.263	0.074	0.021	0.006	0.002	0.000	0.000	0.000	0.000
-200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TABLE A-12
QUICK DOMENICO SPREADSHEET (South Sector)
FORMER TRANSFORMER FACILITY
SHARON, PENNSYLVANIA

ADVECTIVE TRANSPORT WITH THREE DIMENSIONAL DISPERSION AND 1ST ORDER DECAY and RETARDATION

Project:	Sharon - South Sector		
Date:	2/14/02	Prepared by:	MJV
		Contaminant:	**1,2-Dichloroethene**

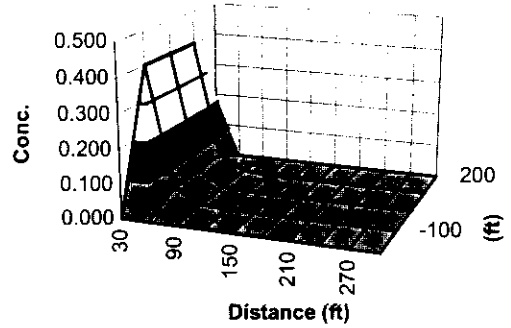
	X						
SOURCE CONC (MG/L)	**DISTANCE T LOCATION C CONCERN (ft)**	**Ax (ft)**	**Ay (ft)**	**Az (ft) >=.001**	**LAMBDA day-1**	**SOURCE WIDTH (ft)**	**SOURCE THICKNESS (ft)**
3.3	2100	10	1	0.001	5.00E-03	300	10.29

Hydraulic Cond (ft/day)	**Hydraulic Gradient (ft/ft)**	**Porosity (dec. frac.)**	**Soil Bulk Density (g/cm^3)**	**KOC**	**Frac. Org. Carb.**	**Retard-ation (R)**	**V (=K*I/n*R) (ft/day)**
2.00E+00	0.015	0.3	1.7	49	5.00E-03	2.38833333	0.0418702

	y(ft)	**z(ft)**	**Time (days)**
2100	0	0	10950

Projected Conc. at		2100	0	0
at	10950	**days**		
0.000	**mg/l**			

AREAL MODEL	**CALCULATION DOMAIN**
Length (ft)	300
Width (ft)	200



	30	60	90	120	150	180	210	240	270	300
200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
100	0.402	0.049	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000
0	0.402	0.049	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000
-100	0.402	0.049	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000
-200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

PA DEPARTMENT
OF ENVIRONMENTAL PROTECTION
QUICK_DOMENICO.XLS
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

ADDENDUM

ADDENDUM
TECHNICAL IMPRACTICABILITY OF GROUNDWATER RESTORATION EVALUATION REPORT
WESTINGHOUSE ELECTRIC SHARON PLANT
SHARON, PENNSYLVANIA

PREPARED FOR:

VIACOM INC.
PITTSBURGH, PENNSYLVANIA

This addendum provides responses to comments received from the U.S. Environmental Protection Agency (USEPA), Office of Emergency and Remedial Response (OERR) in a letter dated June 12, 2002 regarding the Technical Impracticability (TI) of Groundwater Restoration Evaluation Report, Westinghouse Electric Sharon Plant located in Sharon, Pennsylvania submitted by Cummings/Riter Consultants, Inc. (September 11, 2001) on behalf of Viacom Inc. The USEPA OERR comments, and our responses are provided below.

COMMENT NO. 1 - Areal Extent of the "TI Zone": OERR recommends reducing the size of the TI Zone to incorporate only those specific areas where it is impracticable to attain ARARs. Using the lateral boundaries defined by Sharon City's <u>Groundwater Use Restriction Zone</u> (p. ES-3, TI Evaluation) is incompatible with EPA policy in that the Zone appears to encompass an area significantly larger than the extent of the groundwater contamination for this site.

If the aqueous plume is to be incorporated within the TI Zone boundary (see <u>Aqueous Plume</u> discussion below), the south-southwestern extent of the plume should be more clearly defined. For instance, one of the southern-most wells that was non-detect for vinyl chloride in 1992, has tested at 33 ug/L as of the 1999 sampling (MCL of 2 ug/L). We understand that additional contamination from the neighboring site (Roemer) increases the complexity of plume delineation.

> RESPONSE: We have revised (reduced by approximately 65 percent) the area of the proposed TI Zone. The revised proposed TI Zone is bounded to the north by Clark Street, to the east by Sharpsville Avenue, and to the south by Wishart Court continuing west to the intersection of Reno Street and Shenango Avenue. The western boundary extends along Shenango Avenue (from Reno Street) north to Broad Street, then due east to the Norfolk Southern railroad tracks, and finally, north along the railroad tracks to Clark Street. Additional monitoring wells will be established along the boundary of the proposed TI Zone and will be monitored to evaluate whether maximum contaminant levels (MCLs) continue to be met outside the proposed TI Zone as discussed in Section 5.5.4. The proposed TI

Zone area is shown on revised Figure 4-2 (attached). The proposed TI Zone area occupies approximately 35 percent of the groundwater use restriction area. Based on the available sampling and analysis data, and our current understanding of contaminant fate and transport properties, groundwater impacts resulting from historical activities at the Westinghouse Sharon Site do not exceed the boundary of the proposed TI Zone.

There is an area of contaminated groundwater within the proposed TI Zone, located west and southwest of the former Roemer Industries property, in which the groundwater is potentially impacted by historical activities at Roemer and which is unrelated to the former Westinghouse Plant. The area of Roemer's VOC contaminant influence within the currently monitored area is judged to be shown on revised Figure 4-2 (attached). The influence of the Roemer-related contamination might extend beyond the TI Zone proposed for the contaminants that are attributable to the Westinghouse Sharon Site.

COMMENT NO. 2 - Aqueous Plume: If it is technically infeasible to either cleanup or contain the NAPL pools, they would continuously feed the aqueous plume, making restoration of the aqueous plume impossible. Data provided in the TI Evaluation (Figures 5-14, 5-15, 5-16) indicate that the plume may not be stable. Therefore, MNA may not be able to contain the plume. The TI evaluation did not discuss containment of the aqueous plume; instead, it relied on MNA and an oversized TI Zone as the solution. Based on the data provided it appears that a more aggressive system should be evaluated to ensure protection against further downgradient migration and river discharge. OERR recommends further delineation of the southern extent of this aqueous plume and evaluation of possible containment measures.

RESPONSE: Based upon discussions with USEPA, Region 3 representatives, the proposed TI Zone has been modified and is shown on revised Figure 4-2. The revised TI Zone utilizes readily discernable surface features to designate its boundaries while minimizing its extent. As noted in the response to OERR Comment No. 1, and as discussed in Section 5.5.4, it is recognized that additional monitoring wells will be required along the boundary of the proposed TI Zone to monitor for site-related contaminants.

The protectiveness of remedial alternatives has been evaluated (Section 8.0) and has found active alternatives to be no more protective (and probably less protective) as compared to passive alternatives. Attempts at containing the dissolved phase plume through groundwater extraction (in addition to being technically infeasible due to physical constraints and aquifer characteristics) may mobilize non-aqueous phase liquids (NAPLs) and introduce additional contaminant mass into the aquifer.

COMMENT NO. 3 - Monitored Natural Attenuation (MNA) as a "Remedy": The TI Evaluation (p. 90) states that Alternative 2, MNA, is the proposed remedy (along with the TI Waiver). There are a couple inherent problems with this that must be resolved before being incorporated into a ROD:

1) MNA can only be chosen as a <u>cleanup</u> mechanism if there is evidence to suggest that it will achieve cleanup levels (MCLs) in a reasonable time frame. P. 71 of the Evaluation acknowledges that MNA will not restore the aquifer within predictable time frames.

2) However, if <u>Containment</u> is chosen as the remedial objective, MNA may be used as a method of "containing" the contaminants. From the data provided, it is not clear that MNA is containing the aqueous plume at this site.

> RESPONSE: The reference to Alternative 2 was inadvertently included on Page 90. The remedial objective of the selected remedy will be to provide overall protectiveness of human health and the environment. "Cleanup" (aquifer restoration) in reasonable timeframes by any remedial alternative is not feasible due to site conditions; and therefore, is not anticipated. A TI Waiver is therefore necessary irrespective of the remedy that USEPA selects. Institutional controls and monitoring will be protective at this site.

COMMENT NO. 4 - DNAPL Containment Considerations: EPA guidance recommends containment of DNAPL source areas and restoration of the remaining plume. The question at the Sharon site is: "Why can't the DNAPL source be physically or hydraulically contained?" The TI Evaluation concludes two primary reasons for inability of source containment (p. ES-2, TI Evaluation): 1) "anthropogenic conditions" at the site, 2) large areal extent requiring containment.

The DNAPL source area extends off-site, onto neighboring businesses and under large buildings that are currently occupied. OERR agrees that installing physical containment barriers for the DNAPL source pool would, from a logistical viewpoint, be extremely difficult. An additional discussion of the hydrogeological conditions that make DNAPL containment unfeasible should be provided.

> RESPONSE: The use of physical containment barriers at the Sharon Plant is not a feasible approach, due in part to the presence of active industrial buildings and other surface and subsurface features. Along the downgradient edge of the dense, non-aqueous phase liquid (DNAPL) Zone, the containment barrier would have to be installed through two active manufacturing buildings leased and operated by John Maneely, Inc. Along the upgradient edge of the DNAPL Zone, the containment barrier would have to be installed through an active industrial building owned and operated by Winner Steel. An active railroad line operated by Norfolk Southern also runs through the area, providing additional interference to construction of a containment barrier. Storm and sanitary sewers within the

AK Steel and Winner properties present a further obstacle to barrier installation. The use of physical barriers would not result in increased protectiveness above current conditions and their attempted installation would increase short-term risks.

Regarding hydraulic containment, numerous product recovery wells would be required to promote DNAPL containment due to the heterogeneous nature of the alluvial aquifer. The alluvial deposits at the site are composed of reworked glacial material. The thickness of the alluvial deposits is quite variable, as shown by Figure 5-3. Because the material is river deposited, there can be considerable variation in a vertical column at any given point (i.e., lenses of silt and clay or coarse material can be found). This heterogeneity causes preferential flow paths for hydraulic connection with the target DNAPL. In fractured porous media (as may be present at the site), the process of matrix diffusion also serves to impede the effectiveness of remedial technologies further.

Furthermore, drawing down the water levels in an attempt to contain DNAPLs could potentially lower the water levels in areas where light non-aqueous phase liquids (LNAPLs) are present. This could create a smear zone where LNAPL becomes adsorbed onto soil particles further complicating LNAPL removal. Attempts have been made to hydraulically contain LNAPL at the site. To date, SoakEase™ tubes have recovered approximately 121 gallons of LNAPL, pumping/bailing has recovered approximately 274 gallons of LNAPL, and belt skimmer operations at Well GM-4A have recovered approximately 273 gallons of LNAPL, resulting in a total of 668 gallons of LNAPL recovered in 6.5 years of operation, or approximately 1 percent of the total LNAPL mass present at the site. The rate of LNAPL recovery for the first two quarters of 2002 was estimated to be 0.06 gallons per day.

In summary, there is no evidence that leads to the conclusion that site risks would be reduced in this effort. Furthermore, the current technology is ineffective at restoring groundwater in the presence of DNAPL because of the long time periods required to dissolve residual and pooled DNAPL, particularly considering the hydrophobic nature of polychlorinated biphenyls (PCBs). This conclusion holds regardless of the rate of groundwater recovery. Therefore, a TI Waiver would still be required if USEPA selects an active or passive remedy.

COMMENT NO. 5 - Affected AK Steel Property (western boundary): OERR recommends that a sufficient evaluation be done to determine: 1) what type(s) of remediation are being utilized, 2) what contaminant(s) are being addressed, and 3) what authority is overseeing cleanup at the AK Steel property on the western boundary? Potential complications could arise if, for example, the Sharon Site

invokes a TI zone under the Superfund authority that includes (a part of) the AK Steel, while AK Steel is cleaning up some of the same on-site contaminants to MCLs under the RCRA authority.

> **RESPONSE**: Additional information beyond that provided in the Remedial Investigation Report has been solicited from the Pennsylvania Department of Environmental Protection project manager for this site regarding the remedial activities at the AK Steel (presently leased by John Maneely, Inc.) property. The following information was modified from a review of historical reports (NUS Corporation, 1990[1]) and recent discussions with the PADEP.
>
> The PADEP issued a Consent Order to (then) Cyclops Corporation – Sawhill Division which became effective on August 10, 1988. The Consent Order required the drilling and installation of groundwater recovery wells to contain suspected contamination emanating from the plant's waste pickle liquor tanks. The Order also required the construction of an on-site wastewater treatment plant which was to process plant wastewaters (as well as recovered contaminated groundwater) prior to an National Pollutant Discharge Elimination System (NPDES) discharge.
>
> The treatment system reportedly began operation in August 1988. Details regarding the type of treatment were not available. The pumping rates were reported to be variable based on seasonality.
>
> The primary contaminants of interest at the former Cyclops Corporation site (as listed in the Consent Order) are pH, sulfate, chromium, and zinc. The current NPDES permit (as reported by the PADEP) requires analysis of pH, suspended solids, iron, lead, zinc, and oil and grease.
>
> Based on results for groundwater level monitoring and analytical testing, the ongoing groundwater recovery process at AK Steel is not influencing, nor is influenced by, the Westinghouse Sharon site-related groundwater contaminant zone. Long-term monitoring will be used to confirm the lack of influence in the future. The limits of the proposed TI Zone area have been revised (in response to Comment No. 1). The proposed TI Zone does not include the area being actively remediated by the AK Steel activities. The proposed TI Zone and the AK Steel groundwater remediation area are provided on revised Figure 4-2 (attached).

COMMENT NO. 6 - COCs and CPOCs: COCs are not clearly distinguished from CPOCs so that the TI Evaluation does not clearly identify those "specific" contaminants for which the Waiver is being sought. It simply states the TI Waiver

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[1] NUS Corporation, 1990, "Site Inspection of Cyclops Corporation – Sawhill Division," Prepared for the USEPA- Hazardous Site Control Division, March 15.

is for "all CPOCs". EPA guidance (OSWER 9234.2-25, p. 12) recommends that specific COCs be identified for which the TI Waiver is being sought. Guidance further encourages the cleanup of any COC within a TI zone that is practicable. OERR recommends that all COCs be identified, including those COCs that are present as background and are not site-related. Superfund remedies are not expected to cleanup COCs below background levels.

NOTE: On Tables 3-1, 3-2, and 3-3, the Arsenic MCL should be changed to 10 ug/L.

> **RESPONSE:** For purposes of the TI Waiver Evaluation Report, chemicals of concern (COCs) and chemicals of potential concern (COPCs) can be defined as follows. Through the remedial investigation/feasibility study process, COPCs (also known as COI) are identified and evaluated (during the performance of a risk assessment) to determine which chemicals at a site present a potential risk to human health and/or the environment. Some of these COPCs identified through the risk assessment may be detected in environmental samples at concentrations which exceed specific Applicable or Relevant and Appropriate Requirements. These chemicals are defined as COCs and are the chemicals for which the TI evaluation is being conducted. The COCs for the Sharon site are summarized in the revised Tables 3-1 through 3-3 (attached).
>
> We acknowledge the change for the MCL value for arsenic. Revised Tables 3-1 through 3-3 are attached and have been updated in response to this comment.

SUMMARY

Information provided in these responses to the OERR comments has been used to revise specific pages of the TI of Groundwater Restoration Evaluation Report (Cummings/Riter, 2002). The revised pages will be submitted to USEPA for insertion in the existing report. The specific revised text, tables and figures for insertion in the existing report include:

- A revised Page ES-2, clarifying a statement in the last paragraph;
- A revised Page ES-3, noting the revised area of the proposed TI Zone;
- Revised Pages 20 and 22, noting the revised area of the proposed TI Zone;
- A revised Page 32, referencing Tables 3-1, 3-2, and 3-3 which provide the list of COCs for which the TI Waiver is being sought;
- A revised Page 90 (in which all references to Alternative 2 as the proposed remedy have been deleted);
- Revised Tables 3-1, 3-2, and 3-3; and
- A revised Figure 4-2.

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PAGE # AR303319

IMAGERY COVER SHEET
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OPERABLE UNIT OU2

SECTION/BOX/FOLDER 3D

REPORT OR DOCUMENT TITLE Technical Impracticability of groundwater restoration evaluation report

DATE OF DOCUMENT March 22, 02

DESCRIPTION OF IMAGERY Oversized Map: Figure 5-16, -5-15

NUMBER AND TYPE OF IMAGERY ITEM(S) 2 Map