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PHASE IIA SUPPLEMENTAL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY REPORT

FORMER COAL GASIFICATION SITE MECHANICVILLE, NEW YORK

Submitted by:

New York State Electric and Gas Corporation
Corporate Drive - Kirkwood Industrial Park
Binghamton, New York

Prepared by:

ABB Environmental Services, Inc.
110 Free Street
Portland, Maine

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ASEA BROWN BOVERI

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PHASE IIA SUPPLEMENTAL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY REPORT

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1.0 INTRODUCTION

This Phase IIA Supplemental Remedial Investigation (RI) and Feasibility Study (FS) Report was prepared by ABB Environmental Services, Inc. (ABB-ES) for the New York State Electric and Gas Corporation (NYSEG) under Contract No. 85-159. It presents a summary of previous investigations and the findings of the Phase IIA Supplemental RI conducted at the Mechanicville Central Avenue Site (the site), Mechanicville, New York. In addition, this report presents the results of the FS completed to evaluate potential remedial measures that may be warranted to address certain environmental conditions encountered at the site.

1.1 BACKGROUND

In 1986 NYSEG initiated field investigation activities at the former coal gasification site at Mechanicville to assess the potential presence of residual by-products and wastes associated with former gas manufacturing activities at the facility. The investigation activities were conducted as four separate tasks completed during the period between 1986 and 1990. The results of the individual investigation activities were consolidated into a summary document entitled, "Investigation of the Former Coal Gasification Site at Mechanicville, New York; Phase II Remedial Investigation Report and Work Plan for Phase IIA Supplemental Remedial Investigation and Feasibility Study" (Phase II RI Report) which was submitted to the New York State Department of Environmental Conservation (NYSDEC) in June 1992.

In February 1993, NYSEG entered into an Order on Consent - Index #A5-0276-91-10 (the Order) with NYSDEC relative to the Mechanicville Site. The goal of the Order was to develop and implement a Phase IIA Supplemental RI and Feasibility Study (FS) which address health and environmental hazards and potential hazards attributable to the site. Work plans detailing the technical approach and specific supplemental investigation and feasibility study activities required in the Order were included in the Phase II RI Report. The work plan components of this report and modifications required pursuant to comments provided by NYSDEC in correspondence to NYSEG dated July 2, 1992, constitute the Work Plan as incorporated into the Order.

Field work activities associated with the Supplemental Investigation were conducted by ABB Environmental Services, Inc. between May 1993 and July 1993. The FS was conducted subsequent to receipt and evaluation the Phase IIA Supplemental RI data. The scope of the NYSDEC approved "focused" FS was modified to address comments provided by the NYSDEC project manager in a letter to NYSEG dated April 3, 1993. Specifically, the Work Plan was modified to address additional environmental media which were not initially included in the FS work plan.

This Phase IIA Supplemental Remedial Investigation and Feasibility Study Report presents and discusses the data collected from Phase IIA Supplemental field activities as they relate to the current understanding of site conditions developed from previous investigations of the site. The results of the FS are presented and discussed in the context of the requirements of the Order to address any presence of potential threat to the public health or environment posed by the presence of residual by-products and wastes associated with former site operations and any threatened release of such residual materials at or from the site.

1.2 Summary of Phase IIA Supplemental RI Field Work Activities

The following activities were completed during the Phase IIA Supplemental RI field program:

- the collection, field characterization, and laboratory analyses of twenty-four (24) surface soil samples;
- the installation of four (4) seepage meters in the Anthony Kill, the measurement of seepage rates, and collection and laboratory analyses of seepage samples;
- the collection, field characterization, instrumental screening, and laboratory analyses of six (6) sediment samples from the Anthony Kill;
- the completion of three (3) soil borings and the collection and laboratory analysis of two (2) subsurface soil samples;
- the installation of three (3) groundwater monitoring wells and the collection and laboratory analysis of one (1) round of groundwater samples from selected groundwater monitoring wells;
- the performance of in situ hydraulic permeability testing of zones in which new monitoring wells were screened;

- the measurement of water levels in selected overburden and bedrock monitoring wells to evaluate the direction of groundwater flow; and

- the completion of an expanded topographic survey.

1.3 REPORT ORGANIZATION

This RI report contains the following sections:

- Background (Section 2.0)
- Previous Investigations (Section 3.0)
- Summary of Phase IIA Supplemental RI Field Work (Section 4.0)
- Site Topography, Geology, and Hydrogeology (Section 5.0)
- Field and Laboratory Data (Section 6.0)
- Summary of Findings (Section 7.0)
- Conclusions and Recommendations of the Phase IIA Supplemental RI (Section 8.0)
- Feasibility Study Introduction (Section 9.0)
- Identification of Standards, Criteria, and Guidelines (Section 10.0)
- Identification and Screening of Technologies (Section 11.0)
- Development of Remedial Alternatives (Section 12.0)
- Initial Screening of Mechanicville Site Alternatives (Section 13.0)
- Detailed Analysis of Remedial Action Alternatives (Section 14.0)
- Comparative Analysis of Alternatives (Section 15.0)
- Recommendations of Remedial Action (Section 16.0)

The *Background Section* contains information concerning, among other things, site setting, site history, regional geology and regional hydrogeology. The *Previous Investigations Section* summarizes previous investigations conducted at the site. The summary of *Remedial Investigation Field Work Activities Section* contains a description of the Phase IIA Supplemental RI field work activities conducted at the site. The *Site Topography, Geology and Hydrogeology Section* presents ABB-ES' interpretations of geologic and hydrogeologic data collected during RI field work activities. The *Field and Laboratory Data Section* presents field characterization and laboratory analytical data collected during the Phase IIA Supplemental RI field work activities. The *Summary of Findings Section* summarizes the geologic and hydrogeologic data as well as the field characterization and laboratory analytical data relative to environmental conditions at the site. The *Conclusions and Recommendations Section* presents conclusions from the RI and presents recommendations for potential remedial activities at the site to be considered in the FS.

The *Feasibility Introduction* discusses the purpose and scope of this FS. *Identification of Standards, Criteria, and Guidelines* summarizes federal, state, and local SCGs and includes development of remedial objectives that apply to this site. *Identification and Screening of Technologies* focuses on technologies for controlling migration of overburden groundwater and coal tar at the site. *Development of Remedial Alternatives* assembles alternatives with different combinations of technologies based on observations and site features. *Initial Screening of Mechanicville Site Alternatives* uses criteria of implementation, effectiveness, and cost to screen assembled alternatives. *Detailed Analysis of Remedial Action Alternatives* focuses on the three alternatives that emerged from alternatives screening. *Comparative Analysis* of Alternatives compares advantages and disadvantages of each of the three alternatives, relative to one another, with regard

to evaluation criteria. This analysis is the basis for *Recommendations of Remedial Action*.

2.0 BACKGROUND

2.1 SITE SETTING

The site is located in the City of Mechanicville, Saratoga County, New York (see Figure 2-1). The site is bordered on the east by North Central Avenue (formerly Champlain Canal), on the south by Ferris Lane, on the west by a railroad right-of-way, and on the north by the Anthony Kill. Current site conditions are depicted in Figure 2-2.

Saratoga County is in the Valley and Ridge physiographic province of east-central New York (Heath, et al., 1963; Waller, et al., n.d.). The Hudson River forms the northeastern and eastern boundaries of Saratoga County; the Mohawk River, the largest tributary to the Hudson River, forms the southeastern boundary.

The nearest surface water body is the Anthony Kill, a small tributary to the Hudson River at Mechanicville, that borders the northern boundary of the site approximately 1,500 feet upstream from its confluence with the Hudson River.

2.2 HISTORY AND OPERATIONS

2.2.1 Description of Manufactured Gas Plant (MGP) Operations

The water gas process was used at the Mechanicville site to manufacture gas. According to available information, both the blue gas and carbureted water gas manufacturing processes were used during plant operations (USWAG, 1984). Prior to the 1950s, the blue gas process was used, after which the plant converted to the carbureted water gas process. The site plan circa 1910 is shown in Figure 2-3. The site plan circa 1951 is shown in Figure 2-4.

Blue gas was produced by passing steam over incandescent coke and recovering the released gases. Because the steam lowered the temperature of the fuel bed, air blasts were needed periodically to restore the temperature. Using the blue gas process involved alternating cycles of steam injection and air blasts (See Figure 2-3).

The carbureted water gas process was developed to raise the heat content (British thermal units [Btu]) of the gas. In this process, blue gas passes through a carburetor where a spray of oil is injected into the gas streams and subsequently thermally cracked in a superheater (USWAG, 1984). Hydrocarbon gases, such as methane and ethane, were formed in the superheater adding to the Btu content of the gas.

The oil used in the carbureted water gas process was stored in three (3) aboveground tanks underneath a platform supporting the oxide house. A

fourth aboveground tank (10,000 gallons) was located between the two gas holders as shown in Figure 2-4.

At the Mechanicville facility, gas flowed from the gas house to the purifier house to the relief holder, and to the larger distribution holder. All piping was underground (Elvins, 1986; McBride, et al., 1986). This flow path differs from the typical water gas plant where gas was stored in the relief holder prior to being purified. The oxide house apparently stored fresh and/or spent oxide material used to purify the gas.

By-products generated at the Mechanicville gas plant included: ash and condensate from the gas house; wood chips from the purifier house; coal tar; light oils; and tar/oil water emulsions. Information documenting the management of manufactured materials and by-product/wastes generated at the site have not been located. However, it was common practice to dispose of ash and spent oxide material on-site (USWAG, 1984).

According to NYSEG employees, the following methods of disposal were employed:

- The ash and clinkers (noncombusted material) were shoveled out of the generator at night and spread in the area between the relief holder and Ferris Lane.

- The condensate from the water gas purification process was treated in the tar dehydrator (tar separator). The oil was used for fuel and

the water piped through a series of filter beds located behind the coal storage building. These filter beds consisted of wood troughs (approximately ten (10) feet by six (6) feet, and four (4) feet deep) set in the ground and filled with coke. Baffles directed the flow through the coke and discharged the water into the Anthony Kill. The oily coke in the beds was collected periodically and burned in the gas house.

- Wood chips treated with iron oxide were used to remove cyanide and hydrogen sulfide from the gas in the purifier house. When free sulfur accumulated to approximately 50 percent of the mass, much of the iron was tied up in iron sulfide and ferrocyanides, and the spent wood chips were replaced by fresh ones. The plant employed several disposal methods for the spent wood chips: (1) incinerated by the City of Mechanicville from 1951 to 1955; (2) piled along the road until someone came and hauled them away; and (3) spread on the lot just west of the active plant area (NYSEG n.d. and E.C. Jordan Co. 1986).

- Residual coal tar condensed out of the purified gas and mixed with water in the bottom of the relief holder. The mixture was periodically pumped into a truck and hauled off-site.

2.2.2 History and Operation

Founded in 1900, the Halfmoon Light, Heat & Power Co. began gas manufacturing operations in 1901. The layout of the gas plant, circa 1910, is depicted in Figure 2-3. (Sheehan, n.d.). The plant was expanded in 1911 to include a larger water gas holder and distribution gas holder.

In 1924, the Halfmoon Light, Heat & Power Co. was acquired by the Associated Gas and Electric System. Four years later, in 1928, the Associated Gas and Electric System was incorporated into NYSEG (Sheehan, n.d.). The site contained the following facilities/structures as of 1951:

- purifier house
- tar dehydrator
- storage and tool house
- relief gas holder (40,000 cubic feet)
- distribution gas holder (100,000 cubic feet)
- boiler room
- substation
- coal storage area
- filter beds
- transformer platform
- gas regulator building
- radiator shop.

The plant layout in 1951 is depicted in Figure 2-4. Coal gas production continued at the site until 1955 (Elvins, 1986).

From 1955 to 1990, NYSEG operated a natural gas and electric service center until the center was relocated to Halfmoon, New York. During the service center's 1955-1990 occupation, electrical equipment, including new and used transformers, regulators and capacitors, was stored on site. Prior to the late 1970s, the transformers were stored on two wooden platforms. One platform was located on the south border of the site, along Ferris Lane; the other platform was located above the filter beds, east of the former boiler room/substation building. After removal of the platforms, the transformers were relocated to an area by the banks of Anthony Kill. Because of oil staining, the top 8 to 12 inches of soil beneath this transformer storage area were removed by NYSEG in August 1984. Twelve (12) drums of excavated soil were hauled to an approved disposal facility and the excavated area was backfilled with gravel.

Upon routine inspection, minor oil stains were identified at several other locations. A 12- by 24-foot area, located approximately 25 feet west of the former filter beds, was excavated to depth of 2 feet. The excavated soils were then disposed of under the assumption they contained polychlorinated biphenyls (PCBs). Following the excavation, five (5) samples were collected for laboratory analysis. One sample in the center of the excavation area contained 1.0 part per million (ppm) of the PCB Aroclor-1248. The excavation was then lined with plastic and backfilled with clean soil to the original grade.

NYSEG purchased the 0.25-acre lot adjacent to the site on the corner of Ferris Lane and North Central Street in 1924 (Bevis, 1986). The lot remained empty until the 1950s when NYSEG built the existing electrical substation. NYSEG also owns the property west of the site. NYSEG purchased the land between the railroad tracks and the Anthony Kill in 1952, and the land between the railroad tracks and Ferris Lane in 1987.

Recent environmental activities at the site included the removal of one (1) 3,000-gallon gasoline tank. One (1) 3000-gallon diesel tank was decommissioned in place. The tank removal was performed in 1991. Hope Oatman, New York State Department of Environmental Conservation (NYSDEC) Region 5 Division of Environmental Quality, was present to verify that the tanks were properly addressed and did not leak.

In October 1992, the building that formerly housed the boiler room and electric generating equipment was demolished leaving the foundation in place.

The site is currently unoccupied and serves as a garage and supply storage/maintenance shop. The site is bordered by a 6-foot chain-link fence on the east, south, and west perimeters and by the Anthony Kill to the north.

2.3 REGIONAL GEOLOGY AND HYDROGEOLOGY

Regional geologic and hydrogeologic descriptions are based on a review of available literature, regional geologic and hydrogeologic maps, and data gathered in Tasks 1, 2, and 3.

2.3.1 Regional Geology

Saratoga County is located within the Hudson River Valley. The geomorphology is predominantly glacial. Soils in this region include gravelly sands, ablation tills (deposited during the Laurentide Ice sheet), stratified silt and clay deposits, and silty shale (weathered bedrock). Overburden soils range from 0 to 50 feet in thickness. The near-surface strata may have been altered by cultural activities such as farming and urban development.

The bedrock topography in Saratoga County is part of a regional preglacial drainage system that was glacially scoured to form U-shaped valleys. The most prominent surficial bedrock feature is a buried tributary known locally as the Colonie channel which traverses the Clifton Park area in a north-south direction, approximately 4 miles southwest of the site. Within the U-shaped channel is a narrow V-shaped inner gorge that in some places has been cut to sea level.

The Mechanicville area is predominantly underlain by interbedded shales and sandstone. Regionally, the principal bedrock formations consist of tightly folded, faulted and jointed Ordovician shales including the Normanskill Shale, Snake Hill Formation, Canajoharie Shale, and the Schenectady Formation. These formations

are primarily composed of blue-black to grey shales that range in total thickness from 100 to 1,000 feet. Older crystalline rocks (e.g. quartzite, gneiss, and schist) outcrop approximately 12 miles northwest of the site. These formations dip to the east and become overlain by sandstones, carbonates, and the shales described above.

The site is underlain by thinly bedded blue-grey Ordovician shales. The upper 10 feet is highly fractured with increased competency with depth. The shale bedrock beneath the site is approximately 100 to 400 feet thick.

2.3.2 Regional Hydrogeology

In the Mechanicville area, the regional groundwater flow is to the east, toward the Hudson River. Fine-grained stratified clay and silt deposits underlie relatively extensive areas in the eastern part of Saratoga County including the City of Mechanicville. The clay and silt is, for all practical purposes, impermeable and will not yield water in usable quantities (less than 10 gallons per minute (gpm)). Sand and gravel deposits are also common in the eastern region of the county. The saturated thickness of these soil deposits range from 0 to 100 feet. (Health, et. al., 1963).

Only one of the 18 high-use aquifers designated for public water supply by the New York State Department of Health is located in Saratoga County. This aquifer, referred to as the Colonie channel aquifer, consists of a series of the sand and gravel deposits primarily located within the village of Clifton Park, 4 miles southwest of the Mechanicville site. The Colonie channel aquifer consists of

discontinuous sand and gravel deposits that are confined in most places by a thick sequence of lacustrine silt and clay. Several public water supply systems tap the Colonie channel aquifer. Production wells in this aquifer have yields in excess of 500 gpm. Overlying the lacustrine silt and clay is a veneer of lake and dune sands that form a surficial aquifer. This aquifer is hydraulically connected to the lower confined aquifer through ice-contact deposits, such as kames or kame deltas, that are exposed at the land surface. These deposits act as recharge areas for the underlying confined aquifer. (Reynolds, R.J. 1983).

The overburden deposits underlying the Mechanicville site are generally less than 30 feet thick and are composed of silts and clays as well as highly weathered silty shale. The permeability of these deposits is low, ranging from 2.2×10^{-5} to 1.9×10^{-4} centimeters per second (cm/sec) or 0.06 to 0.54 feet per day (ft/day). Due to grain size and low permeability, the overburden deposits at the site are likely to be associated with the impermeable silts and clays described above. The groundwater at the Mechanicville site is not hydraulically connected to the Colonie channel aquifer.

Regionally, groundwater within the bedrock flows along planes influenced by bedding, cleavage, faults and/or joints. As the weight of the overlying bedrock and soils increases with depth, the interstitial spaces between joints and fractures decrease. On average, groundwater flow velocities in bedrock also decrease with depth.

Several natural springs that produce highly mineralized water are present in the dolomite formations in Saratoga Springs, approximately 9 miles north of

Mechanicville. The flow at these springs appears to be controlled by the Saratoga fault, which trends approximately north-south. The fault plane runs approximately 5 miles to the northwest of the Mechanicville site. East of the fault, dolomite is overlain by shale preventing upward seepage of the water. Opposite to dolomite, to the west of the fault, lies crystalline bedrock which acts as an impermeable barrier. Groundwater flowing in the dolomite is forced up to the surface along the fault plane, creating Saratoga Springs.

Bedrock groundwater is extracted primarily from wells installed in the carbonate formations (dolomites and limestones). These formations outcrop in the Glens Falls area and underlie the shales to the south. In 1963, twenty-five (25) wells installed in the carbonate reported yields ranging from 1 to 300 gpm. The average yield was 30 gpm. 110 wells installed in the Ordovician shales produce an average yield of 10 gpm.

Based on boring data collected during Tasks 1 through 4, Ordovician shales underlie the Mechanicville site and outcrop along the norther border of the site, forming the banks of the Anthony Kill. Both the overburden and the bedrock at the site have been documented to produce low yields (approximately 10 gpm), with the nearest primary aquifer 4 miles to the southwest (upgradient). The closest domestic wells are located nearly 1 mile southwest (i.e., upgradient) of the site in the Town of Halfmoon. According to available information, there are no active industrial wells in the Mechanicville area.

3.0 PREVIOUS INVESTIGATIONS

This section presents a summary of the previous investigations performed to complete the RI at the Mechanicville site. Sub-tasks performed during Task 1 (The Preliminary Site Evaluation), Task 2 (The Initial Field Investigation Program), Task 3 (The Expanded Problem Definition Program), and Task 4 (The Risk Assessment) are described in Subsections 3.1 through 3.4. A summary of the results is presented in Section 3.5, followed by conclusions and recommendations pertaining to the site and future investigations.

3.1 TASK 1 PRELIMINARY SITE EVALUATION

The Task 1 Preliminary Site Evaluation was conducted in 1986 to develop an understanding of the site's history, environmental setting, and current conditions. The field work activities included a detailed site reconnaissance, interviews, file searches, and a geophysical survey.

The geophysical survey was conducted within the two parking lots of the NYSEG facility on North Central Avenue. The survey area was approximately one (1) acre in size. The ground-penetrating radar (GPR), terrain conductivity profiling (also referred to as electromagnetic profiling), and seismic refraction surveys were conducted along the traverse lines indicated on Figures 3-1 and 3-2.

3.2 TASK 2 INITIAL FIELD INVESTIGATION PROGRAM

The Task 2 Initial Field Investigation Program was conducted during the period of 1986 to 1987. The purpose of the program was to investigate the presence of manufactured gas plant (MGP)-associated wastes at the Mechanicville site. Field activities included the completion of test pits and soil borings; installation of monitoring wells; sampling of air, soils, groundwater, surface water, and sediments; laboratory analyses; and completion of a preliminary land use investigation.

The primary objectives of Task 2 were problem identification, preliminary risk assessment, and preliminary in-house engineering determinations. The following field activities were performed:

- Excavated five test pits for characterization of the subsurface geology of the site; installed piezometers in two (2) of the test pits to obtain groundwater elevation data; collected six (6) soil samples for laboratory chemical analyses.

- Drilled eight (8) soil borings and collected eight (8) soil samples for laboratory analyses; installed six (6) monitoring wells and one (1) piezometer.

- Performed in situ permeability tests at all wells and obtained five (5) rounds of groundwater elevation data from monitoring wells and piezometers.

- Collected quarterly groundwater samples from six (6) monitoring wells for laboratory analyses.

- Collected quarterly surface water and sediment samples at three (3) locations along the Anthony Kill for laboratory analyses.

- Conducted a topographic survey to identify surficial features and exploration locations.

- Conducted a preliminary land use survey within a half-mile radius of the site.

- Performed a preliminary assessment of the potential health and environmental risks posed by chemical constituents found at the site, and identified remedial alternatives to control the effects and risks.

- Identified additional data requirements and proposed a Task 3 program to obtain the necessary data.

The detailed scope of work and analytical results for Task 2 were described in the Task 2 Report for the Mechanicville site, submitted to NYSEG in April 1986.

3.3 TASK 3 EXPANDED PROBLEM DEFINITION PROGRAM

The Task 3 Expanded Problem Definition Program was conducted during the period of 1987 through 1989. Task 3 was designed to (1) confirm analytical results of the Task 2 investigation, (2) obtain further data on chemical distribution in soil and shallow bedrock at the site, (3) further investigate the potential for chemical migration in groundwater, (4) assess the air quality within the buildings on the site, and (5) identify potential chemical receptors and potential sensitive land users.

Task 3 consisted of the following subtasks:

- Performed a ground penetrating radar (GPR) survey adjacent to the site on the northern side of the Anthony Kill to extend the area of bedrock contouring.

- Excavated four (4) shallow and three (3) deep borings drilled for further site characterization, including the collection and laboratory analyses of soil samples and characterization of bedrock.

- Installed six (6) monitoring wells and collected two (2) rounds of groundwater samples for laboratory analysis and two (2) rounds of water level measurements.

- Performed in situ permeability tests of overburden materials in which monitoring wells were screened. Packer pressure tests were conducted in the deep bedrock wells.

- Updated the topographic survey to include all Task 3 explorations.

- Collected air quality samples at three (3) indoor locations and one background location at the property line fence to assess volatilized contaminants.

- Evaluated and interpreted geologic, hydrogeologic, and chemical data to provide an understanding of site conditions.

- Identified potential receptors of site-derived chemicals.

- Developed a proposed outline for a Task 4 program to assess risks on-site and at the site boundaries.

A detailed discussion of the scope of work and analytical results were presented in the Phase II Remedial Investigation Report submitted to NYSEG in June 1992.

3.4 TASK 4 RISK ASSESSMENT

The scope of the Task 4 Risk Assessment was developed based on information obtained during Tasks 1 through 3. The Risk Assessment was designed to

(1) identify and assess the potential risk associated with exposure to the chemicals present on-site, and (2) evaluate the need for and develop, if necessary, the scope for Conceptual Design (Task 5).

The subtasks completed as part of the Task 4 Risk Assessment included the following:

- Reviewed and summarized the Tasks 2 and 3 field investigation findings on the distribution of chemicals present on-site.
- Selected the contaminants of concern identified on-site that represent potential hazards at the site.
- Identified the possible pathways of exposure and potentially exposed populations at and near the site.
- Identified the potential hazards associated with exposure to the contaminants of concern including acute and chronic toxic effects of the compounds.
- Identified the dose/response data used to quantitatively assess risk (e.g., U.S. Environmental Protection Agency [USEPA] cancer potency factors and reference doses).
- Compared the environmental concentrations of chemicals on-site to existing state and federal health-based criteria and standards.

- Characterized the human health and environmental risks associated with exposure to site-related chemicals.

- Established the Target Clean-up Levels (TCLs) to protect against future potential exposure to contaminants of concern.

- Evaluated the need for a conceptual Remedial Design (Task 5).

The Baseline Risk Assessment is presented in Section 6.0 of the Phase II Remedial Investigation Report submitted to NYSEG in June 1993. A summary of the results and conclusions are presented in Subsections 3.5 and 3.6 of this report.

3.5 SUMMARY

Site Setting, History

The Task 1 report identified potential environmental problems in soils, groundwater, surface water and air. From the site reconnaissance, interviews, and file reviews, it was concluded that:

- Land use in the vicinity of the site is both residential and commercial. Day-care centers, schools, recreational areas, nursing homes, and elderly housing projects are located within a half-mile radius of the Mechanicville site.

- Coal gas was produced at the site for fifty-four (54) years, from 1901 to 1955;

- Coal tar residues accumulated in the base of the relief gas holder;

- Condensate from the water gas process was treated in a tar dehydrator and filter bed system before being discharged into the Anthony Kill;

- Residual ash from the gas generator was reportedly stored on the site before removal by various users;

- Wood chips and oxide wastes from the purifying house were hauled off-site for final disposal. Some spent chips may have been spread on the lot west of the active plant area.

Geology, Hydrogeology

The findings of the field investigations and analytical programs conducted during Task 1, Task 2, Task 3, and Task 4 at the site are summarized as follows:

- The shallow geology consists of 8 to 25 feet of heterogeneous fill deposits including a silty sand and gravel, a clayey silt and fractured shale, and a silty shale, all overlying fractured shale bedrock.

- The water table is approximately 5 to 10 feet below ground surface (bgs). Groundwater movement is principally within the silty shale and underlying bedrock fractures which are prevalent in the upper 10 feet of bedrock.

- Regional groundwater flow is west to east across the site, toward the Hudson River. Locally, groundwater flows to the north-northeast, discharging to the Anthony Kill.

Figure 3-3 shows sampling locations by task.

3.5.1 Nature and Extent of Contamination

Surface Soil

No PCBs were detected in any of the collected surface soil samples. This includes sample SS-5, which was obtained next to the PCB waste-oil drums. Additionally, no volatile organic compounds (VOCs) were detected in samples SS-1 through SS-5. A trace of bromomethane was detected in sample SS-3, but at a concentration below the detection limit for that sample. In addition, this compound was not detected in the duplicate sample, SS-3A. Cyanide was detected in two (2) surface soil samples, SS-1 and SS-3A (no cyanide was detected in the replicate sample SS-3) at 1.8 and 1.9 ppm, respectively. Both samples were collected from the area behind the garage offices and storeroom building, along the upper bank of the Anthony Kill. Several polycyclic aromatic hydrocarbons (PAHs) were detected in samples SS-1 through SS-4, including the duplicate

sample. Concentrations of total PAHs ranged from 9.1 to 71 ppm. No PAHs were detected in sample SS-5. Bis(2-ethylhexyl)phthalate (BEHP) was found in insignificant concentrations in two samples plus the duplicate sample. Although this compound is a common laboratory contaminant, no BEHP was detected in the laboratory blank; therefore, this compound is considered to be present in the surface soil. One other semi-volatile organic compound (SVOC), di-n-butyl phthalate, was detected in several samples. However, this is also a common laboratory contaminant and was found in the laboratory blank at similar concentrations. Therefore, this compound was not considered to be present in surface soils at the site.

Subsurface Soil

Analyses of subsurface soil samples from the field investigation program showed the presence of coal tar and MGP-related compounds (i.e., VOCs, PAHs, and cyanide) near the former relief gas holder, purifier and oxide houses, and filter beds. The highest levels of VOCs and PAHs were detected in samples collected at or near these sites. The highest levels of VOCs (3,800 and 3,410 ppm) were observed in samples collected from B-8 (at depths of 13.5 to 15.5 feet and 15.5 to 17.5 feet), which is located beneath the foundation of the former gas relief holder. The highest levels of PAHs were observed in samples obtained from B-8 (5,440 ppm), TP-5 (8,500 ppm; adjacent to the filter beds), and B-3 (9,310 ppm in the vicinity of the former purifier and oxide houses). Deep soil samples (deeper than 15 feet) contained lower levels of organics than the samples collected from shallow soils.

Iron levels ranged from 18,000 to 35,000 ppm. The lower concentrations were in the deeper fine silty sand. Higher levels were seen in shallow fill samples. Zinc levels generally ranged from 32 to 390 ppm, except for one Task 2 sample (B-5/S-1), which contained 1,600 ppm.

Cyanide was detected in three (3) subsurface soil samples at levels ranging from 1 to 3.2 ppm. These samples were collected in the vicinity of the former purifier and oxide houses. The concentration of cyanide in this area is most likely due to spillage during cleaning of the purifier house (Wilson and Stevens, 1981).

Phenolic compounds were found in four (4) soil boring samples at depths of 4 to 11 feet. Concentrations ranged from 0.74 to 3.6 ppm. These samples were collected in the vicinity of the former filter beds and the former gas and purifier houses. Phenolics are widely distributed in the environment due to both natural (i.e., vegetative decomposition) and man-made processes. Tars and wastewaters at coal gas plants are a source of phenolics; however, the tars produced by water gas plants such as the one at Mechanicville usually contain only negligible amounts of phenolics.

Groundwater

Cyanide was detected in all wells except MW-11. The highest levels of total cyanide (0.58 to 0.8 ppm) were observed at MW-12 during Task 3. During Task 2, a maximum level of 0.42 ppm was reported at MW-3. Well MW-12 is located downgradient from the former relief gas holder while MW-3 is downgradient from the former purifier/oxide structures.

Volatile aromatic compounds, a subset of VOCs, were detected consistently in all wells except MW-1, MW-2, and MW-11. MW-1, MW-10, and MW-11 are located upgradient of the former coal gasification plant. MW-2 is downgradient from the former distribution gas holder, but soils data from B-2 and B-7 suggest little or no contamination in this area. Concentrations in the bedrock wells (MW-6, MW-13, MW-14, and MW-15) were generally greater than those detected in the shallow wells. Other VOCs, including 1,1,1-trichloroethane, 1,1-dichloroethane, and trichloroethylene were detected in several samples. These compounds show no spatial pattern of occurrence (i.e. shallow versus deep, upgradient versus downgradient) and are not typically associated with MGP-associated wastes. They are not believed to be site-derived (E.C. Jordan Co., 1989; GRI, 1987).

PAHs were observed in at least one (1) sample from all wells except MW-1, MW-2, and MW-11. The average concentrations of all the samples collected at each well ranged from nondetectable (at MW-1, MW-2, and MW-11) to 0.75 parts per billion (ppb) at MW-12. The maximum levels of 1500 and 1564 ppb were observed at wells MW-12 and MW-5, respectively. The distribution of PAHs in the groundwater is similar to the distribution in the soil, indicating that contaminated soil is associated with PAHs in the groundwater.

The groundwater sampling data indicate that the detected PAHs are particulate in nature, rather than dissolved species. Some measured concentrations greatly exceed the solubility of PAHs in water. The solubility of PAHs ranges from 0.50 ppb for dibenzo(a,h)anthracene to 620 ppb for indeno(1,2,3-cd)pyrene. Thus, the groundwater concentrations must not be indicative of dissolved PAH concentrations. This conclusion is consistent with the sampling protocol, because

groundwater samples for organics are not filtered prior to analysis for organic contamination.

Dissolved iron was present in at least one (1) sample from every well. Wells MW-1, MW-2, MW-10, and MW-11, considered to provide the most representative background concentrations, contained concentrations ranging from 0.04 to 1.4 ppb. The wells with the highest concentrations of dissolved iron were MW-3, MW-4, MW-5, MW-6, and MW-12. These were the same wells with the highest concentrations of PAHs.

Dissolved zinc was detected at least once in every well. Samples from MW-4 and MW-5 contained unusually high levels (0.52 to 1.09 ppb). Samples from other wells showed fairly uniform concentrations (0.01 to 0.11 ppb). This uniformity suggests that zinc is a natural constituent of site groundwater which has not been elevated by site activities (E.C. Jordan Co., 1989).

Total recoverable phenolics were detected in all wells. The maximum concentration in shallow wells was 17 ppb while the maximum concentration in deep wells was 0.3 ppb.

Surface Water

No volatile aromatics were detected in any surface water samples. PAHs were detected once at the location adjacent to the site at a concentration of 0.105 ppb. Other organics detected during Task 2 included methylene chloride (upstream), acetone (adjacent), and BEHP (all locations). These compounds were found at

concentrations less than 0.1 ppb. They were also found in some sampler and trip blanks. During Task 3, BEHP was found upstream on both sampling occasions at concentrations less than 0.5 ppb; it was not found adjacent or downstream of the site. These three contaminants (methylene chloride, acetone, and BEHP), when present at low concentrations, are common laboratory contaminants. It is unlikely that they are derived from the site (GRI, 1987).

Iron was found at all four locations at levels ranging from 0.2 to 1.8 ppb. The highest concentration was found adjacent to the site. Zinc was detected in at least one (1) sample from three (3) locations; only the downstream sample collected during Task 3 had no detectable zinc. Concentrations ranged from 0.01 to 0.03 ppb. Phenolics were detected in at least one (1) sample from all locations except the upstream and adjacent locations sampled during Task 3. Cyanide was not detected in any of the Task 3 samples. It was detected in at least one (1) sample in each Task 2 location.

Sediment

Three VOCs were detected in the sediments. During Task 2, Round 3 sampling, benzene and toluene were found at a concentration of 0.07 ppm, adjacent to and downstream from the site. During Task 3, ethylbenzene was detected at a level of 0.087 ppm adjacent to the site, along with a trace concentration of benzene. These contaminants are associated with coal tar wastes as well as petroleum products and industrial chemicals.

Analysis of Task 2 and Task 3 sediment samples indicated that PAH concentrations adjacent to the site are elevated compared to upstream and downstream sampling locations. Sampling location SD-2 contained trace levels up to 75.8 ppm of total PAHs during Task 2 sampling, and trace levels to 5.1 ppm during Task 3 sampling.

Concentrations of iron and zinc were fairly consistent in the four (4) locations. Iron concentrations ranged from 7,100 to 33,100 ppm, while zinc concentrations ranged from 25 to 100 ppm. Cyanide compounds were not detected in any Task 2 samples, while in Task 3 a cyanide level of 1.3 ppm was detected adjacent to the site. Phenolics were detected in Task 2 Round 4 samples at all three (3) locations at comparable levels (1.8 to 6.1 ppm). During Task 3, phenolic levels ranged from 0.68 to 2.3 ppm.

Indoor Air

The results of the indoor air program revealed low levels of benzene and toluene at most sampling locations. The only exception was benzene, which was not being detected in the background sample. Ethyl benzene and xylenes were below analytical detection limits for all samples.

The highest indoor levels of toluene and benzene were found in the storeroom. A possible source of benzene in the storeroom may be a forklift used in this area. Although the engine was not running during the sampling period, it is possible that residual gasoline vapors had volatilized into the air. Toluene was detected in the background sample at higher levels than two (2) of the indoor samples. It was

highest in the garage. It is possible that the sample was affected by vehicle use in the area.

Contaminants of Concern

No contaminants of concern were chosen for surface water or groundwater. This is because there was no indication of site-related surface water contamination, based on the Task 2 and 3 surface water sampling results. Also, groundwater is not a current source of drinking water nor does it represent a potential source for the future. Therefore, ABB-ES' evaluation of the risks associated with groundwater consumption is limited to a comparison of the concentrations found to groundwater or drinking water standards.

Chemicals were selected as contaminants of concern in subsurface soil, sediment, and indoor air based upon their concentrations, frequency of detection, and toxicologic properties. All chemicals detected in surface soil samples SS-1 through SS-4 were chosen as contaminants of concern for this medium. All the contaminants of concern are associated with coal gasification activities.

Both carcinogenic and noncarcinogenic PAHs were detected at a high frequency and magnitude. Of the sixteen (16) PAHs detected at the site, seven (7) have been classified as potential human carcinogens and were selected as contaminants of concern: benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene. In addition, several PAHs were chosen as contaminants of concern to represent the noncarcinogenic hazards of PAHs: naphthalene, pyrene, acenaphthene,

acenaphthylene, phenanthrene, fluoranthene, fluorene, anthracene, 2-methylnaphthalene, and benzo(g,h,i)perylene.

Although iron and zinc were found in all samples, they were not selected because they are of such low toxicity. In addition, levels in soil were similar to background levels at the site, while levels in sediment were within an average background range. Other compounds such as acetone, BEHP, butylbenzyl phthalate, di-n-octyl phthalate, carbon disulfide, 4-methylphenol, and propyl benzene were not chosen because of their low frequency of detection. In addition, some of these compounds are common laboratory contaminants and therefore may not actually be present on the site.

3.5.2 Fate and Transport

Chemicals related to former MGP activities are present in the soils and in the shallow and deep groundwater near the former gas plant structures; specifically, the purifier and oxide houses, the relief gas holder, and the filter beds. The concentrations of six (6) compounds (i.e., benzo(a)pyrene, benzene, styrene, total cyanide, iron, and phenolics) and total organics in shallow and deep groundwater exceeded the relative New York State Drinking Water Standards. Benzene and toluene were found in all air quality samples collected, but concentrations did not exceed applicable Occupational Safety and Health Administration (OSHA), American Conference of Governmental Industrial Hygienists (ACGIH), and National Institute for Occupational Safety and Health (NIOSH) standards.

The primary routes identified for off-site chemical migration are via groundwater in the shallow and deep bedrock fractures, and the silty shale fill. Chemical migration is influenced by an east-trending shallow bedrock trough located downgradient of the relief gas holder.

Migratory pathways for chemical migration or transport off-site include air (primarily during excavation of site soils), surface water, groundwater, and sediments.

Potential receptors for chemicals found at the site include more sensitive segments of the population, including the elderly, young children, and the infirm. Additionally, people in the vicinity of the site may be exposed to airborne chemicals predominantly during excavation activities.

3.5.3 Risk Assessment

The significant findings of the Risk Assessment were as follows:

- The contaminants of concern identified in the soil and sediment at the site include carcinogenic PAHs and benzene and several noncarcinogens (toluene, ethylbenzene, styrene, PAHs, trimethylbenzene, xylenes, and cyanide).

- For the public health risk assessment, ABB-ES identified probable exposure pathways by which people could come in contact with site-derived chemicals under current and future conditions, assuming no

remedial action at the site. These included the following: direct contact with and incidental ingestion of surface soil, subsurface soil, and Anthony Kill sediment, and inhalation of volatile compounds and soil particulates.

- Potential carcinogenic and noncarcinogenic risks to human health were estimated under these assumed exposure pathways. Estimated incremental lifetime carcinogenic risks were within the target risk range for both the most probable and realistic worst exposure scenarios, for all of the exposure pathways identified. (USEPA guidelines state that the total incremental carcinogenic risk for an individual resulting from exposure at a hazardous waste site is generally within a range of 10^{-4} and 10^{-6} with a risk of 10^{-4} interpreted as an additional 1 in 10,000 chance of an individual developing cancer during a lifetime, as a result of the exposure.)

- The noncarcinogenic Hazard Indices (HIs) were all well below the cutoff of 1.0, indicating that no significant adverse noncarcinogenic effects would be expected.

- Because Mechanicville site groundwater is not currently used or expected to be used in the foreseeable future as a source of drinking water, public health risks associated with the groundwater are negligible. Groundwater beneath the site, however, does contain several contaminants at levels above both USEPA and New York drinking water standards.

- It is unlikely that the site is significantly utilized by wildlife because of the industrial nature of the area and the lack of suitable habitats. Aquatic organisms in the Anthony Kill, immediately adjacent to the site, were determined to be the environmental receptors most likely to be affected by site-related contamination.

- Contaminated groundwater from the site is discharging to the Anthony Kill; however, due to the dilution, volatilization of VOCs, and sorption of PAHs to soils (PAHs are relatively insoluble in water), no detectable concentrations of site related contaminants are present in surface water samples collected from the Anthony Kill.

3.6 CONCLUSIONS

The conclusions from the Tasks 1 through 4 field investigations and analytical programs are summarized as follows:

- The soils and groundwater in the former active plant area contain chemicals related to the coal gasification process.

- Coal gasification wastes in the subsurface environment are a continuing source of chemicals to soil and groundwater, and groundwater is the primary vehicle of transport.

- Downward seepage gradients within the bedrock trough near North Central Avenue may be carrying chemicals down into shallow and deeper bedrock fractures.

- Compounds are migrating northeasterly in the groundwater at the site, towards the Anthony Kill. The Anthony Kill is a groundwater discharge zone; however, dilution effects, volatilization, and sorption to soils result in the absence of detectable concentrations of VOCs or PAHs in surface water.

- Under current site conditions, the potential for public exposure to the contaminants of concern is low, for two reasons: (1) most of the site is paved or covered with buildings and access to the site is limited, restricting the possibility of contact with contaminated soil or volatilized contaminants; and (2) the groundwater at the site is not used as a drinking water source.

- Therefore, ABB-ES concludes that, under the assumed conditions of exposure, no significant adverse health effects would be anticipated.

- The results of the environmental risk assessment indicate that some potential for impacts does exist for aquatic organisms living in the Anthony Kill immediately adjacent to the site. However, these risks appear relatively minor, for several reasons. Few compounds were present at levels in excess of their environmental criteria, the extent of exceedances was minimal, and potential impacts were associated

only with "worst case" conditions, with no impacts expected under typical conditions. Also, the amount of benthic habitat is limited due to the streambed morphology and exposed bedrock, with little sediment accumulation.

- Finally, there is no evidence that contaminants are being transported downstream at significant levels. Levels of contaminants in the downstream surface water and sediment samples did not exceed protective criteria, even under the most conservative assumptions.

3.6.1 Data Needs and Recommendations for Future Work

Data needs have been identified that must be addressed to meet the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for Remedial Investigations. These data needs are as follows:

- Delineate the nature and extent of site-related contamination east of North Central Avenue. An east-trending bedrock trough was identified in the area of the former relief gas holder and a component of groundwater flow at the site is in an easterly direction.

- Investigate the western portion of the site for groundwater and soil contamination due to the possible disposal of wood chips and oxide wastes in this area. The nature of shallow subsurface anomalies identified during the Task 1 GPR survey will also be assessed.

- Several areas on the eastern and western portions of the site were identified as having been storage areas for PCB-containing transformers and capacitors as well as various electrical equipment. Sampling of these areas for PCB contamination is necessary.

- Investigate the property north of the Anthony Kill across from the site to establish whether a hydraulic connection exists between site groundwater and groundwater north of the Anthony Kill. If a hydraulic connection exists, collection and chemical analyses of groundwater samples may be necessary to evaluate any impacts to groundwater quality caused by the site.

- As has been done in the past, the site Health and Safety Plan (HASP) should be followed during any future exploratory work on the site to prevent or minimize undue exposure.

3.6.2 Recommended Remedial Investigation Objectives

To address the data needs identified in the previous subsection, the Phase IIA Supplemental RI Work Plan was developed. On- and off-site investigation activities are proposed to (1) investigate the potential for PCB contamination on the site, (2) determine the nature and effect of site-derived contamination east of the site, (3) determine if a hydraulic connection exists between the site groundwater and groundwater north of the Anthony Kill, (4) further define the areas and rates of site groundwater discharge to the Anthony Kill, and (5) assess the potential for site-related contamination on the western portion of the site.

4.0 SUMMARY OF PHASE IIA SUPPLEMENTAL RI FIELD PROGRAM

This section presents a summary of the Phase IIA Supplemental RI field work activities. A more detailed description of the Phase IIA Supplemental RI field work activities is provided in the Workplan for Phase IIA Supplemental Remedial Investigation (Section 8.0 of the June 1992 Phase II Supplemental RI Report).

4.1 GEOPHYSICAL INVESTIGATION

A seismic refraction survey was conducted on the Price Chopper property, located directly across North Central Avenue from the site (Figure 4-1). The survey was performed by an experienced ABB-ES geophysicist using a Geometrics ES-2415F Signal Enhancement Seismograph. Individual seismometers (geophones) were separated by 10 feet, and multiple impacts of a 10-pound sledgehammer were used for an energy source. Three (3) impact points were used for each seismic spread. Due to the limited size of the site, the average length of the spreads was 120 feet.

4.2 SOIL INVESTIGATION

The following activities were completed during the soil investigation:

- the investigation of soil conditions east (downgradient) of the site, to assess the potential migration of MGP-related contaminants in this direction;

- the investigation of soil conditions west (upgradient) of the site;

- the investigation of surface soil (0 to 1 foot bgs) conditions in areas formerly used to store transformers, capacitors and other miscellaneous electrical equipment;

- the investigation of surface soil (0 to 1 foot bgs) conditions in the western portion of the site where wood chips and spent oxide wastes may have been periodically disposed.

The locations of all Phase IIA Supplemental RI explorations are shown on Figure 4-2.

4.2.1 Surface Soils (0 to 1 foot bgs)

Surface soil sampling locations are shown on Figure 4-2 and 4-3. Analytical data relating to the surface soil sampling locations are discussed in Subsection 5.2 and summarized in Tables 5-1 and 5-2.

Shallow Subsurface Soil Conditions, in the Western Portion of the Site

Six (6) surface soil samples including one (1) duplicate sample were collected from the western portion of the site for laboratory analyses and analyzed for reactive sulfide and reactive cyanide. All samples were collected from the 0 to 1 foot bgs interval using pre-cleaned stainless steel spoons and bowls. Samples located under asphalt were collected from the 0.25 to 1 foot bgs interval.

Surface Soil Conditions Under Former Transformer Storage Areas

A total of twenty-one (21) surface soil composite samples, including two (2) duplicate samples, were collected and laboratory analyzed for PCBs. The samples were collected from six (6) former transformer storage areas. Four (4) samples were collected from within each of the reported transformer storage areas designated Areas 3, 4, 5, and 6 (see Figure 4-3). Each sample consisted of a composite of four (4) sub-areas. Samples were collected from the 0 to 1 foot bgs interval using pre-cleaned stainless steel spoons and composited in stainless steel bowls. According to photographs, site maps, and interviews with NYSEG employees, transformer storage Area 2 had historically been paved. Based on this information and with the concurrence of the NYSDEC project manager, one (1) sample of accumulated soil was collected from the surface of the asphalt. In transformer storage Area 1, with prior approval of the NYSDEC project manager, two (2) soil samples were collected; one (1) from the accumulated soil from the surface of the asphalt and one (1) shallow subsurface sample (0.15 to 1 feet bgs) collected from beneath the asphalt.

4.2.2 Subsurface Soil (below 2 feet bgs)

Three (3) soil borings (B-16, B-17 and B-18) were drilled during the Phase IIA Supplemental RI field program and completed as groundwater monitoring wells (MW-16, MW-17, and MW-18), respectively. Soil boring/groundwater monitoring well locations are shown on Figure 4-2. Completion of monitoring well borings is discussed in Subsection 4.3.

Two (2) of the borings were completed in the overburden and one (1) (MW-18) was completed in bedrock. Field observations were made on all soil and bedrock samples collected and each soil boring was logged with respect to geologic/soil characterization. Field boring logs and rock core identification logs are presented in Appendix A.

Soil samples (or rock cores) were collected continuously during drilling of all soil borings. Soil samples were collected using a 3-inch outside diameter (OD) split-spoon sampler. All samples were field characterized and instrumentally screened for evidence of VOCs. Rock cores were retrieved using NX core rods and core barrels were then placed in wooden core boxes and stored on site. Three (3) subsurface soil samples, including one (1) duplicate, were submitted for laboratory analyses. Samples were analyzed for VOCs, SVOCs, selected inorganics and total cyanide, reactive cyanide, and reactive sulfide.

4.2.3 Investigation of Former Filter Bed Area

With the concurrence of the NYSDEC project manager, six (6) additional soil borings (borings B-20 through B-25) were completed to investigate subsurface soil conditions in the former filter bed area. The purpose of these borings was to, if possible, locate and sample the residual filter bed material. Field observations were made on all soils samples collected and logged with respect to geologic/soil characterization. Field boring logs are presented in Appendix A.

Soil samples were collected continuously using a 2-inch OD split-spoon sampler. All samples were field characterized and instrumentally screened for evidence of contamination.

4.3 GROUNDWATER INVESTIGATION

4.3.1 Groundwater Monitoring Well Installation

One (1) shallow groundwater monitoring well (MW-16) was installed to characterize groundwater conditions in the overburden soils upgradient of the site. Two (2) collocated groundwater monitoring wells, one (1) screened in the overburden and one (1) screened in the bedrock (MW-17 and MW-18, respectively) were installed downgradient of the site at a location on the Price Chopper property based on the results of the seismic survey.

The overburden groundwater monitoring wells, MW-16 and MW-17, were advanced using 4.25-inch inside diameter (ID) hollow-stem augers. The borings were advanced to competent bedrock which was encountered at depths of 8 and 22.5 feet bgs respectively. The bedrock groundwater monitoring well was advanced to bedrock using the 4-inch ID steel casing and the drive and wash method. The casing was seated approximated 2 feet into the bedrock. The boring was then advanced 15 feet into the bedrock using an NX size core barrel.

All monitoring well screens and risers were constructed of 2-inch ID Schedule 5 stainless steel. The well screens were #10 slot wire-wound and 10 feet in length. Well materials were pre-cleaned by steam-cleaning prior to installation. A sandpack was installed in the annulus between the borehole wall and the screen. The sandpack material, Morie 0 silica sand, was placed at a minimum of 2 feet above the top of the screen. A minimum of 2 feet of bentonite pellets/slurry was placed above the sandpack. Pellets were hydrated with potable water upon installation and allowed adequate time to swell. The remainder of the borehole was backfilled with wet bentonite-cement grout.

Monitoring wells were protected against tampering by installing water-tight, flush-mounted locking curb boxes set in place with a minimum of 2 cubic feet of concrete. After the wells were installed and water levels had equilibrated, water level measurements were recorded.

The elevation of the well risers were surveyed and recorded by David Flanders Associates, Inc. (FLANDERS) (also see Subsection 4.10)

The monitoring well installation diagrams are included in Appendix A. Details of the well installations are listed in Table 4-1.

4.3.2 Piezometers

Seven (7) piezometers (P-3 through P-9) were installed to investigate groundwater flow along the north and south banks of the Anthony Kill. P-10 could not be installed due to the lack of an adequate depth of soil/sediments in the area. Piezometers were constructed of hand slotted 1-inch ID Schedule 40 polyvinyl chloride (PVC), installed in pre-driven holes and cemented in place.

4.3.3 Monitoring Well Development

All three (3) Phase IIA Supplemental RI monitoring wells were developed by pumping using a down hole Whalco submersible pump and periodically stressing the formation with surge and block. A minimum of three (3) well volumes were removed from the well in addition to any volume of water introduced to the formation during drilling activities. At the conclusion of development, purge water clarity varied from clear (MW-17 and MW-18) to slightly turbid (MW-16). Development water was collected in 55-gallon drums, and discharged into the recharge well on-site.

4.3.4 Groundwater Sampling

One (1) round of groundwater sampling, associated with the Phase IIA Supplemental RI field program, was conducted at the site. Monitoring wells were

sampled between 13 and 15 July 1993. Only wells in which no evidence of free-product was observed were sampled.

Prior to sample collection, all wells were checked for both light and dense non-aqueous phase liquids (L and DNAPL [i.e. free product]) utilizing an interface probe. To assure accuracy of the probe, dedicated stainless steel washers were used to sound the bottom of the well instead of the interface probe. If DNAPLs were present, they would be visible on the retrieved washers. LNAPL was observed in one well (MW-3) and DNAPL was observed in five (5) wells (MW-4, MW-5, MW-6, MW-10, and MW-12).

Wells that did not show the presence of free-product were then purged of a minimum of four (4) well volumes. In situ parameters (pH, specific conductivity, and temperature) were recorded periodically during purging. After the field parameters and turbidity stabilized, (typically four [4] to six [6] well volumes) the wells were sampled.

A dedicated Teflon bailer was used to sample each well. After sampling both bailers and pump tubing were containerized with the soil cuttings in U.S. Department of Transportation (DOT) approved 55-gallon drums for off-site disposal.

Samples were submitted to Galson Laboratories (GALSON) of Syracuse, New York. Groundwater samples were collected in appropriate containers supplied by GALSON, preserved in accordance with the Quality Assurance Project Plan (QAPP), and chilled to 4°C prior to priority overnight shipment to GALSON.

Samples were analyzed for VOCs, SVOCs, filtered and unfiltered inorganics, total cyanide (including amenable and iron cyanide), and turbidity.

Water level measurements were taken from all sampled monitoring wells and piezometers. Water levels were measured to the nearest 0.01 foot. Groundwater elevation data are presented in Table 4-2.

4.4 HYDRAULIC CONDUCTIVITY AND PERMEABILITY TESTING

In situ hydraulic conductivity tests, commonly referred to as slug tests, were performed on the three (3) Phase IIA Supplemental RI monitoring wells. Data were recorded using a pressure transducer and a Hermitt 2000 data logger. Data were reduced using Aqtesolv software. Permeabilities were calculated using the Bouwer and Rice method. Because the shallow bedrock is highly fractured, it hydraulically resembles a porous media. Data from slug tests performed at MW-18, screened in the shallow bedrock, were treated the same as MW-16 and MW-17, screened in the overburden. Although different methods were used during the Phase IIA Supplemental RI, as compared to previous investigations, calculated values were consistent with previous findings. Hydraulic conductivity data is presented in Appendix B.

4.5 SEDIMENT AND SEEPAGE INVESTIGATION

The primary objective of the seepage and sediment investigation was to evaluate the quality of groundwater discharge (i.e., seepage) to and sediments in the Anthony Kill at locations upstream of, adjacent to, and downstream of the site.

Sediment samples were collected from the bed of the Anthony Kill using a pre-cleaned stainless steel spoon and bowl. Sediments were placed in appropriate jars and labeled in the field with date, time, and location. Sediment samples were screened with a photoionization detector (PID) meter and infrared spectroscopy (IR) and ultraviolet (UV) fluorescence to select specific samples for laboratory analyses. The sediment samples were submitted to GALSON for laboratory analysis for VOCs, SVOCs, metals, total cyanide, and reactive sulfide and cyanide. Locations of the sediment samples are depicted in Figure 4-2.

Four (4) seepage meters were constructed and installed into the bed of the Anthony Kill. The seepage meters consisted of the top (or bottom) third of a 55-gallon steel drum, with 3/8 inch tubing secured with water/air-tight seals. A catheter bag was then attached to the tubing. The locations of the seepage meters are depicted on Figure 4-2.

Seepage samples were collected from seepage meters SP-1, SP-2, and SP-4. Seepage meter SP-3 produced insufficient discharge to collect a sample. Total sample volume and collection time were noted for computation of discharge flow rates. Samples were analyzed for VOCs and for SVOCs, when sufficient volume was available (SP-1 and SP-2).

4.6 LABORATORY ANALYTICAL METHODS

4.6.1 Laboratory Analytical Parameters/Methods

Several analytical methods were employed to analyze the samples collected during the Phase IIA Supplemental RI field program. Six (6) surface samples, including one (1) duplicate, were analyzed for reactive sulfide and reactive cyanide by USEPA Method 9030 and Method 9010 respectively. Twenty-one (21) surface soil samples, including two (2) duplicates, were analyzed for PCBs utilizing NYSDEC Analytical Services Protocol (ASP) 91-3.

Parameter groups selected for laboratory analyses of subsurface soil, groundwater and sediment and seepage samples collected at the site were as follows:

- VOCs using NYSDEC ASP 91-1 and 91-4;
- SVOCs using NYSDEC ASP 91-2;
- Metals (both total and dissolved metals for groundwater samples) using ASP Superfund Contract Laboratory Program (CLP) analytical methods;
- Reactive sulfide using USEPA Test Method 9030 (soil and sediments only);
- Reactive cyanide using USEPA Test Method 9010 (soil and sediments only);
- Turbidity using USEPA Test Method 180.1 (groundwater only); and

- Total and amenable cyanide using USEPA Test Method 9010.

4.6.2 Data Validation

Samples collected during the Phase IIA Supplemental RI field program were subjected to analytical data validation by ABB-ES in accordance with Quality Assurance Data Validation of Analytical Deliverables and the QAPP.

The analytical results for VOCs, SVOCs, inorganics, reactive sulfide and cyanide, and PCBs are generally acceptable and, in most instances, may be used without qualification. A limited number of samples for various analyses were "flagged" with a variety of laboratory analytical qualifiers. Descriptions of data qualifiers along with their flagged symbols are detailed within the validation report in Appendix C-1. Appendix C-2 contains a presentation of the validated data with sample detection limits and data qualifiers flagged for the Phase IIA Supplemental samples.

4.6.3 Data Reduction

The reduced data tables presenting only analytical results reported in concentrations above the laboratory detection limits is presented in Tables 5-1 through 5-8. Results from these tables have undergone sorting and organization for incorporation and presentation in connection with this Phase IIA Supplemental Report.

4.7 Decontamination and Residuals Management

Equipment decontamination during the Phase IIA Supplemental RI field program was conducted in accordance with Subsection 9.0 of the QAPP. All drilling equipment (e.g., drill rig, split-spoon samplers) was decontaminated on-site in a specially constructed decontamination pad. Decontamination fluids were contained either within the decontamination pad or in 55-gallon drums. Soil cuttings and dedicated sampling equipment were containerized in DOT-approved 55-gallon drums. Drums were numbered and labeled specifying content, date, and location. Drums were also tracked in the field log book. Cuttings samples were collected from the drums and analyzed for toxicity characteristic leaching procedure (TCLP) VOCs, SVOCs and inorganics. NYSEG has arranged for the removal and off-site disposal of all drummed residual material.

4.8 Site Topography

A two-phased topographic survey of the site and portions of the adjacent properties was performed by FLANDERS. The first phase was completed on June 26, 1986 and resulted in a topographic base map at a scale of 1 inch equals 50 feet, with 2-foot elevation contours. This map contained exploration locations (Tasks 2, 3 and 4 activities), significant surface features, landmarks of the site, and the portion of the Anthony Kill directly adjacent to the site.

The second phase of the topographic survey was conducted on May 24, 1993. The revised topographic map included the Phase IIA Supplemental exploration locations and significant features and landmarks of the land west of the site, currently occupied by the Price Chopper. The portion of the Anthony Kill adjacent to the Price Chopper was also included in this survey.

During both phases, the topographic map assumed a relative horizontal and vertical datum of 100 feet at the railroad spike in the utility pole located 25 feet south of the intersection of Ferris Lane and North Central Avenue. The location and elevations of monitoring wells, piezometers, soil borings, shallow subsurface soil samples, and seepage meters have been incorporated into the site base map to accurately depict exploration locations (see Figure 4-2 and Figure 4-3). Figure 4-2 depicts exploration locations. Figure 4-3 depicts surficial topography.

5.0 SITE TOPOGRAPHY, GEOLOGY, AND HYDROGEOLOGY

5.1 INTRODUCTION

Data relative to classification of the surface and overburden soils and bedrock at the site were compiled by ABB-ES geologists from an examination of soils and rock cores collected during the Tasks 2, 3, 4, and the Phase IIA Supplemental RI field investigation programs. Examination and classification of the soils were in accordance with the Unified Soil Classification System (USCS). Observations on Phase IIA Supplemental excavations were recorded on soil boring logs and visual rock identification logs and are included in Appendix A.

5.2 SITE TOPOGRAPHY

The original geomorphology of the site has been altered through cultural activities (e.g., construction and high use). During the Phase IIA Supplemental RI, the topographic survey was expanded to include the area east of the site, across North Central Avenue which is principally occupied by a Price Chopper grocery store and parking lot. The surficial topography of the Price Chopper parking lot is relatively flat. Just beyond the northern border of the pavement, the ground surface slopes abruptly downward, approximately 12 to 14 feet to the Anthony Kill. The parking lot drains to the north through a storm culvert that discharges into the Anthony Kill near the North Central Avenue Bridge.

5.3 SITE GEOLOGY

The geologic strata encountered in soil borings indicate that the original ground surface has been reworked and covered with fill. The fill is underlain by a gravelly sand that grades to a silty shale (highly weathered bedrock). The underlying shale bedrock is located 8 to 23 feet bgs.

Three (3) geologic cross-sections have been prepared to visually depict the shallow geology encountered. The location and orientation of the three (3) transects are shown in Figure 5-1. The first cross-section A-A' (Figure 5-2) traverses the eastern border of the site, parallel to North Central Avenue. The second cross-section B-B' (Figure 5-3) traverses the site in a north-south direction, through one of the former gas holders and the filter beds. The third cross-section C-C' (Figure 5-4) traverses the site approximately parallel to the Anthony Kill.

5.3.1 Overburden

The overburden soils consist of fill, gravelly sand and fractured silty shale (weathered bedrock). Small discontinuous lenses of sand and gravel as well as silty clays are also present. The different soil units present at the site are described as follows:

- Fill. The fill consists of brown to black silty sand and gravel with organic matter, ash, brick fragments, glass, and wood chips. Within the fill, heterogeneities include zones of clayey silt and fractured

shales. The fill averages 8 to 28 feet thick, thinning toward the Anthony Kill.

- Gravelly Sand. A brown, dense gravelly sand was encountered at only one (1) soil boring at a depth of 8 feet bgs. The gravelly sand unit is 1.5 to 4 feet thick. This may be interpreted as fill or, if the area has not been disturbed, a glaciofluvial deposit.

- Glacial Till. A thin discontinuous tan to light grey silty clay with fine gravel was encountered at the top of the bedrock surface at soil boring B-4. The till is less than one (1) foot thick and is located along the northern edge of a small bedrock trough.

- Silty Shale. This unit is primarily highly weathered bedrock. It consists of black to gray platy shale fragments in a brown silt matrix that directly overlies the bedrock throughout the site. The native silty shale is approximately 1 to 3 feet thick. At other areas (B-4 and B-8) shale and silt fragments were possibly used as fill material. At these areas, the silty shale has no identifiable structure and is approximately 8 to 9 feet thick.

Two (2) soil borings (B-16, and B-17) were drilled during the Phase IIA Supplemental field investigation program. At boring B-16, soils consisted of fill (silt, gravel sand, glass, and brick) overlying silty shales. The fill/shale contact is at approximately 6 feet bgs. Bedrock was encountered at 8 feet bgs.

Similar soils were encountered at boring B-17. Approximately 12 feet of fill overlies silts and sands which grade to silty shales at approximately 21 feet bgs. Competent bedrock was encountered at 22.5 feet bgs.

5.3.2 Bedrock

The bedrock at the site consists of thinly bedded blue-gray shale with calcite inclusions. The bedrock outcrops at several locations along the southern bank of the Anthony Kill. The exposed bedrock is tightly folded striking east-west, with the fold axes dipping approximately 30 degrees to the south. Because the bedding with the bedrock structure is tight, bedrock groundwater flow will not follow bedding but, rather follows joints and fractures within the formation.

A seismic refraction survey was conducted in the parking lot of the Price Chopper, east of North Central Avenue, to investigate potential presence of an eastward trending bedrock valley in this area. The bedrock surface appears to be relatively flat, with the highest elevation at approximately 21 feet bgs beneath the center of the parking lot. Beneath the eastern border of the parking lot, bedrock dips gently to the east. Based on the seismic refraction data, depth to bedrock was estimated to be 21 to 23 feet bgs. Boring B-17/MW-17 and B-18/MW-18 were drilled to intercept groundwater flow downgradient from the site. In boring B-18, bedrock was encountered at 22.5 feet bgs, confirming seismic refraction data and indicating that the data could be used to map the general contours of the bedrock surface in this area. Results from the seismic refraction slurry are presented in Appendix D.

During the Phase IIA Supplemental field investigation, bedrock was encountered at 8 and 22.5 feet bgs at B-16 and B-17/B-18 respectively. Fifteen (15) feet of rock core was drilled at B-18. The bedrock was composed of blue-grey shales with calcite intrusions along fracture planes (oriented at 60 and 120 degrees from horizontal). The top 5 feet of the bedrock was highly fractured, with competency increasing with depth. These findings are consistent with previous investigations at the site. A bedrock surface contour map interpreted from the seismic surveys and exploration data collected during Tasks 1.2.3, and 4, and the Phase IIA Supplemental RI field investigation program is shown in Figure 5-5.

The topography of the bedrock surface forms a shallow basin centered beneath the eastern portion of the site and sloping to the north towards the Anthony Kill. The basin is asymmetrical in shape with the western and southern perimeters sloping upward more steeply than the eastern perimeter. Beneath the Price Chopper parking lot, the eastern slope of the basin rises to approximately 21 feet bgs and then dips gently to the east (see Figure 5-5).

5.4 SITE HYDROGEOLOGY

The interpretation of hydrogeologic conditions at the site is based on field measurements of groundwater elevations and in situ permeability tests. The water table at the site ranges from 2 to 20 feet bgs, and the saturated thickness in the overburden ranges from 3 to 25 feet. [redacted]

located in the northern portion of the site collect surface runoff and discharge to the Anthony Kill. As a result, infiltrating precipitation is limited to the western portion of the site that was not acquired by NYSEG until 1952. [redacted]

Water level measurements were collected from piezometers and all accessible groundwater monitoring wells including the three (3) new groundwater monitoring wells: MW-16 screened in the fill and shallow bedrock; MW-17 screened in the overburden; and MW-18 screened in the shallow bedrock. Table 4-2 presents groundwater elevation data collected during Tasks 2, 3, 4, and the Phase IIA Supplemental field investigation.

Groundwater flow through the overburden is influenced by bedrock and surficial topography and by proximity to the Anthony Kill. Based on information from the piezometers and the new and existing monitoring wells, the estimated direction of overburden groundwater flow is northeasterly, towards the Anthony Kill. With the additional data points at monitoring wells MW-16, MW-17, and MW-18, groundwater flow direction is interpreted to flow in a more northeasterly direction than previously described. Specifically, groundwater at the site flows more toward the Anthony Kill with a smaller component flow to the east. Figures 5-6 and 5-7 depict the potentiometric surface of groundwater in the overburden in March 1988 and July 1993, respectively.

Slug tests conducted in monitoring wells MW-16 and MW-17 indicate that the hydraulic conductivity of the saturated overburden is on the order of 10^{-5} and

10^{-3} cm/sec, respectively. These values are consistent with values calculated during Tasks 1, 2, 3, and 4.

Groundwater elevation measurements collected from groundwater monitoring well pairs screened in the overburden and the bedrock indicate that there is a slight (0.004 ft/ft) downward gradient from the overburden to the fractured bedrock layer at the site. In close proximity of the Anthony Kill, the vertical gradient changes. At MW-5 and MW-15, there is an upward gradient of approximately 0.002 ft/ft.

During the Phase IIA Supplemental field investigation, flow in the Anthony Kill was higher during the May 1993 field investigation than during the July 1993 groundwater and seepage meter sampling event. The tops of the seepage meters, installed into the streambed of the Anthony Kill in May, were nearly exposed at the water surface during the July sampling event. The lower flow conditions observed in July were consistent with seasonal precipitation patterns. Additionally, it was noted by ABB-ES field personnel that the water level in the Anthony Kill fluctuated by as much as 0.5 feet during the July sampling event, and increased in turbidity over a period of several hours. It was also noted that turbidity in the stream increased as the water level was observed to increase. The cause of the rapid fluctuations in stream flow are not known at this time.

Based on the seep measurements, the average flux of groundwater seepage is 0.035 gallons per day per square foot (gal/day/ft^2). Using the seepage meter data from the low flow period and assuming that groundwater discharges from site along the 1,000-foot length of the Anthony Kill and that discharge is limited to

one-half of the stream width (approximately 12 feet), the average flow of groundwater into the Anthony Kill is 0.0057 cubic feet per day per cubic foot ($ft^3/day/ft^2$) or 0.04 gallons per day (gpd) per square foot. This value is lower than the calculated 0.03 $ft^3/day/ft^2$, or 0.224 gpd per square foot. The low seepage rate is likely due to a combination of factors: (1) the low flow conditions of the Anthony Kill; (2) the significant fluctuations in water level during the sampling period; and (3) the statistically few number of data points. Therefore, the seepage rates calculated from these data represent a lower bound of the discharge rate from the site to the Anthony Kill. A summary of seepage sample volumes and rates is presented in Table 5-9.

6.0 PHASE IIA SUPPLEMENTAL FIELD AND LABORATORY DATA

6.1 SUMMARY OF PHASE IIA SUPPLEMENTAL ANALYTICAL DATA - SOIL INVESTIGATION

A total of thirty (30) surface and subsurface soil samples were submitted for laboratory analyses. Analytical results for all detected compounds and analytes are presented in Tables 5-1, 5-2 and 5-3. Summaries of all validated laboratory analytical data including quality control samples are provided as Appendix C to this Report.

6.1.1 Surface Soils

Six (6) surface soil samples, including one (1) duplicate sample were collected from the western portion of the site. The samples were collected from the area where spent oxides were reportedly disposed of and were analyzed for reactive sulfide and reactive cyanide. No reactive sulfide or reactive cyanide was detected in any of these samples. The results of the laboratory analyses are summarized in Table 5-1.

A total of twenty-one (21) surface soil composite samples including two (2) duplicate samples were collected from the six (6) former transformer storage areas and analyzed for PCBs. The results of the laboratory analyses are summarized in Table 5-2. Both Aroclor-1248 and Aroclor-1260 were reported at concentrations all below the method detection limits; as a result the reported

values are estimated. Aroclor-1248 was detected at concentrations ranging from 0.057 to 2.5 ppm in eight (8) composite surface soil samples collected from transformer storage Areas 3, 4, and 4A. Aroclor-1260 was detected at concentrations ranging from 0.047 to 2.6 ppm in eleven (11) surface soil samples collected in Areas 3, 4, 4A, 5, and 6.

6.1.2 Subsurface Soils

Continuous split-spoon soil samples were collected from borings B-16 and B-17. No odors or visual evidence of residual contamination were detected or observed in any soil samples collected from these borings. No PID readings above background levels were detected in any of the soil samples collected from the borings. Soil samples were not collected from boring B-18 because it is collocated with boring B-17.

Three (3) subsurface soil samples, including one (1) duplicate sample, were collected from the Phase IIA Supplemental soil borings and submitted for laboratory analyses. One (1) soil sample was collected from boring B-16 and two (2) soil samples were collected from boring B-17 and submitted for laboratory analyses. The soil samples were collected from overburden soils immediately above the bedrock-overburden contact, at the 6 to 8 feet bgs interval in boring B-16 and the 18 to 20 feet bgs intervals in boring B-17. The results of the laboratory analyses are discussed below.

Volatile Organic Compounds No VOCs were detected in any of the three (3) soil samples submitted for laboratory analyses.

Semivolatile Organic Compounds A limited number of SVOCs were detected in the subsurface soils at concentrations below their respective method detection limits. The reported values have been "flagged" with a "J" qualifier indicating an estimated concentration. The following PAHs were detected in the subsurface soils collected from borings B-16 and B-17: chrysene, fluoranthene, pentachlorophenol, benzo(a)anthracene, benzo(a)pyrene, chrysene, naphthalene, and phenanthrene. In addition, diethylphthalate was detected in the subsurface soil sample collected at B-16. The presence of this compound is not associated with the gas manufacturing process and is likely present as an artifact of sample handling and/or laboratory contamination.

Inorganics The inorganics aluminum, antimony, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel and zinc were detected in subsurface soil samples. The reported results are within the range of results reported for soil samples collected during previous site investigation activities.

Reactive Sulfide and Cyanide No reactive sulfide or reactive cyanide was detected in any of the subsurface soil samples submitted for laboratory analyses.

Hydrocarbon odors and visual evidence of MGP by-products were observed in soil samples collected from soil borings completed in the former filter bed area (B-20 through B-25). Subsurface soils from approximately 2 feet bgs to bedrock (approximately 6-10 feet bgs) contain visible quantities of coal tar. However, no evidence of waste coke from the former filter beds was observed in any of the collected soil samples; therefore, no samples were submitted for laboratory analyses from these borings.

6.2 SUMMARY OF ANALYTICAL DATA - GROUNDWATER INVESTIGATION

Groundwater quality at the site has been characterized by the evaluation of field and laboratory data collected from fifteen (15) groundwater monitoring wells. Twelve (12) of the groundwater monitoring wells were installed during Tasks 1 through 4, and three (3) additional groundwater monitoring wells were installed during the Phase IIA Supplemental RI.

During the Phase IIA Supplemental RI, groundwater samples were only collected from wells in which no visible evidence of free product was observed. Free product was observed in groundwater monitoring wells MW-3, MW-4, MW-5, MW-6, MW-10, and MW-12. Consequently these wells were not sampled. Eleven (11) groundwater samples, including two (2) duplicates, were collected from the remaining nine (9) groundwater monitoring wells. Analytical results for all detected compounds and analytes are presented in Tables 5-4, 5-5, and 5-6 along with the respective Maximum Contaminant Levels (MCLs) established under the New York State Drinking Water Standards (NYSDWS). The following is a summary of the analytical data from groundwater samples relative to the NYSDWS:

Volatile Organic Compounds: With the exception of two (2) monitoring wells (MW-14 and MW-15), no VOCs were detected at concentrations in excess of the respective NYSDWS MCLs. In groundwater samples collected from monitoring wells MW-14 and MW-15, the following VOCs were detected above the respective MCLs:

benzene
ethylbenzene
methylene chloride
total xylenes
toluene
1,1-dichloroethane
1,1,1-trichloroethane

Benzene, ethylbenzene, total xylenes and toluene were detected well above the NYSDWS MCLs in the groundwater sample collected at MW-14. 1,1-dichloroethane and 1,1,1-trichloroethane were detected only slightly above the respective NYSDWS MCLs in the groundwater sample and duplicate sample both collected at MW-15.

Semivolatile Organic Compounds: SVOCs were detected above MCLs in four (4) samples collected from three (3) groundwater monitoring wells (MW-13, MW-14 and MW-15). The specific compounds exceeding the respective MCLs include:

acenaphthene
2-methylnaphthalene
naphthalene
bis(2-ethylhexyl)phthalate

BEHP slightly exceed the MCLs. When present at low concentrations, BEHP is a common laboratory contaminant and is believed to be an artifact of the analytical process. It is unlikely that BEHP is derived from the site.

Inorganics: Inorganics have been analyzed in both filtered and unfiltered groundwater samples. In general, concentrations in the unfiltered groundwater are higher than those in the filtered samples. This is primarily due to the presence of suspended soil particles in the unfiltered water samples.

Only manganese was detected in the filtered groundwater samples in concentrations exceeding the NYSDWS MCLs. In the unfiltered groundwater samples, chromium, manganese, and iron were detected at concentrations exceeding MCLs in groundwater samples. Chromium was detected in excess of MCLs in monitoring wells MW-1 and MW-17. Iron was detected in excess of MCLs in monitoring wells MW-1, MW-11, MW-16, MW-17, and MW-18.

Turbidity: Turbidity measurements were elevated in groundwater samples collected from monitoring wells MW-16 and MW-17 (1,100 and 4,600 Nephelometric Turbidity Units (NTU), respectively). The detection of elevated concentration of inorganics in the unfiltered groundwater sample reflects the high amounts of suspended particulates. These wells were installed in relatively silty soils and may require additional development prior to any future groundwater sampling activity.

6.3 SUMMARY OF ANALYTICAL DATA - SEDIMENT AND SEEPAGE INVESTIGATION

6.3.1 Sediment Investigation

Seven (7) sediment samples including one (1) duplicate sample were collected for field and laboratory analyses from the Anthony Kill. Using UV/IR field analyses, PAHs were detected in four (4) of the seven (7) sediment samples and a decision was made to submit all seven (7) samples for laboratory analyses. A summary of sediment laboratory data is presented in Table 5-7. The analytical data from these samples have been compared to USEPA/National Oceanic and Atmospheric Administration sediment criteria (USEPA/NOAA criteria). These criteria were developed to assess the potential impacts of sediment contamination on the aquatic life. The following is a summary of this data relative to the USEPA/NOAA criteria.

Volatile Organic Compounds: No VOCs were detected in excess of the USEPA/NOAA criteria. Six (6) VOCs were detected at low concentrations in the sediment samples. Two of the VOCs, acetone and methylene chloride were detected in all samples and are believed to artifacts of the analytical process. The remaining four VOCs (benzene, chloromethane, ethylbenzene and total xylenes) were detected at concentrations ranging from 1.0 to 14.0 ppb. There are no NOAA criteria for the VOCs.

Semivolatile Organic Compounds: SVOCs, specifically PAHs, were detected in excess of the USEPA/NOAA criteria in five (5) of the seven (7) sediment

samples collected from the streambed of the Anthony Kill. The SVOCs detected include:

acenaphthene
anthracene
benzo(a)anthracene
benzo(a)pyrene
fluoranthene
2-methylnaphthalene
naphthalene
phenanthrene

An evaluation of the significance of the exceedances is provided in Subsection 7.5.

Inorganic: No inorganics were detected in excess of the USEPA/NOAA criteria.

6.3.2 Seepage Investigation

During the July 1993 sampling survey, seepage samples could be collected from only three (3) of the four (4) seepage meters installed in the streambed of the Anthony Kill. Due to low groundwater and stream flow conditions, groundwater seep samples were collected from seepage meters SP-1, SP-2, and SP-4. No seepage was collected from seepage meter SP-3.

The small volumes of seepage water that could be collected required a reduction in the list of target compounds that could be analyzed. Groundwater seepage

samples from SP-1 and SP-2 were analyzed for VOCs and SVOCs. The groundwater seepage collected at SP-4 was analyzed for VOCs only. Results for all detected compounds and analytes are presented in Table 5-8. The analytical data from these samples have been compared to New York State Surface Water Quality Standards (NYS SWQS). The following is a summary of the analytical results for the groundwater seepage samples:

Volatile Organic Compounds: No VOCs were detected above NYS SWQS in any of the groundwater seepage samples submitted for laboratory analyses.

Semivolatile Organic Compounds: Two (2) SVOCs (4-methylphenol and BEHP) were detected in the groundwater seepage samples from seepage meters (SP-1 and SP-2) at levels slightly in excess of the NYS SWQS. Neither BEHP or 4-methyl phenol were detected in sediment samples collected from the locations where seepage meters SP-1 and SP-2 were installed (i.e., SD-4 and SD-3, respectively). Therefore, it is likely that these compounds were present in the sample collection catheter bags and associated tubing. It is significant to note that the sediment samples collected adjacent to seepage meters SP-1 (SD-4) and SP-2 (SD-3) contained measurable concentration of PAHs which were not detected in the seepage water collected from these areas.

7.0 SUMMARY OF FINDINGS

This section summarized the findings from the Phase IIA Supplemental activities conducted at the site.

7.1 SITE TOPOGRAPHY

A topographic survey was conducted east of the site, across from North Central Avenue, in an area principally occupied by the Price Chopper store and parking lot and the Anthony Kill, which abuts the northern boundary of the Price Chopper facility. Surficial topography of the Price Chopper parking lot is relatively flat, sloping slightly to the north and west. Just beyond the northern edge of the parking lot, the ground surface slopes steeply downward approximately 12 to 14 feet, to the streambed of Anthony Kill. The parking lot drains to the north through a storm culvert that discharges into the Anthony Kill near the North Central Avenue bridge.

7.2 SITE GEOLOGY

The Mechanicville site occupies a 2.25 acre lot that is mostly paved. The north of the site is bordered by the Anthony Kill, which drains into the Hudson River 1,500 feet to the east. Site geology is characterized by the presence of fill overlying native soils. In many areas of the site, discrimination between native

and fill soils is difficult and definitive delineation cannot be made. The native soils include silt sands, sand and gravel, till, and silty shale. The thickness of overburden soil ranges from 3 to 25 feet thick. The glacial tills and silty shale (weathered bedrock) overlie shale bedrock.

The bedrock surface topography forms a shallow basin centered beneath the former MGP facility. The slopes of the basin are steeper in the south and east and more gentle to the west. The basin drains to the north, toward the Anthony Kill. The bedrock surface topography east of the site appears to be relatively flat with a local bedrock high beneath the center of the parking lot. Bedrock beneath the Price Chopper parking lot is located approximately 20 to 23 feet bgs. The bedrock surface topography is depicted in Figure 5-5. The upper 10 feet of bedrock is highly fractured. The number and size of fractures decrease rapidly with depth; thereby significantly reducing the potential downward movement of groundwater.

7.3 SITE HYDROGEOLOGY

Two water-bearing units are present at the site: the overburden and the bedrock. Monitoring wells and piezometers have been installed in both water-bearing zones. Groundwater flow direction in the overburden is northeasterly. At the southern border of the site, groundwater flows eastward. Closer to the Anthony Kill, the bedrock surficial topography influences the flow direction, and the potentiometric surface contours parallel the banks of the Anthony Kill. Groundwater flow direction in the proximity of the Anthony Kill, is toward the

Anthony Kill. The average calculated groundwater discharge flow into the Anthony Kill is 0.03 $ft^3/day/ft^2$.

Groundwater flow direction in the shallow fractured bedrock is similar to the flow direction in the overburden flow system, indicating that the two water-bearing units are hydraulically connected. Groundwater flow in the deeper bedrock does not appear to be influenced by the Anthony Kill, but flows to the east, toward the Hudson River.

Groundwater elevation measurements collected from groundwater monitoring well pairs screened in the overburden and the bedrock indicate that there is a slight (0.004 ft/ft) downward gradient from the overburden to the fractured bedrock layer at the site. In close proximity of the Anthony Kill, the vertical gradient changes. At MW-5 and MW-15, there is an upward gradient of approximately 0.002 ft/ft.

Groundwater and stream elevations measured during the Phase IIA Supplemental field investigation suggest that during the drier months, flow into the Anthony Kill depends on the water elevation in the Anthony Kill. As discussed in Subsection 5.4, the water level in the Anthony Kill may fluctuate by up 0.5 feet over a period of several hours.

Groundwater elevation measurements collected from piezometers installed on the northern bank of the Anthony Kill are inconclusive. Because the stage of the Anthony Kill varies over a period of several hours, shallow groundwater flow

direction along the northern bank is dependent on the stage elevation of the Anthony Kill.

7.3.1 Hydrogeologic Model

A groundwater flow model for the Mechanicville site was constructed for the purpose of aiding in the interpretation of groundwater flow through the overburden, fractured bedrock and competent bedrock beneath the site. The model was calibrated to observed and interpreted site conditions. Discussion pertaining to the model selection, calibration, aquifer parameters and mass balance consideration are presented in Appendix E. Interpretations of the shallow groundwater flow, based on water level measurements, indicate discharge of shallow groundwater flow to the Anthony Kill.

The model was set up in three layers; Layer 1, groundwater flow in the overburden; Layer 2, groundwater flow through the upper 10 feet of the fractured bedrock; and Layer 3, groundwater flow through the interval of 10 feet to 20 feet into bedrock. These depths correspond to approximate depths of explorations (borings and well) installed at the site, and also to potential depths of interest of the anticipated remedial alternatives to be evaluated.

The important features of this model are the hydraulic conductivities, the recharge over the area, available flux from upgradient, the over-all water balance, and interactions with the Anthony Kill.

Based on the groundwater flow into the model at the upgradient flux boundary, the total flow into the Anthony Kill is approximately 3 gallons per minute (gpm). The approximated flow rates in each of the layers are: 31.3 cu ft/d (12.3%) in Layer 1; 158.3 cu ft/d (62%) in Layer 2; and 65.2 cu ft/d (26%) in Layer 3. Additional recharge occurs to Layer 1 over the model, however, in the model formulation all flow to the Anthony Kill occurs through Layer 2, the upper 10 feet of fractured bedrock. (See Figure 7-1.)

7.4 CONTAMINANT DISTRIBUTION

7.4.1 Soils

Surface soil samples were collected to evaluate the potential presence of reactive materials in surface soils in the unpaved western portion of the site and to evaluate the potential presence of PCBs in former transformer storage areas.

No reactive sulfide or cyanide was detected in the surface soils west of the site.

Twenty-one (21) surface soil samples were collected and analyzed for PCBs. Aroclor-1248 was detected in eight (8) samples collected from Transformer Storage Areas 3, 4, and 4A, at concentrations ranging from 0.057 to 2.5 ppm. Aroclor-1260 was detected in eleven (11) surface soil samples at concentrations ranging from 0.047 to 2.6 ppm. Aroclor-1260 was detected in samples collected from Transformer Storage Areas 3, 4A, 5, and 6.

Subsurface soils samples were collected for laboratory analyses from two (2) soil borings completed during the Phase IIA Supplemental RI to assess the potential presence of MGP-related constituents in subsurface soils. The laboratory analyses found that:

- No evidence of MGP residuals was observed in subsurface soil samples collected from the two (2) soil borings (B-16 and B-17) completed during the Phase IIA Supplemental field investigation;

- No VOCs were detected in subsurface soil samples;

- Ten (10) SVOCs were detected in subsurface soils collected from boring B-16 and B-17. All compounds were detected at concentrations below the method detection limit and, therefore, the reported values are estimated;

- Eleven (11) inorganic analytes were detected in subsurface soil samples collected from boring B-16 and B-17. Concentrations of these analytes were well within the range of results of previous subsurface soil analyses;

- No reactive cyanide or reactive sulfide was detected in subsurface soil samples; and

- No evidence of filter bed materials were observed in subsurface soils collected at boring B-20 through B-25.

7.4.2 Groundwater

Groundwater samples were collected from nine (9) of the fifteen (15) groundwater monitoring wells which have been installed at the site. The remaining six (6) monitoring wells were not sampled because the presence of DNAPL and/or LNAPL was detected in each well. The monitoring wells in which L or DNAPLs were detected are all located within the perimeter of that portion of the site on which the former gas manufacturing facility was located. The findings of the Phase IIA Supplemental groundwater sampling survey are summarized below: Six (6) VOCs were detected at concentrations in excess of their NYSDWS MCLs in samples collected from monitoring wells MW-14 and MW-15. No VOCs were detected above the NYSDWS MCLs in the seven remaining monitoring wells from which groundwater samples were collected (i.e., MW-1, MW-2, MW-11, MW-16 and MW-17 and MW-18).

Four (4) SVOCs were detected at concentrations in excess of the respective NYSDWS MCLs. Exceedances were detected in groundwater samples collected from groundwater monitoring wells MW-13, MW-14, and MW-15. No SVOC exceedances were detected in groundwater samples collected from MW-16, MW-17, or MW-18.

Inorganics were analyzed in both filtered and unfiltered samples. In general, concentrations in unfiltered groundwater samples are higher than those in the filtered samples. This is due to sorption to soil particulates present only in the unfiltered samples.

Only manganese was detected in the filtered groundwater samples in concentrations exceeding NYSDWS. In the unfiltered groundwater samples, chromium was detected at monitoring wells MW-1 and MW-17. Iron was detected in excess of MCLs at monitoring wells MW-1, MW-11, MW-16, MW-17, and MW-18.

Turbidity was measured at each of the nine (9) sampled groundwater monitoring wells. Samples from both monitoring well MW-16 and MW-17 contained very high (1,100 and 4,600 NTUs) suspended particulates. The detection of elevated inorganics in the unfiltered groundwater samples is likely the result of the presence of suspended particulates in the samples.

7.4.3 Sediments and Groundwater Seepage

Seven (7) sediment samples including one (1) duplicate were collected from areas upstream, adjacent to and downstream of the site. Laboratory analyses of the samples detected both VOCs and SVOCs in all samples. No VOCs were detected above the respective USEPA/NOAA criteria. SVOCs were detected at concentration in excess of USEPA/NOAA criteria in four (4) sediment samples (SD-2, SD-3, SD-4, and SD-5) collected from the streambed of the Anthony Kill. No SVOCs were detected at concentrations in excess of the USEPA/NOAA criteria from the sediment samples SD-1, collected adjacent to the site and sample SD-6 collected downstream from the site. No inorganics were detected at concentrations in excess of the USEPA/NOAA criteria.

The concentrations of SVOCs detected in sediment samples collected during the Phase IIA Supplemental field investigation are comparable to SVOC concentrations detected in sediment samples collected during previous RI activities at the site.

Three (3) groundwater seepage samples were collected from seepage meters SP-1, SP-2, and SP-4. Seepage meter SP-3 did not produce sufficient volume to collect a sample. The results of the analyses are compared to the NYS SWQ Standards. No VOCs were detected at concentrations in excess of their respective MCLs. Two (2) SVOCs were detected at levels exceeding NYS SWQ Standards. BEHP was detected at both SP-1 and SP-2 at 9J and 4J μg/l, respectively. 4-Methylphenol was detected at SP-2 at 2J μg/L. Both BEHP and 4-methylphenol were also detected in the sediment samples SD-4 and SD-2, collected in the proximity of the seepage meters SP-1 and SP-2, respectively. Phenol was also detected in elevated levels (430 and 160 μg/L) in seepage samples SP-1 and SP-2. Phenol was not detected in sediment samples collected immediately adjacent to the seepage meter installation locations and is, therefore, believed to be artifacts of the sample collection process.

7.5 RISK ASSESSMENT

A Task 4 Risk Assessment was conducted in August of 1990 to investigate potential risks to human health and the environment associated with exposures to chemicals present in air, soil, sediment, and groundwater at the site. Results of the risk assessment indicated that risks from both carcinogenic and

noncarcinogenic chemicals in soil, sediment, and air to the identified receptors (children and site workers) and environmental receptors (aquatic organisms) were within USEPA acceptable ranges.

Subsequent to the Task 4 Risk Assessment, additional analytical data for sediments, surface soil, subsurface soil, and groundwater were collected in May and July of 1993. This subsection provides a review of these additional surface soil, subsurface soil and groundwater sediment and seepage data and an evaluation of the importance with regard to the Task 4 public health risk assessment.

7.5.1 Data Summary

Data summaries that include the arithmetic mean (which was calculated assuming one-half the sample quantitation limit (SQL) for non-detects), maximum and minimum detected concentrations, and frequency of detections for chemicals identified in surface soil, subsurface soil, and groundwater are presented in Tables 7-1, 7-2, and 7-3, respectively. In some cases, calculated mean concentrations exceed maximum detected concentrations. This is the result of the range in detection limits seen in some samples. The maximum detected concentration is the appropriate estimator of concentrations in these cases.

Surface soil was analyzed for PCBs, reactive cyanide, and reactive sulfide. Samples for PCB analysis were collected from sampling locations SS-25, SS-29 through SS-41, and SS-45 through SS-48. The PCBs Aroclor-1248 and Aroclor-1260 were detected in the May 1993 and July 1993 samples, respectively,

at maximum concentrations of 2.5 and 2.4 ppm, respectively (Table 7-1). Samples for reactive cyanide and sulfide were collected from SS-20, SS-22, SS-23, and SS-24. These analytes were not detected in any surface soil samples. Subsurface soil was collected from boring locations B-16 and B-17. Nine (9) SVOCs and ten (10) inorganics were identified in the subsurface soil (Table 7-2). Groundwater was collected from monitoring wells MW-1, MW-2, MW-11, and MW-13 through MW-18. Seven (7) VOCs, fourteen (14) SVOCs, and eleven (11) inorganics were detected in these samples. Table 7-3 presents total concentrations of analytes. Results of inorganic analyses for MW-16 and MW-17 were excluded from this summary because turbidity levels in these wells would render them unusable as a potable source.

7.5.2 Evaluation of Surface Soil Exposure

PCBs were not detected in the surface soil data collected in the 1990 sampling round. Therefore, risk estimates were calculated to assess additional potential risks associated with exposures to the Aroclors detected in the 1993 sampling effort.

7.5.3 Evaluation of Groundwater Exposure

Groundwater analytical data were compared to NYSDWS MCLs (November 1993) and USEPA MCLs (May, 1993) (Table 7-4). Mean and maximum detected concentrations of detected VOCs except 1,1-Dichloroethane exceeded NYSDWS MCLs, and the maximum detected concentrations of three (3) VOCs exceeded USEPA MCLs. The mean and maximum detected concentrations of 2-

methylnaphthalene and naphthalene, and the maximum detected concentrations of acenaphthene, phenol, and BEHP exceeded NYSDWS MCLs. The mean and maximum detected concentrations of aluminum, antimony, iron, lead, and manganese, and the maximum detected concentrations of chromium and nickel exceeded either NYSDWS or USEPA MCLs. Standards for aluminum, iron, and manganese, however are secondary. Secondary MCLs are not health based and are for contaminants which may affect the aesthetic qualities of drinking water (i.e., color, odor and taste).

7.5.4 Sediments and Seepage

The Task 4 Risk Assessment also investigated potential risks to environmental receptors associated with current exposures to surface water and sediment. Results of the environmental risk assessment indicated that some potential risks to aquatic organisms may exist in Anthony Kill directly adjacent to the site. Of the site related contaminants detected in surface water, only 2-methylnaphthalene exceeded Ambient Water Quality Criteria (AWQC). Task 4 also reported that the average carbon-normalized phenanthrene concentration detected at sampling locations adjacent to the site exceeded the lower confidence interval of the Sediment Quality Criteria (SQC).

Subsequent to the 1990 Task 4 Risk Assessment, additional analytical data for sediment were collected in the Anthony Kill in the vicinity of the Mechanicville site in May 1993. These data are presented in Table 5-7. In general, the additional analytical data are consistent with the results of previous sampling events and substantiate the findings reported in the environmental assessment

components of the Task 4 Risk Assessment. Six (6) compounds that had not been previously detected in Anthony Kill sediments were detected in the sediment samples collected in May 1993. These compounds are chloromethane, xylenes (total), carbazole, diethylphthalate, dibenzofuran, pentachlorophenol. In addition, aluminum, chromium, cobalt, copper, lead, manganese, and nickel, were detected in the May 1993 samples, these inorganic compounds had not been previously analyzed for. Toluene and di-n-octylphthalate were not detected in these new sediment results although they had been reported in earlier data.

With respect to the sediment constituents that were quantitatively evaluated in the Task 4 Risk Assessment (i.e., acenaphthene, benzo(a)anthracene, benzo(b)pyrene, fluoranthene, phenanthrene, and pyrene), the supplemental sediment analytical data substantiate previous risk conclusions. Excepting acenaphthene, the maximum detected concentrations of these sediment constituents are less than the average concentrations previously used to evaluate environmental impacts. Acenaphthene was detected at sediment sampling location SD-3 at a concentration of 1.6 ppm (0.840 ppm in the duplicate sample), which is higher than the average of 0.590 ppm used to evaluate environmental risk in the Task 4 Risk Assessment. Nonetheless, the carbon-normalized acenaphthene concentration detected in the two samples from SD-3 does not exceed even the lower confidence interval of the SQC for this compound (57 and 64 ppm C, respectively). Carbon-normalized phenanthrene concentrations reported in the May 1993 analytical data exceed the lower confidence interval of the SQC at both the "upstream" and "downstream" sampling locations, but <u>not</u> adjacent to the site.

The Task 4 Risk Assessment also evaluated the potential exposures associated with the discharge of groundwater form the site, using a simplistic and conservative groundwater flow model. Results of this analysis indicated that the estimated low flow concentrations of all groundwater constituents would discharge into the Anthony Kill at concentrations below AWQC. Subsequent to the 1990 Task 4 Risk Assessment, groundwater seepage samples were collected from three locations in the Anthony Kill and analyzed for VOCs and SVOC at SP-1 and SP-2 and VOCs at SP-4. As presented in Table 5-9, no detectable concentrations of PAHs or VOCs were detected in these seep samples. Phenol was detected at both seep sampling locations SP-1 and SP-2 (reported concentrations were 0.430 and 0.16 ppm, respectively. However, the presence of this compound in these seep samples may be a sampling artifact. However, the detected concentrations are below freshwater chronic AWQC (i.e., 2.56 ppm). The low groundwater flow conditions that existed at the time that these samples were collected suggests that the groundwater flows data may underestimate worst case discharge rates. The analytical data do substantiate the earlier groundwater modeling results that suggested that groundwater discharge into the Anthony Kill would not result in exposures to aquatic environmental receptors (e.g., fish, amphibians, and freshwater invertebrates) likely to result in adverse impacts.

7.5.5 Summary

In summary, analytical data from the 1993 sampling effort does not suggest any significant changes in risks from potential exposure to surface soil or subsurface soil at the site compared to risks identified in the Task 4 report. Risks associated with exposure to surface soils samples collected in 1993 containing PCBs are not

appreciably elevated compared to those quantified in 1990. The total risks using both old and new data are within the USEPA target risk range.

A comparison of subsurface soil data collected in 1993 to that summarized in the 1990 Task 4 report indicates that similar or lower concentrations of analytes are found in 1993 data. Thus, similar or lower levels of risks would be associated with exposure to these soils. A variety of organic and inorganic analytes in groundwater were found to exceed New York State and USEPA MCLs.

Compared to the Task 4 report, analytical data from the 1993 sampling effort do not suggest any significant changes in risks from potential exposure to sediments. The data are consistent with the result of previous sampling events. Analytical results from the groundwater seepage samples indicate that the seepage does not pose an unacceptable risk to aquatic life in the Anthony Kill.

8.0 CONCLUSIONS AND RECOMMENDATIONS OF THE PHASE IIA SUPPLEMENTAL REMEDIAL INVESTIGATION

The following subsections present the conclusions and recommendations of the remedial investigation program at the Mechanicville site based on a review of the findings of the all previous remedial investigation activities and the findings of the Phase IIA Supplemental RI reported herein.

8.1 CONCLUSIONS

8.1.1 Site Topography, Geology and Hydrogeology

1. The site is located in a topographic low area adjacent to the south band of the Anthony Kill. The site and adjoining areas have been substantially altered by cultural activities including significant excavation and subsequent filling of lands bordering North Central Avenue and the site. The gas manufacturing facilities have been demolished and majority of the area on which the facilities were located has been paved or is covered by the slab and/or foundation(s) of the of the former structures. As a result, precipitation does not infiltrate into the subsurface soils, thereby reducing the potential flushing of MGP related residuals into the groundwater system that underlies the Site.

2. The site geology consists of 8 to 23 feet of overburden material overlying bedrock. Overburden soils consist of fill, silty sands (tills) and silty shales. The depositional history of the site cannot be clearly discerned; however, the presence of the silty shale layer provides a relatively permeable layer in the overburden through which it is likely that the majority of groundwater flow in the overburden is occurring. Bedrock is composed of a blue-gray shale which is highly weathered in the upper 5 to 10 feet. The size and frequency of fracturing decrease rapidly with depth thereby reducing the effective permeability of bedrock formation with depth.

3. The topography of the bedrock surface forms a shallow basin centered beneath the eastern portion of the site and sloping downward to the north in the direction of the Anthony Kill. The basin is asymmetrical in shape with the western and southern perimeters sloping upward more steeply than the eastern perimeter. The Phase IIA Supplemental RI confirmed the general shape of the basin and demonstrated that the bedrock surface rises to the east of the site, thereby eliminating concerns relative to potential off-site migration of free-product in this direction.

4. Groundwater flow in the overburden and in the shallow fractured bedrock zones is generally to the north toward the Anthony Kill. Hydraulic modeling of the groundwater system indicates that groundwater flow across the entire site is on the order of 4,000 to 5000 gallons per day (i.e., 3 to 5 gpm). Based on the modeling output, it is estimated that approximately 50 percent of groundwater flow crossing the site discharges directly to the Anthony Kill adjacent to the site. The remainder of the groundwater flow

is believed to flow in an easterly direction ultimately discharging to the Hudson River.

5. The Anthony Kill has been designated as a Class C stream by NYSDEC. The streambed in the vicinity of the site is primarily exposed bedrock with a relatively thin veneer of accumulated sediment along the stream banks and in low velocity zones. Hydrologic maps of the area indicate the low flow (7Q10) for the Anthony Kill is approximately 17 cubic feet per second. As a consequence of the low groundwater discharge rates to the Anthony Kill estimates of dilution factors of groundwater discharge to the Anthony Kill under low flow conditions are in the range of 5,000 to 1 further reducing the potential for aquatic impacts associated with contaminant discharges from the site.

8.1.2 Soils

1. Surface soils (0 to 2 feet bgs) contain low levels of certain constituents including PCBs, PAHs, and inorganics associated with former gas manufacturing and service center activities which have occurred at the site. Based on the results of the risk assessment, the presence of these constituents does not pose an unacceptable risk to human health provided that site use is limited to commercial activities which do not result in disturbance of the unpaved areas of the site and maintain the integrity of the pavement in the remainder of the site.

2. Subsurface soils within limited areas of the former gas manufacturing facility contain free phase coal tar both above and below the water table. Coal tar has also been observed in the underlying bedrock, and was found near the streambed of the Anthony Kill by the North Central Avenue bridge. Given that the majority of the former gas manufacturing facility area is currently covered by asphalt or building foundations and slabs, the principal driving force for inducing further migration of the coal tar (i.e., precipitation) has been eliminated. Transport in the groundwater flow system is also expected to be very slow given the extremely low groundwater velocities and the reduced groundwater recharge rates associated with the extensive amount of paved and otherwise impermeable areas both on-site and upgradient of the site. However, in spite of the above mentioned mitigating factors, the presence of coal tar in the subsurface soils represents a continuing source of contamination to both soils and groundwater beneath the site.

3. Based on the results of the risk assessment, the presence of residual material associated with former gas manufacturing and service center operations do not pose a risk to public health so long as the facility continues to be used for commercial purposes and any excavation work is conducted under an appropriate HASP.

4. The presence of waste coke associated with the former filter beds located near the bank to the Anthony Kill could not be confirmed during the Phase IIA Supplemental field investigation. A sample collected by NYSEG in 1981 was submitted for laboratory analysis and failed for reactive sulfide,

reporting concentrations in excess of the reactivity threshold concentration. No evidence of waste coke was identified during the Phase IIA Supplemental field program. It is concluded that the areal extent of this material is limited and the potential volume which must be assessed for potential remediation is also likely to be small (i.e., less than 30 cubic yards)

8.1.3 Groundwater

1. Groundwater flow is primarily confined to the overburden and shallow bedrock units. The hydraulic permeability of the underlying bedrock formation rapidly decreases with depth and flow in the deep bedrock is primarily along fracture and joint planes. The presence of free phase coal tar has been observed in six (6) of the monitoring wells installed in the overburden and shallow bedrock systems. These wells are all located within the perimeter of the former gas manufacturing facility. The free phase coal tar has not been observed as seepage into the Anthony Kill and has not been observed in perimeter monitoring wells MW-14, MW-17 and MW-18. It is concluded that the migration of coal tar from the site is extremely slow under current site conditions.

2. The low permeability of both the overburden soils and the underlying bedrock formation indicate that groundwater will not sustain a viable water supply. This conclusion is supported by the fact that the nearest water supply well is located approximately 5,000 feet southwest of the site. Alternate water supplies represent better alternatives to installation of a

well in this heavily developed area. Further, other potential sources of groundwater contamination, including gas stations, petroleum fuel storage facilities, rail yard and manufacturing facilities, are also present in close proximity to the site and could represent additional threats to any planned water supply installation near the site.

3. Based on results of the risk assessment, the presence of site related contaminants in groundwater does not pose an unacceptable threat to public health. This is primarily due to the fact that there is no current use of groundwater as a water supply. Given the low yield potential of the overburden and bedrock formations and the probable existence of other sources of contamination to groundwater, it is improbable that any new water supplies will be developed near the site.

8.1.4 Surface Water and Sediments

1. The chemical analyses of sediment samples collected at six (6) locations adjacent to and downgradient from the site detected the same constituents at similar concentrations as were reported in earlier phases of the RI. Based on this additional data, it is concluded the presence of these constituents in the sediments of the Anthony Kill does not pose an unacceptable risk to aquatic life in the Anthony Kill.

2. The seepage meter investigation measured groundwater discharge rates were at the low end of the range estimated in the groundwater modeling effort. In addition, the concentrations of contaminants detected in seepage

water samples were significantly below the assumed concentrations. The assumed concentrations were used to assess the potential aquatic impacts associated with the discharge of contaminated groundwater from the site to the Anthony Kill. Because the actual concentrations were lower, the risk assessment approach applied to the assessment of potential surface water impacts is very conservative. Given that this conservative assessment did not identify any adverse impacts to surface water, it is concluded that no further investigation of potential surface water impacts is warranted at this time.

8.2 RECOMMENDATIONS

Recommendations will be developed by ABB-ES and NYSEG and included in this subsection.

1. In that environmental conditions have been adequately characterized at the Mechanicville site, NYSEG recommends that no further investigation activities be conducted. However, NYSEG recognizes that specific additional investigation and/or monitoring activities may be warranted to support the development of remedial actions or to monitor the effectiveness of any remedial actions which are selected for implementation based on the results of the FS.

2. In that the evaluation of public health impacts associated with the former gas manufacturing operation have been based on commercial (i.e., non-

residential) use of the property, NYSEG recommends that site use remain limited to commercial activities. This limitation will continue until such time as a reassessment of site conditions concludes that the public health risks associated with less restrictive uses are within the generally accepted range of risk values (currently 10^{-4} to 10^{-6}) in place at the time that the reassessment is performed.

3. In that the RI program has not identified any current and ongoing threats to public health or the environment, NYSEG recommends that the feasibility study focus on: 1) control of site related residuals to maintain current conditions; and 2) the identification of practicable remedial measures which could mitigate potential future impacts associated with the residuals identified at the site.

9.0 FEASIBILITY STUDY INTRODUCTION

ABB-ES prepared this FS for the Mechanicville former MGP site located in the City of Mechanicville, Saratoga County, New York. The primary objective of this FS is to develop and evaluate appropriate remedial alternatives such that an appropriate remedial response can be selected. This FS was conducted in accordance with guidelines in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 90-4030: "Selection of Remedial Actions at Inactive Hazardous Waste Sites" (NYSDEC, 1990); the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (USEPA, 1993c and USEPA, 1990); and the "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (USEPA, 1988, Interim Final).

This FS is based on results of the four-phase RI conducted for the Mechanicville site during 1986 through 1990, and the Phase IIA Supplemental Remedial Investigation conducted in May 1993. The RI consisted of a Preliminary Site Evaluation (Task 1), an Initial Field Investigation Program (Task 2), an Expanded Problem Definition Program (Task 3), a Risk Assessment (Task 4), and the Phase IIA Supplemental RI (Task 5). The results and conclusions of Tasks 1 through 4 were presented in the Phase II Remedial Investigation Report and Work Plan for the Phase IIA Supplemental Remedial Investigation and Feasibility Study (ABB-ES, 1992), which are summarized in Section 3.0 of this report. The results and conclusions from work conducted under the Phase IIA Supplemental RI are presented in Sections 4.0 through 8.0 of this report.

9.1 PURPOSE

The primary objective of this FS is to develop and evaluate appropriate remedial alternatives such that an appropriate remedial response can be selected. The FS process used for the Mechanicville site is consistent with the NYSDEC TAGM 90-4030 for the Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990) and involves identifying and evaluating suitable technologies for monitoring, containing, treating, and/or removing site wastes (Figure 9-1). Those technologies considered feasible were assembled into remedial alternatives that were evaluated in detail using the evaluation criteria specified in the NYSDEC TAGM 90-4030. The goal of the remedial response selection process is to select remedies that are protective of human health and the environment and maintain protection over time.

9.2 SCOPE OF FEASIBILITY STUDY

The RI identified and investigated various media potentially impacted by coal gasification activities at the Mechanicville site. These media included:

- surface soil
- subsurface soil
- subsurface coal tar
- overburden groundwater
- bedrock groundwater
- surface water of the Anthony Kill

- sediment of the Anthony Kill
- air

The risk assessment (see Subsections 3.4, 3.5, and 7.5) for the site was conducted to identify and assess the potential risks associated with exposure to chemicals detected on-site in these various media. For the public health risk assessment, the potential carcinogenic and noncarcinogenic risks from site-related exposures under baseline conditions (i.e., current conditions and future conditions, assuming no construction or remedial action) were estimated for sediments, soils, and exposure to VOCs and particulate dust from excavation activities during utility repair work. Because surface water data collected from the Anthony Kill do not indicate that site-related contaminants are present at detectable levels, exposure to public health by this pathway was not assessed. The environmental assessment evaluated present and future impacts to environmental receptors for potentially affected media including surface water, sediment, soil, and groundwater.

The FS provides the basis for selecting and implementing remedial actions at the Mechanicville site. This begins with the development of site-specific response objectives, qualitative goals established on the basis of the nature and extent of contamination, the resources currently or potentially threatened, and the potential for human and/or environmental exposures. Existing site-specific data collected during the RI and the risk assessment form the basis for selecting the media for which response objectives should be developed. The rationale for selection of media to be addressed in this FS follows.

Soil. The human health risk evaluation concluded that direct contact with on-site soil (surface and subsurface) by area residents (specifically, older children that may trespass), or utility workers, would not be expected to pose a significant health risk under the assumed exposure conditions (i.e., current conditions and future conditions, assuming no construction or remedial action). Both carcinogenic and noncarcinogenic risks were within target risk levels. Based on the results of the baseline risk assessment, and because no change in site use is planned in the foreseeable future, development of remedial response objectives for surface and subsurface soil is not warranted.

However, because the risk assessment for surface soils was based on current site use, administrative actions (i.e., deed restrictions, easements, zoning) will be a component of each alternative developed in this FS to restrict future noncommercial use of the site. In addition, laboratory analysis of one soil sample, collected by NYSEG in November 1981 from the filter beds, detected the presence of reactive sulfides at a concentration of 1,300 ppm. This concentration exceeds the threshold concentration for the hazardous waste reactivity test. In an attempt to further delineate soils associated with the former filter beds, additional soil borings were completed in this area during the 1993 Phase IIA Supplemental RI (see Subsection 6.1.2). Although no evidence of waste coke was observed in samples collected during the investigation, excavation and treatment and/or disposal of potentially reactive soils will also be a component of each remedial alternative.

Because coal tar constituents that could potentially impact groundwater quality have been detected in subsurface soils at the Mechanicville site, New York State's TAGM 92-4046, "Determination of Soil Cleanup Objectives and Cleanup Levels"

(NYSDEC, 1992), was evaluated. This TAGM provides guidance for establishing target cleanup objectives for contaminants in soil that will be protective of groundwater quality. Recommended soil cleanup objectives cited in the TAGM for VOCs, SVOCs, and PCBs were compared to concentrations detected in subsurface and surface soils at the Mechanicville site. Site-specific cleanup levels were not calculated for organic compounds using actual soil organic carbon content because sufficient background information was not available. In accordance with the TAGM, background levels for the inorganic contaminants of concern, iron (27,000 ppm) and zinc (260 ppm), were used as soil cleanup objectives.

Based on cleanup levels established in this TAGM, VOCs (e.g., benzene, toluene, ethylbenzene) and SVOCs (e.g., PAHs) detected in soil may have a potential impact on site groundwater. However, most samples where organic contaminants were detected at levels in excess of the cleanup levels established by the TAGM are associated with areas where (1) non-aqueous phase liquids (NAPLs) are present in monitoring wells or (2) boring or test pit logs indicate the presence of coal tar. Remedial options for coal tar and soils associated with coal tar are discussed as a separate media in this subsection.

PCB concentrations in surface soils were reported at concentrations below the method detection limit; as a result, the reported values are estimated. The estimated PCB concentrations were either below or slightly above the goal of 1 ppm for surface soils. Because of the low concentrations detected and because all concentrations are estimated, minimal risk is anticipated based on PCBs detected in soil at the site. Therefore, no further action relative to PCBs is proposed for surface soils.

Iron and zinc concentrations in the majority of soil samples were close to background levels with one exception: zinc was detected in the sample from B-5, located near the former filter beds, at a concentration of 1,600 ppm. Several other constituents associated with coal tar (e.g., PAHs) were also detected in this sample. In addition, coal tar has been encountered in the groundwater monitoring well (i.e., MW-5) installed in the boring from which the sample was collected. Soil in this area will therefore be addressed in conjunction with coal tar.

Coal Tar. Based on observations during the investigation program, coal tar is present in both the vadose and saturated zones beneath the Mechanicville site. The presence of free-phase coal tar has been observed in six (6) of the monitoring wells installed in the overburden and shallow bedrock systems, all located within the perimeter of the former gas manufacturing facility. The free-phase coal tar has not been observed as seepage into the Anthony Kill and has not been observed in perimeter monitoring wells (i.e., MW-14, MW-17, and MW-18).

DNAPLs such as coal tar are difficult to treat even in highly permeable soils. Because coal tar has migrated into the saturated zone and into fractured bedrock, efficient coal tar recovery is even more difficult, if not impossible. Although many DNAPL recovery technologies are being tested, there have been no field demonstrations to date (USEPA, 1992b and 1993a). Traditional pump-and-treat methods typically recover only a small fraction of trapped DNAPLs and in situ methods (e.g., bioremediation, soil flushing, vacuum extraction, bioventing), capable of potentially treating contaminants associated with coal tar (e.g., VOCs, PAHs, cyanide, iron) are not demonstrated and would be ineffective for treatment of free-phase coal tar.

Attempts to excavate and treat/dispose of vadose zone soils contaminated with coal tar would also likely prove ineffective because coal tar is dispersed throughout the site at various depths, including the fractured bedrock below the site. Because most of the site is covered with asphalt and buildings, excavation would require demolition, removal, and disposal of a large quantity of construction/demolition debris. In addition, much of the coal tar beneath the site is located below the water table, which ranges from 2 to 20 feet bgs. As a result, excavation would likely require either lowering the water table or dewatering excavated saturated soils. Emissions of toxic and volatile contaminants during large-scale excavation of the entire site may also be a health and safety concern to construction workers and downgradient receptors. All these factors would result in a very costly, potentially ineffective remedial action. In addition, because coal tar has migrated into bedrock, excavation of overburden soil would only be effective at removing a portion of the coal tar associated with the site.

Finally, investigations indicate that migration of coal tar from the site is extremely slow under current site conditions and that existing conditions effectively limit migration of coal tar to the Anthony Kill. Free phase coal tar has not been observed as seepage into the Anthony Kill and has not been observed in perimeter monitoring wells MW-14, MW-17, and MW-18. The majority of the area on which the former gas manufacturing facilities were located is ether paved or is covered by the slab and/or foundation(s) of the former structures. As a result, infiltration by precipitation to subsurface soils is minimized, thereby reducing potential flushing of site-related residuals into the groundwater system beneath the site. In addition, the risk assessment concluded that because groundwater discharge rates to the Anthony

Kill are very low, the potential for aquatic impacts associated with contaminant discharges from the site is minimal.

Based on this evaluation, control of coal tar migration rather than remedial activities that involve removal and/or treatment of coal tar is proposed at this time. Migration of coal tar to the Anthony Kill could potentially be controlled via management of the migration of overburden groundwater, which will be evaluated as part of this FS. Although migration of coal tar from the site appears to be extremely slow under current site conditions, control of coal tar migration contributes to the long-term management of contaminant migration by minimizing further contamination of surface water and limiting the spread of the potentially mobile coal tar source. Effective control of coal tar may also facilitate use of new and emerging technologies that may be available in the future.

Exposure to subsurface contamination would likely occur only during excavation activities in the future (i.e., servicing of underground sewer, water, or other utility lines). Other human health exposure scenarios are unlikely because access to the site is restricted and most of the ground surface above areas where coal tar has been observed is covered by asphalt or buildings/foundations. Because of the industrialized nature of the area, and the lack of suitable habitats, it is unlikely that the site is significantly used by wildlife. As a result, risk to human health and the environment would be minimal. Remedial alternatives developed to address overburden groundwater will, however, consist of placing deed restrictions on the property to restrict noncommercial use of the site in the future. Further, in accordance with the NYSDEC TAGM 90-4030 for the Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990), because wastes would remain

on-site, five-year site reviews will be a component of each remedial alternative developed for the site. Remedial options for coal tar will be reevaluated at this time.

Groundwater. As described in Section 5.0, groundwater flow beneath the Mechanicville site is primarily confined to the overburden and shallow bedrock units. Groundwater flow in these units is generally north toward the Anthony Kill. The hydraulic permeability of the underlying bedrock formation rapidly decreases with depth and flow in the deep bedrock, primarily along fracture and joint planes.

Hydraulic modeling of the groundwater system indicates that groundwater flow across the entire site is on the order of 4,000 to 5,000 gallons per day (i.e., 3 to 5 gpm). Based on the modeling output, it is estimated that approximately 50 percent of groundwater flow crossing the site discharges directly to the Anthony Kill adjacent to the site. The remainder of the groundwater flow is believed to flow in an easterly direction ultimately discharging to the Hudson River.

The low permeability of both the overburden soils and the underlying bedrock formation indicate that groundwater will not sustain a viable water supply. This conclusion is supported by the fact that there are no known current users of the groundwater near or downgradient of the Mechanicville site. The nearest water supply well is located approximately 5,000 feet southwest of the site, and no active industrial wells were identified in the Mechanicville area. In addition, the City of Mechanicville obtains its drinking water from a surface water reservoir approximately three miles northeast of the site, at an elevation approximately 160 feet higher than the site. Alternate water supplies represent better alternatives to installation of a well in this heavily developed area. Further, other potential sources of groundwater

contamination, including gas stations, petroleum fuel storage facilities, rail yards, and manufacturing facilities, are also present near the site and could represent additional threats to any planned water supply installation near the site.

As a result, because there appear to be no potential exposures, groundwater is not considered a potential current or future exposure pathway and was therefore not evaluated as part of the human health risk assessment.

Although no environmental receptors are exposed directly to groundwater at the site, approximately 50 percent of groundwater flow crossing the site discharges to the Anthony Kill, and stream quality could be affected. Therefore, an assessment of the potential impact of groundwater constituents discharging to the Anthony Kill was conducted. Based on this evaluation, estimated low stream flow concentrations of site-derived contaminants are below surface water quality criteria for all chemicals of concern, resulting in minimal risk to environmental receptors.

Groundwater is currently not a source of drinking water, nor does it represent a future potential source. In addition, the ecological risk assessment concluded that the potential impact of groundwater constituents discharging to the Anthony Kill is minimal. However, free-phase coal tar and concentrations of site-related constituents at concentrations in excess of their respective MCLs and NYSDEC criteria (i.e., MCLs and Class GA groundwater criteria) were encountered in both overburden and bedrock groundwater associated with the Mechanicville site. As a result, groundwater containing contaminants in excess of these criteria which discharge to the Anthony Kill could potentially impact ecological receptors. Therefore, this FS includes development of remedial response objectives for protection of ecological

receptors by addressing the release of site-related contaminants in overburden groundwater to the Anthony Kill.

The FS will not address bedrock groundwater for several reasons. First, as described above, groundwater is currently not a source of drinking water. The formation beneath the site does not represent a potential source in the future primarily because it will not yield water in usable quantities. In addition, there are ample surface water supplies available for use by the City of Mechanicville.

Second, based on observations during the RI, the upper portion of bedrock beneath the Mechanicville site contains fractures spaced between 2 inches to 1 foot apart. Although deeper bedrock contained fewer fractures, some fractures contained coal tar or had a distinct coal tar odor. In addition, coal tar has been observed as DNAPL in a number of monitoring wells screened in the bedrock. To remove the coal tar from the bedrock aquifer, it would be necessary to establish the number, density, size, and direction of the fractures, which represent the principal hydraulic route in this formation. This would be difficult to accomplish because of the extreme heterogeneity of a typical fractured system and lack of efficient and economical aquifer characterization techniques (USEPA, 1992a).

In general, DNAPLs are difficult to extract even in highly permeable soils and the technology for their removal is still evolving and not demonstrated (USEPA, 1992b, 1993a, and 1993b). Extraction is difficult primarily because of the tendency for DNAPLs to flow through the interconnected fractures and settle in dead-end segments of the fracture system. When traditional pump and treat systems are installed to clean up aquifers in fractured bedrock formations, improvements in water

quality are very slow because little or no water flushes through dead-end fractures or through the porous rock matrix, both of which are likely to contain the majority of the DNAPL mass (Mackay and Cherry, 1989). Because of the potential impact that DNAPL contamination in bedrock may have on achievement of remediation goals is so significant, USEPA is currently developing specific recommendations for management of sites where DNAPL is present (USEPA, 1993b).

Guidance has been developed by USEPA to clarify how the agency will assess whether restoration of groundwater at a particular site is technically impracticable and what, if any, alternative actions must be taken to ensure protection of human health and the environment (USEPA, 1993b) in the event that restoration is not practicable. This guidance specifies a number of factors that can inhibit groundwater restoration including site use, chemical properties of the contaminants of concern, contaminant distribution, geology, and hydrogeologic factors. Using the approach developed by USEPA, the relative difficulty of groundwater restoration at the Mechanicville site was assessed. The results, presented in Figure 9-2, show that Mechanicville site characteristics severely restrict the restoration potential of the bedrock aquifer beneath the site.

Therefore, because of the difficulty, ineffectiveness, and lack of demonstrated technologies available for extracting DNAPL, particularly from bedrock, remediation of bedrock groundwater beneath the Mechanicville site will not be evaluated as part of this FS. However, in accordance with the NYSDEC TAGM 90-4030 for the Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990), five-year site reviews will be a component of each remedial alternative developed for

the site because wastes will remain on-site. Remedial options for bedrock groundwater will be reevaluated as part of this review process.

Anthony Kill Surface Water and Sediment. The risk assessment concluded that direct contact with Anthony Kill sediments by area residents (specifically, older children which are most likely to trespass) or construction workers would not be expected to pose a significant health risk under the assumed exposure conditions. Both carcinogenic and noncarcinogenic risks were within target risk levels. Because surface water data collected from the Anthony Kill do not indicate that site-related contaminants are present at detectable levels, exposure to public health by this pathway was not assessed.

An evaluation of the environmental risks posed by contaminants detected in surface water and sediment suggests that a minimal potential for negative impacts does exist for organisms in the Anthony Kill. These risks appear to be relatively minor for several reasons. Few compounds were determined to exceed their media-specific protective criteria, and the extent of these exceedances were minimal. Moreover, negative impacts were associated only with "worst case" conditions (e.g., stream low-flow conditions and use of maximum analyte levels for criteria comparisons), with no adverse impacts expected under more typical assumptions. Finally, there is no indication that contaminants are impacting downstream receptors. Levels of contaminants detected in the downstream surface water and sediment samples never exceeded relevant protective criteria, even under the most conservative assumptions.

Because the baseline risk assessment indicated that no unacceptable risk currently exists from exposure to Anthony Kill surface water and sediment, development of remedial response objectives for these media is not warranted.

Air. Both carcinogenic and noncarcinogenic risk estimates were calculated for exposure of nearby residents to fugitive emissions of VOCs and particulate-borne SVOCs with dust originating from a hypothetical soil pile excavated and stockpiled on-site during utility repair work. It was concluded that inhalation of contaminants, volatilized or aerosolized by potential future site activities involving soil excavation, does not pose a significant health risk to the general population. As a result, development of remedial response objectives for this media is also not warranted in this FS. However, in the event that activities involving intrusive/exploratory work are required on the site, an appropriate HASP should be developed and followed to prevent or minimize undue exposure.

Summary. The scope of this FS includes the development of remedial response objectives to control migration of coal tar and groundwater contaminants in overburden to the Anthony Kill. Remedial technologies and alternatives capable of achieving these response objectives will be evaluated.

In addition, because the risk assessment for surface soils was based on commercial site use, administrative actions (i.e., deed restrictions, easements, zoning) will be a component of each alternative developed in this FS to restrict future noncommercial use of the site. In accordance with the NYSDEC TAGM 90-4030 for the Selection of Remedial Alternatives at Inactive Hazardous Waste Sites, five-year site reviews will also be conducted to evaluate the effectiveness of remedial actions implemented

at the site and to evaluate the need for additional remedial actions. Finally, excavation and treatment and/or disposal of soils from the filter beds area that failed the reactivity test in 1981 will be a component of each of the remedial action alternatives.

9.3 FEASIBILITY STUDY ORGANIZATION

This FS evaluates management of migration and source control technologies designed to minimize migration of groundwater and coal tar from the site. This RI/FS report consists of eight sections that comprise the FS portion of the report. In addition to this introductory Section 9.0, Section 10.0 identifies the standards, criteria, and guidelines (SCGs) governing the extent of site remediation and establishes the remedial action objectives that will be used to develop detailed remedial alternatives to mitigate existing or future threats to human health and the environment. Site-specific considerations and assumptions made in defining these objectives are discussed.

Section 11.0 identifies and screens remedial technologies for controlling migration of overburden groundwater and coal tar at the Mechanicville site. In Section 12.0, remedial alternatives are assembled with different combinations of technologies based on observed contamination and site features. Section 13.0 screens the assembled alternatives using the criteria of implementation, effectiveness, and cost. Section 14.0 analyzes in detail the three alternatives that emerged from the alternatives screening. The seven evaluation criteria discussed in the NYSDEC TAGM 90-4030 for the Selection of Remedial Actions at Inactive Hazardous Waste

Sites (NYSDEC, 1990) serve as a basis for conducting the detailed analysis of the three remedial alternatives.

Section 15.0 is a comparative analysis of the remedial alternatives discussed in Section 14.0. The purpose of Section 15.0 is to compare the advantages and disadvantages of each of the three remedial alternatives, relative to one another, with regard to the evaluation criteria. This comparison serves as the basis for selecting an appropriate remedial action in Section 16.0. In accordance with the NYSDEC TAGM 90-4030 (NYSDEC, 1990), a scoring of each alternative was conducted to aid in the comparative analysis of alternatives. The detailed breakdown of how each of the alternatives was scored is presented in Appendix F.

Previous Feasibility Study Work. As part of the Phase II Remedial Investigation Report and Work Plan for the Phase IIA Supplemental Remedial Investigation and Feasibility Study (ABB-ES, 1992), a Phase IIA Supplemental Focused Feasibility Study Work Plan was developed. The Work Plan identified response objectives and the proposed technical approach for a focused FS, which included identification of potential remedial technologies and alternatives to reduce the release of site-related contaminants to the Anthony Kill.

Six alternatives that have the potential to mitigate contaminant migration to the Anthony Kill, plus a no action alternative, were identified. The seven alternatives included:

1. No Action
2. Downgradient Subsurface Drains

3. Downgradient Barrier Wall
4. Downgradient Extraction Wells
5. Downgradient Barrier Wall with Extraction Wells
6. Upgradient Subsurface Drains
7. Upgradient Subsurface Drains with Downgradient Barrier Wall

The applicability of each of these alternatives to site conditions was reevaluated for this FS based on additional data collected during the Phase IIA Supplemental RI and groundwater modeling conducted to evaluate potential alternatives (see Appendix E). Based on this analysis, the technical approach described in the Work Plan was not changed, with two exceptions.

First, the No Action Alternative was changed to a Minimal Action Alternative that includes environmental monitoring, administrative controls (e.g., deed restrictions), five-year site reviews, and asphalt cover maintenance. This alternative represents the minimal effort that would be made to provide protection and will provide a baseline with which to compare other remedial alternatives in this FS. Second, Alternative 5 was not developed into a stand-alone, separate alternative. Based on modeling conducted to evaluate the alternatives, perimeter containment wells at the barrier wall will likely not be required to prevent mounding of groundwater at the wall because of low groundwater flow in the overburden unit beneath the site (Appendix E). As a result, rather than conducting a detailed analysis for this alternative, the addition of perimeter containment wells is evaluated as a potential action to be evaluated in the future in the event that Alternative 3: Downgradient Barrier Wall is selected as the preferred remedial alternative. In addition, because this FS has been developed in accordance with the NYSDEC TAGM 90-4030 for

Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990), the FS is no longer considered a "focused" FS and will not be referred to as such.

10.0 IDENTIFICATION OF STANDARDS, CRITERIA, AND GUIDELINES

10.1 IDENTIFICATION OF STANDARDS, CRITERIA, AND GUIDELINES (SCGS)

The SCGs identified in this section are used to (1) evaluate the appropriate extent of site cleanup, (2) define and formulate remedial action alternatives, and (3) govern implementation and operation of the selected action. SCGs include both state and federal laws, regulations, guidance, and criteria that directly apply to site-specific conditions, features, or remedial actions.

Because of their site-specific nature, identification of SCGs requires evaluation of the body of federal, state, and local environmental and health regulations with respect to chemicals of concern, site characteristics, and proposed remedial alternatives. Requirements that pertain to a remedial response can be categorized into three distinct areas:

- **Chemical-specific** requirements generally involve health- or risk-based numerical values or methodologies that establish site-specific acceptable concentrations and/or amounts. The values are used to develop action levels, cleanup concentrations, and/or discharge limits.

- **Location-specific** requirements involve restrictions established for specific substances or activities because of the location or characteristics of a site.

- **Action-specific** requirements are generally technology- or activity-based limitations that direct how remedial actions are conducted.

10.1.1 Chemical-specific SCGs

Chemical-specific SCGs are numerical values or procedures that, when applied to a specific site, establish numerical limits for individual chemicals or group of chemicals. These SCGs are generally health- or risk-based standards limiting the concentration of a chemical found in or discharged to the environment. They govern the extent of site remediation by providing either actual cleanup levels, or the basis for calculating such levels. Table 10-1 summarizes chemical-specific SCGs, listed by the media to which they apply.

10.1.2 Location-specific SCGs

Location-specific SCGs represent restrictions placed on the concentration of hazardous substances or the conduct of activities because of the location or characteristics of a site. These SCGs set restrictions relative to special locations such as wetlands, floodplains, sensitive ecosystems, as well as historic or archeological sites, and provide a basis for assessing existing site conditions. No location-specific SCGs have been identified for this site.

10.1.3 Action-specific SCGs

Action-specific SCGs provide a basis for screening remedial technologies, developing remedial alternatives, and assessing the feasibility and effectiveness of each remedial

alternative retained for detailed evaluation. Action-specific SCGs, unlike location- and chemical-specific SCGs, are usually technology- or activity-based limitations that direct how remedial actions are conducted. The applicability of this set of requirements is directly related to the components of the remedial alternatives developed for the site. Potential action-specific SCGs are presented in Table 10-2.

10.2 DEVELOPMENT OF REMEDIAL OBJECTIVES

This subsection describes the basis for developing and comparing remedial technologies or alternatives. In Subsection 10.2.1, remedial response objectives developed based on an evaluation of information gathered during the field investigations and assessment activities are identified. The preliminary remediation goals for the Mechanicville site are established in Subsection 10.2.2. An understanding of site environmental contamination and remedial actions that will be considered to meet the response objectives is presented in Subsection 10.2.3. Subsection 10.2.4 describes the general response actions that will be used to identify technologies. The information presented in this section forms the basis for developing and comparing remedial alternatives.

10.2.1 Identification of Remedial Response Objectives

Response objectives are site-specific, qualitative, initial cleanup objectives established on the basis of the nature and extent of contamination, the resources currently or potentially threatened, and the potential for human and environmental exposure.

These response objectives are used to develop remedial action objectives and appropriate remedial alternatives.

Using the results of the RI and risk assessment, media potentially impacted by site-related contaminants were evaluated in Section 9.0 to assess the media for which remedial response objectives should be developed. Based on this assessment, as well as SCGs identified in Subsection 10.1, the goal of the FS is to evaluate what, if any, additional remedial actions should be implemented to mitigate potential impacts to ecological receptors in the Anthony Kill. Therefore, the response objectives for the Mechanicville site include managing of the release of site-related contaminants to the Anthony Kill in terms of the following migration pathways:

- the movement of coal tar into the Anthony Kill; coal tar was observed in subsurface explorations above a confining silt layer 1 to 4 feet above the bedrock surface; and

- the discharge of site-contaminated groundwater to the Anthony Kill.

10.2.2 Identification of Preliminary Remediation Goals

The purpose of evaluating cleanup goals is to establish the extent of cleanup required for a site. Cleanup levels will generally be set at health-based levels that reflect current and potential use and exposure. However, the Mechanicville site is not located over a water supply and the nearest known water supply wells are approximately 1 mile southwest (upgradient) of the site in the Town of Halfmoon. Therefore, because Mechanicville groundwater is not currently used as a public

potable water supply, drinking water standards (i.e., federal and New York State MCLs) are not currently applicable.

In addition to state MCLs, NYSDEC has promulgated standards for the protection of groundwater quality (6 NYCRR Parts 700 - 705). All fresh groundwaters in the State of New York are classified as Class GA groundwaters. The best usage of Class GA groundwater is as a potable water source; the standards and guidance values are therefore set at concentrations to protect human health and drinking water sources and are referred to as health (water source) values. However, as previously discussed (see Subsection 9.2), because groundwaters in the vicinity of the Mechanicville site are not a current source of drinking water, nor a likely potential future source, application of these standards is not appropriate. Further, other potential sources of groundwater contamination, including gas stations, petroleum fuel storage facilities, rail yards, and manufacturing facilities are also nearby the site and represent additional threats to any planned water supply installation near the site. Finally, it is highly unlikely that Class GA groundwater standards could be achieved within a reasonable time frame or cost given potential off-site sources contributing to groundwater contamination and the presence of DNAPLs in the fractured bedrock unit beneath the site (see Subsection 9.2).

Cleanup levels for groundwater that may be extracted from beneath the site will depend on the selected discharge location (e.g., publicly owned treatment works [POTW] or Anthony Kill). Once a discharge location has been selected, discharge criteria will be negotiated with the appropriate agency (e.g., POTW or NYSDEC).

10.2.3 Remedial Action Objectives

Remedial action objectives are site-specific, quantitative goals defining the extent of cleanup required to achieve response objectives. They include preliminary target cleanup levels, the area of attainment, and the restoration time frame, as appropriate. Remedial action objectives are developed during the FS process and are used as the framework for developing detailed remedial alternatives. The objectives are formulated to achieve the overall goal of protecting human health and the environment and are established with consideration given to the site location and present and future use.

Because existing site conditions effectively control migration of coal tar to the Anthony Kill (see Subsection 9.2), the remedial action objectives for the Mechanicville site are:

- Control migration of coal tar to the Anthony Kill to maintain levels that do not pose a risk to ecological receptors.

- Control migration of contaminants in groundwater to the Anthony Kill to maintain levels that do not pose a risk to ecological receptors.

10.2.4 General Response Actions

General response actions describe general categories of remedial technologies that may be employed to address remedial action objectives, and lay the groundwork for identifying specific technologies in Section 11.0. For controlling migration of coal tar

and overburden groundwater, these general response actions may include one or a combination of the following:

- no action
- institutional controls
- groundwater monitoring
- containment
- extraction
- treatment
- disposal

For the Mechanicville site, the primary general response action will be to control migration of coal tar and contaminants in groundwater to the Anthony Kill. The no action alternative is considered a baseline against which other alternatives can be compared. For the purposes of this FS, the no action alternative involves minimal, limited sampling and administrative controls. Therefore, the baseline alternative will be referred to as "minimal action" for the remainder of this FS.

11.0 IDENTIFICATION AND SCREENING OF APPLICABLE TECHNOLOGIES

This section identifies and screens technologies for controlling migration of overburden groundwater and coal tar at the Mechanicville site. This process was completed in accordance with the NYSDEC TAGM 90-4030 for the Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990), the NCP (USEPA, 1993c and USEPA, 1990), and USEPA RI/FS guidance (USEPA, 1988). The result is a list of potential remedial technologies that will be developed into remedial alternatives. Technologies were identified to attain the remedial action objectives established in Subsection 10.2.3, and to fit into the categories of general response actions described in Subsection 10.2.4. The demonstrated performance of each technology was considered, and the applicability of a technology was established by considering site and waste characteristics.

Site characteristics that were considered include:

- site geology, hydrogeology, and terrain
- availability of space and resources necessary to implement the technology
- presence of special features at the site (e.g., floodplains)

Waste characteristics that were considered include:

- contaminated media
- types and concentrations of waste constituents
- physical and chemical properties of the waste (e.g., volatility, solubility, density, viscosity, and mobility)
- location of contaminants (e.g., fractured bedrock)

The technology screening process reduces the number of potentially applicable technologies by evaluating each technology as to its **effectiveness** in providing protection to human health and the environment and to the reduction in toxicity, mobility, or volume of the waste; **implementability**, as a measure of both the technical and administrative feasibility of constructing, operating, and maintaining a remedial technology; and **cost**, as compared to other technologies providing similar performance.

Table 11-1 identifies general response actions and potential remedial technologies for controlling migration of overburden groundwater and coal tar at the Mechanicville site. Technology screening is presented in Table 11-2. Technologies judged not effective nor implementable were eliminated from further consideration. A summary of the technologies retained for remedial alternatives development for overburden groundwater are presented in Figure 11-1.

12.0 DEVELOPMENT OF REMEDIAL ALTERNATIVES

Based on remedial action objectives, location- and chemical-specific SCGs, and screening of applicable technologies, six remedial alternatives were developed for control of overburden groundwater and coal tar at the Mechanicville site. A range of control alternatives was developed to include minimal action, containment, and containment combined with extraction/treatment alternatives. The alternatives developed for control of overburden groundwater and coal tar at the Mechanicville site and the major technical components of each are presented in Table 12-1.

13.0 INITIAL SCREENING OF THE MECHANICVILLE SITE ALTERNATIVES

In this section, the six alternatives developed for the Mechanicville site are screened for effectiveness, implementability, and cost. Criteria considered for each factor during the initial screening of alternatives are presented in Table 13-1. Tables 13-2 through 13-7 present the initial screening of each alternative. Table 13-8 summarizes the status of each alternative based on the initial screening.

14.0 DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

This section presents the detailed analysis of remedial action alternatives for the Mechanicville site. Subsection 14.1 discusses the general approach to the detailed analysis; and Subsections 14.2 through 14.4 present the detailed analyses for Alternatives 1, 2, and 3, respectively, which were retained for further evaluation as discussed in Section 13.0.

14.1 GENERAL APPROACH TO THE DETAILED ANALYSIS

The detailed analysis is intended to provide decision-makers with sufficient information to select the appropriate remedial alternative for management of overburden groundwater and coal tar residuals at the Mechanicville site that best meets the following NYSDEC requirements:

- is protective of public health and the environment
- attains SCGs (or provides grounds for invoking a waiver)
- provides preference for treatment that reduces toxicity, mobility, or volume as a principal element (or provides an explanation in the decision document as to why it does not)
- is cost-effective

The detailed analysis has been conducted in accordance with the NYSDEC TAGM 90-4030 for the Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990), the NCP (USEPA, 1993a and USEPA, 1990), and USEPA RI/FS guidance (USEPA, 1988), and includes the following:

- detailed description of each remedial alternative emphasizing the application of various technologies as components of the alternative; and

- detailed analysis of each alternative against the evaluation criteria described in TAGM 90-4030 (NYSDEC, 1990).

The detailed description of the technologies or processes used for each alternative includes, where appropriate, preliminary site layouts and a discussion of the limitations, assumptions, and uncertainties for each component. These descriptions are intended to provide a conceptual design of each alternative and are used for cost purposes only. Costs presented in this analysis are based on existing data and knowledge of the site and will be reevaluated at the time of remedial action implementation. The three remedial alternatives are subsequently evaluated according to the seven criteria listed in Table 14-1.

The following three remedial alternatives are being considered for implementation at the Mechanicville site:

- Alternative 1: Minimal Action
- Alternative 2: Downgradient Barrier Wall

- Alternative 3: Upgradient Subsurface Drain with Downgradient Barrier Wall

14.2 DETAILED ANALYSIS OF ALTERNATIVE 1: MINIMAL ACTION

14.2.1 Description

The Minimal Action Alternative was developed as a baseline with which to compare other remedial alternatives and represents the minimal effort that would be taken to provide protection. Components of the alternative include the following:

1. Environmental Monitoring
2. Institutional Controls
3. Five-year Site Reviews
4. Asphalt Cover Maintenance
5. Bedrock Mapping

Environmental Monitoring. The objective of the environmental monitoring program would be to monitor site conditions at the Mechanicville site and evaluate whether the risk to human health and the environment changes over time. Based on current site conditions, no significant human health or ecological risk currently exists at the Mechanicville site.

Monitoring would involve routine periodic sampling and analysis of surface water, sediment, and groundwater. The long-term monitoring plan developed and described

below is conceptual. The final, detailed monitoring plan would be developed and submitted for regulatory agency review and comment before implementation.

It is assumed that environmental samples would be collected annually over a period of 30 years, with the frequency reduced over time if no adverse changes in site conditions were observed. Therefore, the estimated costs are believed to be conservative. Based on field investigations conducted to date, all samples would be analyzed for Target Compound List VOCs and SVOCs.

It is assumed that up to four (4) surface water and four (4) sediment samples would be collected along the southern bank of the Anthony Kill annually. Analytical results would be used to detect and evaluate potential migration of coal tar into the stream and its potential impact on ecological receptors.

Groundwater samples would be collected from two (2) existing groundwater monitoring wells (MW-16 and MW-17), one (1) new downgradient monitoring well in overburden, and one (1) new seepage meter installed in the Anthony Kill (Figure 14-1). The upgradient monitoring well, MW-16, would be monitored to provide information on the background concentrations of contaminants in overburden groundwater. The new downgradient well screened at the overburden/bedrock interface and the new seepage meter installed in the Anthony Kill would be monitored to detect and evaluate potential contaminant migration into the Anthony Kill. Monitoring well (i.e., MW-17) would be monitored to evaluate overburden groundwater conditions in the downgradient area east of the site. Water level data would be collected from all existing wells on the site in which free phase coal tar is not encountered to evaluate hydraulic conditions and flow.

Institutional Controls. Institutional controls in the form of deed and land-use restrictions would be implemented to restrict future noncommercial use of the site, thereby limiting the potential for exposure to site contaminants. The controls would also prohibit groundwater use within the site. These controls would be drafted, implemented, and enforced in cooperation with the state and local governments.

Five-year Site Reviews. In accordance with the NYSDEC TAGM 90-4030 for the Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990), a remedial action that results in contaminants remaining on site should be reviewed at least once every five years. Data collected during the environmental monitoring program would provide useful information for this review. The review would assess potential impacts of contaminants to the Anthony Kill and downgradient overburden groundwater, and evaluate risks to human health and the environment. In addition, the review would assess technologies that have emerged and been demonstrated over the previous five years for the extraction and treatment of coal tar present in the overburden and bedrock beneath the site. It was assumed that no site investigation activities would be required as part of this review.

Asphalt Cover Maintenance. The majority of the area on which the former gas manufacturing facilities were located is either paved or is covered by the slab and/or foundation(s) of the former structures. As a result, infiltration by precipitation to subsurface soils is minimized, thereby reducing potential flushing of site-related residuals into the groundwater system beneath the site. In addition, the asphalt cover reduces potential direct contact with site soils. To maintain these benefits, periodic maintenance and/or repair of the asphalt cover is included as part of this alternative. It was assumed that the existing asphalt cover at the site would be inspected annually

to assess its integrity and ability to continue to reduce infiltration to the site. The cap would be visually inspected and repaired (e.g., resurfaced, patched, etc.), as necessary.

Bedrock Mapping. Because bedrock fractures are the primary contaminant pathway for discharge to the Anthony Kill, bedrock mapping would be conducted to identify significant fracture trends in the site vicinity and the general orientation of bedrock fractures in the Anthony Kill. This information would be used to evaluate potential groundwater discharge points and migration pathways in bedrock, and to assess the need to implement additional remedial actions at the site. It was assumed that mapping would include a photolineament survey of the area, a field survey of the streambed of the Anthony Kill, and that no intrusive activities would be required.

14.2.2 Compliance with SCGs

Because Alternative 1 would not involve any remedial actions, contaminated overburden groundwater and coal tar could migrate toward the Anthony Kill and potentially have an adverse impact on ecological receptors. However, investigations indicate that migration of coal tar from the site is extremely slow under current site conditions. Free phase coal tar has not been observed as seepage into the Anthony Kill and has not been observed in perimeter monitoring wells MW-14, MW-17, and MW-18. The risk assessment concluded that because groundwater discharge rates to the Anthony Kill are very low, the potential for aquatic impacts associated with contaminant discharges from the site is minimal. Therefore, because existing site conditions are effective in limiting the migration of coal tar, the Minimal Action

Alternative would maintain the current level of protection and would meet response objectives.

No location-specific SCGs were identified for this site.

The only intrusive actions associated with Alternative 1 would be monitoring well and seepage meter installation and sampling of surface water, sediments, and groundwater. These activities would be conducted according to regulations outlined by OSHA.

14.2.3 Overall Protection of Human Health and the Environment

Groundwater beneath the site is currently not a source of drinking water, nor does it represent a potential future source, and is therefore not a risk to human health because no exposure pathway exists. The risk assessment also concluded that groundwater presents minimal risk to environmental receptors. However, contaminant concentrations in excess of MCLs and NYSDEC criteria have been detected in groundwater, and coal tar present in the subsurface acts as a continuing source to groundwater contamination. Because groundwater and coal tar associated with the site would not be contained or controlled, contaminants in excess of groundwater criteria could migrate to the Anthony Kill, resulting in potential risk to the environment. Monitoring would be necessary to evaluate if this is occurring and, if so, whether it results in unacceptable risk to the environment after reaching the Anthony Kill.

14.2.4 Short-term Impacts and Effectiveness

Individuals accessing the site for sampling activities would be required to be trained in health and safety procedures for work at hazardous waste sites. The existing site-specific HASP would be updated, approved, and followed, and applicable OSHA regulations would be followed.

Because no remedial activities would be implemented under this alternative, no adverse effects on the local community and the environment are anticipated.

14.2.5 Long-term Effectiveness and Permanence

Because no treatment or containment technologies would be implemented, the Minimal Action Alternative would not be a permanent remedy. Containment and control of coal tar and contaminated groundwater would be limited to reductions achieved by the existing asphalt paving and existing site conditions, which, based on existing data, are effective in controlling migration of coal tar. Although no actions would be taken to control potential future ecological risks due to migration of coal tar and contaminants in site groundwater to the Anthony Kill, the risk assessment concluded groundwater discharge currently presents minimal risk to aquatic receptors. Therefore, although the remedial action goal of permanence would not be met, existing conditions are providing protection to human health and the environment.

14.2.6 Reduction of Toxicity, Mobility, and Volume

The existing asphalt cover minimizes precipitation infiltration to subsurface soils, thereby reducing potential flushing and mobility of site-related residuals into the groundwater system beneath the site. Additional treatment (e.g., destruction, separation/treatment, or solidification/chemical fixation technologies) or containment processes would not be employed to address site contamination. Therefore, no reduction over existing site conditions in toxicity, mobility, or volume of contaminants would be achieved.

14.2.7 Implementability

Environmental monitoring, institutional controls, five-year site reviews, asphalt cover maintenance, and bedrock mapping would be the only activities associated with this alternative. Equipment, materials, and services for all activities are readily available. Some coordination among NYSEG, state, and local officials would be required to conduct these activities and to implement institutional controls. Detailed plans for environmental monitoring and bedrock mapping would require development and implementation. These plans would be subject to regulatory review and approval. Institutional controls and five-year reviews would likely be easy to implement. The Minimal Action Alternative would not interfere with possible future remedial actions at the site and will facilitate use of more technically and cost effective technologies for coal tar remediation.

14.2.8 Cost

A cost estimate was prepared for Alternative 1 to help select a remedial alternative. The estimate contains the following principal elements:

- capital cost
- operation and maintenance cost

Capital cost consists of direct and indirect costs. Typically, these costs include those expenditures initially incurred to develop, construct, and implement the remedial alternative. For Alternative 1, direct costs include expenditures for the equipment, labor, and materials necessary to establish institutional controls and conduct bedrock mapping. A 25 percent contingency was included in direct cost items to account for unforeseen project complexities.

Indirect costs include expenditures for contractors' overhead and profit. Additional administrative, engineering, and legal services include engineering expenses, legal fees, health and safety costs, and contingency allowances.

Engineering design and services (i.e., documentation and resident engineering) was estimated at 5 percent of the direct costs. Costs for health and safety activities conducted at Level D were estimated at 2 percent of direct costs. Legal, administrative, and permitting costs were estimated at 2 percent of direct costs.

Operation and maintenance costs refer to expenditures associated with long-term environmental monitoring and maintenance of the environmental systems (i.e., groundwater monitoring wells) and asphalt cover and five-year site reviews.

The estimated total present worth (i.e., 5 percent for 30 years) of Alternative 1 is $685,000. Total estimated engineering, and administrative costs for institutional controls and bedrock mapping are $55,000. The present worth of operation and maintenance costs are estimated at $630,000. Table 14-2 summarizes the costs estimated for Alternative 1.

To generate these costs, the following assumptions were made with respect to Alternative 1:

- the Mechanicville site would be reviewed every five years for a period of 30 years; and

- environmental monitoring (i.e., groundwater, surface water, and sediment) and asphalt cover maintenance would be conducted annually for 30 years.

14.3 DETAILED ANALYSIS OF ALTERNATIVE 2: DOWNGRADIENT BARRIER WALL

14.3.1 Description

Alternative 2 consists of the following major components:

1. Environmental Monitoring
2. Institutional Controls
3. Five-year Site Reviews
4. Asphalt Cover Maintenance
5. Bedrock Mapping
6. Site Preparation
7. Removal and Treatment/Disposal of Filter Bed Soil
8. Installation of Downgradient Barrier Wall

Components 2, 3, 4, and 5 would be performed as described for Alternative 1 (see Subsection 14.2.1). The remaining four major components are described in the following paragraphs.

Environmental Monitoring. The environmental monitoring program would be similar to that described for Alternative 1 (see Subsection 14.2.1). The principal difference would be the objectives of the program which, for Alternative 2, would be to evaluate the effectiveness of the downgradient barrier wall installed at the site and to continue to assess groundwater beneath the site.

Site Preparation. Site preparation would include activities required to prepare the site for mobilization and construction of the barrier wall. Because the gas manufacturing facilities have been demolished and the majority of the area on which the facilities were located has been paved or is covered by the slab of the former structures, minimal clearing of vegetation would be required. It will, however, be necessary to clear some vegetation on the southern bank of the Anthony Kill to allow construction equipment access for installation of the barrier wall. It is assumed that construction of access roads and/or upgrading existing roads to handle heavy equipment would not be required. In addition, because geophysical investigations have been conducted as part of the site investigation (see Sections 3.0 and 4.0), it was assumed that additional surveys to locate underground structures and to delineate bedrock surface would not be required for installation of the downgradient barrier wall. Additional site preparation activities that would be required before work could commence include locating and removing above-ground and subsurface utilities and/or obstructions, establishing a stockpile/storage area for equipment and materials, mobilizing a field office, and establishing a decontamination and trash disposal area.

Removal and Treatment/Disposal of Filter Bed Soil. In November 1981, NYSEG collected soil samples from the filter beds area and the relief gas holder foundation. Laboratory analysis of one (1) sample from the filter beds detected the presence of reactive sulfides at a concentration of 1,300 ppm. This concentration exceeds the threshold concentration for the hazardous reactivity test. In an attempt to further delineate soils associated with the former filter beds, additional soil borings were completed in this area (see Subsection 6.1.2).

Although no evidence of waste coke from the former filter beds was observed in any of the split-spoon soil samples collected in 1993, it was assumed that a test pit survey would be conducted in this area to attempt to locate residual waste coke from the former filter beds. Based on visual observations, soils that contain waste coke would be collected and disposed of appropriately. It was assumed that waste coke might be observed in an estimated 30 cubic yards of soil. This volume estimate was developed assuming an average depth of 8 feet and half the area encompassed by the six (6) borings completed in the former filter bed area (see Subsection 6.1.2). These soils would be excavated, sampled, and disposed of at an appropriate disposal facility. It was assumed that the soils would fail the hazardous test for reactivity, and would therefore require treatment/disposal in an approved, licensed hazardous waste landfill.

Installation of Downgradient Barrier Wall. A low permeable barrier wall is a vertical barrier placed in the subsurface to minimize fluid flow. Barrier walls have been used for many years in civil engineering projects, where they are used for reducing groundwater inflow into excavations or beneath dams. Use of barriers for environmental control purposes is more recent. Goals typically are to prevent contaminated groundwater from crossing site boundaries or discharging into surface waters. At the Mechanicville site, the purpose of the downgradient barrier wall would be to control migration of overburden coal tar to the Anthony Kill.

As described in Section 13.0, a number of techniques are used for constructing barrier walls including slurry walls, grout curtains, and sheet pile walls. Based on current site conditions, a sheet pile wall was selected for analysis in this FS. Sheet pile systems offer a number advantages over other barriers, including:

- The sheet pile system can be installed with minimal excavation, minimizing potential health and safety concerns and disposal of contaminated soils.

- The sheet pile system can achieve low permeabilities if the joints are sealed to prevent potential leakage.

- Minimal construction equipment and ancillary facilities are required, making it more suitable for use at sites where access is limited compared to alternative barrier technologies.

If alternative barrier wall technologies are evaluated during the design and found to be more effective, a different technology may be used at this site.

Sheet piling structures consist of individual sheet piles that are fitted together and driven into the ground. Adjacent sheets are connected by interlocking joints that are designed for mechanical strength rather than to prevent water passage. Because the goal of the downgradient barrier wall at the Mechanicville site is to prevent migration of coal tar to the Anthony Kill, sealing of these joints would likely be necessary to prevent leakage. Various methods are available for sealing joints between sheet piles including placing a sealant into each joint before the sheets are coupled and driven into the ground, grouting the soil adjacent to each joint after the sheets have been driven, or installing sheets designed to allow injection of sealant into joints after being driven into the ground (Starr, et al., 1992). For cost estimating purposes in this FS, the last method was selected.

A patented steel sheet piling whose interlocking joints between individual sheets are constructed with a cavity that can be filled with sealant after driving the sheet piles into the subsurface has been developed. The cavity can be cleaned before and after driving to ensure it is clean and free of soil and/or other foreign material (e.g., rust, grease, etc.). The type of material used to seal the joints is dependent on contaminants present and site conditions. Materials that have been field tested and demonstrated include bentonite grouts, an organic polymer that absorbs water and swells, and epoxy resins. Based on current site conditions at the Mechanicville site, it was assumed that a cement/bentonite grout would be an effective sealant. However, compatibility testing may be needed during design to evaluate effectiveness of the selected grouting material.

For the Mechanicville site, construction of the sheet pile system would begin with excavation and removal of portions of the two existing storm water outfalls that the barrier wall will cross (Figure 14-2). It was assumed that excavated soils generated during removal of the outfalls would be collected and disposed of off-site. The excavated area would subsequently be backfilled with clean fill to provide access for the driving operation.

The contractor would subsequently begin driving the sheet piles using standard techniques for sheet pile wall construction. A 200-foot wall with 30-foot wings on either side would be installed between the south bank of the Anthony Kill and an existing concrete pad (see Figure 14-2). It was assumed that the sheet pile sections would be driven through the overburden soils beneath the site and keyed one to two feet into weathered bedrock. The depth of the sheets would vary between approximately 10 and 28 feet bgs, depending on the depth to bedrock. After driving,

all foreign matter would be removed from the joints by high pressure water blasting. A grouting tube would subsequently be lowered to the bottom of the joint, sealant injected, and the tube withdrawn as the cavity is filled with sealant.

Once the sheet piles are in place, the contractor would excavate down to the storm drain locations, cut holes into the sheet pile wall, and reinstall the two storm drains. The pipe penetrations within the wall would be sealed with bentonite and the area backfilled with clean fill material.

All wash water generated while cleaning the joints and any groundwater encountered during installation of the sheet pile wall would be collected, sampled, and analyzed to determine disposal requirements. It was assumed that this water would be transported to an off-site treatment/disposal facility.

The primary function of this alternative would be to control coal tar migration in the overburden to the Anthony Kill, thus providing protection to aquatic receptors. However, based on groundwater modeling conducted to evaluate remedial alternatives (see Appendix E), the downgradient barrier would not be effective for controlling overburden groundwater flow. The downgradient barrier would only direct groundwater flow in the overburden more easterly in the vicinity of the barrier, and eventually into the Anthony Kill. Flow could also potentially be diverted under the downgradient barrier wall. Groundwater discharging into the Anthony Kill along the length of the barrier is estimated to decrease only about three percent, while no change in overall flow is estimated (see Appendix E).

Groundwater modeling was also conducted to evaluate the potential benefits of perimeter containment wells at the ends of the barrier to relieve mounding and control lateral flow around the barrier (see Appendix E). The model first evaluated the impact on groundwater flow if two (2) perimeter wells were installed in the overburden. Results indicated that the simulated wells could not be pumped at more than a total of 0.05 gpm before creating excessive drawdown. As a result, containment wells were simulated to extend through the overburden and approximately 5 feet into bedrock. The model predicted greater total flow (up to 0.13 gpm before the overburden became dry), but still did not provide significantly greater control of groundwater (only a decrease of 5 percent of total flow and a reduction of approximately 10 percent in flow to the stream along the location of the barrier). In addition, because pumping these wells would lower the water table, migration of overburden coal tar into the bedrock could increase.

Based on the modeling of the remedial system, it was assumed that perimeter containment wells would not be required because the model predicts that groundwater mounding against the downgradient barrier would be minimal (i.e., approximately 0.5 feet, see Appendix E). However, environmental monitoring and visual inspections would be conducted to evaluate the need for future controls such as hydraulic controls.

If conditions indicate the need for perimeter containment wells, it is anticipated that two (2) wells installed on the eastern and western ends of the sheet pile system would be required (Figure 14-3). These wells would be installed five feet into bedrock with 10-foot screens across overburden and shallow bedrock to maintain flow without drying out the overburden. Although modeling estimated that the two

(2) wells would be capable of pumping a total of approximately 0.1 to 0.2 gpm, it was assumed that up to 1 gpm total flow could effectively be removed. Extracted groundwater would be pumped to an on-site treatment unit where it would undergo treatment to remove NAPLs that may be present and potentially treatment to remove inorganic and/or organic contaminants. Treated water would subsequently be discharged to one of the following locations:

- Anthony Kill; or
- local POTW.

The discharge location and degree of treatment required would be negotiated with the POTW and/or NYSDEC prior to installation of the perimeter containment wells. Estimated costs to install, operate, and maintain such a system are discussed in Subsection 14.3.8.

14.3.2 Compliance with SCGs

Location-specific SCGs have not been identified for the Mechanicville site. The components of Alternative 2 would be designed and executed to comply with applicable chemical-specific and action-specific SCGs identified in Tables 10-1 and 10-2, respectively. OSHA requirements for training, safety equipment, and recordkeeping would be met during construction activities at the site.

Alternative 2 would only partially achieve response objectives because contaminated overburden groundwater would continue to migrate to the Anthony Kill. However, the risk assessment concluded that because groundwater discharge rates to the

Anthony Kill are very low, the potential for aquatic impacts associated with contaminant discharges from the site is minimal. Migration of overburden coal tar to the Anthony Kill would be controlled.

14.3.3 Overall Protection of Human Health and the Environment

Alternative 2 would provide some additional protection to ecological receptors by controlling migration of coal tar in the overburden to the Anthony Kill. Because groundwater would only be diverted around and potentially under the downgradient barrier, this alternative would not effectively control migration of overburden groundwater in the long-term. However, groundwater in the area is currently not a source of drinking water, nor does it represent a future potential source, and is therefore not a risk to human health.

Because of the industrialized nature of this area, and the lack of suitable habitats, no significant impacts to area wildlife would be anticipated from implementation of this alternative.

The most significant human health risks would be associated with the use of heavy machinery. To minimize these risks, a HASP would be developed and implemented and OSHA regulations would be followed. Because limited excavation would be required, exposure to contaminated soil during installation of the barrier would be minimal.

14.3.4 Short-term Impacts and Effectiveness

None of the components of Alternative 2 would have significant short-term impacts on the local community and environment. Although land use in the immediate vicinity of the site is both residential and commercial, all activities would be conducted on the site. Local truck traffic along North Central Avenue and noise levels in the vicinity of the site may increase slightly during implementation of this alternative.

The only excavation required as part of this alternative would be excavation associated with temporary removal and replacement of two outfalls and removal of soils from the filter bed area. Because minimal excavation activities would be required, generation of fugitive dust or air emissions is anticipated to be minimal. The site would, however, be monitored and dust suppression measures, such as water sprays, would be used, as necessary. In addition, air zones would be monitored for specific contaminants, and appropriate measures such as use of personal protective equipment would be implemented if health and safety action criteria are exceeded. Workers may also be exposed to contaminants through direct skin contact. Appropriate dermal personal protective equipment would be worn. Workers would be exposed to hazards associated with heavy equipment and the excavation. OSHA guidelines would be followed to minimize the potential for construction-related accidents and a HASP would be developed and followed to address worker health and safety during the remedial action.

Mobilization and site preparation activities would take approximately one week. Installation of the downgradient barrier wall would require four to six weeks. Site

restoration and demobilization would take approximately one week. The total time required to implement this alternative would be approximately eight weeks.

14.3.5 Long-term Effectiveness and Permanence

Alternative 2 is a control technology that would not be considered a permanent remedy because no treatment technologies would be implemented. However, as described in Subsection 9.2, DNAPLs such as coal tar are difficult to extract even from highly permeable soils. Because coal tar has migrated into the saturated zone and into fractured bedrock, efficient recovery is even more difficult, if not impossible. Control of coal tar via a downgradient barrier wall would contribute to the long-term management of the contaminant migration by minimizing further contamination of surface water and limiting the spread of the potentially mobile coal tar source. Because Alternative 2 is not a permanent remedy and because wastes would remain on site, potential future remedial options for the site would be assessed as part of the five-year site review.

The performance life of sheet pile barrier walls can vary from 30 to more than 100 years. The design life of the wall depends on the soil and groundwater conditions at the site and the materials used to construct the barrier. Prior to implementation, site conditions would be thoroughly evaluated to determine the most appropriate construction materials. Because the sheet piles would be driven through overburden soils and keyed one to two feet into weathered bedrock, increased fracturing in bedrock may result. Flow of coal tar could potentially increase due to the increased fracturing and result in further spread of contaminants. To mitigate this effect, grout could be injected into the fractures at the bottom of the sheet pile

wall to prevent leakage through the fractures. However, grouting fractures may not stop all leakage. Environmental monitoring and visual inspections would aid in evaluating the need for such controls.

The existing asphalt cover on the site mitigates exposure to surface and subsurface soil through direct contact, incidental ingestion, and fugitive dust inhalation. Annual maintenance of the cover would therefore be conducted to maintain the integrity of the cover.

If soils associated with the former filter bed are encountered that contain waste coke, these soils would be removed from the site and disposed of off-site. Treatment/disposal of waste in a hazardous waste landfill is a commonly used method of remediation. Material containing waste coke would be sampled and analyzed before transporting off-site to determine if treatment before land disposal is required.

14.3.6 Reduction of Toxicity, Mobility, and Volume

Alternative 2 would decrease the mobility of contaminants by controlling the migration of overburden coal tar into the Anthony Kill. However, mobility of contaminants in groundwater would not be controlled because the barrier would only divert groundwater to a discharge location downstream. Installation of perimeter containment wells may aid in controlling the migration of groundwater to the Anthony Kill. However, groundwater modeling predicted minimal additional control of groundwater (i.e., a decrease of 5 percent of total flow and a reduction of approximately 10 percent in flow to the stream along the location of the barrier).

No reduction in toxicity or volume would be achieved because removal or treatment processes would not be employed with the exception of the soils from the former filter bed containing waste coke. It is assumed that approximately 30 cubic yards of soil containing waste coke would be excavated and disposed of off-site. Hazardous waste landfills are designed to reduce the mobility of contaminants through use of synthetic and clay liners and caps. Landfilling of these soils would not reduce the volume or toxicity of the waste.

14.3.7 Implementability

Activities associated with this alternative include: environmental monitoring, institutional controls, five-year site reviews, bedrock mapping, asphalt cover maintenance, site preparation, disposal of excavated soils from the filter beds, and installation of the downgradient barrier wall. Equipment, materials, and services for all activities are readily available. Some coordination among NYSEG, state, county, and local officials, and adjoining property owners would be required to conduct these activities. Detailed plans for environmental monitoring would require development and implementation. These plans would be subject to regulatory review and approval. Institutional controls and five-year reviews would likely be easy to implement. Installation of the downgradient barrier wall would not impact implementation of possible future remedial activities at the site.

Construction of sheet pile barrier walls utilizes standard construction techniques and equipment and materials that would be readily available. Actual construction may, however, be difficult because of the potential presence of underground structures and

debris and proximity of the downgradient barrier wall to the Anthony Kill. Once constructed, no operation and minimal maintenance would be required.

14.3.8 Cost

A cost estimate was prepared for Alternative 2 to help select a remedial alternative. The estimate contains the following principal elements:

- capital cost
- operating and maintenance cost

Capital cost consists of direct and indirect costs. Typically, these costs include those expenditures initially incurred to develop, construct, and implement the remedial alternative. Direct costs include expenditures for the equipment, labor, and materials necessary to establish institutional controls and access restrictions, prepare the site, excavate and dispose of filter bed soils, and construct the barrier wall. Direct capital costs include construction, labor, and equipment; land and site development; and materials. A 25 percent contingency was included in direct cost items to account for unforeseen project complexities (e.g., adverse weather conditions, inadequate site characterization, and increased construction standby times).

Indirect costs include expenditures for contractors' overhead and profit. Additional administrative, engineering, and legal services that are not actually part of the alternative, but are required to complete implementation of the alternative, include engineering expenses, legal fees, health and safety costs, and contingency allowances.

Engineering design and services during construction (i.e., QA testing, construction oversight, documentation, and resident engineering) for Alternative 2 were estimated at 10 percent each of the direct cost. Costs for health and safety activities conducted at Level D protection were estimated at 5 percent of the direct cost. Legal, administrative, and permitting costs were estimated at 5 percent of the direct cost.

Operating and maintenance costs refer to expenditures associated with the five-year site review, environmental monitoring, and asphalt cover maintenance.

The estimated direct, indirect, operation and maintenance, and total present worth costs for Alternative 2 are presented in Table 14-3. The total present worth cost for Alternative 2 is estimated at $1,184,000. Total estimated construction, engineering, and administrative costs are $554,000. The present worth of operation and maintenance costs is $630,000.

To generate these costs, the following assumptions were made with respect to Alternative 2:

- the Mechanicville site would be reviewed every five years for a period of 30 years;
- environmental monitoring and asphalt cover maintenance would be conducted annually;
- a 200-foot sealable joint sheet pile wall with 30-foot wing walls on the eastern and western sides of the wall would be installed;

- all joints would be sealed with a cement/bentonite grout;
- installation of perimeter containment wells to reduce groundwater mounding upgradient of the wall would not be required; and
- 30 cubic yards of soils from the filter beds area would be excavated and disposed of as hazardous waste.

If installation of two perimeter wells is required, the cost to implement Alternative 2 would increase substantially, primarily because of increased operation and maintenance costs that would be associated with treatment and disposal of contaminated groundwater (Table 14-4). Capital costs, which would include installation of two (2) perimeter containment wells, collection piping, treatment building construction, and the actual treatment system is estimated to range between approximately $321,000 and $440,000. Present worth operation and maintenance costs, which include power requirements, treatment residuals disposal, and system monitoring, are estimated to range from $335,000 to $781,000. Capital and operation and maintenance costs would vary depending on the final discharge location and degree of treatment required. Based on this analysis, the present worth cost associated with groundwater interception and treatment could range from $656,000 to $1,221,000 (see Table 14-4). Therefore, the total present worth cost for Alternative 2 with containment wells and treatment could range from $1,917,000 to $2,482,000.

The low range of this estimate assumes minimum treatment, which would include pretreatment with an oil/water separator and, because of the potential treatment

capabilities of a POTW, discharge to the local POTW. If additional treatment for inorganic and/or organic contaminants is required, costs increase. The high range of the estimate includes pretreatment in an oil/water separator, treatment to remove inorganic constituents using chemical precipitation, and treatment to remove organic compounds using carbon adsorption. Because of costs associated with discharge to the local POTW (i.e., the POTW would charge a per gallon fee for use of the facility), this estimate also assumes the treated water would subsequently be discharged to the POTW. Discharge to the Anthony Kill would be a slightly less. The discharge location would dictate the amount of treatment required.

14.4 Detailed Analysis of Alternative 3: Downgradient Barrier Wall With Upgradient Subsurface Drain

14.4.1 Description

Alternative 3 consists of the following major components:

1. Environmental Monitoring
2. Institutional Controls
3. Five-year Site Reviews
4. Asphalt Cover Maintenance
5 Bedrock Mapping
6. Site Preparation
7. Removal and Treatment/Disposal of Filter Bed Soil
8. Installation of Downgradient Barrier Wall

9. Installation of Upgradient Subsurface Drain

Components 2, 3, and 4 would be performed as described for Alternative 1 (see Subsection 14.2.1). Components 5, 7, and 8 would be completed as described for Alternative 2 (see Subsection 14.3.1). The remaining major components are described in the following paragraphs.

Environmental Monitoring. The environmental monitoring program would be similar to that described for Alternative 1 (see Subsection 14.2.1). The principal difference would be the objectives of the program, which would be to evaluate the effectiveness of the downgradient barrier wall and the upgradient subsurface drain installed at the site.

Site Preparation. Site preparation would include activities required to prepare the site for mobilization and construction of the barrier wall and subsurface drain. Minimal clearing of vegetation would be required for installation of the barrier wall, but none would be required for the subsurface drain. It is assumed that construction of access roads and/or upgrading existing roads would not be required. Additional site preparation activities that would be required before work could commence include locating and removing above-ground and subsurface utilities (i.e., gas mains which are connected to the gas regulator house) and/or obstructions, establishing a stockpile/storage area for equipment, excavated soil, and materials; mobilizing a field office; and establishing a decontamination and trash disposal area.

Installation of Upgradient Subsurface Drain. The upgradient subsurface drain would consist of a buried conduit which collects and conveys groundwater discharge by

gravity flow. Subsurface drains are a traditional civil engineering technique for lowering the water table and diverting groundwater flow. More recently, drains have been used as environmental controls to contain or remove a groundwater plume, or to prevent contact of groundwater with waste material. For the purposes of this FS, the 170-foot long upgradient drain would be installed in the overburden (invert slightly above top of rock) to divert flow and subsequently reduce groundwater flow across the site. The subsurface drain, in conjunction with the downgradient barrier wall, would therefore reduce total flow to the Anthony Kill. The major components of a typical drain system include the following:

- drain pipe to collect and convey flow to a wet well
- filter to prevent fine particles from migrating into and clogging the system
- backfill to restore the surface to grade
- impermeable downgradient barrier (e.g., geomembrane) to reduce flow from the north side of the subsurface drain
- manhole to allow access to the drain for flushing and maintaining the system
- wetwell for collecting groundwater for discharge
- submersible pump to discharge groundwater

Traditional construction techniques would be used to install the drain. A backhoe and/or other excavation equipment would be used to open cut the trench estimated to be 170 feet long, 4 feet wide, and 15 to 18 feet deep (see Figure 14-4). The invert of the drain would be installed on the shallow bedrock layer which is 15 to 18 feet bgs in the proposed location (Figure 14-5). During construction, the excavation would require sheeting or shoring to prevent the side walls from collapsing and provide worker safety. Site conditions would determine whether shoring would be achieved hydraulically, mechanically, or by using a trench box or sheet piling. For cost estimating purposes, use of a trench box was assumed.

The bedrock surface would be contoured by removing bedrock so that the slope would allow gravity flow from the ends of the drain to a low point in the middle. Once the proper slope is attained, the pipe bedding would be laid atop the shallow bedrock. The bedding would be made of granular material coarse enough to allow flow to the pipe but fine enough to prevent infiltration of soils from the side walls. A 4-inch perforated HDPE pipe would be laid atop the bedding, and the trench would be backfilled to the high groundwater mark, approximately 8 feet bgs, with filter sand. The remainder of the trench would be backfilled with clean excavated material. To determine if material is suitable for backfill, all excavated soil would be screened visually and with portable detection equipment before using as backfill.

It was assumed that a wetwell and a pump would be installed to collect and discharge the diverted groundwater to the Anthony Kill (see Figure 14-4). Diverted groundwater could also potentially be discharged to the local POTW if discharge to the Anthony Kill is not feasible. Construction of the discharge system would consist of excavating a trench 3 to 4 feet deep by 1.5 feet wide between the drain and the

Anthony Kill. Gravel bedding would be laid above the high groundwater level so as not to create a preferential path to the Anthony Kill for groundwater. The non-perforated discharge pipe would be laid atop the bedding, and the trench would be backfilled. If the pipe is laid above the frost line to accommodate the high groundwater level, a layer of insulation would be installed at 1 to 2 feet bgs to protect the discharge pipe from freezing. It is assumed that the proposed location of the discharge pipe would be in an area not impacted by coal tar. Therefore, on-site soils would be used to backfill the trench. However, the excavated soil would be screened visually and with portable detection equipment. If soils impacted by coal tar are observed, the soil would be temporarily stockpiled and sampled, and samples would be analyzed by an off-site laboratory. The soil would be disposed of at an appropriate off-site facility based on analytical results. The trench would be backfilled with clean fill. After backfilling the pipe trenches, the disturbed areas would be restored to original conditions.

Groundwater flow with Alternative 3 in place was modeled, and results are presented in Appendix E. At best, the upgradient drain is predicted to be able to intercept approximately 700 gallons of groundwater per day. The drain may also increase the flux rate from upgradient locations slightly by reducing head and creating a preferential pathway for groundwater flowing toward the drain. The net result would only be a decrease of about 16 percent in the total groundwater discharge across the site to the Anthony Kill.

Discharge to the stream along the downgradient barrier wall frontage would be reduced by about 21 percent. This is, however, a fairly minimal reduction in total groundwater flow because the majority of flow across the site is not associated with

overburden but with shallow bedrock (see Subsection 7.3.1). Groundwater flow in the vicinity of the barrier wall would be diverted easterly around the wall while some would be forced under the wall into the Anthony Kill, similar to predicted conditions for Alternative 2.

14.4.2 Compliance with SCGs

Location-specific SCGs have not been identified for the Mechanicville site. Alternative 3 would be designed and executed to meet relevant federal and state action-specific and chemical-specific SCGs summarized in Tables 10-1 and 10-2, respectively. OSHA requirements for training, safety equipment, and record keeping would be met during construction activities at the site. Because this alternative proposes diverting upgradient groundwater to the Anthony Kill, a State Pollution Discharge Elimination System (SPDES) permit would be obtained. The discharge system would be monitored to verify compliance with the permit. Soils excavated during trenching activities would be analyzed and taken to an appropriate off-site disposal/treatment facility.

Alternative 3 would only partially achieve response objectives because contaminated overburden groundwater would continue to migrate to the Anthony Kill. However, the risk assessment concluded that because groundwater discharge rates to the Anthony Kill are very low, the potential for aquatic impacts associated with contaminant discharges from the site is minimal. Migration of coal tar in the overburden to the Anthony Kill would be controlled.

Because this alternative involves discharging upgradient groundwater to the Anthony Kill, groundwater quality in the vicinity of the proposed drain location, as represented by groundwater at monitoring well MW-1, was compared to AWQC. Groundwater quality data summarized in Tables 5-6 and 5-7 indicate that no organic compounds were detected in the well. However, manganese was detected in the filtered inorganic analysis at a concentration of 123 ppb which is greater than its AWQC (50 ppb). Chromium, iron, manganese, and nickel were detected in the unfiltered inorganic analysis at concentrations greater than AWQC. However, because the inorganic analytes in groundwater are naturally occurring and thus discharging to the Anthony Kill, this alternative assumes that no treatment would be required. Groundwater would initially be monitored on a monthly basis to evaluate its quality. Subsequent sampling and analysis frequency will be determined as conditions merit.

14.4.3 Overall Protection of Human Health and the Environment

This alternative would provide some additional protection to ecological receptors by controlling migration of overburden coal tar to the Anthony Kill. However, based on modeling results, this alternative would not significantly reduce the discharge of site-impacted groundwater to the Anthony Kill. Therefore, risk to the environment, which is minimal under current conditions, would not change appreciably. Currently there is minimal risk to human health at the Mechanicville Site.

As described in Subsection 14.3.3, because of the industrialized nature of this area, and the lack of suitable habitats, no significant impacts to area wildlife would be anticipated from implementation of this alternative.

The most significant human health risks would be associated with the use of heavy machinery. To minimize these risks, a HASP would be developed and implemented and OSHA regulations would be followed. Because limited excavation would be required, exposure to contaminated soil during installation of the barrier would be minimal.

14.4.4 Short-term Impacts and Effectiveness

None of the components of this alternative would have significant short-term impacts to the local community and environment. Although land use in the immediate vicinity of the site is residential and commercial, all activities would be conducted at the site. Local truck traffic along North Central Avenue and noise levels in the vicinity of the site may increase slightly during implementation of this alternative.

The short-term impacts and effectiveness of excavation activities associated with construction of the downgradient barrier wall and removal of soils from the filter beds are presented in Subsection 14.3.4 for Alternative 2 and would be similar for Alternative 3.

It is assumed that trenching activities associated with the upgradient subsurface drain would take place in soils not impacted by coal tar. However, if coal tar is encountered during implementation of this alternative, appropriate personnel protective equipment would be worn to minimize exposure through incidental ingestion, inhalation, and direct skin contact. OSHA guidelines would be followed to minimize construction-related accidents. A HASP would be developed and followed to address worker health and safety during remedial action.

Mobilization and site preparation activities would take approximately one week. Installation of the downgradient barrier wall and upgradient subsurface drain would require four to six weeks. Site restoration and demobilization would take approximately one week. The total time required to implement this alternative would be approximately eight weeks.

14.4.5 Long-term Effectiveness and Permanence

Alternative 3 is a control technology that would not be considered a permanent remedy because no treatment technologies would be implemented. However, as described in Subsection 9.2, DNAPLs such as coal tar are difficult to extract even from highly permeable soils. Because coal tar has migrated into the saturated zone and into fractured bedrock, efficient recovery is even more difficult, if not impossible. Control of coal tar via a downgradient barrier wall and an upgradient subsurface drain would contribute to the long-term management of the contaminant migration by minimizing further contamination of surface water and limiting the spread of the potentially mobile coal tar source. Because Alternative 3 is not a permanent remedy and because wastes would remain on site, potential remedial options for the site would be assessed as part of the five-year site review.

According to the risk assessment, the only potential impact to the environment is migration of coal tar and groundwater to the Anthony Kill. The effect of the asphalt cover and upgradient subsurface drain would be a slight reduction of groundwater flow through the site. The system would experience a slight lowering of the water table which, according to modeling results, would have only minimal effect on

groundwater migration because most of the groundwater flow through the site is in the shallow bedrock layer (see Subsection 7.3.1).

The long-term effectiveness and permanence associated with the asphalt cover and removal of soils associated with the former filter bed are presented in Subsection 14.3.5 for Alternative 2 and would be similar for Alternative 3.

14.4.6 Reduction of Toxicity, Mobility, and Volume

Alternative 3 would reduce the mobility of contamination by further reducing the migration of coal tar to the Anthony Kill from overburden soils. According to the modeling results, the upgradient subsurface drain with the downgradient barrier wall would provide some control of overburden groundwater flow. By controlling overburden groundwater migration to the Anthony Kill, coal tar migration would be further controlled.

This alternative would not reduce the toxicity and volume of media impacted by coal tar because neither removal or treatment processes would be employed with the exception of soils from the former filter bed containing waste coke. As in Alternative 2 (see Subsection 14.3.6), soil containing coke would be excavated and disposed of off-site, which would provide some reduction in volume of waste at the site.

14.4.7 Implementability

As described in Subsection 14.3.7, site preparation would be readily implemented at the site. Common construction equipment and methods would be required for this alternative. Services are relatively reliable and several contractors would be available to participate in a competitive bidding process.

Excavation for the subsurface drain would primarily require a backhoe, concrete cutting equipment to dig through the former distribution holder foundation, and a trench box. A jack-hammer attachment to the backhoe would be used to remove enough bedrock to provide a sufficient slope for groundwater to drain to the wetwell. When construction is completed, minimal operations and maintenance would be required for the asphalt cover and discharge system.

14.4.8 Cost

A cost estimate was prepared for Alternative 3 to help select a remedial alternative. The estimate is based on the same principal elements discussed in Alternative 2.

The estimated direct, indirect, operation and maintenance, and total present worth costs for Alternative 3 are presented in Table 14-5. The total present worth cost for Alternative 3 is estimated at $1,690,000. Total estimated construction, engineering, and administrative costs are $818,000. The present worth of operation and maintenance costs is $894,000.

To generate these costs, the following assumptions were made with respect to Alternative 3:

- the Mechanicville site would be reviewed every five years for a period of 30 years;
- environmental monitoring and asphalt cover maintenance would be conducted annually;
- a 200-foot sealable joint sheet pile wall with a 30-foot wing wall on the eastern and western sides of the wall would be installed;
- all joints would be sealed with a cement/bentonite grout;
- a 170-foot upgradient subsurface drain would be installed 10 to 12 feet bgs;
- approximately 50 percent of excavated soil would require off-site disposal;
- diverted groundwater discharged to the Anthony Kill would be monitored in accordance with SPDES requirements;
- diverted groundwater would not require pretreatment for discharge to Anthony Kill; and

- approximately 30 cubic yards of soil from the former filter beds area would be excavated and disposed of as hazardous waste.

15.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

The comparative analysis presented in this section compares the three remedial action alternatives relative to the evaluation criteria used during the detailed analysis of alternatives. The purpose of the comparative analysis is to identify the advantages and disadvantages of the alternatives relative to one another and to aid in the eventual selection of a remedial alternative for overburden groundwater at the Mechanicville site. Subsection 15.1 presents the approach of the comparative analysis and Subsection 15.2 presents the comparison of the alternatives.

15.1 APPROACH TO THE COMPARATIVE ANALYSIS

Specific factors are considered when comparing alternatives for selection of a preferred site remedy. To the extent practicable, the selected alternative should:

- be protective of human health and the environment
- comply with SCGs (or provide grounds for invoking a waiver)
- use permanent solutions and alternative treatment technologies to the maximum extent practicable

- satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element; if this preference is not satisfied, the decision document must explain why

- be cost-effective

In accordance with the NYSDEC TAGM 90-4030 for the Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990), the comparative analysis is conducted to evaluate the relative performance of each alternative in relation to each of the seven evaluation criteria. NYSDEC has categorized the evaluation criteria into two groups: threshold and balancing. A discussion of each criteria group is provided below.

15.1.1 Threshold Criteria

Because the selected remedy must be protective of human health and the environment and comply with SCGs, NYSDEC has designated (1) overall protection of human health and the environment, and (2) compliance with SCGs, as the two threshold criteria. An alternative must meet both criteria to be eligible for selection as the site remedy.

15.1.2 Primary Balancing Criteria

The five primary balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. This balancing provides a preliminary assessment of the

maximum extent to which permanent solutions and treatment can be used practicably in a cost-effective manner.

The alternative that is protective of human health and the environment, is SCG-compliant, and affords the best combination of attributes is identified as the preferred alternative. The balancing emphasizes long-term effectiveness and reduction of toxicity, mobility, or volume through treatment.

15.2 COMPARATIVE ANALYSIS OF ALTERNATIVES

Table 15-1 presents the comparative analysis for the three Mechanicville site remedial alternatives. The comparative analysis highlights the results of the detailed analysis. In accordance with the NYSDEC TAGM 90-4030 (NYDEC, 1990), a scoring of each alternative was conducted to aid in the comparative analysis of alternatives. The TAGM assigns each of the seven criteria a relative weight which results in a maximum score of 100 points (e.g., compliance with SCGs is assigned a relative weight of 10, etc.). Based on the performance of an alternative, as well as how well it meets the objectives of the evaluation criterion, points are assigned. A low total score is an indication that an alternative may not sufficiently achieve the goals and objectives of remedial actions at the Mechanicville site. The total score for each alternative is presented in Table 15-1. A detailed breakdown of how each alternative was scored is presented in Appendix F.

15.2.1 Comparison of Threshold Criteria

The alternatives were first compared relative to the two threshold criteria, overall protection of human health and the environment and compliance with SCGs.

Alternative 1, Minimal Action, was developed as a baseline with which to compare other alternatives. Because Alternative 1 would not involve any remedial actions, contaminated groundwater and coal tar would continue to migrate toward the Anthony Kill at the current rate, a condition which does not currently result in significant adverse impacts on ecological receptors. Investigations indicate that migration of coal tar from the site is extremely slow under current site conditions. The risk assessment concluded that because groundwater discharge rates to the Anthony Kill are very low, the potential for aquatic impacts associated with contaminant discharges from the site is minimal.

Alternative 1 would be designed to comply with all applicable action-specific and chemical-specific SCGs (no location-specific SCGs were identified for the site).

Alternatives 2 and 3 would only partially achieve response objectives. Migration of overburden coal tar to the Anthony Kill would be controlled via the downgradient barrier wall installed as part of both alternatives. However, this is of limited benefit because site investigations indicate that coal tar migration occurs at a very slow rate. Alternative 2 would provide minimal control of contaminated overburden groundwater. Alternative 3 would provide slightly greater control (i.e., total groundwater discharge to the Anthony Kill would be reduced by approximately 16

percent). The effect on the surface water and sediment quality of the Anthony Kill from implementing either of these two alternatives is expected to be minimal.

Both Alternative 2 and 3 would be designed to comply with all applicable action-specific SCGs.

15.2.2 Comparison of Balancing Criteria

As discussed, the primary balancing criteria emphasize long-term effectiveness and permanence, and reduction in toxicity, mobility, or volume through treatment. Although minimal risk is present under existing site conditions, Alternative 1 would not reduce future potential risks to ecological receptors because migration of overburden groundwater and coal tar would not be further controlled and would continue to migrate to the Anthony Kill at current migration rates. Potential options that would provide a permanent solution to the remediation of the site would be evaluated as part of the five-year review process.

Although neither Alternative 2 nor 3 would comply with NYSDEC's preference for treatment, both would increase the control of coal tar migration. Control of coal tar via a downgradient barrier wall would contribute to the long-term management of contaminant migration by reducing further contamination of surface water and limiting the spread of the potentially mobile coal tar source. Alternative 3 would provide slightly greater control of overburden groundwater compared to Alternative 2. Potential options that would provide a permanent solution to the remediation of the site would be evaluated as part of the five-year review process.

None of the components of Alternatives 1, 2, and 3 would result in significant short-term environmental impacts because of the urban/commercialized nature of the area, and lack of suitable habitat for potential ecological receptors. Impacts to worker health and safety would be slightly greater for Alternative 3 compared to Alternative 2 because of the excavation and trenching required to install the upgradient subsurface drain. OSHA guidelines and an approved HASP would be followed to address worker health and safety.

The implementation of Alternatives 2 and 3 would be similar; however, Alternative 3 would require interception and discharge of upgradient groundwater to the Anthony Kill in accordance with a SPDES permit. Water quality would be monitored to determine that it meets applicable criteria. Additionally, Alternative 3 would be the most costly of the alternatives. The increased cost is primarily associated with installation of the subsurface drain and operation and maintenance requirements associated with discharge of upgradient groundwater to the Anthony Kill.

16.0 RECOMMENDATION OF REMEDIAL ACTION

The evaluations and discussions presented in Sections 9.0 through 15.0 provide a basis for selecting a remedial action for the Mechanicville site. The recommended remedial action at the Mechanicville site is the Minimal Action Alternative described in Subsection 14.2. This alternative consists of long-term environmental monitoring, institutional controls, five-year site reviews, asphalt cover maintenance, and bedrock mapping.

Based on the comparative analysis of alternatives, the expected performance of all three alternatives would be essentially the same. Because coal tar has migrated into the saturated zone and into fractured bedrock, efficient recovery would be difficult, if not impossible. Although installation of a downgradient barrier wall may reduce migration of coal tar to the Anthony Kill, investigations indicate that migration of coal tar from the site is extremely slow under current site conditions. Free phase coal tar has not been observed as seepage into the Anthony Kill and has not been observed in perimeter monitoring wells MW-14, MW-17, and MW-18. Based on groundwater modeling conducted to evaluate remedial alternatives, neither Alternative 2 nor Alternative 3 would have a significant impact on total flow of overburden groundwater into the Anthony Kill. Alternative 3 would be slightly more effective, with reductions in total flow to the stream estimated at approximately 16 percent (compared to no reduction for Alternatives 1 and 2). The resulting benefits are, however, expected to be minimal. Finally, the risk assessment concluded that because groundwater discharge rates to the Anthony Kill are very low, the potential for aquatic impacts associated with contaminant discharges from the site

is minimal. Therefore, the Minimal Action Alternative is maintaining protection by using existing site conditions to effectively limit migration of coal tar to the Anthony Kill.

Site-related contaminants have been detected in groundwater beneath the site at concentrations in excess of federal and state drinking criteria (e.g., MCLs) and New York State Class GA criteria. However, as previously presented (see Subsections 9.2 and 10.2.2), because groundwaters in the vicinity of the Mechanicville site are not a current source of drinking water, nor are they a likely potential future source, application of these standards is not appropriate. Further, other potential sources of groundwater contamination, including gas stations, petroleum fuel storage facilities, and manufacturing facilities, are also in close proximity to the site and could represent additional threats to any planned water supply installation near the site. Finally, it is highly unlikely that Class GA groundwater standards could be achieved within a reasonable time frame or cost given potential off-site sources contributing to groundwater contamination and the presence of DNAPLs in the fractured bedrock unit beneath the site (see Subsection 9.2).

Therefore, because the effectiveness of control alternatives is questionable and investigations conducted to date indicate that impacts to human health and the environment from site-related contamination are minimal, the Minimal Action Alternative is recommended. As part of this alternative, the following components would be implemented:

- environmental monitoring to monitor site conditions and periodically evaluate risks to human health and the environment;

- institutional controls to restrict future noncommercial use of the site and to restrict groundwater use within and around the site;

- five-year site reviews to assess (1) potential impacts of site-related contaminants to human health and the environment and (2) technologies that have emerged and been demonstrated for the extraction and treatment of coal tar present in the overburden and fractured bedrock beneath the site;

- asphalt cover maintenance to assess the cover integrity and ability to continue to reduce infiltration to the site; and

- bedrock mapping to facilitate potential future remedial actions by evaluating potential migration routes in bedrock to the Anthony Kill.

Each of these components is described in detail in Subsection 14.2. A brief description of implementation of the Minimal Action Alternative follows.

Before commencing environmental monitoring activities, a site-specific monitoring and maintenance plan would be developed. This plan would detail long-term maintenance of the site and include details with regard to environmental monitoring, asphalt cover maintenance, and five-year site reviews. General components of long-term monitoring and maintenance that would be addressed include:

- objectives of the plan;
- sampling frequency and locations;

- sampling equipment and procedures;
- analytical methods;
- quality assurance and quality control requirements;
- asphalt cover inspection and maintenance requirements; and
- five-year site review requirements.

A work plan for conducting bedrock mapping would also be developed to provide the approach and methodology proposed to complete the task. All plans would be subject to regulatory review and approval before implementation. Finally institutional controls in the form of deed and land-use restrictions would be implemented. These restrictions would require coordination between NYSEG, state, county, and local officials and would require enforcement to be effective.

ABB-ES	ABB Environmental Services, Inc.
ACGIH	American Conference of Governmental Industrial Hygienists
ASP	Analytical Services Protocol
AWQC	ambient water quality criteria
BEHP	bis (2-ethylhexyl) phthalate
bgs	below ground surface
Btu	British thermal units
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
cm/sec	centimeters per second
DNAPL	dense non-aqueous phase liquid
DOT	Department of Transportation
Flanders	David Flanders Associates, Inc.
FS	Feasibility Study
ft/day	feet per day
GALSON	Galson Laboratories
gpm	gallons per minute
GPR	ground-penetrating radar
gpd	gallons per day
HASP	Health and Safety Plan
HI	Hazard Index
ID	inside diameter
IR	infrared spectroscopy
LNAPL	light non-aqueous phase liquid
MCL	Maximum Contaminant Level
mg/L	milligrams per liter (ppm)
mg/kg	milligrams per kilogram (ppm)
MGP	Manufactured Gas Plant
NAPL	non-aqueous phase liquid

NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NTU	Nephelometric Turbidity Units
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDWS	New York State Drinking Water Standards
NYSEG	New York State Electric and Gas Corporation
NYS SWQS	New York State Surface Water Quality Standards
OD	outside diameter
PAH	Polycyclic aromatic hydrocarbons
PCB	Poly-chlorinated biphenol
PID	photoionization detector
ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
POTW	publicly owned treatment works
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
SCGs	standards, criteria, and guidelines
SPDES	State Pollution Discharge Elimination System
SQC	sediment quality criteria
SQL	sample quantitation limit
SVOC	semi-volatile organic compound
TAGM	Technical and Administrative Guidance Memorandum
TCL	Target Clean-up Level
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
UV	ultraviolet fluorescence
VOC	volatile organic compound
μg/L	micrograms per liter (ppb)

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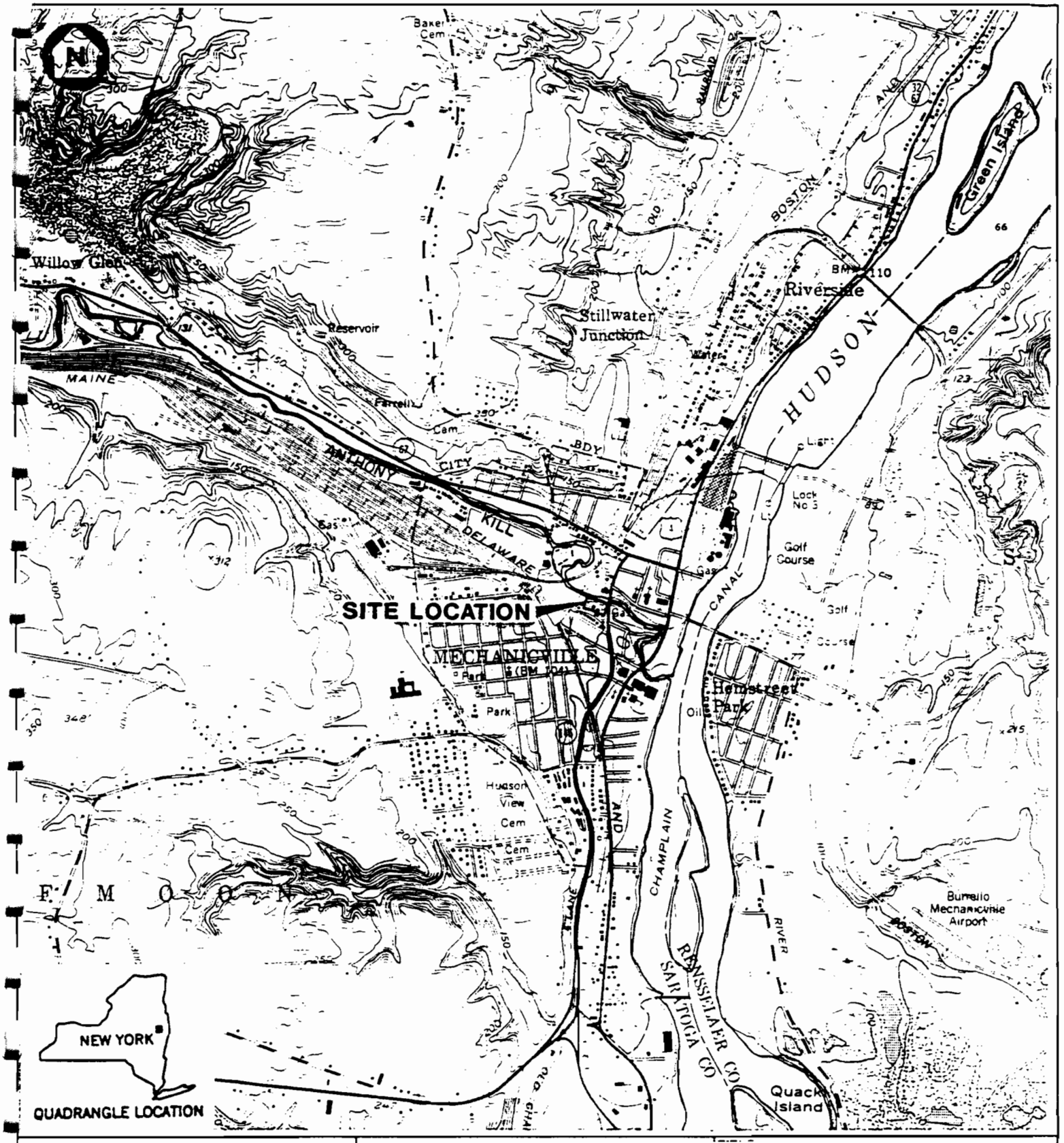
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BASE MAP SOURCE:
USGS QUADRANGLE
MECHANICVILLE (1980)

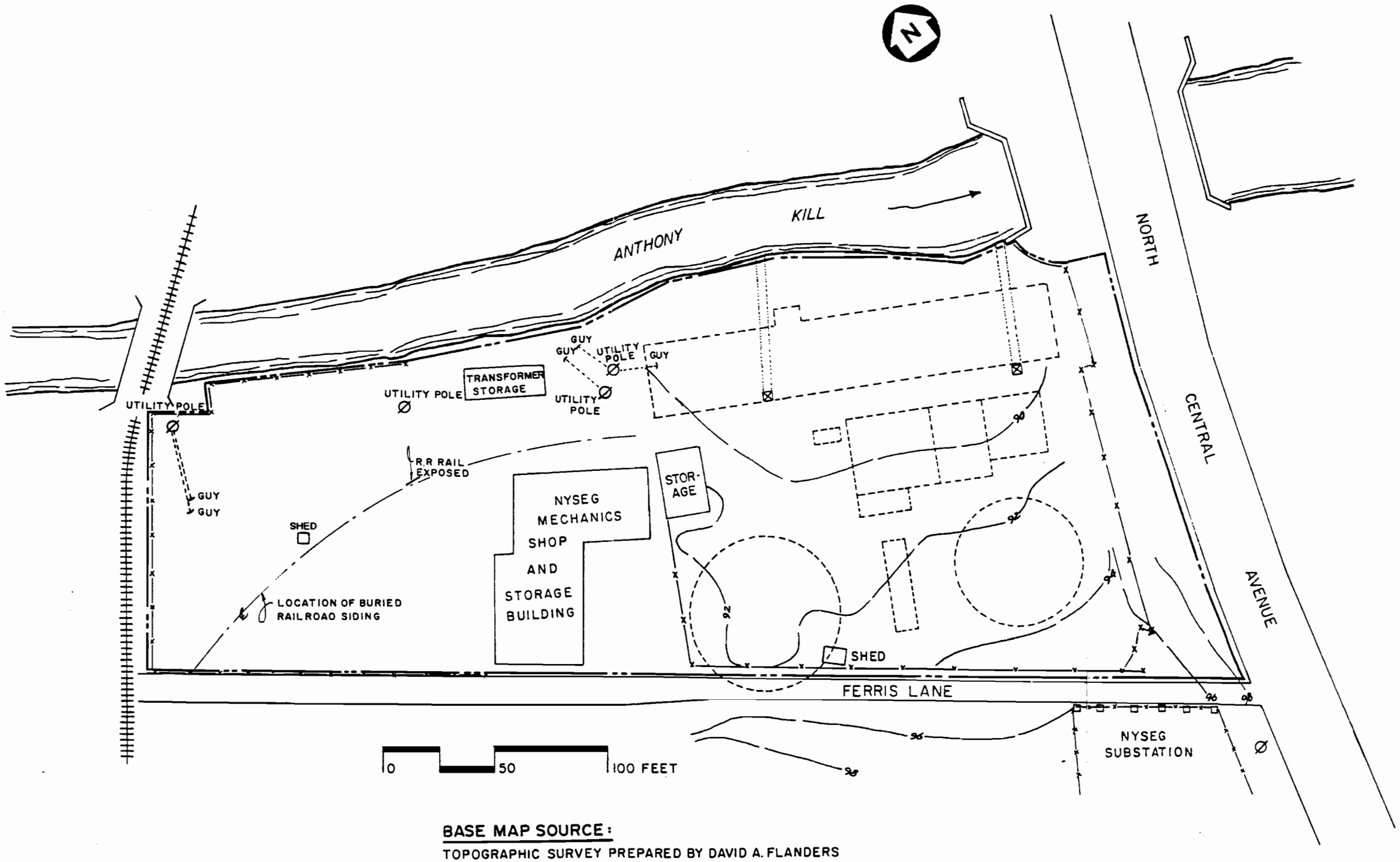
SCALE IN FEET

0 2000 4000

FIGURE 2-1
SITE LOCATION MAP
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

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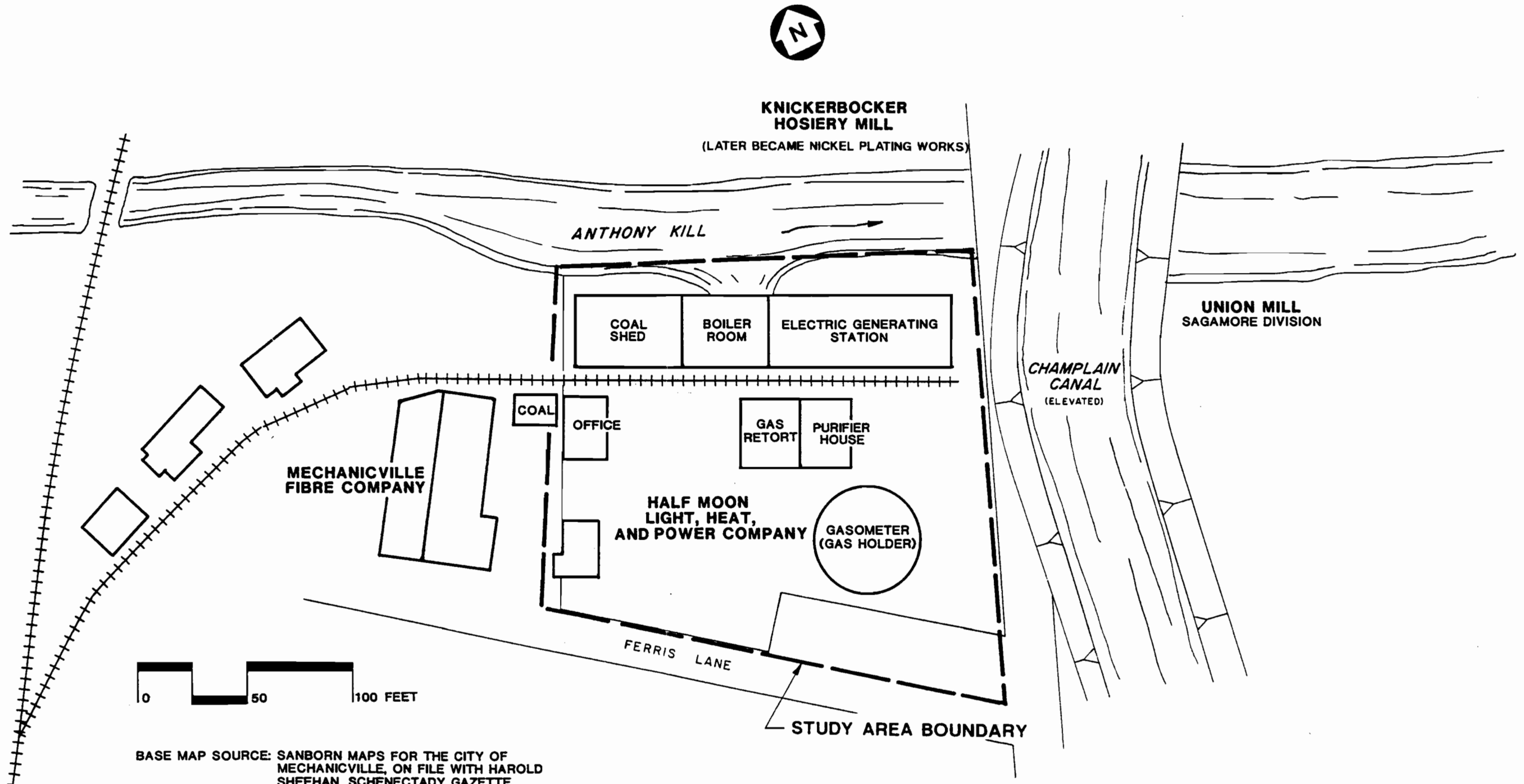
BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK DATED 6/26/86 (86-72-S).

FIGURE 2-2
PRESENT SITE CONDITIONS
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

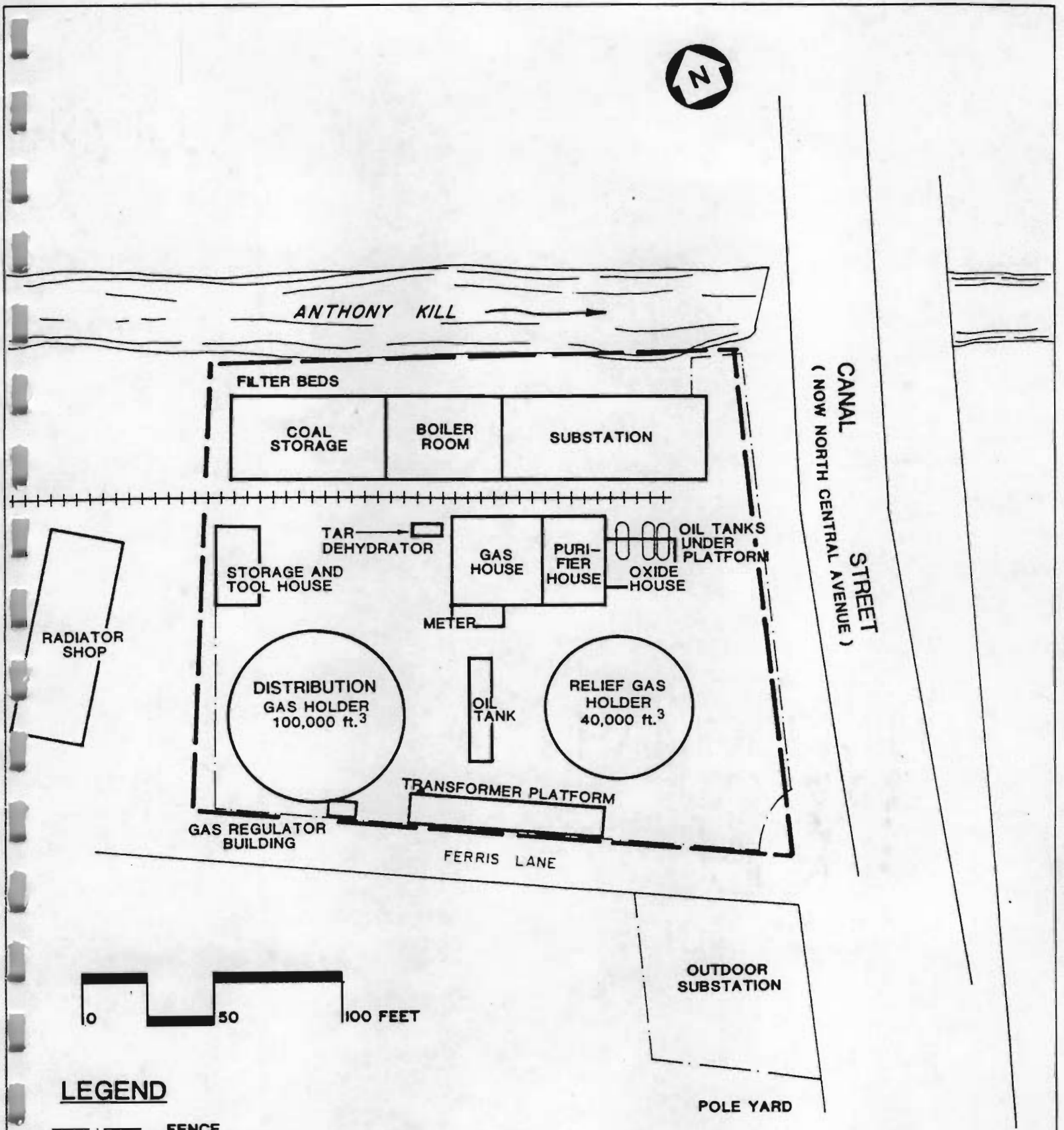
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BASE MAP SOURCE: SANBORN MAPS FOR THE CITY OF MECHANICVILLE, ON FILE WITH HAROLD SHEEHAN, SCHENECTADY GAZETTE, 50 NORTH ST., MECHANICVILLE, NY.

FIGURE 2-3
MECHANICVILLE SITE PLAN CIRCA 1910
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

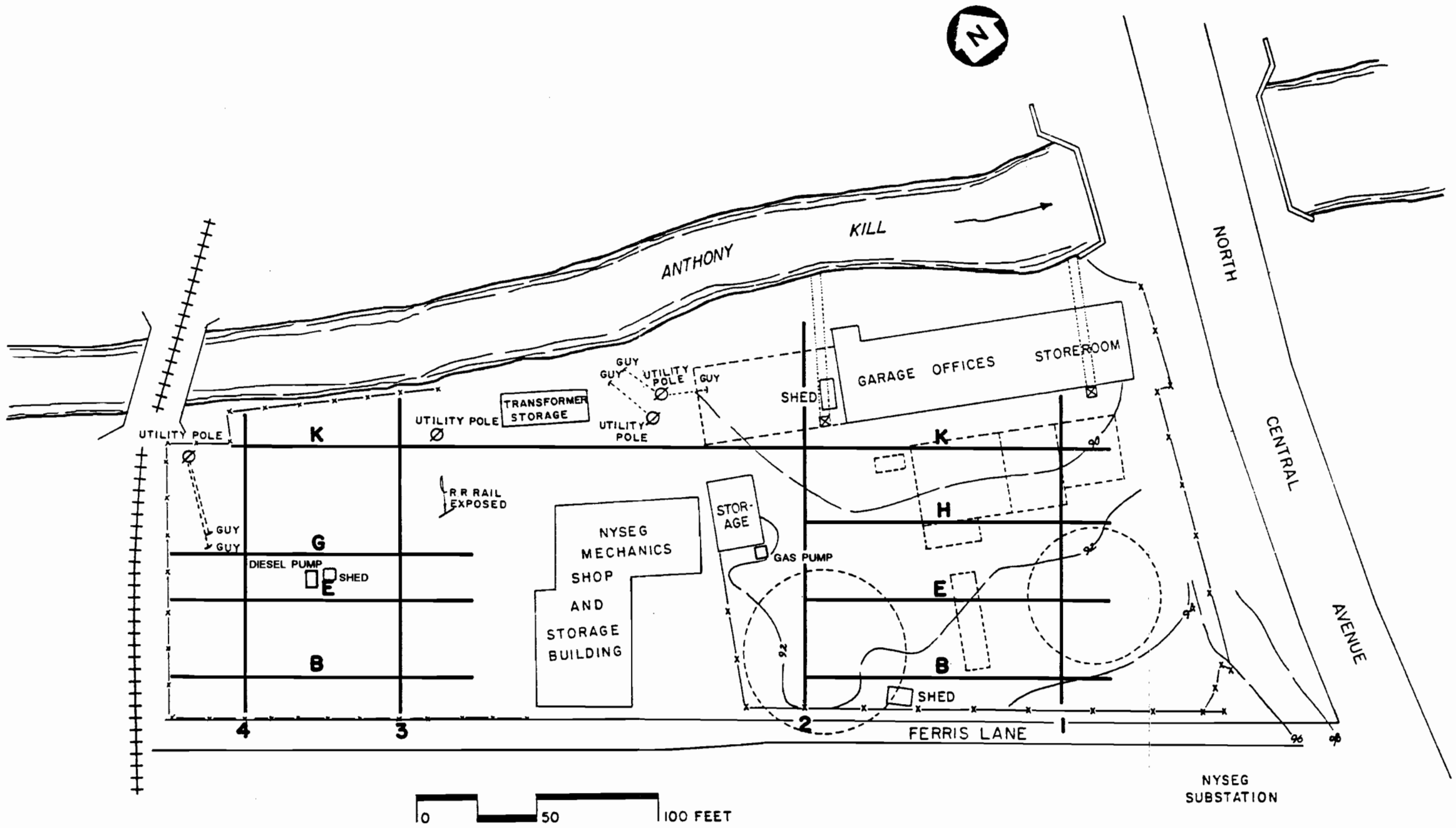


BASE MAP PREPARED BY BROWN, CROSBY, & CO., INC., ENGINEERING DEPARTMENT, 96 WALL ST., NEW YORK, APRIL 1951.

FIGURE 2-4
MECHANICVILLE SITE PLAN CIRCA 1951
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09



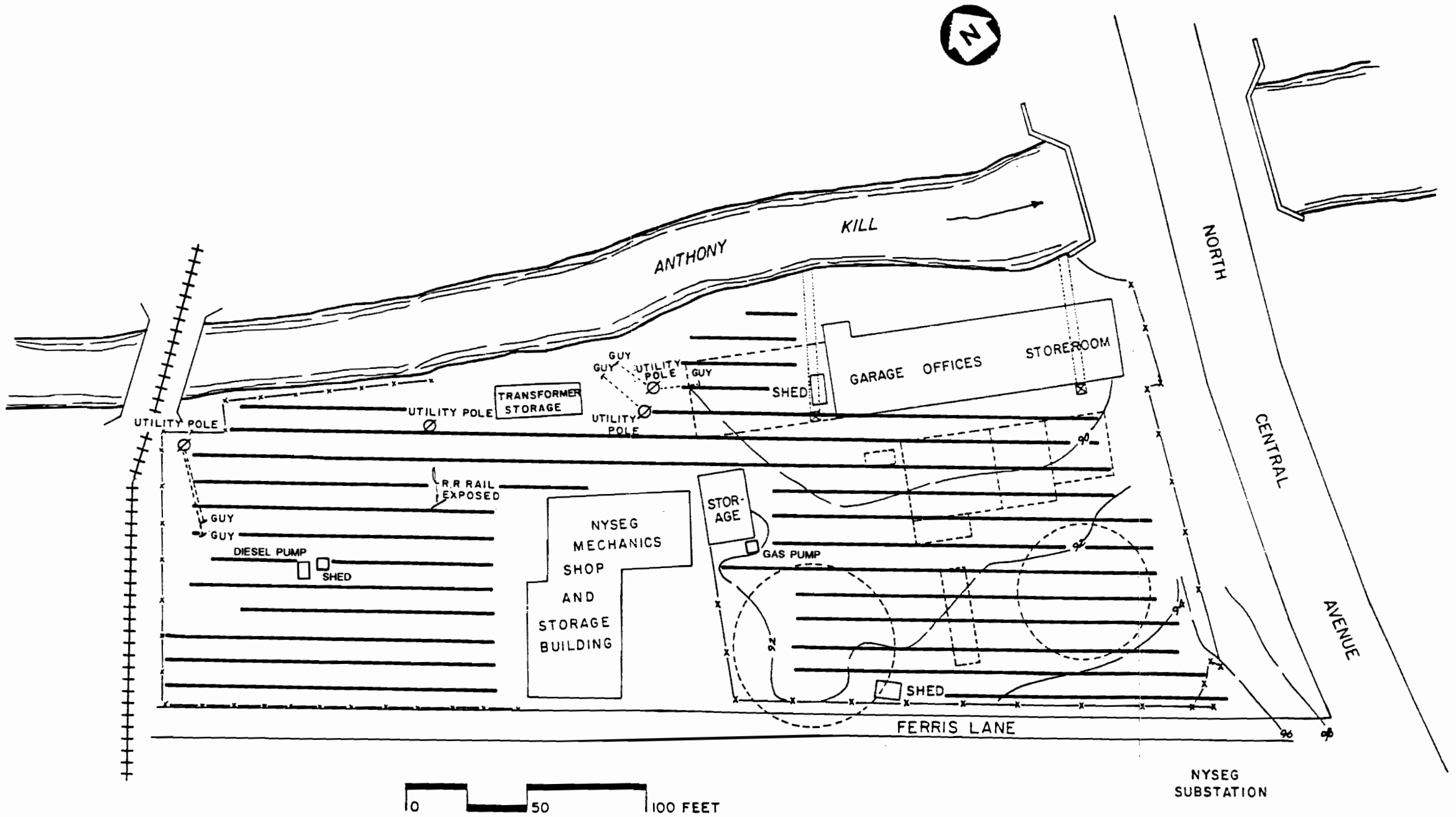
BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK DATED 6/26/86 (86-72-S).

FIGURE 3-1
TASK 2 SEISMIC SURVEY COVERAGE
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09



BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK DATED 6/26/86 (86-72-S).

FIGUR
TASK 2 GROUND PENETRATING RADAR COVE
NYSEG FORMER COAL GASIFICATIO
MECHANICVILLE, NEW

ABB Environmental Servic

4945-09

LEGEND

- APPROXIMATE LOCATION OF FORMER GAS PLANT STRUCTURES
- NYSEG PROPERTY BOUNDARY (APPROXIMATE)
- FENCE
- GROUND ELEVATION CONTOURS, IN FEET RELATIVE TO DATUM POINT
- STORM DRAIN
- CULVERT
- STUDY AREA BOUNDARY AND GEOPHYSICAL SURVEY BOUNDARY

TASK 2:

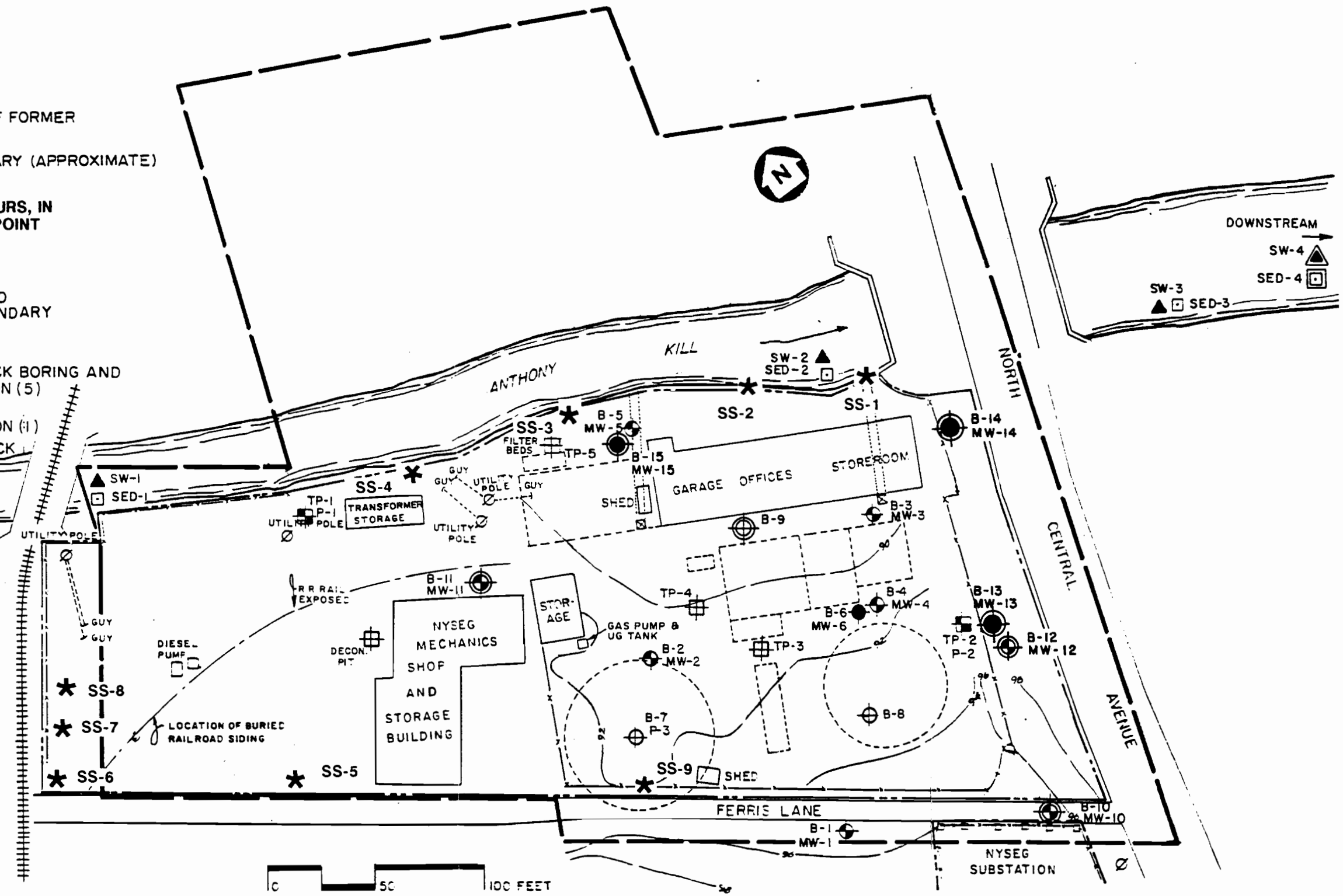
- SOIL AND SHALLOW BEDROCK BORING AND MONITORING WELL LOCATION (5)
- DEEP BEDROCK BORING AND MONITORING WELL LOCATION (1)
- SOIL AND SHALLOW BEDROCK BORING LOCATION (2)
- TEST PIT AND PIEZOMETER LOCATION (2)
- TEST PIT LOCATION (3)
- SURFACE WATER SAMPLE LOCATION (3)
- SEDIMENT SAMPLE LOCATION (3)

TASK 3:

- SOIL/SHALLOW BEDROCK BORING AND MONITORING WELL LOCATION (3)
- DEEP BEDROCK BORING AND MONITORING WELL LOCATION (3)
- SOIL BORING LOCATION (1)
- SURFACE WATER SAMPLE LOCATION (1)
- SEDIMENT SAMPLE LOCATION (1)

TASK 4:

- SURFACE SOIL SAMPLE LOCATION



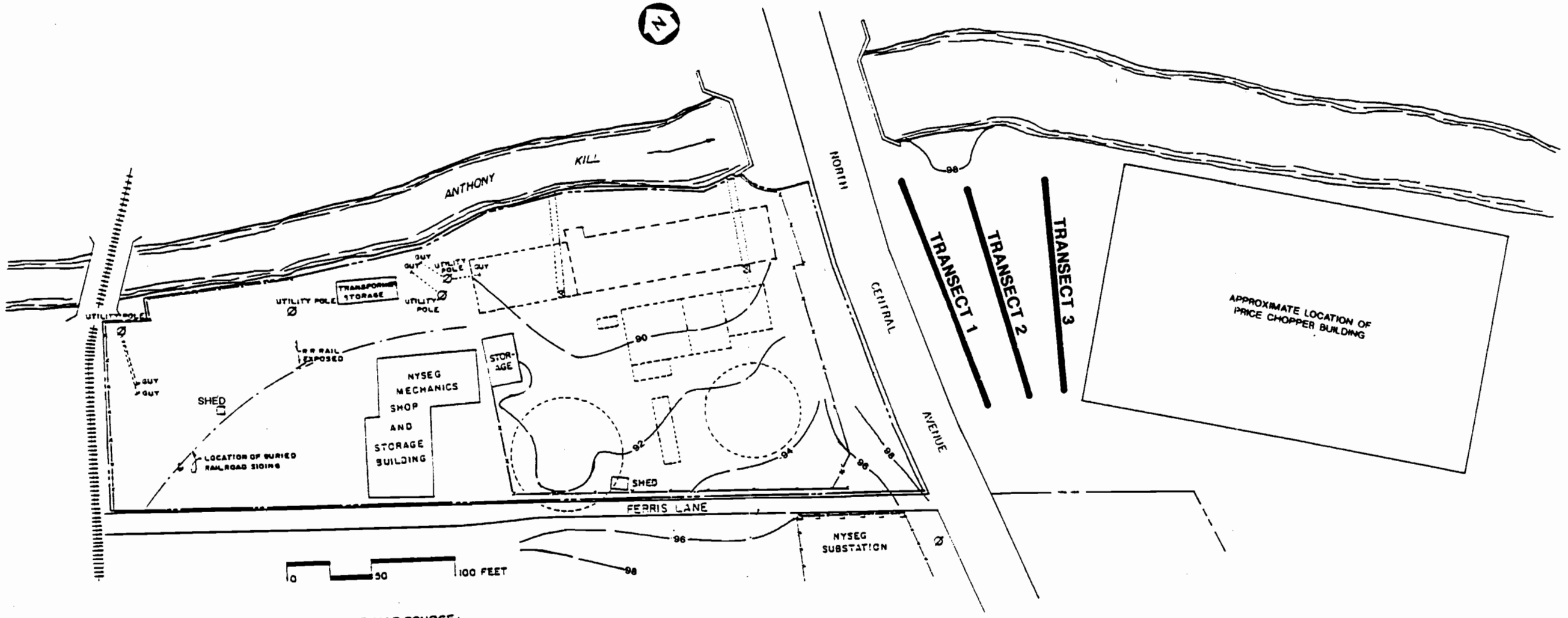
BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK, DATED 6/26/86 (86-72-S). REVISED 12/87.

ELEVATIONS BASED ON ASSUMED DATUM OF 100.00' AT R.R. SPIKE IN UTILITY POLE LOCATED 25' SOUTH OF INTERSECTION OF FERRIS LANE AND NORTH CENTRAL AVENUE.

FIGURE 3-3
TASK 2,3 AND 4 EXPLORATION LOCATIONS
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.



BASE MAP SOURCE:
TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK DATED 6/26/86 (86-72-S), REVISED 5/93.

NOTE: GROUND ELEVATION IN FEET RELATIVE TO DATUM POINT.

FIGURE 4-1
PHASE IIA SUPPLEMENTAL RI SEISMIC SURVEY COVERAGE
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09

LEGEND

- APPROXIMATE LOCATION OF FORMER GAS PLANT STRUCTURES
- NYSEG PROPERTY BOUNDARY (APPROXIMATE)
- FENCE
- GROUND ELEVATION CONTOURS, IN FEET RELATIVE TO DATUM POINT
- STORM DRAIN
- CULVERT
- STUDY AREA BOUNDARY AND GEOPHYSICAL SURVEY BOUNDARY

TASK 2:

- SOIL AND SHALLOW BEDROCK BORING AND MONITORING WELL LOCATION (5)
- DEEP BEDROCK BORING AND MONITORING WELL LOCATION (1)
- SOIL AND SHALLOW BEDROCK BORING LOCATION (2)
- TEST PIT AND PIEZOMETER LOCATION (2)
- TEST PIT LOCATION (3)
- SURFACE WATER SAMPLE LOCATION (3)
- SEDIMENT SAMPLE LOCATION (3)

TASK 3:

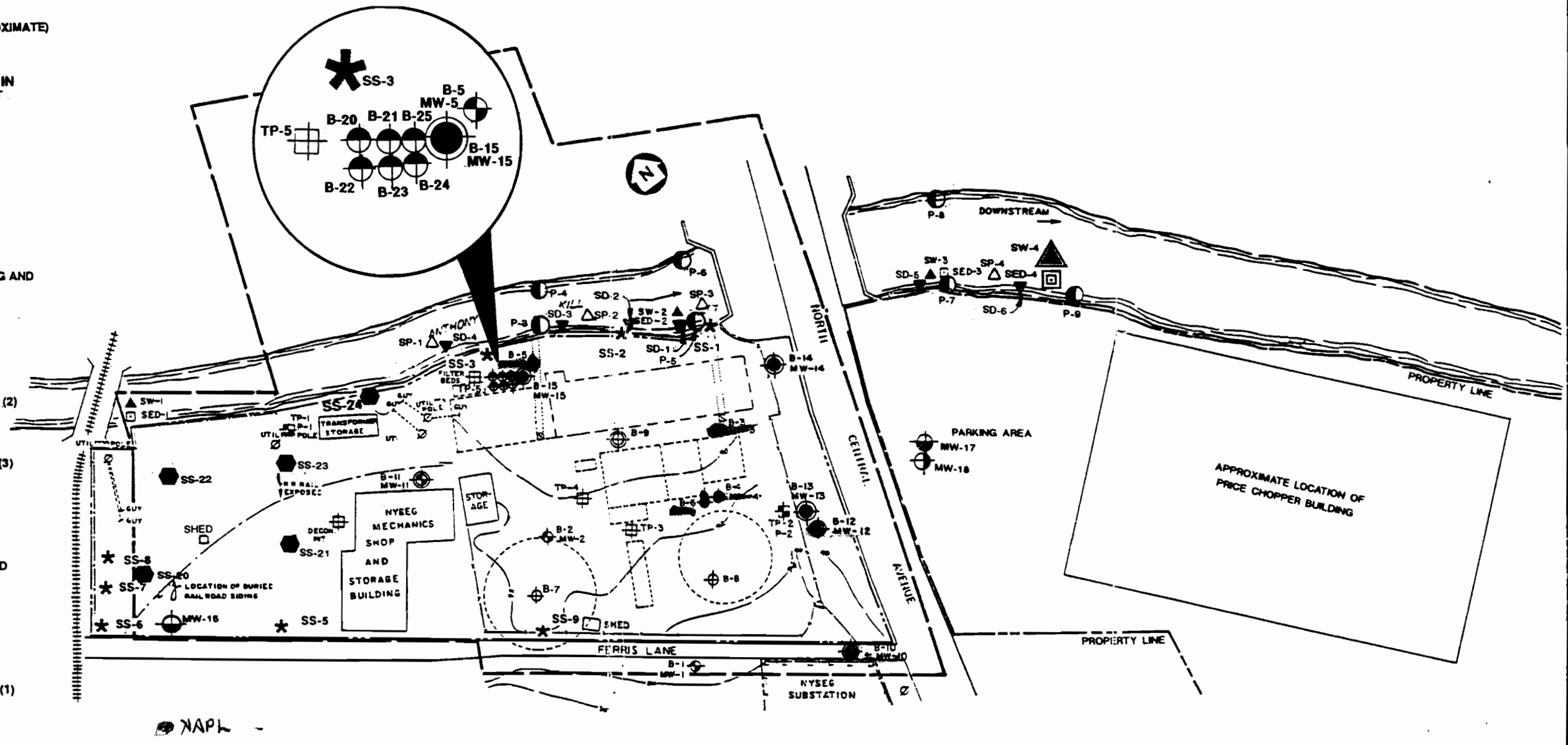
- SOIL/SHALLOW BEDROCK BORING AND MONITORING WELL LOCATION (3)
- DEEP BEDROCK BORING AND MONITORING WELL LOCATION (3)
- SOIL BORING LOCATION (1)
- SURFACE WATER SAMPLE LOCATION (1)
- SEDIMENT SAMPLE LOCATION (1)

TASK 4:

- SURFACE SOIL SAMPLE LOCATION

PHASE IIA SUPPLEMENTAL RI:

- SHALLOW SOIL BORING
- SOIL BORING AND WATER TABLE MONITORING WELL
- SOIL/SHALLOW BEDROCK BORING AND BEDROCK MONITORING WELL
- SHALLOW SUBSURFACE SOIL SAMPLING LOCATION
- PIEZOMETER
- SEDIMENT SAMPLE LOCATION
- SEEPAGE METER LOCATION



NAPL

BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK, DATED 6/26/86 (86-72-S). REVISED 12/87 AND 5/93

ELEVATIONS BASED ON ASSUMED DATUM OF 100.00' AT R.R. SPIKE IN UTILITY POLE LOCATED 25' SOUTH OF INTERSECTION OF FERRIS LANE AND NORTH CENTRAL AVENUE.

AREA EAST OF NORTH CENTRAL AVENUE INTERPRETED FROM AERIAL PHOTOGRAPHS AND TAX MAP 262.53, CITY OF MECHANICVILLE.

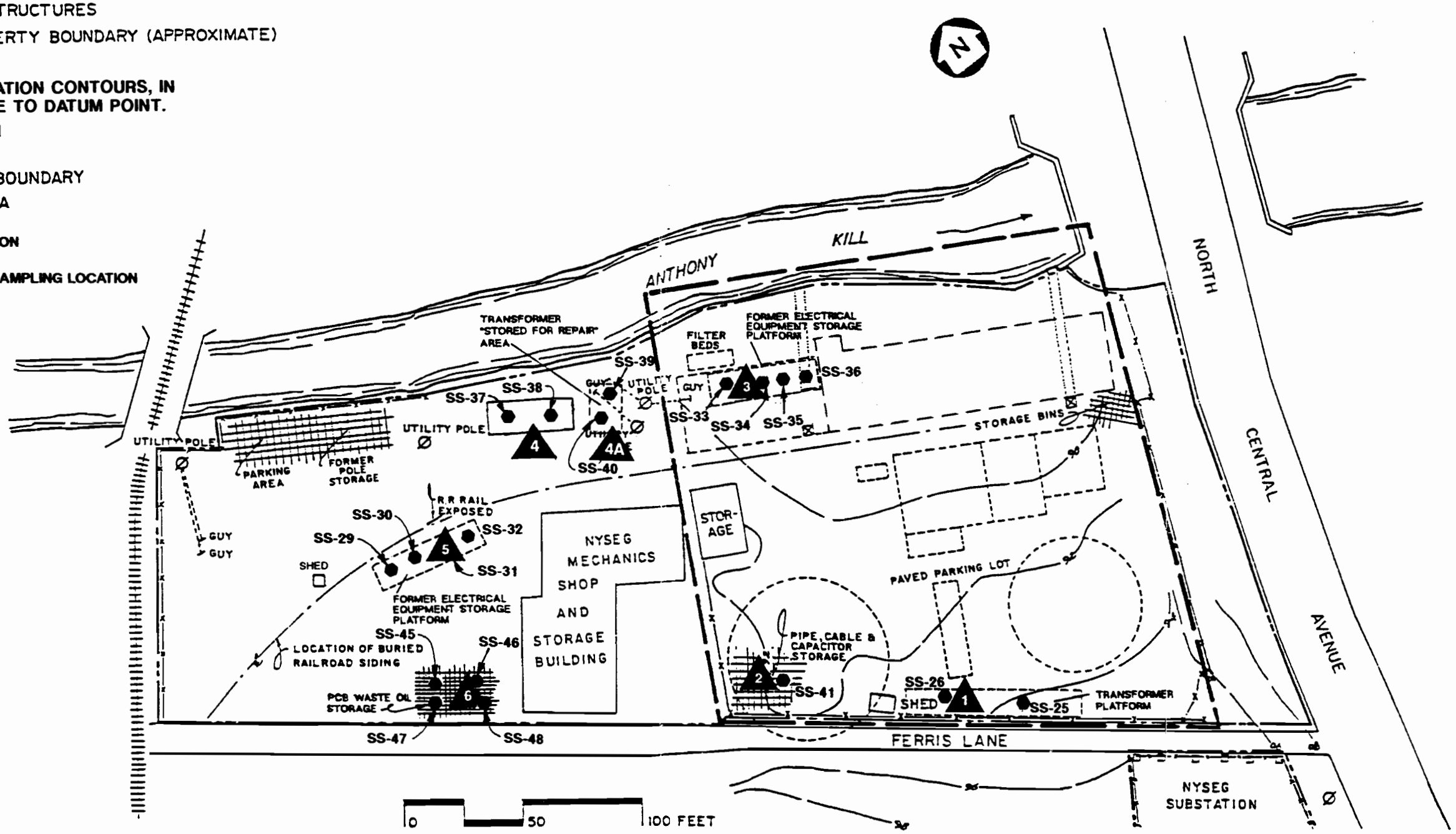
FIGURE 4-2
SAMPLING LOCATIONS
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09

LEGEND

- APPROXIMATE LOCATION OF FORMER GAS PLANT STRUCTURES
- NYSEG PROPERTY BOUNDARY (APPROXIMATE)
- FENCE
- 90 — **GROUND ELEVATION CONTOURS, IN FEET RELATIVE TO DATUM POINT.**
- STORM DRAIN
- CULVERT
- STUDY AREA BOUNDARY
- STORAGE AREA
- 1 — **AREA DESIGNATION**
- SS-45 ● — **SURFACE SOIL SAMPLING LOCATION**



BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK, DATED 6/26/86 (86-72-S). REVISED 12/87.

ELEVATIONS BASED ON ASSUMED DATUM OF 100.00' AT R.R. SPIKE IN UTILITY POLE LOCATED 25' SOUTH OF FERRIS LANE AND NORTH CENTRAL AVENUE.

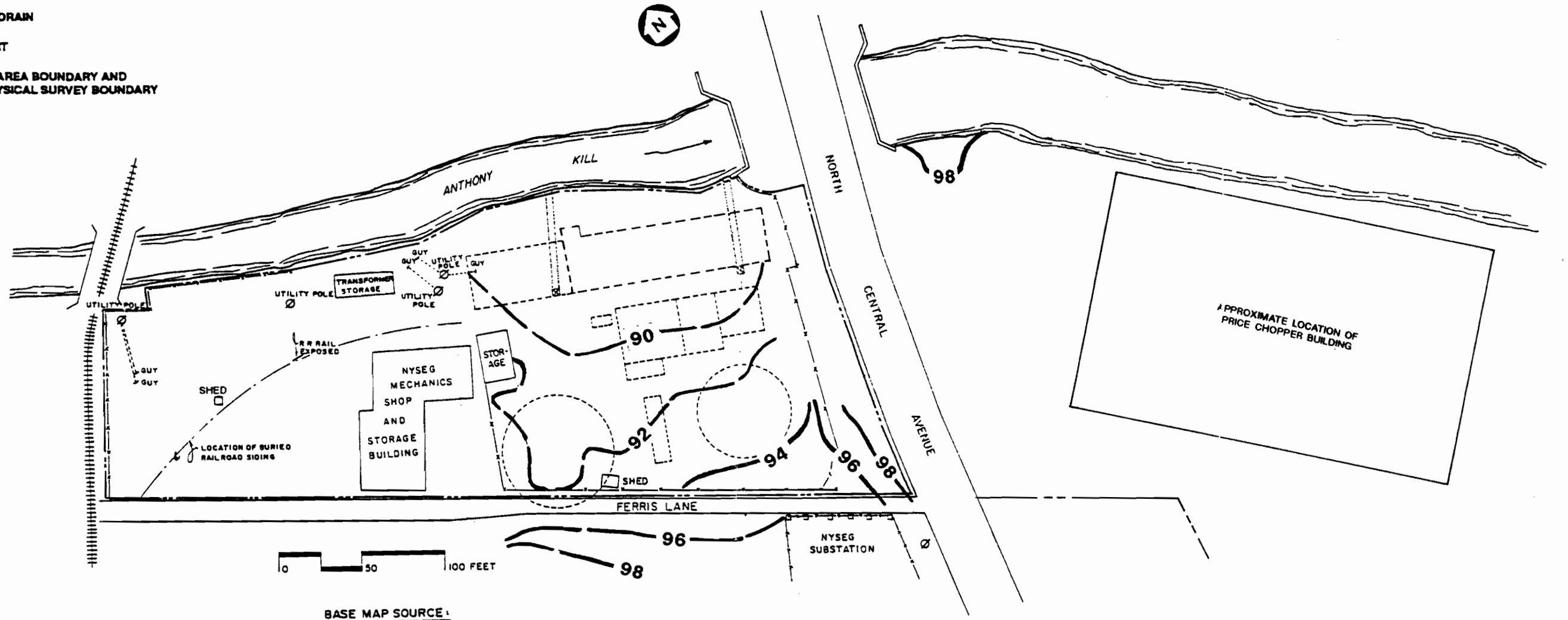
FIGURE 4-3
PCB SAMPLING LOCATIONS
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09

LEGEND

- APPROXIMATE LOCATION OF FORMER GAS PLANT STRUCTURES
- NYSEG PROPERTY BOUNDARY (APPROXIMATE)
- FENCE
- GROUND ELEVATION CONTOURS, IN FEET RELATIVE TO DATUM POINT
- STORM DRAIN
- CULVERT
- STUDY AREA BOUNDARY AND GEOPHYSICAL SURVEY BOUNDARY



BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK DATED 6/26/86 (86-72-S).

NOTE: GROUND ELEVATION IN FEET RELATIVE TO DATUM POINT.

FIGURE 4-4
SURFACE TOPOGRAPHIC CONTOUR MAP
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

LEGEND

- APPROXIMATE LOCATION OF FORMER GAS PLANT STRUCTURES
- NYSEG PROPERTY BOUNDARY (APPROXIMATE)
- FENCE
- GROUND ELEVATION CONTOURS, IN FEET RELATIVE TO DATUM POINT
- STORM DRAIN
- CULVERT
- STUDY AREA BOUNDARY AND GEOPHYSICAL SURVEY BOUNDARY

TASK 2:

- SOIL AND SHALLOW BEDROCK BORING AND MONITORING WELL LOCATION (5)
- DEEP BEDROCK BORING AND MONITORING WELL LOCATION (1)
- SOIL AND SHALLOW BEDROCK BORING LOCATION (2)
- TEST PIT AND PIEZOMETER LOCATION (2)
- TEST PIT LOCATION (3)
- SURFACE WATER SAMPLE LOCATION (3)
- SEDIMENT SAMPLE LOCATION (3)

TASK 3:

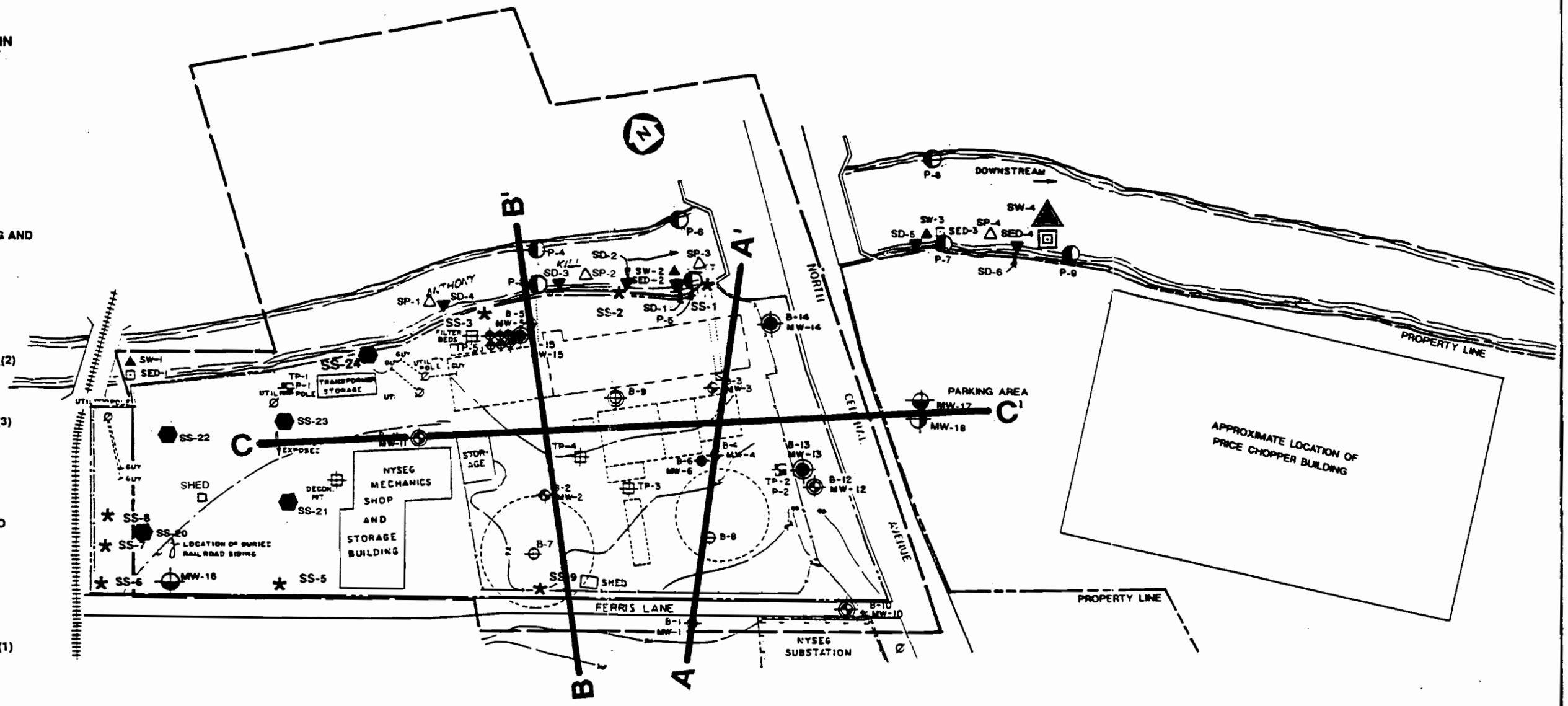
- SOIL/SHALLOW BEDROCK BORING AND MONITORING WELL LOCATION (3)
- DEEP BEDROCK BORING AND MONITORING WELL LOCATION (3)
- SOIL BORING LOCATION (1)
- SURFACE WATER SAMPLE LOCATION (1)
- SEDIMENT SAMPLE LOCATION (1)

TASK 4:

- SURFACE SOIL SAMPLE LOCATION

PHASE IIA SUPPLEMENTAL RI:

- SHALLOW SOIL BORING
- SOIL BORING AND WATER TABLE MONITORING WELL
- SOIL/SHALLOW BEDROCK BORING AND BEDROCK MONITORING WELL
- SHALLOW SUBSURFACE SOIL SAMPLING LOCATION
- PIEZOMETER
- SEDIMENT SAMPLE LOCATION
- SEEPAGE METER LOCATION



BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK, DATED 6/26/86 (86-72-S). REVISED 12/87 AND 5/93

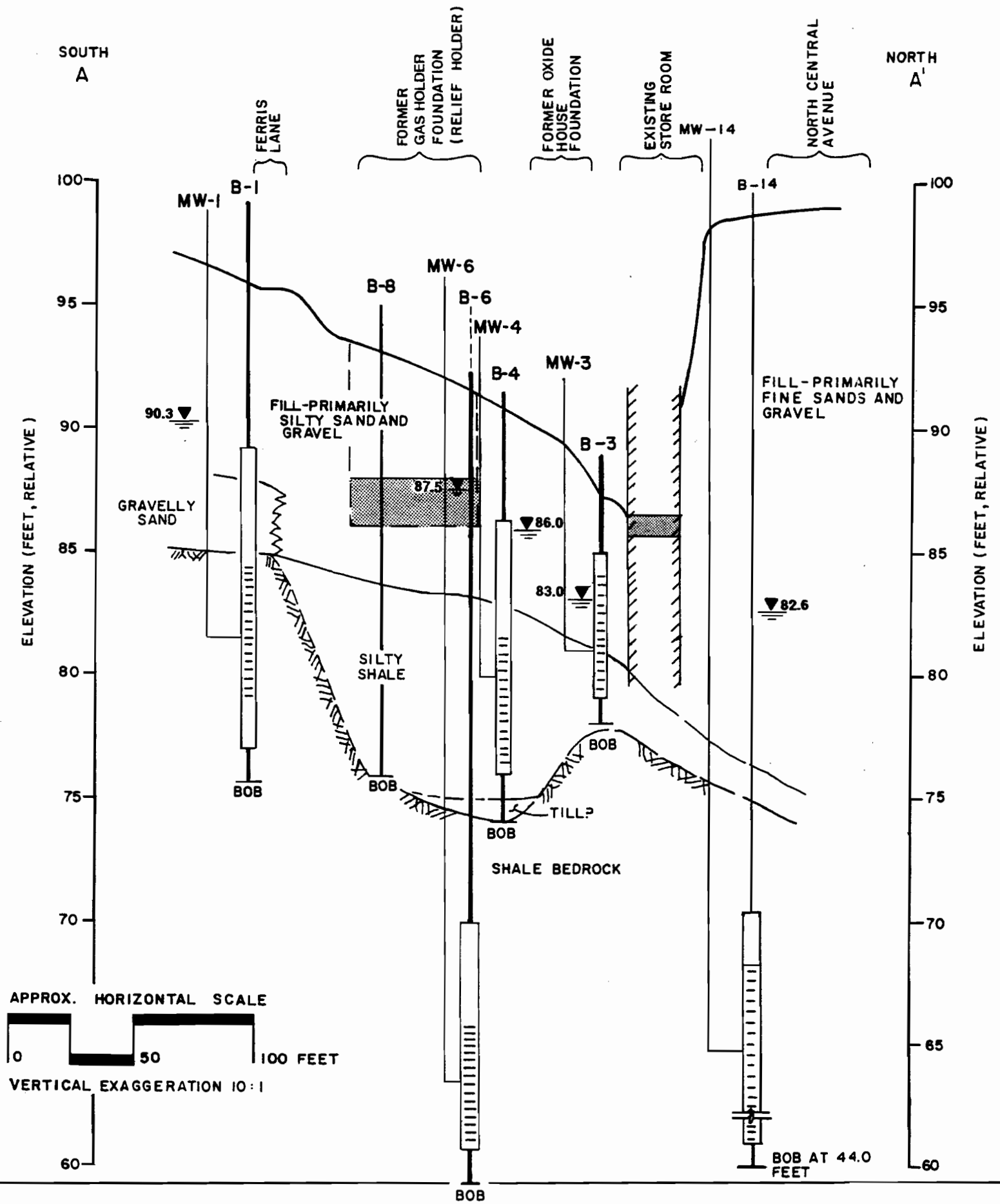
ELEVATIONS BASED ON ASSUMED DATUM OF 100.00' AT R.R. SPIKE IN UTILITY POLE LOCATED 25' SOUTH OF INTERSECTION OF FERRIS LANE AND NORTH CENTRAL AVENUE.

AREA EAST OF NORTH CENTRAL AVENUE INTERPRETED FROM AERIAL PHOTOGRAPHS AND TAX MAP 262.53, CITY OF MECHANICVILLE.

FIGURE 5-1
GEOLOGIC CROSS-SECTION ORIENTATION PLAN
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09



GEOLOGIC DESCRIPTIONS

FILL: PRIMARILY SILTY SAND AND GRAVEL WITH ORGANIC MATTER, ASH, BRICK FRAGMENTS, GLASS, AND WOOD CHIPS WITH ZONES OF HIGHER CLAYEY SILT AND FRACTURED SHALE CONTENT.

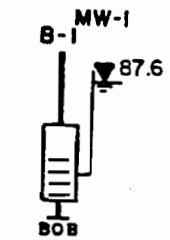
GRAVELLY SAND: DISCONTINUOUS BROWN TO DARK GRAY SAND AND GRAVEL.

SILTY SHALE: BLACK TO GRAY PLATY SHALE FRAGMENTS WITH INTERSTITIAL SILT. LOOSE AND SATURATED. POSSIBLY FILL.

TILL: DISCONTINUOUS TAN TO LIGHT GRAY SILTY CLAY TILL WITH FINE GRAVEL.

SHALE BEDROCK: LAMINATED, BROKEN, DARK GRAY SHALE WITH CALCITE VEINS AND INCLUSIONS. BEDDING DIPS 30-40° FROM HORIZONTAL; FRACTURES ARE 0-90° FROM BEDDING PLANES. UPPER 1 TO 2 FEET SEVERELY WEATHERED.

LEGEND



BORING AND MONITORING WELL LOCATION

OBSERVED WATER LEVEL (FEET, RELATIVE) ON JULY 14, 1993

EFFECTIVE SCREEN LENGTH (ACTUAL SCREEN SHOWN AS ▤)

BOTTOM OF BORING

79.3 OBSERVED SURFACE WATER LEVEL (FEET, RELATIVE) ON MARCH 29, 1988

NOTES

1. SEE FIGURE 3-1 FOR LOCATION AND ORIENTATION OF PROFILE.
2. PROFILE IS BASED ON AN INTERPRETATION OF AVAILABLE SUBSURFACE EXPLORATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE SHOWN.
3. ELEVATIONS BASED ON ASSUMED DATUM OF 100.00' AT R.R. SPIKE IN UTILITY POLE LOCATED 25' SOUTH OF INTERSECTION OF FERRIS LANE AND NORTH CENTRAL AVENUE.
4. FOUNDATION STRUCTURE LOCATIONS SHOWN ARE APPROXIMATE.

FIGURE 5-2
GEOLOGIC CROSS-SECTION A-A'
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09

GIC DESCRIPTIONS

ILTY SAND AND GRAVEL WITH ORGANIC
H, BRICK FRAGMENTS, GLASS, AND WOOD CHIPS
OF HIGHER CLAYEY SILT AND FRACTURED
TENT.

OUS BROWN TO DARK GRAY SAND AND GRAVEL.

RAY PLATY SHALE FRAGMENTS WITH
SILT. LOOSE AND SATURATED. POSSIBLY FILL.

BROKEN, DARK GRAY SHALE WITH CALCITE
NCLUSIONS. BEDDING DIPS 30-40° FROM
: FRACTURES ARE 0-90° FROM BEDDING
PER 1 TO 2 FEET SEVERELY WEATHERED.

MONITORING WELL LOCATION

VATER LEVEL (FEET, RELATIVE) ON JULY 14, 1993

CREEN LENGTH
REEN SHOWN AS ⊟)

BORING

D PIEZOMETER LOCATION

VATER LEVEL (FEET, RELATIVE) ON MARCH 29, 1988

SCREEN

EXPLORATION

E 3-1 FOR LOCATION AND ORIENTATION OF PROFILE.

S BASED ON AN INTERPRETATION OF AVAILABLE
CE EXPLORATIONS. ACTUAL CONDITIONS MAY
M THOSE SHOWN.

S BASED ON ASSUMED DATUM OF 100.00' AT R.R. SPIKE
POLE LOCATED 25' SOUTH OF INTERSECTION OF
NE AND NORTH CENTRAL AVENUE.

ON STRUCTURE LOCATIONS SHOWN ARE APPROXIMATE.

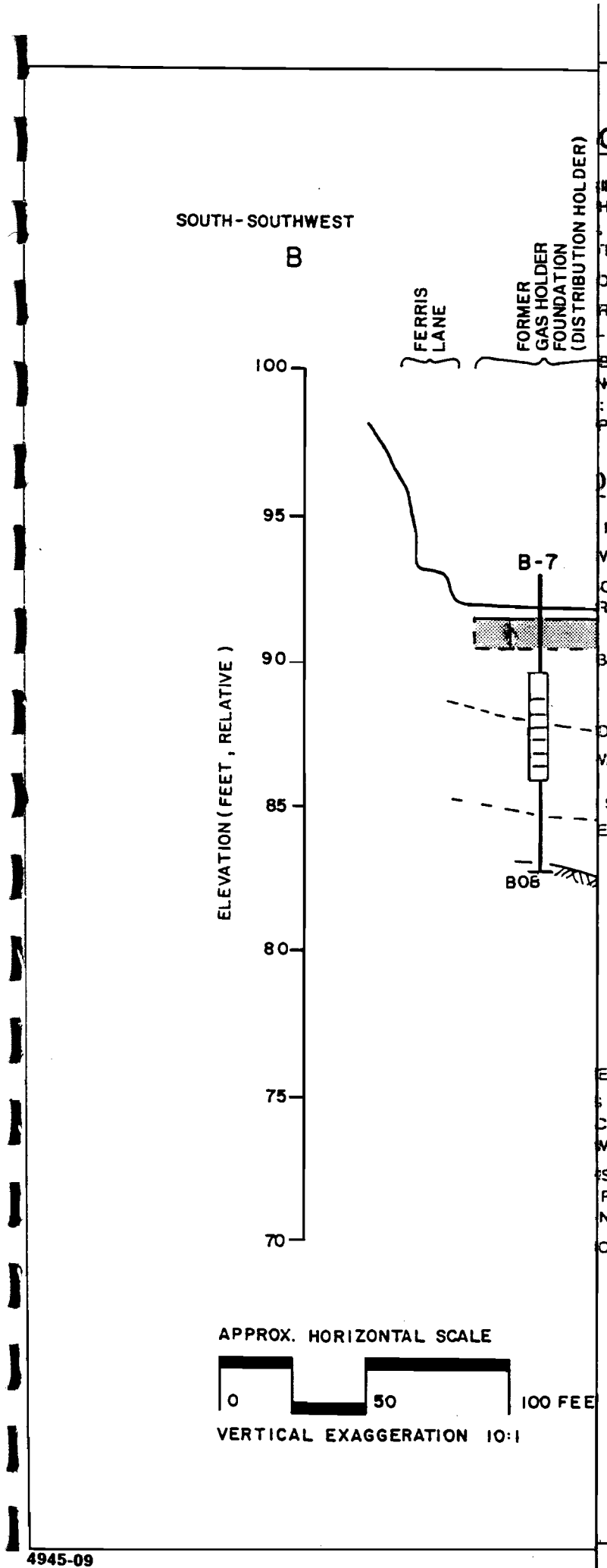
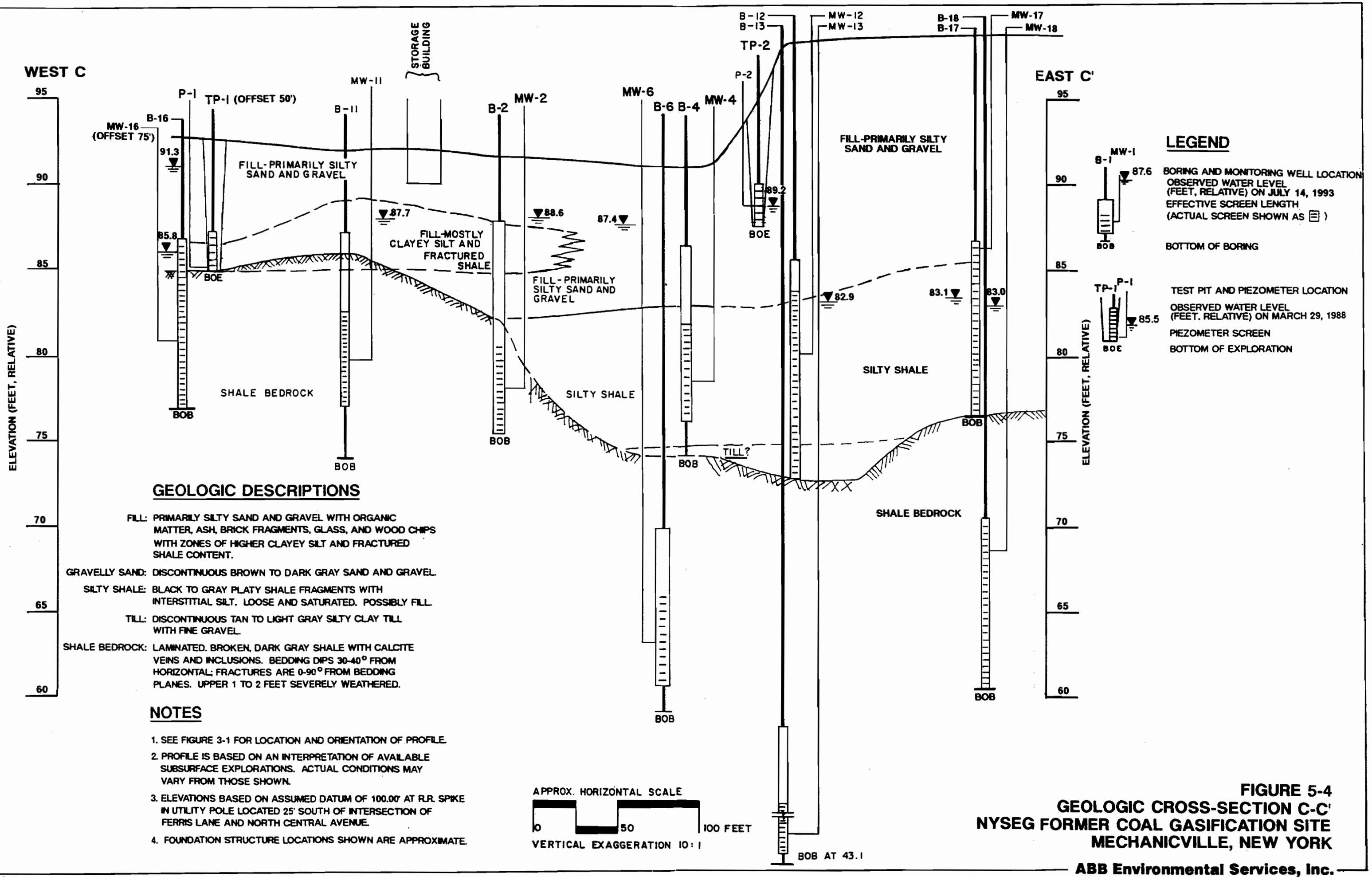


FIGURE 5-3
GEOLOGIC CROSS-SECTION B-B'
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09



GEOLOGIC DESCRIPTIONS

FILL: PRIMARILY SILTY SAND AND GRAVEL WITH ORGANIC MATTER, ASH, BRICK FRAGMENTS, GLASS, AND WOOD CHIPS WITH ZONES OF HIGHER CLAYEY SILT AND FRACTURED SHALE CONTENT.

GRAVELLY SAND: DISCONTINUOUS BROWN TO DARK GRAY SAND AND GRAVEL.

SILTY SHALE: BLACK TO GRAY PLATY SHALE FRAGMENTS WITH INTERSTITIAL SILT. LOOSE AND SATURATED. POSSIBLY FILL.

TILL: DISCONTINUOUS TAN TO LIGHT GRAY SILTY CLAY TILL WITH FINE GRAVEL.

SHALE BEDROCK: LAMINATED. BROKEN, DARK GRAY SHALE WITH CALCITE VEINS AND INCLUSIONS. BEDDING DIPS 30-40° FROM HORIZONTAL; FRACTURES ARE 0-90° FROM BEDDING PLANES. UPPER 1 TO 2 FEET SEVERELY WEATHERED.

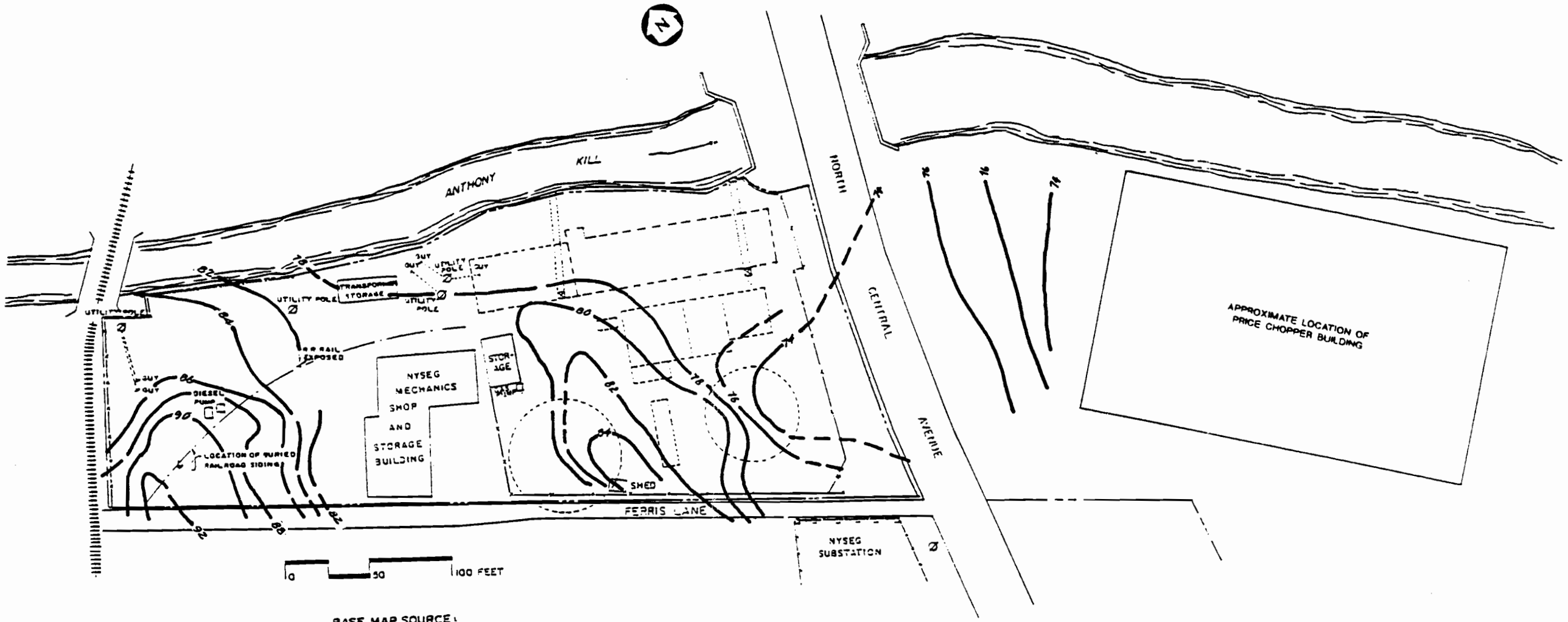
NOTES

1. SEE FIGURE 3-1 FOR LOCATION AND ORIENTATION OF PROFILE.
2. PROFILE IS BASED ON AN INTERPRETATION OF AVAILABLE SUBSURFACE EXPLORATIONS. ACTUAL CONDITIONS MAY VARY FROM THOSE SHOWN.
3. ELEVATIONS BASED ON ASSUMED DATUM OF 100.00' AT R.R. SPIKE IN UTILITY POLE LOCATED 25' SOUTH OF INTERSECTION OF FERRIS LANE AND NORTH CENTRAL AVENUE.
4. FOUNDATION STRUCTURE LOCATIONS SHOWN ARE APPROXIMATE.

FIGURE 5-4
GEOLOGIC CROSS-SECTION C-C'
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09



BASE MAP SOURCE:
TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK DATED 6/26/86 (86-72-S1).

LEGEND

- 90 — GROUND ELEVATION CONTOURS, IN FEET RELATIVE TO DATUM POINT.
- 82 — BEDROCK SURFACE CONTOURS BASED ON SEISMIC REFRACTION AND GPR SURVEY DATA (FT ABOVE RELATIVE DATUM)
- X 76.9 — ELEVATION OF BEDROCK SURFACE DETERMINED FROM BORINGS (FT ABOVE RELATIVE DATUM)

FIGURE 5-5
BEDROCK TOPOGRAPHIC CONTOUR MAP
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09

LEGEND

- APPROXIMATE LOCATION OF FORMER GAS PLANT STRUCTURES
- NYSEG PROPERTY BOUNDARY (APPROXIMATE)
- FENCE
- GROUND ELEVATION CONTOURS, IN FEET RELATIVE TO DATUM POINT.
- STORM DRAIN
- CULVERT
- STUDY AREA BOUNDARY AND GEOPHYSICAL SURVEY BOUNDARY

TASK 2:

- SOIL AND SHALLOW BEDROCK BORING AND MONITORING WELL LOCATION (5)
- DEEP BEDROCK BORING AND MONITORING WELL LOCATION (1)
- SOIL AND SHALLOW BEDROCK BORING LOCATION (2)
- TEST PIT AND PIEZOMETER LOCATION (2)
- TEST PIT LOCATION (3)
- SURFACE WATER SAMPLE LOCATION (3)
- SEDIMENT SAMPLE LOCATION (3)

TASK 3:

- SOIL/SHALLOW BEDROCK BORING AND MONITORING WELL LOCATION (3)
- DEEP BEDROCK BORING AND MONITORING WELL LOCATION (3)
- SOIL BORING LOCATION (1)
- SURFACE WATER SAMPLE LOCATION (1)
- SEDIMENT SAMPLE LOCATION (1)

TASK 4:

- SURFACE SOIL SAMPLE LOCATION

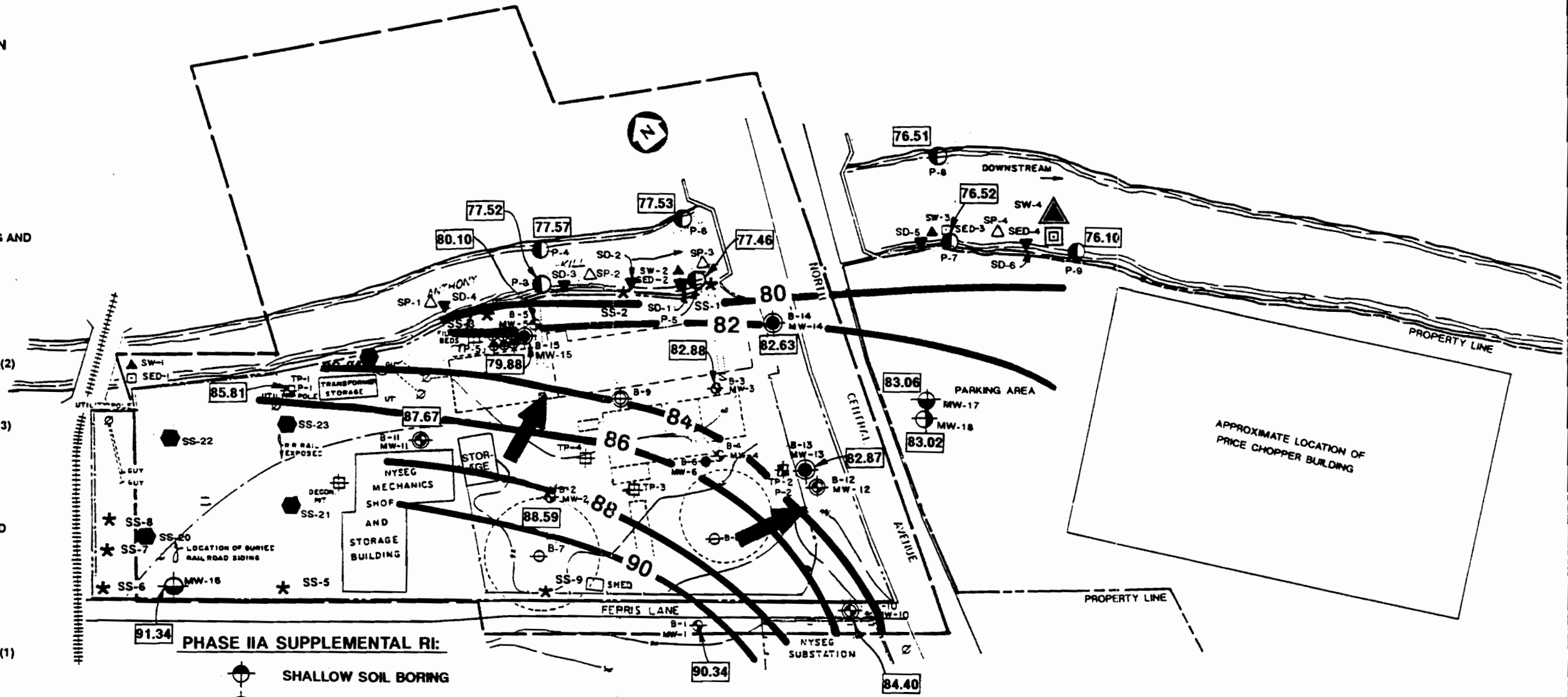
BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK, DATED 6/26/86 (86-72-S). REVISED 12/87 AND 5/93

ELEVATIONS BASED ON ASSUMED DATUM OF 100.00' AT R.R. SPIKE IN UTILITY POLE LOCATED 25' SOUTH OF INTERSECTION OF FERRIS LANE AND NORTH CENTRAL AVENUE.

AREA EAST OF NORTH CENTRAL AVENUE INTERPRETED FROM AERIAL PHOTOGRAPHS AND TAX MAP 262.53, CITY OF MECHANICVILLE.

0 50 100 FEET



PHASE IIA SUPPLEMENTAL RI:

- SHALLOW SOIL BORING
- SOIL BORING AND WATER TABLE MONITORING WELL
- SOIL/SHALLOW BEDROCK BORING AND BEDROCK MONITORING WELL
- SHALLOW SUBSURFACE SOIL SAMPLING LOCATION
- PIEZOMETER
- SEDIMENT SAMPLE LOCATION
- SEEPAGE METER LOCATION
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- 90 — INTERPRETED GROUNDWATER SURFACE CONTOUR
- 91.34 — WATER LEVEL (FT. RELATIVE) OBSERVED ON JULY 14,1993

FIGURE 5-7
POTENTIOMETRIC SURFACE CONTOUR PLAN
JULY 1993
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09

LEGEND

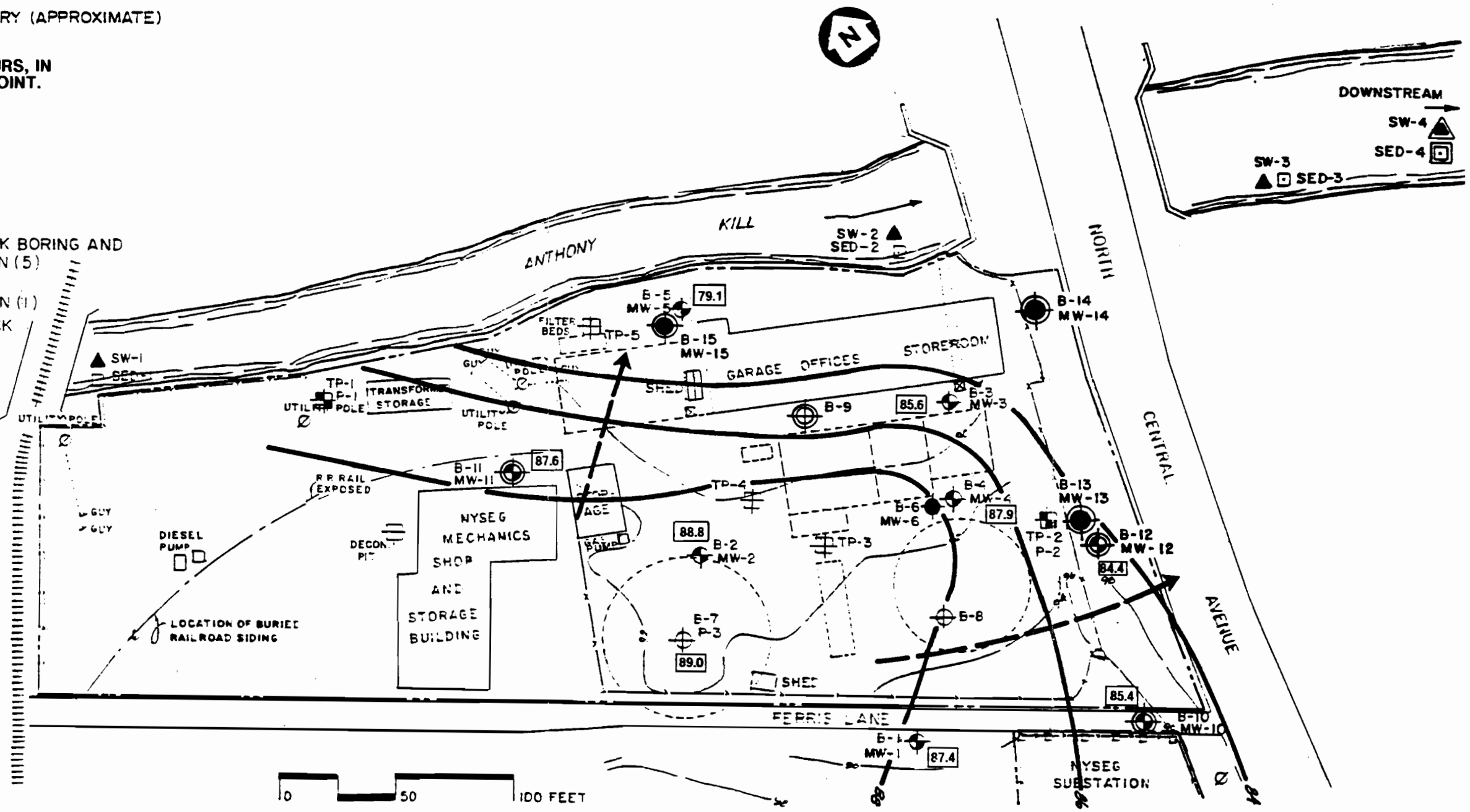
- APPROXIMATE LOCATION OF FORMER GAS PLANT STRUCTURES
- NYSEG PROPERTY BOUNDARY (APPROXIMATE)
- FENCE
- 90 — **GROUND ELEVATION CONTOURS, IN FEET RELATIVE TO DATUM POINT.**
- STORM DRAIN

TASK 2:

- SOIL AND SHALLOW BEDROCK BORING AND MONITORING WELL LOCATION (5)
- DEEP BEDROCK BORING AND MONITORING WELL LOCATION (1)
- SOIL AND SHALLOW BEDROCK BORING LOCATION (2)
- TEST PIT AND PIEZOMETER LOCATION (2)
- TEST PIT LOCATION (3)
- SURFACE WATER SAMPLE LOCATION (3)
- SEDIMENT SAMPLE LOCATION (3)

TASK 3:

- SOIL/SHALLOW BEDROCK BORING AND MONITORING WELL LOCATION (3)
- DEEP BEDROCK BORING AND MONITORING WELL LOCATION (3)
- SOIL BORING LOCATION (1)
- SURFACE WATER SAMPLE LOCATION (1)
- SEDIMENT SAMPLE LOCATION (1)
- 89.0 — WATER LEVEL (FT. RELATIVE) OBSERVED ON MARCH 29, 1988
- 84 — INTERPRETED GROUNDWATER SURFACE CONTOUR
- INTERPRETED GROUNDWATER FLOW DIRECTION



BASE MAP SOURCE:

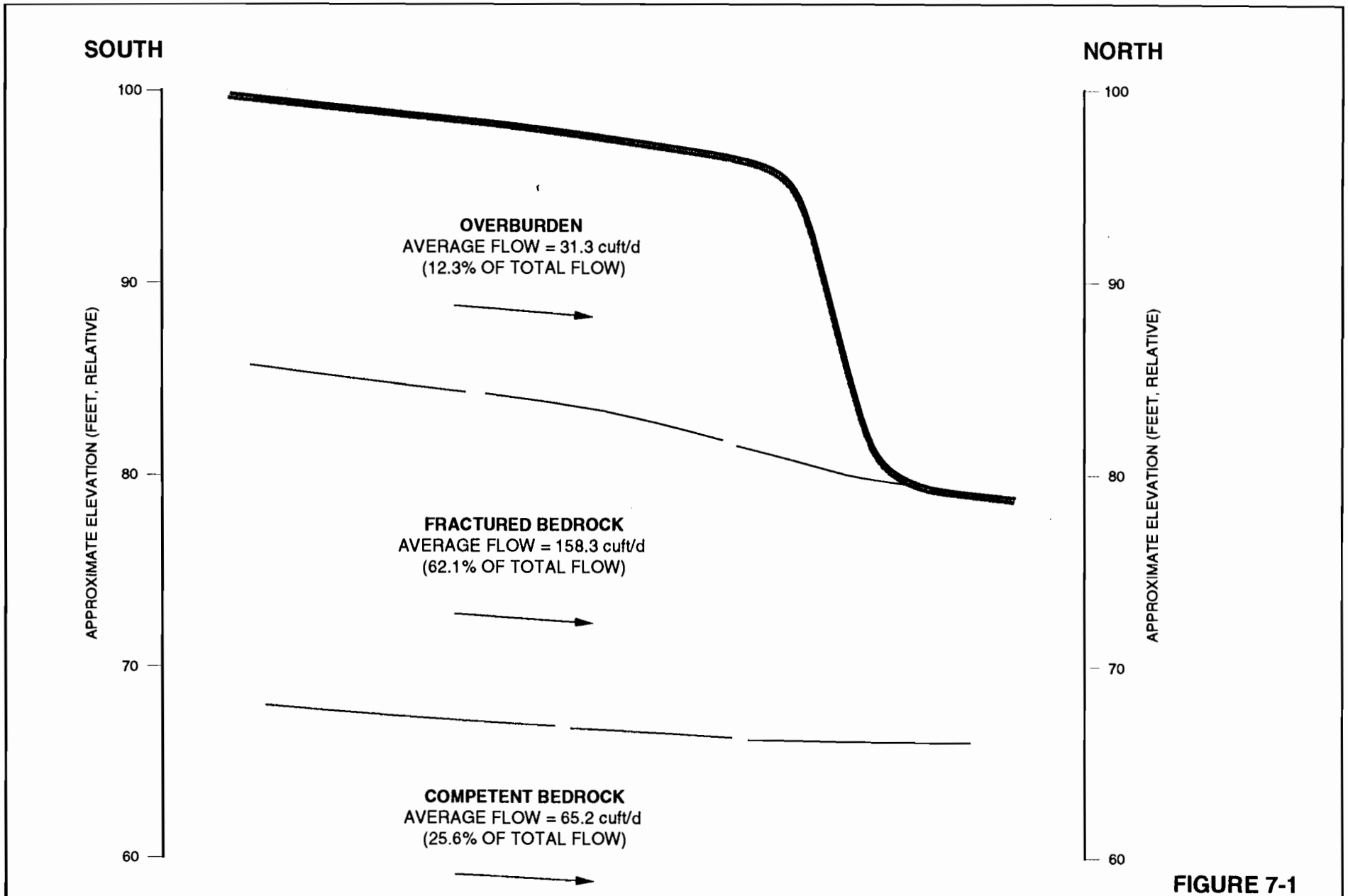
TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK, DATED 6/26/86 (86-72-S). REVISED 12/87.

ELEVATIONS BASED ON ASSUMED DATUM OF 100.00' AT R.R. SPIKE IN UTILITY POLE LOCATED 25' SOUTH OF INTERSECTION OF FERRIS LANE AND NORTH CENTRAL AVENUE.

FIGURE 5-6
POTENTIOMETRIC CONTOUR PLAN
MARCH 1988
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

4945-09

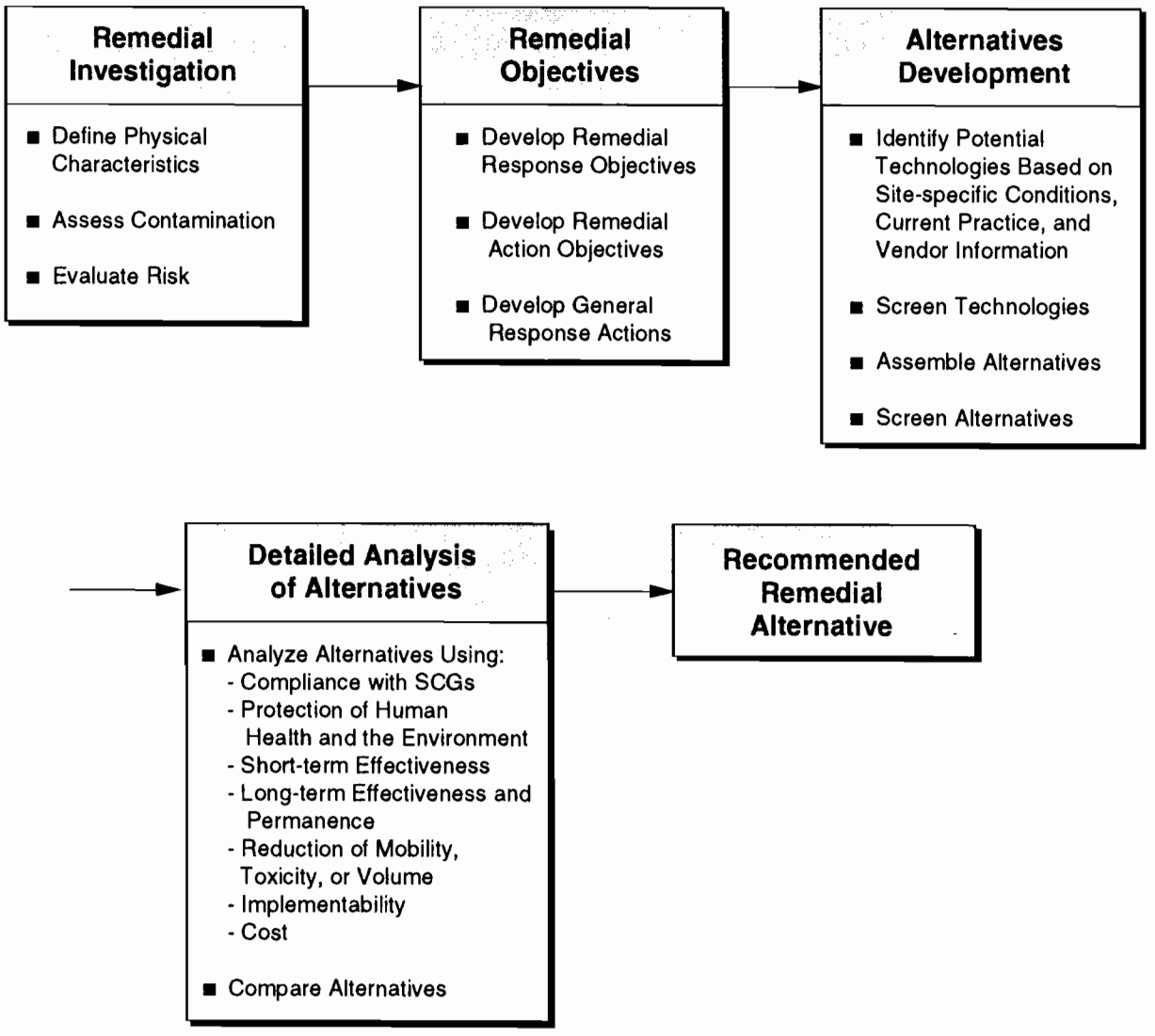


NOT TO SCALE

FIGURE 7-1
HYDROGEOLOGIC FLOW MODEL
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

9311054D(E)



Note: SCGs = Standards, Criteria, and Guidelines

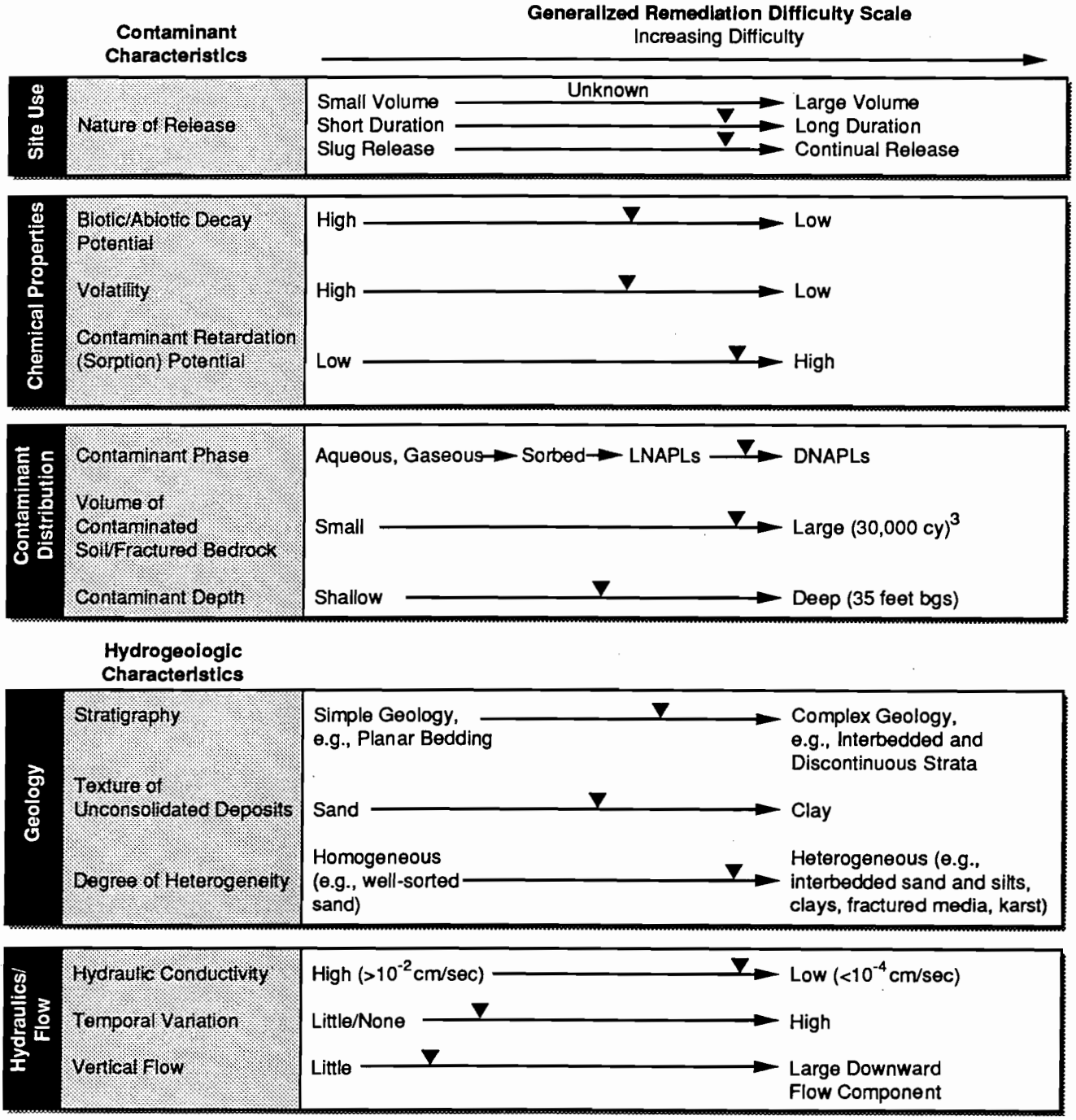
FIGURE 9-1
FEASIBILITY STUDY PROCESS FLOW CHART
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

9311054D(A)

Examples of Factors Affecting Groundwater Restoration[1]

Certain size characteristics may limit the effectiveness of subsurface remediation. The examples listed below are highly generalized. The particular factor or combination of factors that may critically limit restoration potential will be site specific.



NOTES:

▼ Indicates Interpreted Mechanicville Site Characteristics

[1] Source: Adapted from Figure 1; USEPA, "Guidance for Evaluating the Technical Impracticability of Ground-water Restoration"; EPA/540-R-93-080; SEPTEMBER 1993.

[2] Volume estimate assumes all overburden soils and the first 10 feet of bedrock in the area of the former gas manufacturing facility are contaminated.

cy = cubic yard

bgs = below ground surface

FIGURE 9-2
USEPA REMEDIATION DIFFICULTY SCALE
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

9311054D(C)

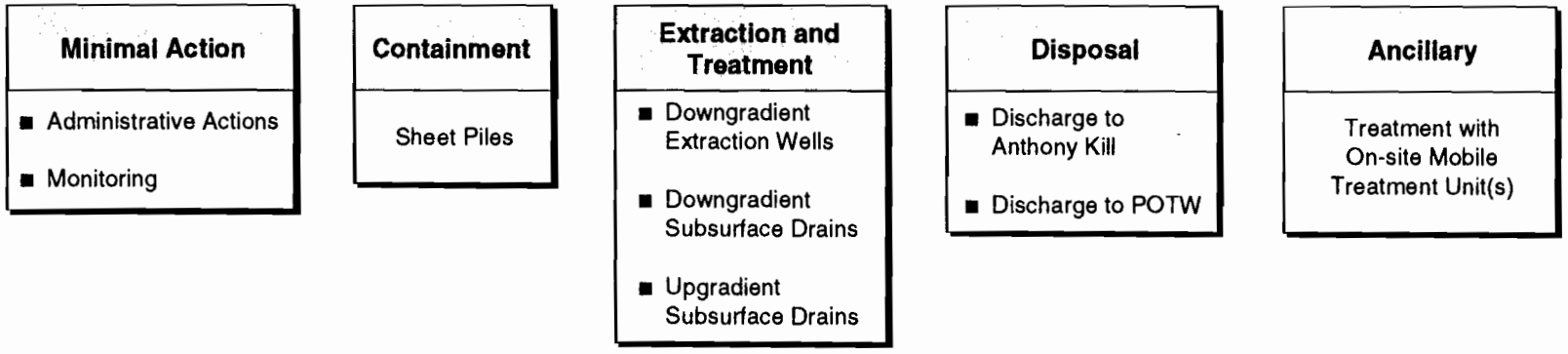
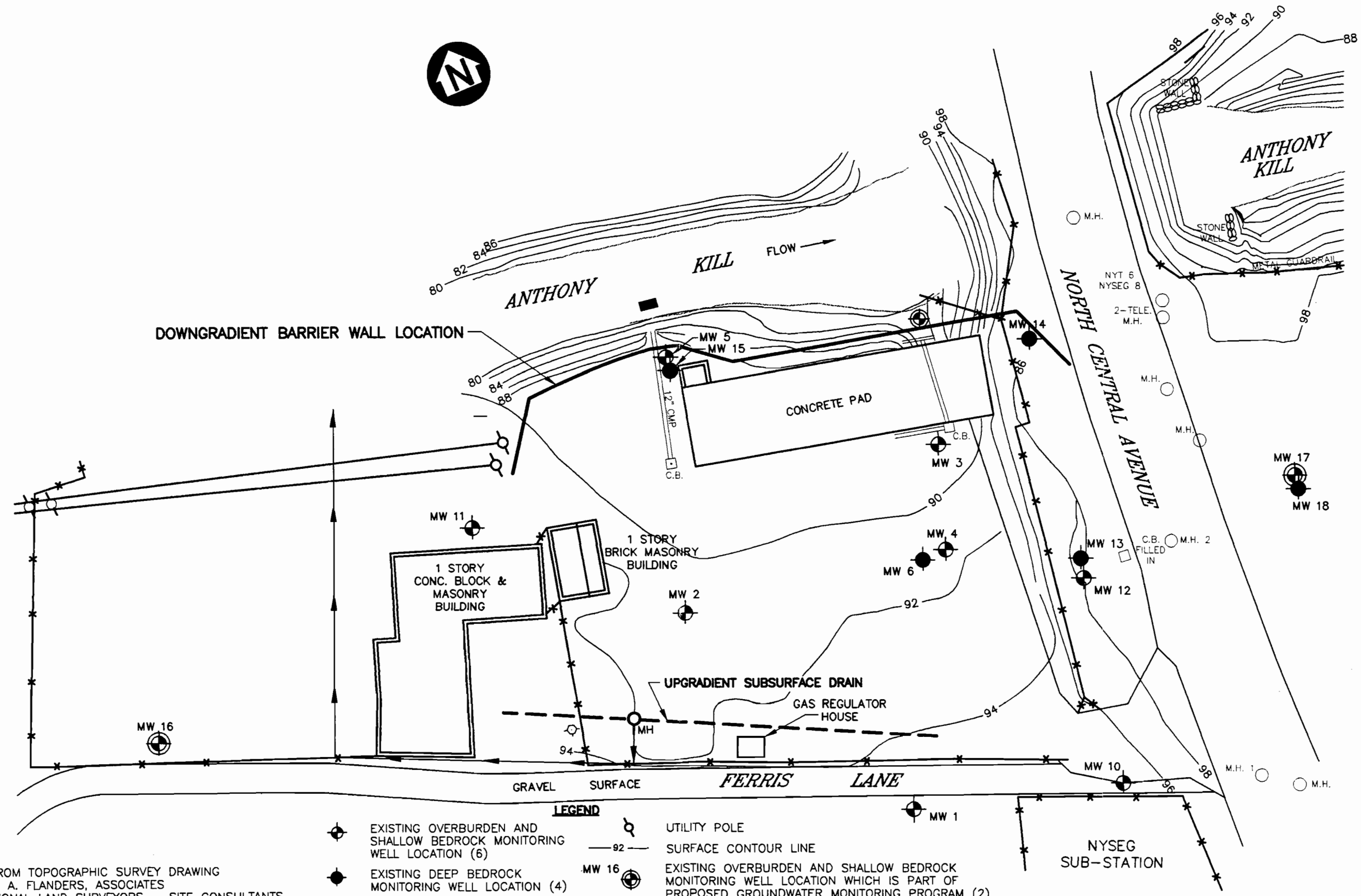


FIGURE 11-1
SUMMARY OF GROUNDWATER TECHNOLOGIES
RETAINED FOR REMEDIAL ALTERNATIVES DEVELOPMENT
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK



SOURCE:

TAKEN FROM TOPOGRAPHIC SURVEY DRAWING
BY DAVID A. FLANDERS, ASSOCIATES
PROFESSIONAL LAND SURVEYORS – SITE CONSULTANTS
1769 ROUTE 9 CLIFTON, NEW YORK
DATED JULY 20, 1993.

0 20 40 80 FEET

SCALE: 1" = 40'

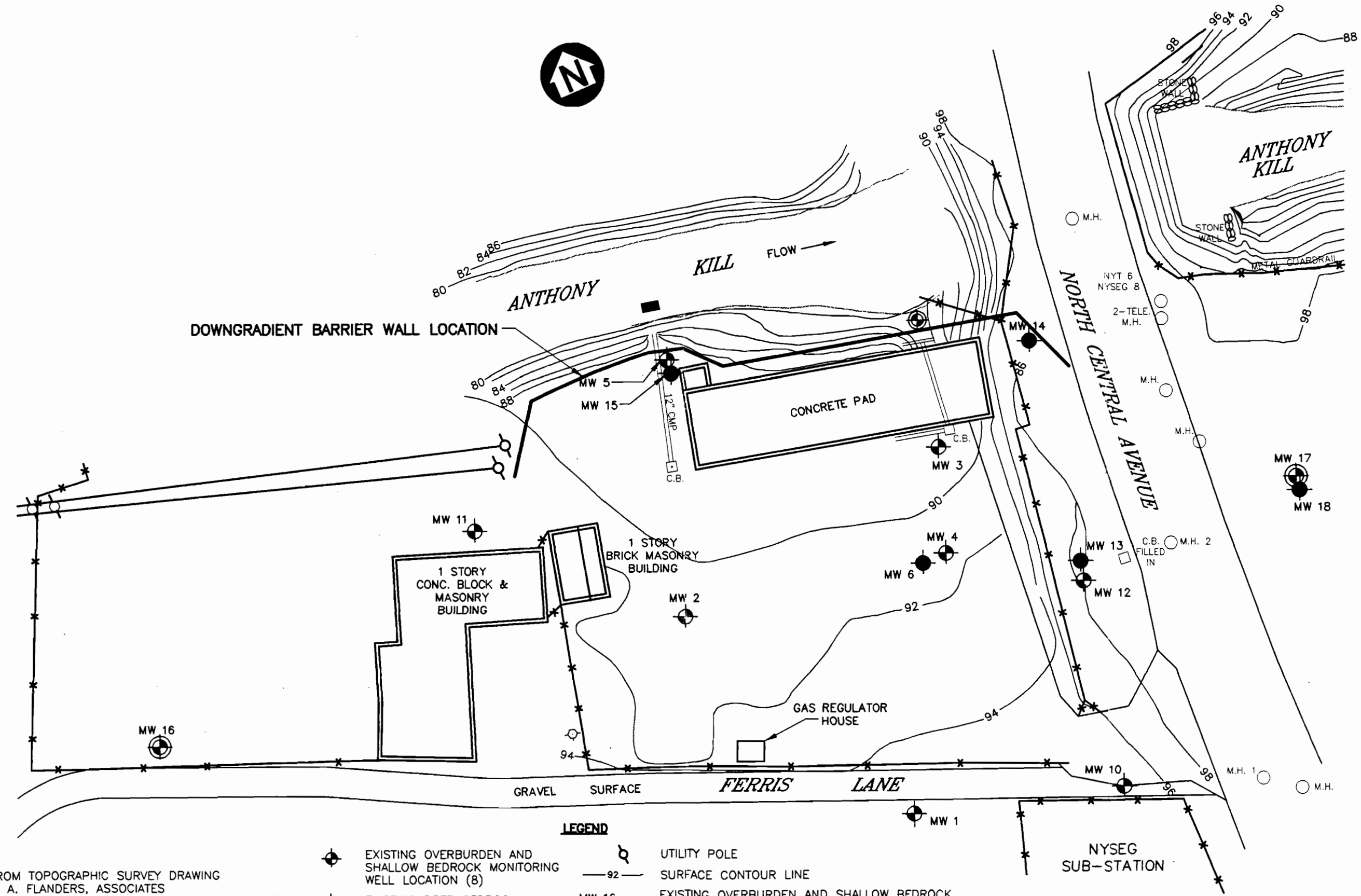
LEGEND

- EXISTING OVERBURDEN AND SHALLOW BEDROCK MONITORING WELL LOCATION (6)
- EXISTING DEEP BEDROCK MONITORING WELL LOCATION (4)
- M.H. 2 — MANHOLE
- C.B. — CATCH BASIN
- HYDRANT
- CHAIN LINK FENCE
- MH — MANHOLE/WETWELL LOCATION FOR DIVERTED GROUNDWATER COLLECTION
- UTILITY POLE
- 92 — SURFACE CONTOUR LINE
- MW 16 — EXISTING OVERBURDEN AND SHALLOW BEDROCK MONITORING WELL LOCATION WHICH IS PART OF PROPOSED GROUNDWATER MONITORING PROGRAM (2)
- NEW OVERBURDEN AND SHALLOW BEDROCK MONITORING WELL LOCATION FOR PROPOSED GROUNDWATER MONITORING PROGRAM (1)
- NEW SEEPAGE METER (1)
- DOWNGRADIENT BARRIER WALL LOCATION
- UPGRADIENT SUBSURFACE DRAIN
- DIVERTED GROUNDWATER DICHARGE PIPING

FIGURE 14-4
ALTERNATIVE 3: DOWNGRADIENT BARRIER WALL WITH UPGRADIENT SUBSURFACE DRAIN
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

J:\4945-09\FIG14-X



SOURCE:

TAKEN FROM TOPOGRAPHIC SURVEY DRAWING
BY DAVID A. FLANDERS, ASSOCIATES
PROFESSIONAL LAND SURVEYORS – SITE CONSULTANTS
1769 ROUTE 9 CLIFTON, NEW YORK
DATED JULY 20, 1993.

0 20 40 80 FEET

SCALE: 1" =40'

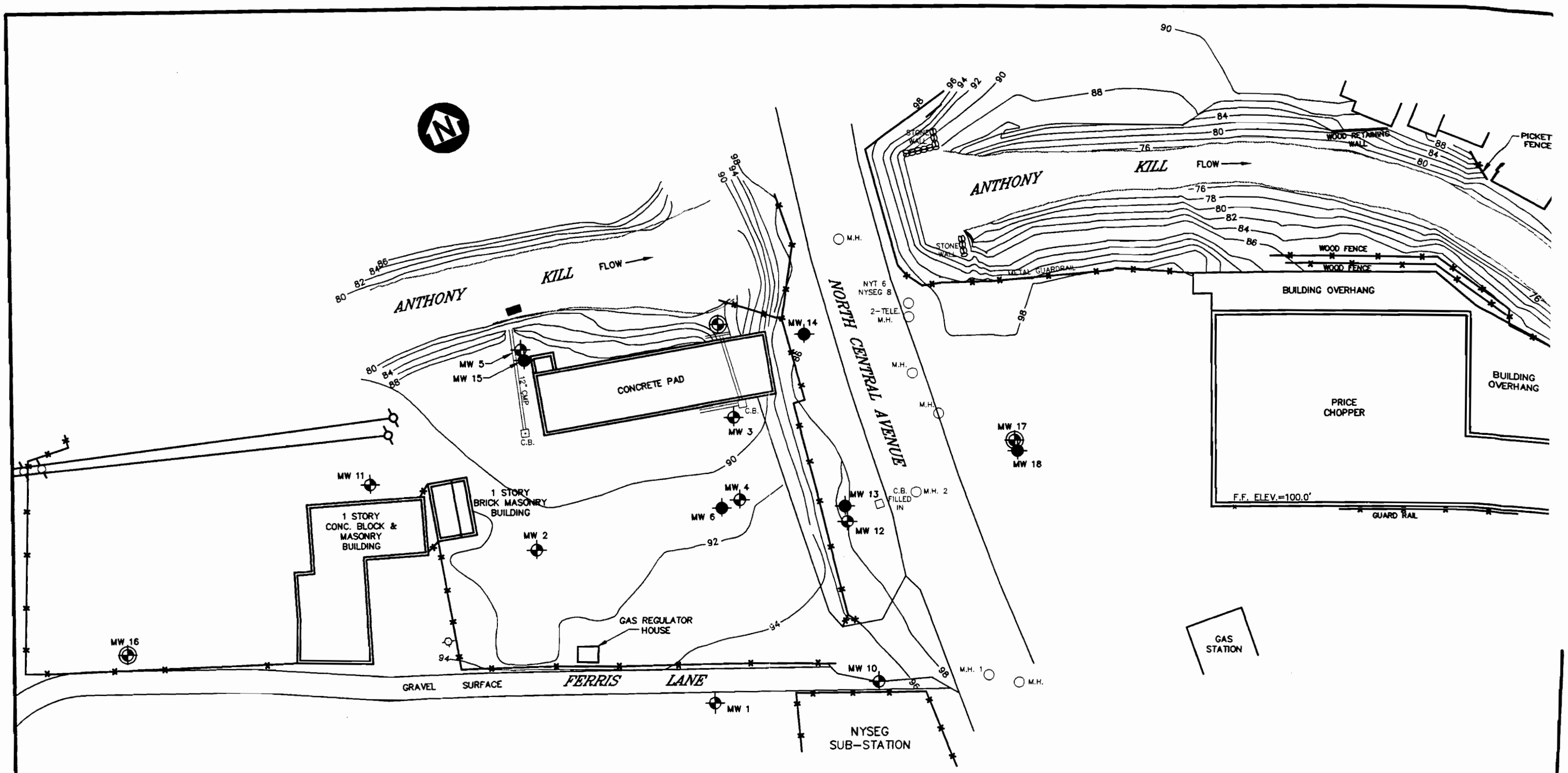
LEGEND

- EXISTING OVERBURDEN AND SHALLOW BEDROCK MONITORING WELL LOCATION (8)
- EXISTING DEEP BEDROCK MONITORING WELL LOCATION (4)
- M.H. 2 ○ MANHOLE
- C.B. □ CATCH BASIN
- HYDRANT
- CHAIN LINK FENCE
- UTILITY POLE
- 92 SURFACE CONTOUR LINE
- MW 16 EXISTING OVERBURDEN AND SHALLOW BEDROCK MONITORING WELL LOCATION WHICH IS PART OF PROPOSED GROUNDWATER MONITORING PROGRAM (2)
- NEW OVERBURDEN AND SHALLOW BEDROCK MONITORING WELL LOCATION FOR PROPOSED GROUNDWATER MONITORING PROGRAM (2)
- DOWNGRADIENT BARRIER WALL LOCATION
- NEW SEEPAGE METER (1)

FIGURE 14-2
ALTERNATIVE 2: DOWNGRADIENT BARRIER WALL WITHOUT PERIMETER GROUNDWATER CONTAINMENT WELLS
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

J:\4945-09\FIG14-2



SOURCE:

TAKEN FROM TOPOGRAPHIC SURVEY DRAWING
BY DAVID A. FLANDERS, ASSOCIATES
PROFESSIONAL LAND SURVEYORS – SITE CONSULTANTS
1769 ROUTE 9 CLIFTON, NEW YORK
DATED JULY 20, 1993.

0 25 50 100 FEET

SCALE: 1"=50'

LEGEND

- EXISTING OVERBURDEN AND SHALLOW BEDROCK MONITORING WELL LOCATION (8)
- EXISTING DEEP BEDROCK MONITORING WELL LOCATION (4)
- M.H. 2 ○ MANHOLE
- C.B. □ CATCH BASIN
- HYDRANT
- CHAIN LINK FENCE
- UTILITY POLE
- —92— SURFACE CONTOUR LINE
- MW 16 EXISTING OVERBURDEN AND SHALLOW BEDROCK MONITORING WELL LOCATION WHICH IS PART OF PROPOSED GROUNDWATER MONITORING PROGRAM (2)
- NEW OVERBURDEN AND SHALLOW BEDROCK MONITORING WELL LOCATION FOR PROPOSED GROUNDWATER MONITORING PROGRAM (1)
- NEW SEEPAGE METER (1)

FIGURE 14-1
PROPOSED GROUNDWATER MONITORING PROGRAM
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

J:\4945-09\FIG14-1

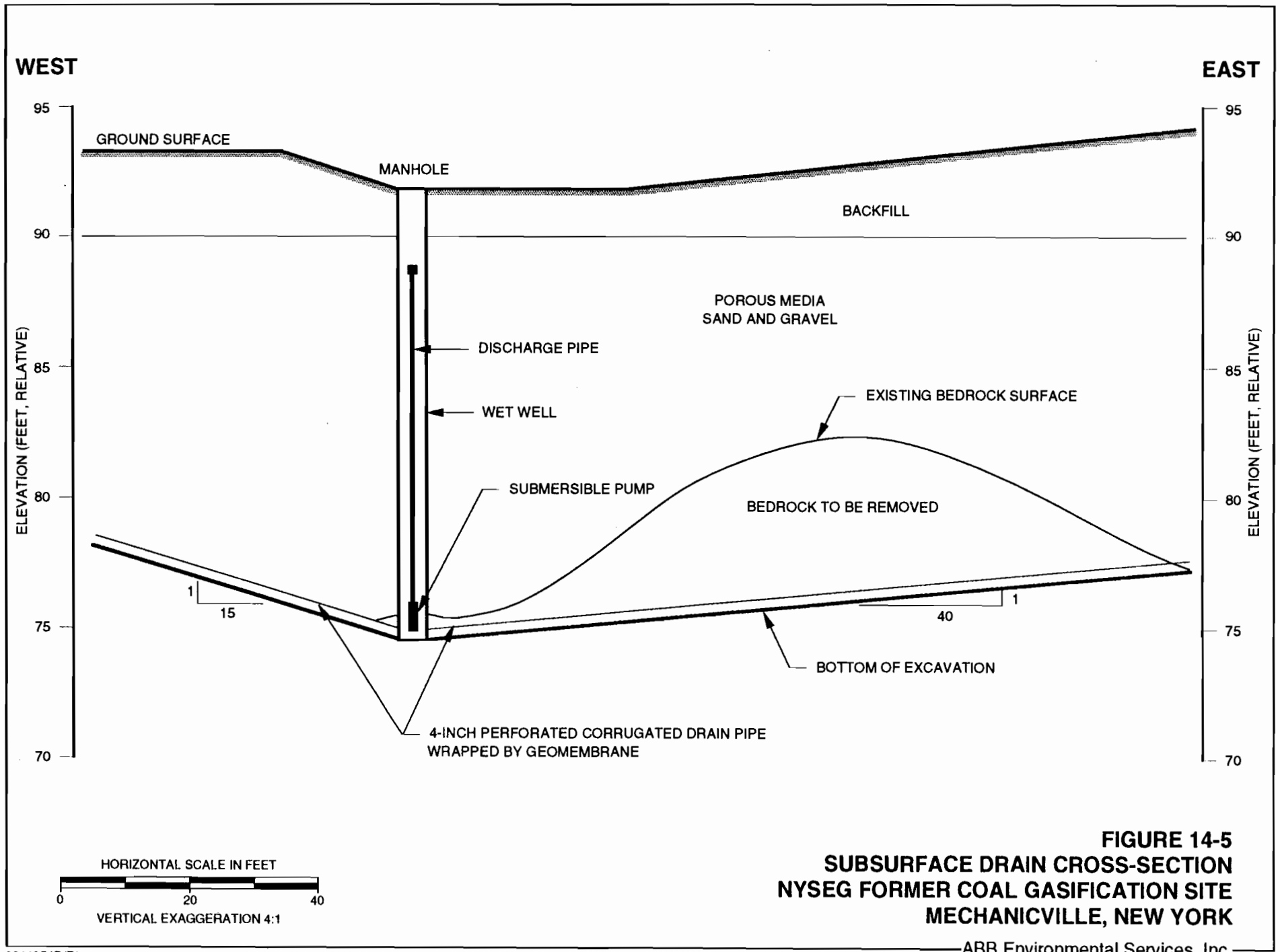


FIGURE 14-5
SUBSURFACE DRAIN CROSS-SECTION
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ABB Environmental Services, Inc.

9311054D(D)

TABLE 4-1

SUMMARY OF MONITORING WELL CONSTRUCTION DATA
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

WELL BORING LOCATION	DATE INSTALLED	GEOLOGIC ZONE SCREENED	TOTAL BORING DEPTH (FEET BGS)	LOCATION OF SCREENED INTERVAL (FEET RELATIVE)	SCREEN LENGTH (FEET)	GROUND ELEVATION (FEET RELATIVE)	RISER PIPE ELEVATION (FEET RELATIVE)
MW-1	08/01/86	Overburden/Shallow Bedrock	20.0	76.0 - 70.78	5.25	95.9	98.56
MW-2	08/01/86	Overburden/Shallow Bedrock	16.0	80.4 - 77.3	3.15	91.6	91.31
MW-3	08/06/86	Overburden	9.0	84.4 - 79.5	5.0	87.4	87.31
MW-4	07/30/86	Overburden	16.5	81.7 - 76.7	5.0	91.0	90.61
MW-5	08/05/86	Overburden/Shallow Bedrock	19.5	74.9 - 69.9	5.0	88.4	87.89
MW-6	07/29/86	Bedrock	31.5	65.7 - 60.7	5.0	91.0	90.65
MW-10	11/12/87	Overburden	19.5	88.0 - 77.2	10.8	96.7	96.49
MW-11	11/13/87	Overburden/Shallow Bedrock	18.0	82.6 - 77.1	5.5	92.1	91.44
MW-12	11/18/87	Overburden	25.5	83.8 - 72.8	11.0	98.3	98.46
MW-13	11/18/87	Bedrock	55.5	53.9 - 43.1	10.8	98.6	98.48
MW-14	11/19/87	Bedrock	55.0	68.7 - 57.7	11.0	98.7	98.93
MW-15	11/17/87	Bedrock	39.0	75.5 - 64.5	11.0	88.56	88.17
MW-16	05/17/93	Overburden/Shallow Bedrock	16.0	89.3 - 79.3	10.0	NS	95.28
MW-17	05/18/93	Overburden	22.5	85.7 - 75.7	10.0	NS	98.18
MW-18	05/19/93	Bedrock	38.0	70.1 - 60.1	10.0	NS	98.12

Notes:

1) BGS - below ground surface
2) Elevation relative to 100-foot datum
3) NS - not surveyed

TABLE 4-2

SUMMARY OF GROUNDWATER ELEVATION DATA
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

		GROUNDWATER ELEVATIONS							
	ELEVATION	AUGUST 1986		SEPTEMBER 1986		DECEMBER 1986		MARCH 1987	
MONITORING WELL DESIGNATION	RISER PIPE (RELATIVE DATUM)[1]	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)
MW-1	98.56	11.3	87.3	11.3	87.3	11.0	87.6	10.16	88.4
MW-2	91.31	3.2	88.1	2.4	88.9	2.3	89.0	2.31	89.0
MW-3	87.31	NA	NA	2.7	84.6	2.2	85.1	1.61	85.7
MW-4	90.61	3.8	86.8	3.5	87.1	2.5	88.1	2.51	88.1
MW-5	87.89	9.5	78.4	9.7	78.2	9.0	78.9	NA	NA
MW-6	90.65	3.9	86.8	3.8	86.9	3.8	86.9	2.95	87.7
MW-10	96.49	NA	NA	NA	NA	NA	NA	NA	NA
MW-11	91.44	NA	NA	NA	NA	NA	NA	NA	NA
MW-12	98.46	NA	NA	NA	NA	NA	NA	NA	NA
MW-13	98.48	NA	NA	NA	NA	NA	NA	NA	NA
MW-14	98.93	NA	NA	NA	NA	NA	NA	NA	NA
MW-15	88.17	NA	NA	NA	NA	NA	NA	NA	NA
MW-16	95.28	NA	NA	NA	NA	NA	NA	NA	NA
MW-17	98.18	NA	NA	NA	NA	NA	NA	NA	NA
MW-18	98.12	NA	NA	NA	NA	NA	NA	NA	NA

Notes are presented on Page 4 of this table.

TABLE 4-2

SUMMARY OF GROUNDWATER ELEVATION DATA
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

		GROUNDWATER ELEVATIONS							
	ELEVATION	AUGUST 1986		SEPTEMBER 1986		DECEMBER 1986		MARCH 1987	
MONITORING WELL DESIGNATION	RISER PIPE (RELATIVE DATUM)[1]	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)
P-1	95.02	9.3	85.7	9.5	85.5	8.3	86.7	8.6	86.4
P-2	98.83	11.7	87.1	11.9	86.9	11.2	87.6	9.1	89.7
P-3	80.38	NA	NA	NA	NA	NA	NA	NA	NA
P-4	80.61	NA	NA	NA	NA	NA	NA	NA	NA
P-5	80.66	NA	NA	NA	NA	NA	NA	NA	NA
P-6	80.47	NA	NA	NA	NA	NA	NA	NA	NA
(P-7)	91.76	3.2	86.6	2.1	89.7	-	-	2.5	89.3
P-7	79.54	NA	NA	NA	NA	NA	NA	NA	NA
P-8	79.55	NA	NA	NA	NA	NA	NA	NA	NA
P-9	79.21	NA	NA	NA	NA	NA	NA	NA	NA

Notes are presented on Page 4 of this table.

TABLE 4-2

SUMMARY OF GROUNDWATER ELEVATION DATA
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
MECHANICVILLE, NEW YORK

		GROUNDWATER ELEVATIONS					
	ELEVATION	JUNE 1987		DECEMBER 1987		JULY 1993	
MONITORING WELL DESIGNATION	RISER PIPE (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)
MW-1	98.56	11.16	87.4	11.06	87.5	8.22	90.34
MW-2	91.31	2.91	88.4	2.51	88.8	2.72	88.59
MW-3	87.31	3.71	83.6	2.21	85.1	4.43	82.88
MW-4	90.61	3.01	87.6	-	-	4.60	86.01
MW-5	87.89	7.99	79.9	-	-	8.01	79.88
MW-6	90.65	3.45	87.2	2.95	87.7	3.24	87.41
MW-10	96.49	NA	NA	10.59	85.9	12.09	84.40
MW-11	91.44	NA	NA	3.94	87.5	3.77	87.67
MW-12	98.46	NA	NA	13.76	84.7	-	-
MW-13	98.48	NA	NA	15.88	82.6	15.61	82.87
MW-14	98.93	NA	NA	16.43	82.5	16.30	82.63
MW-15	88.17	NA	NA	5.67	80.3	8.07	80.10
MW-16	95.28	NA	NA	NA	NA	3.94	91.34
MW-17	98.18	NA	NA	NA	NA	15.12	83.06
MW-18	98.12	NA	NA	NA	NA	15.10	83.02

Notes are presented on Page 4 of this table.

TABLE 4-2

SUMMARY OF GROUNDWATER ELEVATION DATA
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
MECHANICVILLE, NEW YORK

		GROUNDWATER ELEVATIONS					
	ELEVATION	JUNE 1987		DECEMBER 1987		JULY 1993	
MONITORING WELL DESIGNATION	RISER PIPE (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)	DEPTH TO GROUNDWATER (FEET BGS)	GROUNDWATER ELEVATION (RELATIVE DATUM)
P-1	95.02	9.5	85.5	-	-	9.21	85.81
P-2	98.83	11.9	86.9	-	-	9.66	89.17
P-3	80.38	NA	NA	NA	NA	2.86	77.52
P-4	80.61	NA	NA	NA	NA	3.04	77.57
P-5	80.66	NA	NA	NA	NA	3.20	77.46
P-6	80.47	NA	NA	NA	NA	2.94	77.53
(P-7)	91.76	3.3	88.5	NA	NA	NA	NA
P-7	79.54	NA	NA	NA	NA	3.02	76.52
P-8	79.55	NA	NA	NA	NA	3.04	76.51
P-9	79.21	NA	NA	NA	NA	3.11	76.10

NOTES:

1) Elevation relative to 100-foot datum.
2) BGS - below ground surface.
3) NA - Not applicable, well not existant on date of measurement.
4) - = Not measured.
5) (P-7) - Original piezometer #7 destroyed in 1987 and a piezometer installed in 1993 in a different location.

TABLE 5-1
SUMMARY OF LABORATORY ANALYTICAL DATA
SURFACE SOIL INVESTIGATION OF
CONDITIONS WEST OF THE SITE
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

SAMPLE IDENTIFICATION	REACTIVE SULFIDE (ppm)	REACTIVE CYANIDE (ppm)
SS-21	ND	ND
SS-22	ND	ND
SS-23	ND	ND
SS-23 DUP	ND	ND
SS-24	ND	ND
SS-25	ND	ND

NOTES:

1) ppm - parts per million
2) ND indicates that the analyte was not detected.
3) SS - surface soil sample

TABLE 5-2
SUMMARY OF LABORATORY ANALYTICAL DATA
SURFACE SOIL INVESTIGATION OF THE
FORMER TRANSFORMER STORAGE AREAS
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TRANSFORMER STORAGE AREA	SAMPLE IDENTIFICATION	ANALYTICAL RESULTS (ppm)	
		Aroclor-1248	Aroclor-1260
Area 1	SS-25	ND	ND
Area 1	SS-25 SURF.	ND	ND
Area 5	SS-29	ND	0.050 J
Area 5	SS-30	ND	ND
Area 5	SS-31	ND	0.047 J
Area 5	SS-32	ND	ND
Area 3	SS-33	1.800 J	ND
Area 3	SS-34	2.500 J	ND
Area 3	SS-35	0.300 J	0.360 J
Area 3	SS-36	0.057 J	0.180 J
Area 4A	SS-37	0.320 J	2.600 DJ
Area 4A	SS-37 DUP	ND	2.200 J
Area 4A	SS-38	0.700 J	ND
Area 4	SS-39	0.077 J	ND
Area 4	SS-40	0.290 J	ND
Area 2	SS-41	ND	ND
Area 6	SS-45	ND	0.058 J
Area 6	SS-45 DUP	ND	0.075 J
Area 6	SS-46	ND	0.069 J
Area 6	SS-47	ND	0.240 J
Area 6	SS-48	ND	0.130 J

NOTES:

1) ppm - parts per million
2) SS - surface soil sample
3) ND indicates that the analyte was not detected
4) SURF. - sample collected from soil accumulated on surface of pavement
5) J - indicates an estimated value
6) D - indicates that the sample was diluted to facilitate analysis
7) DUP - indicates duplicate sample

TABLE 5-3
SUMMARY OF LABORATORY ANALYTICAL DATA
SUBSURFACE SOIL INVESTIGATION
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

CONSTITUENT	B-16 (6-8 FT) 17-MAY-93 SOIL MEEUB-XX16/11	B-17 (18-20 FT) 18-MAY-93 SOIL MEEDB-XX17/11	B-17 (18-20 FT)DUP 18-MAY-93 SOIL MEEDB-XXDU/11
VOLATILE ORGANIC COMPOUNDS (ppm)	ND	ND	ND
SEMIVOLATILE ORGANIC COMPOUNDS (ppm)			
Benzo(a)Anthracene	ND	0.066 J	ND
Benzo(a)Pyrene	ND	0.048 J	ND
Chrysene	0.060 J	0.069 J	ND
Diethylphthalate	0.330 J	ND	ND
Fluoranthene	0.089 J	0.160 J	0.062 J
Naphthalene	ND	0.056 J	ND
Pentachlorophenol	0.330 J	ND	ND
Phenanthrene	ND	0.200 J	0.077 J
Pyrene	0.082 J	0.130 J	0.049 J
bis(2-Ethylhexyl)phthalate			
INORGANICS (ppm)			
Aluminum	12,200	6,970	6,820
Antimony	ND	0.6 J	ND
Cadmium	0.7	ND	ND
Chromium	21.6	12.5	11.1
Cobalt	16.0	7.0	6.6
Copper	50.4	9.7	7.9
Cyanide - Total			
Amenable	ND	ND	ND
Iron - Cyanide	ND	ND	ND
Iron	29,700	15,000	14,600
Lead	36.4	10.5	36.1
Manganese	511.0	203.0	141.0
Nickel	37.8	11.0	11.3
Zinc	138.0	30.4	28.2

NOTES:

1) FT - Feet
2) DUP - indicates duplicate sample
3) ppm - parts per million
4) ND indicates that the analyte was not detected
5) J - indicates an estimated value
6) ppm - parts per million
7) Samples were analyzed for total cyanide. If detected, then amenable and iron-cyanide were quantified

TABLE 5–4
SUMMARY OF LABORATORY ANALYTICAL DATA
GROUNDWATER INVESTIGATION – ORGANIC ANALYSES
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

CONSTITUENT	NYS DRINKING WATER STANDARDS	MWND1 15NDJULYND93 GROUNDWATER MEGDMW8601/11	MWND1 DUP 15NDJULYND93 GROUNDWATER MEGDMW86DU/12	MWND2 14NDJULYND93 GROUNDWATER MEGDMW8602/11	MWND11 14NDJULYND93 GROUNDWATER MEGDMW8711/11	MWND13 14NDJULYND93 GROUNDWATER MEGDMW8713/11	MWND14 15NDJULYND93 GROUNDWATER MEGDMW8714/11
VOLATILE ORGANIC COMPOUNDS (ppb)							
Benzene	5	ND	ND	ND	ND	ND	4,300
Ethylbenzene	5	ND	ND	ND	ND	ND	1,900
Methylene Chloride	5	5	3 J	ND	ND	4 J	84 J
Total Xylenes	5	ND	ND	ND	ND	ND	850
Toluene	5	ND	ND	ND	ND	ND	120
1,1–Dichloroethane	5	ND	ND	ND	ND	ND	ND
1,1,1–Trichloroethane	5	ND	ND	ND	ND	ND	ND
SEMIVOLATILE ORGANIC COMPOUNDS (ppb)							
Acenaphthylene	50	1 J	1 J	ND	ND	22	13
Acenapthene	50	ND	ND	ND	ND	58	100
Anthracene	50	ND	ND	ND	ND	2 J	4 J
Carbazole	50	ND	ND	ND	ND	5 J	5 J
Dibenzofuran	50	ND	ND	ND	ND	2 J	4 J
Fluoranthene	50	ND	ND	ND	ND	2 J	2 J
Fluorene	50	ND	ND	ND	ND	17	28
2–Methylnaphthalene	50	ND	ND	ND	ND	200	190
Naphthalene	50	2 J	2 J	ND	ND	2,600 D	2,800 D
Phenanthrene	50	ND	ND	ND	ND	20	32
Phenol	50	ND	ND	ND	ND	51	44
Pyrene	50	ND	ND	ND	ND	2 J	2 J
bis(2–Ethylhexyl)phthalate	50	41	44	ND	ND	44	ND
4–Methylphenol	50	ND	ND	ND	ND	4 J	ND

NOTES:

1) NYS – New York State
2) ppb – parts per billion
3) ND indicates that analyte was not detected
4) J – indicates an estimated value
5) D – indicates that the sample was diluted for analysis

TABLE 5-5
SUMMARY OF LABORATORY ANALYTICAL DATA
GROUNDWATER INVESTIGATION - FILTERED INORGANIC ANALYSES
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK
(continued)

CONSTITUENT	NYS DRINKING WATER STANDARDS	MW-15 14-JULY-93 GROUNDWATER MEGDMW8715/11	MW-15 DUP 14-JULY-93 GROUNDWATER MEGDMW87DU/11	MW-16 14-JULY-93 GROUNDWATER MEGUMW9316/11	MW-17 13-JULY-93 GROUNDWATER MEGDMW9317/11	MW-18 13-JULY-93 GROUNDWATER MEGDMW9318/11
INORGANICS (ppb)						
Aluminum	-	ND	ND	55 J	86 J	97 J
Antimony	-	ND	ND	ND	ND	ND
Chromium	100	ND	ND	ND	ND	ND
Cobalt	-	ND	ND	ND	ND	ND
Copper	1,000	ND	ND	ND	20 J	7 J
Cyanide - Total	-	ND	ND	ND	ND	ND
Amenable	-	ND	ND	ND	ND	ND
Iron-Cyanide	-	ND	ND	ND	ND	23
Iron	300	8 J	ND	58	43 J	29 J
Lead	50	ND	ND	ND	ND	ND
Manganese	300	403	403	910	2,320	709
Nickel	5,000	ND	ND	ND	ND	ND
Zinc	5,000	ND	9 J	ND	ND	6 J

NOTES:

1) NYS - New York State
2) DUP - indicated a duplicate sample
3) ppb - parts per billion
4) ND indicates that analyte was not detected
5) J - indicates an estimated value
6) Sample was analyzed for total cyanide. If detected, amenable and iron-cyanide were quantified

TABLE 5–5
SUMMARY OF LABORATORY ANALYTICAL DATA
GROUNDWATER INVESTIGATION – FILTERED INORGANIC ANALYSES
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

CONSTITUENT	NYS DRINKING WATER STANDARDS	MW–1 15–JULY–93 GROUNDWATER MEGDMW8601/11	MW–1 DUP 15–JULY–93 GROUNDWATER MEGDMW86DU/12	MW–2 14–JULY–93 GROUNDWATER MEGDMW8602/11	MW–11 14–JULY–93 GROUNDWATER MEGDMW8711/11	MW–13 14–JULY–93 GROUNDWATER MEGDMW8713/11	MW–14 15–JULY–93 GROUNDWATER MEGDMW8714/11
INORGANICS (ppb)							
Aluminum	–	52 J	ND	54 J	ND	ND	75 J
Antimony	–	ND	ND	ND	ND	ND	ND
Chromium	100	4 J	4 J	ND	ND	ND	ND
Cobalt	–	ND	ND	ND	ND	ND	ND
Copper	1,000	ND	7 J	ND	ND	ND	ND
Cyanide – Total	–	ND	ND	ND	ND	ND	ND
Amenable	–	ND	ND	ND	ND	ND	ND
Iron–Cyanide	–	ND	ND	ND	ND	ND	198
Iron	300	92 J	46 J	ND	56 J	52 J	79 J
Lead	50	ND	ND	ND	ND	ND	ND
Manganese	300	123	128	1,080	2,170	518	787
Nickel	5,000	41	33 J	ND	64	ND	ND
Zinc	5,000	ND	5 J	2 J	3	12 J	2 J

NOTES:

1) NYS – New York State
2) DUP – indicated a duplicate sample
3) ppb – parts per billion
4) ND indicates that analyte was not detected
5) J – indicates an estimated value
6) Sample was analyzed for total cyanide. If detected, amenable and iron–cyanide were quantified

TABLE 5-4
SUMMARY OF LABORATORY ANALYTICAL DATA
GROUNDWATER INVESTIGATION - ORGANIC ANALYSES
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK
(continued)

CONSTITUENT	NYS DRINKING WATER STANDARDS	MWND15 14NDJULYND93 GROUNDWATER MEGDMW8715/11	MWND15 DUP 14NDJULYND93 GROUNDWATER MEGDMW87DU/11	MWND16 14NDJULYND93 GROUNDWATER MEGUMW9316/11	MWND17 13NDJULYND93 GROUNDWATER MEGDMW9317/11	MWND18 13NDJULYND93 GROUNDWATER MEGDMW9318/11
VOLATILE ORGANIC COMPOUNDS (ppb)						
Benzene	5	27	24	ND	ND	ND
Ethylbenzene	5	47	41	ND	ND	ND
Methylene Chloride	5	ND	ND	ND	ND	ND
Total Xylenes	5	29	25	ND	ND	ND
Toluene	5	7	6	ND	ND	ND
1,1-Dichloroethane	5	3 J	3 J	ND	ND	ND
1,1,1-Trichloroethane	5	6	6	ND	0 J	ND
SEMIVOLATILE ORGANIC COMPOUNDS (ppb)						
Acenaphthylene	50	10 J	10	ND	ND	ND
Acenapthene	50	110	110	ND	ND	ND
Anthracene	50	2 J	2 J	ND	ND	ND
Carbazole	50	ND	ND	ND	ND	ND
Dibenzofuran	50	3 J	3 J	ND	ND	ND
Fluoranthene	50	2 J	1 J	ND	ND	ND
Fluorene	50	24	25	ND	ND	ND
2-Methylnaphthalene	50	46	48	ND	ND	ND
Naphthalene	50	480 D	480 D	ND	ND	ND
Phenanthrene	50	34	31	ND	ND	ND
Phenol	50	ND	ND	ND	ND	ND
Pyrene	50	2 J	2 J	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50	45	100	22	ND	ND
4-Methylphenol	50	ND	ND	ND	ND	ND

NOTES:

1) NYS - New York State
2) ppb - parts per billion
3) ND indicates that analyte was not detected
4) J - indicates an estimated value
5) D - indicates that the sample was diluted for analysis

TABLE 5-6
SUMMARY OF LABORATORY ANALYTICAL DATA
GROUNDWATER INVESTIGATION – UNFILTERED INORGANIC ANALYSES
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

CONSTITUENT	NYS DRINKING WATER STANDARDS	MW-1 15-JULY-93 GROUNDWATER MEGDMW8601/11	MW-1 DUP 15-JULY-93 GROUNDWATER MEGDMW86DU/12	MW-2 14-JULY-93 GROUNDWATER MEGDMW8602/11	MW-11 14-JULY-93 GROUNDWATER MEGDMW8711/11	MW-13 14-JULY-93 GROUNDWATER MEGDMW8713/11	MW-14 15-JULY-93 GROUNDWATER MEGDMW8714/11
INORGANICS (ppb)							
Aluminum	–	112.0 J	113.0 J	76.0 J	348.0	62.0 J	86.0 J
Antimony	–	ND	10.1 J	14.5 J	ND	ND	16.7 J
Chromium – Total	100	157.0	824.0	ND	5.0 J	4.0 J	ND
Cobalt	–	ND	7.0 J	ND	ND	ND	ND
Copper	1,000	7.0 J	23.0	ND	ND	ND	ND
Cyanide – Total	–	ND	ND	ND	ND	ND	79.3
Amenable Cyanide	–	ND	ND	ND	ND	ND	ND
Iron Cyanide	–	ND	ND	ND	ND	ND	198.0
Iron	300	3,270.0	4,360.0	191.0	332.0	87.0 J	142.0
Lead	50	1.6 J	1.2	7.2	18.0	2.1 J	1.0 J
Manganese	300	629.0	1,630.0	1,200.0	2,040.0	469.0	727.0
Nickel	5,000	125.0	150.0	ND	63.0	ND	ND
Zinc	5,000	26.0	25.0	31.0	42.0	20.0	12.0 J
TURBIDITY (NTU)	–	1.1	1.3	0.7	5.8	33.0	33.0

NOTES:

1) NYS – New York State
2) DUP – indicates a duplicate sample
3) ppb – parts per billion
4) ND indicates that analyte was not detected
5) J – indicates an estimated value
6) Sample was analyzed for total cyanide. If detected, amenable and iron-cyanide were quanitified
7) NTU – nephelometric turbidity units

TABLE 5-6
SUMMARY OF LABORATORY ANALYTICAL DATA
GROUNDWATER INVESTIGATION - UNFILTERED INORGANIC ANALYSES
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK
(continued)

CONSTITUENT	NYS DRINKING WATER STANDARDS	MW-15 14-JULY-93 GROUNDWATER MEGDMW8715/11	MW-15 DUP 14-JULY-93 GROUNDWATER MEGDMW87DU/11	MW-16 14-JULY-93 GROUNDWATER MEGUMW9316/11	MW-17 13-JULY-93 GROUNDWATER MEGDMW9317/11	MW-18 13-JULY-93 GROUNDWATER MEGDMW9318/11
INORGANICS (ppb)						
Aluminum	-	78.0 J	141.0 J	20,100.0	182,000.0	1,020.0
Antimony	-	17.0 J	ND	ND	ND	ND
Chromium - Total	100	4.0 J	ND	33.0	272.0	5.0 J
Cobalt	-	ND	ND	13.0 J	117.0	ND
Copper	1,000	ND	ND	30.0	349.0	ND
Cyanide - Total	-	ND	ND	ND	65.9	19.1
Amenable Cyanide	-	ND	ND	ND	ND	ND
Iron Cyanide	-	ND	ND	ND	ND	22.5
Iron	300	103.0	199.0	18,800.0	306,000.0	1,280.0
Lead	50	ND	1.2 J	22.2	142.0	3.8
Manganese	300	369.0	383.0	1,100.0	5,750.0	688.0
Nickel	5,000	ND	ND	19.0 J	284.0	ND
Zinc	5,000	16.0 J	21.0	93.0	879.0	46.0
TURBIDITY (NTU)	-	4.3	4.6	1,100.0	4,600.0	6.2

NOTES:

1) NYS - New York State
2) DUP - indicates a duplicate sample
3) ppb - parts per billion
4) ND indicates that analyte was not detected
5) J - indicates an estimated value
6) Sample was analyzed for total cyanide. If detected, amenable and iron-cyanide were quanitified
7) NTU - nephelometric turbidity units

TABLE 5-7

SUMMARY OF LABORATORY ANALYTICAL DATA
SEDIMENT INVESTIGATION
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

CONSTITUENT	NOAA STANDARDS ER-L CONCENTRATION	SD-1 (0-1 FT) 21-MAY-93 SEDIMENT METDEEXX01/11	SD-2 (0-1 FT) 21-MAY-93 SEDIMENT METDEEXX02/11	SD-3 (0-1 FT) 21-MAY-93 SEDIMENT METDEEXX03/11	SD-3 (0-1 FT)DUP 21-MAY-93 SEDIMENT METDEEXXDU/11	SD-4 (0-1 FT) 21-MAY-93 SEDIMENT METDEEXX04/11	SD-5 (0-1 FT) 21-MAY-93 SEDIMENT METDEEXX05/11	SD-6 (0-1 FT) 21-MAY-93 SEDIMENT METDEEXX06/11
VOLATILE ORGANIC COMPOUNDS (ppm)								
Acetone	-	0.012	0.012 J	0.005 J	0.012	0.008 J	0.004 J	0.004 J
Benzene	-	ND	0.001 J	0.002 J	0.004 J	0.014	ND	ND
Chloromethane	-	ND	ND	ND	ND	ND	0.004 J	ND
Ethylbenzene	-	ND	ND	ND	0.003 J	0.003 J	ND	ND
Methylene Chloride	-	0.005 J	0.006	0.006	0.006	0.006 J	0.004 J	0.004 J
Total Xylenes	-	ND	ND	ND	0.010	ND	ND	ND
SEMIVOLATILE ORGANIC COMPOUNDS (ppm)								
Acenaphthylene	-	0.086 J	0.066 J	0.074 J	ND	0.086 J	ND	ND
Acenapthene	0.150	ND	0.860	1.600	0.840	0.660	0.071 J	0.040 J
Anthracene	0.085	ND	0.079 J	0.095 J	0.091 J	3.300	0.130 J	ND
Benzo(a)Anthracene	0.230	0.058 J	0.081 J	0.100 J	0.072 J	0.200 J	0.510	ND
Benzo(a)Pyrene	0.400	0.170 J	0.082 J	0.120 J	0.061 J	0.180 J	0.490	ND
Benzo(b)Fluoranthene	-	0.110 J	0.088 J	0.120 J	ND	0.160 J	ND	ND
Benzo(g,h,i)perylene	-	0.110 J	ND	0.100 J	ND	0.099 J	0.150 J	ND
Benzo(k)Fluoranthene	-	ND	ND	ND	ND	ND	0.460	ND
Carbazole	-	ND	ND	ND	ND	ND	0.120 J	ND
Chrysene	0.400	0.090 J	0.095 J	0.110 J	0.077 J	0.240 J	0.670	ND
Dibenz(a,h)Anthracene	0.060	ND	ND	ND	ND	ND	0.120 J	ND
Dibenzofuran	-	ND	ND	0.080 J	ND	ND	ND	ND
Fluoranthene	0.600	0.120 J	0.150 J	0.190 J	0.180 J	0.400 J	1.300	0.080 J
Fluorene	-	ND	0.210 J	0.420	0.230 J	0.290 J	0.074 J	ND
Indeno(1,2,3-c,d)Pyrene	-	0.120 J	0.081 J	0.072 J	0.041 J	0.140 J	0.330 J	ND
2-Methylnaphthalene	0.065	ND	ND	1.000	0.590	0.057 J	ND	ND
Naphthalene	0.340	ND	ND	3.600	2.000	ND	ND	ND
Pentachlorophenol	-	0.110 J	ND	ND	ND	ND	ND	ND
Phenanthrene	0.225	0.064 J	0.380 J	0.460	0.390 J	0.790	0.820	ND
Pyrene	0.350	0.140 J	0.210 J	0.240 J	0.180 J	0.510 J	1.100	ND
bis(2-Ethylhexyl)phthalate	-	0.240 J	ND	0.140 J	ND	0.300 J	0.420	0.280 J
INORGANICS (ppm)	Σ	1.418	2.382	3.521	4.752	7.412	6.765	0.400
Aluminum	-	5640	5020	7540	6390	6550	5000	6390
Antimony	-	ND	ND	ND	ND	ND	ND	ND
Cadmium	-	ND	ND	ND	ND	ND	ND	ND
Chromium	80	9	8	12	11	11	11	12
Cobalt	-	5	4 J	8	6	6	7	6
Copper	70	20	18	20	16	16	27	18
Cyanide - Total								
Amenable	-	ND	ND	ND	ND	ND	ND	ND
Iron - Cyanide	-	ND	ND	ND	ND	ND	ND	ND
Iron	-	14300	13900	23100	16600	16400	16300	16900
Lead	35	14	16	15	15	13	36	12
Manganese	-	337	236	368	309	278	412	270
Nickel	30	12	10	16	14	13	13	13
Zinc	120	64	75	89	55	66	96 J	56

NOTES PRESENTED ON PAGE 2 OF THIS TABLE.

NOTES:

1) NOAA criteria based on "The Potential for Biological Effects of Sediment Sorbed Contaminants Tested in the National Status and Trends Program". National Oceanic and Atmospheric Administration (NOAA) Criteria Technical Memorandum NOS–OMA 52, 1990.

2) ER–L – Effects Range – Low

3) FT – feet

4) ppm – parts per million

5) ND indicates that analyye was not detected

6) J – indicates an estimated value

7) Samples were analyzed for total cyanide. If detected, then amenable and iron–cyanide were quantified.

TABLE 5-8
SUMMARY OF LABORATORY ANALYTICAL DATA
GROUNDWATER SEEPAGE INVESTIGATION
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

CONSTITUENT	NYS WATER QUALITY STANDARDS	SP-1 14-JULY-93 SEEPAGE MESDEEXX01/11	SP-2 13-JULY-93 SEEPAGE MESDEEXX02/11	SP-4 15-JULY-93 SEEPAGE MESDEEXX04/11
VOLATILE ORGANIC COMPOUNDS (ppb)				
Benzene	-	ND	ND	ND
Ethylbenzene	-	ND	ND	ND
Methylene Chloride	-	1	ND	ND
Total Xylenes	-	ND	ND	ND
Toluene	-	ND	ND	ND
1,1-Dichloroethane	-	ND	ND	ND
1,1,1-Trichloroethane	-	ND	ND	ND
SEMIVOLATILE ORGANIC COMPOUNDS (ppb)				
Acenapthylene	-	ND	ND	NA
Acenapthene	-	ND	ND	NA
Anthracene	-	ND	ND	NA
Carbazole	-	ND	ND	NA
Dibenzofuran	-	ND	ND	NA
Fluoranthene	-	ND	ND	NA
Fluorene	-	ND	ND	NA
2-Methylnaphthalene	-	ND	ND	NA
Naphthalene	-	ND	ND	NA
Phenanthrene	-	ND	ND	NA
Phenol	1.5	430	160	NA
Pyrene	-	ND	ND	NA
bis(2-Ethylhexyl)phthalate	0.6	9 J	4 J	NA
4-Methylphenol	-	ND	2 J	NA

NOTES:

1) NYS - New York State
2) ppb - parts per billion
3) ND indicates that the analyte was not detected
4) NA indicates that sample was not analyzed
5) J - indicates an estimated value

TABLE 5-9

SUMMARY OF SEEPAGE METER FIELD DATA
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

LOCATION	METER ENGAGED		SAMPLE COLLECTED		TIME (HOURS)	VOLUME (ML)	FLUX ($L/D*M^2$)	FLUX ($GAL/DAY*FT^2$)	LABORATORY ANALYSIS
	DATE	TIME	DATE	TIME					
SP-1	7/12/93	10:00	7/14/93	19:00	57	500	0.819	0.0198	VOA, SVOA
SP-2	7/12/93	09:45	7/13/93	07:45	22	835	3.544	0.0856	VOA, SVOA
SP-3[3]	7/12/93	10:15	NA	NA	NA	NA	NA	NA	NA
SP-4	7/12/93	09:35	7/15/93	07:35	70	60	0.08	0.0019	VOA

NOTES:

1) Average seep: 1.454333 liters per day per square meter ($L/d*m^2$) or 0.0351 gallons per day per square foot ($gal/day*ft^2$)
2) ML - milliliter
3) SP-3 did not produce sufficient volume to collect a groundwater seed sample.
4) NA - not applicable
5) VOA - volatile organic analysis
6) SVOA - semi-volatile organic analysis

TABLE 7-1
SUMMARY STATISTICS OF SURFACE SOIL SAMPLING LOCATIONS
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ANALYTE	ARITHMETIC MEAN (ppm)	MAXIMUM DETECTED (ppm)	MINIMUM DETECTED (ppm)	FREQUENCY OF DETECTION
POLYCHLORINATED BIPHENYLS				
Aroclor-1248	0.349	2.500 J	0.057 J	8/18
Aroclor-1260	0.268	2.400 J	0.047 J	10/18

NOTES:

1) Data is from samples SS-25, SS-29 through SS-41, and SS-45 through SS-48, May 1993 and July 1993
2) J = Estimated Value
3) ppm = parts per million

TABLE 7–2
SUMMARY STATISTICS OF SUBSURFACE SOIL SAMPLING LOCATIONS
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ANALYTE	ARITHMETIC MEAN	MAXIMUM DETECTED	MINIMUM DETECTED	FREQUENCY OF DETECTION
SEMIVOLATILE ORGANIC COMPOUNDS (ppm)				
Benzo(a)anthracene	0.155	0.066 J	0.066 J	1/2
Benzo(a)pyrene	0.151	0.048 J	0.048 J	1/2
Chrysene	0.096	0.069 J	0.060 J	2/2
Diethylphthalate	0.231	0.330 J	0.330 J	1/2
Fluoranthene	0.100	0.111 J*	0.089 J	2/2
Naphthalene	0.153	0.056 J	0.056 J	1/2
Pentachlorophenol	0.259	0.330 J	0.330 J	1/2
Phenanthrene	0.159	0.139 J	0.139 J	1/2
Pyrene	0.086	0.090 J*	0.082 J	2/2
INORGANICS (ppm)				
Aluminum	9,547	12,200	6,895 *	2/2
Antimony	0.3	0.55 J	0.55 J	1/2
Cadmium	0.48	0.73 J	0.73 J	1/2
Chromium	16.7	21.6	5.6 *	2/2
Cobalt	11.4	16	6.8 *	2/2
Copper	29.6	50.4	8.8 *	2/2
Iron	22,250	29,700	14,800 *	2/2
Lead	29.9	36.4	23.3 *	2/2
Manganese	392	611	172 *	2/2
Nickel	24.5	37.8	11.2 *	2/2
Zinc	83.7	138	29.3 *	2/2

NOTES:

1) Data is from samples B–16 and B–17 (and B–17D).
2) J = Estimated Value
3) * = Value is a result of average of duplicate samples.
4) ppm = parts per million

TABLE 7–3
SUMMARY STATISTICS OF GROUNDWATER SAMPLING LOCATIONS
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ANALYTE	ARITHMETIC MEAN	MAXIMUM DETECTED	MINIMUM DETECTED	FREQUENCY OF DETECTION
VOLATILE ORGANIC COMPOUNDS (ppb)				
Benzene	482.1	4,300	25.5 *	2/9
Ethylbenzene	217.5	1,900	44 *	2/9
Methylene chloride	11.4	84 J	4 J	3/9
Xylenes	98.9	850	27	2/9
Toluene	15.6	120	6.5 *	2/9
1,1–Dichloroethane	8.5	3 J*	3 J*	1/9
1,1,1–Trichloroethane	8.8	6 J	0.4 J	2/9
SEMIVOLATILE ORGANIC COMPOUNDS (ppb)				
Acenaphthylene	8.0	22	1 J*	4/9
Acenapthene	33.2	110 *	58	3/9
Anthracene	4.3	4 J	2 J*	3/9
Carbazole	5.2	5 J	5 J	2/9
Dibenzofuran	4.4	2 J	4 J	3/9
Fluoranthene	4.1	2 J	1.5 J*	3/9
Fluorene	11.2	28	17	3/9
2–Methylnapthalene	52.0	200	47 *	3/9
Naphthalene	656.4	2,800 D	2 J	4/9
Phenanthrene	12.8	32.5 *	20	3/9
Phenol	14.6	51	44	2/9
Pyrene	4.1	2 J	2 J	3/9
bis(2–ethylhexyl)phthalate	21.8	72.5 *	22	4/9
4–Methylphenol	5.1	4 J	4 J	1/9
INORGANICS (ppb)				
Aluminum	259	1,020	62.0 J	7/7
Antimony	7.8	16.7 J	6.3 J*	4/7
Chromium	73.4	490.5 *	3 J*	5/7
Cobalt	2.8	7 J	7 J	1/7
Copper	3.9	15 *	15	1/7
Cyanide	21.2	79.3	19.1	2/7
Iron	857	3,815 *	87	7/7
Lead	5.0	18	1 J	7/7
Manganese	950	2,040	376 *	7/7
Nickel	31.5	137.5 *	63	2/7
Zinc	27.9	46	12 J	7/7

NOTES:
1) Data is from samples MW–1, MW–2, MW–11, and MW–13 through MW–18 for SVOCs, and
2) MW–1, MW–2, MW–11, MW–13, MW–14, MW–15, and MW–18 for inorganics.
3) J = Estimated Value
4) D = Dilution
5) * = Value is a result of average of duplicate samples.
6) ppb = parts per billion

TABLE 7-4
CRITERIA FOR CHEMICALS FOUND IN GROUNDWATER
FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ANALYTE	MEAN DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	NEW YORK STATE DRINKING WATER MCL [a]	MEAN/MAX EXCEEDS MCL (Y/N)	USEPA DRINKING WATER MCL [b]	MEAN/MAX EXCEEDS MCL (Y/N)
VOLATILE ORGANIC COMPOUNDS (ppb)						
Benzene	482.1	4,300	5	Y/Y	5	Y/Y
Ethylbenzene	218	1,900	5	Y/Y	700	N/Y
Methylene chloride	11.4	84 J	5	Y/Y	5	Y/Y
Xylenes	98.9	850	5	Y/Y	10,000	N/N
Toluene	15.6	120	5	Y/Y	1,000	N/N
1,1-Dichloroethane	8.5	3 J	5	N [e]	5	N [e]
1,1,1-Trichloroethane	8.8	6 J	5	Y/Y	200	N/N
SEMIVOLATILE ORGANIC COMPOUNDS (ppb)						
Acenaphthylene	8.0	22	50	N/N	NA	NA
Acenapthene	33.2	110	50	N/Y	NA	NA
Anthracene	4.3	4 J	50	N/N	NA	NA
Carbazole	5.2	5 J	50	N/N	NA	NA
Dibenzofuran	4.4	2 J	50	N/N	NA	NA
Fluoranthene	4.1	2 J	50	N/N	NA	NA
Fluorene	11.2	28	50	N/N	NA	NA
2-Methylnapthalene	52.0	200	50	Y/Y	NA	NA
Naphthalene	656.4	2,800 D	50	Y/Y	NA	NA
Phenanthrene	12.8	33	50	N/N	NA	NA
Phenol	14.6	51	50	N/Y	NA	NA
Pyrene	4.1	2 J	50	N/N	NA	NA
bis(2-ethylhexyl)phthalate	21.8	73	50	N/Y	6	Y/Y
4-Methylphenol	5.1	4 J	50	N/N	NA	NA
INORGANICS (ppb)						
Aluminum	259	1,020	NA	NA	200 [c]	Y/Y
Antimony	7.8	17 J	NA	NA	6	Y/Y
Chromium	73.4	491	100	N/Y	100	N/Y
Cobalt	2.8	7 J	NA	NA	NA	NA
Copper	3.9	15	1,000 [c]	N/N	1,000 [c]	N/N
Cyanide	21.2	79	NA	NA	200	N/N
Iron	857	3,815	300 [c]	Y/Y	300 [c]	Y/Y
Lead	5.0	18	50	N/N	15 [d]	N/Y
Manganese	950	2,040	300 [c]	Y/Y	50 [c]	Y/Y
Nickel	31.5	138	NA	NA	100	N/Y
Zinc	27.9	46	5,000 [c]	N/N	5,000 [c]	N/N

NOTES:
J - Estimated Value
D - Dilution
[a] New York State Drinking Water MCL (November 18, 1992).
[b] USEPA Drinking Water MCL (May 1993).
[c] Value is a secondary maximum contaminant level.
[d] Value is USEPA treatment technique action level.
[e] Average concentration exceeds maximum concentration, therefore mean concentration was not compared to MCL.
ppb - parts per billion

TABLE 10-1

CHEMICAL-SPECIFIC STANDARDS, CRITERIA, AND GUIDANCE
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

MEDIA	REQUIREMENT	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE REMEDIAL RESPONSE PROCESS
GROUNDWATER AND SURFACE WATER			
Federal Standards	Safe Drinking Water Act (SDWA) - Maximum Contaminant Levels (MCLs) (40 CFR 141.11 - 141.16)	MCLs have been promulgated for common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	Groundwater is not used as a drinking water source in the vicinity of the site; therefore, MCLs are not applicable to the remediation of the Mechanicville Site.
	SDWA - Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.50 - 141.51)	MCLGs are health-based criteria at which no known or anticipated adverse health effects are expected. MCLGs are available for a number of organic and inorganic contaminants.	Groundwater is not used as a drinking water source in the vicinity of the site; therefore MCLGs are not applicable to the remediation of the site.
	Federal Clean Water Act (CWA) Ambient Water Quality Criteria (AWQC)	Federal AWQC are health-based criteria developed for carcinogenic and noncarcinogenic compounds and parameters in surface water bodies. AWQC for the protection of human health provide criteria for exposure from drinking water and consuming aquatic organisms, and from consuming fish alone.	These criteria are the most commonly used numeric standards for determining discharge limits for treated groundwater to a surface water source. These criteria would be applicable to those alternatives proposing direct discharge to the Anthony Kill.
Federal Guidance and Criteria To Be Considered	USEPA Risk Reference Doses (RfDs) and Risk Reference Concentrations (RfCs)	RfDs/RfCs are estimates of a daily exposure level for the human population without an appreciable risk of deleterious effects during a lifetime.	USEPA RfDs/RfCs are used to characterize risks due to noncarcinogens in various media.
	USEPA Carcinogen Assessment Group Cancer Slope Factors (CSFs)	Carcinogenic effects present the most up-to-date information on cancer risk potency available from USEPA's Integrated Risk Information System (IRIS).	USEPA CSFs are used to compute the individual incremental cancer risk resulting from exposure to certain compounds.
	USEPA Health Advisories (HAs)	HAs are issued as non-regulatory guidance. HA values represent the concentration of contaminants in drinking water at which adverse health effects would not be expected to occur. HAs are established for one-day and ten-day exposure durations.	USEPA HAs are used to evaluate noncarcinogenic effects for oral exposures of shorter duration.
State Standards	New York Department of Health Drinking Water Supplies (10 NYCRR Subpart 5-1)	Under this Subpart, MCLs have been promulgated for organic and inorganic contaminants. These standards have been promulgated for the protection of present or future drinking water supplies.	Groundwater is not used as a drinking water source in the vicinity of the site; therefore, MCLs are not directly applicable to the remediation of the Mechanicville Site.

TABLE 10-1

CHEMICAL-SPECIFIC STANDARDS, CRITERIA, AND GUIDANCE
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

MEDIA	REQUIREMENT	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE REMEDIAL RESPONSE PROCESS
	New York Water Quality Regulations for Surface Waters and Groundwaters (6 NYCRR Parts 700 - 705)	New York State has classified groundwater based on best usage. All fresh groundwaters in the State of New York are classified as Class GA where the best usage is as a source of potable water supply. This rule also establishes numeric limits for individual chemical compounds detected in surface water sources, also based on the best usage of the surface water body.	Groundwater is not used as a drinking water source in the vicinity of the site; therefore, class GA standards are not applicable to the remediation of the site. Standards for the protection of surface water would be applicable to establishing any limits for direct discharge of treated groundwater to the Anthony Kill.
SOIL			
State Criteria and Guidance to be Considered	Division of Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels (HWR-92-4046)	This TAGM provides the basis and procedures for establishing soil cleanup levels at inactive hazardous waste sites, when restoration to pre-disposal conditions is not feasible. The TAGM provides four alternative bases for establishing soil cleanup objectives that are protective of human health, protective of groundwater/drinking water quality based on standards, background values for contaminants, and detection limits. Recommendation of the appropriate cleanup objective is based on the criterion that produces the most stringent cleanup level.	This TAGM will be evaluated with respect to remediation of surface and subsurface contamination.

NOTES:

AWQC = Ambient Water Quality Criteria
CFR = Code of Federal Regulations
CSF = cancer slope factor
CWA = Clean Water Act
HAs = health advisories
IRIS = Integrated Risk Information System
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
NYCRR = New York Codes, Rules, and Regulations
RfC = reference concentration
RfD = reference dose
SDWA = Safe Drinking Water Act
TAGM = Technical and Administrative Guidance Memorandum
USEPA = U.S. Environmental Protection Agency

TABLE 10-2

POTENTIAL ACTION-SPECIFIC STANDARDS, CRITERIA, AND GUIDANCE
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

REQUIREMENT	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE REMEDIAL RESPONSE PROCESS
Federal Standards		
Occupational Safety and Health Administration (OSHA) - General Industry Standards (29 CFR Part 1910)	These regulations specify the 8-hour time-weighted average concentration for various organic compounds. Training requirements for workers at hazardous waste operations are specified in 29 CFR 1910.120.	Proper respiratory equipment would be worn if it is impossible to maintain the work atmosphere below the threshold concentration. Workers performing activities would be required to have completed specific training requirements.
OSHA - Safety and Health Standards (29 CFR Part 1926)	This regulation specifies the type of safety equipment and procedures to be followed during site remediation.	All appropriate safety equipment would be on-site. In addition, safety procedures would be followed during on-site activities.
OSHA - Recordkeeping, Reporting, and Related Regulations (29 CFR 1904)	This regulation outlines the recordkeeping and reporting requirements for an employer under OSHA.	These requirements apply to all site contractors and subcontractors, and must be followed during all site work.
Clean Water Act (CWA) - National Pollution Discharge Elimination System (NPDES) (40 CFR Parts 122, 125)	This requirement implements the NPDES program that specifies the applicable effluent standards, monitoring requirements, and standards and special conditions for direct discharge to surface water bodies.	CWA NPDES requirements, including discharge limitations, monitoring requirements, and best management practices would apply to alternatives proposing direct discharge of treated groundwater to the Anthony Kill. Discharges would require NPDES compliance and a NPDES permit.
CWA - Pretreatment Standards for Publicly Owned Treatment Works (POTW) Discharge (40 CFR Part 403)	This regulation specifies pretreatment standards for discharges to a POTW. If treated groundwater is discharged to a POTW, the POTW must have mechanics available to meet the requirements of the National Pretreatment Program. Introduction of pollutants which cause pass through or interference are prohibited. Discharges must also comply with any local POTW regulations.	If treated groundwater is discharged to a POTW, the treated water must meet all discharge limitations imposed by the POTW.
U.S. Department of Transportation Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171.1 - 172.558)	This regulation outlines the procedures for packaging, labeling, manifesting, and transporting of hazardous materials.	If excavated soils or residuals from groundwater treatment fail characteristic hazardous waste analyses, they will be excavated and transported off-site. Those soils will packaged, manifested, and transported to a licensed off-site disposal facility in compliance with these regulations.
State Standards		
New York State Regulations on State Pollutant Discharge Elimination System (SPDES) (6 NYCRR Parts 750 - 758)	Compliance with the New York SPDES is required for discharge of treatment process water. Under these regulations the New York Department of Environmental Conservation may impose treatment standards for discharge, monitoring, reporting, and recordkeeping requirements.	Compliance with these regulations may be attained through compliance with the NPDES program under the CWA for alternatives proposing to discharge treated groundwater to the Anthony Kill. Consideration of additional actions to meet New York SPDES requirements may be necessary.
New York State Identification and Listing of Hazardous Waste Regulations (6 NYCRR Part 371)[1]	These regulations identify the procedures for identifying those solid wastes that are subject to regulation as hazardous under 6 NYCRR Parts 370 - 373.	These regulations will be used in evaluating whether certain on-site soils exhibit the characteristic of a reactive hazardous material. If excavated soils fail characteristic testing they will be handled in accordance with New York State Hazardous Waste Regulations.

TABLE 10-2

POTENTIAL ACTION-SPECIFIC STANDARDS, CRITERIA, AND GUIDANCE
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

REQUIREMENT	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE REMEDIAL RESPONSE PROCESS
New York State Water Pollution Control Regulations (6 NYCRR Part 608)	Part 608 sets forth requirements for the protection of streams, ponds, and lakes. Work conducted within 50 feet of the mean high water line of a protected water body requires obtaining prior approval and a permit from NYSDEC.	A permit will be required for those alternatives proposing major invasive or excavation work within 50 feet of the Anthony Kill.

NOTES:

CFR = Code of Federal Regulations
CWA = Clean Water Act
NPDES = National Pollution Discharge Elimination System
NYCRR = New York Codes Rules and Regulations
NYSDEC = New York State Department of Environmental Conservation
OSHA = Occupational Safety and Health Administration
POTW = publicly owned treatment works
SPDES = State Pollution Discharge Elimination System

[1]In the event that hazardous wastes are encountered at the site, additional federal and state action-specific standards, criteria, and guidelines (SCGs) for handling the wastes will be applicable. Removal and treatment/disposal of all hazardous wastes will be in accordance with all applicable requirements and regulations.

TABLE 11-1

GENERAL RESPONSE ACTIONS AND POTENTIAL REMEDIAL TECHNOLOGIES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

General Response Action	Process/ Technology	Description
Minimal Action	Deed Restrictions Zoning Town Ordinance Environmental Monitoring	Restrict withdrawal and use of groundwater containing site chemicals, restrict noncommercial use of the site, and conduct environmental monitoring to assess groundwater and surface water quality.
Containment	Grout Curtain	Inject a fluid material into the overburden soil to reduce water and coal tar movement. Once in place within the formation voids, the fluids solidify or gel, thus greatly reducing the permeability.
	Slurry Wall	Excavate a trench through or under a slurry of bentonite clay and water. The trench is backfilled with an engineered mixture of materials having the desired permeability properties to form a barrier to coal tar movement.
	Sheet Pile	Interlocking steel sheet piles are driven into the ground with a drop or vibratory hammer. With time, fine soil particles are washed into the seams and water cutoff is effected. For applications in very coarse soils, it is possible to grout the pile seams. No excavation is required.
Groundwater Extraction and Treatment	Vertical Extraction Wells	Intercept and extract groundwater and coal tar for treatment and/or discharge using a series of drilled pumping wells.
	Downgradient Subsurface Drains	Intercept and collect contaminated groundwater and coal tar using a one-sided subsurface drain.
	Upgradient Subsurface Drains	Intercept upgradient groundwater and divert it into the Anthony Kill to minimize flow across the site.
In Situ Treatment	Bioremediation	Inject nutrients and/or an oxygen source into the aquifer to encourage development of a microbial population that degrades compounds of concern.
Disposal	Off-site Discharge	Discharge groundwater (meeting negotiated discharge limits) into the Anthony Kill or to the local POTW.
Ancillary	Treatment	Treat extracted groundwater using mobile process units. Treatment could involve oil/water separation, metals precipitation, and/or carbon adsorption for treatment of organics (e.g., VOCs, PAHs, etc.)

TABLE 11-2

TECHNOLOGY SCREENING
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TECHNOLOGY/ PROCESS	ADVANTAGES	DISADVANTAGES	SCREENING STATUS	COMMENTS
Minimal Action: Administrative Actions to prevent exposure (e.g., deed restrictions, easements, zoning, town ordinance) and monitoring.	Groundwater currently is not used as a drinking water source. Site contaminants currently pose minimal risks to human health and the environment. Restricts withdrawal and use of contaminated groundwater and noncommercial use of the site. Reduces the potential for ingestion and exposure to site chemicals. Provides current information on distribution of chemicals in groundwater, surface water, and/or treatment effectiveness. Minimal capital and operating costs.	Does not reduce mobility, toxicity, or volume of site chemicals. Coal tar will continue to be a source of groundwater and surface water contamination. May not provide a permanent solution. Requires long-term enforcement (maintenance). Requires periodic operational and administrative activity.	Retained	USEPA RI/FS guidance suggests retaining for feasibility study analysis and baseline comparison.

TABLE 11-2

TECHNOLOGY SCREENING
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TECHNOLOGY/ PROCESS	ADVANTAGES	DISADVANTAGES	SCREENING STATUS	COMMENTS
Grout Curtain	Reduces mobility of contaminants in groundwater and coal tar. No operation and minimal maintenance required.	Technology is seldom used for containing groundwater flow in unconsolidated materials. Achieving low permeabilities in unconsolidated material is often difficult. Contaminants present in groundwater may interfere with grout setting reactions and/or reduce grout durability. Extensive treatability testing would be required to evaluate waste grout interaction and compatibility. Gaps in grout curtain due to non-penetration of grout may allow contaminants to migrate off-site. Unproven long-term effectiveness. More costly to install than alternative barrier technologies (e.g., slurry wall).	Eliminated	Significant potential for not meeting response objectives. More economical and effective barriers available.

TABLE 11-2

TECHNOLOGY SCREENING
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TECHNOLOGY/ PROCESS	ADVANTAGES	DISADVANTAGES	SCREENING STATUS	COMMENTS
Slurry Wall	Reduces mobility of contaminants in groundwater and coal tar. Experienced vendors are available to install the slurry wall. No operations and minimal maintenance required.	Requires a large work area to install. Treatability testing would be required to evaluate contaminant/backfill compatibility. Slurry wall may not effectively contain chemicals in groundwater. Compounds present may have adverse effects on the slurry wall and reduce its effectiveness. Unproven long-term effectiveness. Contaminated soils requiring treatment/disposal would be generated during excavation of trench.	Eliminated	Would be difficult to install due to limited space available along the stream bank. Potential for not meeting response objectives.

TABLE 11-2

TECHNOLOGY SCREENING
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TECHNOLOGY/ PROCESS	ADVANTAGES	DISADVANTAGES	SCREENING STATUS	COMMENTS
Sheet Pile Wall	Reduces mobility of contaminants in groundwater and coal tar. No operation and minimal maintenance required. Performance life of sheet pile can vary from 30 to more than 100 years, depending on soil and groundwater conditions and materials used to construct the barrier. Experienced vendors are available to install the sheet piles. Least costly barrier to install. Does not require large work area to install. No excavation required.	May be necessary to grout the piling seams to prevent leakage through interlocking joints. Cannot penetrate competent bedrock. Driving of sheet piles may cause increased fracturing in bedrock and accelerate flow into rock, thereby decreasing barrier effectiveness in overburden.	Retained	Would meet response objectives. Easiest of barriers to implement and lowest cost.

TABLE 11-2

TECHNOLOGY SCREENING
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TECHNOLOGY/ PROCESS	ADVANTAGES	DISADVANTAGES	SCREENING STATUS	COMMENTS
Downgradient Extraction Wells	Would reduce and eventually eliminate off-site groundwater contamination and contaminant migration into the Anthony Kill. Easy to implement - No trenching required. Proven technology. May be less costly to install compared to subsurface drains.	Does not isolate wastes from groundwater, therefore would not prevent leaching of wastes by groundwater. Extracted water would require treatment and/or discharge. Requires long-term pumping, energy supply, and long-term monitoring, operation, and maintenance costs, if chemicals continue to be released from source. May not effectively capture coal tar in saturated zone. Operation and maintenance costs are high.	Retained	System would intercept contaminated groundwater migrating from the site.

TABLE 11-2

TECHNOLOGY SCREENING
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TECHNOLOGY/ PROCESS	ADVANTAGES	DISADVANTAGES	SCREENING STATUS	COMMENTS
Downgradient Subsurface Drains	Would reduce and eventually eliminate contaminant migration into the Anthony Kill. Would require fewer pumps relative to extraction via downgradient wells. Proven technology. Lower operation and maintenance costs compared to extraction wells.	Does not isolate wastes from groundwater, therefore would not prevent leaching of wastes by groundwater. Extracted water would require treatment and/or discharge. Requires long-term pumping energy supply, and long-term monitoring, operation, and maintenance costs, if chemicals continue to be released from source. Trench excavation required for installation. Shoring may be required during installation for worker health and safety. Contaminated soils requiring treatment/disposal would be generated during excavation of trench. May be more costly to install compared to extraction wells.	Retained	System would intercept contamination migrating into the Anthony Kill.

TABLE 11-2

TECHNOLOGY SCREENING
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TECHNOLOGY/ PROCESS	ADVANTAGES	DISADVANTAGES	SCREENING STATUS	COMMENTS
In Situ Bioremediation	Reduces toxicity, mobility, and volume of contaminants in soil and/or groundwater. Does not expose public or environmental receptors to site chemicals in groundwater.	Site-specific information must be collected to determine site-limiting characteristics for biodegradation. May be difficult to support microbial population in free-phase coal tar present in the saturated zone. Need to inject foreign materials (e.g., nutrients) into the groundwater to enhance biodegradation. Treatability studies would be required to determine system requirements (e.g., flow rates, nutrients) and effectiveness. Uncertain cost, effectiveness, and implementability regarding ability to enhance microbial growth by introducing nutrients.	Eliminated	Coal tar present in the saturated zone would make it difficult to maintain the environment necessary to support a microbial population. Technology may be considered in the future to augment other technologies as site conditions become more favorable.

TABLE 11-2

TECHNOLOGY SCREENING
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TECHNOLOGY/ PROCESS	ADVANTAGES	DISADVANTAGES	SCREENING STATUS	COMMENTS
Upgradient Subsurface Drains	Would reduce, after time, mobility, toxicity, and volume of contaminants in groundwater on-site and off-site by minimizing groundwater movement through the contaminated zone. Quality of intercepted groundwater may not require treatment prior to discharge or use, or may require only short-term treatment. Because the site is paved, downgradient recharge would be minimal, as would groundwater discharge from the site. Proven technology. Passive system not requiring long-term energy or operation costs. No contaminated water would be extracted from the ground.	Coal tar would remain as a source of contamination to groundwater. Although infiltration is minimized, potential existing for coal tar to flow toward Anthony Kill by gravity. Extracted groundwater may require long-term monitoring and treatment. Requires long-term monitoring, operation, and maintenance costs. Further site exploration and testing would be required to determine if the technology is technically feasible and to design the system. Trench excavation required for installation. Shoring may be required during installation for worker health and safety.	Retained	Mobility of contaminants would be reduced by minimizing groundwater movement through the contaminated zone.

TABLE 11-2

TECHNOLOGY SCREENING
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TECHNOLOGY/ PROCESS	ADVANTAGES	DISADVANTAGES	SCREENING STATUS	COMMENTS
Off-Site Discharge	Two options exist: discharge to the Anthony Kill or discharge to the local POTW. Anthony Kill is nearby and easily accessible. Discharge to POTW may have less stringent treatment requirements than discharge to the Anthony Kill because of treatment capabilities of the POTW.	Requires a discharge pipeline from vicinity of site to the river and/or POTW. Long-term availability of POTW is determined by others (no control). May pose additional administrative and liability issues for POTW and site administrators. Long-term feasibility may be questionable if POTW effluent quality restrictions are modified. Dependent on compliance status of POTW. Dependent on negotiations with POTW and state agency representatives to determine if POTW is willing and able to accept wastestream.	Retained	Would be used in combination with other technologies.

TABLE 11-2

TECHNOLOGY SCREENING
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

TECHNOLOGY/ PROCESS	ADVANTAGES	DISADVANTAGES	SCREENING STATUS	COMMENTS
Ancillary Groundwater Treatment with On-site Mobile Treatment Unit(s).	Would reduce toxicity and mobility of contaminants in groundwater. Several types of mobile treatment units are available for use.	Appropriate disposal of treatment residuals (e.g., free-phase product, sludges, carbon) would be required.	Retained	Would be used in combination with other technologies.

TABLE 12-1

COMPONENTS OF THE REMEDIAL ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ALTERNATIVE	KEY COMPONENTS
Minimal Action	• Environmental monitoring • Institutional controls (deed restrictions, zoning) • Five-year site reviews • Maintenance of asphalt cap • Mapping of bedrock along southern bank of Anthony Kill
Downgradient Subsurface Drain	• Environmental monitoring • Institutional controls (deed restrictions, zoning) • Five-year site reviews • Maintenance of asphalt cap • Mapping of bedrock along southern bank of Anthony Kill • Site preparation • Removal and disposal of filter bed soil • Trench excavation • Installation of subsurface drain and extraction system • Pretreatment of groundwater prior to discharge • Discharge to POTW or Anthony Kill • Disposal of excavated soil containing coal tar, if necessary

TABLE 12-1

COMPONENTS OF THE REMEDIAL ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ALTERNATIVE	KEY COMPONENTS
Downgradient Barrier Wall	• Environmental monitoring • Institutional controls (deed restrictions, zoning) • Five-year site reviews • Maintenance of asphalt cap • Mapping of bedrock along southern bank of Anthony Kill • Site preparation • Removal and disposal of filter bed soil • Installation of sheet pile barrier wall • Disposal of excavated soil containing coal tar, if necessary
Downgradient Extraction Wells	• Environmental monitoring • Institutional controls (deed restrictions, zoning) • Five-year site reviews • Maintenance of asphalt cap • Mapping of bedrock along southern bank of Anthony Kill • Site preparation • Removal and disposal of filter bed soil • Installation of extraction wells • Pretreatment of groundwater prior to discharge • Discharge to POTW or Anthony Kill

TABLE 12-1

COMPONENTS OF THE REMEDIAL ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ALTERNATIVE	KEY COMPONENTS
Upgradient Subsurface Drain	• Environmental monitoring • Institutional controls (deed restrictions, zoning) • Five-year site reviews • Maintenance of asphalt cap • Mapping of bedrock along southern bank of Anthony Kill • Site preparation • Removal and disposal of filter bed soil • Trench excavation • Installation of drain • Disposal of excavated soil containing coal tar, if necessary
Upgradient Drain with Downgradient Barrier	• Environmental monitoring • Institutional controls (deed restrictions, zoning) • Five-year site reviews • Maintenance of asphalt cap • Mapping of bedrock along southern bank of Anthony Kill • Site preparation • Removal and disposal of filter bed soil • Trench excavation • Installation of upgradient drain • Installation of downgradient sheet pile barrier wall • Disposal of excavated soil containing coal tar, if necessary

TABLE 13-1

CRITERIA FOR INITIAL SCREENING OF ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

EFFECTIVENESS	IMPLEMENTABILITY	COST
• Compliance with SCGs	• Technical Feasibility	• Equipment/Construction
• Reduction in Toxicity, Mobility, or Volume of Contaminants	• Demonstrated Performance	• Operation and Maintenance
• Protection of Human Health and the Environment	• Availability of Equipment, Space, and Services	
• Adverse Short- and Long-term Effects Caused by Implementation	• Administrative Feasibility	

NOTE:

SCGs = standards, criteria, and guidelines

TABLE 13-2

SCREENING OF REMEDIAL ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

MINIMAL ACTION

Synopsis: This alternative would include implementation of deed restrictions to restrict non-commercial use of and access to the site. Groundwater and surface water quality would be monitored and the asphalt cap would be maintained.

EFFECTIVENESS	IMPLEMENTABILITY	COST
Advantages	**Advantages**	**Advantages**
• Site contaminants currently pose minimal risks to human health and the environment.	• Most easily implemented because no remedial actions are required.	• Minimal capital and O&M costs are required.
• Low potential for contaminant exposure during implementation.	• Services and materials are readily available.	
• Site would be monitored for contaminant migration.		
• Institutional controls would restrict future use of the site.		
Disadvantages	**Disadvantages**	**Disadvantages**
• Coal tar would continue to be a source of groundwater contamination.	• May require future remedial actions.	• Because this alternative does not involve remedial actions, and because the potential for future remedial action exists, this alternative may ultimately be more costly.
• Would not achieve remedial response objectives.	• Long-term monitoring and maintenance would be required.	
• Would not reduce toxicity, mobility, or volume of contaminants.		

Conclusion: The Minimal Action Alternative is retained for comparison with the remaining alternatives.

TABLE 13-3

SCREENING OF REMEDIAL ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

DOWNGRADIENT SUBSURFACE DRAIN

Synopsis: This alternative would include installation of a one-sided subsurface drain to intercept and collect contaminated groundwater and coal tar, preventing migration to the Anthony Kill. Collected groundwater would be pretreated and discharged to the local POTW or Anthony Kill. Coal tar would be disposed of off-site at an appropriate disposal facility. Deed restrictions would be imposed to restrict noncommercial use and access to the site. Groundwater and surface water quality would be monitored and the asphalt cap would be maintained.

EFFECTIVENESS	IMPLEMENTABILITY	COST
Advantages	**Advantages**	**Advantages**
• Would reduce migration of coal tar and contaminated groundwater to the Anthony Kill.	• Would require standard construction techniques.	• Capital costs are readily defined.
• Would reduce mobility and volume of contaminants.	• Would require fewer pumps and less energy than downgradient extraction wells.	• O&M less costly than wells.
Disadvantages	**Disadvantages**	**Disadvantages**
• Coal tar may clog the drain.	• Long-term monitoring and maintenance would be required.	• Long-term O&M may be more costly than other alternatives.
• Drain may cause a change in direction of groundwater flow and/or draw surface water from the Anthony Kill into the drain because of a head differential.	• Construction may be difficult because of underground structures and proximity to the bank of the Anthony Kill.	• Excavated contaminated soil would require treatment and/or disposal.
• Drain may not effectively intercept coal tar.	• Off-gas controls may be required during excavation of contaminated soil.	
	• Excavated contaminated soil would require treatment and/or disposal.	
	• Contaminated groundwater would require pretreatment before discharge.	

Conclusion: Because this alternative may be difficult to implement and maintain, and may not effectively control migration of coal tar, the Downgradient Subsurface Drain Alternative is not retained for detailed analysis.

TABLE 13-4

SCREENING OF REMEDIAL ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

DOWNGRADIENT BARRIER WALL

Synopsis: This alternative would include installation of sheet piles to prevent groundwater and coal tar from migrating off-site to the Anthony Kill. Deed restrictions would be imposed to prevent noncommercial use of and restrict access to the site. Groundwater and surface water quality would be monitored and the asphalt cap would be maintained.

EFFECTIVENESS	IMPLEMENTABILITY	COST
Advantages	**Advantages**	**Advantages**
• Would reduce migration of coal tar to the Anthony Kill.	• Would require standard construction techniques.	• Engineering and capital costs may be less expensive than with a subsurface drain.
	• No groundwater treatment, therefore, minimal O&M required.	
	• No excavation required.	• Minimal O&M costs.
	• Does not require large work area to install.	• Minimal costs for disposing of excavated contaminated soil.
Disadvantages	**Disadvantages**	**Disadvantages**
• May cause mounding of contaminated groundwater upgradient of the barrier.	• Long-term monitoring would be required.	• Higher capital and O&M costs would be incurred if installation of perimeter containment wells is required.
• Mounding may increase migration of coal tar downward into the bedrock and alter groundwater flow patterns.	• Driving sheet piles may further fracture bedrock, increasing potential for coal tar migration.	
• Would not reduce toxicity or volume of contaminants.	• Construction may be difficult due to underground structures and proximity to the Anthony Kill.	
• Would not reduce migration of contaminated groundwater to Anthony Kill.	• May be necessary to grout piling seams to prevent leakage through interlocking joints.	
	• May be necessary to install perimeter containment wells near barrier to prevent mounding of contaminated groundwater upgradient of the barrier.	

Conclusion: Because this alternative would effectively control the migration of coal tar to the Anthony Kill, it is retained for detailed analysis.

TABLE 13-5

SCREENING OF REMEDIAL ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

DOWNGRADIENT EXTRACTION WELLS

Synopsis: This alternative would include installation of extraction wells to intercept and collect contaminated groundwater and coal tar discharging to the Anthony Kill. Extracted groundwater would be discharged to the local POTW or the Anthony Kill after pretreatment. Deed restrictions would be imposed to restrict noncommercial use of and access to the site. Groundwater and surface water quality would be monitored and the asphalt cap would be maintained.

EFFECTIVENESS	IMPLEMENTABILITY	COST
Advantages	**Advantages**	**Advantages**
• Would reduce migration of contaminated groundwater and coal tar to the Anthony Kill.	• Easier to install wells than to construct subsurface drain or barrier. Would require standard drilling techniques.	• Engineering and capital costs may be less expensive than downgradient drain.
• Would reduce mobility and volume of contaminants.	• No excavation of contaminated soil, hence, less health and safety and waste disposal concerns.	• Minimal costs for disposing of contaminated soil cuttings.
Disadvantages	**Disadvantages**	**Disadvantages**
• May not be capable of intercepting coal tar potentially migrating to the Anthony Kill.	• Long-term monitoring and maintenance would be required.	• Higher O&M costs than other alternatives.
• An excessive number of wells would be required to capture contaminant plume.	• Underground structures may prevent adequate well spacing and placement.	• Largest volume of groundwater to treat and dispose compared to other alternatives.
• Well point control may not be as effective as downgradient subsurface drains.		
• Coal tar may clog well screens.		

Conclusion: Because this alternative may not effectively capture coal tar potentially discharging to the Anthony Kill, it is not retained for detailed analysis.

TABLE 13-6

SCREENING OF REMEDIAL ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

UPGRADIENT SUBSURFACE DRAIN

Synopsis: This alternative would include installation of a subsurface drain upgradient of the site to divert uncontaminated groundwater around the site followed by discharge to the Anthony Kill. The drain would minimize migration of contaminated groundwater and coal tar to the Anthony Kill by minimizing groundwater flow across the site. Deed restrictions would be imposed to restrict noncommercial use of and access to the site. Groundwater and surface water quality would be monitored and the asphalt cap would be maintained.

EFFECTIVENESS	IMPLEMENTABILITY	COST
Advantages	**Advantages**	**Advantages**
• Would reduce migration of contaminated groundwater and coal tar to the Anthony Kill by minimizing groundwater flow across the site.	• Would require standard construction techniques.	• Lower capital cost required than other alternatives.
	• Less health and safety concerns during excavation because drain would not be installed in contaminated soils.	• No contaminated soil treatment/disposal costs.
Disadvantages	**Disadvantages**	**Disadvantages**
• Would not fully achieve response objectives because coal tar would remain as source to groundwater contamination.	• Long-term monitoring and maintenance would be required.	• Higher capital costs may be incurred if groundwater requires pretreatment.
• Would not reduce toxicity and volume of contamination.	• Pretreatment would be required before discharge to the Anthony Kill if upgradient groundwater does not meet ambient water quality standards.	
• May cause change in groundwater gradient on-site which would result in contaminated groundwater and coal tar flowing toward the drain.		
• Would lower water table on-site which may increase migration of coal tar downward into bedrock aquifer.		
• Although lateral flow is reduced, would be potential for gravity flow of coal tar to Anthony Kill.		

Conclusion: This alternative is not retained for detailed analysis because it would not meet response objectives. This alternative may also require groundwater treatment prior to discharge to the Anthony Kill, and it may increase coal tar migration to the bedrock.

TABLE 13-7

SCREENING OF REMEDIAL ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

UPGRADIENT SUBSURFACE DRAIN WITH DOWNGRADIENT BARRIER

Synopsis: This alternative would combine installation of a subsurface drain upgradient of the site with construction of a downgradient subsurface barrier. The drain would divert groundwater away from the site, and the sheet piles would mitigate migration of contaminated groundwater and coal tar to the Anthony Kill. Deed restrictions would be imposed to restrict noncommercial use of and access to the site. Groundwater and surface water quality would be monitored and the asphalt cap would be maintained.

EFFECTIVENESS	IMPLEMENTABILITY	COST
Advantages	**Advantages**	**Advantages**
• Would reduce migration of coal tar and contaminated groundwater to the Anthony Kill.	• Would require standard construction techniques.	• Construction costs readily estimated.
• Would reduce mobility of contaminants.	• Less health and safety concerns during excavation because drain would not be installed in contaminated soils.	• No contaminated soil treatment/disposal costs.
• Would minimize groundwater flow across the site.		
Disadvantages	**Disadvantages**	**Disadvantages**
• May cause change in groundwater gradient on-site which would result in contaminated groundwater and coal tar flowing toward the drain.	• Long-term monitoring and maintenance would be required.	• Higher capital costs incurred if groundwater requires pre-treatment.
• Would lower water table on-site which may increase migration of coal tar downward into bedrock aquifer.	• Driving sheet piles may further fracture bedrock, increasing potential for coal tar migration.	
• Would not reduce volume of contaminants	• Pretreatment may be required before discharge to the Anthony Kill if upgradient groundwater does not meet ambient water quality standards.	
	• Sheet pile construction may be difficult because of underground structures and proximity to Anthony Kill.	
	• May be necessary to grout piling seams to prevent leakage through interlocking joints.	

Conclusion: This alternative is retained for detailed analysis because it would effectively control migration of coal tar to the Anthony Kill.

TABLE 13-8

SCREENING STATUS OF REMEDIAL ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ALTERNATIVE	STATUS
Minimal Action	Retained
Downgradient Subsurface Drain	Eliminated
Downgradient Barrier Wall	Retained
Downgradient Extraction Wells	Eliminated
Upgradient Subsurface Drain	Eliminated
Upgradient Subsurface Drain with Downgradient Barrier	Retained

TABLE 14-1

CRITERIA FOR DETAILED ANALYSIS OF ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

CRITERIA	DESCRIPTION
Overall protection of human health and the environment	Describes how each alternative, as a whole, protects and maintains human health and the environment.
Compliance with SCGs*	Describes how the alternative complies with SCGs or if a waiver is required and how it is justified.
Long-term effectiveness and permanence	Evaluates the effectiveness of alternatives in protecting human health and the environment after response objectives have been met.
Reduction of mobility, toxicity, or volume through treatment	Evaluates the anticipated performance of the specific treatment technologies.
Short-term effectiveness	Examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation period until the response objectives are met.
Implementability	Assesses the technical and administrative feasibility of alternatives and the availability of required resources.
Cost	Evaluates the capital and operation and maintenance costs of each alternative.

Notes:

*SCGs = standards, criteria, and guidelines.

TABLE 14-2

COST SUMMARY TABLE FOR ALTERNATIVE 1: MINIMAL ACTION
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

DIRECT COST	$49,000
Direct costs include institutional controls, bedrock mapping, and monitoring well/seepage meter installation.	
INDIRECT COST	$6,000
Indirect costs include health and safety, legal, administration, permitting, engineering, and services during construction.	
TOTAL CAPITAL (DIRECT AND INDIRECT) COSTS	$55,000
PRESENT WORTH OF O&M COSTS (@ 5% FOR 30 YEARS)	$630,000
Operating and maintenance costs include environmental monitoring, five-year site reviews, and asphalt cover maintenance.	
TOTAL PRESENT WORTH FOR ALTERNATIVE 1	$685,000

Notes:

Cost estimates are based on available information and professional judgment. Changing market conditions and regulatory requirements may cause actual costs to vary from the estimated costs.

A contingency of 25 percent has been included in each direct, indirect, and O&M cost item.

TABLE 14-3

COST SUMMARY TABLE FOR ALTERNATIVE 2: DOWNGRADIENT BARRIER WALL
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

DIRECT COST	$426,000
Direct costs include institutional controls, mobilization/demobilization, site preparation, bedrock mapping, excavation and disposal of filter bed soils, and downgradient barrier wall installation.	
INDIRECT COST	$128,000
Indirect costs include health and safety, legal, administration, permitting, engineering, and services during construction.	
TOTAL CAPITAL (DIRECT AND INDIRECT) COSTS	$554,000
PRESENT WORTH OF O&M COSTS (@ 5% FOR 30 YEARS)	$630,000
Operating and maintenance costs include environmental monitoring, five-year site reviews, and asphalt cover maintenance.	
TOTAL PRESENT WORTH FOR ALTERNATIVE 2	$1,184,000

Notes:

Cost estimates are based on available information and professional judgment. Changing market conditions and regulatory requirements may cause actual costs to vary from the estimated costs.

A contingency of 25 percent has been included in each direct, indirect, and O&M cost item.

TABLE 14-4

COST SUMMARY TABLE FOR PERIMETER GROUNDWATER CONTAINMENT WELLS
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

DIRECT COST	$247,000 - $338,000
Direct costs include installation of perimeter containment wells, collection piping, treatment building construction, and the treatment system.	
INDIRECT COST	$74,000 - $120,000
Indirect costs include health and safety, legal, administration, permitting, engineering, and services during construction.	
TOTAL CAPITAL (DIRECT AND INDIRECT) COSTS	$321,000 - $440,000
PRESENT WORTH OF O&M COSTS (@ 5% FOR 30 YEARS)	$335,000 - $781,000
Operating and maintenance costs include power requirements, treatment residuals disposal, and treatment system monitoring.	
TOTAL PRESENT WORTH	$656,000 - $1,221,000

Notes:

Cost estimates are based on available information and professional judgment. Changing market conditions and regulatory requirements may cause actual costs to vary from the estimated costs.

A contingency of 25 percent has been included in each direct, indirect, and O&M cost item.

Cost estimate is for installation and O&M of groundwater containment wells only.

TABLE 14-5

COST SUMMARY TABLE FOR ALTERNATIVE 3: UPGRADIENT SUBSURFACE DRAIN WITH DOWNGRADIENT BARRIER
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

DIRECT COST	$670,000
Direct costs include institutional controls, mobilization/demobilization, bedrock mapping, excavation and disposal of filter bed soils, upgradient subsurface drain installation, and downgradient barrier wall installation.	
INDIRECT COST	$202,000
Indirect costs include health and safety, legal, administration, permitting, engineering, and services during construction.	
TOTAL CAPITAL (DIRECT AND INDIRECT) COSTS	$872,000
PRESENT WORTH OF O&M COSTS (@ 5% FOR 30 YEARS)	$818,000
Operating and maintenance costs include environmental monitoring, five-year site reviews, and asphalt cover maintenance.	
TOTAL PRESENT WORTH FOR ALTERNATIVE 3	$1,690,000

Notes:

Cost estimates are based on available information and professional judgment. Changing market conditions and regulatory requirements may cause actual costs to vary from the estimated costs.

A contingency of 25 percent has been included in each direct, indirect, and O&M cost item.

TABLE 15-1

COMPARATIVE ANALYSIS OF ALTERNATIVES
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

ALTERNATIVE	THRESHOLD CRITERIA		BALANCING CRITERIA					
	OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	COMPLIANCE WITH SCGs	LONG-TERM EFFECTIVENESS AND PERMANENCE	REDUCTION OF TOXICITY, MOBILITY, & VOLUME	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST	SCORE[1]
Alternative 1 Minimal Action	Existing site conditions are effective in controlling migration of coal tar. Currently no unacceptable risk to human health and the environment.	No location-specific SCGs apply to this site. Would comply with action-specific and chemical-specific SCGs.	Would maintain risk at current, insignificant level. Would not reduce potential future risk to ecological receptors.	Maintains reduced mobility due to asphalt cover integrity.	Impacts to community and site worker health and safety during implementation would be unlikely. Minimal short-term environmental impacts.	All components of Alternative 1 would be readily implementable.	Least costly of the alternatives. NPW = $0.7 M	69
Alternative 2 Downgradient Barrier Wall	Would reduce migration of overburden coal tar to Anthony Kill; would provide only minimal control of overburden groundwater.	No location-specific SCGs apply to this site. Would comply with action-specific and chemical-specific SCGs.	Alternative 2 may be slightly more effective than Alternative 1 in the long-term for controlling migration of overburden coal tar to the Anthony Kill. Minimal reduction of total overburden groundwater flow would be achieved.	Migration of overburden coal tar would be controlled.	Implementation impacts, air impacts, and nuisance dust would be minimal. Implementation time estimated to be 2 months to construct.	Well-developed, reliable technology. Requires standard construction techniques to implement. Construction may be difficult because of underground structures and proximity to Anthony Kill.	Least costly of the two remedial action alternatives. NPW = $1.2 M	64
Alternative 3 Upgradient Subsurface Drain with Downgradient Barrier Wall	Would reduce migration of overburden coal tar to Anthony Kill; would reduce total flow of overburden groundwater to stream by approximately 16 percent.	No location-specific SCGs apply to this site. Would comply with action-specific and chemical-specific SCGs.	Alternative 3 would provide similar long-term effectiveness to Alternative 2. It would, however, provide slightly greater control of total overburden groundwater flow to the Anthony Kill (i.e., 16 percent reduction).	Migration of overburden coal tar would be controlled. Total flow of overburden groundwater to Anthony Kill would be reduced slightly.	Impacts to worker health and safety would be slightly greater for Alternative 3 compared to Alternative 2 because of excavation and trenching required to install the subsurface drain. Implementation time estimated to be 2 months.	Well-developed, reliable technology. Requires standard construction techniques. Implementation requires obtaining a SPDES permit to discharge diverted, upgradient groundwater.	Most costly of the alternatives. NPW = $1.7 M	61

Notes:
SCGs = standards, criteria, and guidelines
MCL = Maximum Contaminant Level
NPW = net present worth
[1]Alternative score based on criteria in the NYSDEC TAGM 90-4030 for Selection of Remedial Alternatives at Inactive Hazardous Waste Sites (NYSDEC, 1990) (see Appendix F).

APPENDIX A

Monitoring Well/Soil Boring Information

Former Coal Gasification Site
Mechanicville, New York

APPENDIX A-1

Soil Boring Logs

Former Coal Gasification Site
Mechanicville, New York

FIELD BORING LOG

BORING NO.: B-16 (MW-16)

Client: **NYSEG-MECHANICVILLE SITE**			Project No.: **4945-10**
Contractor: **Empire Soils, Inc.**		Date Started: 5/17/93	Date Completed: 5/17/93
Method: HSA	Casing Size: 4.25" ID	PID: TE 508 B	Protection Level: mod B D
Ground Elev.: 952.8 ft MSL	Soil Drilled: 16'	Total Depth: 16'	Ground Water Depth (BGS): ≈ 8
Logged by: NSG		Checked by: NSG	Date: 6/16/93

Page

Depth (FT)	PID AIR (PPM)	Sample Number and Depth	LAB Analysis	Field UV/IR	Recovery/ Penetration	PID Sample (PPM)	Soil/Rock Description	Soil Class	Blows/6 inches	Well Data	Depth (FT)
0	0.0	S-1 0'-2'			2.0/2.0	0.0	DARK BROWN SAND & SILT SOME ORGANICS, TRACE BROKEN GLASS, TRACE BRICK, MOD. DENSE, PR GRADED, MOIST	FILL	5-5-3-7		0
2	0.0	S-2 2'-4'			1.2/2.0	0.0	DARK BROWN F. SAND AND GRAVEL, PR GRADED, DENSE, MOIST, (GRAVEL CONSIST OF SHALE FRAGMENTS)	FILL	5-6-2-7		2
4	0.0	S-3 4'-6'			2.0/2.0	0.0	DARK BROWN TO BLACK SHALE FRAGMENTS IN F SAND AND SILT MATRIX. PR GRADED, DENSE, ~~MOIST~~ MOIST AT 5.2' BGS. WEATHERED ROCK IN TIP OF SPOON	GP	10-15-25-45		4
6	6.0	S-4 4'-8'	✓		1.6/1.6	0.0	DARK BROWN TO GREY F. SAND AND WEATHERED SHALE, TR. SILT, DENSE PR. GRADED. DRY	GP	22-55-80-100/0.1		6
8	0.0	S-5 8'-10'			0.8/2.0	0.0	GREY WEATHERED SHALE, SOME SILT, PR GRADED, DRY. (WEATHERED BEDROCK)		55-100/0.3		8
10											10
12	0.0	S-6 11.5-13.5			0.0/0.1	0.0	NO RECOVERY		100/0.1		12
14	0.0	S-7 13.5-			0/0	0.0	NO RECOVERY.		100/0.0		14
16							BOB 16' BGS				16
18											18

FIELD BORING LOG

BORING NO.: B-17 (MW-17)

Client: **NYSEG-MECHANICVILLE SITE**			Project No.: **4945-10**
Contractor: **Empire Soils, Inc.**		Date Started: 5/18/93	Date Completed: 5/18/93
Method: HSA	Casing Size: 4.25" ID	PID: TE 508 B	Protection Level: mod D
Ground Elev.: 948.18 ft MSL	Soil Drilled: 20'	Total Depth: 22.5' BGS	Ground Water Depth (BGS): 19.4'
Logged by: NSG		Checked by: NSG	Date: 6/16/93

Depth (FT)	PID AIR (PPM)	Sample Number and Depth	LAB Analysis	Field UV/IR	Recovery/ Penetration	PID Sample (PPM)	Soil/Rock Description	Soil Class	Blows/6 inches	Well Data	Depth (FT)
18											
	0.0	S-10 18-20	V (Qual)		2.0 / 2.0	0.0	BROWN TO GREY F. SAND AND SILT FIRM, DENSE, PR GRADED, SATURATED.	SP/GP	7-6-6-5		
20											
	0.0	S-11 20-22'			2.0 / 2.0	0.0	GREY TO BROWN F. SAND, LITTLE SILT, SOME FE STAINING, 0.1' LAYER OF SHALE AT 21.7' BGS LOOSE TO GRADED, SATURATED	SP	7-10-11-14		
22											
	0.0	S-12 22-24'			0.8 / 0.8	0.0	GREY TO BROWN F. SAND, LITTLE SILT, SOME FE STAINING, LOOSE, PR GRADED, SATURATED. BEDROCK AT 22.5' BGS	SP	63 - 100/0.3		
24											
							BOT = 22.5' BGS				
26											

WL 19.4

FIELD BORING LOG

BORING NO.: B-20

Client: **NYSEG-MECHANICVILLE SITE**			Project No.: **4945-10**
Contractor: **Empire Soils, Inc.**		Date Started: 5/20/93	Date Completed: 5/20/93
Method: Drive Split Spoon	Casing Size: 2" ID	PID: TE 508 B	Protection Level: MOD. D
Ground Elev.: 892 ft MSL	Soil Drilled: 12'	Total Depth: 12'	Ground Water Depth (BGS):
Logged by: NSG, DBD		Checked by: NSG	Date: 6/16/93

Depth (FT)	PID AIR (PPM)	Sample Number and Depth	LAB Analysis	Field UV/IR	Recovery/ Penetration	PID Sample (PPM)	Soil/Rock Description	Soil Class	Blows/6 inches	Well Data	Depth (FT)
0	0.0	S-1 0'-2'			1.1/2.0	0.0	GRAY F. SAND AND SOME SILT, LITTLE GRAVEL, LITTLE COARSE SAND, WELL GRADED LOOSE, DRY	~~FILL~~ FILL	26 20-10-5		0
2	0.0	S-2 2'-4'				4.8	GRAY, ROOTS SAND AND GRAVEL STRONG HYDROCARBON ODOR, LOOSE, SATURATED	FILL	4-5-4-3		2
4	NA	S-3 4-6				NA*	NO RECOVERY		4-3-1-1		4
6	NA	S-4 6-8'				NA	NO RECOVERY, SHEEN ON SPOON		1-1-1-1		6
8	0.0	S-5 8-10'				6	BLACK COAL TAR AND CS. SAND INTENSE HYDROCARBON ODOR * DRILLER INDICATED A "TILE" LIKE STRUCTURE AT 9' BGS	FILL	7-20 55-31		8
10		S-6 10'-12'					10-10.2 BLACK CS SAND AND COAL TAR INTENSE HYDROCARBON ODOR 10.2-10.9 WEATHERED BEDROCK REFUSAL AT 10.9' BGS	FILL	34-100/0.1		10
12							B03 ~~TD~~ = 12' BGS				12
14											14
16							* PID IS NOT ACURATE DUE TO RAIN AND HUMIDITY				16

FIELD BORING LOG

BORING NO.: B-22

Client: **NYSEG-MECHANICVILLE SITE**			Project No.: **4945-10**
Contractor: **Empire Soils, Inc.**		Date Started: 5/20/93	Date Completed: 5/20/93
Method: Drive Split Spoon	Casing Size: 2" ID	PID: TE 508 B	Protection Level: mod B
Ground Elev.: 861.2 ft MSL	Soil Drilled: 8	Total Depth: 8' BGS	Ground Water Depth (BGS):
Logged by: DBD		Checked by: NSG	Date: 6/16/93

Depth (FT)	PID AIR (PPM)	Sample Number and Depth	LAB Analysis	Reid UV/IR	Recovery/ Penetration	PID Sample (PPM)	Soil/Rock Description	Soil Class	Blows/6 inches	Well Data	Depth (FT)
0	*	S-1 0-2'			1.5/20	*	0-0.7' BROWN F. SAND, SOME SILT 0.7-1.1' BLACK F. LOAM 1.1-1.5 BROWN SHALE FRAGMENTS IN F SAND MATRIX, STRONG ODOR.	FILL	11-11-7-7		0
2		S-2 2-4'			0.5/2.0		GREY CS SAND, AND F. SAND W/ PIECES OF WOOD, SLIGHT SHEEN, HYDROCARBON ODOR, WELL GRADED LOOSE, MOIST.	FILL	4-4-4-4		2
4		S-3 4'-6'			1.5/20		BROWN CS SAND AND F SAND GRADING TO F. SAND AND SILT AT ≈ 4.3' BGS 5.0'-5.5' WEATHERED SHALE. STRONG HYDROCARBON ODOR.	FILL	1-3-11-20		4
6		S-4 6-8'			1.8/19		BROWN-GRAY WEATHERED SHALE. SATURATED, STRONG HYDROCARBON ODOR	FILL/BEDROCK			6
8							BOH = 8'				8
10							* PID IS NOT WORKING DUE TO HUMIDITY AND RAIN.				10
12											12
14											14

FIELD BORING LOG

BORING NO.: B-24

Client: **NYSEG-MECHANICVILLE SITE**			Project No.: **4945-10**
Contractor: **Empire Soils, Inc.**		Date Started: 5/20/93	Date Completed: 5/20/93
Method: D2" split spoon	Casing Size: 2" ID	PID: TE 508 B	Protection Level: mod D
Ground Elev.: 88.9 ft MSL	Soil Drilled: 6'	Total Depth: 6'	Ground Water Depth (BGS):
Logged by: DTD		Checked by: NSC	Date: 6/16/93

Depth (FT)	PID AIR (PPM)	Sample Number and Depth	LAB Analysis	Field UV/IR	Recovery/ Penetration	PID Sample (PPM)	Soil/Rock Description	Soil Class	Blows/6 inches	Well Data	Depth (FT)
0	0	S-1 0'-2'			0.6/2.0	0	DARK BROWN CS SAND, F SAND SOME GRAVEL, WELL GRADED, DENSE NO ODOR, DRY	FILL	5-7-60-15		0
2		S-2 2'-4'			0.6/2.0		BLACK SILT, SOME CS SAND, STEEN ON OUTSIDE OF SPOON, DRY, DENSE	FILL	3-2-3-5		2
4		S-3 4'-6'			1.4/2.0		BLACK CS. SAND, VISIBLE CONTAMINATION (COAL TAR), STRONG HYDROCARBON ODOR, WEATHERED SHALE IN BOTTOM OF SAMPLE, DRY	FILL BED. ROCK	16 12-25-100/.3		4
6							B03 = 6' PID NOT WORKING DUE TO RAIN AND HUMIDITY				6
8											8
10											10
12											12

APPENDIX A-2

Visual Rock Core Logs

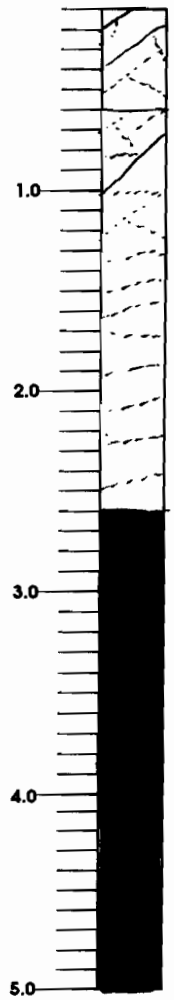
Former Coal Gasification Site
Mechanicville, New York

VISUAL IDENTIFICATION ROCK CORES

B-18/MW-18

Client: **NYSEG - Mechanicville Site**	Project No.: 4945-10	Sample: S-1	Core Recovery: 2.6'
	Date 5/19/93	Core Diameter(in): NX = 3"	Required 92 %
Drilling Co.: Empire Soils, Inc.	Boring No.: B-18/MW-18	Depth (ft): 23-27'	Rock Quality: EXCELLENT
Logged by: NSG	Checked by: NSG	Core Length: 4.0'	Sheet 1 of 4

CORE RECOVERY (FT.)



TOTAL 2.6 FT.

65 (%)

0.3 FT CORE RECOVERY

0.7

1.7

TOTAL 2.4 FT.

92 (%)

ROCK DESCRIPTION AND IDENTIFICATION

DARK BLUE-GREY SHALE, VANES AT APPROXIMATELY 30°

SILT AND ROCK FLOUR PRESENT ON MECHANICAL AND NATURAL FRACTURES.

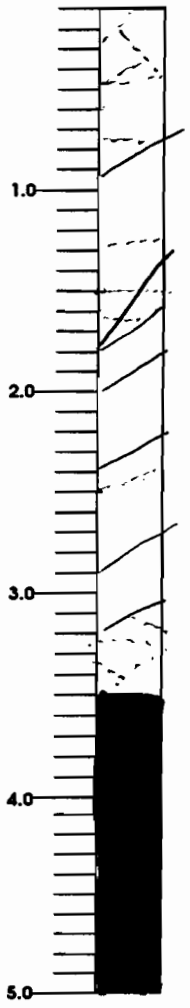
APPROXIMATELY 1.5' LOST TO ROCK FLOUR. MOST MECHANICAL FRACTURES ARE ROUNDED SUGGESTING "ROLLING" IN THE CORE BARREL.

VISUAL IDENTIFICATION ROCK CORES

B-18 / MW-18

Client: **NYSEG - Mechanicville Site**	Project No.: 4945-10	Sample: S-3	Core Recovery: 35
	Date 5/19/93	Core Diameter(in): NX (3")	Required 66 %
Drilling Co.: Empire Soils, Inc.	Boring No.: B-18 / MW-18	Depth (ft): 30'-34'	Rock Quality: FAIR
Logged by: NSC	Checked by: NSC	Core Length: 4.0	Sheet 3 of 4

CORE RECOVERY (FT.)



TOTAL 3.5 FT.

88 (%)

0.3 FT CORE RECOVERY

0.8

0.7

0.4

0.4

TOTAL 2.3 FT.

66 (%)

ROCK DESCRIPTION AND IDENTIFICATION

DARK BLUE-GREY SHALE, SOME CALCITE INCLUSIONS DARK GREY TO BLACK VARVES AT 30° AT A 1" INTERVALS.

APPENDIX A-3

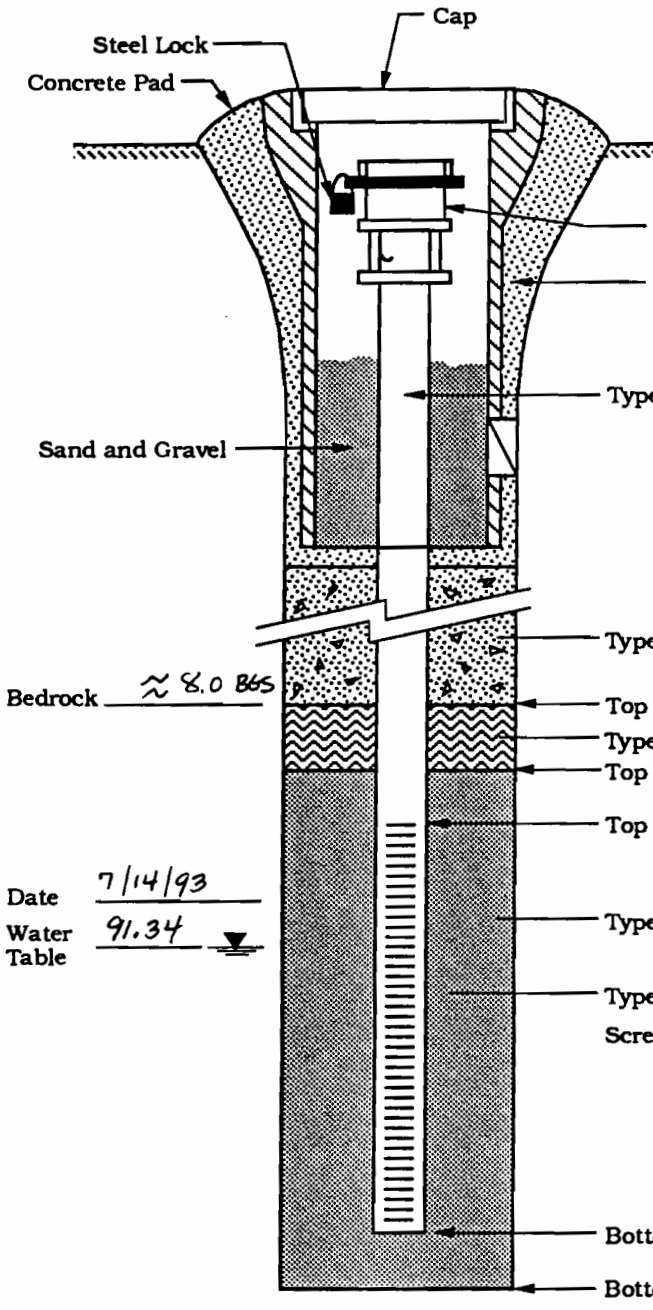
Monitoring Well Diagrams

Former Coal Gasification Site
Mechanicville, New York

FLUSH MOUNT MONITORING WELL INSTALLATION DIAGRAM

WELL I.D.: MW-16 (B-16)

Client: **NYSEG - Mechanicville Site**	Boring Diameter: ≈ 1'	Project No.: 4945-10
	Well Inside Diameter: 2"	Date Installed: 5/17/93
Drilling Co.: **Empire Soils, Inc.**	Well Material: Stainless Steel	Drilling Method: HSA
Field Scientist: NSG	Top of Well Elevation: 95.28	Development Method: Pump & Surge



Elevation (feet, Relative)

Depth (feet,bgs)

95.28

Type of Riser 2" ID Stainless Steel

Type of Grout Bentonite/Cement

	Depth (feet,bgs)	Elevation (feet, Relative)
Top of Seal	2	93.3
Type of Seal Bentonite Pellets		
Top of Sand Pack	4	91.3
Top of Screen	6	89.3

Type of Sand Pack Morie Ø #9947 Silica Sand

Type of Screen 2" ID Stainless Steel

Screen Slot Size 0.010

	Depth (feet,bgs)	Elevation (feet, Relative)
Bottom of Screen	16	79.3
Bottom of Borehole	16	79.3

NOT TO SCALE

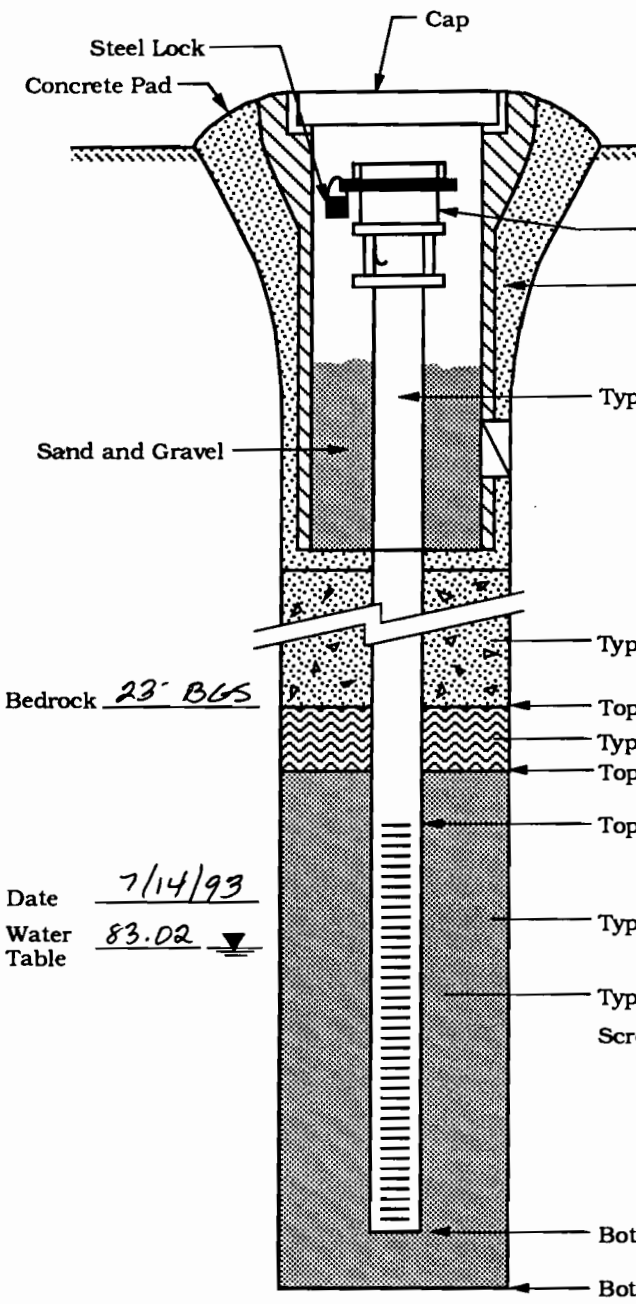
9307053D

ABB Environmental Services, Inc.

FLUSH MOUNT MONITORING WELL INSTALLATION DIAGRAM

WELL I.D.: MW-18 (B-18)

Client: **NYSEG - Mechanicville Site**	Boring Diameter: ≈ 1'	Project No.: 4945-10
	Well Inside Diameter: 2" ID	Date Installed: 5/19/93
Drilling Co.: **Empire Soils, Inc.**	Well Material: Stainless Steel	Drilling Method: HSA
Field Scientist: NSG	Top of Well Elevation: 98.12	Development Method: Pump & Surge



	Depth (feet, bgs)	Elevation (feet, Relative)
Top of Riser		98.12
Type of Riser	2" ID Stainless Steel	
Type of Grout	Bentonite/Cement	
Top of Seal	24	74.1
Type of Seal	Bentonite Pellets	
Top of Sand Pack	26	72.1
Top of Screen	28	70.1
Type of Sand Pack	Morie Ø Silica Sand	
Type of Screen	2" ID Stainless Steel	
Screen Slot Size	0.010'	
Bottom of Screen	38	60.1
Bottom of Borehole	38	60.1

NOT TO SCALE

9307053D

ABB Environmental Services, Inc.

APPENDIX B

Hydraulic Conductivity Report

Former Coal Gasification Site
Mechanicville, New York

Introduction

During the Phase IIA Supplemental RI, the hydraulic conductivity (K) of the overburden and bedrock water bearing zones beneath the Mechanicville site have been estimated through the performance of in situ rising head tests. During in situ tests, the water bearing zones were stressed by lowering the water level in monitoring wells and recording the rate of water level recovery to prestress conditions. The water level recovery data was then input to mathematical formulas to estimate the K of the water bearing zones in which the monitoring wells were screened.

In Situ Tests

In accordance with the Phase IIA Supplemental RI Work Plan, in situ rising head tests were performed at MW-16, MW-17 and MW-18. A weighted PVC slug was use to displace the water.

Prior to in situ testing at each monitoring well, the cap was removed to allow the water level in the well to stabilize (reach its static condition). After the water level stabilized, a pressure transducer was lowered into the well and placed approximately 6 inches above the bottom of the well. The pressure transducer, which reads and transmits the overlying water pressure data, was connected to a Hermit 2000 Data Logger. The Data Logger, which converts the pressure readings to water levels, records and stores the data for future analysis. For in situ tests the data logger initially records water levels approximately every 1/2 second. This rate decreases after two minutes into the test when water levels are recorded every 30 seconds.

After installation of the pressure transducer and data logger, slug tests, utilizing a weighted PVC slug, were performed the Phase IIA Supplemental RI monitoring wells, MW-16, MW-17 and MW-18. The slug was carefully lowered into the well, so not to disturb the transducer. After the water level had returned to static conditions, the slug was rapidly removed from the water, causing a sudden decrease in the water level. Simultaneously, the data logger was activated and the water level recovery was recorded. When the water level in the well recovered to its static condition, the test was complete. Two (2) to three (3) tests were performed on each monitoring well.

In Situ Test Analysis

All slug tests were analyzed by the Bouwer-Rice method (1976) for slug tests in unconfined aquifers. This analysis is incorporated in the Aqtesolv$_{tm}$ computer program, which was used to calculate K estimates. This appendix contains: Table B-1 which presents the test results; the time-displacement graphs; and the equation used in the program's application of the Bouwer-Rice method.

Conclusion

The Bouwer-Rice method yields realistic estimates of K that are consistent with previous work conducted at the Mechanicville site. Hydraulic conductivity test performed during Tasks 2, 3, and 4 report average K values of 3.3 X 10^{-4}, 6.2 X 10^{-4}, and 2.7 X 10^{-4} measured at monitoring wells screened in the overburden, overburden/shallow bedrock, and bedrock respectively. Hydraulic conductivity test performed at MW-17, MW-16 and MW-18, screened in the overburden,

overburden/shallow bedrock, and bedrock estimated K at values of 1 X 10^{-3}, 4 X 10^{-5}, and 1 X 10^{-5} respectively.

REFERENCES

Bouwer, H. and R.C. Rice, 1976. "A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells."; Water Resources Research; Vol. 12, No. 3; pp. 423-428.

TABLE B-1

SUMMARY OF HYDRAULIC CONDUCTIVITY RESULTS
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
NYSEG FORMER COAL GASIFICATION SITE
MECHANICVILLE, NEW YORK

WELL BORING LOCATION	GEOLOGIC ZONE SCREENED	TOTAL BORING DEPTH (FEET BGS)	LOCATION OF SCREENED INTERVAL (FEET RELATIVE)	EFFECTIVE SCREEN LENGTH (FEET)	TEST METHOD	AVERAGE HYDRAULIC CONDUCTIVITY (cm/sec)
MW-1	Overburden/Shallow Bedrock	20.0	76.0 - 70.78	8	Falling Head	9.5 E-4
MW-2	Overburden/Shallow Bedrock	16.0	80.4 - 77.3	8	Falling Head	1.1 E-3
MW-3	Overburden	9.0	84.4 - 79.5	6.5	Falling Head	1.6 E-4
MW-4	Overburden	16.5	81.7 - 76.7	8.5	Falling Head	1.9 E-4
MW-5	Overburden/Shallow Bedrock	19.5	74.9 - 69.9	13	Falling Head	5.4 E-4
MW-6	Bedrock	31.5	65.7 - 60.7	10	Falling Head/Packer	1.5 E-4
MW-10	Overburden	19.5	88.0 - 77.2	13	Rising Head	2.2 E-5
MW-11	Overburden/Shallow Bedrock	18.0	82.6 - 77.1	12	Rising Head	2.0 E-4
MW-12	Overburden	25.5	83.8 - 72.8	13	Rising Head	4.0 E-4
MW-13	Bedrock	55.5	53.9 - 43.1	15	Rising Head/Packer	5.7 E-4
MW-14	Bedrock	55.0	68.7 - 57.7	13	Rising Head/Packer	4.3 E-4
MW-15	Bedrock	39.0	75.5 - 64.5	13	Rising Head/Packer	1.7 E-4
MW-16	Overburden/Shallow Bedrock	16.0	89.3 - 79.3	12	Rising Head	3.9 E-5
MW-17	Overburden	22.5	85.7 - 75.7	12	Rising Head	1.2 E-3
MW-18	Bedrock	38.0	70.1 - 60.1	12	Rising Head	1.1 E-5

Notes:

1) BGS - below ground surface
2) Elevation relative to 100-foot datum
3) cm/sec - centimeters per second

Bouwer-Rice Equation for Hydraulic Conductivity

Basic Equations:

Equation 1

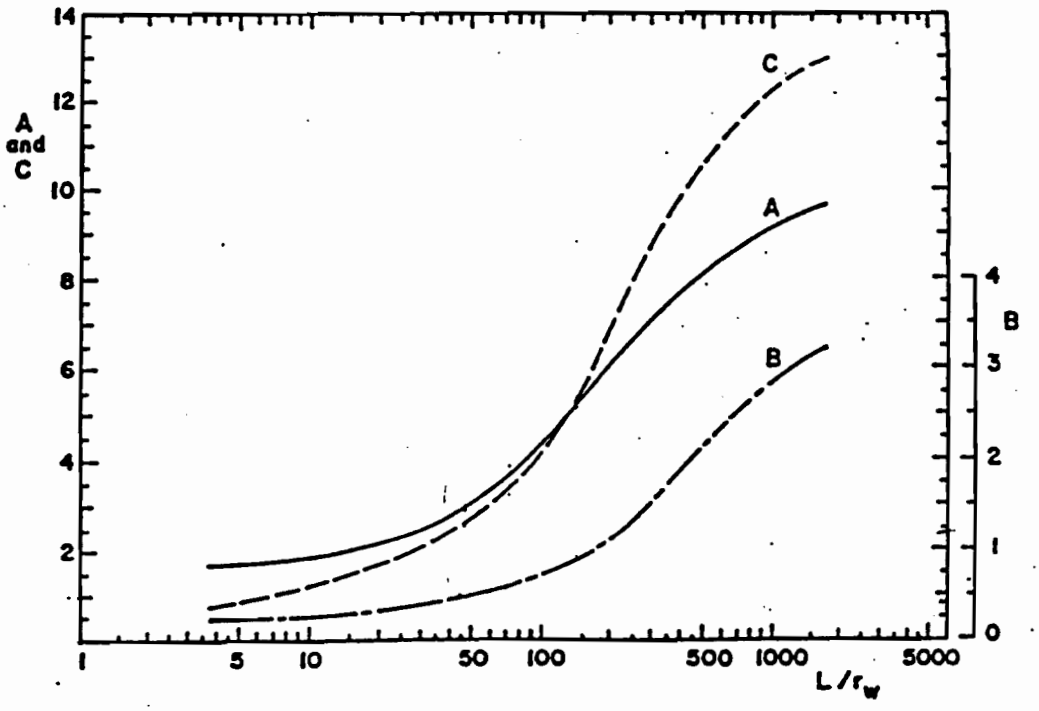
$$\ln \frac{R_c}{R_w} = \left[\frac{1.1}{\ln \frac{H}{r_w}} + \frac{C}{\frac{L}{r_w}}\right]^{-1}$$

Equation 2

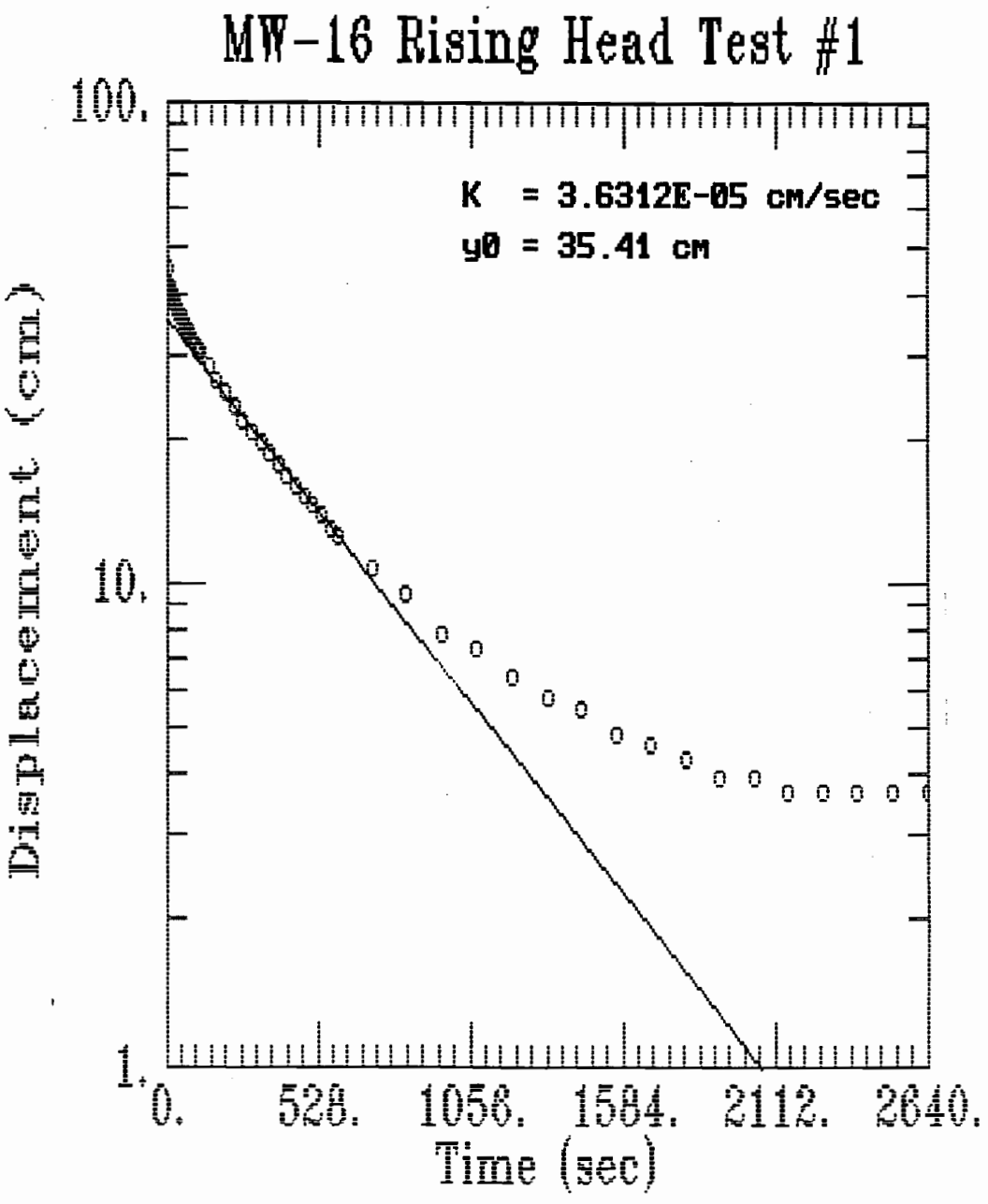
$$K = \left[\frac{r_c^2 \ln \frac{R_c}{R_w}}{2L}\right] \frac{1}{t} \ln \frac{y_o}{y_t}$$

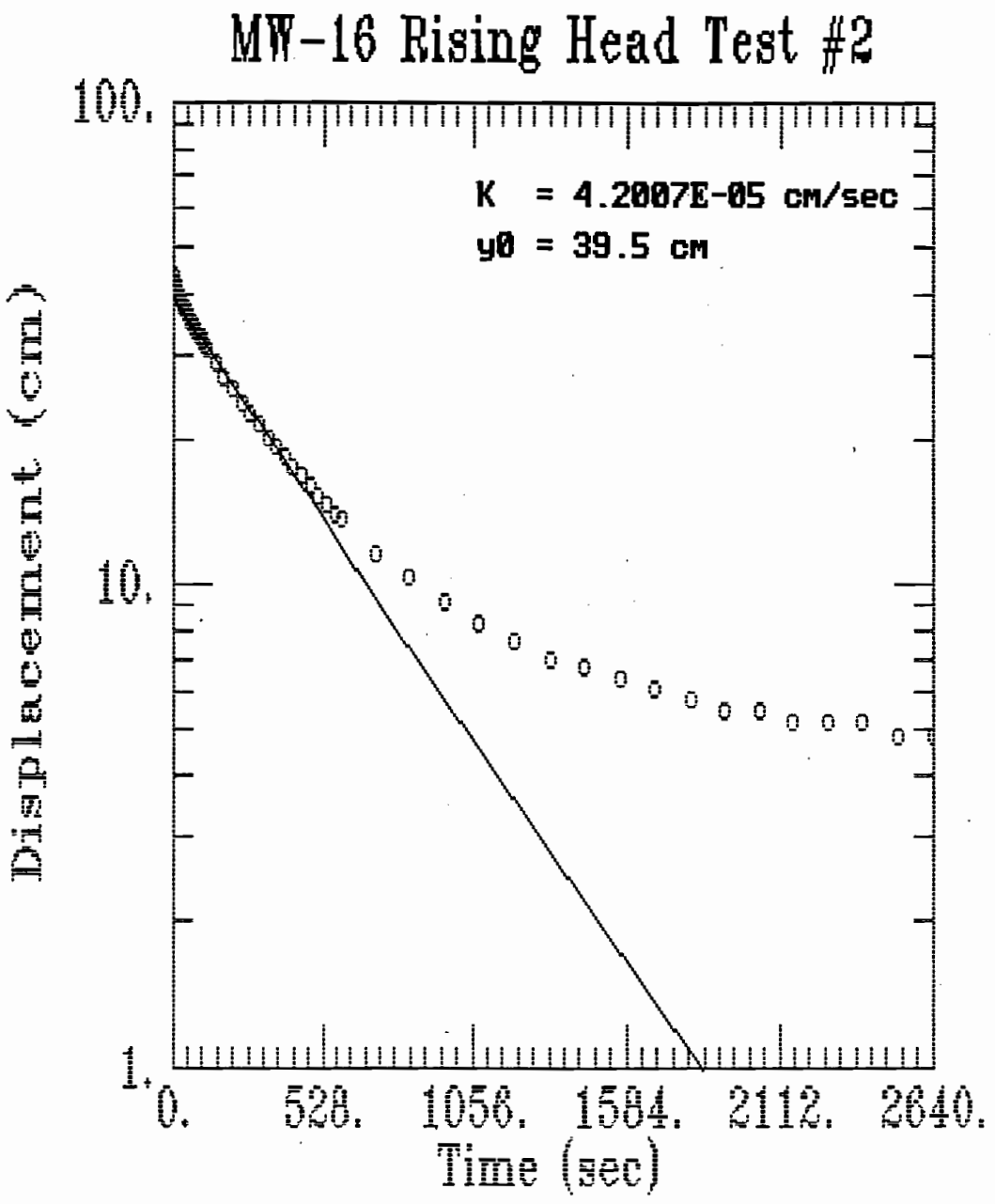
where

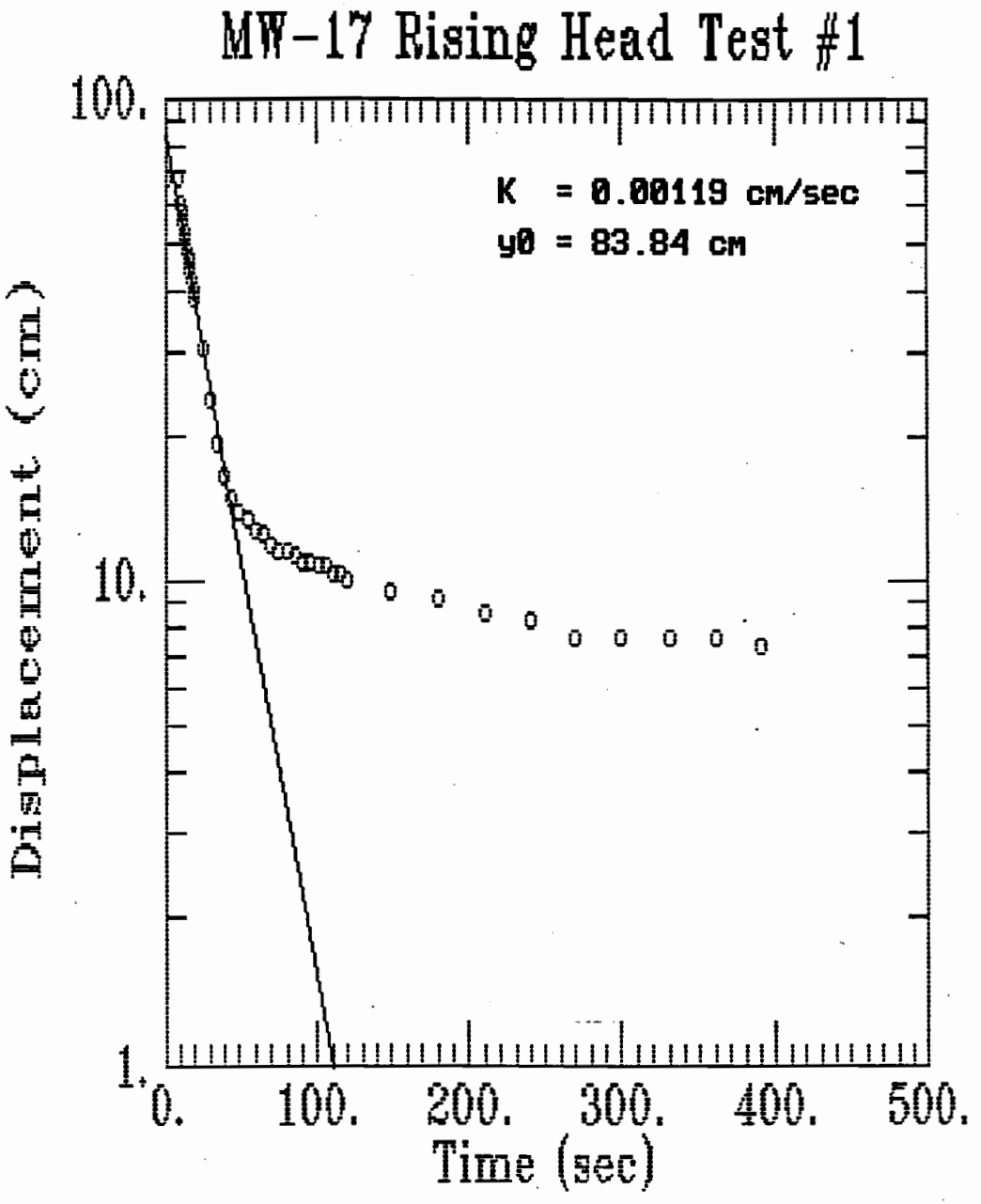
R_c	-	radius of the well casing
R_w	-	radius of the bore hole
H	-	static height of water in the well
L	-	effective screen length
t_o	-	start time
t	-	time in seconds
Y_o	-	displacement at time = t_o
K	-	hydraulic conductivity
C	-	a dimensionless variable derived from the Bouwer-Rice A, B, C, vs. L/r_w graph

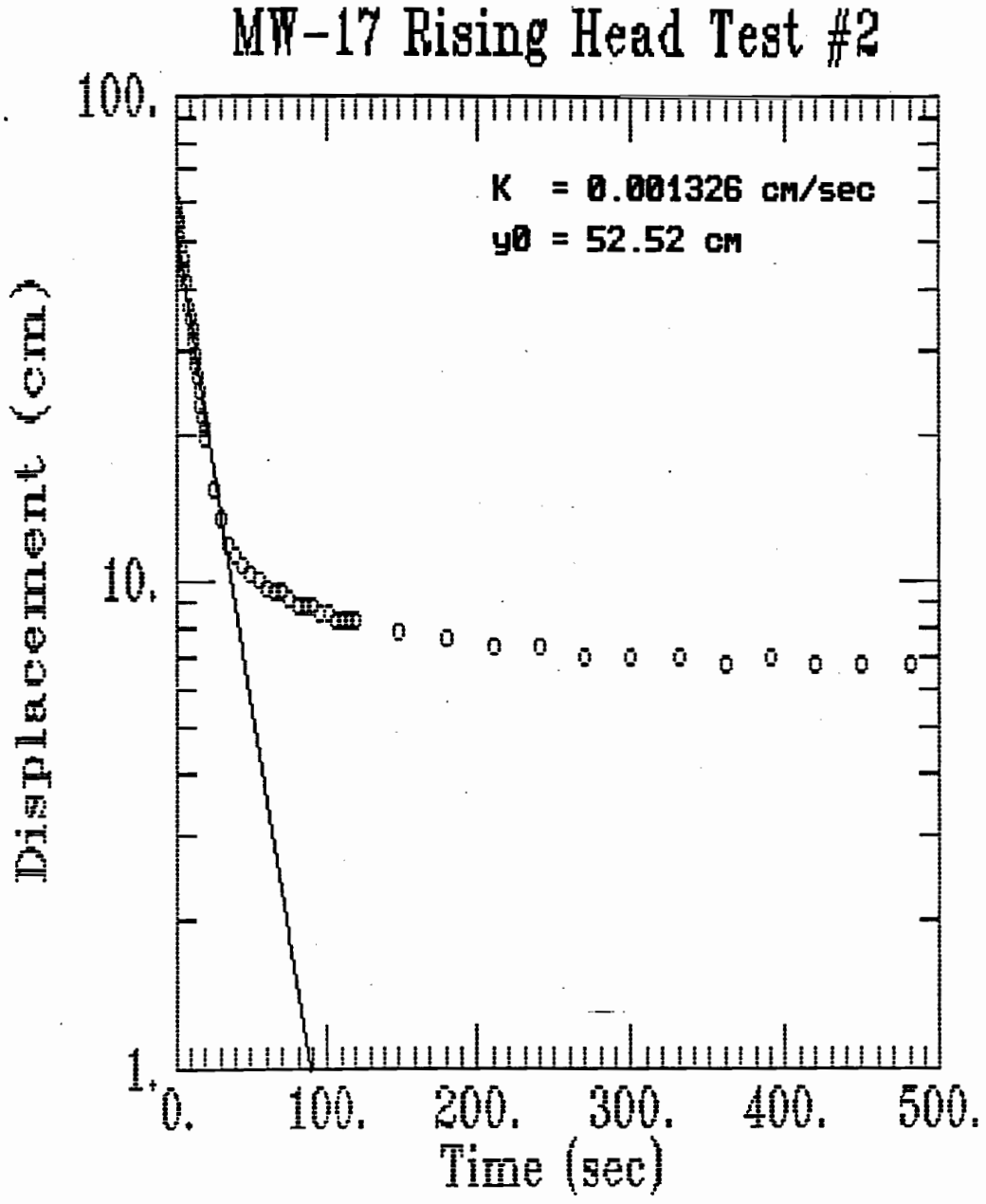


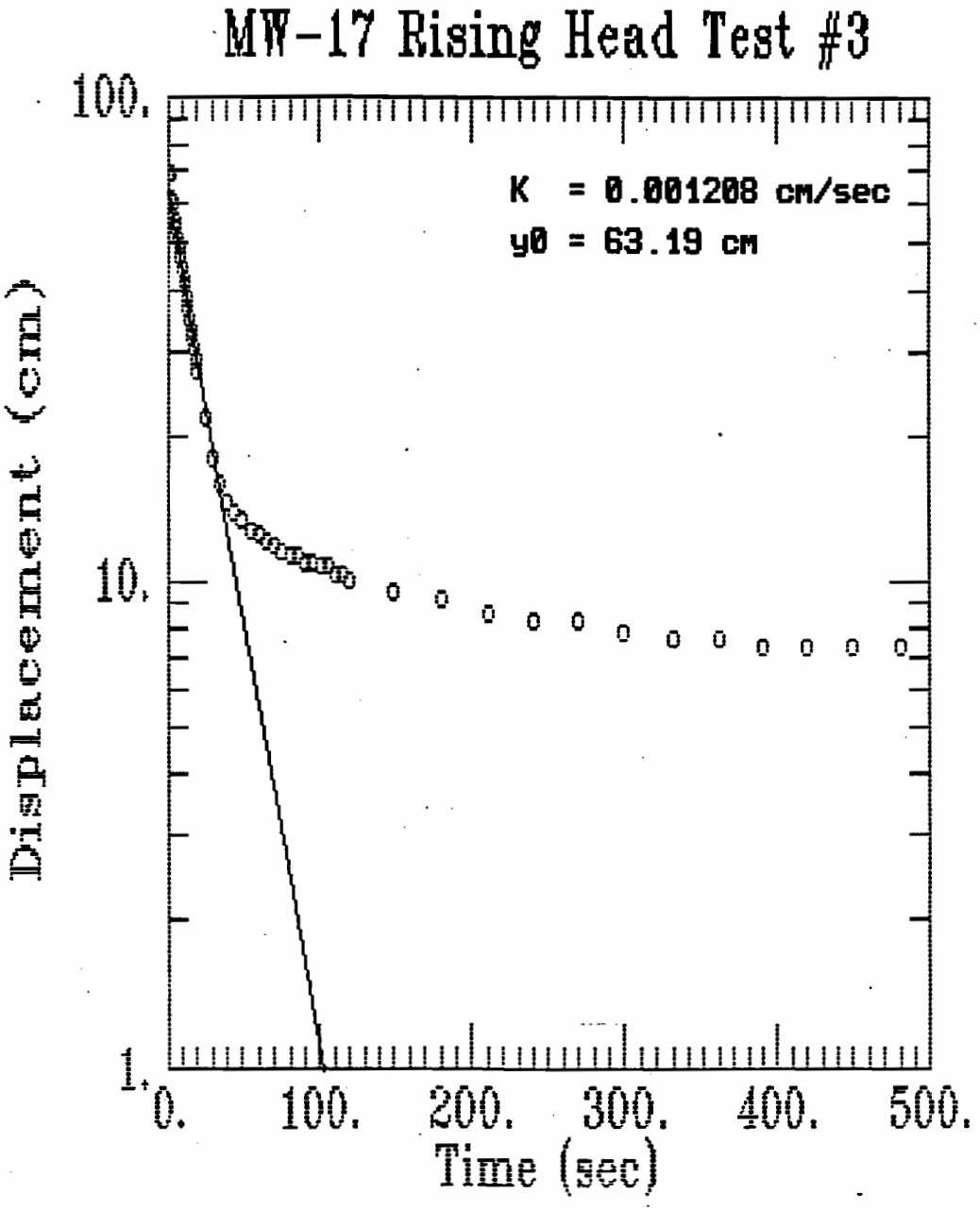
Curves relating coefficients A, B, and C to L/R_w. (From Bouwer and Rice, 1976).

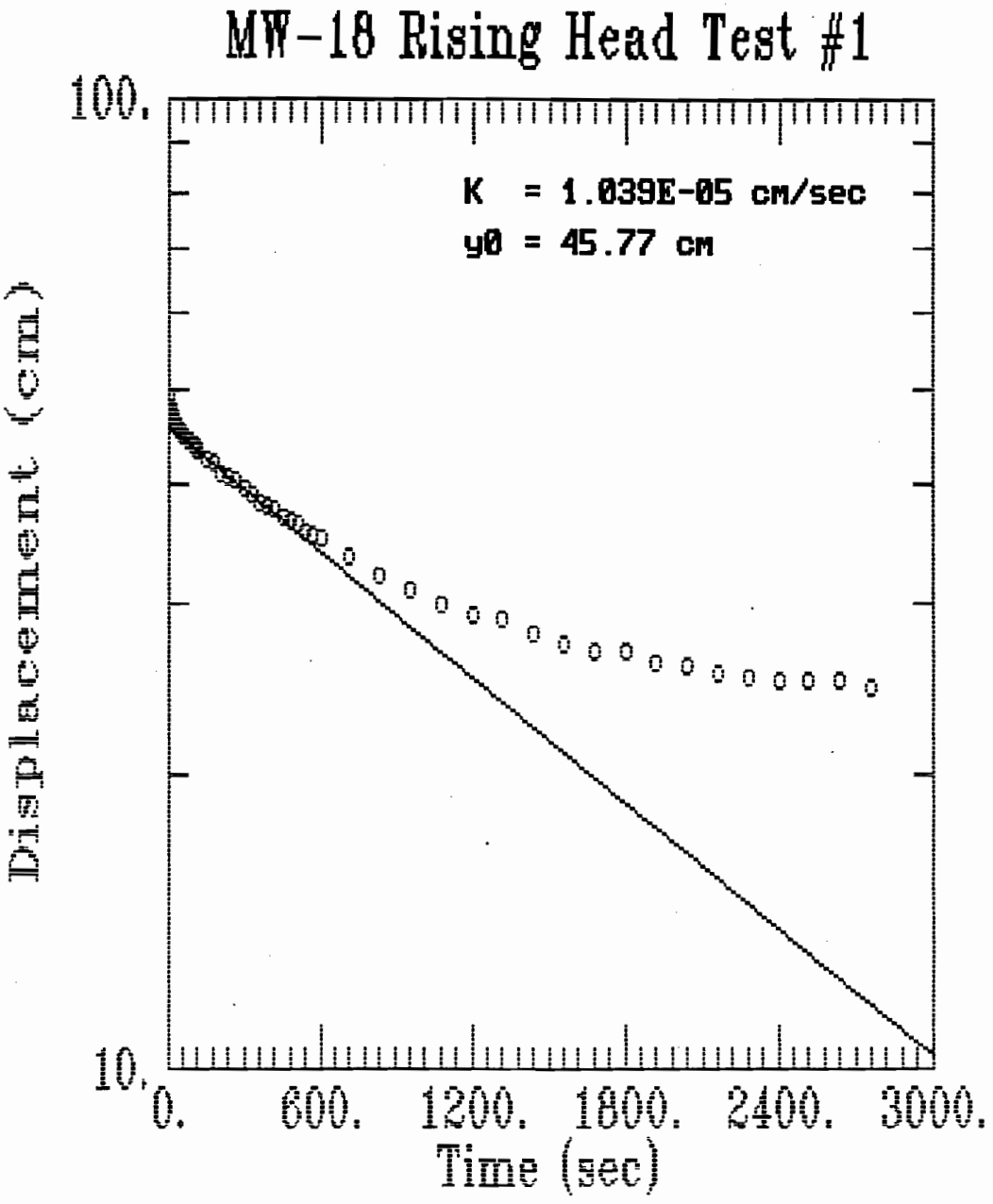

MW-16 Rising Head Test #1
K = 3.6312E-05 cm/sec
y0 = 35.41 cm
Displacement (cm)
100.
10.
1.
0.
528.
1056.
1584.
2112.
2640.
Time (sec)

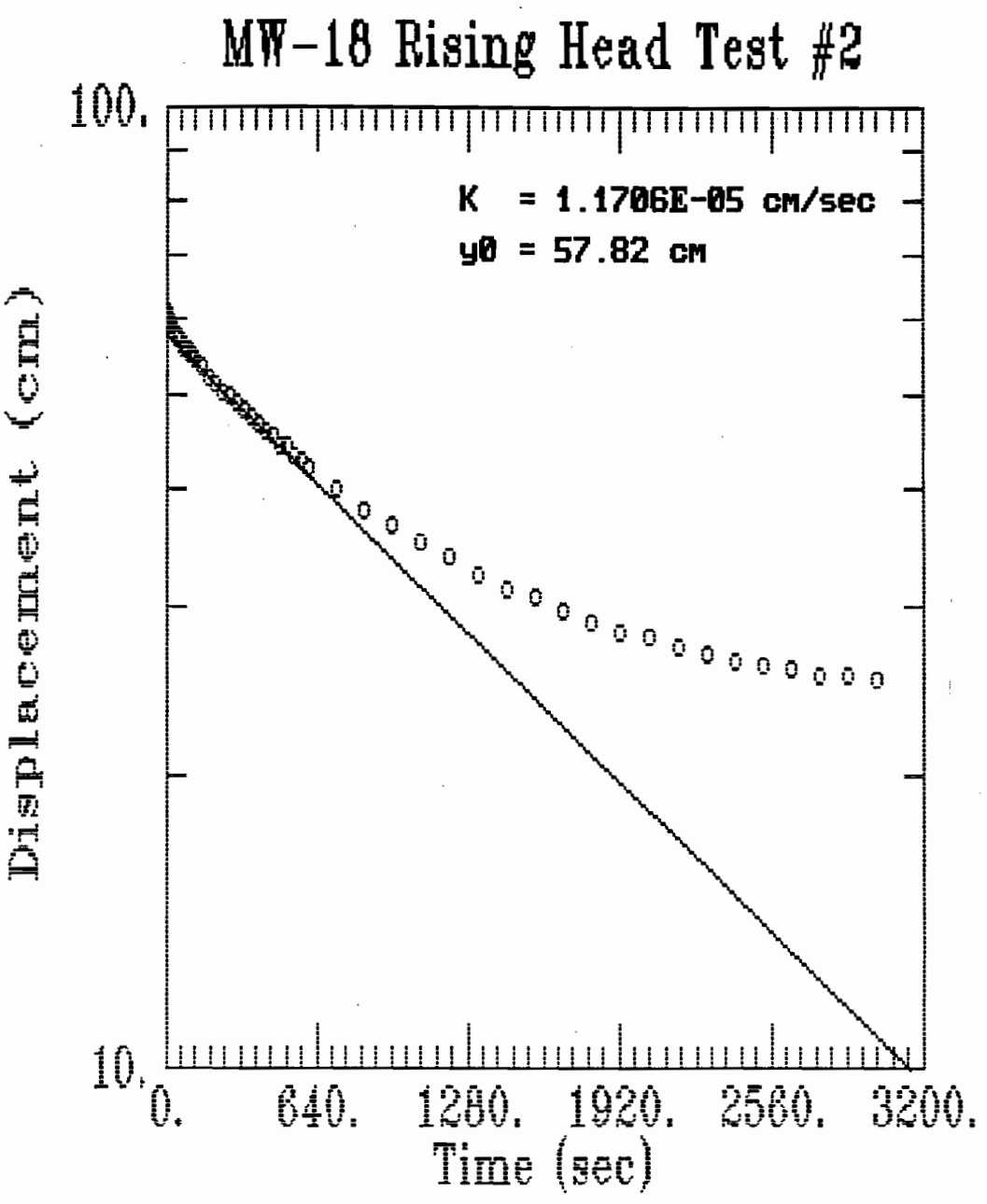

MW-16 Rising Head Test #2
K = 4.2007E-05 cm/sec
y0 = 39.5 cm
Displacement (cm)
100.
10.
1.
0.
528.
1056.
1584.
2112.
2640.
Time (sec)

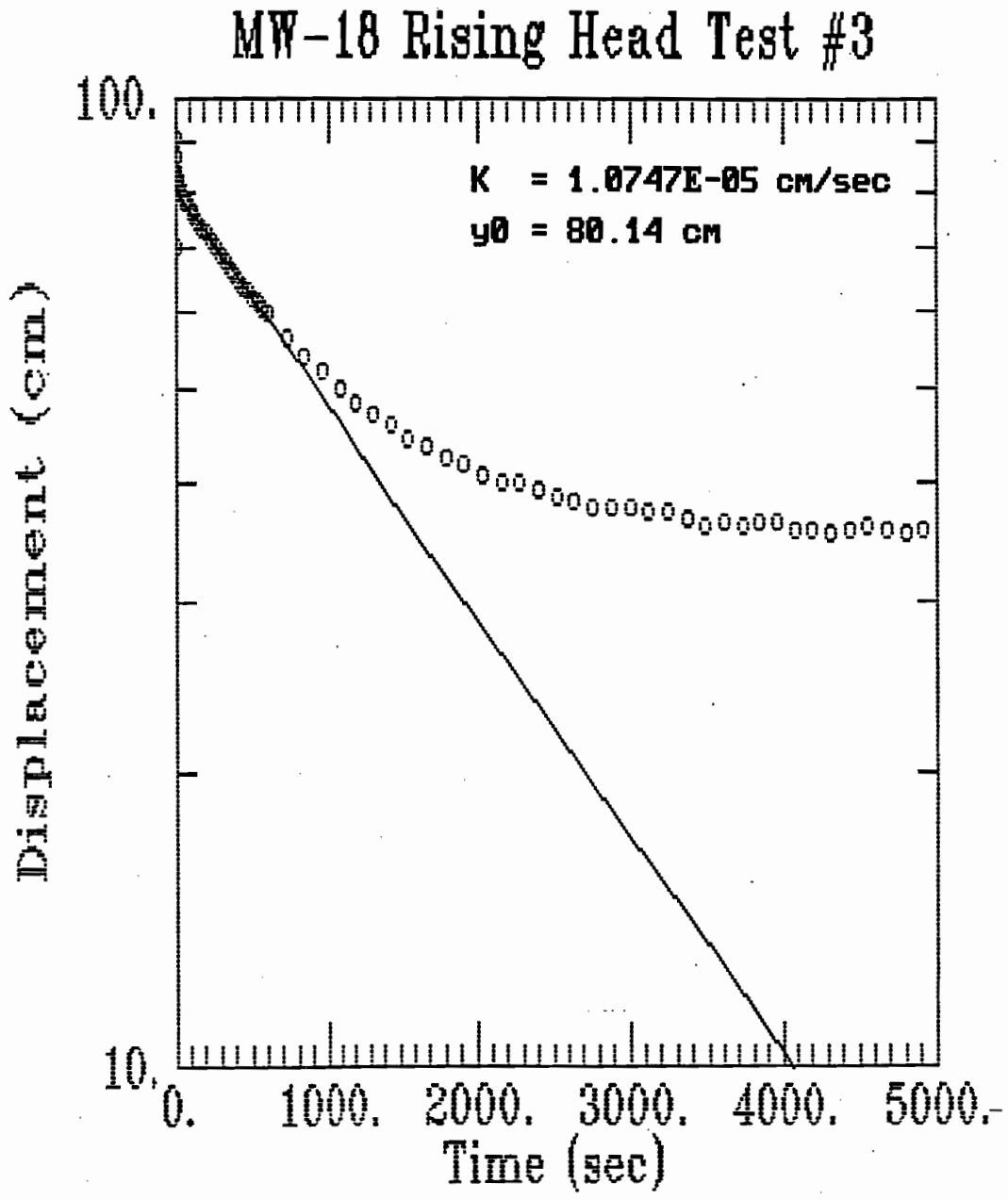

MW-17 Rising Head Test #1
K = 0.00119 cm/sec
y0 = 83.84 cm
Displacement (cm)
100.
10.
1.
0.
100.
200.
300.
400.
500.
Time (sec)


MW-17 Rising Head Test #2
K = 0.001326 cm/sec
y0 = 52.52 cm
Displacement (cm)
100.
10.
1.
0.
100.
200.
300.
400.
500.
Time (sec)


MW-17 Rising Head Test #3
K = 0.001208 cm/sec
y0 = 63.19 cm
Displacement (cm)
100.
10.
1.
0.
100.
200.
300.
400.
500.
Time (sec)


MW-18 Rising Head Test #1
K = 1.039E-05 cm/sec
y0 = 45.77 cm
100.
10.
Displacement (cm)
0.
600.
1200.
1800.
2400.
3000.
Time (sec)


MW-18 Rising Head Test #2
K = 1.1706E-05 cm/sec
y0 = 57.82 cm
Displacement (cm)
100.
10.
0.
640.
1280.
1920.
2560.
3200.
Time (sec)


MW-18 Rising Head Test #3
K = 1.0747E-05 cm/sec
y0 = 80.14 cm
Displacement (cm)
100.
10.
0.
1000.
2000.
3000.
4000.
5000.
Time (sec)

APPENDIX C

Validation Report/ Laboratory Results

Former Coal Gasification Site
Mechanicville, New York

APPENDIX C-1

Validation Report

Former Coal Gasification Site
Mechanicville, New York

Sampling Dates: May 17-22, 1993

Review is complete for the data package generated by Galson Laboratories pertaining to soil samples collected at the Mechanicville site. Review was performed following NYSDEC criteria and USEPA Region II guidelines. All samples analyzed for PCBs were validated at Level III. One sample (METDEEXX05/11) was validated at Level IV for the volatile, semivolatile, and inorganic analyses. The remaining samples were blank evaluated. Samples were analyzed for volatiles, semivolatiles, PCBs, and inorganics using NYSDEC ASP 91-1, 91-2, 91-3, and Superfund-CLP, respectively. Samples were also analyzed for reactive cyanide and reactive sulfide using SW846.

The data table referenced in this memo includes Table 2, Validation/Summary Table, included in Appendix C-2.

The following subsections summarize the qualifications/edits that have been determined by validation.

All Organic Analyses

Compound results below the contract required quantitation limit (CRQL) were flagged with a J by the laboratory and were considered estimated and flagged J.

Compound results greater than the calibration range were diluted and reanalyzed. The diluted results for all compounds beyond calibration range were inserted into the original results and the

remainder of the diluted analysis deleted.

PCB results which exhibited a percent difference greater than 25% between quantitation results on the two columns used for analysis were considered estimated and flagged J.

Inorganic Analyses

Analyte results below the contract required detection limit (CRDL) were considered estimated and flagged with a J.

Volatile Analyses - Qualifications/Edits

1. Acetone was detected in two of the laboratory method blanks at 6 μg/L and 7 μg/L. Equipment blank MEEXB-XXSB/11, which was associated with several of the soil boring samples, also contained 10 μg/L of acetone. As a result acetone should be considered nondetect in all associated soil samples.

2. Initial calibration criteria for linearity were not met for acetone. Positive results were estimated in sample METDEEXX05/11. 2-Butanone did not meet linearity criteria, and the nondetected result in this sample was estimated (UJ).

Volatile Analyses - Comments

Please see items 1 and 2 under **Qualifications/Edits**. All hold times, instrument tunes, internal standards, and surrogate recoveries were within QC limits for the sample validated at Level IV.

All matrix spike and matrix spike duplicate recoveries and RPDs met QC criteria.

Semivolatile Analyses - Qualifications/Edits

3. Naphthalene was detected at 17 μg/kg in the GPC blank associated with the sediment samples. Naphthalene detected at less than 170 μg/kg should be considered nondetect.

4. Source water MEEXB-SR/11 contained di-n-butylphthalate at 3 J μg/L and bis(2-ethylhexyl)phthalate at 18 μg/L. Bis(2-ethylhexyl)phthalate concentrations less than 5994 μg/kg were considered nondetect in the associated samples. Di-n-butylphthalate was not detected in any of the associated samples.

5. Several compounds did not meet percent difference criteria during the continuing calibration for sample METDEEXX05/11. N-nitroso-di-n-propylamine, benzoic acid, 2,4-dinitrophenol, di-n-octylphthalate, and pentachlorophenol were qualified as estimated.

Semivolatile Analyses - Comments

Please see items 3 - 5 under **Qualifications/Edits**. All hold time, instrument tune, internal standard, and surrogate recovery criteria were met for the sample validated at Level IV. Matrix spike and matrix spike duplicate recoveries and RPDs were within recommended limits.

PCB Analyses - Qualifications/Edits

6. Due to shipping delays, the majority of the sample results required qualification since the samples arrived at the laboratory with no ice left in the cooler. The only samples not

affected were MEEISHXX29/11, MEEISHXX30/11, MEEISHXX31/11, and MEEISHXX32/11.

7. Surrogate recoveries were above QC limits for the following samples:

MEEISHXX33/11	MEEISHXX34/11
MEEISHXX35/11	MEEISHXXDU/13
MEEISHXX48/11	

No action was required.

PCB Analyses - Comments

Please see items 6 and 7 under **Qualifications/Edits**. All method blanks and field blanks were compliant. All matrix spike and matrix spike duplicate recoveries and RPDs were within the required limits.

The majority of the samples were contained in a data package that contained only surrogate recovery forms, matrix spike and matrix spike duplicate recovery forms, and method blank summary forms. These data were already estimated due to the shipping problem mentioned in item 6 above. Initial and continuing calibration, calibration sequence, and retention time window criteria were also reviewed for the remaining samples listed in item 6.

Inorganic Analyses - Qualifications/Edits

8. Matrix spike recovery criteria were not met for zinc. Zinc results were estimated in sample METDEEXX05/11.

9. Analytical spike recovery for antimony was less than 85% during the analysis of sample METDEEXX05/11, and antimony results were estimated.

10. Several analytes were detected in source water blank MEEXB-XXSR/11. Results in the associated samples were considered nondetect if they were less than the value given below for the following compounds:

Aluminum	990 mg/kg
Iron	2068 mg/kg
Manganese	116 mg/kg
Zinc	18.5 mg/kg

Inorganic Analyses - Comments

Please see items 8 - 10 under **Qualifications/Edits.** All appropriate QC criteria were reviewed and found acceptable for the sample validated at Level IV unless noted under

Qualifications/Edits.

Reactive Cyanide and Reactive Sulfide Analyses - Qualification/Edits

There were no qualifications or edits to these data.

Reactive Cyanide and Reactive Sulfide Analyses - Comments

All associated blanks were compliant. Reactive cyanide and reactive sulfide were not detected in any of the samples.

Sampling Dates: July 13-15, 1993

Review is complete for the data package generated by Galson Laboratories pertaining to groundwater samples collected at the Mechanicville site. Samples were analyzed for volatiles, low level volatiles, semivolatiles, PCBs, and inorganics using NYSDEC ASP 91-1, 91-4, 91-2, 91-3, and Superfund-CLP, respectively. Samples were also analyzed for reactive cyanide and reactive sulfide using SW846. Two leachate samples, COMP-3 and COMP-4, were analyzed for TCLP volatiles, semivolatiles, and inorganics. Review was performed following NYSDEC criteria and USEPA Region II guidelines. All samples analyzed for PCBs were validated at Level III. One sample (MEGDMW8715/11) was validated at Level IV for the volatile, semivolatile, and inorganic analyses. Sample MEGDMW9317/11 was validated at Level IV for the low level volatile analysis. The remaining samples were blank evaluated.

The data tables referenced in this memo includes Table 2, Validation/Summary Table, included in Appendix C-2.

The following subsections summarize the qualifications/edits that have been determined by validation.

All Organic Analyses

Compound results below the CRQL were flagged with a J by the laboratory and were considered estimated and flagged J.

Compound results greater than the calibration range were diluted and reanalyzed, and the diluted

results flagged with a D by the laboratory. The diluted results for all compounds beyond calibration range were inserted into the original results and the remainder of the diluted analysis deleted.

Inorganic Analyses

Analyte results below the CRDL were considered estimated and flagged with a J.

Volatile Analyses - Qualifications/Edits

1. Trip blanks MEXXXXXXTB/11 and MEXXXXXXTB/12 contained methylene chloride at 0.6 and 5 μg/L, respectively. All associated sample results less than ten times the associated blank concentration were considered non-detect.

2. Initial calibration criteria for linearity were not met for methylene chloride and 1,2-dichloroethene (total). Positive results were estimated in sample MEGDMW8715/11.

3. Methylene chloride did not meet percent difference criteria during continuing calibration. Results for this compound was estimated in sample MEGDMW8715/11.

Volatile Analyses - Comments

Please see items 1 - 3 under **Qualifications/Edits**. All hold time, instrument tune, internal standard, method blank, and surrogate recovery criteria were met for the sample validated at Level IV. All matrix spike and matrix spike duplicate recoveries and RPDs also met QC

criteria.

Low Detection Limit Volatile Analyses - Qualifications/Edits

4. Linearity criteria were not met for vinyl chloride and methylene chloride during the initial calibration. Since these compounds were not detected in any samples, no action was required.

Low Detection Limit Volatile Analyses - Comments

Please see item 4 under **Qualifications/Edits**. All hold time, instrument tune, internal standard, surrogate recovery, and method blank criteria were met.

Semivolatile Analyses - Qualifications/Edits

5. Equipment blank MEXXMWXXFB/11 contained phenol at 6 J μg/L, diethylphthalate at 1 J μg/L, di-n-butylphthalate at 3 J μg/L and bis(2-ethylhexyl)phthalate at 2 μg/L. All associated sample results less than ten times the associated blank concentration were considered non-detect.

6. Internal standard area responses were below QC limits for two internal standards during the analysis of sample MEGDMW8715/11. All compounds quantitated using these internal standards were qualified as estimated for both positive and non-detected results.

7. Bis(2-ethylhexyl)phthalate did not meet field duplicate precision criteria for samples

MEGDMW8715/11 and MEGDMW87DU/11. Results for this compound were qualified as estimated in both samples.

Semivolatile Analyses - Comments

Please see items 5 - 7 under **Qualifications/Edits**. All hold time, instrument tune, method blank, and surrogate recovery criteria were met for the sample validated at Level IV. Matrix spike and matrix spike duplicate recoveries and RPDs were within recommended limits.

PCB Analyses - Qualifications/Edits

No qualification of these data was required.

PCB Analyses - Comments

All method blanks and field blanks were compliant. All matrix spike and matrix spike duplicate recoveries and RPDs were within the required limits. All other appropriate QC were reviewed and found acceptable.

Total and Dissolved Inorganic Analyses - Qualifications/Edits

8. Aluminum percent recovery was greater than QC limits during laboratory control sample analysis. The positive result in the sample reviewed was qualified as estimated.

Total and Dissolved Inorganic Analyses - Comments

criteria.

Low Detection Limit Volatile Analyses - Qualifications/Edits

4. Linearity criteria were not met for vinyl chloride and methylene chloride during the initial calibration. Since these compounds were not detected in any samples, no action was required.

Low Detection Limit Volatile Analyses - Comments

Please see item 4 under **Qualifications/Edits**. All hold time, instrument tune, internal standard, surrogate recovery, and method blank criteria were met.

Semivolatile Analyses - Qualifications/Edits

5. Equipment blank MEXXMWXXFB/11 contained phenol at 6 J μg/L, diethylphthalate at 1 J μg/L, di-n-butylphthalate at 3 J μg/L and bis(2-ethylhexyl)phthalate at 2 μg/L. All associated sample results less than ten times the associated blank concentration were considered non-detect.

6. Internal standard area responses were below QC limits for two internal standards during the analysis of sample MEGDMW8715/11. All compounds quantitated using these internal standards were qualified as estimated for both positive and non-detected results.

7. Bis(2-ethylhexyl)phthalate did not meet field duplicate precision criteria for samples

APPENDIX C-2

Laboratory Results with Detection Limits and Data Qualifiers

Former Coal Gasification Site
Mechanicville, New York

DATA QUALIFIERS

Analytical data qualifiers appear on each table as appropriate and are applied by the laboratory or data reviewer. The descriptions of these data qualifiers are as follows:

Data Qualifiers:

J (organic) Laboratory flag which indicates an estimated concentration because results are either below the contract required quantitation level (CRQL) or quality control criteria were not met.

J (inorganic) Laboratory flag which indicates an estimated concentration because results are either below the contract required detection level (CRDL) or quality control criteria were not met.

U Indicates that compound was analyzed but not detected.

UJ Indicates that quantitation level was estimated because QC criteria were not met.

D Indicates that sample concentration was obtained by dilution to bring result within calibration range.

Other Notations:

NR Analysis not requested.

ND Not detected.

PROJECT: NYSEG Mechanicville | Miscellaneous Soil Analysis (mg/kg) | 26-Aug-93

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEEDB-XX17/11	MEEISHXX20/11	MEEISHXX22/11	MEEISHXX23/11	MEEISHXX24/11	MEEISHXXDU/11	MEEUB-XX16/11	MEEXB-XXDU/11
	LAB NUMBER:	13178-003	13197-001	13197-002	13197-003	13197-007	13197-006	13156-001	13178-006
	DATE SAMPLED:	05/18/93	05/19/93	05/19/93	05/19/93	05/19/93	05/19/93	05/17/93	05/18/93
ANALYTE	RL								
Reactive Cyanide	100	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Reactive Sulfide	100	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Associated Method Blank:		13178	13178	13178	13178	13178	13178	13178	13178
Associated Equipment Blank:		-	-	-	-	-	-	-	-
Associated Field Blank:		-	-	-	-	-	-	-	-

Box Number: 4945-100

Table 2
Validation / Summary Table

	LOCATION:	SS-20 (0-1FT)	SS-22 (0-1FT)	SS-23 (0-1 FT)	SS-24 (0-1 FT)	SS-23DUP(0-1FT)
	ISIS ID:	MEEISHXX20/11	MEEISHXX22/11	MEEISHXX23/11	MEEISHXX24/11	MEEISHXXDU/11
	LAB NUMBER:	13197-001	13197-002	13197-003	13197-007	13197-006
	DATE SAMPLED:	05/19/93	05/19/93	05/19/93	05/19/93	05/19/93
ANALYTE	RL					
Reactive Cyanide	100	100 U	100 U	100 U	100 U	100 U
Reactive Sulfide	100	100 U	100 U	100 U	100 U	100 U
Associated Method Blank:		13178	13178	13178	13178	13178
Associated Equipment Blank:		-	-	-	-	-
Associated Field Blank:		-	-	-	-	-

Site: SURFACE SOIL
U = not detected

PROJECT: NYSEG Mechanicville

Pesticides/PCBs Soil Analysis (ug/kg)

08/25/93

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEEISHXX25/11	MEEISHXX33/11	MEEISHXX34/11	MEEISHXX35/11	MEEISHXX36/11	MEEISHXX37/11	MEEISHXX38/11	MEEISHXX39/11
	LAB NUMBER:	13256-002	13256-015	13256-016	13256-017	13256-018	13256-003	13256-007	13256-008
	DATE SAMPLED:	05/22/93	05/22/93	05/22/93	05/22/93	05/22/93	05/22/93	05/22/93	05/22/93
	DATE EXTRACTED:	05/27/93	05/27/93	05/27/93	05/27/93	05/27/93	05/27/93	05/27/93	05/27/93
	DATE ANALYZED:	06/13/93	06/16/93	06/16/93	06/15/93	06/14/93	06/15/93	06/15/93	06/14/93
ANALYTE	SOW-3/90 - II CRQL								
alpha-BHC	1.7	NR	NR	NR	NR	NR	NR	NR	NR
beta-BHC	1.7	NR	NR	NR	NR	NR	NR	NR	NR
delta-BHC	1.7	NR	NR	NR	NR	NR	NR	NR	NR
gamma-BHC (Lindane)	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Heptachlor	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Aldrin	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Heptachlor Epoxide	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Endosulfan I	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Dieldrin	3.3	NR	NR	NR	NR	NR	NR	NR	NR
4,4'-DDE	3.3	NR	NR	NR	NR	NR	NR	NR	NR
Endrin	3.3	NR	NR	NR	NR	NR	NR	NR	NR
Endosulfan II	3.3	NR	NR	NR	NR	NR	NR	NR	NR
4,4'-DDD	3.3	NR	NR	NR	NR	NR	NR	NR	NR
Endrin Aldehyde	3.3	NR	NR	NR	NR	NR	NR	NR	NR
Endosulfan Sulfate	3.3	NR	NR	NR	NR	NR	NR	NR	NR
4,4'-DDT	3.3	NR	NR	NR	NR	NR	NR	NR	NR
Methoxychlor	17	NR	NR	NR	NR	NR	NR	NR	NR
Endrin Ketone	3.3	NR	NR	NR	NR	NR	NR	NR	NR
alpha-Chlordane	1.7	NR	NR	NR	NR	NR	NR	NR	NR
gamma-Chlordane	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Toxaphene	170	NR	NR	NR	NR	NR	NR	NR	NR
Aroclor-1016	33	37 UJ	710 UJ	720 UJ	220 UJ	36 UJ	37 UJ	370 UJ	35 UJ
Aroclor-1221	67	74 UJ	1400 UJ	1400 UJ	440 UJ	73 UJ	73 UJ	740 UJ	70 UJ
Aroclor-1232	33	37 UJ	710 UJ	720 UJ	220 UJ	36 UJ	37 UJ	370 UJ	35 UJ
Aroclor-1242	33	37 UJ	710 UJ	720 UJ	220 UJ	36 UJ	37 UJ	370 UJ	35 UJ
Aroclor-1248	33	37 UJ	1800 J	2500 J	300 J	57 J	320 J	700 J	77 J
Aroclor-1254	33	37 UJ	710 UJ	720 UJ	220 UJ	36 UJ	37 UJ	370 UJ	35 UJ
Aroclor-1260	33	37 UJ	710 UJ	720 UJ	360 J	180 J	2600 DJ	410 J	35 UJ
Dilution Factor:		1.00	20.0	20.0	5.00	1.00	1.00	10.0	1.00
Percent Solids:		90	94	93	76	91	91	90	95
Sample Volume\Weight (ml\g):		30.1	30.0	30.0	30.0	30.1	30.0	30.0	30.1
Associated Method Blank:		061193P012	061193P012	061193P012	061193P012	061193P012	061193P012	061193P012	061193P012
Associated Equipment Blank:		-	-	-	-	-	-	-	-
Associated Field Blank:		-	-	-	-	-	-	-	-

Box Number: 4945-101

Table 2
Validation / Summary Table

ANALYTE	SOW-3/90 - II CRQL	SAMPLE LOCATION: MEEISHXX40/11	MEEISHXX41/11	MEEISHXX45/11	MEEISHXX46/11	MEEISHXX47/11	MEEISHXX48/11	MEEISHXXDU/12	MEEISHXXDU/13
		LAB NUMBER: 13256-009	13256-001	13256-010	13256-012	13256-013	13256-014	13256-006	13256-011
		DATE SAMPLED: 05/22/93	05/22/93	05/22/93	05/22/93	05/22/93	05/22/93	05/22/93	05/22/93
		DATE EXTRACTED: 05/27/93	05/27/93	05/28/93	05/27/93	05/27/93	05/27/93	05/27/93	05/27/93
		DATE ANALYZED: 06/15/93	06/13/93	06/14/93	06/14/93	06/15/93	06/15/93	06/16/93	06/14/93
alpha-BHC	1.7	NR	NR	NR	NR	NR	NR	NR	NR
beta-BHC	1.7	NR	NR	NR	NR	NR	NR	NR	NR
delta-BHC	1.7	NR	NR	NR	NR	NR	NR	NR	NR
gamma-BHC (Lindane)	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Heptachlor	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Aldrin	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Heptachlor Epoxide	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Endosulfan I	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Dieldrin	3.3	NR	NR	NR	NR	NR	NR	NR	NR
4,4'-DDE	3.3	NR	NR	NR	NR	NR	NR	NR	NR
Endrin	3.3	NR	NR	NR	NR	NR	NR	NR	NR
Endosulfan II	3.3	NR	NR	NR	NR	NR	NR	NR	NR
4,4'-DDD	3.3	NR	NR	NR	NR	NR	NR	NR	NR
Endrin Aldehyde	3.3	NR	NR	NR	NR	NR	NR	NR	NR
Endosulfan Sulfate	3.3	NR	NR	NR	NR	NR	NR	NR	NR
4,4'-DDT	3.3	NR	NR	NR	NR	NR	NR	NR	NR
Methoxychlor	17	NR	NR	NR	NR	NR	NR	NR	NR
Endrin Ketone	3.3	NR	NR	NR	NR	NR	NR	NR	NR
alpha-Chlordane	1.7	NR	NR	NR	NR	NR	NR	NR	NR
gamma-Chlordane	1.7	NR	NR	NR	NR	NR	NR	NR	NR
Toxaphene	170	NR	NR	NR	NR	NR	NR	NR	NR
Aroclor-1016	33	70 UJ	37 UJ	36 UJ	42 UJ	86 UJ	86 UJ	1800 UJ	38 UJ
Aroclor-1221	67	140 UJ	73 UJ	72 UJ	84 UJ	170 UJ	170 UJ	3600 UJ	76 UJ
Aroclor-1232	33	70 UJ	37 UJ	36 UJ	42 UJ	86 UJ	86 UJ	1800 UJ	38 UJ
Aroclor-1242	33	70 UJ	37 UJ	36 UJ	42 UJ	86 UJ	86 UJ	1800 UJ	38 UJ
Aroclor-1248	33	290 J	37 UJ	36 UJ	42 UJ	86 UJ	86 UJ	1800 UJ	38 UJ
Aroclor-1254	33	70 UJ	37 UJ	36 UJ	42 UJ	86 UJ	86 UJ	1800 UJ	38 UJ
Aroclor-1260	33	70 UJ	37 UJ	58 J	69 J	240 J	130 J	2200 J	75 J
Dilution Factor:		2.00	1.00	1.00	1.00	2.00	2.00	50.0	1.00
Percent Solids:		95	91	93	79	77	77	92	87
Sample Volume\Weight (ml\g):		30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.1
Associated Method Blank:		061193P012	061193P012	061193P013	061193P012	061193P012	061193P012	061193P012	061193P012
Associated Equipment Blank:		-	-	-	-	-	-	-	-
Associated Field Blank:		-	-	-	-	-	-	-	-

Box Number: 4945-101

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEEISHXX29/11	MEEISHXX30/11	MEEISHXX31/11	MEEISHXX32/11
	LAB NUMBER:	13197-008	13197-009	13197-010	13197-011
	DATE SAMPLED:	05/19/93	05/19/93	05/19/93	05/19/93
	DATE EXTRACTED:	05/24/93	05/24/93	05/24/93	05/24/93
	DATE ANALYZED:	06/11/93	06/11/93	06/11/93	06/11/93
ANALYTE	SOW-3/90 - II CRQL				
alpha-BHC	1.7	NR	NR	NR	NR
beta-BHC	1.7	NR	NR	NR	NR
delta-BHC	1.7	NR	NR	NR	NR
gamma-BHC (Lindane)	1.7	NR	NR	NR	NR
Heptachlor	1.7	NR	NR	NR	NR
Aldrin	1.7	NR	NR	NR	NR
Heptachlor Epoxide	1.7	NR	NR	NR	NR
Endosulfan I	1.7	NR	NR	NR	NR
Dieldrin	3.3	NR	NR	NR	NR
4,4'-DDE	3.3	NR	NR	NR	NR
Endrin	3.3	NR	NR	NR	NR
Endosulfan II	3.3	NR	NR	NR	NR
4,4'-DDD	3.3	NR	NR	NR	NR
Endrin Aldehyde	3.3	NR	NR	NR	NR
Endosulfan Sulfate	3.3	NR	NR	NR	NR
4,4'-DDT	3.3	NR	NR	NR	NR
Methoxychlor	17	NR	NR	NR	NR
Endrin Ketone	3.3	NR	NR	NR	NR
alpha-Chlordane	1.7	NR	NR	NR	NR
gamma-Chlordane	1.7	NR	NR	NR	NR
Toxaphene	170	NR	NR	NR	NR
Aroclor-1016	33	36 U	36 U	36 U	36 U
Aroclor-1221	67	71 U	73 U	72 U	71 U
Aroclor-1232	33	36 U	36 U	36 U	36 U
Aroclor-1242	33	36 U	36 U	36 U	36 U
Aroclor-1248	33	36 U	36 U	36 U	36 U
Aroclor-1254	33	36 U	36 U	36 U	36 U
Aroclor-1260	33	50 J	36 U	47 J	36 U
Dilution Factor:		1.00	1.00	1.00	1.00
Percent Solids:		94	91	93	94
Sample Volume\Weight (ml\g):		30.0	30.0	30.0	30.0
Associated Method Blank:		061093P012	061093P012	061093P012	061093P012
Associated Equipment Blank:		-	-	-	-
Associated Field Blank:		-	-	-	-

Box Number: 4945-100

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEEDB-XX17/11	MEEUB-XX16/11	MEEXB-XXDU/11
	LAB NUMBER:	13178-003	13156-001	13178-006
	DATE SAMPLED:	05/18/93	05/17/93	05/18/93
	DATE ANALYZED:	05/21/93	05/21/93	05/21/93
ANALYTE	SOW-3/90 - II CRQL			
Chloromethane	10	12 U	11 U	12 U
Bromomethane	10	12 U	11 U	12 U
Vinyl Chloride	2	12 U	11 U	12 U
Chloroethane	10	12 U	11 U	12 U
Methylene Chloride	5	6 U	5 U	6 U
Acetone	10	32 U	11 U	39 U
Carbon Disulfide	5	6 U	5 U	6 U
1,1-Dichloroethene	5	6 U	5 U	6 U
1,1-Dichloroethane	5	6 U	5 U	6 U
1,2-Dichloroethene (total)	5	6 U	5 U	6 U
Chloroform	5	6 U	5 U	6 U
1,2-Dichloroethane	5	6 U	5 U	6 U
2-Butanone	10	12 U	11 U	12 U
1,1,1-Trichloroethane	5	6 U	5 U	6 U
Carbon Tetrachloride	3	6 U	5 U	6 U
Bromodichloromethane	5	6 U	5 U	6 U
1,2-Dichloropropane	5	6 U	5 U	6 U
cis-1,3-Dichloropropene	2	6 U	5 U	6 U
Trichloroethene	5	6 U	5 U	6 U
Dibromochloromethane	5	6 U	5 U	6 U
1,1,2-Trichloroethane	5	6 U	5 U	6 U
Benzene	5	6 U	5 U	6 U
trans-1,3-Dichloropropene	2	6 U	5 U	6 U
Bromoform	5	6 U	5 U	6 U
4-Methyl-2-Pentanone	10	12 U	11 U	12 U
2-Hexanone	10	12 U	11 U	12 U
Tetrachloroethene	3	6 U	5 U	6 U
1,1,2,2-Tetrachloroethane	5	6 U	5 U	6 U
Toluene	10	6 U	5 U	6 U
Chlorobenzene	10	6 U	5 U	6 U
Ethylbenzene	10	6 U	5 U	6 U
Styrene	10	6 U	5 U	6 U
Total Xylenes	10	6 U	5 U	6 U
Dilution Factor:		1.00	1.00	1.00
Percent Solids:		81	93	82
Sample Volume\Weight (ml\g):		5.00	5.00	5.00
Associated Method Blank:		CH177	CH177	CH177
Associated Equipment Blank:		MEEXB-XXSB/11	MEEXB-XXSB/11	MEEXB-XXSB/11
Associated Field Blank:		-	-	-
Associated Trip Blank:		-	-	-

Box Number: 4945-100

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEEDB-XX17/11		MEEUB-XX16/11		MEEXB-XXDU/11	
	LAB NUMBER:	13178-003		13156-001		13178-006	
	DATE SAMPLED:	05/18/93		05/17/93		05/18/93	
	DATE EXTRACTED:	05/20/93		05/20/93		05/20/93	
	DATE ANALYZED:	06/01/93		06/01/93		06/01/93	
ANALYTE	SOW-3/90 - II CRQL						
Phenol	330	360	U	360	U	390	U
bis(2-Chloroethyl)ether	330	360	U	360	U	390	U
2-Chlorophenol	330	360	U	360	U	390	U
1,3-Dichlorobenzene	330	360	U	360	U	390	U
1,4-Dichlorobenzene	330	360	U	360	U	390	U
1,2-Dichlorobenzene	330	360	U	360	U	390	U
2-Methylphenol	330	360	U	360	U	390	U
2,2'-oxybis(1-Chloropropane)	330	360	U	360	U	390	U
4-Methylphenol	330	360	U	360	U	390	U
N-Nitroso-di-n-propylamine	330	360	U	360	U	390	U
Hexachloroethane	330	360	U	360	U	390	U
Nitrobenzene	330	360	U	360	U	390	U
Isophorone	330	360	U	360	U	390	U
2-Nitrophenol	330	360	U	360	U	390	U
2,4-Dimethylphenol	330	360	U	360	U	390	U
bis(2-Chloroethoxy)methane	330	360	U	360	U	390	U
2,4-Dichlorophenol	330	360	U	360	U	390	U
1,2,4-Trichlorobenzene	330	360	U	360	U	390	U
Naphthalene	330	56	J	360	U	390	U
4-Chloroaniline	330	360	U	360	U	390	U
Hexachlorobutadiene	330	360	U	360	U	390	U
4-Chloro-3-Methylphenol	330	360	U	360	U	390	U
2-Methylnaphthalene	330	360	U	360	U	390	U
Hexachlorocyclopentadiene	330	360	U	360	U	390	U
2,4,6-Trichlorophenol	330	360	U	360	U	390	U
2,4,5-Trichlorophenol	800	1800	U	1800	U	2000	U
2-Chloronaphthalene	330	360	U	360	U	390	U
2-Nitroaniline	800	1800	U	1800	U	2000	U
Dimethylphthalate	330	360	U	360	U	390	U
Acenaphthylene	330	360	U	360	U	390	U
2,6-Dinitrotoluene	330	360	U	360	U	390	U

Box Number: 4945-100

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEEDB-XX17/11	MEEUB-XX16/11	MEEXB-XXDU/11
	LAB NUMBER:	13178-003	13156-001	13178-006
	DATE SAMPLED:	05/18/93	05/17/93	05/18/93
	DATE EXTRACTED:	05/20/93	05/20/93	05/20/93
	DATE ANALYZED:	06/01/93	06/01/93	06/01/93
ANALYTE	SOW-3/90 - 11 CRQL			
3-Nitroaniline	800	1800 U	1800 U	2000 U
Acenaphthene	330	360 U	360 U	390 U
2,4-Dinitrophenol	800	1800 U	1800 U	2000 U
4-Nitrophenol	800	1800 U	1800 U	2000 U
Dibenzofuran	330	360 U	360 U	390 U
2,4-Dinitrotoluene	330	360 U	360 U	390 U
Diethylphthalate	330	360 U	330 J	390 U
4-Chlorophenyl-phenylether	330	360 U	360 U	390 U
Fluorene	330	360 U	360 U	390 U
4-Nitroaniline	800	1800 U	1800 U	2000 U
4,6-Dinitro-2-methylphenol	800	1800 U	1800 U	2000 U
N-Nitrosodiphenylamine	330	360 U	360 U	390 U
4-Bromophenyl-phenylether	330	360 U	360 U	390 U
Hexachlorobenzene	330	360 U	360 U	390 U
Pentachlorophenol	800	1800 U	330 J	2000 U
Phenanthrene	330	200 J	360 U	77 J
Anthracene	330	360 U	360 U	390 U
Carbazole	330	360 U	360 U	390 U
Di-n-butylphthalate	330	360 U	360 U	390 U
Fluoranthene	330	160 J	89 J	62 J
Pyrene	330	130 J	82 J	49 J
Butylbenzylphthalate	330	360 U	360 U	390 U
3,3'-Dichlorobenzidine	330	360 U	360 U	390 U
Benzo(a)Anthracene	330	66 J	360 U	390 U
Chrysene	330	69 J	60 J	390 U
bis(2-Ethylhexyl)phthalate	330	1600 U	360 U	1300 U
Di-n-octylphthalate	330	360 U	360 U	390 U
Benzo(b)Fluoranthene	330	360 U	360 U	390 U
Benzo(k)Fluoranthene	330	360 U	360 U	390 U
Benzo(a)Pyrene	330	48 J	360 U	390 U
Indeno(1,2,3-c,d)Pyrene	330	360 U	360 U	390 U
Dibenz(a,h)Anthracene	330	360 U	360 U	390 U
Benzo(g,h,i)perylene	330	360 U	360 U	390 U
Dilution Factor:		1.00	1.00	1.00
Percent Solids:		92	93	85
Sample Volume\Weight (ml\g):		30.0	30.0	30.0
Associated Method Blank:		AI15293	AI15293	AI15293
Associated Equipment Blank:		MEEXB-XXSB/11	MEEXB-XXSB/11	MEEXB-XXSB/11
Associated Field Blank:		-	-	-

Box Number: 4945-100

PROJECT: NYSEG Mechanicville

Inorganic Soil Analysis (mg/kg)

08/25/93

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEEDB-XX17/11		MEEUB-XX16/11		MEEXB-XXDU/11	
	LAB NUMBER:	13178-003		13156-001		13178-006	
	DATE SAMPLED:	05/18/93		05/17/93		05/18/93	
ANALYTE	SOW-3/90 - II CRDL						
Aluminum	40	6970		12200		6820	
Antimony	12	0.55	J	0.27	U	0.33	U
Arsenic	2	NR		NR		NR	
Barium	40	NR		NR		NR	
Beryllium	1	NR		NR		NR	
Cadmium	1	0.46	U	0.73		0.43	U
Calcium	1000	NR		NR		NR	
Chromium	2	12.5		21.6		11.1	
Cobalt	10	7.0		16.0		6.6	
Copper	5	9.7		50.4		7.9	
Iron	20	15000		29700		14600	
Lead	0.6	10.5		36.4		36.1	
Magnesium	1000	NR		NR		NR	
Manganese	3	203		511		141	
Mercury	0.04	NR		NR		NR	
Nickel	8	11.0		37.8		11.3	
Potassium	1000	NR		NR		NR	
Selenium	1	NR		NR		NR	
Silver	2	NR		NR		NR	
Sodium	1000	NR		NR		NR	
Thallium	2	NR		NR		NR	
Vanadium	10	NR		NR		NR	
Zinc	4	30.4		138		28.2	
Cyanide	2	3.0	U	2.0	U	2.7	U
	Percent Solids:	84		94		85	
	Associated Method Blank:	PBS13156		PBS13156		PBS13156	
	Associated Equipment Blank:	MEEXB-XXSB/11		MEEXB-XXSB/11		MEEXB-XXSB/11	
	Associated Field Blank:	-		-		-	

Box Number: 4945-100

Table 2
Validation / Summary Table

ANALYTE	SOW-3/90 - II CRQL	SAMPLE LOCATION: MEGDMW8601/11	MEGDMW8602/11	MEGDMW86DU/12	MEGDMW8711/11	MEGDMW8713/11	MEGDMW8714/11	MEGDMW8715/11	MEGDMW87DU/11
		LAB NUMBER: 13988-003	13970-002	13988-006	13970-003	13988-002	13988-007	13970-004	13970-005
		DATE SAMPLED: 07/15/93	07/14/93	07/15/93	07/14/93	07/15/93	07/15/93	07/14/93	07/14/93
		DATE ANALYZED: 07/21/93	07/20/93	07/21/93	07/20/93	07/21/93	07/21/93	07/21/93	07/21/93
Chloromethane	10	10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Bromomethane	10	10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Vinyl Chloride	10	10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Chloroethane	10	10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Methylene Chloride	10	5	10 U	3 J	10 U	4 J	84 J	10 U	10 U
Acetone	10	10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Carbon Disulfide	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
1,1-Dichloroethene	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
1,1-Dichloroethane	10	5 U	5 U	5 U	5 U	5 U	120 U	3 J	3 J
1,2-Dichloroethene (total)	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
Chloroform	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
1,2-Dichloroethane	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
2-Butanone	10	10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
1,1,1-Trichloroethane	10	5 U	5 U	5 U	5 U	5 U	120 U	6	6
Carbon Tetrachloride	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
Bromodichloromethane	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
1,2-Dichloropropane	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
cis-1,3-Dichloropropene	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
Trichloroethene	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
Dibromochloromethane	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
1,1,2-Trichloroethane	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
Benzene	10	5 U	5 U	5 U	5 U	5 U	4300	27	24
trans-1,3-Dichloropropene	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
Bromoform	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
4-Methyl-2-Pentanone	10	10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
2-Hexanone	10	10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Tetrachloroethene	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
1,1,2,2-Tetrachloroethane	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
Toluene	10	5 U	5 U	5 U	5 U	5 U	120	7	6
Chlorobenzene	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
Ethylbenzene	10	5 U	5 U	5 U	5 U	5 U	1900	47	41
Styrene	10	5 U	5 U	5 U	5 U	5 U	120 U	5 U	5 U
Total Xylenes	10	5 U	5 U	5 U	5 U	5 U	850	29	25
Dilution Factor:		1.00	1.00	1.00	1.00	1.00	25.0	1.00	1.00
Sample Volume\Weight (ml\g):		5.00	5.00	5.00	5.00	5.00	.200	5.00	5.00
Associated Method Blank:		BM985.93	BM985.93	BM985.93	BM985.93	BN004.93	BN004.93	BN004.93	BN004.93
Associated Equipment Blank:		MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11
Associated Field Blank:		-	-	-	-	-	-	-	-
Associated Trip Blank:		MEGXMWXXTB/14	MEXXXXXXTB/12	MEGXMWXXTB/14	MEXXXXXXTB/12	MEGXMWXXTB/14	MEGXMWXXTB/14	MEXXXXXXTB/12	MEXXXXXXTB/12

Box Number: 4945-104

Table 2
Validation / Summary Table

SAMPLE LOCATION: MEGUMW9316/11
LAB NUMBER: 13970-001
DATE SAMPLED: 07/14/93
DATE ANALYZED: 07/20/93

ANALYTE	SOW-3/90 - II CRQL		
Chloromethane	10	10	U
Bromomethane	10	10	U
Vinyl Chloride	10	10	U
Chloroethane	10	10	U
Methylene Chloride	10	10	U
Acetone	10	10	U
Carbon Disulfide	10	5	U
1,1-Dichloroethene	10	5	U
1,1-Dichloroethane	10	5	U
1,2-Dichloroethene (total)	10	5	U
Chloroform	10	5	U
1,2-Dichloroethane	10	5	U
2-Butanone	10	10	U
1,1,1-Trichloroethane	10	5	U
Carbon Tetrachloride	10	5	U
Bromodichloromethane	10	5	U
1,2-Dichloropropane	10	5	U
cis-1,3-Dichloropropene	10	5	U
Trichloroethene	10	5	U
Dibromochloromethane	10	5	U
1,1,2-Trichloroethane	10	5	U
Benzene	10	5	U
trans-1,3-Dichloropropene	10	5	U
Bromoform	10	5	U
4-Methyl-2-Pentanone	10	10	U
2-Hexanone	10	10	U
Tetrachloroethene	10	5	U
1,1,2,2-Tetrachloroethane	10	5	U
Toluene	10	5	U
Chlorobenzene	10	5	U
Ethylbenzene	10	5	U
Styrene	10	5	U
Total Xylenes	10	5	U

Dilution Factor: 1.00
Sample Volume\Weight (ml\g): 5.00

Associated Method Blank: BM985.93
Associated Equipment Blank: MEGXMWXXFB/11
Associated Field Blank: -
Associated Trip Blank: MEXXXXXXTB/12

Box Number: 4945-104

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEGDMW9317/11	MEGDMW9318/11	MESDEEXX01/11	MESDEEXX02/11	MESDEEXX04/11
	LAB NUMBER:	13929-002	13929-003	13970-006	13929-001	13988-001
	DATE SAMPLED:	07/13/93	07/13/93	07/14/93	07/13/93	07/15/93
	DATE ANALYZED:	07/20/93	07/20/93	07/21/93	07/20/93	07/22/93
ANALYTE	SOW-10/92 CRQL					
Chloromethane	1	1 U	1 U	1 U	1 U	1 U
Bromomethane	1	1 U	1 U	1 U	1 U	1 U
Vinyl Chloride	1	1 U	1 U	1 U	1 U	1 U
Chloroethane	1	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	2	1 U	1 U	1	1 U	1 U
Acetone	5	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethane	1	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	1	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1	1 U	1 U	1 U	1 U	1 U
Chloroform	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1	1 U	1 U	1 U	1 U	1 U
2-Butanone	5	10 U	10 U	10 U	10 U	10 U
Bromochloromethane	1	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	1	0.4 J	1 U	1 U	1 U	1 U
Carbon Tetrachloride	1	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichloropropane	1	1 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	1	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	1	1 U	1 U	1 U	1 U	1 U
1,1,2-Trichloroethane	1	1 U	1 U	1 U	1 U	1 U
Benzene	1	1 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	1	1 U	1 U	1 U	1 U	1 U
Bromoform	1	1 U	1 U	1 U	1 U	1 U
4-Methyl-2-Pentanone	5	10 U	10 U	10 U	10 U	10 U
2-Hexanone	5	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	1	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	1	1 U	1 U	1 U	1 U	1 U
1,2-Dibromoethane	1	1 U	1 U	1 U	1 U	1 U
Toluene	1	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	1	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1	1 U	1 U	1 U	1 U	1 U
Styrene	1	1 U	1 U	1 U	1 U	1 U
Total Xylenes	1	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-Chloropropane	1	1 U	1 U	1 U	1 U	1 U
Dilution Factor:		1.00	1.00	1.00	1.00	1.00
Sample Volume\Weight (ml\g):		25.0	25.0	25.0	25.0	25.0
Associated Method Blank:		CH591.93	CH591.93	CH591.93	CH591.93	CH634.93
Associated Equipment Blank:		-	-	-	-	-
Associated Field Blank:		-	-	-	-	-
Associated Trip Blank:		MEXXXXXXTB/11	MEXXXXXXTB/11	MEXXXXXXTB/13	MEXXXXXXTB/11	MEGXMWXXTB/15

Box Number: 4945-104

Table 2
Validation / Summary Table

SAMPLE LOCATION:	MEGDMW8601/11	MEGDMW8602/11	MEGDMW86DU/12	MEGDMW8711/11	MEGDMW8713/11	MEGDMW8714/11	MEGDMW8715/11	MEGDMW87DU/11
LAB NUMBER:	13988-003	13970-002	13988-006	13970-003	13988-002	13988-007	13970-004	13970-005
DATE SAMPLED:	07/15/93	07/14/93	07/15/93	07/14/93	07/15/93	07/15/93	07/14/93	07/14/93
DATE EXTRACTED:	07/19/93	07/16/93	07/19/93	07/16/93	07/19/93	07/19/93	07/16/93	07/16/93
DATE ANALYZED:	08/05/93	08/04/93	08/05/93	08/04/93	08/05/93	08/05/93	08/04/93	08/05/93

ANALYTE	SOW-3/90 - II CRQL															
Phenol	10	10	U	10	U	10	U	10	U	51		44		11	U	10	U
bis(2-Chloroethyl)ether	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
2-Chlorophenol	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
1,3-Dichlorobenzene	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
1,4-Dichlorobenzene	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
1,2-Dichlorobenzene	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
2-Methylphenol	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
2,2'-oxybis(1-Chloropropane)	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
4-Methylphenol	10	10	U	10	U	10	U	10	U	4	J	10	U	11	U	10	U
N-Nitroso-di-n-propylamine	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
Hexachloroethane	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
Nitrobenzene	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
Isophorone	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
2-Nitrophenol	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
2,4-Dimethylphenol	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
bis(2-Chloroethoxy)methane	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
2,4-Dichlorophenol	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
1,2,4-Trichlorobenzene	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
Naphthalene	10	2	J	10	U	2	J	10	U	2600	D	2800	D	480	D	480	D
4-Chloroaniline	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
Hexachlorobutadiene	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
4-Chloro-3-Methylphenol	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
2-Methylnaphthalene	10	10	U	10	U	10	U	10	U	200		190		46		48	
Hexachlorocyclopentadiene	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
2,4,6-Trichlorophenol	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
2,4,5-Trichlorophenol	25	25	U	26	U	24	U	24	U	28	U	25	U	28	U	26	U
2-Chloronaphthalene	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
2-Nitroaniline	25	25	U	26	U	24	U	24	U	28	U	25	U	28	U	26	U
Dimethylphthalate	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U
Acenaphthylene	10	1	J	10	U	1	J	10	U	22		13		10	J	10	
2,6-Dinitrotoluene	10	10	U	10	U	10	U	10	U	11	U	10	U	11	U	10	U

Box Number: 4945-104

Table 2
Validation / Summary Table

SAMPLE LOCATION:	MEGDMW8601/11	MEGDMW8602/11	MEGDMW86DU/12	MEGDMW8711/11	MEGDMW8713/11	MEGDMW8714/11	MEGDMW8715/11	MEGDMW87DU/11
LAB NUMBER:	13988-003	13970-002	13988-006	13970-003	13988-002	13988-007	13970-004	13970-005
DATE SAMPLED:	07/15/93	07/14/93	07/15/93	07/14/93	07/15/93	07/15/93	07/14/93	07/14/93
DATE EXTRACTED:	07/19/93	07/16/93	07/19/93	07/16/93	07/19/93	07/19/93	07/16/93	07/16/93
DATE ANALYZED:	08/05/93	08/04/93	08/05/93	08/04/93	08/05/93	08/05/93	08/04/93	08/05/93

ANALYTE	SOW-3/90 - II CRQL								
3-Nitroaniline	25	25 U	26 U	24 U	24 U	28 U	25 U	28 U	26 U
Acenaphthene	10	10 U	10 U	10 U	10 U	58	100	110	110
2,4-Dinitrophenol	25	25 U	26 U	24 U	24 U	28 U	25 U	28 U	26 U
4-Nitrophenol	25	25 U	26 U	24 U	24 U	28 U	25 U	28 U	26 U
Dibenzofuran	10	10 U	10 U	10 U	10 U	2 J	4 J	3 J	3 J
2,4-Dinitrotoluene	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Diethylphthalate	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
4-Chlorophenyl-phenylether	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Fluorene	10	10 U	10 U	10 U	10 U	17	28	24	25
4-Nitroaniline	25	25 U	26 U	24 U	24 U	28 U	25 U	28 U	26 U
4,6-Dinitro-2-methylphenol	25	25 U	26 U	24 U	24 U	28 U	25 U	28 U	26 U
N-Nitrosodiphenylamine	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
4-Bromophenyl-phenylether	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Hexachlorobenzene	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Pentachlorophenol	25	25 U	26 U	24 U	24 U	28 U	25 U	28 U	26 U
Phenanthrene	10	10 U	10 U	10 U	10 U	20	32	34	31
Anthracene	10	10 U	10 U	10 U	10 U	2 J	4 J	2 J	2 J
Carbazole	10	10 U	10 U	10 U	10 U	5 J	5 J	11 U	10 U
Di-n-butylphthalate	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Fluoranthene	10	10 U	10 U	10 U	10 U	2 J	2 J	2 J	1 J
Pyrene	10	10 U	10 U	10 U	10 U	2 J	2 J	2 J	2 J
Butylbenzylphthalate	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
3,3'-Dichlorobenzidine	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Benzo(a)Anthracene	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Chrysene	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
bis(2-Ethylhexyl)phthalate	10	41	10 U	44	19 U	44	10 U	45	100
Di-n-octylphthalate	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Benzo(b)Fluoranthene	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Benzo(k)Fluoranthene	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Benzo(a)Pyrene	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Indeno(1,2,3-c,d)Pyrene	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Dibenz(a,h)Anthracene	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Benzo(g,h,i)perylene	10	10 U	10 U	10 U	10 U	11 U	10 U	11 U	10 U
Dilution Factor:		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Sample Volume\Weight (ml\g):		1010	950	1040	1040	880	1020	900	980
Associated Method Blank:		DG143.93	DG113.93	DG143.93	DG113.93	DG143.93	DG143.93	DG113.93	DG113.93
Associated Equipment Blank:		MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11
Associated Field Blank:		-	-	-	-	-	-	-	-

Box Number: 4945-104

PROJECT: NYSEG Mechanicville

Semivolatile Organic Aqueous Analysis (ug/L)

10/20/93

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEGDMW9317/11	MEGDMW9318/11	MEGUMW9316/11	MESDEEXX01/11	MESDEEXX02/11
	LAB NUMBER:	13929-002	13929-003	13970-001	13970-006	13929-001
	DATE SAMPLED:	07/13/93	07/13/93	07/14/93	07/14/93	07/13/93
	DATE EXTRACTED:	07/16/93	07/16/93	07/16/93	07/16/93	07/16/93
	DATE ANALYZED:	08/04/93	08/04/93	08/04/93	08/06/93	08/06/93
ANALYTE	SOW-3/90 - II CRQL					
Phenol	10	12 U	10 U	10 U	430	160
bis(2-Chloroethyl)ether	10	12 U	10 U	10 U	24 U	13 U
2-Chlorophenol	10	12 U	10 U	10 U	24 U	13 U
1,3-Dichlorobenzene	10	12 U	10 U	10 U	24 U	13 U
1,4-Dichlorobenzene	10	12 U	10 U	10 U	24 U	13 U
1,2-Dichlorobenzene	10	12 U	10 U	10 U	24 U	13 U
2-Methylphenol	10	12 U	10 U	10 U	24 U	13 U
2,2'-oxybis(1-Chloropropane)	10	12 U	10 U	10 U	24 U	13 U
4-Methylphenol	10	12 U	10 U	10 U	24 U	2 J
N-Nitroso-di-n-propylamine	10	12 U	10 U	10 U	24 U	13 U
Hexachloroethane	10	12 U	10 U	10 U	24 U	13 U
Nitrobenzene	10	12 U	10 U	10 U	24 U	13 U
Isophorone	10	12 U	10 U	10 U	24 U	13 U
2-Nitrophenol	10	12 U	10 U	10 U	24 U	13 U
2,4-Dimethylphenol	10	12 U	10 U	10 U	24 U	13 U
bis(2-Chloroethoxy)methane	10	12 U	10 U	10 U	24 U	13 U
2,4-Dichlorophenol	10	12 U	10 U	10 U	24 U	13 U
1,2,4-Trichlorobenzene	10	12 U	10 U	10 U	24 U	13 U
Naphthalene	10	12 U	10 U	10 U	24 U	13 U
4-Chloroaniline	10	12 U	10 U	10 U	24 U	13 U
Hexachlorobutadiene	10	12 U	10 U	10 U	24 U	13 U
4-Chloro-3-Methylphenol	10	12 U	10 U	10 U	24 U	13 U
2-Methylnaphthalene	10	12 U	10 U	10 U	24 U	13 U
Hexachlorocyclopentadiene	10	12 U	10 U	10 U	24 U	13 U
2,4,6-Trichlorophenol	10	12 U	10 U	10 U	24 U	13 U
2,4,5-Trichlorophenol	25	29 U	24 U	26 U	61 U	32 U
2-Chloronaphthalene	10	12 U	10 U	10 U	24 U	13 U
2-Nitroaniline	25	29 U	24 U	26 U	61 U	32 U
Dimethylphthalate	10	12 U	10 U	10 U	24 U	13 U
Acenaphthylene	10	12 U	10 U	10 U	24 U	13 U
2,6-Dinitrotoluene	10	12 U	10 U	10 U	24 U	13 U

Box Number: 4945-104

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEGDMW9317/11	MEGDMW9318/11	MEGUMW9316/11	MESDEEXX01/11	MESDEEXX02/11
	LAB NUMBER:	13929-002	13929-003	13970-001	13970-006	13929-001
	DATE SAMPLED:	07/13/93	07/13/93	07/14/93	07/14/93	07/13/93
	DATE EXTRACTED:	07/16/93	07/16/93	07/16/93	07/16/93	07/16/93
	DATE ANALYZED:	08/04/93	08/04/93	08/04/93	08/06/93	08/06/93
ANALYTE	SOW-3/90 - II CRQL					
3-Nitroaniline	25	29 U	24 U	26 U	61 U	32 U
Acenaphthene	10	12 U	10 U	10 U	24 U	13 U
2,4-Dinitrophenol	25	29 U	24 U	26 U	61 U	32 U
4-Nitrophenol	25	29 U	24 U	26 U	61 U	32 U
Dibenzofuran	10	12 U	10 U	10 U	24 U	13 U
2,4-Dinitrotoluene	10	12 U	10 U	10 U	24 U	13 U
Diethylphthalate	10	12 U	10 U	10 U	24 U	13 U
4-Chlorophenyl-phenylether	10	12 U	10 U	10 U	24 U	13 U
Fluorene	10	12 U	10 U	10 U	24 U	13 U
4-Nitroaniline	25	29 U	24 U	26 U	61 U	32 U
4,6-Dinitro-2-methylphenol	25	29 U	24 U	26 U	61 U	32 U
N-Nitrosodiphenylamine	10	12 U	10 U	10 U	24 U	13 U
4-Bromophenyl-phenylether	10	12 U	10 U	10 U	24 U	13 U
Hexachlorobenzene	10	12 U	10 U	10 U	24 U	13 U
Pentachlorophenol	25	29 U	24 U	26 U	61 U	32 U
Phenanthrene	10	12 U	10 U	10 U	24 U	13 U
Anthracene	10	12 U	10 U	10 U	24 U	13 U
Carbazole	10	12 U	10 U	10 U	24 U	13 U
Di-n-butylphthalate	10	12 U	10 U	10 U	24 U	13 U
Fluoranthene	10	12 U	10 U	10 U	24 U	13 U
Pyrene	10	12 U	10 U	10 U	24 U	13 U
Butylbenzylphthalate	10	12 U	10 U	10 U	24 U	13 U
3,3'-Dichlorobenzidine	10	12 U	10 U	10 U	24 U	13 U
Benzo(a)Anthracene	10	12 U	10 U	10 U	24 U	13 U
Chrysene	10	12 U	10 U	10 U	24 U	13 U
bis(2-Ethylhexyl)phthalate	10	12 U	10 U	22	9 J	4 J
Di-n-octylphthalate	10	12 U	10 U	10 U	24 U	13 U
Benzo(b)Fluoranthene	10	12 U	10 U	10 U	24 U	13 U
Benzo(k)Fluoranthene	10	12 U	10 U	10 U	24 U	13 U
Benzo(a)Pyrene	10	12 U	10 U	10 U	24 U	13 U
Indeno(1,2,3-c,d)Pyrene	10	12 U	10 U	10 U	24 U	13 U
Dibenz(a,h)Anthracene	10	12 U	10 U	10 U	24 U	13 U
Benzo(g,h,i)perylene	10	12 U	10 U	10 U	24 U	13 U
Dilution Factor:		1.00	1.00	1.00	1.00	1.00
Sample Volume\Weight (ml\g):		860	1040	960	410	780
Associated Method Blank:		DG113.93	DG113.93	DG113.93	DG113.93	DG113.93
Associated Equipment Blank:		MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	-	-
Associated Field Blank:		-	-	-	-	-

Box Number: 4945-104

PROJECT: NYSEG Mechanicville

Inorganic Aqueous Analysis (ug/L)

10/19/93

Table 2
Validation / Summary Table

ANALYTE	SOW-3/90 - II CRDL	SAMPLE LOCATION: MEGDMW8601/11		MEGDMW8602/11		MEGDMW86DU/12		MEGDMW8711/11		MEGDMW8713/11		MEGDMW8714/11		MEGDMW8715/11		MEGDMW87DU/11	
		LAB NUMBER: 13988-003		13970-002		13988-006		13970-003		13988-002		13988-007		13970-004		13970-005	
		DATE SAMPLED: 07/15/93		07/14/93		07/15/93		07/14/93		07/15/93		07/15/93		07/14/93		07/14/93	
Aluminum	200	112	J	76.0	J	113	J	348		62.0	J	86.0	J	78.0	J	141	J
Antimony	60	5.0	U	14.5	J	10.1	J	5.0	U	5.0	U	16.7	J	17.0	J	5.0	U
Arsenic	10	NR		NR		NR		NR		NR		NR		NR		NR	
Barium	200	NR		NR		NR		NR		NR		NR		NR		NR	
Beryllium	5	NR		NR		NR		NR		NR		NR		NR		NR	
Cadmium	5	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U
Calcium	5000	NR		NR		NR		NR		NR		NR		NR		NR	
Chromium	10	157		4.0	U	824		5.0	J	4.0	J	4.0	U	4.0	J	4.0	U
Cobalt	50	5.0	U	5.0	U	7.0	J	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Copper	25	7.0	J	4.0	U	23.0	J	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U
Iron	100	3270		191		4360		332		87.0	J	142		103		199	
Lead	3	1.6	J	7.2		1.2	J	18.0		2.1	J	1.0	J	1.0	U	1.2	J
Magnesium	5000	NR		NR		NR		NR		NR		NR		NR		NR	
Manganese	15	629		1200		1630		2040		469		727		369		383	
Mercury	0.2	NR		NR		NR		NR		NR		NR		NR		NR	
Nickel	40	125		8.0	U	150		63.0		8.0	U	8.0	U	8.0	U	8.0	U
Potassium	5000	NR		NR		NR		NR		NR		NR		NR		NR	
Selenium	5	NR		NR		NR		NR		NR		NR		NR		NR	
Silver	10	NR		NR		NR		NR		NR		NR		NR		NR	
Sodium	5000	NR		NR		NR		NR		NR		NR		NR		NR	
Thallium	10	NR		NR		NR		NR		NR		NR		NR		NR	
Vanadium	50	NR		NR		NR		NR		NR		NR		NR		NR	
Zinc	20	26.0		31.0		25.0		42.0		20.0		12.0	J	16.0	J	21.0	
Cyanide	10	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U	79.3		10.0	U	NR	
Associated Method Blank:		PBW13929		PBW13929		PBW13929		PBW13929		PBW13929		PBW13929		PBW13929		PBW13929	
Associated Equipment Blank:		MEGXMWXXFB/11		MEGXMWXXFB/11		MEGXMWXXFB/11		MEGXMWXXFB/11		MEGXMWXXFB/11		MEGXMWXXFB/11		MEGXMWXXFB/11		MEGXMWXXFB/11	
Associated Field Blank:		-		-		-		-		-		-		-		-	

Box Number: 4945-104

Table 2
Validation / Summary Table

		SAMPLE LOCATION:	MEGDMW9317/11		MEGDMW9318/11		MEGUMW9316/11	
		LAB NUMBER:	13929-002		13929-003		13970-001	
		DATE SAMPLED:	07/13/93		07/13/93		07/14/93	
ANALYTE	SOW-3/90 - II CRDL							
Aluminum	200		182000		1020		20100	
Antimony	60		5.0	U	5.0	U	5.0	U
Arsenic	10		NR		NR		NR	
Barium	200		NR		NR		NR	
Beryllium	5		NR		NR		NR	
Cadmium	5		4.0	U	4.0	U	4.0	U
Calcium	5000		NR		NR		NR	
Chromium	10		272		5.0	J	33.0	
Cobalt	50		117		5.0	U	13.0	J
Copper	25		349		4.0	U	30.0	
Iron	100		306000		1280		18800	
Lead	3		142		3.8		22.2	
Magnesium	5000		NR		NR		NR	
Manganese	15		5750		688		1100	
Mercury	0.2		NR		NR		NR	
Nickel	40		284		8.0	U	19.0	J
Potassium	5000		NR		NR		NR	
Selenium	5		NR		NR		NR	
Silver	10		NR		NR		NR	
Sodium	5000		NR		NR		NR	
Thallium	10		NR		NR		NR	
Vanadium	50		NR		NR		NR	
Zinc	20		879		46.0		93.0	
Cyanide	10		65.9		19.1		10.0	U
Associated Method Blank:			PBW13929		PBW13929		PBW13929	
Associated Equipment Blank:			MEGXMWXXFB/11		MEGXMWXXFB/11		MEGXMWXXFB/11	
Associated Field Blank:			-		-		-	

Box Number: 4945-104

Table 2
Validation / Summary Table

SAMPLE LOCATION:		MEGDMW8714/11	MEGDMW9317/11	MEGDMW9318/11
LAB NUMBER:		13988-007	13929-002	13929-003
DATE SAMPLED:		07/15/93	07/13/93	07/13/93
ANALYTE	RL			
Amenable Cyanide	10	10 U	10 U	10 U
Iron Cyanide	20	198	20 U	22.5
Associated Method Blank:		-	-	-
Associated Equipment Blank:		-	-	-
Associated Field Blank:		-	-	-

Box Number: 4945-103

Table 2
Validation / Summary Table

ANALYTE	SOW-3/90 - II CRDL	SAMPLE LOCATION: MEGDMW8601/11	MEGDMW8602/11	MEGDMW86DU/12	MEGDMW8711/11	MEGDMW8713/11	MEGDMW8714/11	MEGDMW8715/11	MEGDMW87DU/11
		LAB NUMBER: D13988-003	D13970-002	D13988-006	D13970-003	D13988-002	D13988-007	D13970-004	D13970-005
		DATE SAMPLED: 07/15/93	07/14/93	07/15/93	07/14/93	07/15/93	07/15/93	07/14/93	07/14/93
Aluminum	200	52.0 J	54.0 J	48.0 U	48.0 U	48.0 U	75.0 J	48.0 U	48.0 U
Antimony	60	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Arsenic	10	NR	NR	NR	NR	NR	NR	NR	NR
Barium	200	NR	NR	NR	NR	NR	NR	NR	NR
Beryllium	5	NR	NR	NR	NR	NR	NR	NR	NR
Cadmium	5	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Calcium	5000	NR	NR	NR	NR	NR	NR	NR	NR
Chromium	10	4.0 J	4.0 U	4.0 J	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Cobalt	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Copper	25	4.0 U	4.0 U	7.0 J	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Iron	100	92.0 J	8.0 U	46.0 J	56.0 J	52.0 J	79.0 J	8.0 J	8.0 U
Lead	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Magnesium	5000	NR	NR	NR	NR	NR	NR	NR	NR
Manganese	15	123	1080	128	2170	518	787	403	403
Mercury	0.2	NR	NR	NR	NR	NR	NR	NR	NR
Nickel	40	41.0	8.0 U	33.0 J	64.0	8.0 U	8.0 U	8.0 U	8.0 U
Potassium	5000	NR	NR	NR	NR	NR	NR	NR	NR
Selenium	5	NR	NR	NR	NR	NR	NR	NR	NR
Silver	10	NR	NR	NR	NR	NR	NR	NR	NR
Sodium	5000	NR	NR	NR	NR	NR	NR	NR	NR
Thallium	10	NR	NR	NR	NR	NR	NR	NR	NR
Vanadium	50	NR	NR	NR	NR	NR	NR	NR	NR
Zinc	20	2.0 U	2.0 J	5.0 J	3.0 J	12.0 J	2.0 J	2.0 U	9.0 J
Cyanide	10	NR	NR	NR	NR	NR	NR	NR	NR
Associated Method Blank:		PBW13929	PBW13929	PBW13929	PBW13929	PBW13929	PBW13929	PBW13929	PBW13929
Associated Equipment Blank:		MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11
Associated Field Blank:		-	-	-	-	-	-	-	-

Box Number: 4945-104

Table 2
Validation / Summary Table

		SAMPLE LOCATION:	MEGDMW9317/11		MEGDMW9318/11		MEGUMW9316/11	
		LAB NUMBER:	D13929-002		D13929-003		D13970-001	
		DATE SAMPLED:	07/13/93		07/13/93		07/14/93	
ANALYTE	SOW-3/90 - II CRDL							
Aluminum	200		86.0	J	97.0	J	55.0	J
Antimony	60		5.0	U	5.0	U	5.0	U
Arsenic	10		NR		NR		NR	
Barium	200		NR		NR		NR	
Beryllium	5		NR		NR		NR	
Cadmium	5		4.0	U	4.0	U	4.0	U
Calcium	5000		NR		NR		NR	
Chromium	10		4.0	U	4.0	U	4.0	U
Cobalt	50		5.0	U	5.0	U	5.0	U
Copper	25		20.0	J	7.0	J	4.0	U
Iron	100		43.0	J	29.0	J	58.0	J
Lead	3		1.0	U	1.0	U	1.0	U
Magnesium	5000		NR		NR		NR	
Manganese	15		2320		709		910	
Mercury	0.2		NR		NR		NR	
Nickel	40		8.0	U	8.0	U	8.0	U
Potassium	5000		NR		NR		NR	
Selenium	5		NR		NR		NR	
Silver	10		NR		NR		NR	
Sodium	5000		NR		NR		NR	
Thallium	10		NR		NR		NR	
Vanadium	50		NR		NR		NR	
Zinc	20		2.0	U	6.0	J	2.0	U
Cyanide	10		NR		NR		NR	

Associated Method Blank:	PBW13929	PBW13929	PBW13929
Associated Equipment Blank:	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11
Associated Field Blank:	-	-	-

Box Number: 4945-104

Table 2
Validation / Summary Table

SAMPLE LOCATION:		MEGDMW8601/11	MEGDMW8602/11	MEGDMW86DU/12	MEGDMW8711/11	MEGDMW8713/11	MEGDMW8714/11	MEGDMW8715/11	MEGDMW87DU/11
LAB NUMBER:		13988-003	13970-002	13988-006	13970-003	13988-002	13988-007	13970-004	13970-005
DATE SAMPLED:		07/15/93	07/14/93	07/15/93	07/14/93	07/15/93	07/15/93	07/14/93	07/14/93
ANALYTE	RL								
Turbidity	0.2	1.1	0.70	1.3	5.8	33	33	4.3	4.6
Associated Method Blank:		-	-	-	-	-	-	-	-
Associated Equipment Blank:		MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11
Associated Field Blank:		-	-	-	-	-	-	-	-

Box Number: 4945-104

Table 2
Validation / Summary Table

SAMPLE LOCATION:		MEGDMW9317/11	MEGDMW9318/11	MEGUMW9316/11
LAB NUMBER:		13929-002	13929-003	13970-001
DATE SAMPLED:		07/13/93	07/13/93	07/14/93
ANALYTE	RL			
Turbidity	0.2	4600	6.2	1100
Associated Method Blank:		-	-	-
Associated Equipment Blank:		MEGXMWXXFB/11	MEGXMWXXFB/11	MEGXMWXXFB/11
Associated Field Blank:		-	-	-

Box Number: 4945-104

Table 2
Validation / Summary Table

ANALYTE	SOW-3/90 - II CRQL	SAMPLE LOCATION: METDEEXX01/11	METDEEXX02/11	METDEEXX03/11	METDEEXX04/11	METDEEXX05/11	METDEEXX06/11	METDEEXXDU/11
		LAB NUMBER: 13244-001	13244-002	13244-003	13244-007	13244-008 #	13244-009	13244-006
		DATE SAMPLED: 05/21/93	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93
		DATE ANALYZED: 05/26/93	05/26/93	05/26/93	05/27/93	05/27/93	05/28/93	05/27/93
Chloromethane	10	12 U	13 U	12 U	17 U	4 J	12 U	12 U
Bromomethane	10	12 U	13 U	12 U	17 U	12 U	12 U	12 U
Vinyl Chloride	2	12 U	13 U	12 U	17 U	12 U	12 U	12 U
Chloroethane	10	12 U	13 U	12 U	17 U	12 U	12 U	12 U
Methylene Chloride	5	5 J	6	6	6 J	4 J	4 J	6
Acetone	10	12	12 J	5 J	8 J	4 J	4 J	12
Carbon Disulfide	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
1,1-Dichloroethene	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
1,1-Dichloroethane	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
1,2-Dichloroethene (total)	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Chloroform	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
1,2-Dichloroethane	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
2-Butanone	10	12 U	13 U	12 U	17 U	12 UJ	12 U	12 U
1,1,1-Trichloroethane	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Carbon Tetrachloride	3	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Bromodichloromethane	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
1,2-Dichloropropane	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
cis-1,3-Dichloropropene	2	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Trichloroethene	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Dibromochloromethane	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
1,1,2-Trichloroethane	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Benzene	5	6 U	1 J	2 J	14	6 U	6 U	4 J
trans-1,3-Dichloropropene	2	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Bromoform	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
4-Methyl-2-Pentanone	10	12 U	13 U	12 U	17 U	12 U	12 U	12 U
2-Hexanone	10	12 U	13 U	12 U	17 U	12 U	12 U	12 U
Tetrachloroethene	3	6 U	6 U	6 U	8 U	6 U	6 U	6 U
1,1,2,2-Tetrachloroethane	5	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Toluene	10	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Chlorobenzene	10	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Ethylbenzene	10	6 U	6 U	6 U	3 J	6 U	6 U	3 J
Styrene	10	6 U	6 U	6 U	8 U	6 U	6 U	6 U
Total Xylenes	10	6 U	6 U	6 U	8 U	6 U	6 U	10
Dilution Factor:		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Solids:		81	79	83	61	84	82	85
Sample Volume\Weight (ml\g):		5.00	5.00	5.00	5.00	5.00	5.00	5.00
Associated Method Blank:		QC52693-1	QC52693-1	QC52693-1	QC520793-1	QC520793-1	QC520793-1	QC520793-1
Associated Equipment Blank:		-	-	-	-	-	-	-
Associated Field Blank:		-	-	-	-	-	-	-
Associated Trip Blank:		-	-	-	-	-	-	-

Box Number: 4945-102
#: Level IV Validation

PROJECT: NYSEG Mechanicville

Semivolatile Organic Soil Analysis (ug/kg)

08/25/93

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	METDEEXX01/11	METDEEXX02/11	METDEEXX03/11	METDEEXX04/11	METDEEXX05/11	METDEEXX06/11	METDEEXXDU/11
	LAB NUMBER:	13244-001	13244-002	13244-003	13244-007	13244-008 #	13244-009	13244-006
	DATE SAMPLED:	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93
	DATE EXTRACTED:	05/26/93	05/26/93	05/26/93	05/26/93	05/26/93	05/26/93	05/26/93
	DATE ANALYZED:	06/08/93	06/08/93	06/08/93	06/09/93	06/09/93	06/09/93	06/09/93
ANALYTE	SOW-3/90 - II CRQL							
Phenol	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
bis(2-Chloroethyl)ether	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
2-Chlorophenol	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
1,3-Dichlorobenzene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
1,4-Dichlorobenzene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
1,2-Dichlorobenzene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
2-Methylphenol	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
2,2'-oxybis(1-Chloropropane)	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
4-Methylphenol	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
N-Nitroso-di-n-propylamine	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Hexachloroethane	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Nitrobenzene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Isophorone	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
2-Nitrophenol	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
2,4-Dimethylphenol	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
bis(2-Chloroethoxy)methane	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
2,4-Dichlorophenol	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
1,2,4-Trichlorobenzene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Naphthalene	330	410 U	550 U	3600	550 U	400 U	410 U	2000
4-Chloroaniline	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Hexachlorobutadiene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
4-Chloro-3-Methylphenol	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
2-Methylnaphthalene	330	410 U	430 U	1000	57 J	400 U	410 U	590
Hexachlorocyclopentadiene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
2,4,6-Trichlorophenol	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
2,4,5-Trichlorophenol	800	2000 U	2100 U	2000 U	2800 U	2000 U	2000 U	2000 U
2-Chloronaphthalene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
2-Nitroaniline	800	2000 U	2100 U	2000 U	2800 U	2000 U	2000 U	2000 U
Dimethylphthalate	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Acenaphthylene	330	86 J	66 J	74 J	86 J	400 U	410 U	400 U
2,6-Dinitrotoluene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U

Box Number: 4945-102
#: Level IV Validation

Table 2
Validation / Summary Table

ANALYTE	SOW-3/90 - II CRQL	METDEEXX01/11	METDEEXX02/11	METDEEXX03/11	METDEEXX04/11	METDEEXX05/11	METDEEXX06/11	METDEEXXDU/11
SAMPLE LOCATION:		METDEEXX01/11	METDEEXX02/11	METDEEXX03/11	METDEEXX04/11	METDEEXX05/11	METDEEXX06/11	METDEEXXDU/11
LAB NUMBER:		13244-001	13244-002	13244-003	13244-007	13244-008 #	13244-009	13244-006
DATE SAMPLED:		05/21/93	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93
DATE EXTRACTED:		05/26/93	05/26/93	05/26/93	05/26/93	05/26/93	05/26/93	05/26/93
DATE ANALYZED:		06/08/93	06/08/93	06/08/93	06/09/93	06/09/93	06/09/93	06/09/93
3-Nitroaniline	800	2000 U	2100 U	2000 U	2800 U	2000 U	2000 U	2000 U
Acenaphthene	330	410 U	860	1600	660	71 J	40 J	840
2,4-Dinitrophenol	800	2000 U	2100 U	2000 U	2800 U	2000 U	2000 U	2000 U
4-Nitrophenol	800	2000 U	2100 U	2000 U	2800 U	2000 U	2000 U	2000 U
Dibenzofuran	330	410 U	430 U	80 J	550 U	400 U	410 U	400 U
2,4-Dinitrotoluene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Diethylphthalate	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
4-Chlorophenyl-phenylether	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Fluorene	330	410 U	210 J	420	290 J	74 J	410 U	230 J
4-Nitroaniline	800	2000 U	2100 U	2000 U	2800 U	2000 U	2000 U	2000 U
4,6-Dinitro-2-methylphenol	800	2000 U	2100 U	2000 U	2800 U	2000 U	2000 U	2000 U
N-Nitrosodiphenylamine	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
4-Bromophenyl-phenylether	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Hexachlorobenzene	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Pentachlorophenol	800	110 J	2100 U	2000 U	2800 U	2000 U	2000 U	2000 U
Phenanthrene	330	64 J	380 J	460	790	820	410 U	390 J
Anthracene	330	410 U	79 J	95 J	3300	130 J	410 U	91 J
Carbazole	330	410 U	430 U	410 U	550 U	120 J	410 U	400 U
Di-n-butylphthalate	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Fluoranthene	330	120 J	150 J	190 J	490 J	1300	80 J	180 J
Pyrene	330	140 J	210 J	240 J	510 J	1100	410 U	180 J
Butylbenzylphthalate	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
3,3'-Dichlorobenzidine	330	410 U	430 U	410 U	550 U	400 U	410 U	400 U
Benzo(a)Anthracene	330	58 J	81 J	100 J	200 J	510	410 U	72 J
Chrysene	330	90 J	95 J	110 J	240 J	670	410 U	77 J
bis(2-Ethylhexyl)phthalate	330	240 J	430 U	140 J	300 J	420	280 J	400 U
Di-n-octylphthalate	330	410 U	430 U	410 U	550 U	400 UJ	410 U	400 U
Benzo(b)Fluoranthene	330	110 J	88 J	120 J	160 J	400 U	410 U	400 U
Benzo(k)Fluoranthene	330	410 U	430 U	410 U	550 U	460	410 U	400 U
Benzo(a)Pyrene	330	170 J	82 J	120 J	180 J	490	410 U	61 J
Indeno(1,2,3-c,d)Pyrene	330	120 J	81 J	72 J	140 J	330 J	410 U	41 J
Dibenz(a,h)Anthracene	330	410 U	430 U	410 U	550 U	120 J	410 U	400 U
Benzo(g,h,i)perylene	330	110 J	430 U	100 J	99 J	150 J	410 U	400 U
Dilution Factor:		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Solids:		81	78	82	60	84	82	84
Sample Volume\Weight (ml\g):		30.0	30.0	30.0	30.1	30.0	30.0	30.0
Associated Method Blank:		AI21193	AI21193	AI21193	AI21193	AI21193	AI21193	AI21193
Associated Equipment Blank:		-	-	-	-	-	-	-
Associated Field Blank:		-	-	-	-	-	-	-

Box Number: 4945-102
#: Level IV Validation

PROJECT: NYSEG Mechanicville

Inorganic Soil Analysis (mg/kg)

08/26/93

Table 2
Validation / Summary Table

	LOCATION:	SD-1 (0-1FT)	SD-2 (0-1FT)	SD-3 (0-1FT)	SD-4 (0-1FT)	SD-5 (0-1FT)	SD-6 (0-1FT)	SD-3DUP(0-1FT)
	ISIS ID:	METDEEXX01/11	METDEEXX02/11	METDEEXX03/11	METDEEXX04/11	METDEEXX05/11	METDEEXX06/11	METDEEXXDU/11
	LAB NUMBER:	13244-001	13244-002	13244-003	13244-007	13244-008 #	13244-009	13244-006
	DATE SAMPLED:	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93
ANALYTE	SOW-3/90 - II CRDL							
Aluminum	40	5640	5020	7540	6550	5000	6390	6390
Antimony	12	0.30 U	0.37 U	0.36 U	0.34 U	0.32 U	0.35 U	0.33 U
Arsenic	2	NR	NR	NR	NR	NR	NR	NR
Barium	40	NR	NR	NR	NR	NR	NR	NR
Beryllium	1	NR	NR	NR	NR	NR	NR	NR
Cadmium	1	0.40 U	0.49 U	0.48 U	0.46 U	0.43 U	0.47 U	0.44 U
Calcium	1000	NR	NR	NR	NR	NR	NR	NR
Chromium	2	8.8	7.9	11.5	10.6	10.7	12.0	10.8
Cobalt	10	5.0	4.3 J	7.9	5.8	6.7	5.8	5.8
Copper	5	19.7	17.5	20.0	15.5	26.5	18.1	16.0
Iron	20	14300	13900	23100	16400	16300	16900	16600
Lead	0.6	13.5	155	14.6	12.5	36.2	11.7	14.5
Magnesium	1000	NR	NR	NR	NR	NR	NR	NR
Manganese	3	337	236	368	278	412	270	309
Mercury	0.04	NR	NR	NR	NR	NR	NR	NR
Nickel	8	12.2	9.5	16.0	13.4	12.7	13.2	13.7
Potassium	1000	NR	NR	NR	NR	NR	NR	NR
Selenium	1	NR	NR	NR	NR	NR	NR	NR
Silver	2	NR	NR	NR	NR	NR	NR	NR
Sodium	1000	NR	NR	NR	NR	NR	NR	NR
Thallium	2	NR	NR	NR	NR	NR	NR	NR
Vanadium	10	NR	NR	NR	NR	NR	NR	NR
Zinc	4	64.4	74.9	88.6	65.7	96.3 J	55.7	54.9
Cyanide	2	2.6 U	3.0 U	2.3 U	3.0 U	2.9 U	2.9 U	2.6 U
	Percent Solids:	83	80	83	83	84	83	86
	Associated Method Blank:	PBS13244	PBS13244	PBS13244	PBS13244	PBS13244	PBS13244	PBS13244
	Associated Equipment Blank:	-	-	-	-	-	-	-
	Associated Field Blank:	-	-	-	-	-	-	-

Site: SEDIMENT SAMPLES
B = less than CRDL U = not detected * = duplicate analysis not met N = spike recovery not met W = post digestion spike not met
J = estimated

Table 2
Validation / Summary Table

	LOCATION:	SD-1 (0-1 FT)	SD-2 (0-1 FT)	SD-3 (0-1 FT)	SD-4 (0-1 FT)	SD-5 (0-1 FT)	SD-6 (0-1 FT)	SD-3DUP (0-1FT)
	ISIS ID:	METDEEXX01/11	METDEEXX02/11	METDEEXX03/11	METDEEXX04/11	METDEEXX05/11	METDEEXX06/11	METDEEXXDU/11
	LAB NUMBER:	13244-001	13244-002	13244-003	13244-007	13244-008	13244-009	13244-006
	DATE SAMPLED:	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93	05/21/93
ANALYTE	RL							
Reactive Cyanide	100	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Reactive Sulfide	100	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Associated Method Blank:		13244	13244	13244	13244	13244	13244	13244
Associated Equipment Blank:		-	-	-	-	-	-	-
Associated Field Blank:		-	-	-	-	-	-	-

Site: SEDIMENT SAMPLES
U = not detected

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	COMP-3	COMP-4
	LAB NUMBER:	13905-003	13905-004
	DATE SAMPLED:	07/12/93	07/12/93
	DATE ANALYZED:	07/23/93	07/23/93
ANALYTE	RL		
Vinyl Chloride	10	10 U	10 U
1,1-Dichloroethene	5	5 U	5 U
1,2-Dichloroethane	5	5 U	5 U
2-Butanone	10	10 U	10 U
Carbon Tetrachloride	5	5 U	5 U
Trichloroethene	5	5 U	5 U
Benzene	5	5 U	5 U
Tetrachloroethene	5	5 U	5 U
Chlorobenzene	5	5 U	5 U
	Dilution Factor:	1	1
	Sample Volume\Weight (ml\g):	5	5
	Associated Method Blank:	BN037.93	BN037.93
	Associated Equipment Blank:	-	-
	Associated Field Blank:	-	-

Box Number: 4945-103

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	COMP-3	COMP-4
	LAB NUMBER:	13905-003	13905-004
	DATE SAMPLED:	07/12/93	07/12/93
	DATE EXTRACTED:	07/19/93	07/19/93
	DATE ANALYZED:	08/02/93	08/02/93
ANALYTE	RL		
Pyridine	98	98 U	100 U
1,4-Dichlorobenzene	10	10 U	10 U
2-Methylphenol	10	10 U	10 U
3 & 4-Methylphenol	10	10 U	10 U
Hexachloroethane	98	98 U	100 U
Nitrobenzene	10	10 U	10 U
Hexachlorobutadiene	10	10 U	10 U
2,4,6-Trichlorophenol	10	10 U	10 U
2,4,5-Trichlorophenol	10	10 U	10 U
2,4-Dinitrotoluene	10	10 U	10 U
Hexachlorobenzene	10	10 U	10 U
Pentachlorophenol	5	5 U	5 U
Dilution Factor:		1	1
Sample Volume\Weight (ml\g):		1015	1000
Associated Method Blank:		AI44193	AI44193
Associated Equipment Blank:		-	-
Associated Field Blank:		-	-

Box Number: 4945-103

APPENDIX D

Seismic Refraction Survey Report

Former Coal Gasification Site
Mechanicville, New York

Introduction

A seismic survey was conducted in the Price Chopper parking lot adjacent to the NYSEG Former Coal Gasification Site in Mechanicville, New York. The survey was conducted to investigate for the presence of a bedrock low hypothesized to exist and to guide the location of a monitoring well pair (MW-17 and MW-18). Seismic methods are often employed to map bedrock surfaces and structural features. Seismic surveying was conducted on 17 May 1993. Find attached to this memorandum seismic data reports for each seismic line.

Instrumentation and General Survey Information

Three 120 foot long seismic lines were shot in the Price Chopper parking lot (located between the Price Chopper and North Central Avenue. Figure 4-1 in the RI illustrates the location of each seismic spread. A Geometrics ES-2515F seismograph was used for seismic data collection. A 12-channel geophone array was used where geophone spacing was 10 feet. A 10 pound sledgehammer was used as an energy source, an offset of 5 feet was used. Analog strip chart recordings were obtained and interpreted in the field. First-break pick analysis and preliminary depth calculations were also made in the field. Seismic data was later processed using various applications software. In order to minimize the adverse effects of cultural noise (primarily vehicular traffic), the survey was conducted between 2:00 a.m. and 4:30 a.m.

Seismic Survey Results

Tables D-1, D-2, and D-3 in the seismic data reports present calculated depths to bedrock beneath each seismic profile line. Figures D-1 through D-3 show these data plotted as depth

to bedrock. Seismic velocities calculated for bedrock ranged between 9,000 and 15,000 feet per second (ft/sec). These values are indicative of weathered and competent shale bedrock. Seismic Line 1 suggests that bedrock lies between 23 and 25 feet below ground surface (bgs). Seismic Line 2 shows that a slight bedrock high may exist paralleling the general structural trend of nearby outcrop. Seismic data indicates that bedrock is found between 20 and 21 feet bgs along Seismic Line 2. Data collected from Seismic Lines 1 and 2 correlate well with the depth of bedrock determined during the subsequent construction of MW-17 and MW-18 (22.5 feet bgs). The bedrock surface appears deeper beneath Seismic Line 3 ranging from 25 to 28 feet bgs.

SIPT2 V-4.0 — SEISMIC REFRACTION INTERPRETATION PROGRAM — RIMROCK GEOPHYSICS, INC.

DATA FILE: c:\temp\msrl1.dat PRINT FILE: c:\temp\msrl1.prn RUN DATE AND TIME: 12-18-1993 at 13:04

TITLE: NYSEG/Mechanicville/Seismic Line 1, 17 May 1993, 0215-0254 hrs

PROGRAM CONTROL DATA — Printer Plot Scales — Datum Override Values — Special Control Parameters

Sprds	Exit	Layers	Elev V-Over	Horiz ft/col	Time ft/row	Time ms/col	Point 1 Elev	Point 1 X-Loc	Point 2 Elev	Point 2 X-Loc	Equation Slope	Equation Intcpt	Trace BLim	Trace TLim	Off Print	L SP Dip
1	6	2	0	.0	.0	.0	.0	.0	.0	.0	.0000	.0	.50	10.0	0	0 0

SHOTPOINT AND GEOPHONE INPUT DATA

Spread A, 3 Shotpoints, 12 Geophones, X-Shift = 0.0, X-True = 1

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
S	98.5	.0	.0	.0	.0	.0	1
T	98.5	60.0	.0	.0	.0	.0	0
U	98.5	120.0	.0	.0	.0	.0	2

Arrival Times + Fudge T and Layers represented

Geo	Elev	X-Loc	Y-Loc	SP S —T—	SP S —L	SP T —T—	SP T —L	SP U
1	98.5	5.0	.0	1.0	0	29.5	2	36.0 2
2	98.5	15.0	.0	1.8	0	28.5	1	36.3 2
3	98.5	25.0	.0	4.0	0	22.0	1	36.0 2
4	98.5	35.0	.0	25.3	1	16.8	1	35.0 2
5	98.5	45.0	.0	29.5	1	2.5	0	34.0 2
6	98.5	55.0	.0	30.0	2	2.0	1	33.0 2
7	98.5	65.0	.0	30.3	2	2.0	1	32.0 2
8	98.5	75.0	.0	31.5	2	2.5	0	31.0 1
9	98.5	85.0	.0	32.8	2	3.8	0	25.0 1
10	98.5	95.0	.0	33.8	2	19.0	1	5.5 0
11	98.5	105.0	.0	35.0	2	29.3	1	2.3 0
12	98.5	115.0	.0	35.5	2	30.0	2	1.8 1

Layer 1 Velocity V for direct rays and direct distances DD

Spread A	SP	Geo	DD	V	Avg V
S	4	35.0	1386.		
S	5	45.0	1525.		
				1456.	
T	2	45.0	1579.		
T	3	35.0	1591.		
T	4	25.0	1493.		
T	6	5.0	2500.		
T	7	5.0	2500.		
T	10	35.0	1842.		
T	11	45.0	1538.		
				1863.	
U	8	45.0	1452.		
U	9	35.0	1400.		
U	12	5.0	2857.		
				1903.	

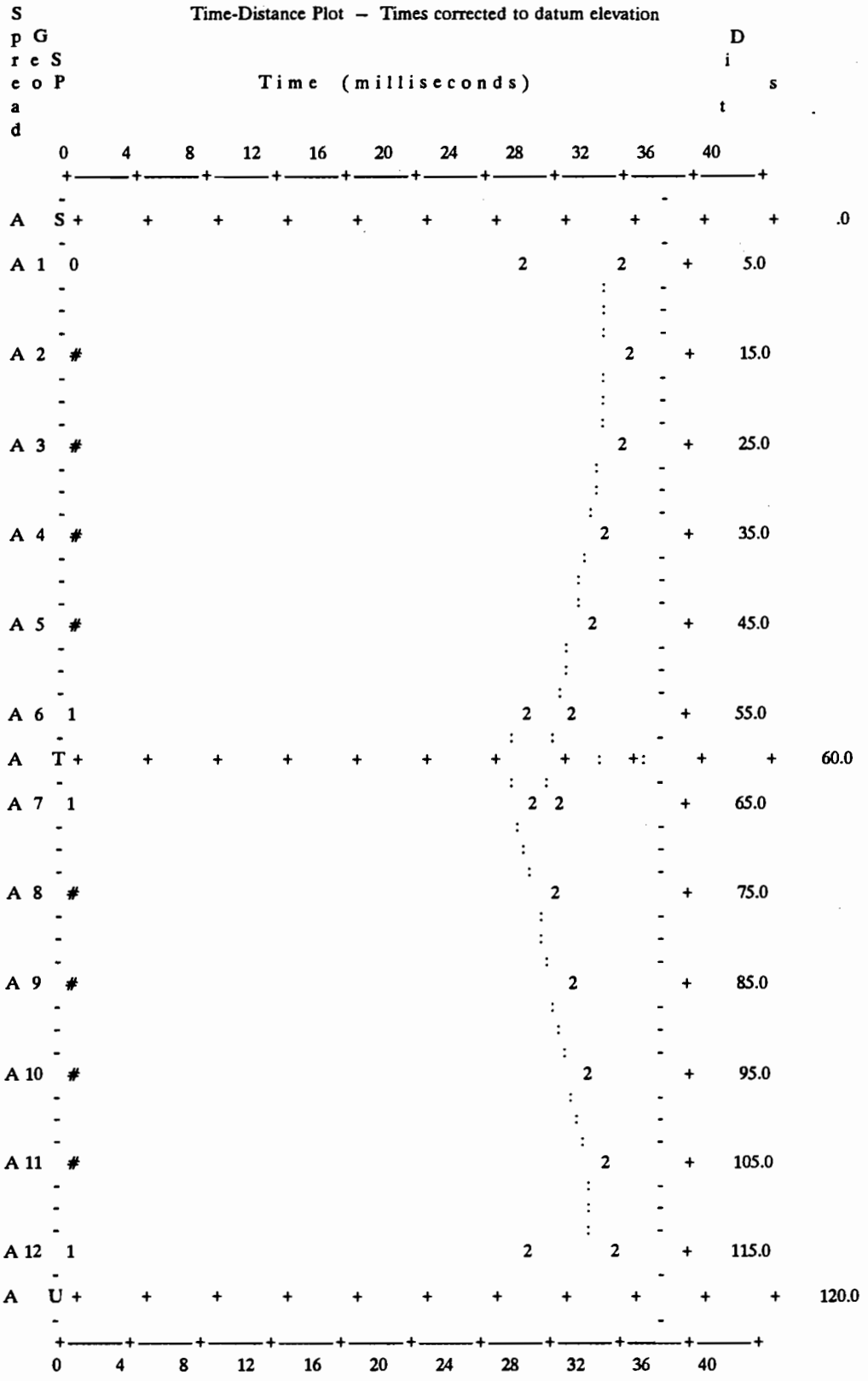
Wtd Avg Velocity computed for Layer 1 = 1805.

Arrival times Td corrected to datum. (Datum Elev = 98.5 + .0000X)

Spread A

		SP S	SP T	SP U
Datum Elev		98.5	98.5	98.5
Geo	. X-Loc Cor	T .0	.0	.0
		-Td-	-Td-	-Td-
1	98.5 5.0 .0	.0	29.5	36.0
2	98.5 15.0 .0	.0	.0	36.3
3	98.5 25.0 .0	.0	.0	36.0
4	98.5 35.0 .0	.0	.0	35.0
5	98.5 45.0 .0	.0	.0	34.0
6	98.5 55.0 .0	30.0	.0	33.0
7	98.5 65.0 .0	30.3	.0	32.0
8	98.5 75.0 .0	31.5	.0	.0
9	98.5 85.0 .0	32.8	.0	.0
10	98.5 95.0 .0	33.8	.0	.0
11	98.5 105.0 .0	35.0	.0	.0
12	98.5 115.0 .0	35.5	30.0	.0

NYSEG/Mechanicville/Seismic Line 1, 17 May 1993, 0215-0254 hrs



PRINTER PLOT SCALES

Time: .40 ms/col
Dist: 2.50 ft/row

Layer 2 Velocity V and Intercept time Ti computed by regression:

Spread A

V	Ti	Geos	SP	Geos	Ti	V	Avg V	Avg Ti	Pts
000.	.0	0 0	S	6 12	24.1	9912.	9912.	24.1	7.
13659.	28.4	1 7	U	12 12	.0	000.	13659.	28.4	7.

Avg = 11487. for 14. Pts

Layer 2 Velocity V, Avg dTi and Eps computed by Hobson-Overton method:

Spread A

SPs	Geos	V	AdTi	SE Ep	5 Highest Eps									
					Eps	Geo	Eps	Geo	Eps	Geo	Eps	Geo	Eps	Geo
S U	6 7	16000.	-2.4	.000	.000	0	.000	0	.000	0	.000	0	.000	0

Avg = 16000. for 2. Pts

Wtd Avg Velocity computed for Layer 2 = 12490.

Arrival times Tc corrected to top of Layer 2, and Elev of top of Layer 2:

Spread A

	SP S	SP T	SP U
Elev	75.5	74.2	73.1

Geo	.	X-Loc		Cor T	12.7	13.5	14.1
				-Tc-	-Tc-	-Tc-	
1	75.4	5.0	12.8	-24.5	3.3	9.1	
2	74.2	15.0	13.5	-24.4	1.6	8.7	
3	73.3	25.0	14.0	-22.7	-5.4	7.9	
4	73.0	35.0	14.1	-1.6	-10.8	6.8	
5	73.6	45.0	13.8	3.0	-24.8	6.1	
6	74.1	55.0	13.5	3.8	-25.0	5.4	
7	74.3	65.0	13.4	4.1	-24.9	4.5	
8	73.7	75.0	13.7	5.1	-24.7	3.2	
9	73.3	85.0	14.0	6.1	-23.7	-3.1	
10	72.9	95.0	14.2	6.8	-8.7	-22.8	
11	72.9	105.0	14.2	8.1	1.6	-26.0	
12	73.2	115.0	14.0	8.8	2.5	-26.4	

Spread A Points of emergence of refracted rays below target geophones:

Geo		SP S	SP T	SP U
—		——L	——L	——L
1	X-Loc	.0 0	5.2 2	5.2 2
	Elev	.0	75.5	75.5
2	X-Loc	.0 0	.0 1	15.9 2
	Elev	.0	.0	74.1
3	X-Loc	.0 0	.0 1	28.1 2
	Elev	.0	.0	73.0
4	X-Loc	.0 1	.0 1	39.9 2
	Elev	.0	.0	73.1
5	X-Loc	.0 1	.0 0	51.0 2
	Elev	.0	.0	73.9
6	X-Loc	53.7 2	.0 1	58.9 2
	Elev	74.1	.0	74.3
7	X-Loc	61.8 2	.0 1	67.1 2
	Elev	74.3	.0	74.3
8	X-Loc	69.9 2	.0 0	.0 1
	Elev	74.1	.0	.0
9	X-Loc	79.6 2	.0 0	.0 1
	Elev	73.5	.0	.0
10	X-Loc	90.2 2	.0 1	.0 0
	Elev	72.9	.0	.0
11	X-Loc	101.6 2	.0 1	.0 0
	Elev	72.8	.0	.0
12	X-Loc	112.4 2	112.4 2	.0 1
	Elev	73.1	73.1	.0

Spread A Points of entry of refracted rays below source shotpoints:

L=2	Right	X-Loc	2.6	63.9	.0
		Elev	75.6	74.4	.0
L=2	Left	X-Loc	.0	56.8	115.6
		Elev	.0	74.3	73.2

TABLE D-1

NYSEG/Mechanicville/Seismic Line 1, 17 May 1993, 0215-0254 hrs

Spread A Depth and Elev of layers directly beneath SPs and Geos:

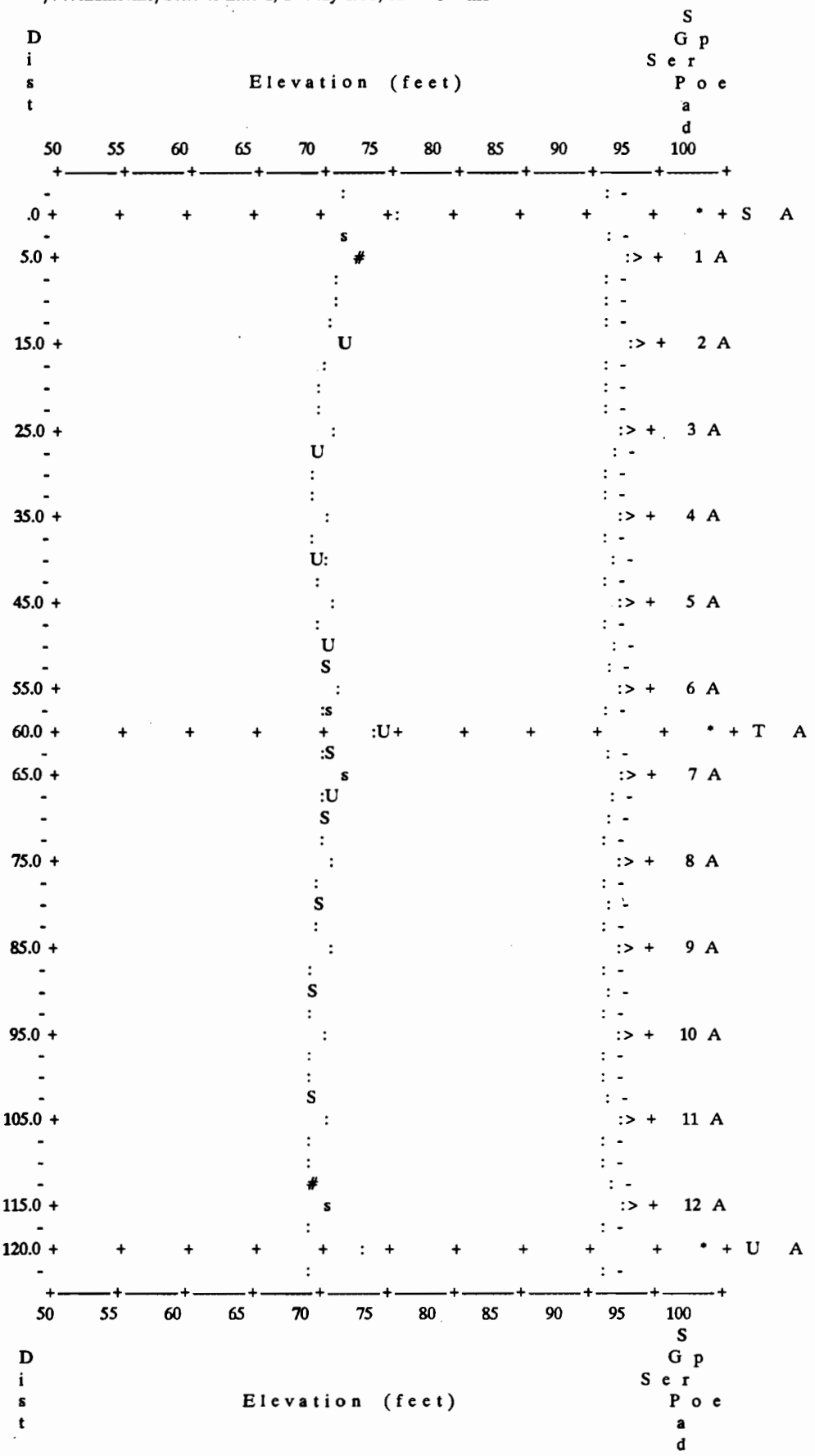
	Surface		Layer 2	
SP	X-Loc	Elev	Depth	Elev
S	.0	98.5	23.0	75.5
T	60.0	98.5	24.3	74.2
U	120.0	98.5	25.4	73.1
Geo				
1	5.0	98.5	23.1	75.4
2	15.0	98.5	24.3	74.2
3	25.0	98.5	25.2	73.3
4	35.0	98.5	25.5	73.0
5	45.0	98.5	24.9	73.6
6	55.0	98.5	24.4	74.1
7	65.0	98.5	24.2	74.3
8	75.0	98.5	24.8	73.7
9	85.0	98.5	25.2	73.3
10	95.0	98.5	25.6	72.9
11	105.0	98.5	25.6	72.9
12	115.0	98.5	25.3	73.2

Velocities used, Spread A

	Layer 1	Layer 2
Vertical	1805.	
Horizontal		12490.

FIGURE D-1

NYSEG/Mechanicville/Seismic Line 1, 17 May 1993, 0215-0254 hrs



PRINTER PLOT SCALES

Elev: .50 ft/col
Dist: 2.50 ft/row

LEGEND

> Geophone Location
* Shotpoint Location
A,B,C Emergent Ray; Source SP A,B,C,...
? Questionable Emergent Ray
s Ray Entrypoint Beneath SP
More Than One Symbol to Plot Here
+ Grid Mark

DATA FILE: c:\temp\msrl2.dat PRINT FILE: c:\temp\msrl2.prn RUN DATE AND TIME: 12-18-1993 at 14:33

TITLE: NYSEG/Mechanicville/Seismic Line 2, 17 May 1993, 0319-0336 hrs

PROGRAM CONTROL DATA — Printer Plot Scales — Datum Point 1 — Datum Point 2 — Override Equation — Values — Special Control Parameters

Sprds	Exit	Layers	Elev V-Over	Horiz ft/col	Time ft/row	ms/col	Point 1 Elev	Point 1 X-Loc	Point 2 Elev	Point 2 X-Loc	Override Slope	Override Intcpt	Values BLim	Values TLim	Trace Off Print	L SP Dip
1	6	2	0	.0	.0	.0	.0	.0	.0	.0	.0000	.0	.50	10.0	0	0 0

SHOTPOINT AND GEOPHONE INPUT DATA

Spread A, 3 Shotpoints, 12 Geophones, X-Shift = 0.0, X-True = 1

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
S	98.5	.0	.0	.0	.0	.0	1
T	98.5	60.0	.0	.0	.0	.0	0
U	98.5	120.0	.0	.0	.0	.0	2

Arrival Times + Fudge T and Layers represented

Geo	Elev	X-Loc	Y-Loc	SP S —T—	L	SP T —T—	L	SP U
1	98.5	5.0	.0	3.8	1	28.8	2	36.3 2
2	98.5	15.0	.0	6.3	0	28.8	1	36.3 2
3	98.5	25.0	.0	7.5	0	21.5	1	35.5 2
4	98.5	35.0	.0	14.8	0	16.3	1	35.0 2
5	98.5	45.0	.0	28.8	1	3.0	0	31.3 2
6	98.5	55.0	.0	30.0	2	2.0	1	30.3 2
7	98.5	65.0	.0	31.3	2	2.0	1	29.8 2
8	98.5	75.0	.0	32.8	2	5.8	0	29.8 1
9	98.5	85.0	.0	33.8	2	17.0	1	18.0 1
10	98.5	95.0	.0	34.8	2	.0	0	20.5 1
11	98.5	105.0	.0	35.0	2	28.0	1	8.8 1
12	98.5	115.0	.0	37.3	2	30.8	2	.0 0

Layer 1 Velocity V for direct rays and direct distances DD

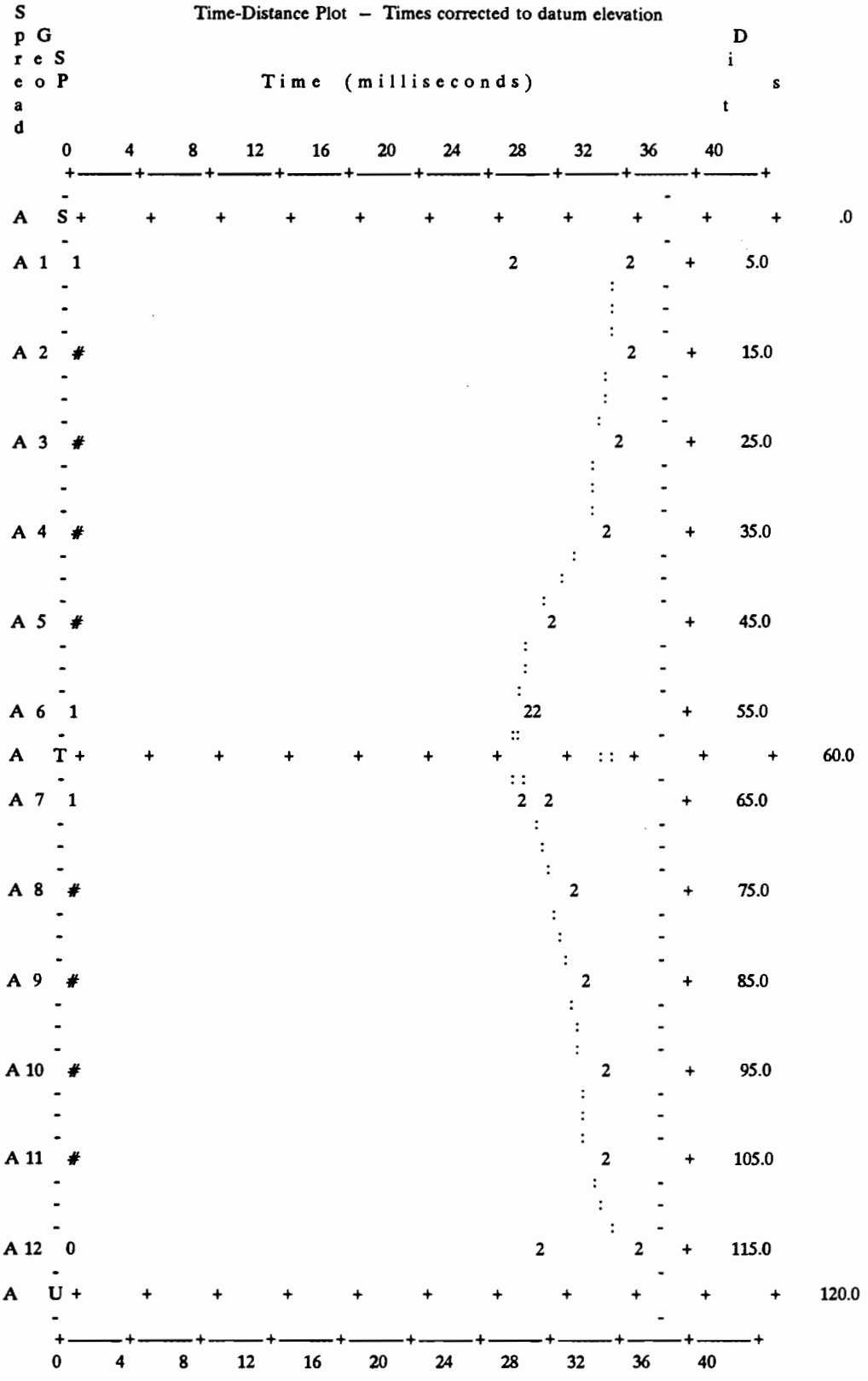
Spread A	SP	Geo	DD	V	Avg V
S	1	5.0	1333.		
S	5	45.0	1565.		
				1449.	
T	2	45.0	1565.		
T	3	35.0	1628.		
T	4	25.0	1538.		
T	6	5.0	2500.		
T	7	5.0	2500.		
T	9	25.0	1471.		
T	11	45.0	1607.		
				1830.	
U	8	45.0	1513.		
U	9	35.0	1944.		
U	10	25.0	1220.		
U	11	15.0	1714.		
				1598.	

Wtd Avg Velocity computed for Layer 1 = 1700.

Arrival times Td corrected to datum. (Datum Elev = 98.5 + .0000X)

Spread A

				SP S	SP T	SP U
Datum Elev				98.5	98.5	98.5
Geo	.	X-Loc	Cor T	.0	.0	.0
—	.	—— ——		–Td–	–Td–	–Td–
1	98.5	5.0	.0	.0	28.8	36.3
2	98.5	15.0	.0	.0	.0	36.3
3	98.5	25.0	.0	.0	.0	35.5
4	98.5	35.0	.0	.0	.0	35.0
5	98.5	45.0	.0	.0	.0	31.3
6	98.5	55.0	.0	30.0	.0	30.3
7	98.5	65.0	.0	31.3	.0	29.8
8	98.5	75.0	.0	32.8	.0	.0
9	98.5	85.0	.0	33.8	.0	.0
10	98.5	95.0	.0	34.8	.0	.0
11	98.5	105.0	.0	35.0	.0	.0
12	98.5	115.0	.0	37.3	30.8	.0



PRINTER PLOT SCALES

Time: .40 ms/col
Dist: 2.50 ft/row

Layer 2 Velocity V and Intercept time Ti computed by regression:

Spread A V	Ti	Geos	SP	Geos	Ti	V	Avg V	Avg Ti	Pts
000.	.0	0 0	S	6 12	24.0	8960.	8960.	24.0	7.
7832.	22.6	1 7	U	12 12	.0	000.	7832.	22.6	7.

Avg = 8358. for 14. Pts

Layer 2 Velocity V, Avg dTi and Eps computed by Hobson-Overton method:

Spread A SPs	Geos	V	AdTi	SE Ep	5 Highest Eps Eps	Geo	Eps	Geo	Eps	Geo	Eps	Geo	Eps	Geo
S U	6 7	11429.	.6	.000	.000	6	.000	7	.000	0	.000	0	.000	0

Avg = 11429. for 2. Pts

Wtd Avg Velocity computed for Layer 2 = 9041.

Arrival times Tc corrected to top of Layer 2, and Elev of top of Layer 2:

Spread A				SP S	SP T	SP U
Elev				77.4	77.6	78.0
Geo	.	X-Loc	Cor T	12.4	12.3	12.0
				-Tc-	-Tc-	-Tc-
1	77.4	5.0	12.4	-21.1	4.0	11.8
2	76.4	15.0	13.0	-19.2	3.4	11.2
3	75.5	25.0	13.6	-18.5	-4.4	9.9
4	75.9	35.0	13.3	-11.0	-9.4	9.7
5	76.3	45.0	13.0	3.3	-22.3	6.2
6	77.7	55.0	12.2	5.3	-22.6	6.0
7	77.5	65.0	12.4	6.4	-22.7	5.3
8	77.3	75.0	12.5	7.9	-19.0	5.2
9	77.5	85.0	12.4	8.9	-7.7	-6.4
10	77.8	95.0	12.2	10.2	-24.5	-3.7
11	78.0	105.0	12.0	10.5	3.6	-15.3
12	77.9	115.0	12.1	12.7	6.3	-24.1

NYSEG/Mechanicville/Seismic Line 2, 17 May 1993, 0319-0336 hrs

Spread A Points of emergence of refracted rays below target geophones:

Geo		SP S	SP T	SP U
—		——L	——L	——L
1	X-Loc	.0 1	6.7 2	6.7 2
	Elev	.0	77.3	77.3
2	X-Loc	.0 0	.0 1	16.5 2
	Elev	.0	.0	76.2
3	X-Loc	.0 0	.0 1	29.0 2
	Elev	.0	.0	75.1
4	X-Loc	.0 0	.0 1	42.6 2
	Elev	.0	.0	76.0
5	X-Loc	.0 1	.0 0	52.4 2
	Elev	.0	.0	77.5
6	X-Loc	54.2 2	.0 1	58.1 2
	Elev	77.7	.0	77.7
7	X-Loc	60.1 2	.0 1	68.5 2
	Elev	77.6	.0	77.3
8	X-Loc	70.4 2	.0 0	.0 1
	Elev	77.3	.0	.0
9	X-Loc	81.4 2	.0 1	.0 1
	Elev	77.3	.0	.0
10	X-Loc	92.1 2	.0 0	.0 1
	Elev	77.7	.0	.0
11	X-Loc	101.6 2	.0 1	.0 1
	Elev	78.0	.0	.0
12	X-Loc	110.5 2	110.5 2	.0 0
	Elev	78.0	78.0	.0

Spread A Points of entry of refracted rays below source shotpoints:

L=2	Right	X-Loc	4.0	63.1	.0
		Elev	77.5	77.5	.0
L=2	Left	X-Loc	.0	55.1	116.4
		Elev	.0	77.8	77.9

TABLE D-2

NYSEG/Mechanicville/Seismic Line 2, 17 May 1993, 0319-0336 hrs

Spread A Depth and Elev of layers directly beneath SPs and Geos:

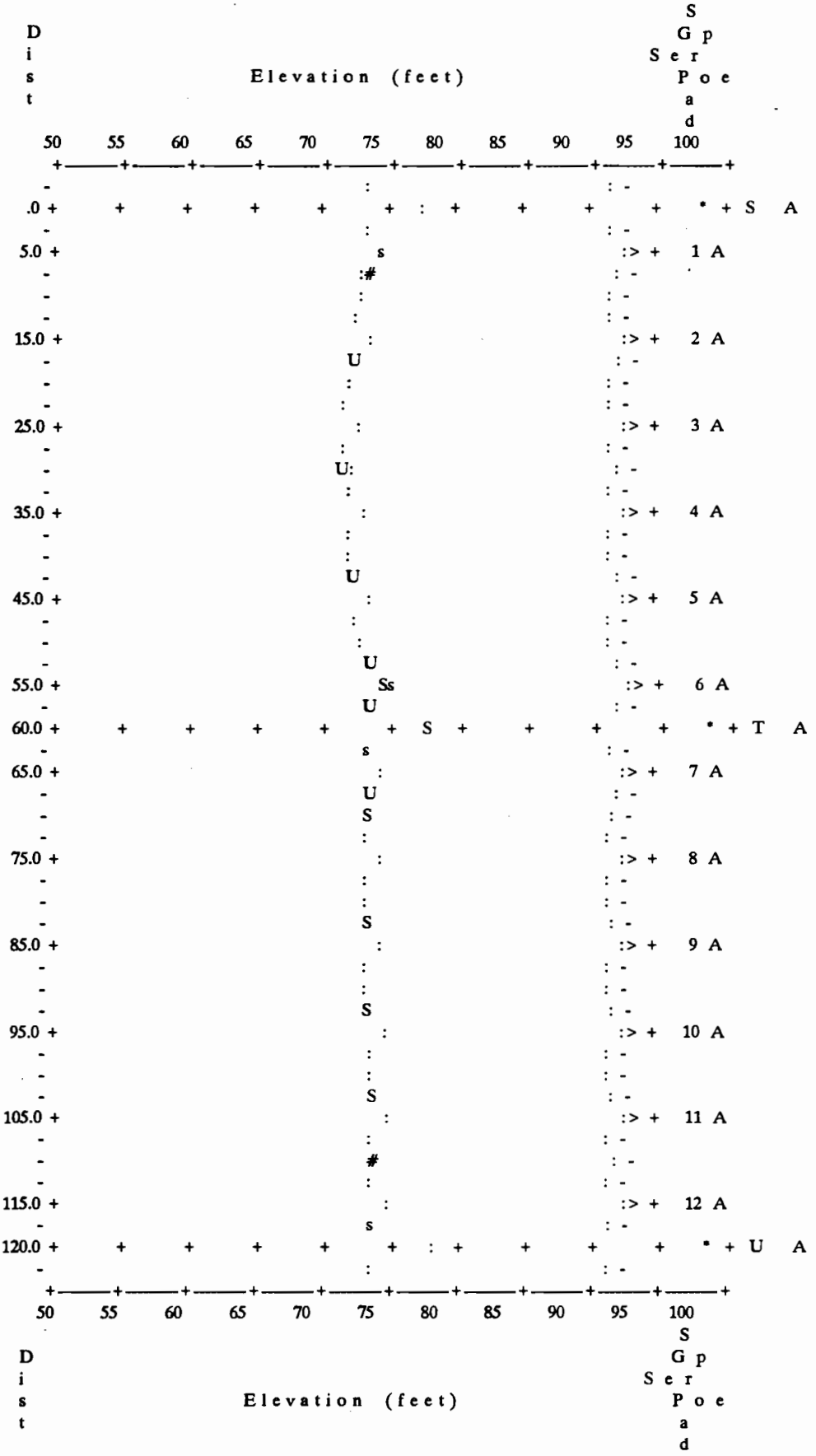
	Surface		Layer 2	
SP	X-Loc	Elev	Depth	Elev
S	.0	98.5	21.1	77.4
T	60.0	98.5	20.9	77.6
U	120.0	98.5	20.5	78.0
Geo				
1	5.0	98.5	21.1	77.4
2	15.0	98.5	22.1	76.4
3	25.0	98.5	23.0	75.5
4	35.0	98.5	22.6	75.9
5	45.0	98.5	22.2	76.3
6	55.0	98.5	20.8	77.7
7	65.0	98.5	21.0	77.5
8	75.0	98.5	21.2	77.3
9	85.0	98.5	21.0	77.5
10	95.0	98.5	20.7	77.8
11	105.0	98.5	20.5	78.0
12	115.0	98.5	20.6	77.9

Velocities used, Spread A

	Layer 1	Layer 2
Vertical	1700.	
Horizontal		9041.

FIGURE D-2

NYSEG/Mechanicville/Seismic Line 2, 17 May 1993, 0319-0336 hrs



PRINTER PLOT SCALES

Elev: .50 ft/col
Dist: 2.50 ft/row

LEGEND

> Geophone Location
* Shotpoint Location
A,B,C Emergent Ray; Source SP A,B,C,...
? Questionable Emergent Ray
s Ray Entrypoint Beneath SP
More Than One Symbol to Plot Here
+ Grid Mark

DATA FILE: c:\temp\msrl3.dat PRINT FILE: c:\temp\msrl3.prn RUN DATE AND TIME: 12-18-1993 at 14:38

TITLE: NYSEG/Mechanicville/Seismic Line 3, 17 May 1993, 0401-0420 hrs

PROGRAM CONTROL DATA — Printer Plot Scales — Datum Point 1 — Datum Point 2 — Override Equation — Values — Special Control Parameters

Sprds	Exit	Layers	Elev V-Over	Horiz ft/col	Time ft/row	ms/col	Elev	X-Loc	Elev	X-Loc	Slope	Intcpt	Trace Off BLim	L TLim	Print	SP	Dip
1	6	2	0	.0	.0	.0	.0	.0	.0	.0	.0000	.0	.50	10.0	0	0	0

SHOTPOINT AND GEOPHONE INPUT DATA

Spread A, 3 Shotpoints, 12 Geophones, X-Shift = 0.0, X-True = 1

SP	Elev	X-Loc	Y-Loc	Depth	Uphole T	Fudge T	End SP
S	98.5	.0	.0	.0	.0	.0	1
T	98.5	60.0	.0	.0	.0	.0	0
U	98.5	120.0	.0	.0	.0	.0	2

Arrival Times + Fudge T and Layers represented

Geo	Elev	X-Loc	Y-Loc	SP S —T—	L	SP T —T—	L	SP U
1	98.5	5.0	.0	.0	0	31.0	1	37.5 2
2	98.5	15.0	.0	12.5	1	24.5	1	37.0 2
3	98.5	25.0	.0	16.3	1	22.5	1	35.8 2
4	98.5	35.0	.0	24.0	1	3.8	0	34.8 2
5	98.5	45.0	.0	30.0	1	3.0	0	32.5 2
6	98.5	55.0	.0	31.3	2	3.0	1	32.5 2
7	98.5	65.0	.0	31.8	2	2.0	1	32.5 2
8	98.5	75.0	.0	33.3	2	.0	0	27.0 1
9	98.5	85.0	.0	35.8	2	2.0	0	28.5 1
10	98.5	95.0	.0	37.0	2	4.3	0	10.5 1
11	98.5	105.0	.0	36.3	2	22.3	1	7.5 1
12	98.5	115.0	.0	38.8	2	31.0	1	5.0 1

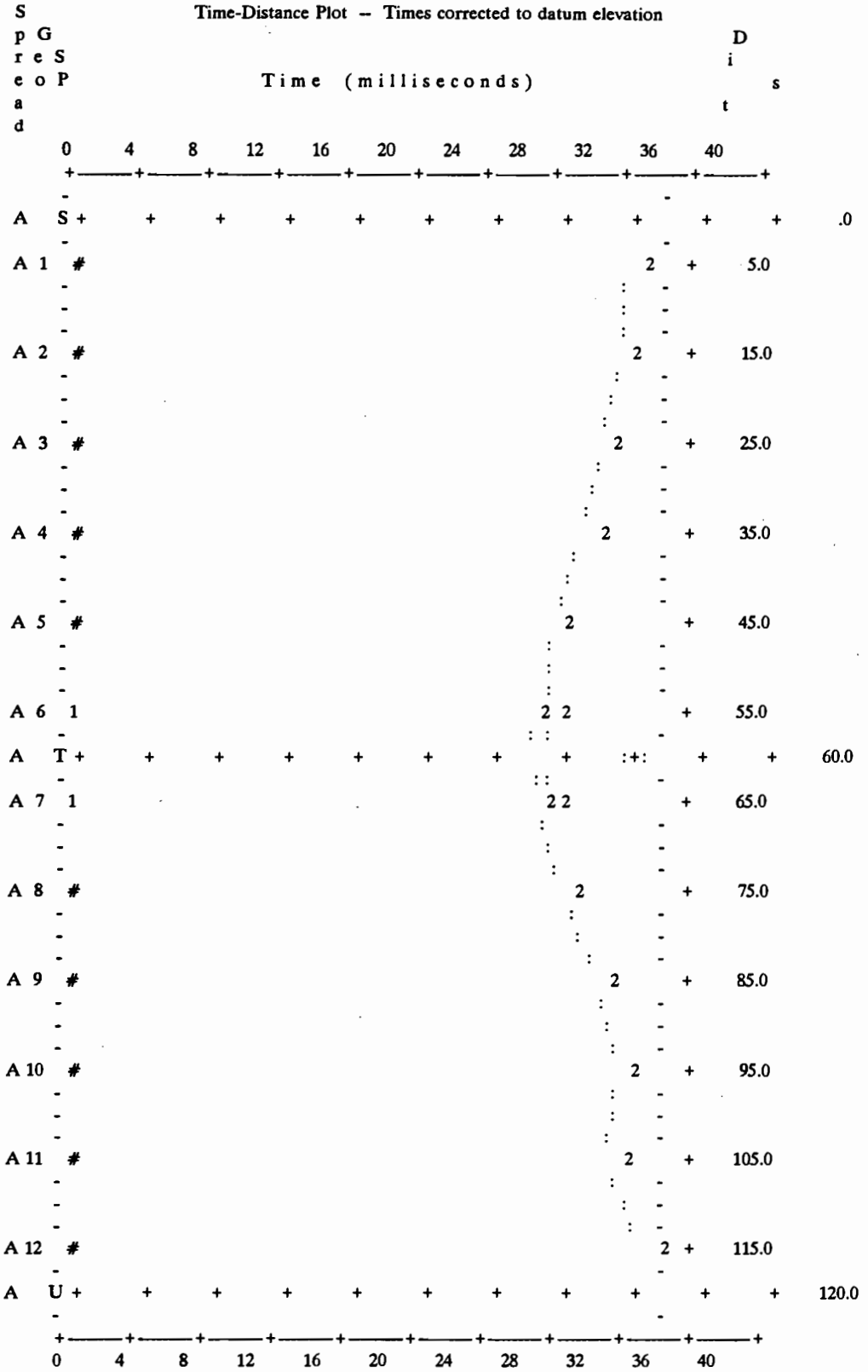
Layer 1 Velocity V for direct rays and direct distances DD

Spread A	SP	Geo	DD	V	Avg V
S	2	15.0	1200.		
S	3	25.0	1538.		
S	4	35.0	1458.		
S	5	45.0	1500.		
				1424.	
T	1	55.0	1774.		
T	2	45.0	1837.		
T	3	35.0	1556.		
T	6	5.0	1667.		
T	7	5.0	2500.		
T	11	45.0	2022.		
T	12	55.0	1774.		
				1876.	
U	8	45.0	1667.		
U	9	35.0	1228.		
U	10	25.0	2381.		
U	11	15.0	2000.		
U	12	5.0	1000.		
				1655.	

Wtd Avg Velocity computed for Layer 1 = 1694.

Arrival times Td corrected to datum. (Datum Elev = 98.5 + .0000X)

Spread A				SP S	SP T	SP U
Datum Elev				98.5	98.5	98.5
Geo	.	X-Loc	Cor T	.0	.0	.0
---	.	--- ---		-Td-	-Td-	-Td-
1	98.5	5.0	.0	.0	.0	37.5
2	98.5	15.0	.0	.0	.0	37.0
3	98.5	25.0	.0	.0	.0	35.8
4	98.5	35.0	.0	.0	.0	34.8
5	98.5	45.0	.0	.0	.0	32.5
6	98.5	55.0	.0	31.3	.0	32.5
7	98.5	65.0	.0	31.8	.0	32.5
8	98.5	75.0	.0	33.3	.0	.0
9	98.5	85.0	.0	35.8	.0	.0
10	98.5	95.0	.0	37.0	.0	.0
11	98.5	105.0	.0	36.3	.0	.0
12	98.5	115.0	.0	38.8	.0	.0



PRINTER PLOT SCALES

Time: .40 ms/col
Dist: 2.50 ft/row

Layer 2 Velocity V and Intercept time Ti computed by regression:

Spread A V	Ti	Geos	SP	Geos	Ti	V	Avg V	Avg Ti	Pts
000.	.0	0 0	S	6 12	24.2	7943.	7943.	24.2	7.
10275.	26.4	1 7	U	6 12	.0	000.	10275.	26.4	7.

Avg = 8960. for 14. Pts

Layer 2 Velocity V, Avg dTi and Eps computed by Hobson-Overton method:

Spread A SPs	Geos	V	AdTi	SE Ep	5 Highest Eps Eps	Geo	Eps	Geo	Eps	Geo	Eps	Geo	Eps	Geo
S U	6 7	40000.	-1.0	.000	.000	0	.000	0	.000	0	.000	0	.000	0

Avg = 40000. for 2. Pts

Wtd Avg Velocity computed for Layer 2 = 15858.

Arrival times Tc corrected to top of Layer 2, and Elev of top of Layer 2:

Spread A				SP S	SP T	SP U
Elev				72.9	71.7	70.3
Geo	.	X-Loc	Cor T	15.1	15.8	16.7
				-Tc-	-Tc-	-Tc-
1	72.9	5.0	15.1	-30.2	.0	5.7
2	70.9	15.0	16.3	-18.9	-7.6	4.1
3	71.0	25.0	16.2	-15.1	-9.6	2.9
4	71.1	35.0	16.2	-7.3	-28.3	1.9
5	72.2	45.0	15.5	-.7	-28.4	.3
6	72.1	55.0	15.6	.5	-28.4	.2
7	71.3	65.0	16.1	.6	-29.9	-.2
8	69.4	75.0	17.2	.9	-33.0	-6.8
9	68.7	85.0	17.6	3.0	-31.4	-5.8
10	68.0	95.0	18.0	3.9	-29.6	-24.2
11	69.1	105.0	17.3	3.8	-10.9	-26.5
12	70.4	115.0	16.6	7.0	-1.4	-28.3

NYSEG/Mechanicville/Seismic Line 3, 17 May 1993, 0401-0420 hrs

Spread A Points of emergence of refracted rays below target geophones:

Geo		SP S	SP T	SP U
—		——L	——L	——L
1	X-Loc	.0 0	.0 1	5.7 2
	Elev	.0	.0	73.0
2	X-Loc	.0 1	.0 1	16.3 2
	Elev	.0	.0	70.6
3	X-Loc	.0 1	.0 1	30.5 2
	Elev	.0	.0	70.6
4	X-Loc	.0 1	.0 0	41.8 2
	Elev	.0	.0	72.0
5	X-Loc	.0 1	.0 0	47.3 2
	Elev	.0	.0	72.4
6	X-Loc	51.7 2	.0 1	55.7 2
	Elev	72.3	.0	72.1
7	X-Loc	60.0 2	.0 1	64.4 2
	Elev	71.8	.0	71.3
8	X-Loc	66.3 2	.0 0	.0 1
	Elev	71.1	.0	.0
9	X-Loc	76.5 2	.0 0	.0 1
	Elev	69.1	.0	.0
10	X-Loc	91.9 2	.0 0	.0 1
	Elev	67.6	.0	.0
11	X-Loc	106.0 2	.0 1	.0 1
	Elev	69.2	.0	.0
12	X-Loc	113.7 2	.0 1	.0 1
	Elev	70.3	.0	.0

Spread A Points of entry of refracted rays below source shotpoints:

L=2	Right	X-Loc	2.8	.0	.0
		Elev	73.1	.0	.0
L=2	Left	X-Loc	.0	.0	116.6
		Elev	.0	.0	70.5

TABLE D-3

NYSEG/Mechanicville/Seismic Line 3, 17 May 1993, 0401-0420 hrs

Spread A Depth and Elev of layers directly beneath SPs and Geos:

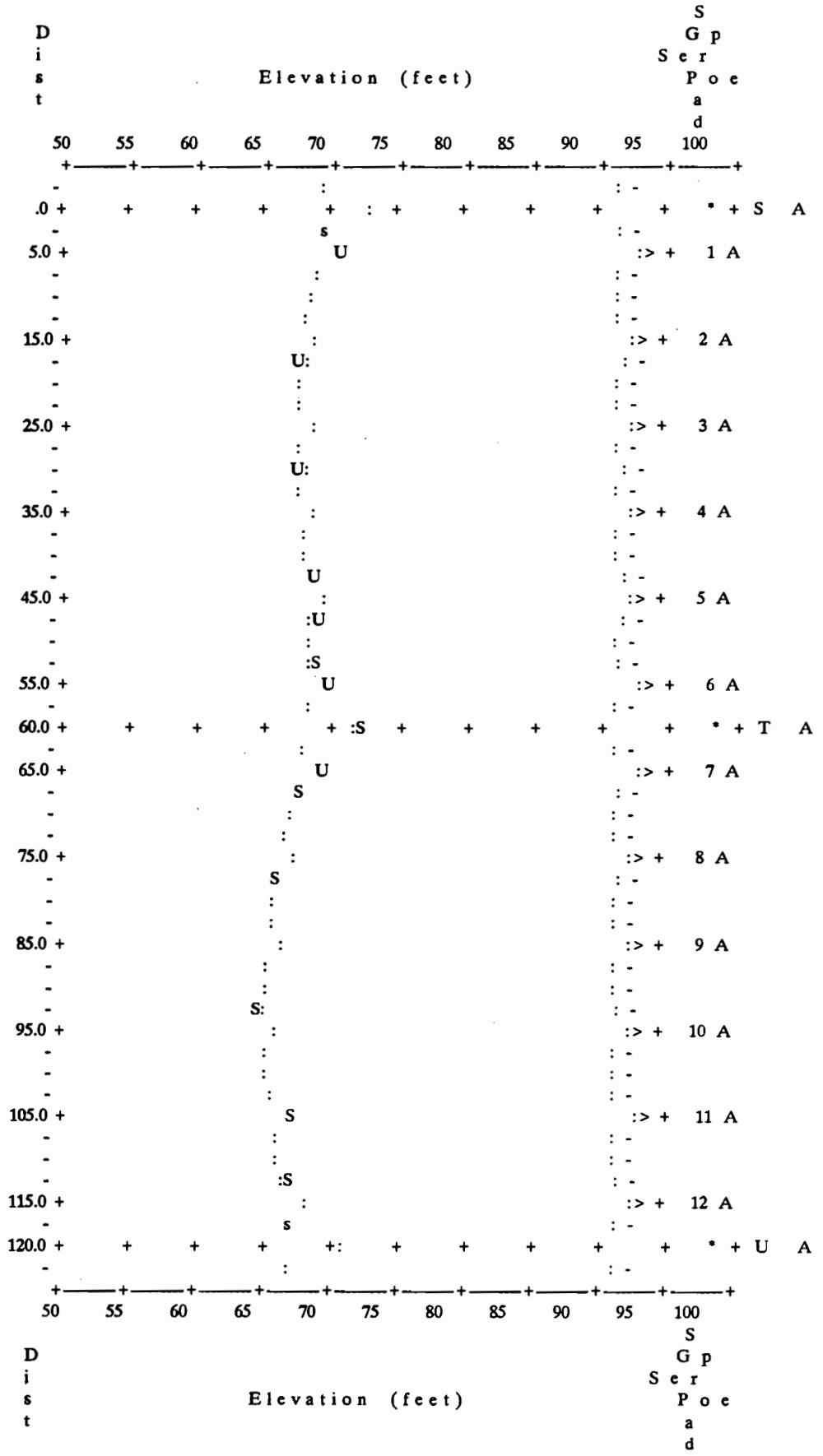
	Surface		Layer 2	
SP	X-Loc	Elev	Depth	Elev
S	.0	98.5	25.6	72.9
T	60.0	98.5	26.8	71.7
U	120.0	98.5	28.2	70.3
Geo				
1	5.0	98.5	25.6	72.9
2	15.0	98.5	27.6	70.9
3	25.0	98.5	27.5	71.0
4	35.0	98.5	27.4	71.1
5	45.0	98.5	26.3	72.2
6	55.0	98.5	26.4	72.1
7	65.0	98.5	27.2	71.3
8	75.0	98.5	29.1	69.4
9	85.0	98.5	29.8	68.7
10	95.0	98.5	30.5	68.0
11	105.0	98.5	29.4	69.1
12	115.0	98.5	28.1	70.4

Velocities used, Spread A

	Layer 1	Layer 2
Vertical	1694.	
Horizontal		15858.

TABLE D-3

NYSEG/Mechanicville/Seismic Line 3, 17 May 1993, 0401-0420 hrs



PRINTER PLOT SCALES

Elev: .50 ft/col
Dist: 2.50 ft/row

LEGEND

> Geophone Location
* Shotpoint Location
A,B,C Emergent Ray; Source SP A,B,C,...
? Questionable Emergent Ray
s Ray Entrypoint Beneath SP
More Than One Symbol to Plot Here
+ Grid Mark

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	COMP-3	COMP-4
	LAB NUMBER:	13905-003	13905-004
	DATE SAMPLED:	07/12/93	07/12/93
ANALYTE	RL		
Arsenic	100	100 U	100 U
Barium	2	647 J	1120
Cadmium	4	5 J	4 U
Chromium	4	7 J	4 U
Lead	38	38 U	46 J
Mercury	0.1	0.1 U	0.1 U
Selenium	1	20 U	20 U
Silver	7	7 U	7 U
Associated Method Blank:		TCLP13905	TCLP13905
Associated Equipment Blank:		-	-
Associated Field Blank:		-	-

Box Number: 4945-103
TCLP Analysis

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	COMP-3	COMP-4
	LAB NUMBER:	13905-003	13905-004
	DATE SAMPLED:	07/12/93	07/12/93
ANALYTE	RL		
Cyanide	1	2.9 U	3.1 U
Associated Method Blank:		TCLP13905	TCLP13905
Associated Equipment Blank:		-	-
Associated Field Blank:		-	-

Box Number: 4945-103
TCLP analysis

Table 2
Validation / Summary Table

	SAMPLE LOCATION:	MEEISHXX21/12	COMP-3	COMP-4
	LAB NUMBER:	13905-002	13905-003	13905-004
	DATE SAMPLED:	07/12/93	07/12/93	07/12/93
ANALYTE	RL			
Reactive Cyanide	100	100 U	100 U	100 U
Reactive Sulfide	100	100 U	100 U	100 U
Associated Method Blank:		MB13905CN	MB13905CN	MB13905CN
Associated Equipment Blank:		-	-	-
Associated Field Blank:		-	-	-

Box Number: 4945-103

APPENDIX E

Groundwater Modeling

Former Coal Gasification Site
Mechanicville, New York

INTRODUCTION

A groundwater flow model for the Mechanicville site was constructed for the purpose of aiding in the evaluation of remedial alternatives. The model, calibrated to observed and interpreted site conditions, was then used to simulate effects of various alternatives on groundwater flow directions and overall water balances in the model domain.

CONCEPTUAL MODEL

The site is situated along the south bank of the Anthony Kill, and about 1,200 feet west of the Champlain Canal of the Hudson River. Interpretations of the shallow groundwater flow at the site, based on water level measurements, indicate discharge of shallow groundwater flow to the Anthony Kill. Review of the topographic map of the area suggests a groundwater divide for shallow groundwater south of the site and extending eastward toward the Hudson. The conceptual model considers that the shallow flow (i.e., extending 20 feet into the shaley bedrock) constitutes the shallow flow system to be considered in evaluations of remedial alternatives. This depth is somewhat arbitrary, but is reasonable when considering the principal use of the model to compare and evaluate remedial measures for control of the tar in the overburden and shallow groundwater flow. Deeper flow in bedrock would be expected to flow toward the much larger sink, the Hudson River, with flow patterns determined by fracture distributions and orientations in the rock. The 20-foot depth is also about the vertical limit of information currently available for the site. Bedrock is inferred to become more competent with depth, and flux rates are expected to be much lower in the deeper rock. The inferred groundwater flow

direction perpendicular into the Anthony Kill east and west of the site, and the Anthony Kill as the conservatively assumed ultimate receptor for all shallow groundwater flow, results in an inference of recharge and upgradient groundwater flux as the sources of groundwater in the model, and of the Kill as the sole receptor. While the bedrock is not a porous medium, it has been modeled so here due to the relatively high reported hydraulic conductivities for the rock, reports of highly weathered and fractured shallow rock, the similar inferred groundwater flow directions for the overburden and shallow rock, and the lack of suitable fractured rock models. The model deals only with groundwater flow, and cannot predict any potentials for further migration of coal tars at the site.

MODEL SELECTION

The U.S. Geological Survey (USGS) groundwater model code MODFLOW (Harbaugh, 1988) was selected as appropriate for modeling the groundwater flow regime at the site, having the flexibility and capabilities to simulate the various boundary conditions and alternatives desired in the model. ABB-ES uses Geraghty and Miller's packaging of MODFLOW on a 486 DOS-based PC running at 50 Mhz. The output is handled through a postprocessor and printed out as a SURFER plot of contoured head values. A simple site map identifying a few of the key buildings provides a visual frame of reference.

MODEL SETUP AND BOUNDARIES

The model was set up with respect to expected simulation needs and available site data. The model covers an area of 300 feet (north-south) by 740 feet (east-west), and is discretized uniformly as 10-foot square elements, leading to 74 rows and 30 columns in the model. The model grid is shown on Figure E-1.

Vertically, the bottom of the water table aquifer was taken as the top of competent rock. A top-of-rock surface was kriged based on 94 selected points over the model area (from geophysical data and including a few assumed points along the model south boundary where no data were available, see Figure E-2). The kriged surface was transformed in SURFER to provide a matrix of values as input to the model as the bottom of layer one (the overburden). This matrix was further transformed by successively subtracting 10 feet to create bottom of layer two (the weathered rock with higher conductivity), and the bottom of layer three (the rock with lower conductivity). These depths corresponded to approximate depths of explorations (borings and wells) installed at the site, and also to potential depths of interest for the anticipated remedial alternatives to be evaluated.

The east and west boundaries of the model were assumed to be no-flow boundaries since they paralleled interpreted groundwater flow lines. The south boundary was split as a flux boundary (using MODFLOW's general head boundary package) opposite the site, and a no-flow boundary (along an apparent divide) further east of the site. The northern boundary of the model was assumed to be the river, which was represented by MODFLOW's river package. Since there is exposed bedrock along much of the Anthony Kill in the model domain, the overburden was assumed

FIGURE E-1

Mechanicville - Model Grid

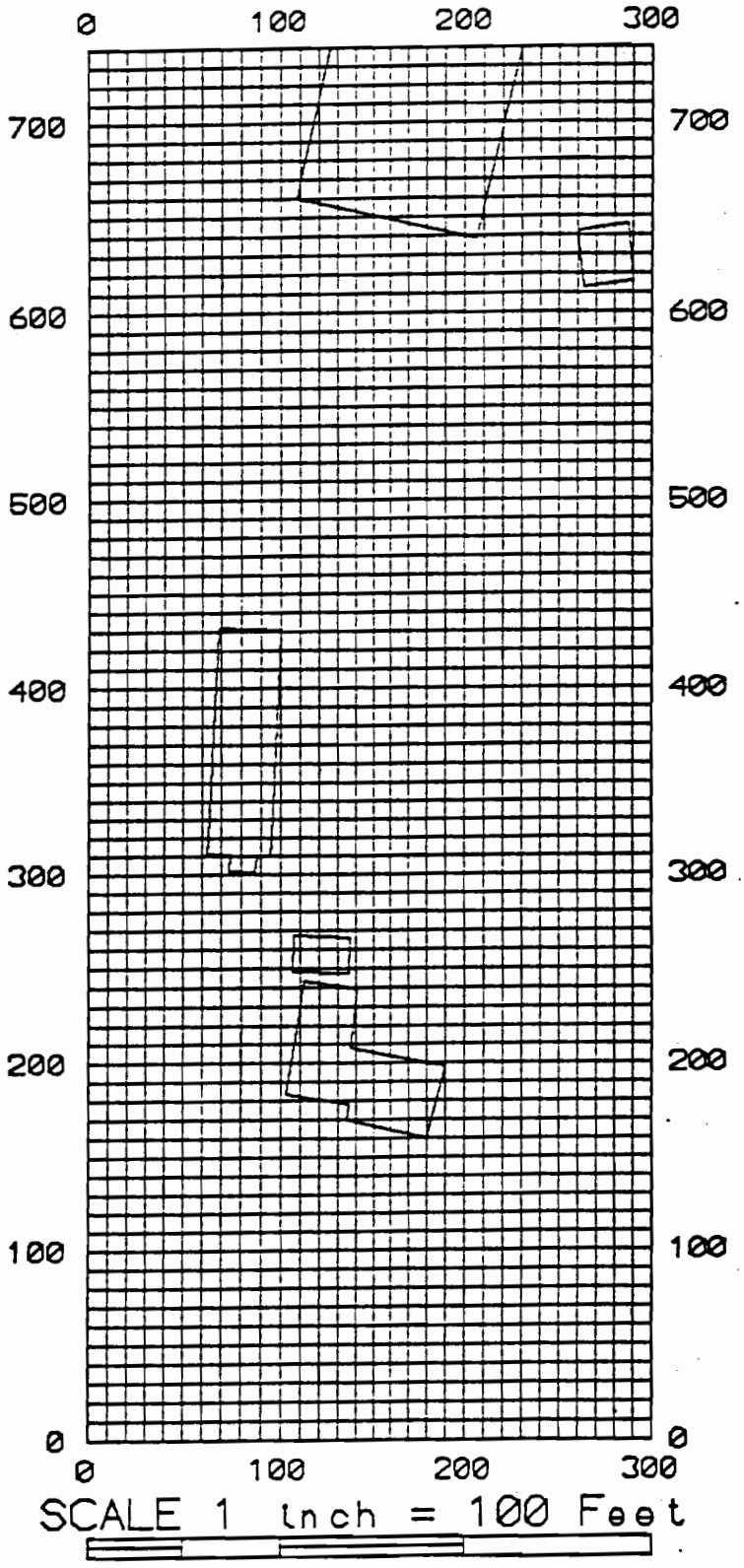
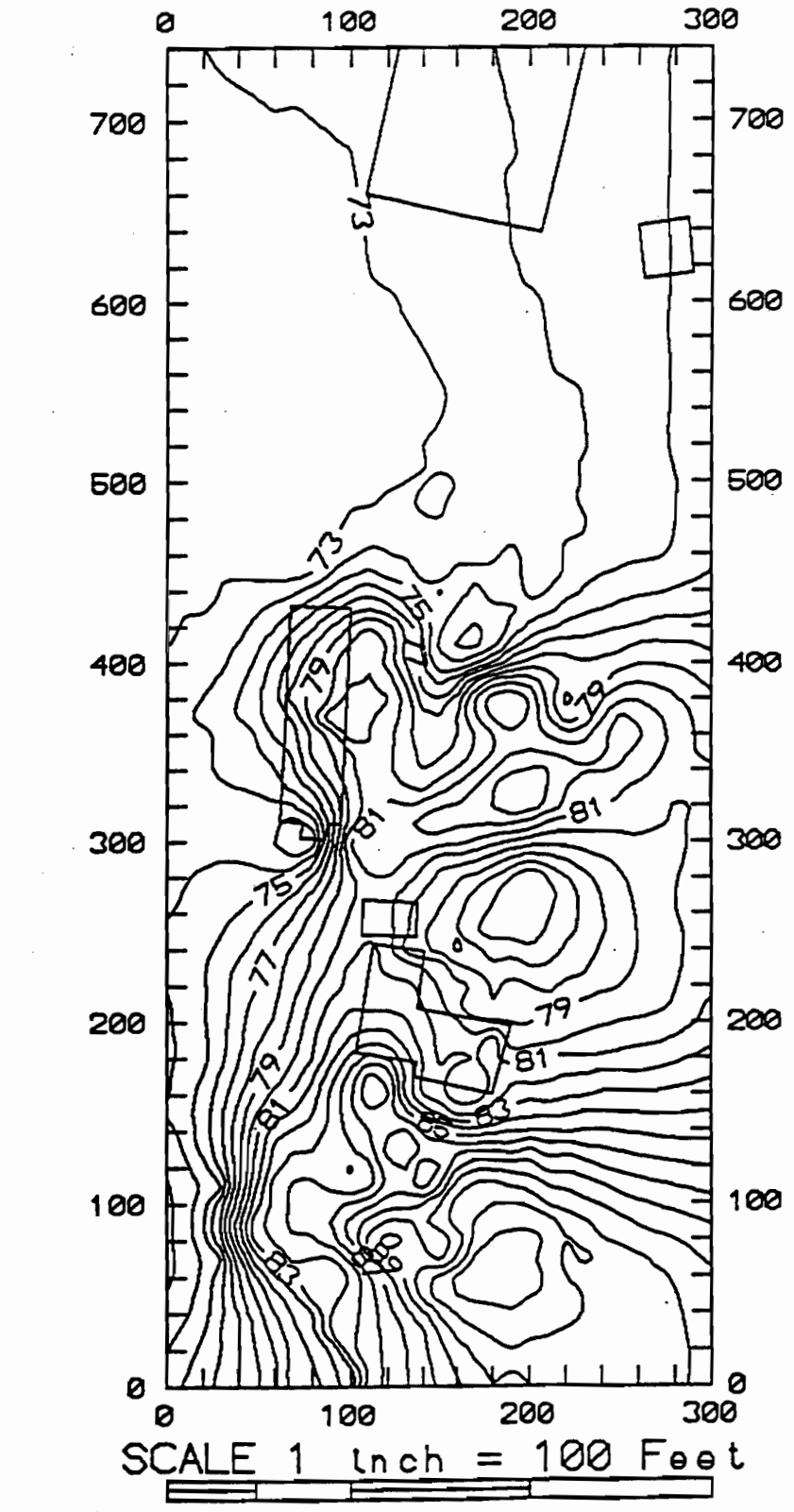
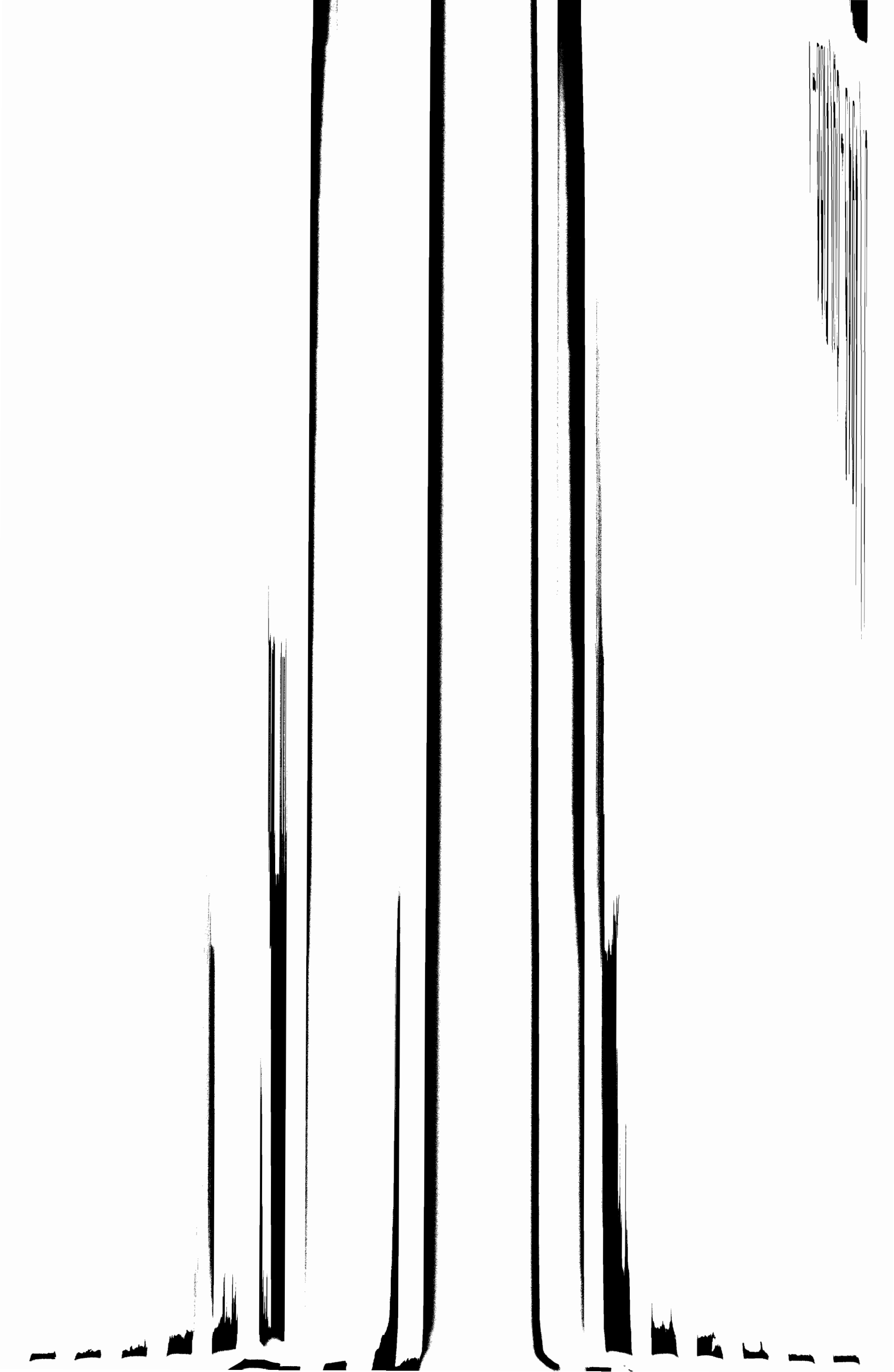


FIGURE E-2


Mechanicville - Top of Rock
0
100
200
300
700
600
500
400
300
200
100
0
73
75
77
79
81
83
85
87
89
SCALE 1 inch = 100 Feet



to be absent over the river area, and in the model these areas were made inactive in layer one and the river was designated as active only with layer two, the upper rock. The Anthony Kill, then, becomes the sole sink for groundwater in the model under natural conditions. Diffuse recharge was applied over the model area with consideration to the extensive paving over much of the site area. No seeps could be simulated along the river bank due to limitations of the model to represent seepage faces.

The model was conducted in the steady-state mode as long-term effects were to be considered, and available data for water levels were considered representative of average conditions for the site (moderately low seasonal variations reported for water levels).

GROUNDWATER AQUIFER PARAMETERS AND MASS BALANCE CONSIDERATIONS

The objective of the construction and calibration of the model was to provide a mathematical framework for remedial alternative evaluation. This required encompassing the main features of the groundwater flow system, i.e., flow direction, over-all water balance and fluxes, and interactions between model layers and the Anthony Kill. The model input data and computed fluxes, then, should be consistent with observations or estimates based on measurements.

The important features of this model are the hydraulic conductivities, the recharge over the area, available flux from upgradient, the over-all water balance, and interactions with the Anthony Kill. Hydraulic conductivity (K) data for the site

In the model, flux rates and head distributions at the river are controlled primarily by the selected or estimated value of the conductance term, which incorporates the resistance of the river bottom sediments to surface and groundwater exchange. This value is seldom known accurately, and is usually a calibration parameter. This is discussed in the calibration section.

CALIBRATION

Concern for some of the extreme boundary conditions in the model led to an approach of roughly calibrating a preliminary model and applying anticipated remedial measure simulations to identify any numerical stability problems in the model and to provide an initial look at the balances and the probable effects of the alternative measures. When the model proved stable under these conditions, and discussions were held with the feasibility study team to revise the simulation scenarios, the model was recalibrated and the revised simulations run.

In the calibration process, the principal parameters varied were in the general head boundary package (the input data file specifying parameter values controlling the upgradient flux into the model), the river conductance (controlling heads near the river bank), the recharge, and the hydraulic conductivities. During the calibration procedure, the K values in layers one and two were split into two zones based on the observed lower head in MW-10 and to more accurately capture the more easterly flow in this portion of the model. The K values in the final calibration run were 0.1 and 0.2 ft/d in layer one, 0.5 and 0.6 ft/d in layer two, and a constant 0.4 ft/d in layer three. The length of the flux boundary along the southern model perimeter was

1. an upgradient diversion drain with downgradient barrier, both in the overburden (Run 14);
2. a downgradient overburden barrier only (Run 15);
3. a downgradient overburden barrier with added extraction wells near the ends (Run 16); and
4. the downgradient barrier only, but with site paving extended and improved to allow only 2 inches/yr of net recharge (Run 17).

The results of these simulations are discussed in the following paragraphs. Locations of the remedial measures referenced in the discussion are shown on Figure E-3. The graphical output of the runs are found at the end of this appendix. Note that the modeling provides only one aspect for the consideration of the appropriateness of any remedial measure. Implementability is a particularly important consideration. See Section 14.0 of this FS for a complete discussion of the evaluation and selection of alternatives.

Run 14: Upgradient diversion drain with downgradient barrier. This alternative evaluated the effect of a 170-foot long upgradient drain in the overburden (invert slightly above top of rock) to divert flow, to reduce groundwater flow across the site, and reduce discharge to the river in conjunction with a downgradient barrier wall. At best, the drain was able to intercept about 700 gallons per day, but also increased the flux rate from upgradient slightly. Only part of this increase in upgradient flux may be a long-term contribution, as the upgradient total flow is limited by recharge available to the upgradient recharge area (the model may slightly overestimate available flow from upgradient under an upgradient drain stress). The net result was only a decrease of about 16 percent in the total groundwater discharge to the

Run 17: Downgradient barrier with improved expanded site paving. This remedial action would reduce recharge to the site and lower migration potentials of site contaminants. The model results showed a decrease in total recharge from 245 cu ft/d to 181 cu ft/d. Part of this gain was offset by a slight increase in upgradient flux to 263 cu ft/d. As discussed under Run 14, the model may slightly overestimate flow from upgradient when heads on-site are lowered (by drains or reduced recharge). Total discharge to the Kill was lowered only by about 12 percent. Along the length of the barrier wall, discharge to the Anthony Kill was reduced by about 13 percent. The most noticeable effect was a larger area of layer one going dry near the bedrock high in the western portion of the site.

SUMMARY

This groundwater modeling was conducted to provide a reasonable representation of the site groundwater flow system, and provide a mathematical framework for aiding in the evaluation of the remedial alternatives under consideration. While the modeling has limitations, particularly since fractured rock forms part of the aquifer system, the model behaves much as interpreted from site data, parameter values are consistent with observed and measured values, and mass balances are reasonable. The application of the model provides a rational basis for the comparative analysis of the remedial alternatives and insight into the behavior of the site groundwater system. Even if final calibrated model estimates of total flows are on the low side, estimates of the upper end of probable overall site flows are less than 5 times the best fit analysis. Hence upper end flow estimates would still be only about 13 gpm for the entire modelled system, and only a fraction of that actually flows through the

REFERENCES

Harbaugh, A. and M. McDonald, 1988. A Modular Three-Dimensional Finite-Difference Groundwater Flow Model. U.S. Geological Survey - Techniques of Water-Resources Investigations of the USGS, Book 6, Chapter A1.

APPENDIX F

Alternatives Scoring Table

Former Coal Gasification Site
Mechanicville, New York

APPENDIX F

ALTERNATIVES SCORING TABLE[1]
SELECTION OF REMEDY
MECHANICVILLE, NEW YORK

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE NEW YORK STATE STANDARDS CRITERIA AND GUIDELINES (SCGs) (RELATIVE WEIGHT = 10)			ALTERNATIVE[2]		
ANALYSIS FACTOR	**BASIS FOR EVALUATION DURING DETAILED ANALYSIS**	**SCORE**	**1**	**2**	**3**
1. Compliance with chemical-specific SCGs.	Meets chemical specific SCGs such as groundwater standards.	Yes = 4 No = 0	4	4	4
2. Compliance with action-specific SCGs.	Meets SCGs such as technology standards for incineration or landfill.	Yes = 3 No = 0	3	3	3
3. Compliance with location-specific SCGs.	Meets location-specific SCGs such as Freshwater Wetlands Act.	Yes = 3 No = 0	3	3	3
TOTAL (Maximum = 10)			10	10	10

Notes:

[1] Alternatives Scoring Table from NYSDEC TAGM 90-4030: Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990).

[2] Alternative 1 = Minimal Action
Alternative 2 = Downgradient Barrier Wall
Alternative 3 = Upgradient Subsurface Drain with Downgradient Barrier Wall

APPENDIX F

ALTERNATIVES SCORING TABLE[1]
SELECTION OF REMEDY
MECHANICVILLE, NEW YORK

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT (RELATIVE WEIGHT = 20)				ALTERNATIVE[2]		
ANALYSIS FACTOR		**BASIS FOR EVALUATION DURING DETAILED ANALYSIS**	**SCORE**	**1**	**2**	**3**
1. Use of the site after remediation.	Unrestricted use of the land and water. **(If answer is yes, go to next analysis factor.)**		Yes = 20 No = 0	0	0	0
TOTAL (Maximum = 20)						
2. Human health and the environment exposure after the remediation.	(i)	Is the exposure to contaminants via air route acceptable?	Yes = 3 No = 0	3	3	3
	(ii)	Is the exposure to contaminants via groundwater/surface water acceptable?	Yes = 4 No = 0	4	4	4
	(iii)	Is the exposure to contaminants via sediments/soils acceptable?	Yes = 3 No = 0	3	3	3
Subtotal (maximum = 10)						
3. Magnitude of residual public health risks after the remediation.	(i)	Health risk.	≤ 1 in 1,000,000 = 5	5	5	5
	(ii)	Health risk.	≤ 1 in 100,000 = 2			
Subtotal (maximum = 5)						
4. Magnitude of residual environmental risks after remediation.	(i)	Less than acceptable.	= 5			
	(ii)	Slightly greater than acceptable.	= 3			
	(iii)	Significant risk still exists.	= 0	5	5	5
Subtotal (maximum = 5)						
TOTAL (maximum = 20)				20	20	20

Notes:

[1] Alternatives Scoring Table from NYSDEC TAGM 90-4030: Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990).

[2] Alternative 1 = Minimal Action
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APPENDIX F

ALTERNATIVES SCORING TABLE[1]
SELECTION OF REMEDY
MECHANICVILLE, NEW YORK

SHORT-TERM EFFECTIVENESS (RELATIVE WEIGHT = 10)			ALTERNATIVE[2]		
ANALYSIS FACTOR	BASIS FOR EVALUATION DURING DETAILED ANALYSIS	SCORE	1	2	3
1. Protection of community during remedial actions.	• Are there significant short-term risks to the community that must be addressed? **(If answer is no, go to Factor 2.)**	Yes = 0 No = 4	4	4	4
	• Can the risk be easily controlled?	Yes = 1 No = 0	-	-	-
Subtotal (maximum = 4)	• Does the mitigative effort to control risk impact the community lifestyle?	Yes = 0 No = 2	-	-	-
2. Environmental Impacts.	• Are there significant short-term risks to the environment that must be addressed? **(If answer is no, go to Factor 3.)**	Yes = 0 No = 4	4	4	4
	• Are the available mitigative measures reliable to minimize potential impacts?	Yes = 3 No = 0	-	-	-
Subtotal (maximum = 4)					
3. Time to implement the remedy.	• What is the required time to implement the remedy?	≤ 2 years = 1 > 2 years = 0	1	1	1
	• Required duration of the mitigative effort to control short-term risk.	≤ 2 years = 1 > 2 years = 0	1	1	1
Subtotal (maximum = 2)					
TOTAL (maximum = 10)			10	10	10

Notes:

[1] Alternatives Scoring Table from NYSDEC TAGM 90-4030: Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990).

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APPENDIX F

ALTERNATIVES SCORING TABLE[1]
SELECTION OF REMEDY
MECHANICVILLE, NEW YORK

LONG-TERM EFFECTIVENESS AND PERMANENCE (RELATIVE WEIGHT = 15)				ALTERNATIVE[2]		
ANALYSIS FACTOR		**BASIS FOR EVALUATION DURING DETAILED ANALYSIS**	**SCORE**	**1**	**2**	**3**
1. On-site or off-site treatment or land disposal.	•	On-site treatment*	= 3			
	•	Off-site treatment*	= 1	0	0	0
	•	On-site or off-site land disposal	= 0			
Subtotal (maximum = 3)						
2. Permanence of the remedial alternative.	•	Will the remedy be classified as permanent in accordance with Section 2.1(a), (b), or (c). **(If answer is yes, go to Factor 4.)**	Yes = 3 No = 0	0	0	0
Subtotal (maximum = 3)						
3. Lifetime of remedial actions.	•	Expected lifetime or duration of effectiveness of the remedy.	25-30 years = 3 20-25 years = 2 15-20 years = 1 < 15 years = 0	0	3	3
Subtotal (maximum = 3)						
4. Quantity and nature of waste or residual left at the site after remediation.	(i)	Quantity of untreated hazardous waste left at the site.	None = 3 < 25% = 2 25-50% = 1 ≥ 50% = 0	0	0	0
	(ii)	Is there treated residual left at the site? **(If answer is no, go to Factor 5.)**	Yes = 0 No = 2	0	0	0
	(iii)	Is the treated residual toxic?	Yes = 0 No = 1	0	0	0
	(iv)	Is the treated residual mobile?	Yes = 0 No = 1	0	0	0
Subtotal (maximum = 5)						

APPENDIX F

ALTERNATIVES SCORING TABLE[1]
SELECTION OF REMEDY
MECHANICVILLE, NEW YORK

LONG-TERM EFFECTIVENESS AND PERMANENCE (RELATIVE WEIGHT = 15)				ALTERNATIVE[2]		
ANALYSIS FACTOR		BASIS FOR EVALUATION DURING DETAILED ANALYSIS	SCORE	1	2	3
5. Adequacy and reliability of controls.	(i)	Operation and maintenance required for a period of:	< 5 years = 1 > 5 years = 0	0	0	0
	(ii)	Are environmental controls required as a part of the remedy to handle potential problems? **(If answer is no, go to "iv".)**	Yes = 0 No = 1	0	0	0
	(iii)	Degree of confidence that controls can adequately handle potential problems.	Moderate to very confident = 1 Somewhat to not confident = 0	0	0	0
	(iv)	Relative degree of long-term monitoring required **(compare with other remedial alternatives)**	Minimum = 2 Moderate = 1 Extensive = 0	0	0	0
Subtotal (maximum = 4)						
TOTAL (maximum = 15)				0	3	3

Notes:

* Treatment is defined as destruction or separation/treatment or solidification/chemical fixation of inorganic wastes or wastes with "low" concentrations of organic contaminants.

[1] Alternatives Scoring Table from NYSDEC TAGM 90-4030: Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990).

[2] Alternative 1 = Minimal Action
Alternative 2 = Downgradient Barrier Wall
Alternative 3 = Upgradient Subsurface Drain with Downgradient Barrier Wall

APPENDIX F

ALTERNATIVES SCORING TABLE[1]
SELECTION OF REMEDY
MECHANICVILLE, NEW YORK

REDUCTION OF TOXICITY, MOBILITY OR VOLUME (RELATIVE WEIGHT = 15)				ALTERNATIVE[2]		
ANALYSIS FACTOR	**BASIS FOR EVALUATION DURING DETAILED ANALYSIS**		**SCORE**	**1**	**2**	**3**
1. Volume of hazardous waste reduced (reduction in volume or toxicity). **If Factor 1 is not applicable, go to Factor 2.)**	(i)	Quantity of hazardous waste destroyed or treated. **Immobilization technologies do not score under Factor 1.**	99-100% = 8 90-99% = 7 80-90% = 6 60-80% = 4 40-60% = 2 20-40% = 1 < 20% = 0	-	-	-
	(ii)	Are there untreated or concentrated hazardous waste produced as a result of (i)? **If answer is no, go to Factor 2.**	Yes = 0 No = 2	-	-	-
Subtotal (maximum = 10) **If subtotal = 10, go to Factor 3**	(iii)	After remediation, how is the untreated, residual hazardous waste material disposed?	Off-site land disposal = 0 On-site land disposal = 1 Off-site destruction or treatment = 2	-	-	-
2. Reduction in mobility of hazardous waste. **If Factor 2 is not applicable, go to Factor 3.**	(i)	Quality of Available Wastes Immobilized After Destruction/Treatment	90-100% = 2 60-90% = 1 < 60% = 0	-	0	0
	(ii)	Method of Immobilization - Reduced mobility by containment - Reduced mobility by alternative treatment technologies	= 0 = 3	-	0	0
Subtotal (maximum = 5)						

APPENDIX F

ALTERNATIVES SCORING TABLE[1]
SELECTION OF REMEDY
MECHANICVILLE, NEW YORK

REDUCTION OF TOXICITY, MOBILITY OR VOLUME (RELATIVE WEIGHT = 15)			ALTERNATIVE[2]		
ANALYSIS FACTOR	BASIS FOR EVALUATION DURING DETAILED ANALYSIS	SCORE	1	2	3
3. Irreversibility of the destruction or treatment or immobilization of hazardous waste.	Completely irreversible	= 5			
	Irreversible for most of the hazardous waste constituents.	= 3			
	Irreversible for only some of the hazardous waste constituents.	= 2			
	Reversible for most of the hazardous waste constituents.	= 0	0	0	0
Subtotal (maximum = 5)					
TOTAL (maximum = 15)			0	0	0

Notes:

1 Alternatives Scoring Table from NYSDEC TAGM 90-4030: Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990).

2 Alternative 1 = Minimal Action
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APPENDIX F

ALTERNATIVES SCORING TABLE[1]
SELECTION OF REMEDY
MECHANICVILLE, NEW YORK

IMPLEMENTABILITY (RELATIVE WEIGHT = 15)				ALTERNATIVE[2]		
ANALYSIS FACTOR		BASIS FOR EVALUATION DURING DETAILED ANALYSIS	SCORE	1	2	3
1. Technical Feasibility						
a. Ability to construct technology.	(i)	Not difficult to construct. No uncertainties in construction.	= 3	3	2	2
	(ii)	Somewhat difficult to construct. No uncertainties in construction.	= 2			
	(iii)	Very difficult to construct and/or significant uncertainties in construction	= 1			
b. Reliability of technology.	(i)	Very reliable in meeting the specified process efficiencies or performance goals.	= 3	3	2	2
	(ii)	Somewhat reliable in meeting the specified process efficiencies or performance goals.	= 2			
c. Schedule of delays due to technical problems.	(i)	Unlikely	= 2	2	2	2
	(ii)	Somewhat likely	= 1			
d. Need of undertaking additional remedial action, if necessary.	(i)	No future remedial actions may be anticipated.	= 2			
	(ii)	Some future remedial actions may be necessary.	= 1	1	1	1
Subtotal (maximum = 10)						

APPENDIX F

ALTERNATIVES SCORING TABLE[1]
SELECTION OF REMEDY
MECHANICVILLE, NEW YORK

IMPLEMENTABILITY (RELATIVE WEIGHT = 15)				ALTERNATIVE[2]		
ANALYSIS FACTOR	BASIS FOR EVALUATION DURING DETAILED ANALYSIS		SCORE	1	2	3
2. Administrative Feasibility						
a. Coordination with other agencies.	(i)	Minimal coordination is required.	= 2	2	2	2
	(ii)	Required coordination is normal.	= 1			
	(iii)	Extensive coordination is required.	= 0			
Subtotal (maximum = 2)						
3. Availability of Services and Materials						
a. Availability of prospective technologies.	(i)	Are technologies under consideration generally commercially available for the site-specific application?	Yes = 1 No = 0	1	1	1
	(ii)	Will more than one vendor be available to provide a competitive bid?	Yes = 1 No = 0	1	1	1
b. Availability of necessary equipment and specialists.	(i)	Additional equipment and specialists may be available without significant delay.	Yes = 1 No = 0	1	1	1
Subtotal (maximum = 3)						
TOTAL (maximum = 15)				14	12	12

Notes:

[1] Alternatives Scoring Table from NYSDEC TAGM 90-4030: Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990).

[2] Alternative 1 = Minimal Action
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APPENDIX F

ALTERNATIVES SCORING TABLE[1]
SELECTION OF REMEDY
MECHANICVILLE, NEW YORK

COST (RELATIVE WEIGHT = 15)			ALTERNATIVE[2]		
ANALYSIS FACTOR	BASIS FOR EVALUATION DURING DETAILED ANALYSIS	SCORE	1	2	3
Present Worth Cost	Because the Minimal Action Alternative has the lowest present worth cost, it has been assigned the highest score of 15. Other alternatives are assigned a score inversely proportional to their present worth.		15	9	6
TOTAL ALL FACTORS			69	64	61

Note:

[1] Alternatives Scoring Table from NYSDEC TAGM 90-4030: Selection of Remedial Actions at Inactive Hazardous Waste Sites (NYSDEC, 1990).

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