INVESTIGATION OF THE FORMER COAL GASIFICATION SITE AT MECHANICVILLE, NEW YORK

TASK 2 REPORT
INITIAL FIELD INVESTIGATION PROGRAM

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DECEMBER 1987

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GLOSSARY OF ACRONYMS

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1.0 INTRODUCTION

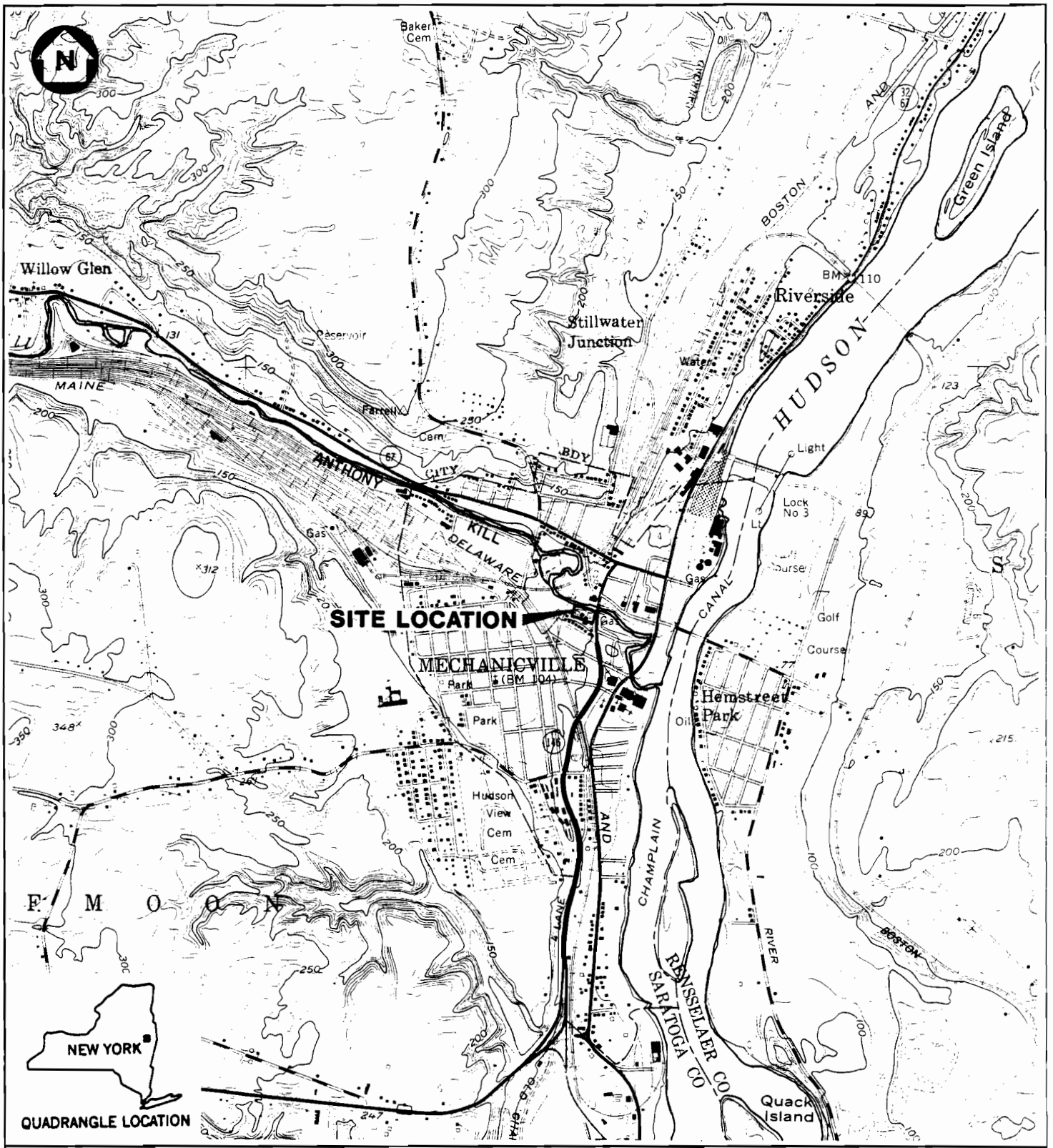
This report was prepared by E.C. Jordan Co. (Jordan) for the New York State Electric and Gas Corporation (NYSEG) under Contract No. 85S-159, Investigation of Former Coal Gasification Sites. It describes the results of Task 2, the Initial Field Investigation Program, at the Mechanicville site, where coal gas was produced from 1901 to 1955. The Preliminary Site Evaluation (Task 1) at this site was completed in August 1986 and the results are summarized in the Task 1 Report (Jordan, 1986a). As part of the site investigation, the contract requires the completion of three additional tasks, as necessary: Task 3 - Expanded Problem Definition Program; Task 4 - Risk Assessment; and Task 5 - Conceptual Design. The need for subsequent tasks is evaluated at the completion of each task. Recommendations for the conduct of future work at the site are included in this report.

1.1 PROBLEM SUMMARY

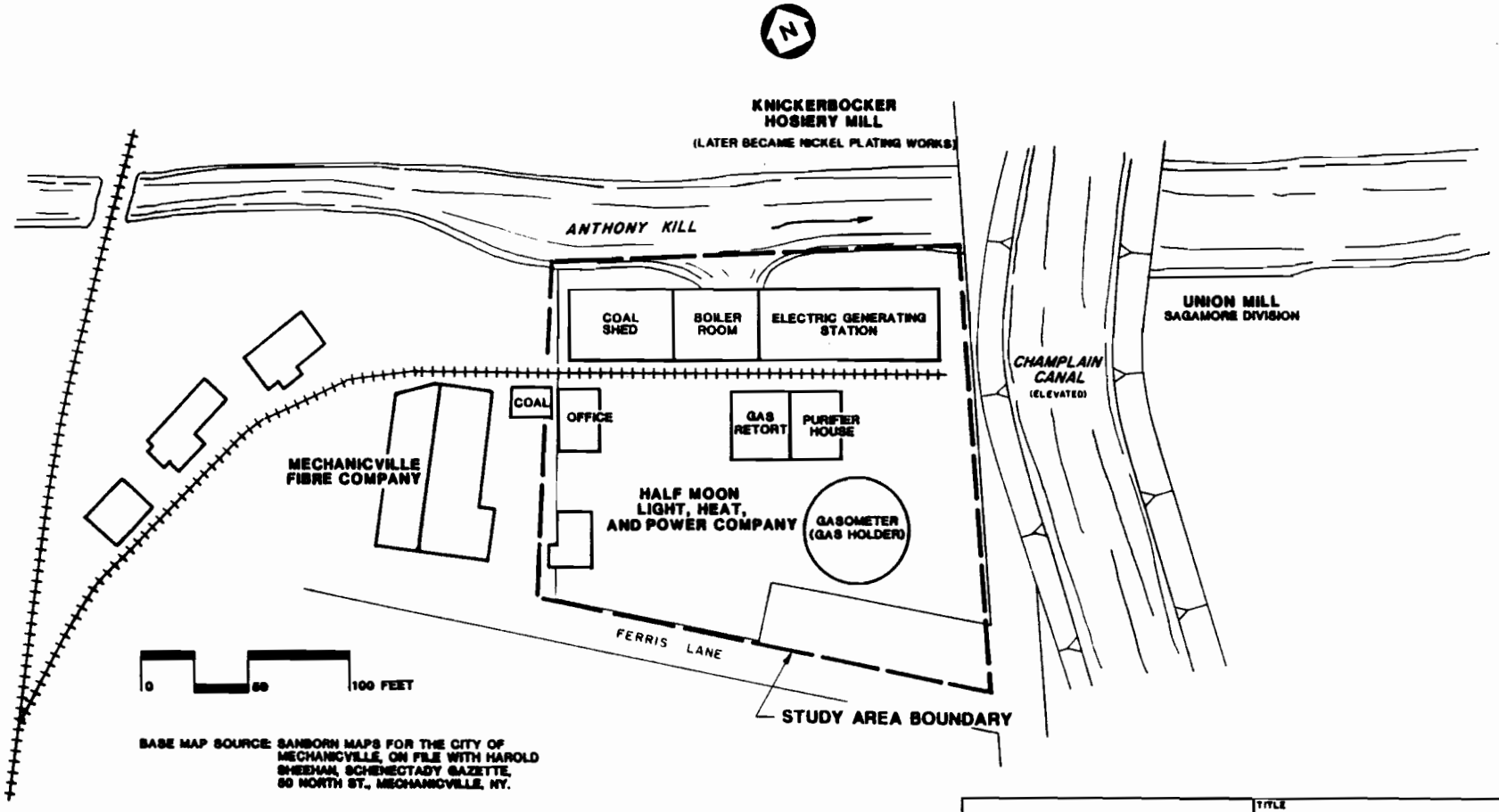
The site is located in Mechanicville, Saratoga County, New York (Figure 1). Saratoga County is in the Valley and Ridge Physiographic Province in east-central New York (Heath, et. al., 1963). The Hudson River forms the northeastern and eastern boundaries of Saratoga County; the Mohawk River, which is the largest tributary to the Hudson, forms the southeastern boundary. The Anthony Kill, a small tributary, flows into the Hudson River at Mechanicville. The Mechanicville site is adjacent to the Anthony Kill, one-quarter mile upstream from the confluence with the Hudson River. The site lies in an outwash plain, at approximately 95 feet above mean sea level (MSL).

The Champlain Canal once bordered the site on the east. Completed in 1823, the canal connected the Hudson River at Waterford (south of Mechanicville) to Lake Champlain. The canal flowed through Mechanicville along what is now Central Avenue (Figure 2). Like the present roadway, the canal was elevated and the water surface was approximately 10 feet above the gas plant site. The hand-dug canal was approximately 12 feet deep and 30 feet wide. The Champlain Canal was abandoned in 1916 when the Barge Canal opened. The empty canal became a receptacle for garbage, debris, and junk before it was completely filled with soil by the City of Mechanicville in 1917. Later, the state dug up the canal, removed the trash and debris, and prepared the roadbed for Central Avenue (Sheehan, Records).

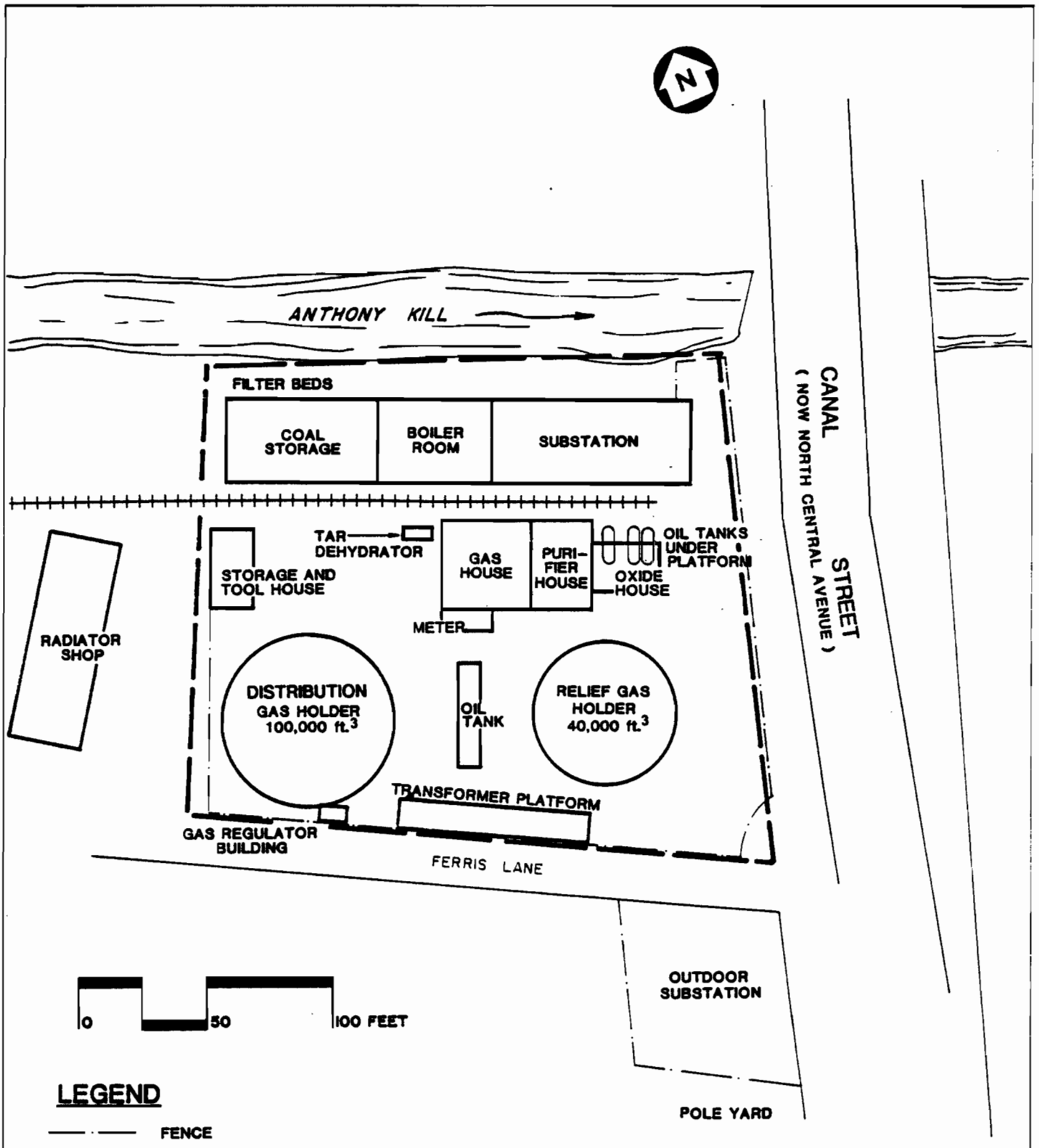
The history of coal gas production at the site, presented in the Task 1 Report, is summarized in the following paragraphs. It was reconstructed from old maps and newspaper articles, NYSEG records, and interviews with NYSEG employees (Elvins, 1986; McBride, et. al., 1986). The site housed a water gas plant (Figures 2 and 3) owned by NYSEG and its predecessor companies from 1901 until 1955, at which time coal gas production ended due to the availability of natural gas. Most of the aboveground structures were demolished at the time of closure, including the coal storage shed, gas house, purifier and oxide houses, gas holders, oil tanks, and tar dehydrator. Only the boiler house, indoor substation, and old office building now remain on-site. The filter beds, which are coke-filled wooden troughs set into the ground, were left in



BASE MAP SOURCE: **USGS QUADRANGLE** **MECHANICVILLE (1980)**	**E.C. JORDAN CO.** CONSULTING ENGINEERS	TITLE **MECHANICVILLE SITE LOCATION MAP**
SCALE IN FEET 0 — 2000 — 4000	CLIENT **NEW YORK STATE ELECTRIC AND GAS CORP.** **BINGHAMTON, NEW YORK**	**INVESTIGATION OF FORMER COAL GASIFICATION SITES** PROJECT NO. 4945-02 **FIGURE 1**



E.C. JORDAN CO. CONSULTING ENGINEERS	TITLE: PLAN OF MECHANICVILLE COAL GASIFICATION PLANT CIRCA 1910
CLIENT: NEW YORK STATE ELECTRIC AND GAS CORP. BINGHAMTON, NEW YORK	INVESTIGATION OF FORMER COAL GASIFICATION SITES
	PROJECT NO. 4946-02 FIGURE 2



E.C. JORDAN CO. CONSULTING ENGINEERS	PLAN OF THE MECHANICVILLE COAL GASIFICATION PLANT CIRCA 1951
NEW YORK STATE ELECTRIC AND GAS CORP. BINGHAMTON, NEW YORK	INVESTIGATION OF FORMER COAL GASIFICATION SITES
	JOB NO. 4945-02 FIGURE 3

the ground and covered with soil after the gas plant closed. These beds had been used to filter residual oil and tar from the gas house condensate before discharge to the Anthony Kill.

By-products of the coal gasification process included ash and condensate material from the gas house; wood chips from the purifier house; and coal tar and oil sludges. It was common practice at coal gas plants to dispose of ashes and spent oxide material on-site. Ashes and clinkers were shoveled out of the generator at night and spread in the area between the relief holder and Ferris Lane. Some of the spent wood chips were piled alongside the road to be hauled away. The purifier house was cleaned out after plant shutdown; however, accumulated tar was left in the base of the relief holder and coke was left in the filter beds.

Ash and cinders are relatively free of organics, but may leach traces of various heavy metals and salts. Spent oxide wastes contain high concentrations of free sulfur, sulfate and sulfide compounds, cyanide compounds, and iron compounds. Coal tar is a complex mixture of organic compounds, composed primarily of polynuclear aromatic hydrocarbons (PAHs), with smaller amounts of phenolics and light aromatic compounds (USWAG, 1984).

After closure of the Mechanicville gas plant in 1955, NYSEG converted the site to a natural gas and electric service center (Figure 4). A small natural gas distribution shed was constructed over a portion of the old distribution gas holder. The former boiler room/substation building was converted to offices, a garage, and a supply storage maintenance shop. The old office is now used as a storage shed and tool house. A buried gasoline storage tank, containing unleaded fuel, is located adjacent to the southeastern corner of the old office. The 2,000-gallon tank, installed around 1980, replaced an older tank that was reportedly taking in water. No gasoline leaks were reported (McBride, et. al., 1986). The remaining developed portion of the site is a paved parking lot. NYSEG has extended its property boundaries over the years by filling in the Anthony Kill embankment with debris. Thus, the stream appears wider in Figure 3 than in Figure 4.

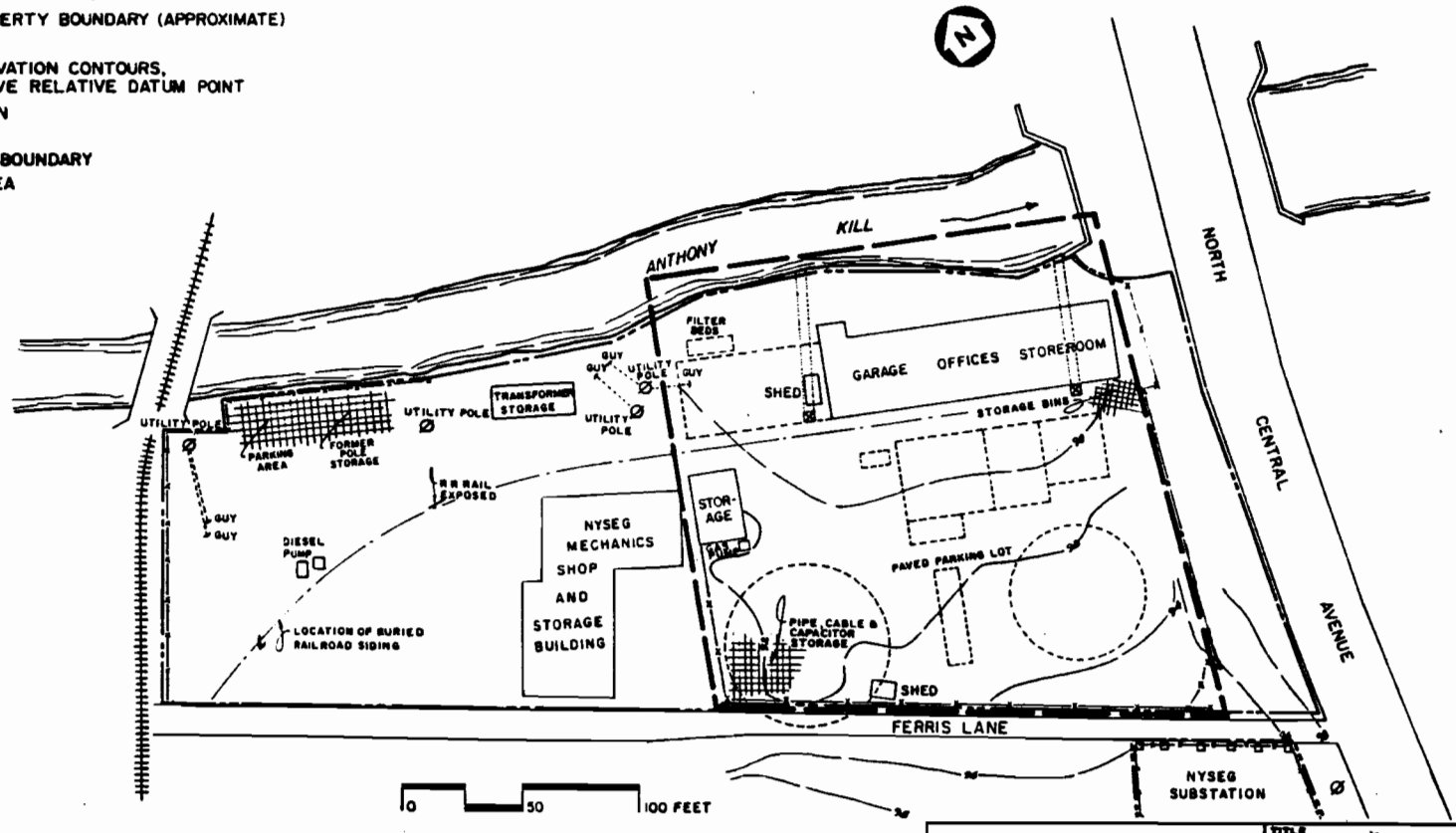
In 1922, NYSEG purchased a quarter-acre lot on the corner of Ferris Lane and North Central Street (Bevis, 1986). This property was mostly vacant during the years the coal gas plant was operating. In 1953, NYSEG built the electrical substation that currently stands on the lot. NYSEG also owns the land on the west side of the site. The portion between the railroad tracks and the Anthony Kill (see Figure 4) was purchased by NYSEG in 1952 (Bevis, 1986) and the parcel between the tracks and Ferris Lane was acquired in October 1987. Jordan's Task 2 investigation focused on the eastern portion of the site (approximately one acre) where coal gas production activities occurred.

1.2 PURPOSE

In the Preliminary Site Evaluation (Task 1), Jordan developed an understanding of the site's history, environmental setting, and current conditions from available information and site reconnaissance. The Task 1 findings are presented in the Task 1 Report for Mechanicville submitted to NYSEG in August 1986 (Jordan, 1986a). Based on Task 1 findings, the scope of Task 2 (Initial Field Investigation) was developed.

LEGEND

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



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.

E.C. JORDAN CO.
CONSULTING ENGINEERS

CLIENT
NEW YORK STATE ELECTRIC AND GAS CORP.
BINGHAMTON, NEW YORK

TITLE
MECHANICVILLE SITE PLAN - 1987
MECHANICVILLE, NEW YORK

INVESTIGATION OF FORMER COAL GASIFICATION SITES

PROJECT NO. 4946-02 FIGURE 4

Task 2 was designed to: (1) develop an understanding of the site hydrogeologic setting; (2) determine the identity and concentrations of chemicals present in the soils, groundwater, surface water, and sediments; and (3) perform a preliminary risk assessment of the possible risks of those chemicals to human and environmental receptors. This report summarizes the findings of Task 2 and provides recommendations for future activities. Task 2 and any future investigations will be the technical foundation for subsequent tasks.

1.3 SCOPE OF TASK 2

The scope of work required to complete Task 2 objectives is described in the Mechanicville Site Work Plan submitted to NYSEG in April 1986 (Jordan, 1986b). The completed subtasks are summarized below.

1. Prepared a site-specific Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP).

2. Excavated five test pits for characterization of the subsurface geology at the site; installed piezometers in two of the test pits to obtain groundwater level data; collected six soil samples for laboratory chemical analysis; and prepared test pit logs.

3. Drilled eight soil borings and obtained eight soil samples for laboratory chemical analysis and site characterization; installed six monitoring wells and one piezometer; and prepared boring logs and well installation diagrams.

4. Performed in-situ permeability tests at all wells and obtained five rounds of groundwater level data from monitoring wells and piezometers.

5. Collected groundwater samples from six monitoring wells on a quarterly basis for laboratory chemical analysis (four sampling rounds completed between September 1986 and June 1987).

6. Collected surface water and sediment samples at three locations along the Anthony Kill on a quarterly basis for laboratory chemical analysis (four sampling rounds completed between September 1986 and June 1987).

7. Performed laboratory analysis of soil, groundwater, surface water, and sediment samples.

8. Conducted a topographic survey to identify relative locations and elevations of test pits, borings, monitoring wells, piezometers, and other pertinent features at the site.

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

10. Evaluated the geologic, hydrogeologic, and chemical data to develop an understanding of site conditions and chemical distribution.

11. 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.

12. Identified additional data requirements and proposed a Task 3 program (including schedule and costs) for obtaining the necessary data.

2.0 FIELD ACTIVITIES

Field activities undertaken during Task 2 are described in this section. The accomplishments of the program and the rationale for the explorations are discussed. Field logs, well diagrams, and descriptions of procedures used during field activities are presented in Appendix A. Exploration and sampling procedures are further documented in the QAPP (Jordan, 1985).

2.1 TEST PITS

On July 21, 1986, J.H. Maloy Co., contracted through Empire Soils Investigations, Inc. (Empire), excavated six backhoe-dug test pits at the Mechanicville site. Test pit depths ranged from 3 to 7.7 feet below ground surface. One test pit, labelled "Decon Pit" in Figure 5, was used to capture fluids from decontamination (i.e., steam-cleaning) of equipment. The remaining test pits, TP-1 through TP-5, were used to investigate subsurface geology, distribution of coal gasification wastes, and depth to groundwater. These test pits are shown in Figure 5.

Test pit completion was observed by a Jordan field geologist. Test pit logs describing the soil layers and field observations are summarized in Appendix A-1. A total of six soil samples was obtained for laboratory chemical analysis and forwarded to ERCO Laboratories, a division of ENSECO, Inc., in Cambridge, Massachusetts. One sample each was collected from TP-1, TP-2, and TP-4; two samples and one duplicate were taken from TP-5. No samples were obtained from TP-3 or the decontamination pit. The analytical samples were selected from soil layers that: (1) contained visual signs of coal gasification wastes; (2) had a coal tar odor; or (3) showed detectable levels of organic vapors as measured with a photoionization detector (PID). Thus, the test pit samples were targeted for waste material in shallow soil, where present. Results of the soil analyses are discussed in Section 3.5.1.

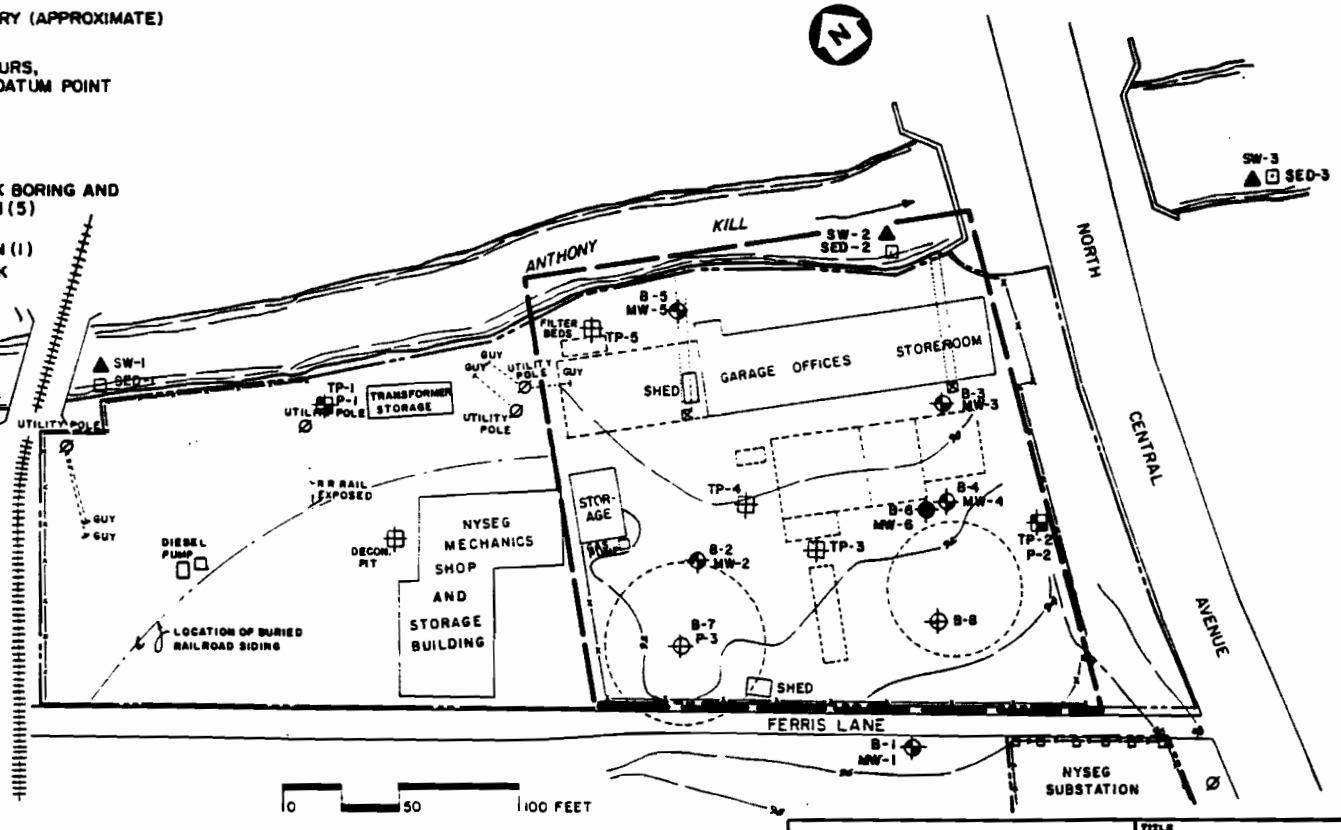
2.2 BORINGS

Eight borings (B-1 through B-8) were drilled at the site by Empire between July 23 and August 6, 1986 (see Figure 5). The borings were drilled to: (1) investigate the subsurface geology; (2) evaluate the effects of former coal gasification activities on subsurface soils; (3) investigate the foundations of the former gas holders; and (4) permit installation of monitoring wells. Boring locations were selected following consideration of former coal gasification activities, the test pit observations, the anticipated direction of groundwater flow, and the results of the ground-penetrating radar (GPR) survey, described in the Mechanicville Task 1 Report (Jordan, 1986a).

Borings were drilled to bedrock using hollow-stem augers; NX-sized cores (3-inch diameter) were used to drill into the shale bedrock at four borings (B-1, B-2, B-5, and B-6). Total boring depths ranged from 9 to 32 feet below ground surface. Continuous split-spoon samples (2-foot) were collected above the bedrock and continuous core samples (5-foot) were taken in the bedrock. All samples were scanned with a PID for organic vapors. Reference soil samples (for physical characteristics) and analytical soil samples (for laboratory

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- STUDY AREA BOUNDARY
- 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)



BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK, DATED 8/28/86 (86-72-S). REVISED 12/87.

ELEVATIONS BASED ON ASSUMED DATUM OF 100.00' AT R.R. SPIKE IN UTILITY POLE LOCATED 23' SOUTH OF INTERSECTION OF FERRIS LANE AND NORTH CENTRAL AVENUE.

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BINGHAMTON, NEW YORK

TITLE
TASK 2 EXPLORATION LOCATIONS
MECHANICVILLE SITE

INVESTIGATION OF FORMER COAL GASIFICATION SITES

PROJECT NO. 4945-02 FIGURE 5

chemical analysis by ERCO) were collected from each boring except B-6. Soil sampling was not conducted at B-6 because of its close proximity to B-4. Core samples collected at B-1, B-2, B-5, and B-6 were logged and placed in core boxes stored at the site. Boring logs completed by Jordan field geologists are presented in Appendix A-2, along with a table summarizing field observations. Results of the chemical analysis of soil samples are described in Section 3.5.1.

2.3 MONITORING WELLS AND PIEZOMETERS

Six monitoring wells were installed in six of the eight boreholes between July 23 and August 14, 1986. Each monitoring well number (i.e., MW-1 through MW-6) corresponds to the number of the borehole in which it was installed; monitoring well locations are shown in Figure 5. The purpose of the monitoring wells was to obtain water level measurements, permeability data, and water samples for laboratory chemical analyses. MW-1 was installed to provide groundwater information upgradient of the site; MW-2 through MW-5 were installed in locations anticipated to be downgradient of former coal gasification structures. The screened zone (including the sand backfill) for these five wells coincided approximately with the top 10 feet of the water table, and spanned both soil and bedrock strata (see Appendix A-3). The sixth well, MW-6, was installed to provide data on water levels, water quality, fracture patterns, and permeability in the bedrock. The top of the screened zone for this well was positioned 5 feet below the bedrock surface and extended 10 feet into the bedrock, to a depth of 31 feet below ground surface.

Monitoring wells were constructed of 2-inch diameter, stainless steel pipe; flush-mounted protective casings were used on all wells except MW-1 where the casing was above ground. A 5-foot stainless steel well screen with 0.01-foot slots was used in each monitoring well. Wells were backfilled with clean Jersey sand and sealed with a minimum of 2 feet of bentonite pellets. Well installation diagrams appear in Appendix A-3.

MW-1 through MW-3 were developed using a hydraulic pump. The remaining wells, MW-4 through MW-6, were flushed out with an air compressor system. Rising-head permeability tests were initially started on MW-1, MW-2, and MW-5, but were halted when contamination was encountered during development. As an alternative to pumping contaminated water, falling-head permeability tests were performed on MW-1 through MW-5 after well development. A packer test was conducted at MW-6 to characterize the permeability of bedrock at the site. Methods and results for both falling-head and packer tests are provided in Appendix A-4.

To augment the well measurements, three piezometers were installed at the Mechanicville site to provide water level data. Two of the piezometers (P-1 and P-2) were installed in TP-1 and TP-2, respectively, to give groundwater information on the eastern and western portions of the site. The third piezometer (P-3) was placed in B-7 (inside the perimeter of the former gas distribution holder) to allow water level measurements in this region. Locations of these piezometers are shown in Figure 5. The piezometers were constructed of a single section of 1/2-inch ID PVC piping with 1- to 3-foot hand-slotted

screens. Although the piezometers were capped, protective casings were not installed.

2.4 GROUNDWATER SAMPLING

Four rounds of groundwater sampling were conducted at the site: September and December of 1986, and March and June of 1987. During each round, water level measurements were taken at each well and piezometer; these data are presented in Appendix A-5. Using dedicated bailers, groundwater samples were collected from each well, and quality assurance/quality control (QA/QC) samples (i.e., duplicates, trip blanks, sampler blanks, and filtration blanks) were obtained. Monitoring well sampling procedures were followed as detailed in Appendix A-6. Round 1 laboratory chemical analyses were completed by ERCO. The remaining three rounds of samples were analyzed by NYSEG. Results of the groundwater analysis are discussed in Section 3.5.2.

2.5 SURFACE WATER/SEDIMENT SAMPLING

Three surface water and three sediment sampling stations were selected to determine the distribution of organic and inorganic compounds along the Anthony Kill (see Figure 5). The sampling stations were upstream of the site, adjacent to the site near the outfall of the easternmost drainage culvert, and downstream of the site on the eastern side of the North Central Avenue Bridge. Four rounds of surface water/sediment samples were collected in September and December of 1986, and March and June of 1987. During each round, one sample from each medium was collected at each sampling station; a duplicate sample from each medium was also collected in each round. Round 1 laboratory chemical analyses were completed by ERCO. The remaining three rounds of samples were sent to NYSEG. NYSEG analyzed the surface water samples, but sent the sediment samples to ERCO. Results of the surface water and sediment analyses are discussed in Sections 3.5.3 and 3.5.4, respectively.

2.6 SITE SURVEY

Topography and subsurface explorations (i.e., test pits, borings, monitoring wells, and piezometers) were surveyed by David A. Flanders Associates of Ballston Lake, New York, in late June of 1986. The surveyor determined exploration locations and ground elevations to the nearest 0.1 foot, and the uncapped riser elevations of the monitoring wells and piezometers to the nearest 0.01 foot. The reference datum used was an assumed datum of 100 feet taken from a railroad spike in the utility pole located between the NYSEG substation and North Central Avenue, south of the site. Exploration locations were mapped on the base map developed in Task 1 (at a scale of 1 inch equals 50 feet) (see Appendix A-7).

2.7 PRELIMINARY LAND USE SURVEY

General land uses and cover types were surveyed for the area within a half-mile radius of the Mechanicville site. Existing land use maps, street maps, and aerial photographs were used for the survey, along with field checking. Potentially sensitive land uses, identified with the assistance of local

officials and published data, included facilities for the very young, the elderly, and the infirmed; that is, populations particularly sensitive to contaminants.

Potential contributors of chemicals to groundwater and surface water were identified from aerial photographs and during field checking. Potential contributors include locations where chemical substances are typically used and/or disposed of. The land use survey results are presented in Section 3.4.

3.0 SITE CHARACTERIZATION

The geology and hydrogeology of the Mechanicville site, as interpreted from data gathered in Tasks 1 and 2, are described in this section. Results of the land use survey and the laboratory chemical analyses of samples collected during Task 2 are also discussed.

3.1 GEOLOGY AND SOILS

The Saratoga County area is drained by the Hudson River and its tributaries. The Hudson River Valley is formed by highly folded and faulted shales originally deposited as sediments along the continental margin during the Ordovician Period, approximately 500 million years ago. The pre-glacial Hudson River Valley and its drainage system were probably similar to their present configuration. However, the valleys may have been widened or deepened by sub-glacial erosion when the Laurentide Ice Sheet flowed south from Canada over this area.

As the ice sheet began its northward retreat, sediment-laden meltwater streams flowed through the Anthony Kill Valley, depositing sands and gravels in the higher energy zones, and clays and silts in quieter water. These glaciofluvial deposits form the terraces that lie along the southern border of Mechanicville.

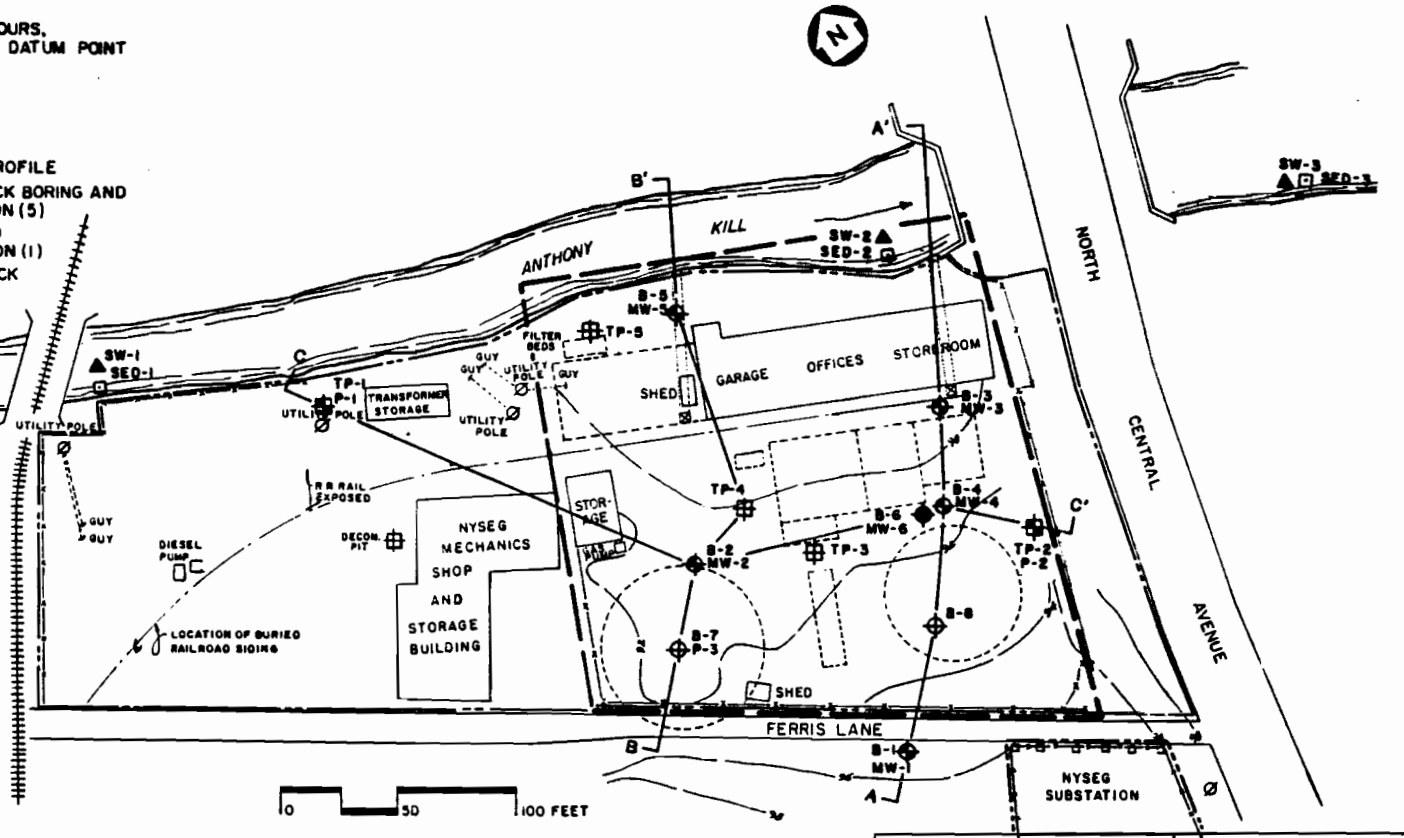
Subsurface conditions at the Mechanicville site were explored during the Task 2 field investigation by means of test pit and boring explorations. The shallow geology consists of up to 18 feet of soil overlying a fractured shale bedrock. The bedrock surface is deepest in the southeastern portion of the site. An interpretation of site stratigraphy is illustrated through geologic profiles located on a plan view of the site (Figure 6). The profiles, shown in Figures 7 through 9, are constructed with a 10:1 vertical scale exaggeration.

The unconsolidated deposits encountered at the site include a combination of both fill and natural soils. Fill, including a silty sand and gravel and a clayey silt and fractured shale, forms the upper 8-10 feet of the site. In the southeast portion of the site, where excavation for the relief gas holder occurred, and in the area between the building and the Anthony Kill, a silty shale unit underlies the fill deposits. The silty shale unit is 8 to 9 feet thick in borings B-4 and B-8. This silty shale unit is loose, moist, and lacks structure, and is interpreted to represent fill material, possibly disturbed weathered bedrock from on-site. Isolated gravelly sand and silty clay till units were also encountered at the site. The unconsolidated deposits overlie a shale bedrock which is severely weathered in its upper 1 to 2 feet, and highly fractured in the upper 5 to 10 feet. Descriptions of the subsurface geologic conditions investigated at the site are presented in the following paragraphs.

Fill. The uppermost fill consists primarily of brown to black silty sand and gravel with organic matter, ash, brick fragments, glass, and wood chips. Within the fill, there is considerable heterogeneity, including zones of clayey silt and fractured shale. This uppermost fill, encountered in all borings, varied in depth from 2 to 10 feet below ground surface. The fill averages 8 to 10 feet thick across the site, but thins at the Anthony Kill (see Profiles A-A' and B-B'). The off-site lateral extent of the fill is unknown, but is expected

LEGEND

- APPROXIMATE LOCATION OF FORMER GAS PLANT STRUCTURES
- NYSEG PROPERTY BOUNDARY (APPROXIMATE)
- FENCE
- GROUND ELEVATION CONTOURS, IN FEET ABOVE RELATIVE DATUM POINT
- STORM DRAIN
- CULVERT
- STUDY AREA BOUNDARY
- A — A' LOCATION OF GEOLOGIC PROFILE
- 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).



BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 6 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK, DATED 6/26/86 (86-72-3). REVISED 12/87.

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

E.C. JORDAN CO.

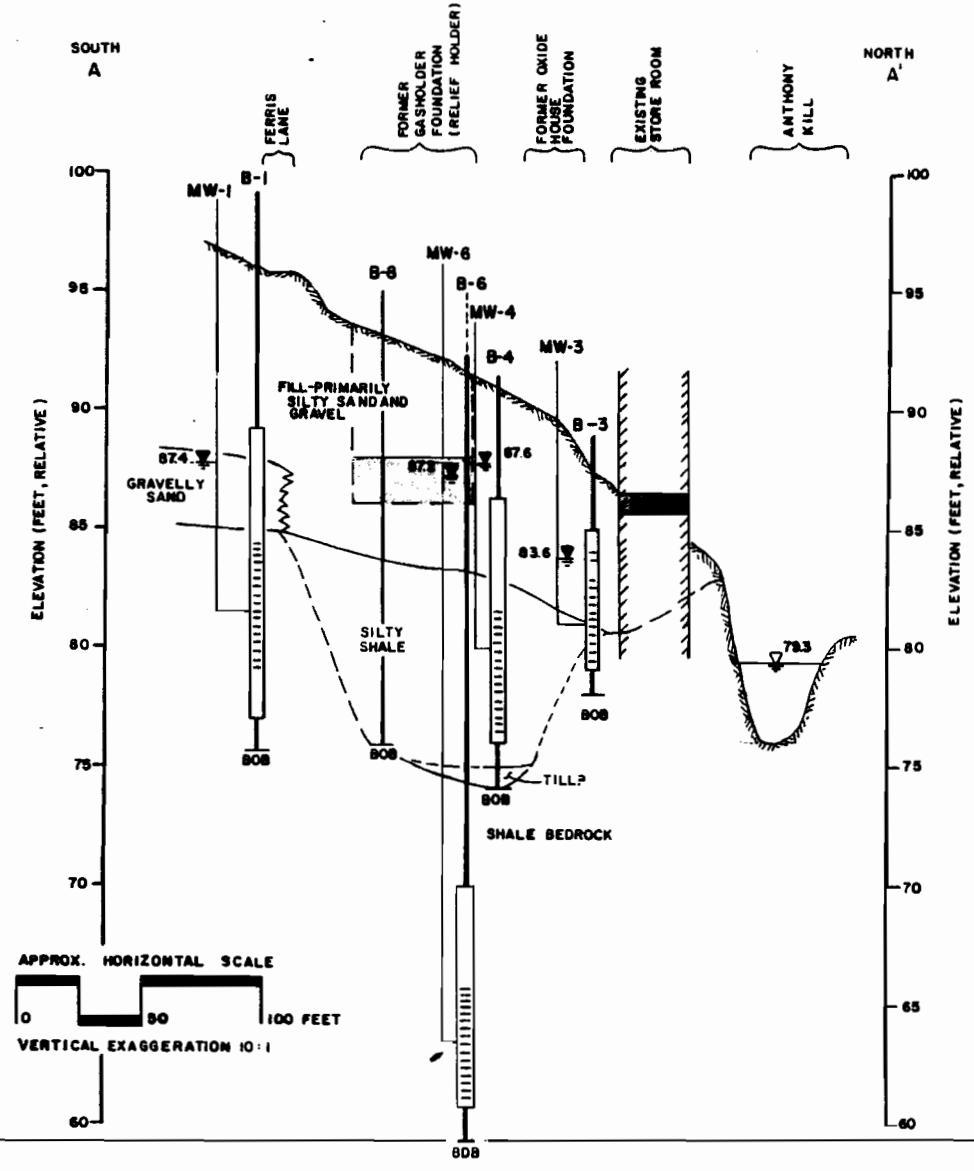
GEOLOGIC PROFILE LOCATIONS

MECHANICVILLE SITE

NEW YORK STATE ELECTRIC AND GAS CORP. BINGHAMTON, NEW YORK

INVESTIGATION OF FORMER COAL GASIFICATION SITES

JOB NO. 4945-02 FIGURE 6



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 GREY SAND AND GRAVEL.

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

TILL : DISCONTINUOUS TAN TO LIGHT GREY SILT CLAY TILL WITH FINE GRAVEL.

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

LEGEND

MW-1 / B-1 — BORING AND MONITORING WELL LOCATION

87.6 — OBSERVED WATER LEVEL (FEET, RELATIVE) ON JUNE 2, 1987.

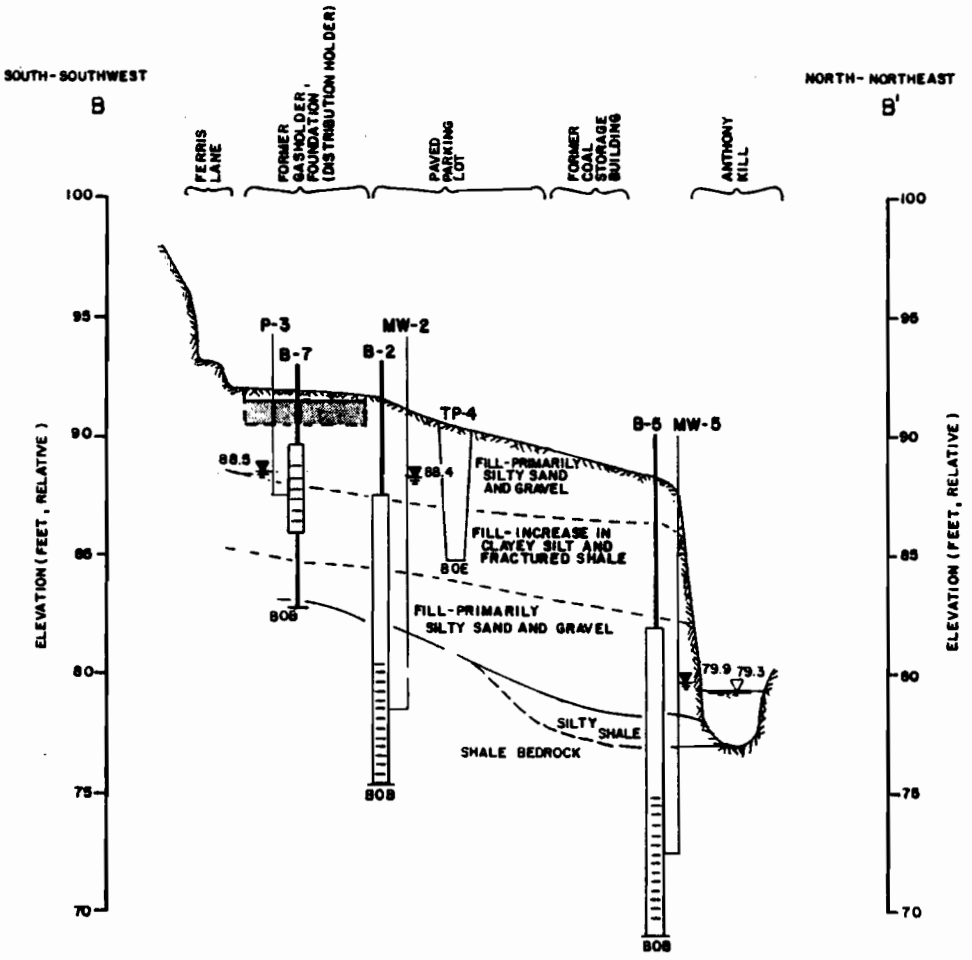
EFFECTIVE SCREEN LENGTH (ACTUAL SCREEN SHOWN AS ▤)

BOB — BOTTOM OF BORING

79.3 — OBSERVED SURFACE WATER LEVEL (FEET, RELATIVE) ON JUNE 2, 1987.

NOTES:
1. SEE FIGURE 6 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 STRUCTURES ARE SHOWN AS APPROXIMATE

E.C. JORDAN CO. CONSULTING ENGINEERS	INTERPRETIVE GEOLOGIC PROFILE A-A' MECHANICVILLE SITE
NEW YORK STATE ELECTRIC AND GAS CORP. BINGHAMTON, NEW YORK	INVESTIGATION OF FORMER COAL GASIFICATION SITES
	JOB NO. 4945-02 FIGURE 7



APPROX. HORIZONTAL SCALE

0 50 100 FEET

VERTICAL EXAGGERATION 10:1

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 GREY SAND AND GRAVEL.

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

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

LEGEND



BORING AND MONITORING WELL LOCATION

OBSERVED WATER LEVEL (FEET, RELATIVE) ON JUNE 2, 1987.

EFFECTIVE SCREEN LENGTH (ACTUAL SCREEN SHOWN AS ▭)

BOTTOM OF BORING



TEST PIT AND PIEZOMETER LOCATION

OBSERVED WATER LEVEL (FEET, RELATIVE) ON JUNE 2, 1987.

PIEZOMETER SCREEN

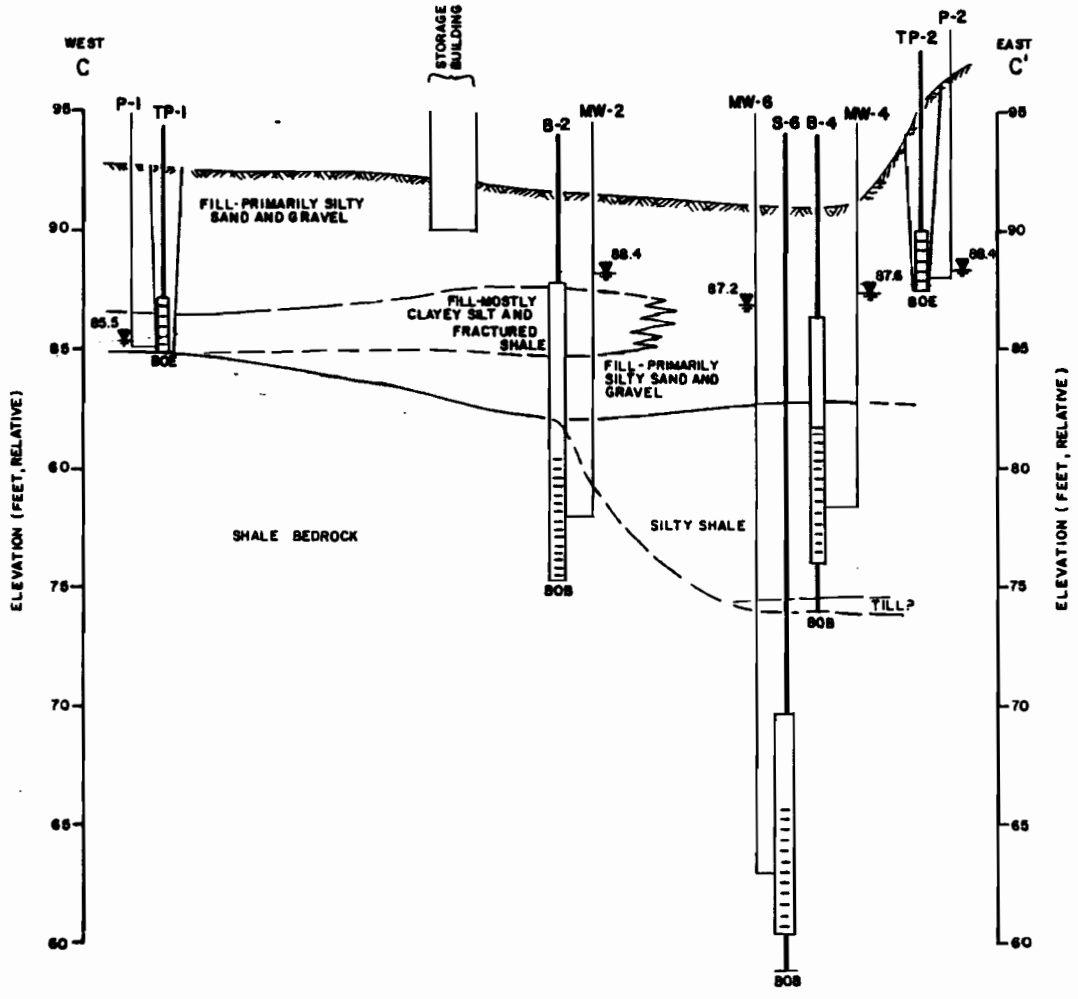
BOTTOM OF EXPLORATION



OBSERVED SURFACE WATER LEVEL (FEET, RELATIVE) ON JUNE 2, 1987.

NOTES:
1. SEE FIGURE 6 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 STRUCTURES ARE SHOWN AS APPROXIMATE.

E.C. JORDAN CO. CONSULTING ENGINEERS	INTERPRETIVE GEOLOGIC PROFILE B-B' MECHANICVILLE SITE
NEW YORK STATE ELECTRIC AND GAS CORP. BINGHAMTON, NEW YORK	INVESTIGATION OF FORMER COAL GASIFICATION SITES
	JOB NO. 4945-02 FIGURE 8



APPROX. HORIZONTAL SCALE

0 50 100 FEET

VERTICAL EXAGGERATION 10:1

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 GREY SAND AND GRAVEL.

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

TILL : DISCONTINUOUS TAN TO LIGHT GREY SILT CLAY TILL WITH FINE GRAVEL.

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

LEGEND



BORING AND MONITORING WELL LOCATION

OBSERVED WATER LEVEL (FEET, RELATIVE) ON JUNE 2, 1987.

EFFECTIVE SCREEN LENGTH (ACTUAL SCREEN SHOWN AS ▭)

BOTTOM OF BORING



TEST PIT AND PIEZOMETER LOCATION

OBSERVED WATER LEVEL (FEET, RELATIVE) ON JUNE 2, 1987.

PIEZOMETER SCREEN

BOTTOM OF EXPLORATION

NOTES:
1. SEE FIGURE 6 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 STRUCTURES ARE SHOWN AS APPROXIMATE.

EC JORDAN CO. CONSULTING ENGINEERS	INTERPRETIVE GEOLOGIC PROFILE C-C' MECHANICVILLE SITE
NEW YORK STATE ELECTRIC AND GAS CORP. BINGHAMTON, NEW YORK	INVESTIGATION OF FORMER COAL GASIFICATION SITES
	JOB NO. 4945-02 FIGURE 9

to occur east of the site along North Central Avenue where the old Champlain Canal was filled. Due to the heterogeneous nature of the uppermost fill, the hydraulic conductivity is likely to be highly variable across the site.

Gravelly Sand. A brown, dense, gravelly sand was encountered in only one boring (B-1) at a depth of 8 feet below ground surface (see profile A-A'). The gravelly sand unit is 1.5 to 4 feet thick. Where it exists, the gravelly sand overlies weathered bedrock. The gravelly sand may represent fill.

Silty Shale. In the southeast portion of the site, and between the building and the Anthony Kill, a silty shale unit overlies the bedrock. This unit consists of black to grey platy shale fragments with interstitial silt. The silty shale is loose, saturated, and lacks a consistent structure. These properties indicate that this area may have been disturbed by excavation, backfilling, and grading during construction of the gas plant. The silty shale in these areas is interpreted to be fill material. The silty shale unit varies in thickness across the site from 1 to 9 feet. It is thickest in the area of the former relief gas holder, near B-4, B-6 and B-8 (see Profile A-A'). This unit has a relatively high hydraulic conductivity. The off-site lateral extent of the silty shale layer is unknown.

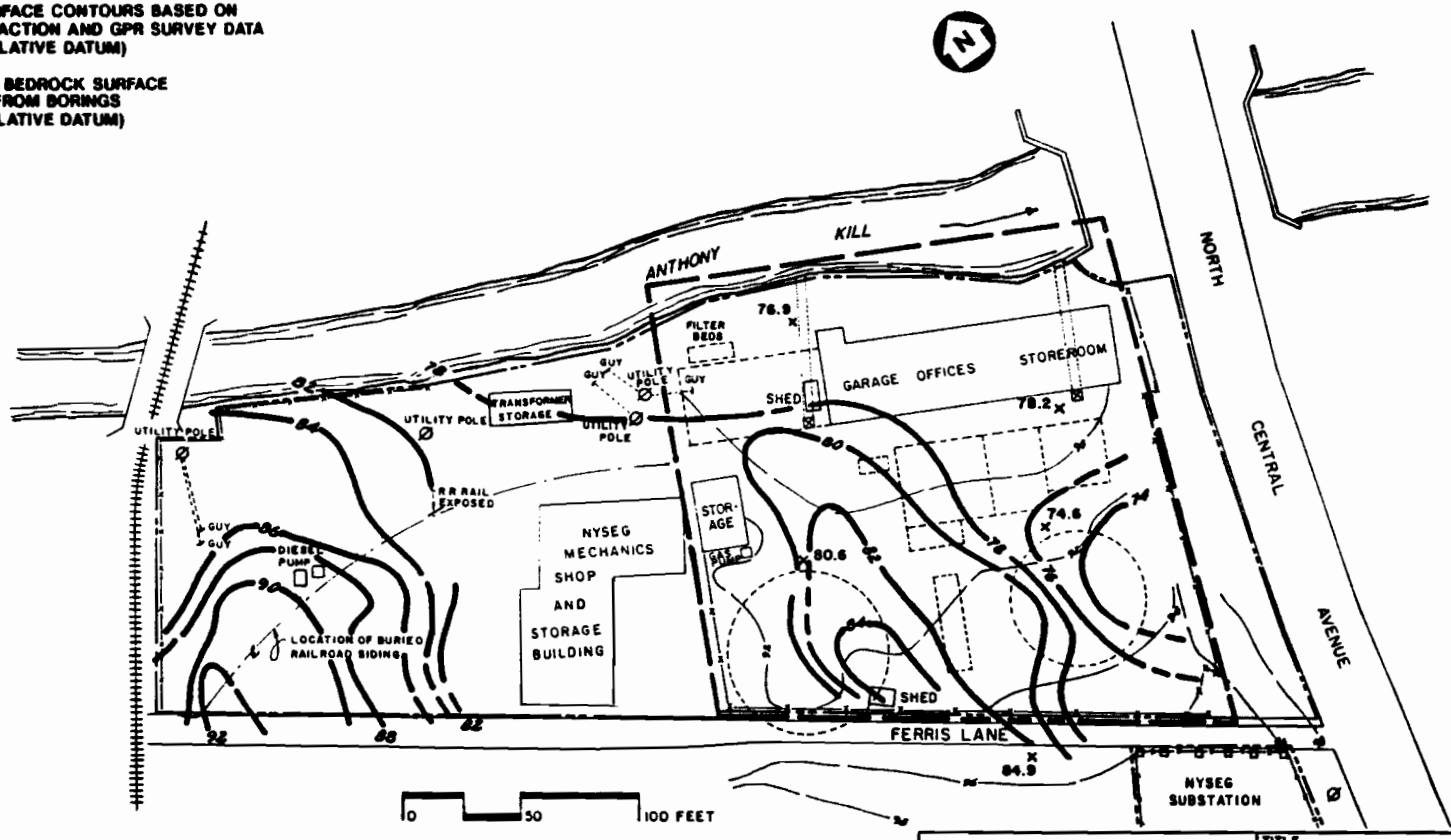
Till. A thin, discontinuous tan to light grey silty clay till with fine gravel was encountered at the top of the bedrock surface in one boring, B-4. The pocket of till is less than one foot thick and is located along the northern edge of a small bedrock trough. The till contained some natural organic matter, suggesting that this remnant till was the original post-glacial topsoil at the site. Because the till appears to be laterally discontinuous, it is not anticipated to significantly influence groundwater flow at the site.

Shale Bedrock. The bedrock at the Mechanicville site is a laminated gray shale with calcite inclusions. The upper 1 to 2 feet of the bedrock is severely weathered and contains interstitial silt and dry platy shale fragments. Bedrock outcrops in several places along the south bank of the Anthony Kill. Based on measurements taken from these outcrops, the bedrock strike trends east to west and bedding dips to the south approximately 30 degrees from horizontal. Bedrock core was obtained in four borings beneath the highly weathered zone. The rock core is very broken to broken, with fractures every 2 inches to a foot. The primary fractures are parallel to the bedding and secondary hairline fractures exist at an angle of up to 90 degrees to the primary fractures. Some weathering has occurred along the fracture faces. Groundwater movement in the shale bedrock occurs primarily through the fractures in response to the hydraulic gradient. The permeability of the bedrock is equivalent to, if not greater than, the overlying soils.

A bedrock contour map interpreted from the GPR and seismic refraction data collected in Task 1 is shown in Figure 10. The map depicts the surface of the weathered rock; the competent rock is 1 to 2 feet below the weathered rock surface. Depths to the competent bedrock measured during the drilling program correlate well with the geophysical data, as shown in Figure 10. There is a bedrock high near the former distribution holder. Bedrock appears to slope downward from this high, toward both the Anthony Kill (north) and North Central Avenue (east). A small east-trending bedrock depression, approximately 5 feet

LEGEND

- GROUND ELEVATION CONTOURS, IN FEET ABOVE RELATIVE DATUM POINT
- 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)



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.

E.C. JORDAN CO.
CONSULTING ENGINEERS

CLIENT
NEW YORK STATE ELECTRIC AND GAS CORP.
BINGHAMTON, NEW YORK

TITLE
BEDROCK SURFACE CONTOURS
MECHANICVILLE SITE

INVESTIGATION OF FORMER COAL GASIFICATION SITES

PROJECT NO. 4945-02 **FIGURE 10**

deep, occurs in the center of the site near the former relief holder (B-4 and B-6). This small depression may represent a relic post-glacial stream channel.

3.2 HYDROGEOLOGY

The interpretation of hydrogeologic conditions at the site is based on field and laboratory permeability data and water level observations presented in Appendices A-4 and A-5, respectively.

3.2.1 Groundwater Flow Conditions

Based on observations made during the excavations of borings and test pits, and groundwater measurements from piezometers and monitoring wells, the water table at the site exists at an approximate depth of 2 to 10 feet below ground surface. There was a measured seasonal groundwater fluctuation of approximately 1 to 3 feet, with the highest water table levels occurring in March 1987, and the lowest in September 1986 and June 1987. The water table occurs principally in the fill during both high and low water table conditions. The saturated thickness of soils at the site range from approximately 3 to 13 feet, with the greatest saturated thicknesses coincident with the areas of greatest depth to bedrock.

The groundwater surface contour map for the site is shown in Figure 11. The contours were interpreted using groundwater levels observed on June 2, 1987, from monitoring wells MW-1 through MW-5 and piezometers P-1, P-2, and P-3. Water level data collected in August, September, and December of 1986, and March of 1987 result in a similar interpretation of contours. The effective screens of MW-1, MW-2, and MW-5 intercept groundwater in the fill and shallow bedrock. MW-3, MW-4, and the three piezometers monitor groundwater levels in the fill, and MW-6 monitors groundwater levels at depth in the fractured bedrock.

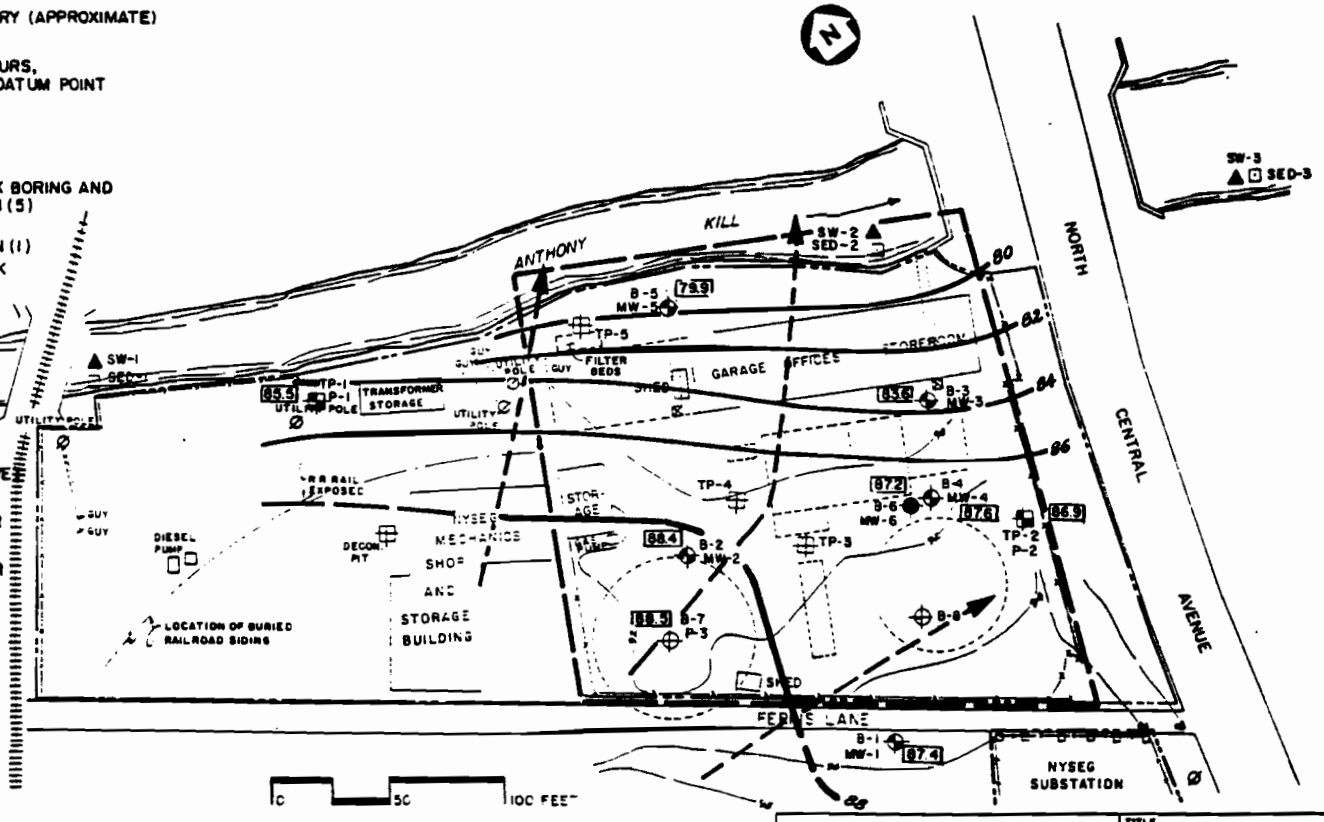
As illustrated in Figure 11, the groundwater surface slopes north-northeast, toward the Anthony Kill. The average horizontal gradient of the groundwater surface is calculated to be 0.05 ft/ft across the site. Because groundwater moves from areas of high elevation to areas of low elevation, the interpreted direction of flow is north-northeast. Groundwater flow direction in the southeastern corner of the site, near the former relief gas holder, appears to be more easterly, toward North Central Avenue. The easterly flow appears to be controlled by the thick unit of silty shale, the bedrock depression, and shallow bedrock fractures due to the permeable nature of these units. Additional off-site groundwater level information is required to confirm groundwater flow direction east of the site.

Groundwater flow is primarily horizontal through the system; however, a downward gradient was observed in the MW-4/MW-6 multilevel well cluster. The calculated average vertical groundwater gradient at MW-4/MW-6 was 0.03 ft/ft downward from the fill into the bedrock formation.

Groundwater flow within the fractured rock is controlled by the orientation, size, and interconnection of the fractures. Based on visual observations of

LEGEND

- APPROXIMATE LOCATION OF FORMER GAS PLANT STRUCTURES
- NYSEG PROPERTY BOUNDARY (APPROXIMATE)
- FENCE
- GROUND ELEVATION CONTOURS, IN FEET ABOVE RELATIVE DATUM POINT
- STORM DRAIN
- CULVERT
- STUDY AREA BOUNDARY
- 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)
- 88.5 WATER LEVEL (FEET, RELATIVE) OBSERVED ON 6/2/87
- 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.

E.C. JORDAN CO.
CONSULTING ENGINEERS

CLIENT
NEW YORK STATE ELECTRIC AND GAS CORP.
BINGHAMTON, NEW YORK

TITLE
GROUNDWATER SURFACE CONTOURS MECHANICVILLE SITE

INVESTIGATION OF FORMER COAL GASIFICATION SITES

PROJECT NO. 4945-02 FIGURE 11

rock core from the upper 5 to 15 feet of the bedrock formation at four borings, the primary fractures are oriented 30 to 45 degrees from horizontal. Groundwater movement occurs primarily along these fractures. The directional orientation of the fractures is unknown; however, based on the orientation of regional tectonic fracture patterns (Isachsen and McKendree, 1977) it is likely that the primary bedrock fractures are oriented to the north and northeast. Given this orientation, groundwater in the shallow rock fractures on-site would discharge to the Anthony Kill.

The impervious asphalt paving and buildings that cover most of the site presently limit direct infiltration by precipitation. Two storm drains located in the northern portion of the site collect surface runoff and discharge to the Anthony Kill. Limited infiltration into the site over the years has minimized the potential for waste constituents to be flushed downward into the groundwater flow system. However, during the coal gas production years, the site was not paved and conditions were more favorable for the mobilization of waste constituents. The date of paving is not known.

In-situ permeability and packer tests were conducted in the monitoring wells to estimate hydraulic conductivities and groundwater flow rates in soil and shallow bedrock. The results of in-situ, falling-head permeability tests on the shallow wells screened primarily in the silty shale (MW-3 and MW-4) produced an average hydraulic conductivity of 1.8×10^{-4} cm/sec (0.5 ft/day). In-situ permeability tests in the wells screened primarily in shallow bedrock (MW-1, MW-2 and MW-5) had a hydraulic conductivity ranging from 5.4×10^{-4} to 1.1×10^{-3} cm/sec (1.5 to 3.1 ft/day), with the average hydraulic conductivity for these shallow bedrock wells being 8.6×10^{-4} cm/sec (2.4 ft/day). The in-situ permeability and packer tests conducted in the deeper bedrock well (MW-6) produced hydraulic conductivities of 7.5×10^{-5} cm/sec and 1.9×10^{-4} cm/sec, respectively.

As discussed previously, the upper fill consists of a heterogeneous mixture of materials and likely exhibits a broad range in permeability. Since the saturated thickness of fill is limited at the site and wells were installed predominantly below the upper fill to monitor groundwater flow, in-situ permeability data for the fill are not available. However, a laboratory permeability test was performed on a sample collected from TP-1. Since it is not uncommon to find laboratory and in-situ permeabilities varying by an order of magnitude for the same soil conditions, it is possible that the fill hydraulic conductivities are higher than that measured by the laboratory test. The laboratory permeability test showed hydraulic conductivity of 2.7×10^{-8} cm/sec (7.5×10^{-5} ft/day).

Groundwater velocity is a function of hydraulic conductivity, effective porosity, and the groundwater gradient. The horizontal groundwater flow rate for the silty shale is calculated to be approximately 30 to 50 ft/yr, assuming a porosity of 0.25. The horizontal gradient used to calculate these flow rates is 0.05 ft/ft. The horizontal groundwater flow rate for the shallow bedrock system is calculated to be approximately 280 to 570 ft/yr, assuming a porosity of 0.10. Groundwater flow rates within the deeper bedrock system were not calculated because an insufficient number of wells exist to determine the

hydraulic gradient for the deeper bedrock system. If the hydraulic gradient is similar to the shallow bedrock seepage gradient, groundwater movement is expected to be somewhat slower at depth in the bedrock. However, higher flow rates may exist preferentially along zones where bedrock is more extensively fractured.

In summary, based on the available permeability data and seepage gradients, the principal zone of groundwater movement at the site is interpreted to exist within the silty shale and fractured zones of the bedrock formation. Additional permeability data for the soil and bedrock, and seepage gradients for the deeper bedrock formation are needed to further evaluate groundwater flow at the site.

3.2.2 Groundwater Usage

Historically, the City of Mechanicville used surface water supplies for a drinking water source. The Mechanicville reservoir is approximately three miles northwest of the site at an elevation approximately 160 feet higher than the site. The reservoir is drained by Plum Brook, which flows into the Anthony Kill a few miles upstream of the site. A few residences outside the city limits, however, use groundwater for drinking water (Renaldi, 1986). The closest domestic wells are nearly a mile southwest (upgradient) of the site in the Town of Halfmoon. Based on information obtained during the records search, there are no active industrial wells in the Mechanicville area. There are two abandoned industrial wells: the West Virginia Pulp and Paper Co. well (2,157 feet deep), and a bedrock well used by the former Mintzer Petroleum Co. (29 feet deep). The latter is located 1.5 miles south (upgradient) of the site (Heath, et. al., 1963). The records examined did not report the former yields of these wells.

3.3 SURFACE WATER HYDROLOGY

The Anthony Kill and Hudson River are two major surface water bodies near the site. The Anthony Kill flows out of Round Lake in a southeastern direction, then bends eastward, flowing past the site and emptying into the Hudson River at Mechanicville. The Hudson River is located approximately 1,500 feet east of the site.

Surface runoff from the site flows into two drainage catch basins that empty via underground culverts into the Anthony Kill. Locations of the culverts are shown in Figure 4.

3.3.1 Discharge

There are no continuous-record gauging stations on the Anthony Kill. The U.S. Geological Survey (USGS) has periodically taken base-flow measurements at the partial-record stations on the Anthony Kill at Mechanicville (Station No. 01335700, latitude 42°55'05" and longitude 73°42'53") and Coons Crossing (Station No. 01335698, latitude 42°55'13" and longitude 73°44'50"). The estimated low flow discharge at the Mechanicville Station is 17 cubic feet per second (cfs) for a drainage basin of 62.4 square miles. The average low flow at the Coons Crossing Station is estimated at 15 cfs for a drainage basin of

52.9 square miles (USGS, 1979). The USGS maintains a partial-record gauging station on the Hudson River at Mechanicville (Station No. 01335500, latitude 42°54'45" and longitude 73°40'45"). The drainage area upstream of this station is 4,500 square miles. The minimum average 7-day, 10-year discharge for the water years 1931 to 1956 of the Hudson River at this station was 1,900 cfs (USGS, 1979).

3.3.2 Water Quality

The New York State Department of Environmental Conservation (NYSDEC) has assigned a Class D stream classification to the section of the Anthony Kill from the Mechanicville city line to the Hudson River (Hodgson, 1986). Class D waters are designated by NYSDEC for secondary contact recreation, but no higher uses because of intermittent flow or water quality conditions that are not conducive to the propagation of game fish. Farther upstream, between Coons Crossing and Mechanicville, the Anthony Kill is designated Class C(t). Class C waters are suitable for fishing and all other uses, except primary contact recreation or as a source of water for drinking, culinary, or food processing purposes. The "(t)" denotes that the water body is a trout stream (NYSDEC, 1981).

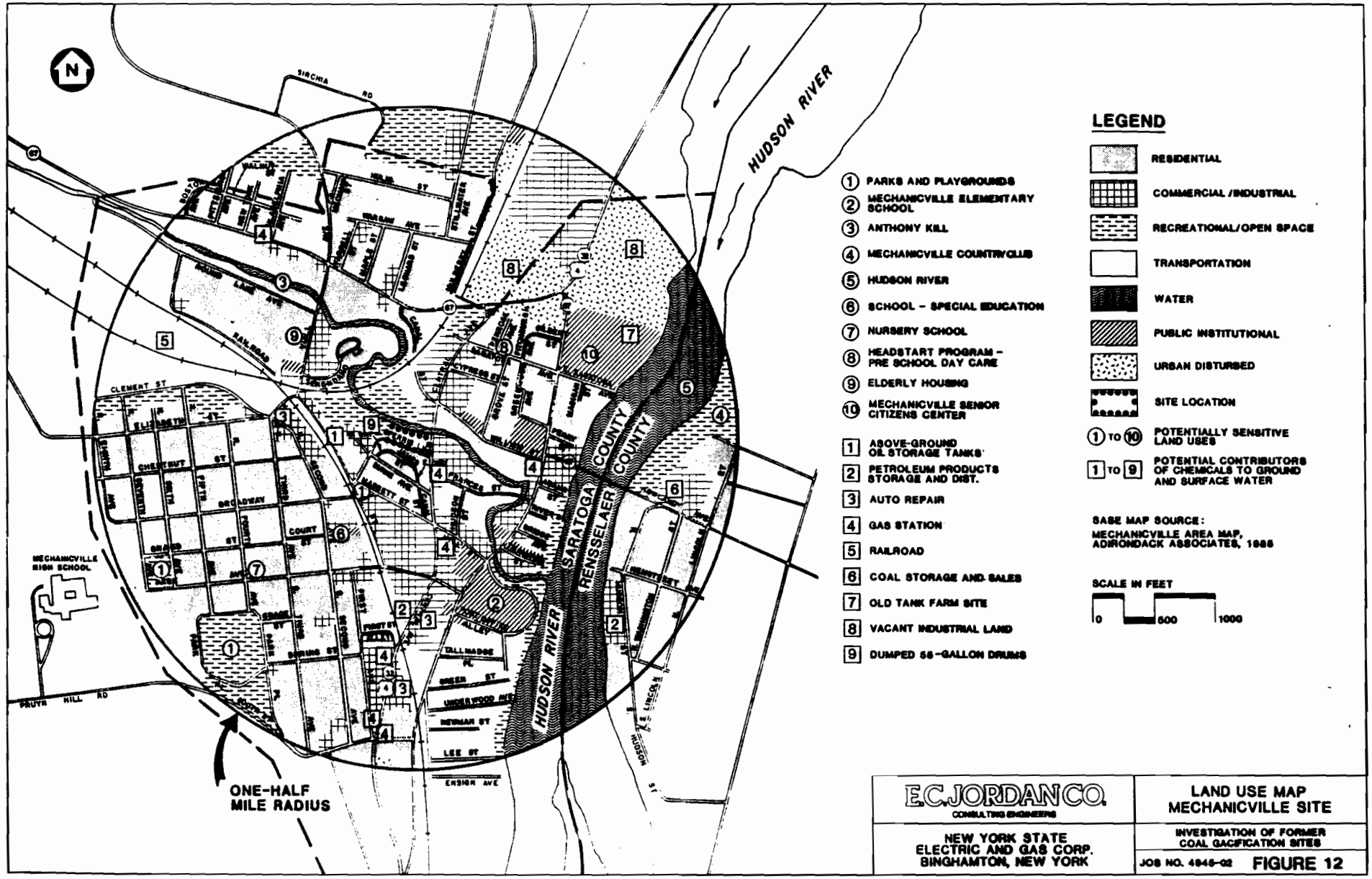
NYSDEC has conducted water quality testing downstream of Mechanicville on the Hudson River, and two miles upstream of the site at Plum Brook (which drains the water supply reservoir) (NYSDEC, 1981). The Hudson River test results (1981) showed water quality impairment from coliform bacteria, heavy metals, and PCBs. No impairment was evident at Plum Brook, which has a Class A designation (suitable for use as a water supply source) (NYSDEC, 1981).

3.4 LAND USE

General land uses and cover types were surveyed for the area within a half-mile radius of the site (Figure 12). Existing land use maps, street maps, and aerial photographs, combined with field checking, were utilized to determine general land uses. Potentially sensitive land uses were identified with the assistance of local officials and published data. Potential contributors of chemicals to groundwater and surface water were identified from aerial photographs and during field inspection. Current land uses around the site are described in the following sections.

3.4.1 General Land Use

Figure 12 depicts present land use and cover types for the area within a half-mile radius of the site. Land uses in the immediate vicinity of the site include both residential and commercial. The central business district of the city, located east and south of the site, is characterized by a mixture of commercial, residential, public, and semi-public land uses. Included are retail stores, offices, municipal buildings (i.e., city hall, fire station, library, and community services), the post office, and several churches. The central business district is bounded on the east by the Hudson River. The portion of the land use study area on the east side of the Hudson River in Schagticoke is predominantly residential.



E.C. JORDAN CO.
CONSULTING ENGINEERS

LAND USE MAP
MECHANICVILLE SITE

NEW YORK STATE
ELECTRIC AND GAS CORP.
BINGHAMTON, NEW YORK

INVESTIGATION OF FORMER
COAL GACIFICATION SITES

JOB NO. 4945-02 **FIGURE 12**

Southwest of the site, land uses are primarily residential with a few interspersed commercial sites and parks. Railyards of the Delaware and Hudson, and Boston and Maine railroads are located west of the site. Land northwest and north of the site is primarily open space, with a few private residences and commercial facilities. The area northeast of the site is a mixture of commercial, residential, and industrial properties.

3.4.2 Potentially Sensitive Land Use

Segments of the human population particularly sensitive to contaminants include the very young, the elderly, and the infirmed. The young are particularly sensitive because a given dose of a harmful material will have a greater effect on a smaller, lighter child than on a larger, heavier adult. A child's immune system is also more susceptible to negative impacts as the physiological systems develop. The elderly and infirmed typically suffer from other medical problems that decrease the body's ability to fight chemical intake. Additionally, the elderly and the infirmed may take medication for other health problems; effects of chemicals on the body may be exacerbated by these drugs.

Therefore, land uses that foster concentrations of these populations are of particular concern in conducting a risk assessment. At the Mechanicville site, these uses include day care centers, schools, recreational areas, nursing homes, and elderly housing projects. Figure 12 shows the proximity of these land uses to the site.

3.4.3 Potential Contributors of Chemicals to Groundwater and Surface Water

Potential sources of chemicals in groundwater and surface water near the site include aboveground and belowground tanks used for storing petroleum products, vehicle maintenance yards, a railroad yard, a coal storage and sales facility, vacant industrial property, and a drum disposal area. The drums were observed on the vacant lot just west of the site. There are about a dozen 55-gallon drums in poor condition lying on their sides in the grass. The contents and origin of these drums are not known. The location of the potential contributors identified in the land use survey are depicted in Figure 12.

3.5 DISTRIBUTION OF CHEMICALS

Task 2 chemical analyses of samples from Mechanicville were conducted by two laboratories. ERCO completed analyses on soil, groundwater, and surface water samples for Round 1 sampling, and sediment samples for all four rounds. The NYSEG laboratory performed the water analyses (groundwater and surface water) for Round 2 through Round 4 samples. The analytical parameters and methods are listed in Appendix B-1 and discussed briefly herein. The analytical program was designed to measure constituents of coal tar and coal gas purification wastes, if present. Appendix B-1 also provides representative waste characterizations for coal tar and spent oxide wastes.

Organic analyses of most soil and sediment samples and the first round of groundwater and surface water samples were performed using high performance liquid chromatography (HPLC) with an ultraviolet (UV) detector. Confirmatory analyses were performed on several replicate soil and Round 1 groundwater

samples using gas chromatography (GC) and a mass spectrometer (MS) detector. The GC/MS method is more specific than the HPLC/UV method in identification of organic compounds, and more accurate in quantitation. Typically, non-specific detectors (e.g., the UV detector) tend to yield higher concentrations of chemicals than the MS for a given sample. The NYSEG laboratory used GC/MS methods exclusively for organic analyses of water samples from Rounds 2, 3, and 4. Analytical results are described by media in the following sections.

3.5.1 Soil

Soil samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), selected trace metals (i.e., iron and zinc), cyanide, total recoverable phenolics (phenolics), and total organic carbon (TOC). The six test pit samples were collected from depths of 3 to 7.5 feet below ground surface, and the eight boring samples were collected from 4- to 17.5-foot depths. The test pit samples were taken from the silty sand and gravel and clayey silt fill soils. Samples from B-2, B-3, B-4, and B-7 were from the silty sand and gravel fill, just above the silty shale. Samples from B-5 and B-8 were collected from within the silty shale and the B-1 sample was from a gravelly sand stratum observed only at that boring. Tables 1 and 2 present analytical results of these soil samples. Concentrations of the chemicals detected are expressed in mg/kg (ppm). Figure 13 illustrates the distribution of selected chemicals in soil in the study area.

Organic chemicals associated with coal tar were found at the site. The analyses of samples B-3 and B-8 indicated the highest levels of VOCs and PAHs present in subsurface soil samples. B-8 was drilled into the former relief gas holder itself, while B-3 was downgradient of both the gas holder and the former purifier and oxide houses. The samples from B-8 contained visible coal tar, which had been left in the holder when the plant closed. B-8 had the highest total VOC concentration (3,800 mg/kg), while the highest total PAH level was obtained at B-3 (9,310 mg/kg). The confirmatory GC/MS analysis performed on B-8 indicated comparable results at generally lower concentrations than those reported by the HPLC analysis. Methylene chloride and carbon disulfide were detected in the GC/MS analysis of sample TP-5. Both of these compounds were detected at concentrations at or below 1 mg/kg and may be indicative of laboratory contamination.

The samples from TP-5 and B-5, collected near the former filter beds, were the most downgradient sampling locations relative to site activities. The samples were similar in VOC and PAH concentrations: 16 and 4,654 mg/kg at B-5, and 24 and 4,630 mg/kg at TP-5, respectively. The duplicate HPLC analytical results for TP-5 were comparable for VOCs, but relatively dissimilar for PAHs. The differences in PAH concentrations may be attributable to the inherent heterogeneity of soil samples. A confirmatory GC/MS analysis was also performed on a sample from TP-5; the concentrations of compounds detected by GC/MS were generally lower than HPLC results. Total VOC and PAH concentrations in the GC/MS sample were 13.84 mg/kg and 1,137 mg/kg, respectively.

Analysis of sample B-7, collected from beneath the former distribution holder, indicated the presence of several VOCs and PAHs. A total VOC concentration of 4.3 mg/kg and total PAH concentration of 11.21 mg/kg were found at B-7. Higher

12/17/87

TABLE 1
CHEMICALS FOUND IN SOIL BORING SAMPLES
MECHANICVILLE SITE

SAMPLE IDENTIFIER	B-1/S-1	B-2/S-1	B-3/S-1	B-4/S-1	B-5/S-1	B-7/S-1	B-8/S-1	B-8/S-1
ORGANICS ANALYSIS (1)	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	HPLC	GC/MS
DATE OF SAMPLE COLLECTION	7/23/86	8/1/86	8/5/86	7/29/86	8/4/86	7/31/86	8/6/86	8/6/86
SAMPLE DEPTH (FT)	8.0-10.0	8.0-9.5	4.0-6.0	6.0-8.0	10.0-11.0	7.0-9.0	13.5-15.5	15.5-17.5
ZONE SAMPLED	GRAVELLY SAND	FILL	FILL AND SILTY SHALE	FILL AND SILTY SHALE	SILTY SHALE	FILL	SILTY SHALE	SILTY SHALE
$$VOLATILE ORGANICS (MG/KG)$$								
-VOLATILE AROMATICS-								
BENZENE	ND (2)	ND	13.000	ND	0.880	2.400	640.000	380.000
TOLUENE	ND	ND	8.600	0.310	1.600	1.300	840.000	660.000
ETHYLBENZENE	ND	ND	120.000	2.300	6.300	0.170	440.000	250.000
STYRENE	ND	ND	ND	ND	ND	0.180	780.000	720.000
TOTAL XYLENES	-- (3)	--	--	--	--	--	--	1400.000
m-XYLENE	ND	ND	25.000	0.640	1.500	0.180	400.000	--
o-XYLENE	ND	ND	44.000	2.400	ND	ND	320.000	--
p-XYLENE	ND	ND	25.000	0.870	1.500	0.075	210.000	--
TRIMETHYLBENZENE	ND	ND	35.000	3.800	4.200	ND	170.000	--
n-PROPYLBENZENE	ND	ND	ND	ND	ND	ND	ND	--
-OTHER-								
ACETONE	--	--	--	--	--	--	--	ND
METHYLENE CHLORIDE	--	--	--	--	--	--	--	ND
CARBON DISULFIDE	--	--	--	--	--	--	--	ND
TOTAL VOLATILE AROMATICS	ND	ND	270.600	10.320	15.980	4.305	3800.000	3410.000
$$SEMIVOLATILE ORGANICS (MG/KG)$$								
-PAH-								
ACENAPHTHENE	9.000	(4)	380.000	42.000	250.000	(4)	600.000	(4)
ACENAPHTHYLENE	ND	(5)	(5)	(5)	(5)	(5)	(5)	670.000
ANTHRACENE	8.000	(4)	670.000	80.000	450.000	(4)	550.000	270.000
BENZO(b)FLUORANTHENE	5.700	ND	(4)	ND	120.000	(4)	200.000	(4)
BENZO(k)FLUORANTHENE	(4)	ND	240.000	ND	ND	0.980	ND	(4)
BENZO(g,h,i)PERYLENE	(4)	ND	(4)	ND	ND	1.400	140.000	(4)
BENZO(a)ANTHRACENE	(6)	(6)	(6)	(6)	ND	(6)	(6)	(4)
BENZO(a)PYRENE	6.200	ND	200.000	(4)	94.000	1.100	140.000	(4)
CHRYSENE	17.000	(4)	780.000	100.000	ND	0.800	480.000	(4)
DIBENZO(a,h)ANTHRACENE	6.300	ND	ND	ND	ND	1.300	ND	ND
FLUORANTHENE	44.000	(4)	1100.000	130.000	750.000	0.890	850.000	290.000
FLUORENE	34.000	(4)	1300.000	120.000	620.000	1.100	2100.000	380.000
INDENO(1,2,3-cd)-PYRENE	ND	ND	ND	ND	ND	ND	ND	(4)
NAPHTHALENE	ND	(4)	2300.000	44.000	760.000	1.900	1500.000	2500.000
PHENANTHRENE	13.000	(4)	940.000	110.000	630.000	0.870	760.000	870.000
PYRENE	11.000	(4)	1400.000	170.000	980.000	0.870	1400.000	460.000
-OTHER-								
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--	--	ND
TOTAL PAH	154.200	(4)	9310.000	796.000	4654.000	11.210	8720.000	5440.000
$$OTHER CHEMICALS (MG/KG)$$								
-METALS-								
IRON	34000	30000	31000	35000	27000	26000	19000	--
ZINC	190	75	130	80	1600	320	61	--
-CYANIDE-								
TOTAL CYANIDE	ND	ND	3.2	1.0	ND	ND	ND	--
AMENABLE CYANIDE	ND	ND	3.2	1.0	ND	ND	ND	--
FERRO-FERRI CYANIDE	ND	ND	ND	ND	ND	ND	ND	--
-OTHER-								
TOTAL RECOVERABLE PHENOLICS	ND	ND	3.6	ND	2.6	ND	ND	--
TOTAL ORGANIC CARBON	110000	6800	100000	23000	110000	76000	190000	--

NOTES:
(1) INDICATES SAMPLE WAS ANALYZED BY GC/MS (EPA METHODS 8240 AND 8270) OR BY HPLC (EPA METHODS 8020 AND 8310).
(2) ND = NOT DETECTED (SEE APPENDIX B-2 FOR MINIMUM DETECTION LIMITS).
(3) -- = NOT ANALYZED
(4) TRACE CONCENTRATIONS DETECTED BELOW THE QUANTIFIABLE REPORTING LIMIT.
(5) ACENAPHTHYLENE AND NAPHTHALENE, COELUTED.
(6) BENZO(a)ANTHRACENE AND CHRYSENE, COELUTED.

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TABLE 2
CHEMICALS FOUND IN TEST PIT SAMPLES
MECHANICVILLE SITE

SAMPLE IDENTIFIER	TP-1/S-1	TP-2/S-1	TP-4/S-1	TP-5/S-1	TP-5/S-1	TP-5/S-1
ORGANICS ANALYSIS (1)	HPLC	HPLC	HPLC	HPLC	HPLC DUP	GC/MS
DATE OF SAMPLE COLLECTION	7/21/86	7/21/86	7/21/86	7/21/86	7/21/86	7/21/86
SAMPLE DEPTH (FT)	6.5-7.0	7.0-7.5	3.0-4.0	3.0-4.0	3.0-4.0	4.0-6.0
ZONE SAMPLED	FILL	FILL	FILL	FILL	FILL	FILL
VOLATILE ORGANICS (MG/KG)						
-VOLATILE AROMATICS-						
BENZENE	ND (2)	ND	0.220	ND	ND	ND
TOLUENE	ND	ND	0.160	1.000	0.750	0.640
ETHYLBENZENE	ND	ND	0.150	6.600	6.100	2.200
STYRENE	ND	ND	ND	ND	ND	ND
TOTAL XYLENES	-- (3)	--	--	--	--	11.000
m-XYLENE	ND	ND	0.091	4.100	3.100	--
o-XYLENE	ND	ND	0.082	3.900	3.000	--
p-XYLENE	ND	ND	0.062	2.100	1.600	--
TRIMETHYLBENZENE	ND	ND	ND	4.600	5.100	--
n-PROPYLBENZENE	ND	ND	0.083	2.100	2.000	--
-OTHER-						
ACETONE	--	--	--	--	--	ND
METHYLENE CHLORIDE	--	--	--	--	--	1.000
CARBON DISULFIDE	--	--	--	--	--	0.110
TOTAL VOLATILE AROMATICS	ND	ND	0.848	24.400	21.650	13.840
SEMIVOLATILE ORGANICS (MG/KG)						
-PAH-						
ACENAPHTHENE	ND	(4)	ND	290.000	(4)	140.000
ACENAPHTHYLENE	ND	ND	(5)	(5)	(5)	33.000
ANTHRACENE	ND	ND	25.000	470.000	220.000	67.000
BENZO(b)FLUORANTHENE	ND	ND	23.000	ND	ND	13.000
BENZO(k)FLUORANTHENE	ND	ND	ND	ND	ND	21.000
BENZO(g,h,i)PERYLENE	ND	ND	18.000	ND	ND	13.000
BENZO(a)ANTHRACENE	ND	ND	(6)	(6)	ND	35.000
BENZO(a)PYRENE	ND	(4)	13.000	(4)	ND	36.000
CHRYSENE	ND	ND	59.000	110.000	ND	32.000
DIBENZO(a,h)ANTHRACENE	ND	ND	13.000	ND	ND	(4)
FLUORANTHENE	ND	45.000	84.000	880.000	220.000	78.000
FLUORENE	ND	18.000	31.000	620.000	2600.000	89.000
INDENO(1,2,3-cd)-PYRENE	ND	ND	ND	ND	ND	ND
NAPHTHALENE	ND	ND	19.000	350.000	5200.000	120.000
PHENANTHRENE	ND	12.000	31.000	810.000	260.000	210.000
PYRENE	ND	45.000	96.000	1100.000	ND	250.000
-OTHER-						
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	ND
TOTAL PAH	ND	120.000	412.000	4630.000	8500.000	1137.000
OTHER CHEMICALS (MG/KG)						
-METALS-						
IRON	27000	35000	27000	31000	35000	--
ZINC	260	120	87	79	220	--
-CYANIDE-						
TOTAL CYANIDE	ND	2.0	ND	ND	ND	--
AMENABLE CYANIDE	ND	ND	ND	ND	ND	--
FERRO-FERRI CYANIDE	ND	2.0	ND	ND	ND	--
-OTHER-						
TOTAL RECOVERABLE PHENOLICS	ND	ND	ND	ND	ND	--
TOTAL ORGANIC CARBON	8300	1400	10000	30000	26000	--

NOTES:
(1) INDICATES SAMPLE WAS ANALYZED BY GC/MS (EPA METHODS 8240 AND 8270) OR BY HPLC (EPA METHODS 8020 AND 8310).
(2) ND = NOT DETECTED (SEE APPENDIX B-2 FOR MINIMUM DETECTION LIMITS).
(3) -- = NOT ANALYZED OR NOT APPLICABLE.
(4) TRACE CONCENTRATIONS DETECTED BELOW THE QUANTIFIABLE REPORTING LIMIT.
(5) ACENAPHTHYLENE AND NAPHTHALENE, COELUTED.
(6) BENZO(a)ANTHRACENE AND CHRYSENE, COELUTED.

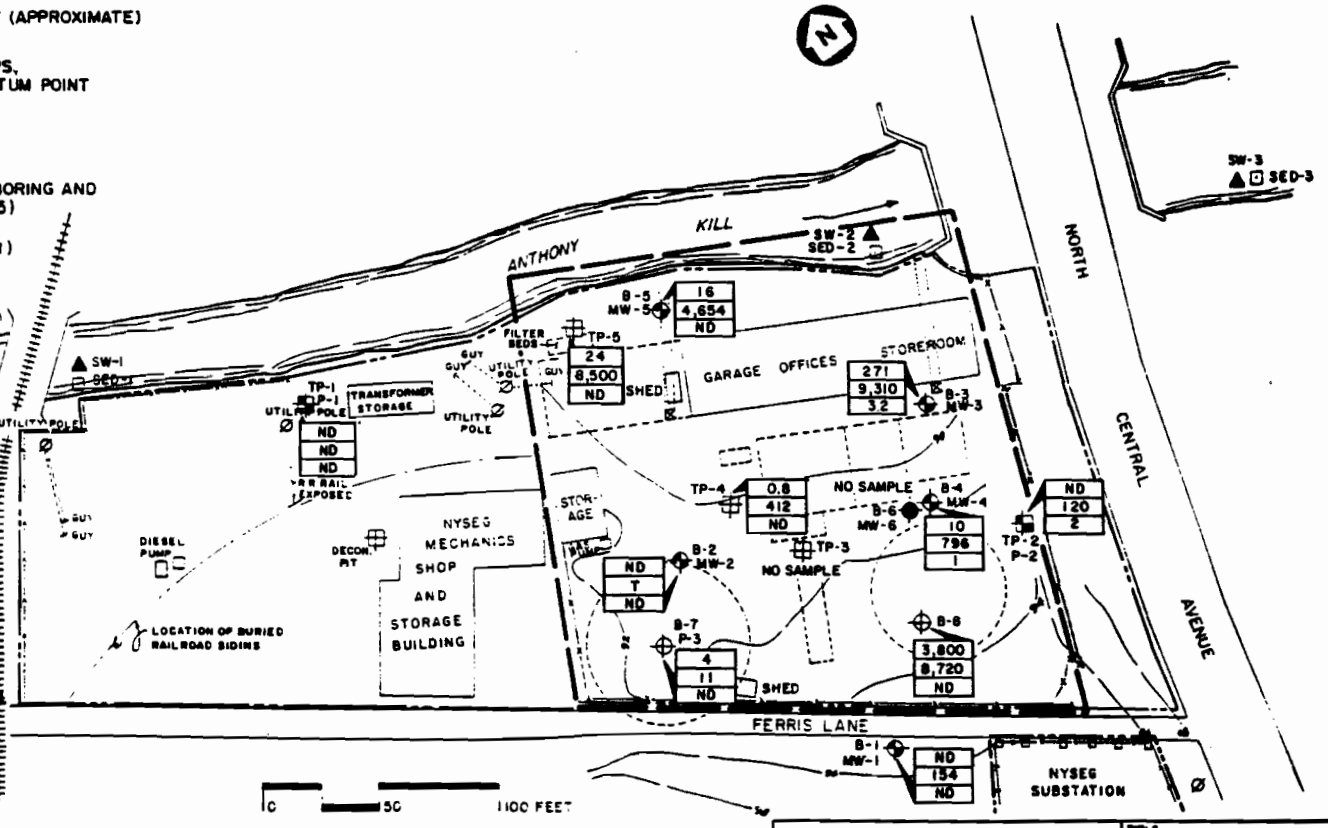
LEGEND

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

TOTAL VOCs	CONCENTRATIONS DETECTED IN SOIL SAMPLES IN mg/kg. DURING JULY/AUGUST 1986 SAMPLING EVENT.
TOTAL PAHs	
TOTAL CN	

NOTES:

1. FOR CONSISTENCY, ONLY HPLC ORGANIC ANALYSES RESULTS ARE SHOWN.
2. WHERE DUPLICATE SAMPLES WERE ANALYZED, THE HIGHER VALUE IS SHOWN.
3. SAMPLES WERE COLLECTED AT DEPTHS BETWEEN 3 AND 11 FEET BELOW GROUND SURFACE WITH THE EXCEPTION OF B-8 WHICH WAS 13.5 TO 15.5 FEET DEEP.
4. ALL SAMPLES EXCEPT TP-5 WERE COLLECTED BELOW THE HIGHEST OBSERVED WATER TABLE LEVEL.



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.

E.C. JORDAN CO.
CONSULTING ENGINEERS

CLIENT
NEW YORK STATE ELECTRIC AND GAS CORP.
BINGHAMTON, NEW YORK

TITLE
DISTRIBUTION OF SELECTED CHEMICALS IN SOIL
MECHANICVILLE SITE

INVESTIGATION OF FORMER COAL GASIFICATION SITES

PROJECT NO. 4945-02 FIGURE 13

PAH concentrations were detected in samples B-4 (796 mg/kg) and TP-4 (412 mg/kg), located downgradient of the former relief holder and the former tar dehydrator, respectively. The VOC concentrations in these samples were 10.32 mg/kg in B-4 and 0.848 mg/kg in TP-4.

No VOCs were found in four of the subsurface soil samples: TP-1, TP-2, B-1, and B-2. PAHs were detected in TP-2 (120 mg/kg), B-1 (154.2 mg/kg), and B-2 (trace concentrations); no PAHs were found in TP-1. Three of the samples (TP-1, TP-2, and B-1) were collected near the site boundaries, away from the former on-site coal gasification activities. The fourth sample (B-2) was collected near the center of the site, downgradient from the former gas distribution holder.

The results of the metal analyses at TP-1, considered to be a background sample, were 27,000 mg/kg for iron and 260 mg/kg for zinc. Iron and zinc concentrations in the remaining soil samples were close to the background levels with one exception: the sample from B-5, located near the former filter beds, contained an elevated concentration of zinc (1,600 mg/kg). Sample B-5 was taken from the silty shale, 10 to 11 feet below ground surface. The sample from nearby TP-5, which was taken at a shallower depth (3 to 4 feet below ground surface and above the water table), contained only 79 mg/kg zinc. One possible source of zinc at former coal gas plant sites is zinc acetate, which was commonly used as a corrosion inhibitor in gas holder sealing waters (Wilson and Stevens, 1981).

Laboratory results indicate the presence of cyanide in three of the soil samples (TP-2, B-3, and B-4), all of which were collected near the former purifier and oxide houses. As noted in Section 1.1 and Appendix B-1, cyanide compounds are major constituents of spent oxide wastes; their presence in these samples is most likely attributable to spillage during cleaning of the purifier house (Wilson and Stevens, 1981). The sample from TP-2 contained ferro-ferricyanide, and the samples from B-3 and B-4 contained amenable cyanide. The total cyanide concentrations in these samples ranged from 1.0 to 3.2 mg/kg.

Phenolics were detected in only two soil samples, B-3 (3.6 mg/kg) and B-5 (2.6 mg/kg), both of which were collected in areas near former site activities. Phenolics are widely distributed in the environment, due to both natural (i.e., vegetative decomposition) and manmade processes. Tars and wastewater are the sources of phenolics at coal gas plants, although tars produced by water gas plants, such as the one at Mechanicville, typically contain only negligible amounts of phenolics (USWAG, 1984).

TOC analysis is a generic test for organic material and measures VOCs and SVOCs, as well as naturally occurring biological material. The concentration of TOC in the background soil sample (TP-1) was 8,300 mg/kg. Only two other subsurface samples (TP-2 and B-2) contained lower TOC levels than the background sample. TOC values in the remaining soil samples ranged from 10,000 to 190,000 mg/kg. TOC results were predictable, given the site use history and results of the VOC and SVOC analyses, with one exception: the TOC concentration of 110,000 mg/ℓ at B-1 was higher than expected. While samples B-1 and TP-2 contained comparable concentrations of PAHs and no VOCs, the TOC concentration was two orders of magnitude higher at B-1. This seems to

indicate that the gravelly sand at B-1 is higher in organic content than the silty sand and gravel fill which covers the site.

Based on results of the soil samples analyzed, it appears that coal-tar and coal-gasification-related chemicals (i.e., VOCs, PAHs, and cyanide) are present in the subsurface environment in the study area of the site. Coal tar was observed beneath the base of the relief gas holder where the highest concentrations of organic chemicals were found. Significant levels of organic compounds were also found downgradient of this holder and adjacent to the former filter beds. Coal tar was also observed in the silty shale during drilling at B-3, B-4, B-5, and B-6, and in the overlying sand and gravel fill soils during test pit excavation at TP-4 and TP-5.

3.5.2 Groundwater

Groundwater samples were collected from each of the six Mechanicville monitoring wells on four separate occasions (September and December of 1986 and March and June of 1987). These samples, plus duplicates and blanks, were analyzed for VOCs, SVOCs, selected metals (i.e., iron and zinc), cyanide, phenolics, TOC, and sulfate. Conductivity, pH, and temperature were also measured in the field. Quality assurance samples included (1) sampler blanks prepared in the field and analyzed for the same parameters as groundwater samples; (2) trip blanks prepared prior to the field work and analyzed for VOCs only; and (3) filtration blanks prepared in the field by running deionized water through the filter apparatus and analyzed for selected inorganics.

Results of the groundwater analyses are presented in Table 3 (expressed in mg/ℓ [ppm]) and the quality assurance sample results are in Appendix B-2. The distribution of selected chemicals detected in two sampling rounds in groundwater is depicted in Figure 14: December 1986 and June 1987. These two rounds were selected to illustrate seasonal variations in the data, with December representing a wet season (high water table) and June representing a dry season (low water table).

Volatile aromatic compounds, a subset of VOCs, were detected in groundwater from each of the wells except MW-2, located downgradient of the former gas distribution holder. However, low concentrations of volatile aromatics (0.015 mg/ℓ) were found in only one sample from MW-1, located upgradient of the site. VOCs were detected in samples from the four remaining wells in all four sampling rounds. The highest levels of volatile aromatics were detected in samples from MW-6, the deepest of the six wells. Excluding the Round 1 HPLC results (which are typically overestimations), the volatile aromatic concentrations at MW-6 were between 4 and 6 mg/ℓ. At MW-4, the shallow well adjacent to MW-6, the aromatics totalled between 2 and 4 mg/ℓ (again, excluding the HPLC results). Both MW-4 and MW-6 are downgradient of the former gas relief holder. At MW-3 and MW-5, the total volatile aromatic concentrations were generally below 2 mg/ℓ.

Other VOCs detected in the groundwater included acetone and methylene chloride, which were found sporadically in samples from three of the wells: MW-1, MW-2, and MW-6. With the exception of one acetone concentration of 3.78 mg/ℓ (MW-1),

TABLE 3
CHEMICALS FOUND IN GROUNDWATER SAMPLES
MECHANICVILLE SITE

WELL IDENTIFIER	MW-1					MW-2					MW-3				
SAMPLE IDENTIFIER	MW-101	MW-101	MW-201	MW-301	MW-401	MW-102	MW-202	MW-202 DUP	MW-302	MW-402	MW-103	MW-103	MW-203	MW-303	MW-403
ORGANICS ANALYSIS (1)	HPLC	GC/MS	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS	GC/MS
DATE OF SAMPLE COLLECTION	9/9/86	9/9/86	12/2/86	3/10/87	6/2/87	9/9/86	12/2/86	12/2/86	3/10/87	6/2/87	9/9/86	9/9/86	12/2/86	3/10/87	6/2/87
VOLATILE ORGANICS (MG/L)															
-VOLATILE AROMATICS-															
BENZENE	ND (2)	ND	0.0055	ND	ND	ND	ND	ND	ND	ND	0.530	0.560	0.608	0.429	0.230
TOLUENE	ND	ND	(4)	ND	ND	ND	ND	ND	ND	ND	0.100	0.120	(4)	0.0576	ND
ETHYLBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.640	0.910	0.719	ND	ND
STYRENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL XYLENE	-- (3)	ND	0.010	ND	ND	--	ND	ND	ND	ND	--	0.770	0.640	0.0329	0.379
m - XYLENE	ND	--	--	--	--	ND	--	--	--	--	0.110	--	--	--	--
o - XYLENE	ND	--	--	--	--	ND	--	--	--	--	0.300	--	--	--	--
p - XYLENE	ND	--	--	--	--	ND	--	--	--	--	0.140	--	--	--	--
TRIMETHYLBENZENE	ND	--	--	--	--	ND	--	--	--	--	ND	--	--	--	--
-OTHER-															
ACETONE	--	0.220	3.780	0.059	ND	--	ND	ND	0.0536	ND	--	ND	ND	ND	ND
METHYLENE CHLORIDE	--	ND	ND	ND	ND	--	ND	ND	0.0086	ND	--	ND	ND	ND	ND
TOTAL VOLATILE AROMATICS	ND	ND	0.0155	ND	ND	ND	ND	ND	ND	ND	1.820	2.360	1.967	0.5195	0.609
SEMIVOLATILE ORGANICS (MG/L)															
-PAH-															
ACENAPHTHENE	0.110	0.022	0.012	ND	ND	ND	ND	ND	1.030	0.902	ND	0.420	ND	0.537	0.524
ACENAPHTHYLENE	0.250	0.048	0.018	ND	ND	ND	ND	ND	ND	0.084	2.500	(4)	ND	ND	ND
ANTHRACENE	(4)	(4)	0.031	ND	ND	ND	ND	ND	ND	ND	0.300	(4)	ND	0.226	0.140
BENZO(b)FLUORANTHENE	ND	(4,5)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(k)FLUORANTHENE	ND	(5)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(g,h,i)PERYLENE	ND	(4)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(a)ANTHRACENE	(6)	(4)	ND	ND	ND	ND	ND	ND	ND	ND	(6)	(4)	ND	0.102	ND
BENZO(a)PYRENE	(4)	(4)	ND	ND	ND	ND	ND	ND	ND	ND	0.280	(4)	ND	ND	ND
CHRYSENE	0.024	(4)	ND	ND	ND	ND	ND	ND	ND	ND	0.880	(4)	ND	ND	ND
DIBENZO(a,h)ANTHRACENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FLUORANTHENE	0.061	0.024	ND	ND	ND	ND	ND	ND	0.930	ND	2.700	(4)	0.680	0.223	0.174
FLUORENE	0.240	0.026	0.010	ND	ND	ND	ND	ND	ND	ND	4.700	(4)	0.660	0.197	0.198
INDENO(1,2,3,-cd)PYRENE	ND	(4)	ND	ND	ND	ND	ND	ND	ND	ND	ND	(4)	ND	ND	ND
NAPHTHALENE	1.200	0.260	0.136	ND	ND	ND	ND	ND	6.034	0.445	13.000	2.600	4.130	2.480	1.914
PHENANTHRENE	0.051	0.039	0.028	ND	ND	ND	ND	ND	1.700	ND	1.300	0.440	ND	0.624	0.140
PYRENE	0.044	0.025	0.017	(4)	ND	ND	ND	ND	ND	ND	0.660	0.200	0.690	0.431	0.264
-OTHER-															
BIS(2-ETHYLHEXYL)PHTHALATE	--	0.073	0.016	(4)	0.040	--	0.016	0.018	1.710	ND	--	0.250	ND	ND	ND
2-METHYLNAPHTHALENE	--	ND	ND	ND	ND	--	ND	ND	ND	0.144	--	ND	ND	ND	0.856
TOTAL PAH	1.980	0.444	0.252	(4)	ND	ND	ND	ND	9.694	1.431	26.320	3.660	6.160	4.820	3.354

TABLE 3 (CON'T)
CHEMICALS FOUND IN GROUNDWATER SAMPLES
MECHANICVILLE SITE

WELL IDENTIFIER	MW-1					MW-2					MW-3				
SAMPLE IDENTIFIER	MW-101	MW-101	MW-201	MW-301	MW-401	MW-102	MW-202	MW-202 DUP	MW-302	MW-402	MW-103	MW-103	MW-203	MW-303	MW-403
ORGANICS ANALYSIS (1)	HPLC	GC/MS	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS	GC/MS
DATE OF SAMPLE COLLECTION	9/9/86	9/9/86	12/2/86	3/10/87	6/2/87	9/9/86	12/2/86	12/2/86	3/10/87	6/2/87	9/9/86	9/9/86	12/2/86	3/10/87	6/2/87
OTHER CHEMICALS (MG/L)															
-METALS-															
IRON	ND	--	ND	ND	0.05	0.50	0.07	0.06	ND	0.10	20.00	--	6.60	9.70	4.90
ZINC	ND	--	0.007	ND	ND	ND	0.072	0.005	ND	0.09	0.11	--	0.008	0.03	0.02
-CYANIDE-															
TOTAL CYANIDE	ND	--	0.01	ND	0.01	ND	ND	ND	ND	0.01	0.46	--	ND	0.320	0.42
AMENABLE CYANIDE	ND	--	--	ND	ND	ND	ND	--	ND	ND	ND	--	--	ND	ND
FERRO-FERRI CYANIDE	ND	--	0.03	ND	0.01	ND	ND	0.02	ND	0.01	0.46	--	0.05	0.320	0.42
-OTHER-															
TOTAL RECOVERABLE PHENOLICS	ND	--	--	--	ND	ND	--	--	--	0.008	0.020	--	--	--	0.015
TOTAL ORGANIC CARBON	4.1	--	14	3.2	4.2	4.6	9	6	3.7	4.1	11	--	24	15.3	11
SULFATE	--	--	74.6	--	--	--	65.2	60.6	--	--	--	--	17.7	--	--
TOTAL NEW YORK STATE REGULATED ORGANICS (7)	1.730	0.396	0.250	0.000	ND	ND	ND	ND	9.694	1.355	25.660	6.020	8.127	5.340	3.978
FIELD MEASUREMENTS															
pH (8)	5.3	5.3	6.7	7.5	6.6	6.0	6.4	6.4	7.6	6.8	(11)	(11)	(11)	(11)	(11)
CONDUCTIVITY (9)	1830	1830	370	2040	1315	1680	786	786	1890	1225	(11)	(11)	(11)	(11)	(11)
TEMPERATURE (10)	11.2	11.2	8.4	5.9	10.0	17.8	13.3	13.3	3.2	12.6	(11)	(11)	(11)	(11)	(11)

NOTES:
(1) INDICATES WHETHER SAMPLE VALUES WERE OBTAINED BY GC/MS OR HPLC METHODS.
(2) ND = NOT DETECTED (SEE APPENDIX B-2 FOR MINIMUM DETECTION LIMITS).
(3) -- = NOT ANALYZED
(4) TRACE CONCENTRATIONS DETECTED BELOW QUANTIFIABLE REPORTING LIMIT.
(5) BENZO(b)FLOURANTHENE AND BENZO(k)FLOURANTHENE, COELUTED.
(6) BENZO(a)ANTHRACENE AND CHRYSENE, COELUTED.
(7) THE N.Y. STATE CLASS GA GROUNDWATER STANDARD FOR ORGANICS INCLUDES PHENOLIC COMPOUNDS, VOLATILE ORGANICS, AND SEMIVOLATILE ORGANICS EXCEPT FOR ACETONE, STYRENE, ACENAPHTHALENE, BENZO(g,h,i)PERYLENE, DIBENZO(a,h)ANTHRACENE, AND BIS(2-ETHYLHEXYL)PHTHALATE.
(8) pH READINGS IN STANDARD UNITS
(9) CONDUCTIVITY IN MICROMHOS/CM
(10) TEMPERATURE IN DEGREES CELSIUS
(11) INDICATES SAMPLE TOO CONTAMINATED TO SUBMERGE PROBES.

TABLE 3 (CON'T)
CHEMICALS FOUND IN GROUNDWATER SAMPLES
MECHANICVILLE SITE

WELL IDENTIFIER	MW-104	MW-204	MW-304	MW-404	MW-105	MW-205	MW-405	MW-405 DUP	MW-106	MW-106 DUP	MW-206	MW-306	MW-306 DUP	MW-406
	MW-4				MW-5-(12)				MW-6					
SAMPLE IDENTIFIER	MW-104	MW-204	MW-304	MW-404	MW-105	MW-205	MW-405	MW-405	MW-106	MW-106	MW-206	MW-306	MW-306	MW-406
ORGANICS ANALYSIS (1)	HPLC	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS DUP	HPLC	HPLC DUP	GC/MS	GC/MS	GC/MS DUP	GC/MS
DATE OF SAMPLE COLLECTION	9/9/86	12/2/86	3/10/87	6/2/87	9/9/86	12/2/86	6/2/87	6/2/87	9/9/86	9/9/86	12/2/86	3/10/87	3/10/87	6/2/87
VOLATILE ORGANICS (MG/L)														
-VOLATILE AROMATICS-														
BENZENE	0.950	0.673	0.482	0.494	0.240	0.298	0.412	0.440	1.900	1.600	1.690	1.520	1.630	1.613
TOLUENE	0.760	0.487	0.335	0.409	0.200	0.295	0.400	0.362	1.600	1.200	0.815	0.353	0.353	0.616
ETHYLBENZENE	2.300	0.803	1.140	0.378	0.071	0.270	0.541	0.464	1.700	1.300	0.855	0.943	1.500	1.956
STYRENE	ND	ND	0.051	ND	ND	ND	ND	ND	0.920	0.610	ND	ND	1.370	ND
TOTAL XYLENE	--	1.230	1.440	1.347	--	ND	0.273	0.227	--	--	1.220	1.270	ND	1.452
m - XYLENE	0.850	--	--	--	0.065	--	--	--	1.200	1.000	--	--	--	--
o - XYLENE	0.810	--	--	--	0.120	--	--	--	0.940	0.770	--	--	--	--
p - XYLENE	0.430	--	--	--	0.058	--	--	--	0.570	0.450	--	--	--	--
TRIMETHYLBENZENE	0.088	--	--	--	0.046	--	--	--	0.120	0.100	--	--	--	--
-OTHER-														
ACETONE	--	ND	ND	ND	--	ND	ND	ND	--	--	0.850	ND	ND	ND
METHYLENE CHLORIDE	--	ND	ND	ND	--	ND	ND	ND	--	--	0.350	ND	ND	ND
TOTAL VOLATILE AROMATICS	6.188	3.193	3.448	2.628	0.800	0.863	1.626	1.493	8.950	7.030	4.580	4.086	4.853	5.637
SEMIVOLATILE ORGANICS (MG/L)														
-PAH-														
ACENAPHTHENE	0.980	0.240	0.187	0.218	0.260	17.300	150.280	195.500	37.000	48.000	ND	0.890	1.200	3.580
ACENAPHTHYLENE	8.300	ND	0.041	0.218	2.400	ND	150.280	197.200	26.000	59.000	ND	ND	ND	3.300
ANTHRACENE	0.510	ND	ND	ND	ND	7.600	178.330	227.800	11.000	16.000	ND	ND	ND	5.290
BENZO(b)FLUORANTHENE	ND	ND	ND	ND	ND	ND	ND	ND	4.000	6.600	ND	ND	ND	0.540
BENZO(k)FLUORANTHENE	ND	ND	ND	ND	ND	ND	ND	ND	7.200	4.100	ND	ND	ND	0.580
BENZO(g,h,i)PERYLENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(a)ANTHRACENE	(6)	ND	ND	ND	ND	ND	18.360	23.970	(6)	(6)	ND	ND	ND	ND
BENZO(a)PYRENE	0.290	ND	ND	ND	ND	ND	ND	ND	4.800	6.500	ND	ND	ND	0.560
CHRYSENE	1.400	ND	ND	ND	ND	ND	ND	26.350	25.000	17.000	ND	ND	ND	0.680
DIBENZO(a,h)ANTHRACENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FLUORANTHENE	4.200	ND	0.014	ND	0.150	6.300	43.860	59.500	93.000	74.000	ND	ND	1.310	2.510
FLUORENE	13.000	ND	0.026	0.100	3.900	7.600	62.220	80.920	120.000	140.000	ND	ND	ND	1.980
INDENO(1,2,3,-cd)PYRENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NAPHTHALENE	33.000	6.120	3.970	2.392	11.000	39.400	331.500	413.100	280.000	300.000	6.980	5.040	5.910	18.760
PHENANTHRENE	2.000	ND	ND	ND	ND	6.700	178.330	227.800	36.000	45.000	ND	1.340	1.530	5.290
PYRENE	1.000	ND	0.027	ND	(4)	8.100	93.450	112.370	36.000	30.000	ND	0.843	ND	ND
-OTHER-														
BIS(2-ETHYLHEXYL)PHTHALATE	--	ND	0.013	ND	--	ND	ND	ND	--	--	ND	ND	ND	ND
2-METHYLNAPHTHALENE	--	ND	ND	0.580	--	ND	197.200	247.690	--	--	ND	ND	ND	7.170
TOTAL PAH	64.680	6.360	4.265	2.928	17.710	93.000	1206.610	1564.510	680.000	746.200	6.980	8.113	9.950	43.070

TABLE 3 (CON'T)
CHEMICALS FOUND IN GROUNDWATER SAMPLES
MECHANICVILLE SITE

WELL IDENTIFIER	MW-4				MW-5-(12)				MW-6					
SAMPLE IDENTIFIER	MW-104	MW-204	MW-304	MW-404	MW-105	MW-205	MW-405	MW-405 DUP	MW-106	MW-106 DUP	MW-206	MW-306	MW-306 DUP	MW-406
ORGANICS ANALYSIS (1)	HPLC	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS	HPLC	HPLC	GC/MS	GC/MS	GC/MS	GC/MS
DATE OF SAMPLE COLLECTION	9/9/86	12/2/86	3/10/87	6/2/87	9/9/86	12/2/86	6/2/87	6/2/87	9/9/86	9/9/86	12/2/86	3/10/87	3/10/87	6/2/87
OTHER CHEMICALS (MG/L)														
-METALS-														
IRON	61.00	6.50	3.86	5.10	1.10	7.50	5.10	9.40	5.50	14.00	7.60	10.10	9.70	4.80
ZINC	0.29	0.02	0.02	0.01	ND	0.021	0.16	0.33	ND	ND	ND	0.01	0.01	0.03
-CYANIDE-														
TOTAL CYANIDE	0.072	0.06	0.050	0.06	0.013	0.02	0.01	ND	0.075	0.081	0.12	0.060	0.050	0.07
AMENABLE CYANIDE	ND	0.04	ND	ND	0.013	--	ND	ND	0.026	0.024	0.10	ND	ND	ND
FERRO-FERRI CYANIDE	0.072	0.02	0.050	0.06	ND	0.06	0.01	0.01	0.049	0.057	0.02	0.060	0.050	0.07
-OTHER-														
TOTAL RECOVERABLE PHENOLICS	0.043	--	--	0.014	0.019	--	0.43	0.017	0.050	0.043	--	--	--	0.031
TOTAL ORGANIC CARBON	12	20	5.2	9.4	7.4	30	16	12	16	16	28	12.5	13.7	14
SULFATE	--	30.9	--	--	--	84.0	--	--	--	--	14.5	--	--	--
TOTAL NEW YORK STATE REGULATED ORGANICS (7)	62.611	9.553	7.621	5.352	16.129	93.863	1058.386	1368.820	662.080	693.663	11.910	12.199	13.433	45.438
FIELD MEASUREMENTS														
pH (8)	(11)	(11)	(11)	(11)	5.8	6.4	(11)	(11)	5.7	5.7	6.9	7.7	7.7	6.7
CONDUCTIVITY (9)	(11)	(11)	(11)	(11)	1640	680	(11)	(11)	1930	1930	1138	2300	2300	1385
TEMPERATURE (10)	(11)	(11)	(11)	(11)	12.7	12.0	(11)	(11)	16.0	16.0	14.3	6.0	6.0	13.1

NOTES:
(1) INDICATES WHETHER SAMPLE VALUES WERE OBTAINED BY GC/MS OR HPLC METHODS.
(2) ND = NOT DETECTED (SEE APPENDIX B-2 FOR MINIMUM DETECTION LIMITS).
(3) -- = NOT ANALYZED
(4) TRACE CONCENTRATIONS DETECTED BELOW QUANTIFIABLE REPORTING LIMIT.
(5) BENZO(b)FLOURANTHENE AND BENZO(k)FLOURANTHENE, COELUTED.
(6) BENZO(a)ANTHRACENE AND CHRYSENE, COELUTED.
(7) THE N.Y. STATE CLASS GA GROUNDWATER STANDARD FOR ORGANICS INCLUDES PHENOLIC COMPOUNDS, VOLATILE ORGANICS, AND SEMIVOLATILE ORGANICS EXCEPT FOR ACETONE, STYRENE, ACENAPHTHALENE, BENZO(g,h,i)PERYLENE, DIBENZO(a,h)ANTHRACENE, AND BIS(2-ETHYLHEXYL)PHTHALATE.
(8) pH READINGS IN STANDARD UNITS
(9) CONDUCTIVITY IN MICROMHOS/CM
(10) TEMPERATURE IN DEGREES CELSIUS
(11) INDICATES SAMPLE TOO CONTAMINATED TO SUBMERGE PROBES.
(12) MW-5 ROUND 3 SAMPLING WAS NOT CONDUCTED DUE TO WEATHER OBSTRUCTIONS.

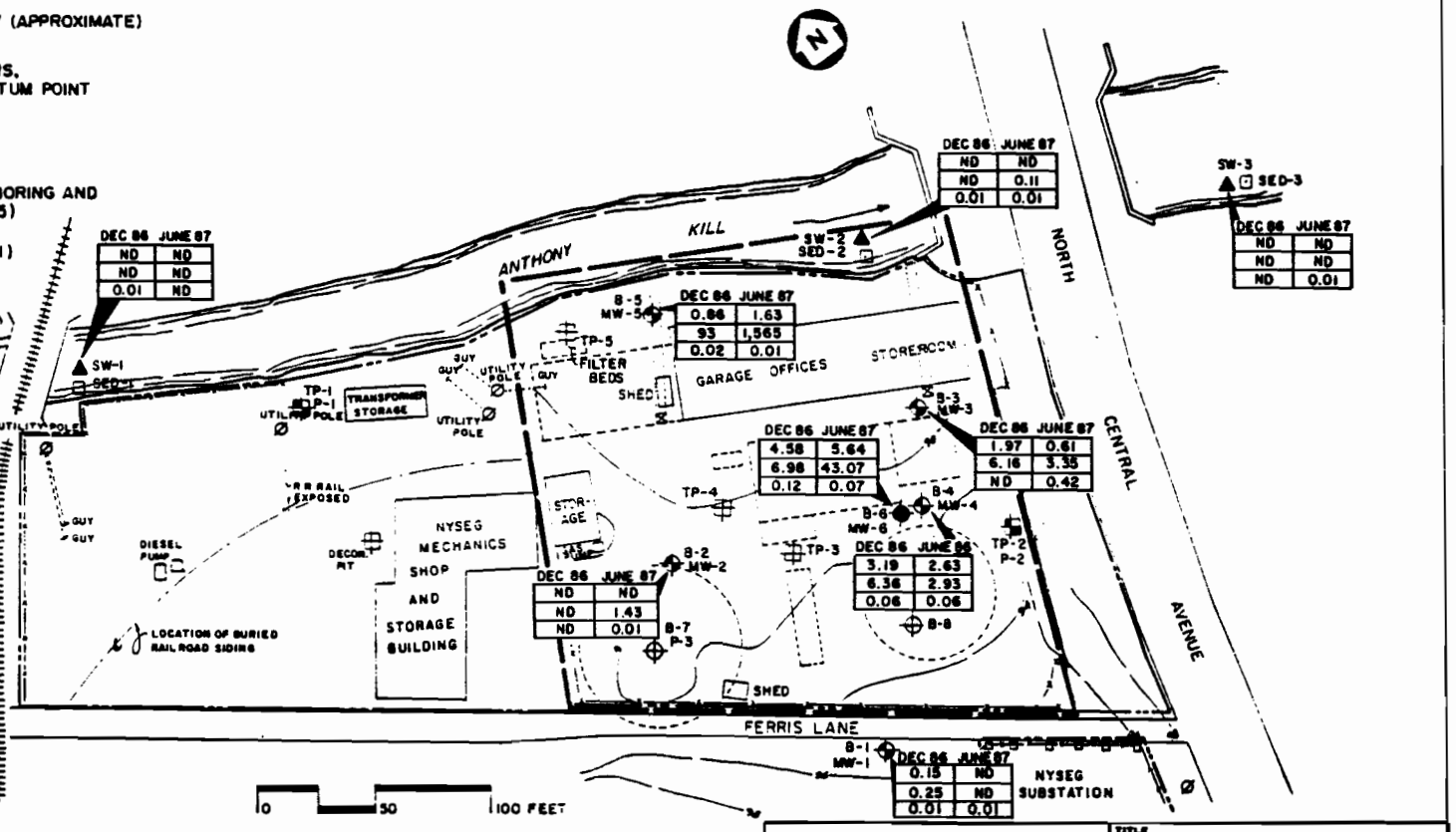
LEGEND

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

TOTAL VOCs	CONCENTRATIONS DETECTED IN GROUNDWATER SAMPLES IN mg/l.
TOTAL PAHs	
TOTAL CN	

NOTES:

1. ALL ORGANIC CONCENTRATIONS ARE FROM GC/MS ANALYSES.
2. WHERE DUPLICATE SAMPLES WERE ANALYZED, THE HIGHER VALUE IS SHOWN.
3. RESULTS ARE SHOWN FOR TWO SAMPLING EVENTS: DECEMBER 1986 AND JUNE 1987, AS LABELLED.
4. B-6 IS THE ONLY BEDROCK WELL; THE REMAINING WELLS SPAN BOTH SOIL AND BEDROCK ZONES.



BASE MAP SOURCE:

TOPOGRAPHIC SURVEY PREPARED BY DAVID A. FLANDERS ASSOCIATES, 8 MORNINGSIDE DRIVE, BALLSTON LAKE, NEW YORK, DATED 8/28/86 (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.

E.C. JORDAN CO.
CONSULTING ENGINEERS

CLIENT
NEW YORK STATE ELECTRIC AND GAS CORP.
BINGHAMTON, NEW YORK

TITLE
DISTRIBUTION OF SELECTED CHEMICALS IN GROUNDWATER AND SURFACE WATER
MECHANICVILLE SITE

INVESTIGATION OF FORMER COAL GASIFICATION SITES

PROJECT NO. 4945-02 FIGURE 14

the detected concentrations were below 1 mg/ℓ. Acetone was detected in the Round 2 sampler blank and the Round 3 trip blank, at concentrations lower than those detected in the environment samples (less than 0.1 mg/ℓ). Methylene chloride was also found in the Round 3 trip blank and the Round 4 sampler blank (less than 0.01 mg/ℓ). Both of these compounds are common laboratory contaminants which are often reported in environmental sampling results and which are not typically associated with coal gasification wastes. Therefore, they are not believed to be site-derived chemicals.

Laboratory analyses indicate the presence of PAHs in all wells. The highest PAH readings were obtained from MW-5, where concentrations were between 17 and 1,565 mg/ℓ over three sampling rounds. (MW-5 was not sampled during Round 3 because of snow cover.) Between the first and fourth sampling rounds, the PAH concentrations in the groundwater at MW-5 increased by two orders of magnitude. This phenomenon was not observed at any of the other wells at the site. In fact, at MW-1, MW-4, and MW-6, total PAH concentrations decreased over this period. Based on Jordan's current understanding of the site, the increase at MW-5 cannot be explained. However, the decrease in PAHs at the other wells may be attributable to disturbances caused during well installation and development, and to the fact that the Round 1 data were HPLC, as opposed to GC/MS. Excluding the HPLC results, total PAH concentrations ranged from "not detected" (ND) to 0.44 mg/ℓ at MW-1; ND to 9.69 mg/ℓ at MW-2; 3.35 to 6.16 mg/ℓ at MW-3; 2.93 to 6.36 mg/ℓ at MW-4; and 6.98 to 43.07 mg/ℓ at MW-6.

Bis(2-ethylhexyl)phthalate was detected in low concentrations (generally less than 0.1 mg/ℓ) in samples from four of the six wells; none was found in MW-5 or MW-6. This compound is often detected in environmental samples, is not a typical constituent of coal gasification wastes, and may be a laboratory contaminant. The compound was also detected in two of the three GC/MS sampler blanks, also at low levels (less than 0.1 mg/ℓ). Therefore, it is not believed to be a site-derived chemical. On the other hand, the compound 2-methylnaphthalene is a constituent of coal tar (USWAG, 1984). It was detected in all downgradient wells in Round 4 samples. The concentrations reported at MW-5 (197 to 247 mg/ℓ) were significantly higher than those reported for the other four wells (0.14 to 7.17 mg/ℓ).

Iron and zinc are natural constituents of groundwater (Todd, 1980). Iron was reported in samples from all wells. Low concentrations of iron were found at MW-1 and MW-2 (less than or equal to 0.5 mg/ℓ), with much higher concentrations detected at the other four wells (1 to 61 mg/ℓ). Therefore, the iron content of the groundwater on-site appears to have been elevated by site activities. Zinc concentrations do not vary significantly between the upgradient and downgradient wells. The highest reported zinc concentration was 0.33 mg/ℓ at MW-5 (Round 4). The remaining values were almost all at or below 0.1 mg/ℓ.

Cyanide is not a natural component of groundwater. Both amenable (free) cyanide and ferro-ferricyanide were detected in the Mechanicville groundwater samples. At MW-1, MW-2, and MW-5, the concentrations of total cyanide were always less than 0.03 mg/ℓ. At the remaining three wells, located next to the former purifier/oxide house, total cyanide concentrations ranged from 0.05 to 0.46 mg/ℓ, predominantly in the complex form (i.e., ferro-ferricyanide).

Predictably, the highest cyanide concentrations were found at MW-3, which is downgradient of the former purifier/oxide structures.

Phenolics, which were only included in the Round 1 and 4 analytical programs, were not detected in the upgradient samples, and were found in only one sample from MW-2 at 0.008 mg/ℓ. Elevated concentrations of phenolics were present in samples from the four remaining downgradient wells. The range of phenolic concentrations at these wells was from 0.014 to 0.43 mg/ℓ.

Sulfate analysis was requested during Round 2 only. Sulfate was present in all wells at concentrations ranging from 14.5 to 84 mg/ℓ (74.6 mg/ℓ was detected at the upgradient well, MW-1). Sulfate is a natural constituent of groundwater resulting from the oxidation of sulfide ores, gypsum, and anhydrite. Concentrations up to 300 mg/ℓ are common in natural waters (Todd, 1980).

Finally, TOC concentrations in the groundwater samples all fell within a relatively small range: 3.2 to 30 mg/ℓ. Samples from MW-1 and MW-2 generally contained less than 10 mg/ℓ TOC, while those from MW-3 through MW-6 generally contained greater than 10 mg/ℓ. The TOC results provide further evidence of the impact of site activities on organics in groundwater.

To summarize, coal gasification waste-related chemicals (i.e., VOCs, PAHs, iron, cyanide, and phenolics) are present in elevated concentrations in groundwater within the study area of the site. These chemicals were found in the highest concentrations near the former locations of the relief gas holder, the purifier and oxide houses, and the filter beds. They were detected not only in the wells spanning the fill soils and shallow bedrock, but also in the deep bedrock well (MW-6).

3.5.3 Surface Water

Surface water samples were collected from three locations along the Anthony Kill during four sampling episodes (September and December of 1986 and March and June of 1987). Samples were collected from stations located upstream (SW-1), adjacent (SW-2), and downstream (SW-3) relative to the site. Samples were analyzed for VOCs, SVOCs, selected trace metals (i.e., iron and zinc), cyanide, phenolics, TOC, oil and grease, and sulfate. The analytical results are presented in Table 4 with concentrations expressed in mg/ℓ (ppm). Quality assurance water samples included sampler blanks and trip blanks (see Section 3.5.2); results are presented in Appendix B-2.

No volatile aromatics were detected in any surface water samples. PAHs were detected only at SW-2 in Round 4, with a total PAH concentration of 0.105 mg/ℓ. Other organics detected in surface water included acetone (SW-2), methylene chloride (SW-1), and bis(2-ethylhexyl)phthalate (all three stations). Since these compounds were found at low levels (less than 0.1 mg/ℓ) and were also found in some sampler and trip blanks, their presence appears to be due to laboratory contamination. It is unlikely, then, that acetone, methylene chloride, and bis(2-ethylhexyl)phthalate are site-derived chemicals.

The metals analyses indicate the presence of iron in samples from all three stations at comparable levels (0.037 to 1.09 mg/ℓ). The highest concentration

TABLE 4
CHEMICALS FOUND IN SURFACE WATER SAMPLES
MECHANICVILLE SITE

SITE IDENTIFIER	SW-1					SW-2						SW-3				
SAMPLE IDENTIFIER	SW-101	SW-201	SW-301	SW-301 DUP	SW-401	SW-102	SW-202	SW-202 DUP	SW-302	SW-402	SW-402 DUP	SW-103	SW-103 DUP	SW-203	SW-303	SW-403
ORGANICS ANALYSIS (1)	HPLC	GC/MS	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	HPLC	HPLC	GC/MS	GC/MS	GC/MS
DATE OF SAMPLE COLLECTION	9/9/86	12/2/86	3/10/87	3/10/87	6/2/87	9/9/86	12/2/86	12/2/86	3/10/87	6/2/87	6/2/87	9/9/86	9/9/86	12/2/86	3/10/87	6/2/87
VOLATILE ORGANICS (MG/L)																
-VOLATILE AROMATICS-																
BENZENE	ND (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOLUENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
STYRENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL XYLENE	-- (3)	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	--	--	ND	ND	ND
m - XYLENE	ND	--	--	--	--	ND	--	--	--	--	--	ND	ND	--	--	--
o - XYLENE	ND	--	--	--	--	ND	--	--	--	--	--	ND	ND	--	--	--
p - XYLENE	ND	--	--	--	--	ND	--	--	--	--	--	ND	ND	--	--	--
TRIMETHYLBENZENE	ND	--	--	--	--	ND	--	--	--	--	--	ND	ND	--	--	--
-OTHER-																
ACETONE	--	ND	ND	ND	ND	--	ND	0.010	ND	ND	ND	--	--	ND	ND	ND
METHYLENE CHLORIDE	--	--	0.0054	ND	ND	--	--	--	ND	ND	ND	--	--	--	ND	ND
TOTAL VOLATILE AROMATICS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SEMIVOLATILE ORGANICS (MG/L)																
-PAH-																
ACENAPHTHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.042	ND	ND	ND	ND	ND	ND
ACENAPHTHYLENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.043	ND	ND	ND	ND	ND	ND
ANTHRACENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(b)FLUORANTHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(k)FLUORANTHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(g,h,i)PERYLENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(a)ANTHRACENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(a)PYRENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHRYSENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DIBENZO(a,h)ANTHRACENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FLUORANTHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FLUORENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
INDENO(1,2,3,-cd)PYRENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NAPHTHALENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHENANTHRENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PYRENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.020	ND	ND	ND	ND	ND	ND
-OTHER-																
BIS(2-ETHYLHEXYL)PHTHALATE	--	ND	ND	ND	0.016	--	ND	ND	ND	ND	0.012	--	--	0.025	ND	0.030
2-METHYLNAPHTHALENE	--	ND	ND	ND	ND	--	ND	ND	ND	0.069	ND	--	--	ND	ND	ND
TOTAL PAH	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.105	ND	ND	ND	ND	ND	ND

TABLE 4 (CON'T)
CHEMICALS FOUND IN SURFACE WATER SAMPLES
MECHANICVILLE SITE

SITE IDENTIFIER	SW-1					SW-2						SW-3				
SAMPLE IDENTIFIER	SW-101	SW-201	SW-301	SW-301	SW-401	SW-102	SW-202	SW-202	SW-302	SW-402	SW-402	SW-103	SW-103	SW-203	SW-303	SW-403
ORGANICS ANALYSIS (1)	HPLC	GC/MS	GC/MS	GC/MS DUP	GC/MS	HPLC	GC/MS	GC/MS DUP	GC/MS	GC/MS	GC/MS DUP	HPLC	HPLC DUP	GC/MS	GC/MS	GC/MS
DATE OF SAMPLE COLLECTION	9/9/86	12/2/86	3/10/87	3/10/87	6/2/87	9/9/86	12/2/86	12/2/86	3/10/87	6/2/87	6/2/87	9/9/86	9/9/86	12/2/86	3/10/87	6/2/87
##OTHER CHEMICALS (MG/L)##																
-METALS-																
IRON	0.23	0.47	1.09	0.99	0.037	0.23	0.40	0.45	0.79	0.36	0.33	0.22	0.24	0.41	0.78	0.33
ZINC	ND	ND	ND	ND	0.010	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	0.01
-CYANIDE-																
TOTAL CYANIDE	ND	0.01	ND	ND	ND	ND	0.01	ND	ND	0.01	ND	ND	ND	ND	ND	0.01
AMENABLE CYANIDE	ND	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	ND	--	ND	ND
FERRO-FERRI CYANIDE	ND	0.01	ND	ND	ND	ND	0.02	0.03	ND	0.01	ND	ND	ND	0.01	ND	0.01
-OTHER-																
TOTAL RECOVERABLE PHENOLICS	ND	--	--	--	0.24	ND	--	--	--	0.013	0.005	ND	0.037	--	--	ND
TOTAL ORGANIC CARBON	5.5	11	11.9	7.3	6.4	ND	10	9	7.5	6.0	6.0	5.0	5.4	10.0	6.2	5.5
OIL AND GREASE	11	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	--
SULFATE	--	16.4	--	--	--	--	19.3	18.6	--	--	--	--	--	18.4	--	--

NOTES:
(1) INDICATES SAMPLE VALUES WERE OBTAINED BY GC/MS (EPA METHODS 624 AND 625) OR BY HPLC (EPA METHODS 602 AND 610).
(2) ND = NOT DETECTED (SEE APPENDIX B-2 FOR MINIMUM DETECTION LIMITS).
(3) -- = NOT ANALYZED

of iron was found at the upstream location (SW-1). Zinc was detected only in the Round 4 samples, and measured 0.01 mg/ℓ at all three stations. Ferro-ferricyanide was found in Round 2 samples from each station (0.01 to 0.03 mg/ℓ) and in Round 4 samples taken at SW-2 and SW-3 (0.01 mg/ℓ). Phenolics were detected at the downstream sample (SW-3), in Round 1, and at SW-1 and SW-2 in Round 4. These results show no clear pattern of site contributions of these chemicals to the Anthony Kill.

Oil and grease analysis was performed at SW-1 and SW-3 during Round 1. This analysis was requested after an oily sheen originating upstream of the site was observed by Jordan samplers. The upstream sample contained 11 mg/ℓ of oil and grease, but none was detected at the downstream station. This finding demonstrates that the source of the sheen was indeed upstream of the site.

Sulfate was analyzed during Round 2 only and was detected at similar concentrations in all three surface water samples (16.4 to 19.3 mg/ℓ).

In summary, results of the analysis of surface water samples collected from the Anthony Kill do not show an adverse impact attributable to site activities. Even though it is likely that chemicals dissolved in groundwater are being discharged from the site to the stream, the resulting concentrations would be expected to be below detection limits due to volatilization and dilution. Compared to the low flow discharge of 17 cfs for the Anthony Kill, the site groundwater discharge is estimated to be less than 0.05 cfs (based on the average hydraulic conductivity of 1.9 ft/day for the unconsolidated soils and shallow bedrock). The Task 2 samples did provide evidence of chemical contributions to the Anthony Kill from upstream sources.

3.5.4 Sediment

Sediment samples were collected during four sampling episodes (September and December of 1986 and March and June of 1987) from the same locations along the Anthony Kill as surface water samples. The samples were analyzed for VOCs, SVOCs, selected trace metals (i.e., iron and zinc), cyanide, phenolics, TOC, and sulfate. The analytical results are presented in Table 5 with concentrations expressed in mg/kg (ppm).

No volatile aromatic compounds were detected in any samples collected from SED-1, the upstream location. The only volatile aromatics detected at the other stations were during Round 3: benzene was detected at SED-2 (0.07 mg/ℓ), the midstream location; and toluene was found at SED-3 (0.07 mg/ℓ), the downstream location. Acetone and methylene chloride were found in all of the Round 4 sediment samples in similar concentrations. These VOCs are common contaminants not typically associated with coal tar wastes.

Several PAHs were detected at all three sampling locations. PAHs were detected at the upstream location (SED-1) during the first and second rounds of sampling only (7.3 to 8.6 mg/ℓ). At SED-2 adjacent to the site, PAHs were detected during all four rounds of sampling. The first and second rounds of samples at SED-3 contained PAHs (16.78 to 45.64 mg/kg), while only trace amounts were detected in Round 3 and no PAHs were found in Round 4. The Round 2 sample from SED-2 contained the highest concentration of total PAHs found in any of the

TABLE 5
CHEMICALS FOUND IN SEDIMENT SAMPLES
MECHANICVILLE SITE

SITE IDENTIFIER	SED-1					SED-2						SED-3				
SAMPLE IDENTIFIER	SED-101	SED-201	SED-301	SED-301 DUP	SED-401	SED-102	SED-202	SED-202 DUP	SED-302	SED-402	SED-402 DUP	SED-103	SED-103 DUP	SED-203	SED-303	SED-403
ORGANICS ANALYSIS (1)	HPLC	HPLC	GC/MS	GC/MS	GC/MS	HPLC	HPLC	HPLC	GC/MS	GC/MS	GC/MS	HPLC	HPLC	HPLC	GC/MS	GC/MS
DATE OF SAMPLE COLLECTION	9/9/86	12/2/86	3/10/87	3/10/87	6/2/87	9/9/86	12/2/86	12/2/86	3/10/87	6/2/87	6/2/87	9/9/86	9/9/86	12/2/86	3/10/87	6/2/87
VOLATILE ORGANICS (MG/KG)																
-VOLATILE AROMATICS-																
BENZENE	ND (2)	ND	ND	ND	ND	ND	ND	ND	0.07	ND	ND	ND	ND	ND	ND	ND
TOLUENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.070	ND
ETHYLBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
STYRENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL XYLENE	-- (3)	--	ND	ND	ND	--	--	--	ND	ND	ND	--	--	--	ND	ND
a - XYLENE	ND	ND	--	--	--	ND	ND	ND	--	--	--	ND	ND	ND	--	--
o - XYLENE	ND	ND	--	--	--	ND	ND	ND	--	--	--	ND	ND	ND	--	--
p - XYLENE	ND	ND	--	--	--	ND	ND	ND	--	--	--	ND	ND	ND	--	--
-OTHER-																
ACETONE	--	--	ND	ND	5.300	--	--	--	ND	6.600	3.800	--	--	--	ND	4.000
METHYLENE CHLORIDE	--	--	ND	ND	2.400	--	--	--	ND	3.000	2.900	--	--	--	ND	2.300
TOTAL VOLATILE AROMATICS	ND	ND	ND	ND	ND	ND	ND	ND	0.07	ND	ND	ND	ND	ND	0.07	ND
SEMIVOLATILE ORGANICS (MG/KG)																
-PAH-																
ACENAPHTHENE	(4)	ND	ND	ND	ND	(4)	ND	ND	ND	0.700	1.600	0.910	1.100	(4)	ND	ND
ACENAPHTHYLENE	0.740	ND	ND	ND	ND	0.900	ND	ND	ND	ND	1.300	2.700	3.500	8.800	ND	ND
ANTHRACENE	(4)	(4)	ND	ND	ND	(4)	(4)	(4)	(4)	ND	ND	1.100	1.200	(4)	(4)	ND
BENZO(b)FLUORANTHENE	(4)	0.580	ND	ND	ND	(4)	(4)	2.000	(4,5)	ND	ND	1.000	0.940	0.630	(4,5)	ND
BENZO(k)FLUORANTHENE	(4)	(5)	ND	ND	ND	(4)	(5)	4.800	(4,5)	ND	ND	0.930	1.000	(5)	(4,5)	ND
BENZO(g,h,i)PERYLENE	ND	3.100	ND	ND	ND	ND	(4)	15.000	ND	ND	ND	ND	ND	4.400	(4)	ND
BENZO(a)ANTHRACENE	(6)	(6)	ND	ND	ND	(6)	(6)	(6)	(4)	ND	ND	(6)	(6)	(6)	(4)	ND
BENZO(a)PYRENE	(4)	0.450	ND	ND	ND	(4)	(4)	6.100	(4)	ND	ND	0.740	0.800	0.650	(4)	ND
CHRYSENE	0.520	0.610	ND	ND	ND	0.460	(4)	8.500	(4)	ND	ND	2.000	2.100	(4)	(4)	ND
DIBENZO(a,h)ANTHRACENE	ND	0.930	ND	ND	ND	(4)	ND	7.100	ND	ND	ND	ND	1.600	2.300	ND	ND
FLUORANTHENE	0.960	0.470	ND	ND	ND	0.920	(4)	5.600	(4)	ND	ND	2.200	4.700	(4)	(4)	ND
FLUORENE	1.500	ND	ND	ND	ND	1.400	ND	ND	ND	ND	0.500	4.000	4.300	ND	ND	ND
INDENO(1,2,3,-cd)PYRENE	ND	(7)	ND	ND	ND	(4)	ND	(7)	ND	ND	ND	(4)	(4)	(7)	(4)	ND
NAPHTHALENE	3.600	ND	ND	ND	ND	3.300	ND	19.000	(4)	4.400	13.000	10.000	19.000	ND	ND	ND
PHENANTHRENE	0.570	0.390	ND	ND	ND	(4)	(4)	1.800	(4)	ND	ND	2.000	2.300	(4)	(4)	ND
PYRENE	0.690	0.770	ND	ND	ND	0.960	(4)	5.900	(4)	ND	ND	1.900	3.100	(4)	(4)	ND
-OTHER-																
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	(4)	ND	ND	--	--	--	(4)	ND	ND	--	--	--	(4)	ND
2-METHYLNAPHTHALENE	--	--	ND	ND	ND	--	--	--	ND	0.900	ND	--	--	--	ND	ND
DI-N-BUTYL PHTHALATE	--	--	--	--	2.100	--	--	--	--	ND	4.000	--	--	--	--	3.200
TOTAL PAH	8.580	7.300	ND	ND	ND	7.940	(3)	75.800	(4)	5.100	16.400	29.480	45.640	16.780	(4)	ND

TABLE 5 (CON'T)
CHEMICALS FOUND IN SEDIMENT SAMPLES
MECHANICVILLE SITE

SITE IDENTIFIER	SED-1					SED-2						SED-3				
SAMPLE IDENTIFIER	SED-101	SED-201	SED-301	SED-301 DUP	SED-401	SED-102	SED-202	SED-202 DUP	SED-302	SED-402	SED-402 DUP	SED-103	SED-103 DUP	SED-203	SED-303	SED-403
ORGANICS ANALYSIS (1)	HPLC	HPLC	GC/MS	GC/MS	GC/MS	HPLC	HPLC	HPLC	GC/MS	GC/MS	GC/MS	HPLC	HPLC	HPLC	GC/MS	GC/MS
DATE OF SAMPLE COLLECTION	9/9/86	12/2/86	3/10/87	3/10/87	6/2/87	9/9/86	12/2/86	12/2/86	3/10/87	6/2/87	6/2/87	9/9/86	9/9/86	12/2/86	3/10/87	6/2/87
##OTHER CHEMICALS (MG/KG)##																
-METALS-																
IRON	16000	9200	10800	8320	15600	21000	19000	16000	9980	30800	23600	13000	13000	20000	13000	33100
ZINC	47	36	37	31	--	51	69	100	46	--	--	65	60	88	76	--
-CYANIDE-																
TOTAL CYANIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AMENABLE CYANIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
FERRO-FERRI CYANIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
-OTHER-																
TOTAL RECOVERABLE PHENOLICS	ND	ND	ND	ND	3.1	ND	ND	ND	ND	6.1	3.1	ND	ND	ND	ND	1.8
TOTAL ORGANIC CARBON	3000	4600	4790	3320	9700	7700	3500	7600	16100	11000	22000	4500	4600	4600	9350	15000
SULFATE	--	ND	--	--	--	--	60	40	--	--	--	--	--	30	--	--

NOTES:
(1) INDICATES WHETHER SAMPLE VALUES WERE OBTAINED BY GC/MS OR HPLC METHODS.
(2) ND = NOT DETECTED (SEE APPENDIX B-2 FOR MINIMUM DETECTION LIMITS).
(3) -- = NOT ANALYZED
(4) TRACE CONCENTRATIONS DETECTED BELOW THE REPORTING LIMIT.
(5) BENZO(b)FLUORANTHENE AND BENZO(k)FLUORANTHENE, COELUTED.
(6) BENZO(a)ANTHRACENE AND CHRYSENE, COELUTED.
(7) INDENO(1,2,3-cd)PYRENE AND BENZO(g,h,i)PERYLENE, COELUTED.

sediment samples (75.8 mg/kg). It is important to note that data for Rounds 1 and 2 were obtained by HPLC. Looking just at the GC/MS analytical results from Rounds 3 and 4, it appears that PAH concentrations in Anthony Kill sediment directly adjacent to the site are elevated compared to concentrations measured at the upstream and downstream sampling locations.

All three sediment samples contained iron and zinc in fairly consistent concentrations. Iron levels ranged from 8,320 to 33,100 mg/kg, while zinc concentrations ranged from 31 to 100 mg/kg. Cyanide compounds were not detected in any sediment samples. Phenolics were detected in Round 4 samples at all three stations at comparable levels (1.8 to 6.1 mg/kg). Sulfate was detected at the midstream (SED-2) and downstream (SED-3) locations, in concentrations of 30 to 60 mg/kg. Thus, there is evidence that sulfate concentrations of the Anthony Kill sediments are elevated above background levels (upstream) due to site activities.

4.0 SITE ASSESSMENT

This section focuses on the significance of the findings of the Task 2 investigation at the Mechanicville site. Chemicals related to coal gasification wastes were detected in the soil, groundwater, surface water, and sediment at or near the site. The analytical results are compared to relevant criteria (where available) in Section 4.1. Sections 4.2 and 4.3 contain a preliminary identification of exposure risks and potentially applicable remedial alternatives that will be refined in subsequent tasks.

4.1 COMPARISON OF ANALYTICAL RESULTS TO REGULATORY CRITERIA

Analytical results are compared to relevant state criteria (where available) in this section. As part of the site assessment process, environmental and health criteria that may be relevant at the site were reviewed. The review covered regulatory standards and guidelines included in the following: (1) New York State Regulations; (2) National Drinking Water Regulations; (3) USEPA Ambient Water Quality Criteria (AWQC); and (4) USEPA Health Advisories. Relevant criteria are shown in Table 6.

Criteria are not available for the chemicals of interest in soils and sediments. A qualitative assessment of risks associated with chemicals in these media is provided in Section 4.2.1. Criteria are also lacking for some of the detected chemicals in groundwater and surface water. New York State has established criteria for all the chemicals regulated at the federal level, plus some that are not. Furthermore, where both federal and state criteria exist for a given chemical, the New York State standard is generally more stringent. For these reasons, New York State standards and guidance values are used in this assessment. State standards are enforced by regulation, while guidance values are not enforceable by law.

4.1.1 Groundwater

The relevant federal and state criteria for groundwater identified in the review are listed in Table 6. Most of the criteria are based on the assumption that the groundwater will be used as a drinking water supply. As previously noted, the Mechanicville site is not located over a water supply aquifer. The nearest water supply wells are about one mile southwest of the site (i.e., upgradient) in the Town of Halfmoon. Drinking water standards, therefore, are not presently applicable at this site; they are included in this assessment for hypothetical comparison purposes only.

The New York State standards and guidelines are for fresh groundwater used as a source of potable water. The federal maximum contaminant levels (MCLs) are enforceable standards for water supply systems promulgated under the National Primary Drinking Water Act. Maximum contaminant level goals (MCLGs) are non-enforceable health goals designed to prevent any adverse health effects or risks and were established under the Safe Drinking Water Act (SDWA) without considering the cost or feasibility of attainment. USEPA Health Advisories, established by the Office of Drinking Water, are set at levels where adverse health effects are not expected. Carcinogenic risks are not taken into

TABLE 6
CRITERIA FOR CHEMICALS FOUND IN GROUNDWATER AND SURFACE WATER
MECHANICVILLE SITE

	NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES (1)				NATIONAL DRINKING WATER REGULATIONS		EPA HEALTH ADVISORIES(4)	EPA AMBIENT WATER QUALITY CRITERIA (5)				
	CLASS D SURFACE WATER		CLASS GA GROUNDWATER					--AQUATIC LIFE(6)--		----------HUMAN HEALTH(9)----------		
	STANDARDS	GUIDANCE VALUES	STANDARDS	GUIDANCE VALUES	MAXIMUM CONTAMINANT LEVELS(2)	MAXIMUM CONTAMINANT LEVEL GOAL(3)	LIFETIME ADULT EXPOSURE	ACUTE (7)	CHRONIC (8)	DRINKING WATER ONLY (10)	FISH CONSUMPTION ONLY	DRINKING WATER AND FISH CONSUMPTION
VOLATILE ORGANICS (MG/L)												
-VOLATILE AROMATICS-												
BENZENE	----	0.006	ND (11)	----	0.005 (12)	0	----	5.3	----	0.00067	----	0.00066
TOLUENE	----	----	----	0.05	----	2 (12)	11	17.5	----	15	424	14.3
ETHYLBENZENE	----	----	----	0.05	----	0.68 (12)	3.40	32	----	2.40	3.28	1.4
STYRENE	----	----	0.931	----	----	0.140 (12)	----	----	----	----	----	----
TOTAL XYLENE	----	----	----	0.05	----	0.44 (12)	2.20	----	----	----	----	----
m-XYLENE	----	----	----	----	----	----	----	----	----	----	----	----
o-XYLENE	----	----	----	----	----	----	----	----	----	----	----	----
p-XYLENE	----	----	----	----	----	----	----	----	----	----	----	----
TRIMETHYLBENZENE	----	----	----	0.05	----	----	----	----	----	----	----	----
-OTHER-												
ACETONE	----	----	----	----	----	----	----	----	----	----	----	----
METHYLENE CHLORIDE	----	----	----	0.05	----	----	----	12	----	----	----	----
SEMIVOLATILE ORGANICS (MG/L)												
-PAH-												
ACENAPHTHENE	----	----	[redacted]	0.02	----	----	----	0.52	----	0.02 (13)	----	0.02 (13)
ACENAPHTHYLENE	----	----	----	----	----	----	----	----	----	----	----	----
ANTHRACENE	----	----	----	0.05	----	----	----	----	----	----	----	----
BENZO(b)FLUORANTHENE	----	----	----	0.000002	----	----	----	----	----	0.0000031	----	0.0000028
BENZO(k)FLUORANTHENE	----	----	----	0.000002	----	----	----	----	----	0.0000031	----	0.0000028
BENZO(g,h,i)PERYLENE	----	----	----	----	----	----	----	----	----	----	----	----
BENZO(a)ANTHRACENE	----	----	----	0.000002	----	----	----	----	----	0.0000031	----	0.0000028
BENZO(a)PYRENE	----	0.0000012	ND	----	----	----	----	----	----	0.0000031	----	0.0000028
CHRYSENE	----	----	----	0.000002	----	----	----	----	----	0.0000031	----	0.0000028
DIBENZO(a,h)ANTHRACENE	----	----	----	----	----	----	----	----	----	----	----	----
FLUORANTHENE	----	----	----	0.05	----	----	----	3.98	----	0.19	0.054	0.042
FLUORENE	----	----	----	0.05	----	----	----	----	----	----	----	----
INDENO(1,2,3,-cd)PYRENE	----	----	----	0.000002	----	----	----	----	----	0.0000031	----	0.0000028
NAPHTHALENE	----	----	----	0.01	----	----	----	2.3	0.62	----	----	----
PHENANTHRENE	----	----	----	0.05	----	----	----	----	----	----	----	----
PYRENE	----	----	----	0.05	----	----	----	----	----	----	----	----
TOTAL CARCINOGENIC PAH	----	----	----	----	----	----	----	----	----	0.0000031	----	0.0000028
-OTHER-												
BIS(2-ETHYLHEXYL)PHTHALATE	----	----	4.2	----	----	----	----	0.94	0.003	21	50	15
TOTAL NEW YORK STATE REGULATED ORGANICS (14)	----	----	0.1	----	----	----	----	----	----	----	----	----

TABLE 6 (CONT.)
CRITERIA FOR CHEMICALS FOUND IN GROUNDWATER AND SURFACE WATER
MECHANICVILLE SITE

	NEW YORK STATE AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES (1)				NATIONAL DRINKING WATER REGULATIONS		EPA HEALTH ADVISORIES(4)	EPA AMBIENT WATER QUALITY CRITERIA (5)				
	CLASS D SURFACE WATER		CLASS GA GROUNDWATER					--AQUATIC LIFE(6)--		----------HUMAN HEALTH(9)----------		
	STANDARDS	GUIDANCE VALUES	STANDARDS	GUIDANCE VALUES	MAXIMUM CONTAMINANT LEVELS(2)	MAXIMUM CONTAMINANT LEVEL	LIFETIME ADULT EXPOSURE	ACUTE (7)	CHRONIC (8)	DRINKING WATER ONLY	FISH CONSUMPTION ONLY	DRINKING WATER AND FISH CONSUMPTION
OTHER CHEMICALS (MG/L)												
-METALS-												
IRON	0.3	----	0.3	----	----	0.3 (15)	----	----	----	----	----	----
ZINC	(16)	----	5	----	----	5 (15)	----	----	----	5 (13)	----	5 (13)
-CYANIDE-												
TOTAL CYANIDE	----	----	0.2	----	----	----	0.75	----	----	----	----	----
FERRO-FERRI CYANIDE	----	----	----	----	----	----	----	----	----	----	----	----
FREE CYANIDE	0.022	----	----	----	----	----	----	0.0035	0.052	0.2	----	0.2
-OTHER-												
TOTAL RECOVERABLE PHENOLICS (17)	----	----	0.001	----	----	----	----	----	----	3.5	----	3.5
TOTAL ORGANIC CARBON	----	----	----	----	----	----	----	----	----	----	----	----
SULFATE	----	----	250.0	----	----	----	----	----	----	----	----	----

NOTES:

(1) NYSDEC TECHNICAL AND OPERATIONAL GUIDANCE SERIES 85-W-38 AS REVISED APRIL 1, 1987. CLASS D SURFACE WATERS ARE SUITABLE FOR SECONDARY CONTACT RECREATION; CLASS GA DENOTES FRESH GROUNDWATER WHICH IS A SOURCE OF POTABLE WATER SUPPLY.

(2) MCLs (MAXIMUM CONTAMINANT LEVELS) ARE ENFORCEABLE STANDARDS FOR PUBLIC WATER SUPPLY SYSTEMS PROMULGATED UNDER THE SAFE DRINKING WATER ACT (40 CFR PART 141).

(3) MCLGs (MAXIMUM CONTAMINANT LEVEL GOALS) ARE PROPOSED NON-ENFORCEABLE HEALTH GOALS AND HAVE BEEN SET AT A LEVEL OF NO KNOWN OR ANTICIPATED HEALTH EFFECTS.

(4) EPA HEALTH ADVISORIES (FORMERLY SNARLs) ARE NON-ENFORCEABLE CRITERIA ESTABLISHED BY THE OFFICE OF DRINKING WATER. THEY ARE SET AT LEVELS WHERE ADVERSE HEALTH EFFECTS ARE NOT EXPECTED.

(5) WATER QUALITY CRITERIA WERE FORMULATED TO PROTECT AQUATIC LIFE AND HUMAN HEALTH FROM POLLUTANTS IN SURFACE WATERS. (40 CFR SUMMARY, FRI. NOV. 28, 1980, P. 79318-79379). WATER QUALITY CRITERIA HAVE NO REGULATORY IMPACT, BUT ARE USEFUL IN ESTABLISHING WATER QUALITY-BASED EFFLUENT LIMITATIONS, WATER QUALITY STANDARDS, AND TOXIC POLLUTANT EFFLUENT STANDARDS.

(6) GUIDANCE CRITERIA FOR THE PROTECTION OF FRESHWATER AQUATIC LIFE. CONCENTRATIONS SPECIFIED SHOULD PROTECT MOST (BUT NOT NECESSARILY ALL) AQUATIC FRESHWATER LIFE AND ITS USES.

(7) THE ACUTE TOXICITY LEVEL IS THE MAXIMUM TO WHICH ORGANISMS CAN BE EXPOSED WITHOUT SIGNIFICANT RISK OF ADVERSE IMPACT.

(8) CHRONIC TOXICITY LEVEL IS THE 24-HOUR AVERAGE VALUE THAT ORGANISMS CAN BE EXPOSED TO WITHOUT SIGNIFICANT RISK OF ADVERSE IMPACT.

(9) HUMAN HEALTH GUIDELINES WERE DERIVED BASED ON "GUIDELINES AND METHODOLOGY USED IN THE PREPARATION OF HEALTH EFFECT ASSESSMENT CHAPTERS OF THE CONSENT DECREE WATER CRITERIA DOCUMENTS" DEVELOPED BY EPA'S OFFICE OF RESEARCH AND DEVELOPMENT.

(10) THESE ADJUSTED CRITERIA, FOR DRINKING WATER INGESTION ONLY, WERE DERIVED FROM PUBLISHED EPA AWQC FOR COMBINED FISH AND DRINKING WATER INGESTION AND FOR FISH INGESTION ALONE. THESE ADJUSTED VALUES ARE NOT OFFICIAL EPA AWQC, BUT MAY BE APPROPRIATE FOR SUPERFUND SITES WITH CONTAMINATED GROUNDWATER. (USEPA SUPERFUND PUBLIC HEALTH EVALUATION MANUAL, OCTOBER 1986, PAGES 61-64).

(11) ND = NOT DETECTABLE BY USEPA METHODS 602 OR 624 (BENZENE) OR METHODS 610 OR 625 (BENZO(a)PYRENE).

(12) PROPOSED

(13) TO PROTECT AGAINST TASTE AND ODOR EFFECTS; NOT HEALTH BASED.

(14) NEW YORK STATE HAS A MAXIMUM WATER QUALITY VALUE OF 0.1 MG/L OF DESIGNATED ORGANIC CHEMICALS FOR SURFACE WATER AND GROUNDWATER DISCHARGES REQUIRING PERMITS. THE DESIGNATED ORGANICS INCLUDE ALL OF THE ORGANIC CHEMICALS LISTED EXCEPT ACENAPHTHYLENE, BENZO(g,h,i)PERYLENE, DIBENZO(a,h)ANTHRACENE, AND STYRENE.

(15) SECONDARY MAXIMUM CONTAMINANT LEVELS WHICH APPLY TO PUBLIC WATER SYSTEMS. THESE REGULATIONS CONTROL CONTAMINANTS IN DRINKING WATER THAT PRIMARILY AFFECT THE AESTHETIC QUALITIES RELATING TO THE PUBLIC ACCEPTANCE OF DRINKING WATER (40 CFR PART 143).

(16) ZINC STANDARD FOR CLASS D WATERS IS DETERMINED BY THE FORMULA EXP(0.83[LN(PPM HARDNESS)]+1.95) AND APPLIES TO THE ACID SOLUBLE FORM.

(17) AS MEASURED BY APHA METHOD 510.B WHICH IS EQUIVALENT TO EPA METHOD 420.1 (SEE APHA, 1985; USEPA, 1983).

consideration in setting USEPA Health Advisories. These advisories do, however, take into account the length of exposure to the chemical in drinking water.

As shown in Table 6, standards have been promulgated by the State of New York for 10 of the chemicals detected in groundwater at the site: benzene, styrene, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, total regulated organics, iron, zinc, cyanide, phenolic compounds, and sulfate. Concentrations in excess of the standard for each of these chemicals (except bis(2-ethylhexyl)phthalate, zinc, and sulfate) were measured during Task 2.

The benzene standard (non-detectable levels) was exceeded at MW-3, MW-4, MW-5, and MW-6 in each sampling round (Figure 15). Benzene was not detected at MW-2, and detected at MW-1 only in Round 2. The standard for benzo(a)pyrene (non-detectable levels) was exceeded at MW-3, MW-4, and MW-6 in at least one sampling round (see Figure 15). All but one of these exceedances occurred during Round 1 when HPLC analysis was used.

The styrene groundwater standard (i.e., 0.931 mg/ℓ) was nearly equaled at MW-6 in Round 1, but was exceeded only in the MW-6 Round 3 duplicate sample; this compound was detected only at MW-6 (Figure 16). The New York State Class GA groundwater standard for regulated organics (i.e., 0.1 mg/ℓ) was exceeded in all sampling rounds at MW-3, MW-4, MW-5, and MW-6. The same standard was exceeded at MW-1 and MW-2 in two of the four sampling events (see Figure 16).

Iron concentrations above 0.3 mg/ℓ were detected at MW-3, MW-4, MW-5, and MW-6 in all sampling rounds (Figure 17). This iron standard was also exceeded in the Round 1 sample from MW-2; iron was not detected in samples from MW-1. Total cyanide concentrations above the 0.2 mg/ℓ standard were found only at MW-3 (three of four sampling rounds). While cyanide was detected at each of the other monitoring wells, the 0.2-mg/ℓ standard was not exceeded (see Figure 17). Total phenolics concentrations exceeded the groundwater standard (i.e., 0.001 mg/ℓ) at MW-3, MW-4, MW-5, and MW-6 in both sampling rounds in which the analysis was included. Phenolic compounds exceeded the standard at MW-2 in Round 4, but were not detected in the upgradient well (see Figure 17).

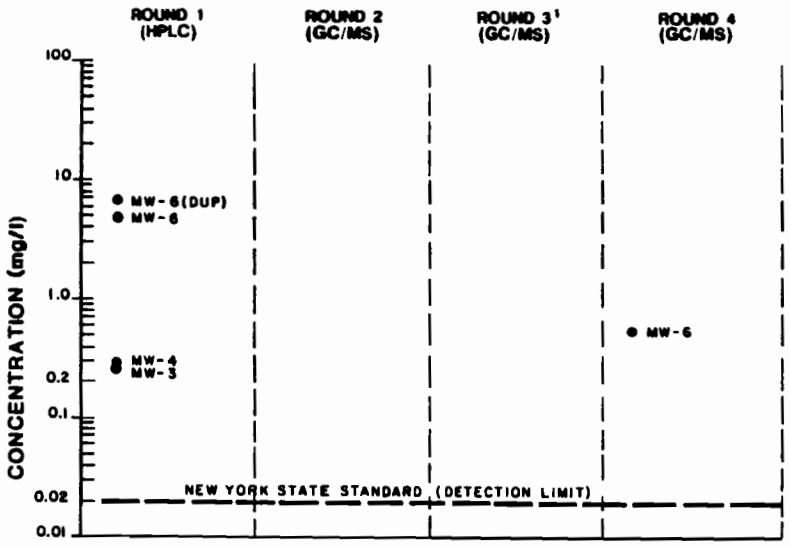
New York State has guidance values for 16 chemicals detected at Mechanicville, all of which were exceeded at one or more monitoring wells. Groundwater samples that contained chemicals in excess of the New York State guidance values are listed in Table 7. The frequency of guidance value exceedances at the wells increased in the following order: MW-2 (6 exceedances), MW-1 (7), MW-4 and MW-5 (28), MW-3 (34), and MW-6 (39). Note that fewer samples were collected from MW-5 than from the other wells (no Round 3 samples).

4.1.2 Surface Water

Table 6 also contains relevant federal and state criteria for surface water. The listed New York State criteria are for Class D waters, which is the classification of the Anthony Kill near the Mechanicville site. USEPA AWQC for aquatic life and human health are also listed.

New York State has Class D standards for one chemical detected in the Anthony Kill surface water samples: iron. The iron standard of 0.3 mg/ℓ was exceeded

BENZO (a) PYRENE IN GROUNDWATER

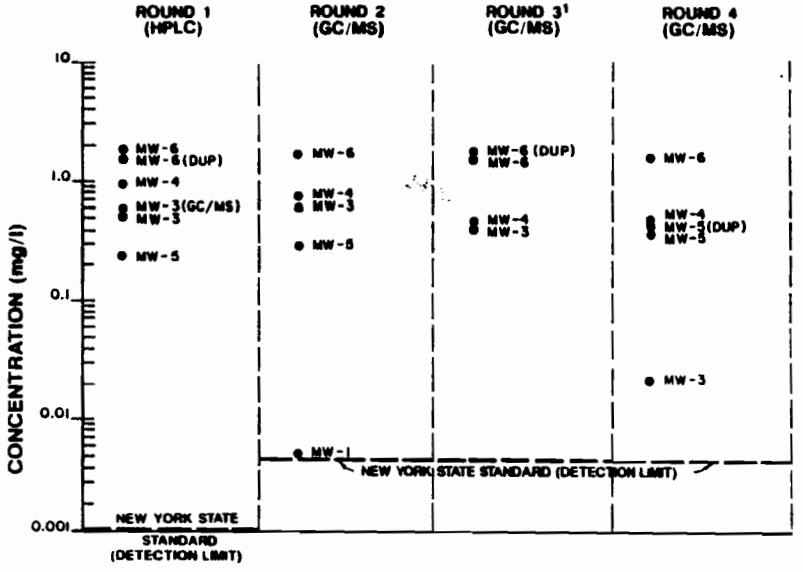


SAMPLES IN WHICH BENZO (a) PYRENE WAS NOT DETECTED

ROUND 1 (HPLC)	ROUND 2 (GC/MS)	ROUND 3[1] (GC/MS)	ROUND 4 (GC/MS)
MW-1[2]	MW-1	MW-1	MW-1
MW-1(GC/MS)[2]	MW-2	MW-2	MW-2
MW-2	MW-2(DUP)	MW-3	MW-3
MW-3(GC/MS)[2]	MW-3	MW-4	MW-4
MW-5	MW-4	MW-6	MW-5
	MW-5	MW-6(DUP)	MW-5(DUP)
	MW-6		

[1] MW-5 WAS NOT SAMPLED IN ROUND 3.
[2] TRACE CONCENTRATIONS DETECTED BELOW QUANTIFIABLE REPORTING LIMIT

BENZENE IN GROUNDWATER



SAMPLES IN WHICH BENZENE WAS NOT DETECTED

ROUND 1 (HPLC)	ROUND 2 (GC/MS)	ROUND 3[1] (GC/MS)	ROUND 4 (GC/MS)
MW-1	MW-2	MW-1	MW-1
MW-1(GC/MS)	MW-2(DUP)	MW-2	MW-2
MW-2			

[1] MW-5 WAS NOT SAMPLED IN ROUND 3.

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TITLE
BENZO (a) PYRENE AND BENZENE IN GROUNDWATER
MECHANICVILLE SITE

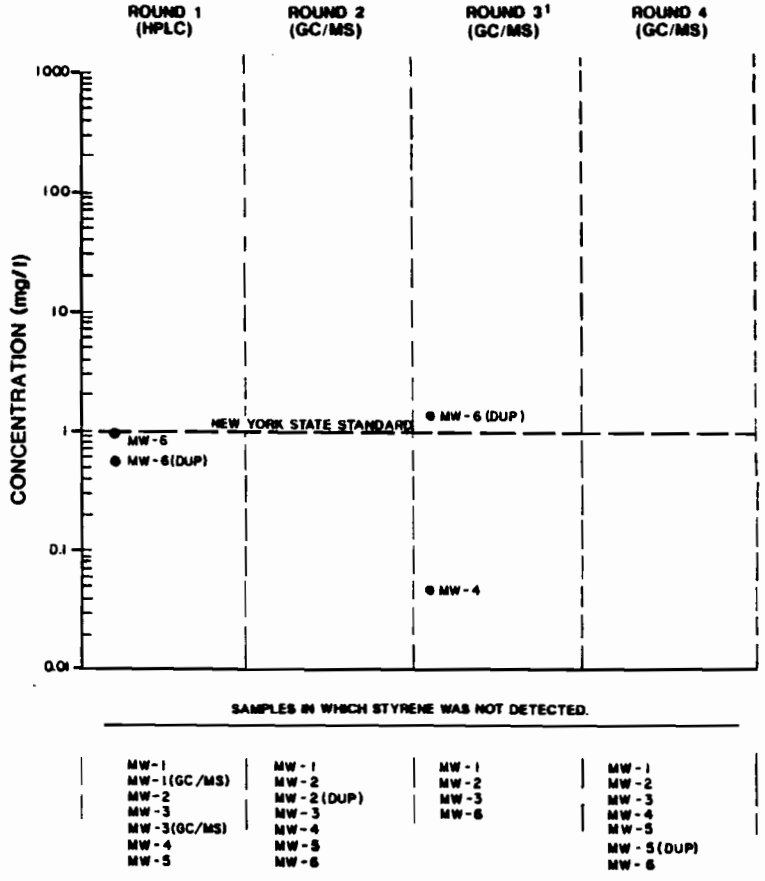
CLIENT
NEW YORK STATE ELECTRIC AND GAS CORP.
BINGHAMTON, NEW YORK

INVESTIGATION OF FORMER COAL GASIFICATION SITES

PROJECT NO. 4945-02

FIGURE 15

STYRENE IN GROUNDWATER

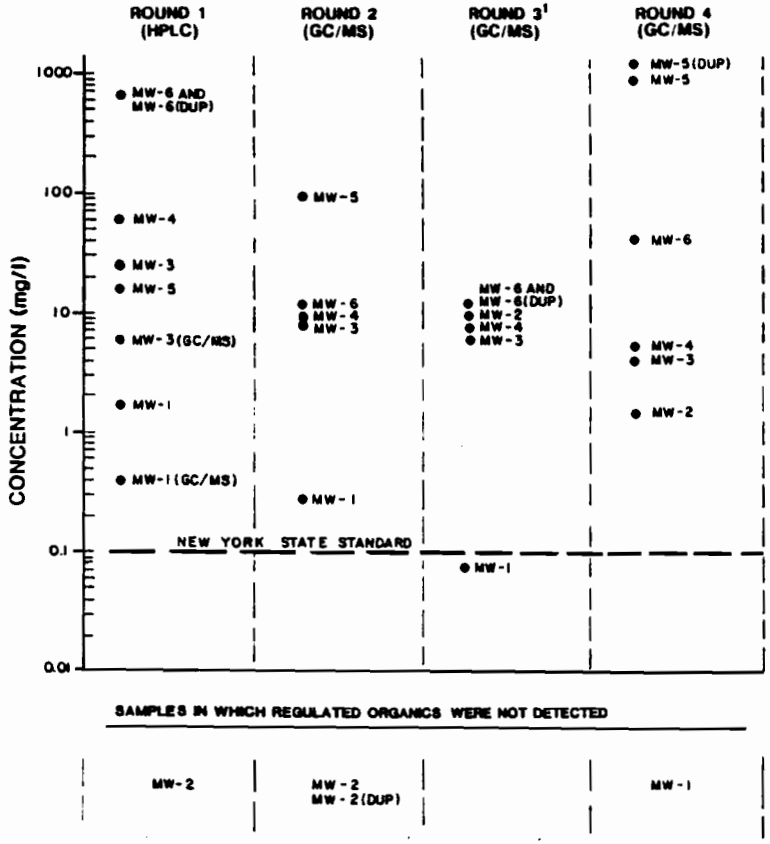


SAMPLES IN WHICH STYRENE WAS NOT DETECTED.

ROUND 1 (HPLC)	ROUND 2 (GC/MS)	ROUND 3[1] (GC/MS)	ROUND 4 (GC/MS)
MW-1	MW-1	MW-1	MW-1
MW-1(GC/MS)	MW-2	MW-2	MW-2
MW-2	MW-2(DUP)	MW-3	MW-3
MW-3	MW-3	MW-6	MW-4
MW-3(GC/MS)	MW-4		MW-5
MW-4	MW-5		MW-5(DUP)
MW-5	MW-6		MW-6

[1] MW-6 WAS NOT SAMPLED ON ROUND 3.

TOTAL NEW YORK STATE REGULATED ORGANICS IN GROUNDWATER



SAMPLES IN WHICH REGULATED ORGANICS WERE NOT DETECTED

ROUND 1 (HPLC)	ROUND 2 (GC/MS)	ROUND 3[1] (GC/MS)	ROUND 4 (GC/MS)
MW-2	MW-2		MW-1
	MW-2(DUP)		

[1] MW-6 WAS NOT SAMPLED ON ROUND 3.

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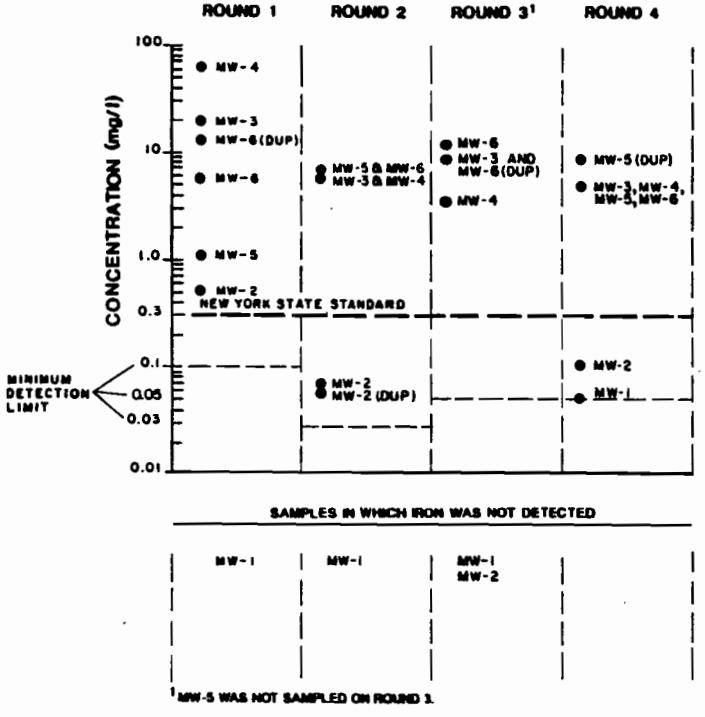
TITLE
STYRENE AND TOTAL NEW YORK STATE REGULATED ORGANICS IN GROUNDWATER
MECHANICVILLE SITE

INVESTIGATION OF FORMER COAL GASIFICATION SITES

PROJECT NO. 4945-02

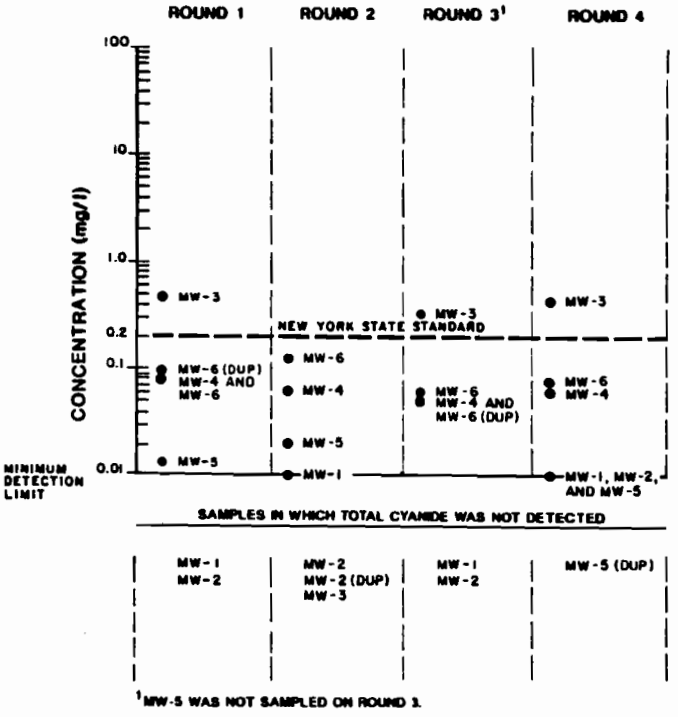
FIGURE 16

IRON IN GROUNDWATER



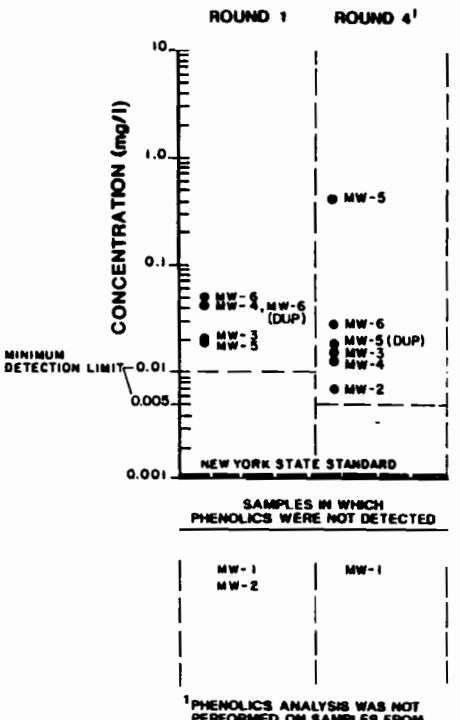
[1] MW-5 WAS NOT SAMPLED ON ROUND 3.

TOTAL CYANIDE IN GROUNDWATER



[1] MW-5 WAS NOT SAMPLED ON ROUND 3.

PHENOLICS IN GROUNDWATER



[1] PHENOLICS ANALYSIS WAS NOT PERFORMED ON SAMPLES FROM ROUNDS 2 AND 3.

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BINGHAMTON, NEW YORK

TITLE
IRON, TOTAL CYANIDE, AND PHENOLICS IN GROUNDWATER
MECHANICVILLE SITE

INVESTIGATION OF FORMER COAL GASIFICATION SITES

PROJECT NO. 4945-02

FIGURE 17

TABLE 7

GROUNDWATER SAMPLES CONTAINING CHEMICALS
IN EXCESS OF NEW YORK STATE GUIDANCE VALUES
MECHANICVILLE SITE

Chemical	Guidance Value (mg/ℓ)[1]	Well Number	Round Number
Volatile Aromatics			
Toluene	0.05	MW-3	1,3
		MW-4	1,2,3,4
		MW-5[2]	1,2,4
		MW-6	1,2,3,4
Ethylbenzene	0.05	MW-3	1,2
		MW-4	1,2,3,4
		MW-5[2]	1,2,4
		MW-6	1,2,3,4
Total Xylene	0.05	MW-3	1,2,4
		MW-4	1,2,3,4
		MW-5[2]	1,4
		MW-6	1,2,3,4
Trimethylbenzene[3]	0.05	MW-4	1
		MW-6	1
Methylene Chloride[4]	0.05	MW-6	2
PAHs			
Acenaphthene	0.02	MW-1	1
		MW-2	3,4
		MW-3	1,3,4
		MW-4	1,2,3,4
		MW-5[2]	1,2,4
		MW-6	1,3,4
Anthracene	0.05	MW-3	1,3,4
		MW-4	1
		MW-5[2]	2,4
		MW-6	1,4
Benzo(b)fluoranthene	0.000002	MW-6	1,4
Benzo(k)fluoranthene	0.000002	MW-6	1,4
Benzo(a)anthracene	0.000002	MW-3	3
		MW-5[2]	4

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TABLE 7 (continued)

GROUNDWATER SAMPLES CONTAINING CHEMICALS
IN EXCESS OF NEW YORK STATE GUIDANCE VALUES
MECHANICVILLE SITE

Chemical	Guidance Value (mg/ℓ)[1]	Well Number	Round Number
Chrysene	0.000002	MW-1	1
		MW-3	1
		MW-4	1
		MW-5[2]	4
		MW-6	1,4
Fluoranthene	0.05	MW-1	1
		MW-2	3
		MW-3	1,2,3,4
		MW-4	1
		MW-5[2]	1,2,4
		MW-6	1,3,4
Fluorene	0.05	MW-1	1
		MW-3	1,2,3,4
		MW-4	1,4
		MW-5[2]	1,2,4
		MW-6	1,4
Naphthalene	0.01	MW-1	1,2
		MW-2	3,4
		MW-3	1,2,3,4
		MW-4	1,2,3,4
		MW-5[2]	1,2,4
		MW-6	1,2,3,4
Phenanthrene	0.05	MW-1	1
		MW-2	3
		MW-3	1,3,4
		MW-4	1
		MW-5[2]	2,4
		MW-6	1,3,4
Pyrene	0.05	MW-3	1,2,3,4
		MW-4	1
		MW-5[2]	2,4
		MW-6	1,3

[1] NYSDEC, Division of Water, Technical and Operational Guidance Series 85-W-38, Revised April 1, 1987.

[2] No Round 3 samples collected from MW-5 due to snow cover.

[3] Detected by HPLC analysis only.

[4] Detected by GC/MS analysis only.

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0007.0.0

at all three stations in Rounds 2 and 3, and at SW-2 and SW-3 in Round 4. USEPA AWQC for acenaphthene (0.02 mg/ℓ) and total PAHs (0 mg/ℓ) were exceeded in one sample from SW-2 (Round 4). Neither acenaphthene nor any other PAHs were detected in the duplicate of this sample.

4.2 PRELIMINARY IDENTIFICATION OF EXPOSURE RISKS

Environmental conditions at the Mechanicville site are summarized in Table 8, and the potential toxicological effects of prolonged exposure to chemicals detected at the site are summarized in Table 9. The purpose of this section is to identify exposure risks posed by detected chemicals to determine whether further explorations are warranted at this site. Air samples were not collected at the Mechanicville site during the Task 2 investigation; hence, risks associated with air emissions have not been evaluated. A complete risk assessment will be conducted during Task 4.

4.2.1 Soil and Sediment

As previously stated, the review of criteria did not uncover any regulations or guidelines pertaining to the detected chemicals in soil or sediment, at either the federal or state level. In lieu of such criteria, a qualitative assessment based on total PAHs is provided. PAHs were selected for this assessment because of their prevalence in coal gasification wastes and their expected persistence in the soil/sediment environment (see Table 8).

PAHs are a diverse group of compounds of varying toxicity. They are highly lipid-soluble and are absorbed through the gastrointestinal and respiratory tracts and, to a lesser degree, through the skin. Many PAHs have been shown to have carcinogenic potential, while others do not exhibit carcinogenicity (see Table 9). In developing AWQC, NYSDEC classified the following PAHs as carcinogenic: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, and indeno(1,2,3-cd)pyrene (NYSDEC, 1985). In addition, many PAHs are skin and eye irritants (NIOSH, 1980).

Under present site conditions and in the absence of excavations, the PAHs detected in subsurface soils at the Mechanicville site pose little risk of human contact or ingestion. Much of the site is paved and buildings cover additional areas. Access is limited by the fence surrounding the site; the main gate is locked at night. Additionally, the chemicals detected were at least 3 feet below ground surface.

However, it is possible that soils containing coal tar and its constituents may be uncovered and exposed during future excavations. Such excavations would present chemical exposure risks to excavators, site workers, and passers-by. The possible exposure routes to chemicals in the soil during excavations include direct contact, ingestion, and inhalation. PAHs were also detected in the Anthony Kill sediment samples, primarily in samples collected adjacent to the site (SED-2). This section of the Anthony Kill is used for secondary contact recreation (such as boating) and contact with sediment is possible during these activities. Because of the toxicological properties of PAHs and the potential for exposure, their presence in the soil and sediment at the site is cause for concern and evaluation in Task 4.

TABLE 8

SUMMARY OF ENVIRONMENTAL CONDITIONS
MECHANICVILLE SITE

Technical Factors	Subsurface Soils	Groundwater	Surface Water	Sediment
Chemicals Present	The following chemicals have been detected in the subsurface soils near former coal gasification structures: - VOCs - PAHs - iron and zinc - cyanide compounds - phenolic compounds These chemicals were found primarily in samples collected from the fill soils.	The following chemicals have been detected in groundwater at the site: - VOCs - PAHs - iron and zinc - cyanide compounds - phenolic compounds - sulfate These chemicals were found in samples collected from roughly the top 10 feet of the water table and from the deeper bedrock.	The following chemicals have been found in the Anthony Kill, adjacent to the site: - iron - cyanide compounds - phenolic compounds - sulfate These chemicals were found upstream of, adjacent to, and downstream of the site.	The following chemicals have been detected in sediments from the Anthony Kill, adjacent to the site: - benzene and toluene - PAHs - iron and zinc - sulfate Benzene, toluene, and sulfate were found in samples adjacent to and/or downstream of the site. PAHs, iron, and zinc were detected at all three sampling locations.
Chemical Transport Mechanism	Because chemicals were detected below the water table, transport of soluble chemicals (VOCs, metals, phenolics) in shallow groundwater is likely. Both PAHs and complex cyanides are highly insoluble in water and therefore fairly immobile in the soil environment.	The interpreted direction of shallow groundwater flow is to the north-northeast, with an easterly component in the southeast corner of the site. Shallow groundwater is likely to discharge to the Anthony Kill. Groundwater flow within the fractured rock is controlled by the orientation, size, and interconnection of the fractures. A downward gradient was observed at the multi-level well cluster.	Dissolved and sediment-attached chemicals in the Anthony Kill are likely to be transported downstream to the Hudson River (approximately one-quarter mile).	Sediments deposited in the Anthony Kill may be resuspended during high flow/high energy conditions and carried further downstream of the site.

TABLE 8 (Cont.)

SUMMARY OF ENVIRONMENTAL CONDITIONS
MECHANICVILLE SITE

Technical Factors	Subsurface Soils	Groundwater	Surface Water	Sediment
Expected Persistence of Chemicals in the Environment	There is only a slight tendency for most VOCs to adsorb to soil particles and they are expected to leach readily into the groundwater or slowly volatilize. They also are easily biodegradable by soil bacteria. PAHs strongly adsorb to soil particles, especially soils high in organic content. PAHs undergo microbial degradation and are readily metabolized by multicellular organisms. The lower molecular weight PAHs (e.g., naphthalene, acenaphthene, fluorene) are degraded more rapidly than the higher molecular weight compounds (benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene). Trace metals are nonvolatile. Their environmental fate depends on soil/water interactions which are controlled by pH, cation exchange capacity, and organic matter content, among other factors. Amenable cyanide is soluble and biodegradable. Ferro-ferricyanides are stable compounds which are difficult to degrade. Therefore, they will persist in the soil environment. Under highly acidic conditions, ferro-ferricyanides can be transformed to amenable cyanide and hydrogen cyanide gas. They are somewhat soluble and will leach to groundwater and surface water. Phenolic compounds have a relatively low volatility and high solubility.	VOCs in groundwater are expected to biodegrade over time. PAHs are relatively insoluble in water, but leaching to groundwater does occur. Dissolved PAHs in groundwater are subject to microbial degradation. However, biodegradation probably occurs more slowly in aquatic systems than in soil. Dissolved PAHs may also undergo rapid, direct photolysis when oxidants are available. The volatility of PAH compounds is low. The behavior of trace metals in groundwater is complex. However, their mobility in groundwater can be significantly retarded by adsorption and precipitation reactions. Amenable cyanide forms a single anion in water which is biodegradable. Ferro-ferricyanides in water form a metal cyanide radical which is difficult to degrade and likely to persist. Phenolic compounds are soluble and biodegradable.	See Groundwater	See Soil

TABLE 8 (Cont.)

SUMMARY OF ENVIRONMENTAL CONDITIONS
MECHANICVILLE SITE

Technical Factors	Subsurface Soils	Groundwater	Surface Water	Sediment
Existing or Potential Receptors of Chemicals	The probability of direct exposure of humans or animals to chemicals in the soil is low since the site is paved. If excavations were made at the site, however, workers and area residents could be exposed to these chemicals.	Exposure to chemicals in the shallow groundwater may occur in building and utility excavations in the site vicinity. The only direct groundwater usage in the area is at a few domestic wells nearly one mile southwest of the site. Because shallow groundwater appears to flow north-northeast from the site, these wells are unlikely to be receptors of site-derived chemicals.	Direct contact with the surface water by humans is likely in this highly populated area, even though this section of the Anthony Kill is designated for secondary contact recreation only (Class D). Aquatic organisms in the stream are also potential receptors of chemicals.	As with surface water, direct contact with chemicals in sediments is a concern in this urban area, especially for recreational users of the Anthony Kill.

TABLE 9

TOXICOLOGICAL PROPERTIES OF COMPOUNDS IDENTIFIED
IN VARIOUS MEDIA
MECHANICVILLE SITE

Compound Class	Media Identified In	Specific Compounds	Toxicological Properties[1]
Volatile Organic Compounds	Groundwater	Toluene, benzene, xylenes, ethylbenzene, trimethylbenzene, styrene	These aromatic compounds are absorbed readily through the respiratory and gastrointestinal (GI) tracts and can also be absorbed through the skin. Benzene has the potential to cause cancer. Depending on the dose received, the other compounds can exert toxic effects on the liver and kidneys; they can also act as central nervous system (CNS) depressants and respiratory irritants.
	Subsurface Soil	All of the above plus n-propylbenzene	
	Sediment	Toluene, benzene	
Semivolatile Compounds			
o PAHs	Groundwater	Acenaphthene, acenaphtylene, anthracene, benzofluoranthenes, benzo(a)anthracene, benzo(a) pyrene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene.	PAHs are a diverse group of compounds of varying toxicity. They are highly lipid-soluble and are absorbed through the GI and respiratory tracts, and to a lesser degree, through the skin. Many PAHs have been shown to be potentially carcinogenic. Other PAHs are thought to be noncarcinogenic; these include fluorene, anthracene, pyrene, naphthalene, phenanthrene, and fluoranthene. The acute toxicity and chronic toxicity of low level exposure are not well understood.
	Subsurface soil Sediment	All of the above plus benzo-(g,h,i)perylene and dibenzo-(a,h)anthracene	
o Phenolic compounds	Groundwater Subsurface soil Surface water	Total recoverable phenolics	Depending on the dose, these compounds can produce liver and kidney toxicity and CNS effects. They can act as respiratory and skin irritants.
Inorganic Compounds	Groundwater	Iron, zinc, cyanide, sulfate	Iron and zinc are essential nutrients. However, they can produce objectionable effects such as staining, bad taste, and GI irritation at high levels. Cyanide that is bioavailable can exert toxic effects on the liver, kidneys, CNS, and cardiovascular system at high enough levels. Sulfate is a natural constituent of groundwater which effects taste in high concentrations (500 mg/ℓ).
	Subsurface soil	Iron, zinc, cyanide	
	Surface water	Iron, cyanide, sulfate	
	Sediment	Iron, zinc, sulfate	

[1] In assessing the risks to human health and the environment posed by these chemicals, not only toxicological properties but also potential receptors and probable exposure conditions must be considered. These factors will be addressed in the Task 4 risk assessment.

Coal tar was observed at several locations at the site, primarily in the silty shale. Pockets of coal tar are likely to persist at former coal gas plant sites because biodegradation processes work very slowly on this concentrated material (USWAG, 1984). Coal tar is heavier than water and migrates downward through the soil and groundwater under the influence of gravity. At the Mechanicville site, movement of tar along the bedrock surface and into fractures is likely. The bedrock surface slopes generally downward towards the Anthony Kill except beneath the former relief holder where a trough (possibly a former stream bed or fault zone) slopes eastward toward North Central Avenue.

4.2.2 Groundwater and Surface Water

The chemical data obtained during Task 2 show that groundwater criteria are exceeded at the site. Groundwater exists under unconfined conditions within the shale bedrock and overlying soils. Based on the recorded groundwater surface elevations, the interpreted direction of flow in the unconfined system is generally north-northeast, with easterly flow in the southeast corner of the site. The flow rate in the unconsolidated soils is estimated to be 30 to 50 ft/yr; the flow rate within the shallow bedrock is calculated to be approximately 170 to 180 ft/yr.

Shallow groundwater appears to be discharging to the Anthony Kill. The groundwater beneath the relief gas holder may flow eastward beneath North Central Avenue and discharge to the Anthony Kill downstream of SW-3/SED-3. Groundwater flow in this area of the site may also be influenced by the old Champlain Canal bed. If the soils used to fill the canal and prepare the present roadbed are more permeable than the surrounding soils and if they extend below the groundwater table, the canal/roadbed could be a preferential flowpath for groundwater and chemical migration.

The Anthony Kill is expected to be the primary receptor for chemicals detected in groundwater. There are no water supply wells (public or private) near the Mechanicville site. The closest domestic wells are nearly a mile southwest (i.e., upgradient) of the site. Exposures to chemicals in shallow groundwater might occur during excavations for utility repair or new construction in the site vicinity or through seepage of groundwater into basements.

Surface water data collected from the Anthony Kill do not indicate an exposure risk associated with surface water at the present time. However, there is evidence that groundwater from the southeastern portion of the site may be discharging to the stream below the downstream monitoring point (SW-3).

4.2.3 Summary

The chemicals detected in soil, groundwater, and sediment at Mechanicville do not present immediate exposure risks to humans. However, there is potential for degradation of the quality of the Anthony Kill water and sediments and for contact with chemicals in sediments by recreational users of the stream. In addition, human exposures to chemicals in soil and groundwater are possible during future excavations. To fully evaluate these exposure risks and design remedial alternatives (if necessary), further explorations are needed at the site.

4.3 PRELIMINARY IDENTIFICATION OF REMEDIAL ALTERNATIVES

A list of remedial alternatives that could be used to address the environmental concerns at Mechanicville identified during Task 2 is presented in Table 10. This list has been revised since completion of Task 1 to reflect knowledge of the site gained from the Task 2 investigations, and will be further refined when field investigations are completed. The final selection of alternatives will be made after completion of the risk assessment (Task 4).

TABLE 10

PRELIMINARY IDENTIFICATION OF REMEDIAL ALTERNATIVES
MECHANICVILLE SITE

MEDIUM	CONCEPTUAL ACTION	REMEDIAL MEASURE	REMARKS
Soil/Sediment	Containment	Capping	Much of the site is presently covered with asphalt and structures. An impervious cap could further reduce infiltration and, therefore, the rate of leaching of chemicals from the soils into the groundwater. A cap would also reduce contact potential. Not applicable to sediment.
	Removal	Excavation and Transport	Involves excavation and removal with subsequent transportation to another location. Potential impact on air quality during excavation and long-term liability at disposal site should be considered. Dredging is also an option for sediment.
	Disposal	Landfilling	Landfill selection depends on whether wastes are hazardous or non-hazardous. If hazardous, they must be disposed of in a properly licensed RCRA landfill.
	Treatment	Incineration	Proven technology, effective in destroying organics. On-site units require test burns prior to full scale use.
		Biodegradation	Several recent applications of this technology to coal tar and coal tar-contaminated soils have been reported in literature. This treatment requires experimentation to determine the proper organisms and optimal operating conditions. It can be applied in situ, through land farming, or by use of a batch reactor vessel.
		Solidification	Involves mixing the waste with cement or similar additives to incorporate the waste into the cement matrix. Process improves waste handling and is inexpensive. Does not destroy compounds but reduces toxicity by reducing contaminant mobility and availability to biota. Method is currently commercially available.
		Soil Aeration	This process removes organic contaminants from soil/sediment by partitioning. Some further treatment system may be required to treat the air, and potential impacts on air quality must be evaluated. The effect of this process on semivolatile contaminants would have to be evaluated prior to implementation.
		Vacuum Extraction	Underground wells are operated under a vacuum to volatilize and extract soil gases. Vacuum system is constructed on-site to remove and collect volatile and semivolatile compounds from the unsaturated soil zone. May require extensive carbon air treatment system to treat the off-gases. Effectiveness on semivolatile compounds would have to be evaluated prior to implementation. Not applicable to sediment.
	Access Control	Posting Fencing Land Restrictions	Prevents contact with hazardous constituents. Will be considered in conjunction with other technologies. Not applicable to sediment.
	No Action		To be considered in conjunction with other technologies.

TABLE 10 (Cont.)

PRELIMINARY IDENTIFICATION OF REMEDIAL ALTERNATIVES
MECHANICVILLE SITE

MEDIUM	CONCEPTUAL ACTION	REMEDIAL MEASURE	REMARKS
Groundwater	Containment	Capping	See soils.
	Diversion	Low Permeable Barriers	Retard lateral chemical migration within the soil and weathered bedrock zone by positioning on the competent bedrock surface. Would not retard vertical migration or chemical movement in bedrock fractures.
		Injection Wells/Interceptor Trenches	Control groundwater flow direction. Generally used in conjunction with groundwater extraction.
	In Situ Treatment	Biodegradation	Analysis/culture of the contaminated water to determine the present activity and nutrient levels needed to stimulate hydrocarbon-utilizing bacteria.
		Aquifer Flushing	May include the use of chemical additives. Often used in conjunction with groundwater removal.
		Other Technologies	Cost-effectiveness is dependent on concentration and types of contamination. Physical or physical/chemical technologies such as oxidation and precipitation may be applicable to highly contaminated waters.
	Removal	Extraction of Groundwater via Pumping	If large volumes of water are to be extracted, on-site treatment may be appropriate. May include recharge or discharge to surface drainage. Distribution of contamination and required operating period is not known. May require years of operation.
	Treatment	Carbon Adsorption	Contaminated carbon filters require appropriate disposal or regeneration. Data regarding process efficiency and applicability are available.
		Biodegradation	On-site biological treatment may be considered if large volumes of groundwater require treatment. Extracted groundwater may also be released to publicly owned treatment works for secondary biological treatment depending on present plant capacity, waste characteristics, and feasibility.
		Steam Stripping	Steam stripping is essentially a continuous fractional distillation process using steam to remove organics from aqueous wastes. Residuals, including steam condensate, recovered solvents, and "stripped" effluent must be disposed or treated.
		Incineration	Likely to destroy organic wastes in groundwater, but process cost is expected to be high.
		Ozonation/UV Photolysis	Ultraviolet light is used to enhance the reactivity of ozone and achieve oxidation of organic compounds. UV light cannot effectively destroy pollutants in opaque solutions, however. Process by-products are also a concern.
	No Action		To be considered in conjunction with other technologies.

5.0 CONCLUSIONS AND RECOMMENDATIONS

In this section, the findings of the Task 2 initial field investigation program are summarized. Based on these findings, additional data needs for risk assessment and conceptual design are identified. A Task 3 program to satisfy the data requirements is recommended.

5.1 SUMMARY OF TASK 2 FINDINGS

Significant findings from the Task 2 field investigation at the Mechanicville site are summarized as follows:

1. The unconsolidated deposits at the site consist primarily of fill soils of varying composition overlying a fractured shale bedrock. Up to 9 feet of silty shale fill exist in the southeast portion of the site.

2. The bedrock is laminated gray shale with calcite inclusions and was encountered 9 to 18 feet below ground surface. The upper 1 to 2 feet of the bedrock is highly weathered. The bedrock surface slopes to the north and east. A small east-trending bedrock depression was mapped near the former relief gas holder.

3. Groundwater flow appears to be north-northeast across the site; groundwater flow near the former relief gas holder may be more easterly, toward North Central Avenue. Groundwater in the soil and shallow bedrock system likely discharges to the Anthony Kill, either adjacent to the site or further downstream. The silty shale and fractured bedrock formation are interpreted to represent the principal zones of groundwater movement.

4. Land surrounding the site is predominantly residential and commercial, with the central business district of the city located east and south of the site. There are sensitive land uses (i.e., schools, recreation areas, nursing homes) and potential contributors of chemicals to groundwater and surface water (i.e., tanks, drums, a railroad yard, and other industrial property) within a half-mile radius of the site.

5. VOCs and PAHs were detected in soils throughout the site study area. Concentrations were highest near the former relief holder and the filter beds.

6. VOCs and PAHs were detected in groundwater on-site. Contaminant concentrations in groundwater exceeded relevant federal and/or state criteria for public water supply systems in both bedrock and overburden monitoring wells. The highest concentrations of PAHs and VOCs were found at MW-4 and MW-6 (downgradient of the relief gas holder), MW-3 (downgradient of the oxide house), and MW-5 (downgradient of the coal storage shed and filter beds).

7. Organic compounds typically associated with coal gasification wastes were found in only one surface water sample from the Anthony Kill.

8. PAHs were detected in sediments taken from the Anthony Kill adjacent to the site, but not upstream or downstream of the site using GC/MS analytical techniques. The HPLC results showed PAHs at all three locations.

9. There are no water supply wells within a one-mile radius of the site. Potential risks associated with excavations at the site and discharge of site-derived chemicals to the Anthony Kill were identified.

From these findings, the following preliminary conclusions can be drawn:

1. The fill soils and groundwater in the fill and shallow bedrock contain chemicals related to the coal gasification process.

2. There are coal gasification wastes in the subsurface environment which are a continuing source of chemicals to soil and groundwater.

3. Coal tar constituents travel along the bedrock surface as well as through bedrock fractures. There are no natural geologic barriers to the migration of dissolved chemicals in groundwater.

4. Chemical data on groundwater in the deep bedrock and in soil and bedrock off-site are lacking.

5. The preliminary exposure assessment suggests no immediate threat to the public is posed by on-site soils and groundwater.

5.2 DATA NEEDS

The goal of the Task 3 expanded problem definition program is to further define distribution of contamination so that a detailed risk assessment can be performed (Task 4) and remedial measures can be developed and evaluated (Task 5). To meet this goal, the Task 3 program must be designed to:

- more specifically identify and quantify chemicals, particularly in soil;
- increase the understanding of the distribution of chemicals detected; and
- further evaluate chemical migration pathways and potential receptors.

Data requirements in each of these categories are listed in Table 11 and discussed in the following paragraphs.

Most of the soil samples collected during Task 2 from the Mechanicville site were analyzed using HPLC/UV methods. For risk assessment purposes, data generated by a more specific detection method (e.g., GC/MS) are needed. It is especially important that PAH results be confirmed by GC/MS analysis before the risks associated with these chemicals are further assessed.

TABLE 11

DATA REQUIREMENTS AND RECOMMENDED ACTIVITIES
MECHANICVILLE SITE

General Category	Specific Data Requirement	Recommended Task 3 Activity*
Specific Identification and Quantification of Chemicals	Confirmation of Task 2 analytical results obtained with HPLC/UV methods.	Use of GC/MS methods for all organic analyses.
Chemical Distribution		
Soil	Chemical data from soil in the study area at previously unsampled locations and depths.	Sampling and analysis of soil at B-9 through B-12.
Groundwater	Chemical data from groundwater upgradient of, adjacent to, and downgradient of former coal gasification structures.	Installation of MW-10 through MW-15. Sampling and analysis of groundwater from existing and new wells.
Chemical Migration	Evaluation of the former canal bed as a preferential flowpath.	Investigation of canal construction and closure procedures.
	Interpretation of bedrock surface contours at site boundaries.	GPR and seismic refraction surveys east and north of the site boundaries.
	Chemical data from soil and at soil/bedrock interface in areas of potential off-site migration.	Sampling and analysis of soil samples from B-10, B-11, and B-12.
	Data on fracture patterns of deeper bedrock.	Coring up to 30 feet of bedrock at B-13, B-14, and B-15.
	Increased understanding of groundwater flow direction and groundwater quality at downgradient locations.	Installation, in-situ permeability testing, and sampling of MW-11, MW-12, MW-13, MW-14, and MW-15 and water level measurements from all wells.

TABLE 11 (cont.)

DATA REQUIREMENTS AND RECOMMENDED ACTIVITIES
MECHANICVILLE SITE

General Category	Specific Data Requirement	Recommended Task 3 Activity*
	Further definition of vertical seepage gradients.	Water level data from multi-level well nests at three locations (MW-4/M-6, MW-12/MW-13, and MW-5/MW-15).
	Evaluation of water and sediment in the Anthony Kill at possible groundwater discharge points adjacent to the site and downstream of SW-3/SED-3.	Sampling and analysis of surface water and sediment samples collected at SW-2/SED-2 and SW-4/SED-4. Samples from SW-1/SED-1 should also be collected for background comparison purposes.
Potential Receptors	Determination of human and environmental receptors for site-derived chemicals.	Survey of current and potential use of groundwater and surface water along chemical migration pathways and further evaluation of other chemical exposure routes (e.g., basement seepage, excavations).

* Exploration locations are shown in Figure 18.

Task 2 data confirmed the presence of VOCs and PAHs in soils in the former active plant area on-site. Additional soil sampling at the site boundaries is needed to increase understanding of the distribution of these chemicals. The vertical and horizontal distribution of PAHs and VOCs in soils is important for risk assessment and conceptual design.

Task 2 data confirmed that groundwater quality on-site has been impacted by past coal gasification activities. Additional groundwater quality data upgradient and downgradient of former coal gasification structures are necessary to assess the distribution of contaminants in the overburden and in bedrock fractures. This will require several new wells screened in the overburden and bedrock, as well as continued sampling of existing wells. New wells are also needed to evaluate potential routes for chemical migration and to verify the direction of groundwater flow east of the site.

Additional data are needed to assess the migration of chemicals off-site. During Task 2, a bedrock surface contour map was developed at the site. This map needs to be extended to the north and east of the site so that the potential for coal tar movement off-site along the bedrock surface can be evaluated. Similarly, additional data on the construction and decommissioning of the Champlain Canal are required to evaluate migration pathways east of the site. In-situ permeability data in the fill soils, shallow bedrock, and deeper bedrock are also needed to further evaluate groundwater flow at the site.

Based on the Task 2 investigation, there are no natural geologic barriers to the movement of contaminants in the subsurface. There are no confining soil layers, a downward seepage gradient was observed, and the shale bedrock is fractured. Knowledge of the nature of the bedrock is limited because only one of the Task 2 borings went more than 5 feet into the bedrock (15 feet were cored at B-6). To meet the Task 3 goal of defining the distribution of contamination related to this site, data would be needed on the condition of the deeper bedrock both on- and off-site. However, an extensive bedrock drilling and monitoring well installation program would be required to explore chemical migration in the deep bedrock. Until receptors for chemicals in the bedrock are clearly identified, such an extensive investigation is not recommended.

5.3 TASK 3 RECOMMENDATIONS

A scope of work for Task 3 is described in the Work Plan for the Mechanicville site, completed in April 1986 (Jordan, 1986b). Because the specific elements of the Task 3 program could not be defined at that time, a general program representing the anticipated maximum level of effort that would be required at Mechanicville was presented and costed. Based on the Task 2 findings, changes to the proposed program and corresponding budget are recommended. The new program is presented in the following paragraphs. The proposed Task 3 schedule and budget are discussed in Section 6.0.

The proposed program is designed to increase Jordan's understanding of chemical distribution in the soil and shallow bedrock at the site and site boundaries. It will allow comparisons to be made between chemical concentrations in the

fill soils and the upper bedrock, but will not define a lower boundary of contamination. Similarly, the program will provide data on the lateral movement of chemicals on-site and at the site boundaries, but may not define the lateral extent of chemical migration off-site. The scope of work required to meet these objectives consists of the following elements:

1. Preparation of a bedrock surface contour map for areas adjacent to the site on the north and east using GPR and seismic refraction geophysical techniques.

2. Drilling of up to seven borings and collection of at least one soil sample from each boring for laboratory chemical analysis.

3. Coring up to 30 feet of bedrock in each of three borings to evaluate the extent of fracturing at depth and enable sampling of deeper groundwater.

4. Installation of monitoring wells in six of the borings.

5. Conducting additional in-situ permeability tests in shallow and deep boreholes.

6. Collection of two rounds of groundwater samples and water level measurements from new and existing wells.

7. Collection of two rounds of surface water/sediment samples at one upstream, one adjacent, and one downstream sampling location for analysis.

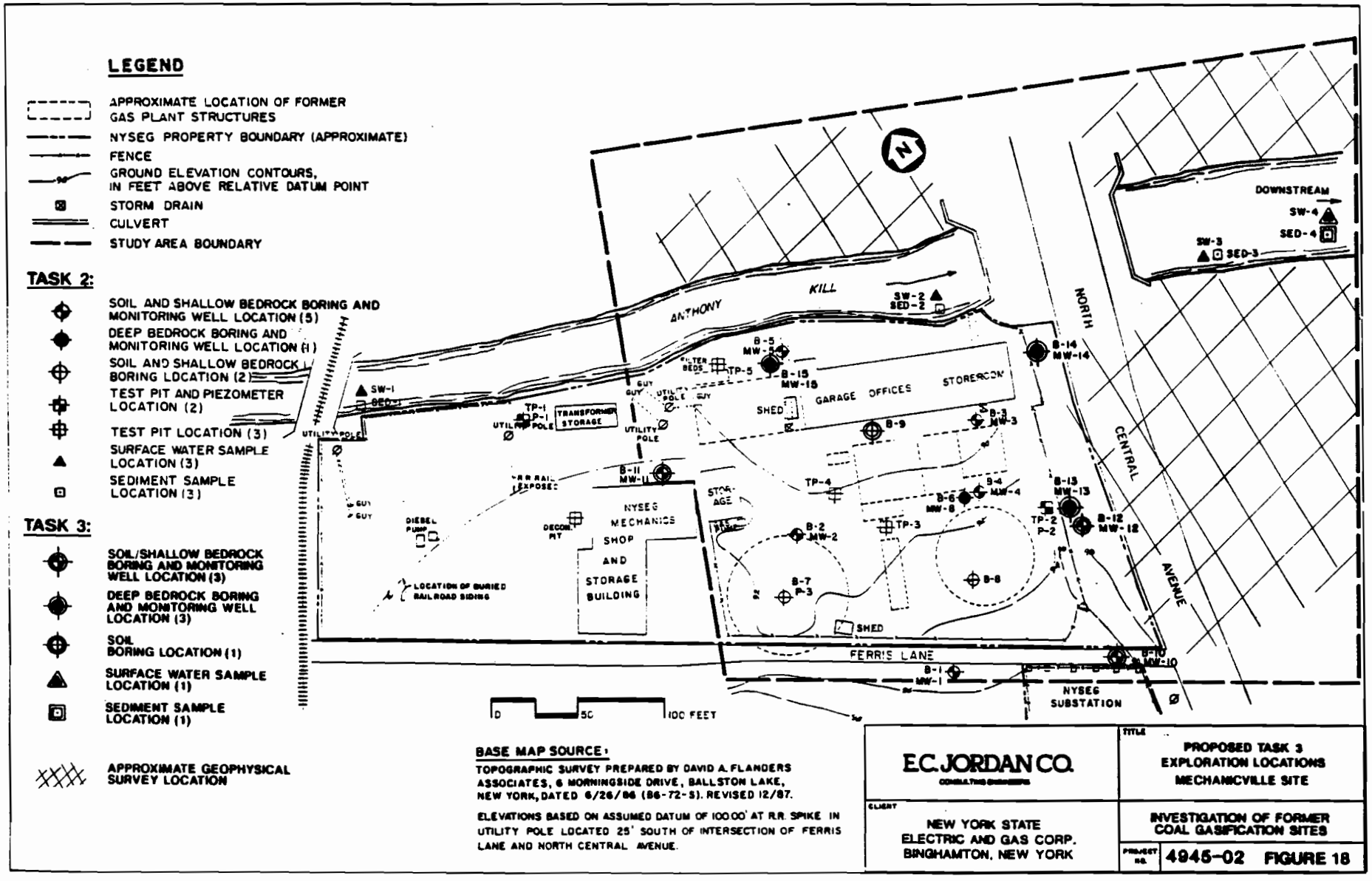
8. Analysis of soil, groundwater, surface water, and sediment samples for the same chemical parameters and methods included in the Task 2 program with one exception: Organic analyses will be conducted exclusively using GC/MS methods.

9. Surveying of the elevations of geophysical survey reference points, new borings, and wells; and plotting locations on the base map.

10. Additional land and water use assessment to identify potential receptors.

11. Evaluation of the data and preparation of a Task 3 report.

Proposed Task 3 exploration locations are shown in Figure 18. The rationale for locations of these explorations is presented in Table 12. Specific information on how these activities will be conducted is outlined in the following sections. Jordan plans to use North Star Drilling Co. of Cortland, New York, for drilling services.



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 10000' AT R.R. SPIKE IN UTILITY POLE LOCATED 25' SOUTH OF INTERSECTION OF FERRIS LANE AND NORTH CENTRAL AVENUE.

E.C. JORDAN CO.
CONSULTING ENGINEERS

CLIENT
NEW YORK STATE ELECTRIC AND GAS CORP.
BINGHAMTON, NEW YORK

TITLE
PROPOSED TASK 3 EXPLORATION LOCATIONS MECHANICVILLE SITE

INVESTIGATION OF FORMER COAL GASIFICATION SITES

PROJECT NO. 4945-02 FIGURE 18

TABLE 12

RATIONALE FOR TASK 3 EXPLORATION LOCATIONS
MECHANICVILLE SITE

Exploration	Rationale
Geophysical Survey	GPR and seismic refraction will be used to estimate depth to bedrock east and north of the site so that an extended bedrock surface contour map can be constructed, and off-site coal tar migration potential can be evaluated. Approximate Cost: $ 9,622 GPR survey $ 5,001 seismic survey
Shallow Borings and Monitoring Wells	Shallow borings will be drilled through the fill soils to the bedrock surface. Where the overburden is shallow, the borehole will be drilled into the shallow bedrock. Boring depths are expected to be between 15 and 20 feet. These borings will be used to characterize subsurface conditions in the soil and shallow bedrock. One analytical sample is scheduled for each boring. Approximate Cost: $ 683 per boring Sample analyses performed by NYSEG Shallow monitoring wells will be screened in the unconsolidated deposits and shallow bedrock to characterize shallow groundwater flow conditions. Two rounds of analytical samples are scheduled for each well. Approximate Cost: $ 1,640 per well Sample analyses performed by NYSEG
B-9	Located in the central portion of the site where chemicals are anticipated to be present in significant concentrations; will provide data on the distribution of chemicals in soil on-site.
B-10, MW-10	Located in the southeastern corner of the site where site-derived chemicals are not anticipated; MW-10 will provide important groundwater level data.

TABLE 12 (cont.)

RATIONALE FOR TASK 3 EXPLORATION LOCATIONS
MECHANICVILLE SITE

Exploration	Rationale
B-11, MW-11	Located on the western boundary of the study area, downgradient of B-7 and B-2/MW-2. Samples collected here will aid in delineating chemical distribution on the western side of the site.
B-12, MW-12	Located in the middle of the bedrock trough (as determined by the Task 2 geophysical survey) on the east side of the site to provide data on chemical migration in shallow groundwater and along the bedrock surface; one of two paired wells.
Deeper Borings and Monitoring Wells	Deeper borings will be drilled approximately 30 feet into the bedrock. Boring depths are expected to be between 45 and 60 feet. The borings will be used to further characterize bedrock at the site. One analytical sample is scheduled for each boring. Approximate Cost: $ 5,054 per boring Sample analyses performed by NYSEG Bedrock monitoring wells will be screened in the bedrock to monitor flow conditions in this system. Two rounds of analytical samples are scheduled for each well. Approximate Cost: $ 3,537 per well Sample analyses performed by NYSEG
B-13, MW-13	Located adjacent to B-12/MW-12 in the bedrock trough on the eastern side of the site; this pair of wells will provide multilevel data.
B-14, MW-14	Located near the northeast boundary of the site to provide data on chemical migration in the bedrock.
B-15, MW-15	Located adjacent to B-5/MW-5 on the banks of the Anthony Kill; this pair of wells will provide multilevel data.

TABLE 12 (cont.)

RATIONALE FOR TASK 3 EXPLORATION LOCATIONS
MECHANICVILLE SITE

Exploration	Rationale
Surface Water and Sediment Samples	Surface water and sediment samples will be collected adjacent to the site and at a yet-to-be-determined downstream sampling location on the Anthony Kill where groundwater from the site may be discharging. Upstream samples will be collected at the same time for background characterization purposes. Two rounds of analytical samples are scheduled for each sampling location. Approximate Cost: $ 295 per surface water/sediment sample (collection) Sample analyses performed by NYSEG.

5.3.1 Geophysical Survey

During Task 1, GPR and seismic refraction results were used to prepare a bedrock surface contour map of the site (see Figure 10). The interpreted results correlated well with depths to bedrock observed during the boring program. It is recommended that these two geophysical exploration techniques be used to extend the bedrock surface contour map east and north of the site, provided access can be obtained from adjacent landowners (see Figure 18). The GPR survey will utilize a Geophysical Survey Systems, Inc., Subsurface Interface Radar (SIR) System 8. Seismic refraction profiling will be accomplished with a Geometrics ES-2415F Signal Enhancement Seismograph. A 10-foot grid will be established throughout the area of GPR investigation with a compass and cloth tape. Seismic refraction will be conducted along 50-foot grid lines.

5.3.2 Borings

Four shallow soil borings (B-9, B-10, B-11, and B-12, each 15 to 20 feet deep) and three deeper bedrock borings (B-13, B-14, and B-15, each approximately 50 feet deep) are recommended for soil characterization and monitoring well installation. Borings will be drilled to bedrock using hollow-stem augers; NX-sized cores (3-inch diameter) will be used to drill into the bedrock. Boring procedures outlined in the Work Plan will be followed. Continuous split-spoon samples will be collected in the unconsolidated deposits and continuous core samples will be taken in the bedrock. One sample from each boring (plus one duplicate) will be collected for laboratory chemical analysis.

The borings are positioned to fill data gaps identified in Task 2. B-9, B-10, B-11, and B-12 will provide information on conditions in the fill soils and at the soil/bedrock interface in previously unexplored areas of the site. These borings will be placed near the bedrock surface to sample the fill soils and fill/bedrock interface. B-10 and B-11 are expected to be clean and will be useful in establishing the boundaries of contaminated soil. It is unclear from the Task 2 results whether the chemicals detected at B-5 were associated with the filter beds alone or whether the coal tar left in the relief gas holder might also be impacting this area. B-9 will aid in defining the extent of coal tar migration across the site. B-13, B-14, and B-15 are bedrock borings that will provide information on chemical migration in the bedrock at two critical locations: at the edge of the Anthony Kill and at the eastern boundary of the site.

5.3.3 Monitoring Wells

Monitoring wells are recommended at six of the boring locations. The standard well installation procedures in the Work Plan will be followed. MW-10, MW-11, and MW-12 will be screened to monitor the fill soils and the fill/bedrock interface. MW-13, MW-14, and MW-15 will be screened entirely within the bedrock.

The monitoring wells will provide needed water level and water quality data. MW-10, MW-12, and MW-13 will aid in the interpretation of groundwater flow direction in the southeastern portion of the site. The new multilevel well

pairs, MW-12/MW-13 and MW-5/MW-15, will provide information on vertical seepage gradients at the bedrock trough and adjacent to the Anthony Kill.

Water quality data from the new and existing wells will enhance the understanding of chemical concentrations in the fill soils and in the shallow bedrock, both on-site and at the eastern and northern site boundaries. As previously discussed, the need to investigate other potential migration routes, such as the deep bedrock, will be reassessed after completion of the detailed risk assessment (Task 4).

5.3.4 Groundwater Sampling

Two rounds of groundwater samples are recommended in Task 3, as originally proposed. Each round will include sampling of all Task 2 and Task 3 wells (12 total) plus two duplicates and three blanks (sampler, trip, and filtration).

5.3.5 Surface Water and Sediment Sampling

The surface water samples analyzed in Task 2 generally did not contain measurable levels of coal-tar-related chemicals. However, sediment samples collected from the Anthony Kill at SED-2 (adjacent to the site) contained several PAHs. Therefore, it is recommended that surface water/sediment sampling adjacent to the site (SW-2/SED-2) be included in the Task 3 program.

Because of the potential for groundwater flow in an easterly direction with eventual discharge to the Anthony Kill, sampling of surface water and sediment at a new downstream location (SW-4/SED-4) is also recommended in Task 3. The sampling location will be determined based on results of the geophysical survey and the revised interpretation of groundwater flow direction east of the site. Two rounds of sampling of each media are proposed at SW-4/SED-4. Samples of each media will also be collected at SW-1/SED-1 for background comparison purposes.

5.3.6 Air Sampling

No air sampling was done during Task 2, and none is recommended for Task 3 for the following reasons. The chemicals detected in soil and groundwater at the site are beneath the ground surface, which is paved. Volatilization of these chemicals, therefore, is unlikely under present site use conditions. Furthermore, because the site is used for parking and maintenance of trucks and automobiles and is located on a heavily trafficked street, any air samples collected would likely contain contaminants more related to current site uses than previous ones. Air sampling may be required if an excavation in the former active plant area is planned to design appropriate safety measures. However, this sampling should be part of a pilot study to assess impacts from a specific activity rather than a more general study.

5.3.7 Analytical Program

Soil, water, and sediment samples will be analyzed for the same set of parameters selected for the Task 2 program: All organic analyses will be performed using GC/MS methods and all samples will be analyzed by NYSEG.

5.3.8 Elevation Survey

At the completion of the field program, locations and elevations of Task 3 geophysical survey reference points, borings, monitoring wells, and sampling stations will be determined by a surveyor, relative to the previously established datum. The site plan developed in Task 2 will be updated to include Task 3 exploration points.

5.3.9 Receptor Analysis

Jordan will further assess current and potential receptors of site-derived chemicals on a media-specific basis (e.g., soil, groundwater, surface water, sediment). The receptor analysis will be expanded to a one-mile radius to identify and characterize both human populations and environmental systems which could be impacted given observed contamination distribution data and potential migration pathways. More detailed information on population, recreational water use, and groundwater use will be gathered from local and state agencies. If groundwater usage data are unavailable from public sources, a survey of residents in the site vicinity may be necessary to confirm the Task 2 findings that there are no wells within a one-mile radius of the site. Receptor analysis data will be used in the Task 4 risk assessment.

5.3.10 Data Evaluation and Report Preparation

Jordan will evaluate the geologic, hydrogeologic, chemical, and receptor analysis data collected in Task 3 and prepare a report containing data interpretation, findings, and recommendations for further work. The Task 3 report will include a summary of the findings of Tasks 1 and 2.

6.0 TASK 3 SCHEDULE AND COSTS

6.1 SCHEDULE

An attempt will be made to coordinate the Task 3 field program at Mechanicville with the field program at the Mechanicville/Coons Crossing site, and both will begin within two weeks of receipt of authorization to proceed from NYSEG. The site-specific QAPP and HASP will be updated first. A tentative schedule for Task 3 activities is shown in Table 13. The geophysical survey, boring, and monitoring well installation program is expected to begin on November 2, 1987, and take approximately three weeks to complete.

Jordan intends to keep NYSEG informed of progress of the exploration program at least twice per week, and immediately if any unexpected conditions are encountered. During sampling activities, weekly contact with NYSEG is planned.

6.2 COSTS

The costs of the expanded problem definition program (Task 3) were originally submitted to NYSEG in the Mechanicville Work Plan (Jordan, 1986b). These costs have been modified to reflect the program recommended in Section 5.3 of this report. New program costs are presented in Table 14. Manpower estimates in Table 14 do not include hours for response to NYSDEC review comments, if required.

TABLE 13

SCHEDULE FOR TASK 3 FIELD ACTIVITIES
MECHANICVILLE SITE

Activity	Proposed Start Date
Geophysical Survey	November 2, 1987
Exploratory Borings/Monitoring Well Installations	November 9, 1987
Elevation Survey	November 18, 1987
Groundwater, Surface Water, and Sediment Sampling	December 1987 and March 1988

6.87.14T
0026.0.0

GLOSSARY OF ACRONYMS

AWQC	Ambient Water Quality Criteria
cfs	cubic feet per second
GC	gas chromatography
GPR	ground-penetrating radar
HASP	Health and Safety Plan
HPLC	High Performance Liquid Chromatography
MCLs	Maximum Contaminant Levels
MCLGs	Maximum Contaminant Level Goals
MS	Mass Spectrometer
MSL	Mean Sea Level
ND	not detected
NYSDEC	New York State Department of Environmental Conservation
NYSEG	New York State Electric and Gas Corporation
PAHs	polynuclear aromatic hydrocarbons
PID	photoionization detector
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
SDWA	Safe Drinking Water Act
SIR	Subsurface Interface Radar
SVOCs	semivolatile organic compounds
TOC	total organic carbon
USGS	U.S. Geological Survey
UV	ultraviolet
VOCs	volatile organic compounds

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APPENDIX A

FIELD DATA

APPENDIX A-1

TEST PIT LOGS
AND
FIELD OBSERVATIONS

TEST PIT OBSERVATIONS
MECHANICVILLE SITE

Test Pit	Total Depth (ft)	Visual Appearance	Odor and PID Characterization	Samples Collected
TP-1	7.7	Brown fill with cobbles from 0 to 0.8 ft. and black ash with clinkers and cinders from 0.8 to 2.0 ft. Reddish brown fine sandy silt, small cobbles, large boulders, organic material, bricks clinkers from 2.0 to 3.0 ft. and brown sandy silt with cobbles, clinkers, glass, wood, bricks from 3.0 to 6.0 ft. From 6.0 to 7.7 ft., light brown clayey silt with dark stains in root channels and highly fractured shale fragments. Wet oily sheen at 7.7 ft. No visible coal tar.	Slight odor in black ash layer from 0.8 to 2.0 ft. Slight odor in light brown clayey silt layer from 6.0 to 7.7 ft. PID-background levels.**	Sample TP-1/S-1 at 6.5 to 7.0 ft.*
TP-2	7.5	Brown to dark brown silty sand with sharp angular cobbles from 0 to 1.3 ft. Brown sandy fill with bricks from 1.3 to 2.6 ft. Angular cobbles and boulders from 2.6 to 5.5 ft. with less weathered angular rocks in sand matrix from 5.5 to 7.0 ft. Angular cobbles (>50%) with gray clayey silt and brown sandy silt lenses from 7.0 to 7.5 ft. No visual signs of coal tar wastes.	PID readings of background levels in ambient air. Readings of 10 ppm from sampled material.	Sample TP-2/S-1 at 7.0 to 7.5 ft.*

TEST PIT OBSERVATIONS (continued)

Test Pit	Total Depth (ft)	Visual Appearance	Odor and PID Characterization	Samples Collected
TP-3	3.0	Light brown sandy silt with cobbles from 0.2 to 1.0 ft., and dark brown silty fill with cobbles, bricks, concrete from 1.0 to 3.0 ft. Concrete obstruction at 3.0 ft. No visible signs of coal tar or other contamination encountered.	PID readings at background level in ambient air and at soil.	No samples collected due to concrete obstruction.
TP-4	5.5	Light brown sandy silt with cobbles from 0.1 to 0.3 ft. and dark brown sandy silt with cobbles from 0.3 to 1.0 ft. Bricks from 1.0 to 1.5 ft. Light brown sand from 1.5 to 3.0 ft. Angular shale saturated with coal tar from 3.0 to 4.5 ft. and larger angular shale fragments from 4.75 to 5.5 ft. saturated with coal tar.	PID readings of 30-40 ppm near sampled soil (3 to 4 feet below ground surface).	TP-4/S-1 at 3.0 4.0 ft. *
TP-5	6.5	Light brown sandy silt with cobbles from 0 to 1.3 ft and dark brown sandy silt with angular cobbles from 1.3 to 3.0 ft. Highly fractured shale, silt and clay soil, wood chips, and coke fragments saturated with coal tar from 3.0 to 6.5 ft. At 6.5 ft., silt and fractured shale saturated with coal tar.	PID reading of 50 ppm over saturated soil.	TP-5/S-1 from 3.0 to 4.0 ft.* TP-5/S-2 from 4.0 to 6.0 ft.* Duplicate sample TP-5/S-1 Dup.*

* Samples analyzed by ERCO.

** Background PID levels represent ambient air levels obtained outside and upwind of the site boundaries. At the Mechanicville site, background levels were generally less than 5 ppm.

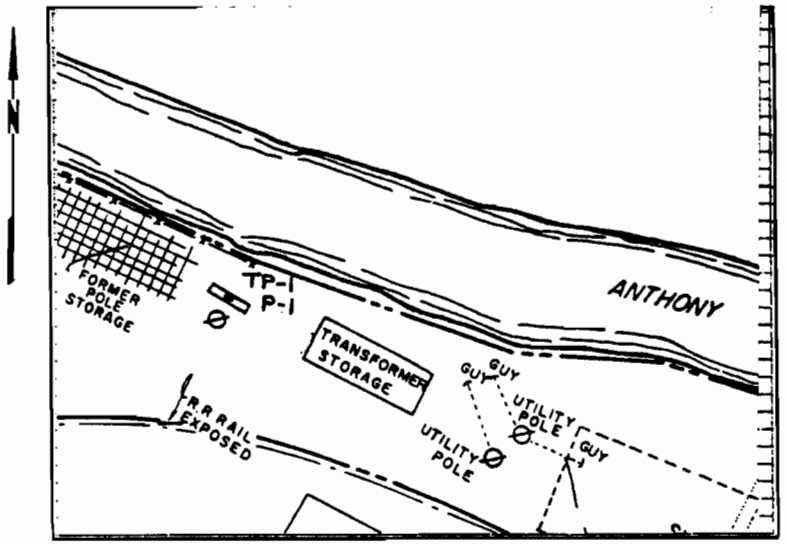
TEST PIT RECORD

SITE Mechanicville NYSEG 4945-02

TEST PIT TP-1 DATE 7/21/86 TIME ST. 10:50 END 11:30

COORDINATES N/A GRID ELEMENT N/A

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 50 FT

CREW MEMBERS

1. S. Wibby
2. C. Moore
3. P. Tierney } Maloy (Empire)
4. R. Ciccateri }
5.
6.

MONITOR EQUIPMENT

PI METER	(Y)	N
EXPLOSIVE GAS	(Y)	N
AVAIL. OXYGEN	(Y)	N
OVA	Y	(N)

OTHER Radiation meter

PHOTOGRAPHS, ROLL # 1

EXPOSURE 1

NOTES

FILL

0'-0.8' Brown, sandy fill with cobbles loose, dry

0.8'-2.0' Black ash with clinkers and cinders. oxidized, loose, dry. Slight odor.

2.0'-3.0' Reddish brown fine sandy silt with small cobbles, large rounded boulders, organic material (roots), bricks and clinkers

3.0'-6.0' Brown sandy silt with cobbles, clinkers glass, wood bricks. Dry and loose.

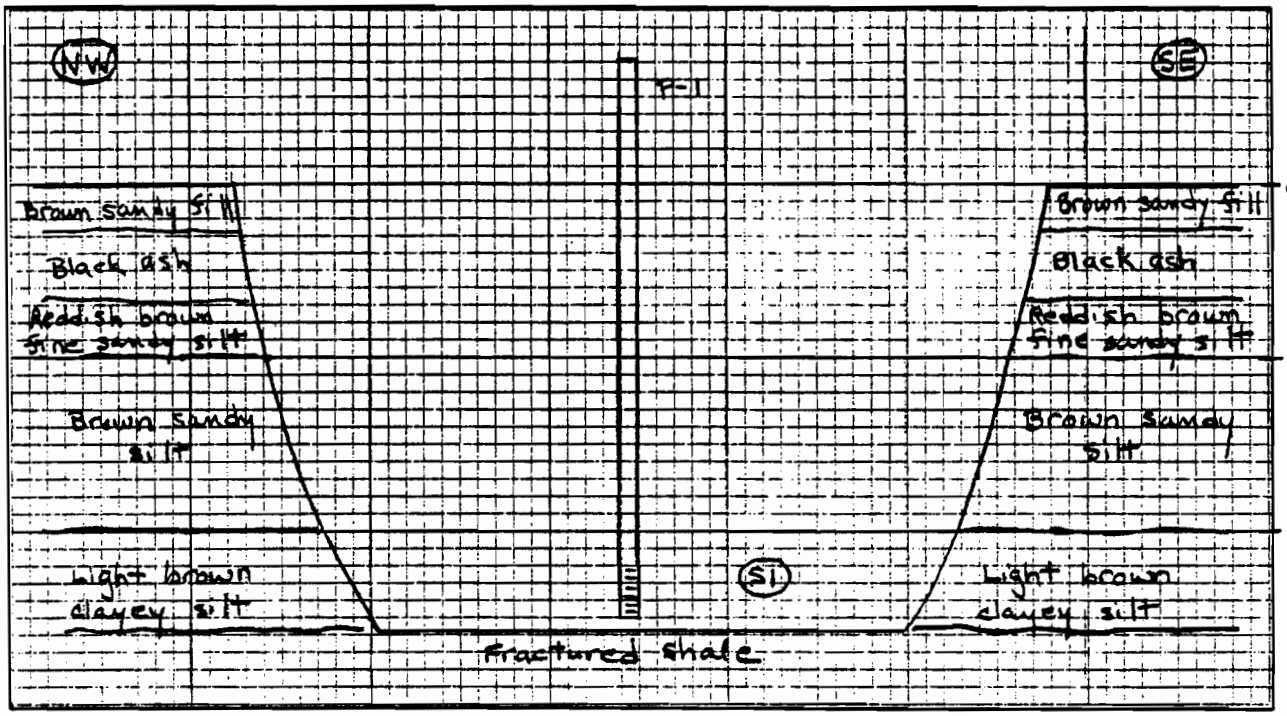
6.0'-7.7' Light brown Clayey silt, cohesive, moist with mottling and slight odor. Dark stains in root channels.

7.7 Bedrock. Highly fractured shale, wet oily sheen. No groundwater seepage.

TEST PIT RECORD
PROFILE ALONG TEST PIT- 1

SITE NYSEG Mechanicville

DEPTH (FT) SCALE 1" = 3 FT



NOTES:

Test pit dimensions (L x W x D)
14' x 1.5' x 7.7'
No groundwater seepage.
PI readings at background level.
No visible coal tar but ash & clinkers present.
Piezometer (P-1) installed behind utility pole - screened from 6.5' to 7.5'.

SAMPLES OBTAINED

NO.	DEPTH (FT)	INIT. SER. NO.	HD. SP. VOA PPM
S-1	6.5'-7.0'	NEEXTPXX01/11	
S-2			
S-3			
S-4			
S-5			
S-6			
S-7			
S-8			
	Collected soil for		
	lab permeability test.		

REFERENCE: FIELD BOOK, PG. _____
ATTACHMENTS _____

Christina Moore
SIGNATURE

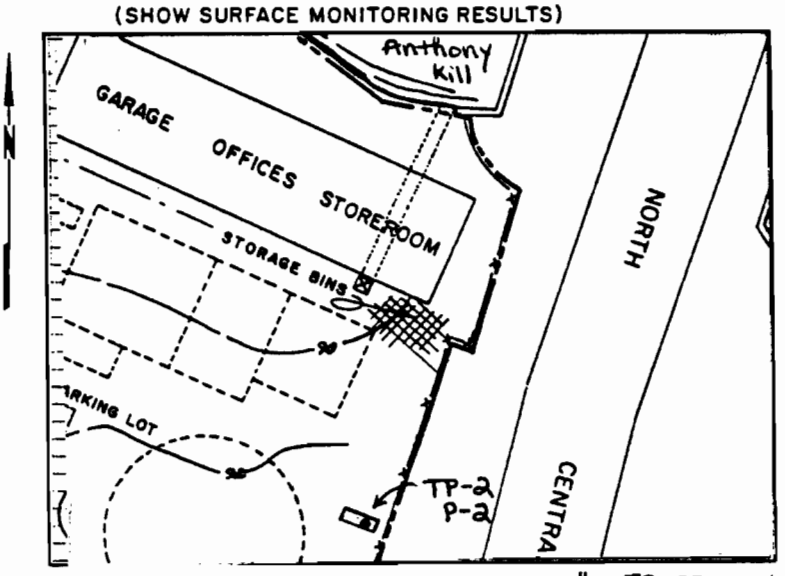
TEST PIT RECORD

SITE Mechanicville - NYSEG 4945-02

TEST PIT TP-2 DATE 7/21/86 TIME ST. 15:30 END 16:45

COORDINATES N/A GRID ELEMENT N/A

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 50 FT

CREW MEMBERS

1. C. Moore
2. S. Wibby
3. PT } Maloy (Empire)
4. RC }
5.
6.

MONITOR EQUIPMENT

PI METER	(Y)	N
EXPLOSIVE GAS	(Y)	N
AVAIL. OXYGEN	(Y)	N
OVA	Y	(N)

OTHER Radiation meter

PHOTOGRAPHS, ROLL #1

EXPOSURE #9, #10

NOTES 0'-1.3' Brown to dark brown silty sand with sharp angular cobbles (>50%)

1.3'-2.6' Brown sandy fill with bricks, reduced

2.6'-5.5' angular cobbles and boulders with some sandy fill. Highly weathered. (75% rock material)

5.5'-7.0' angular rocks, less weathered, with sand matrix

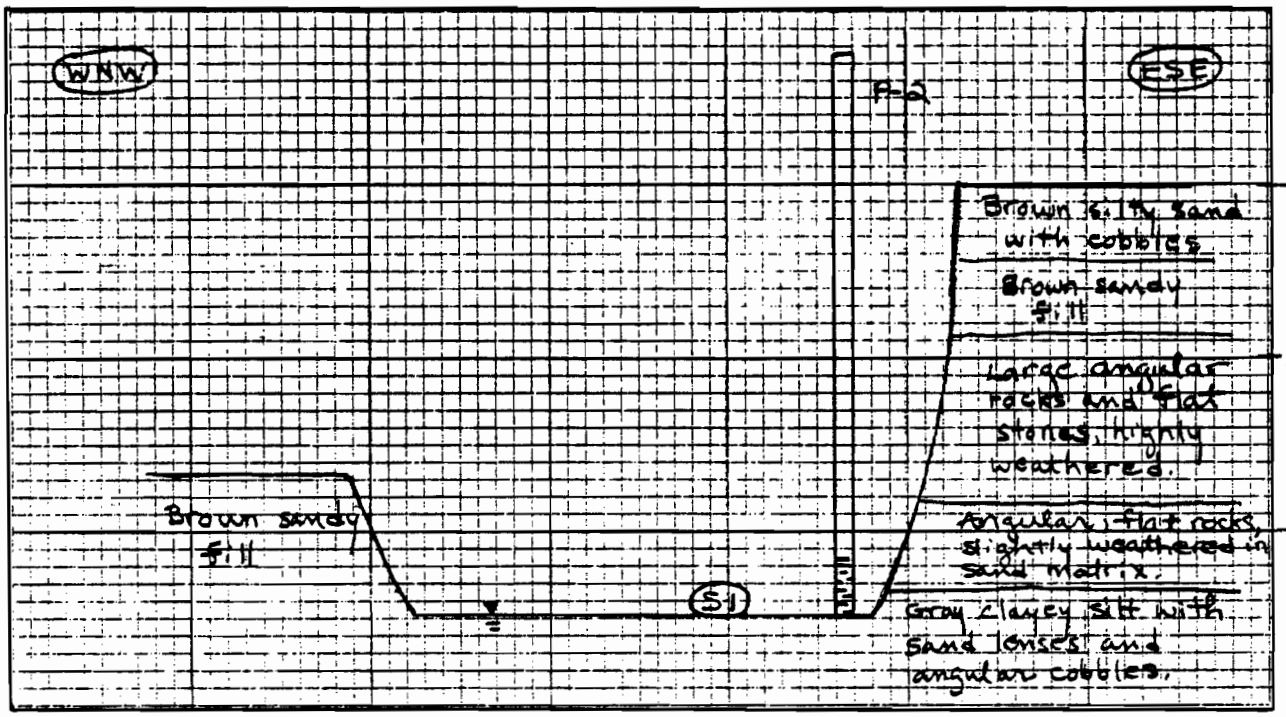
7.0'-7.5' & light gray clayey silt matrix with brown sandy silt lenses with angular cobbles (>50%). mottling

▽ 7.5'

TEST PIT RECORD
PROFILE ALONG TEST PIT- 2

SITE NYSEG Mechanicville

DEPTH (FT) SCALE 1" = 3 FT



NOTES:

Test pit dimensions (LxWxD): 11' x 2' x 7.5'

PI readings at background level in ambient air - 10 ppm from sampled material.

No visible coal tar.

Piezometer (P-2) installed on bank - screened from 6.5'-7.5'.

Test pit was dug into the bank.

SAMPLES OBTAINED

NO.	DEPTH (FT)	INIT. SER. NO.	HD. SP. VOA PPM
S-1	7.0'-7.5'	MEEXTPXX03/11	
S-2			
S-3			
S-4			
S-5			
S-6			
S-7			
S-8			

REFERENCE: FIELD BOOK, PG. _____
ATTACHMENTS _____

Christina Moore
SIGNATURE

E.C. JORDAN CO.

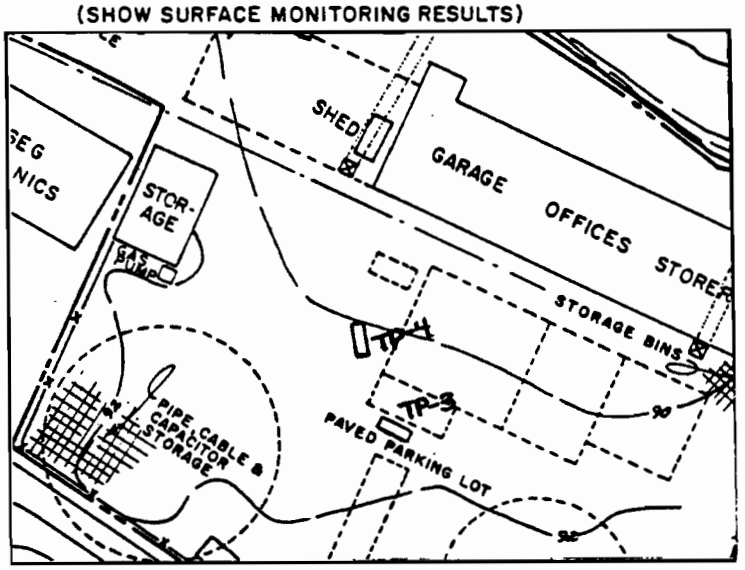
TEST PIT RECORD

SITE Mechanicville NYSE G 4945-02

TEST PIT TP-3 DATE 7/21 TIME ST. 14:15 END 14:30

COORDINATES N/A GRID ELEMENT N/A

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



CREW MEMBERS

1. C Moore
2. S Wibby
3. PT } Maloy (empire)
4. RC }
5.
6.

MONITOR EQUIPMENT

PI METER (Y) N Background
EXPLOSIVE GAS (Y) N
AVAIL. OXYGEN (Y) N
OVA Y (N)
OTHER Radiation meter
PHOTOGRAPHS, ROLL —
EXPOSURE —

NOTES 0.2'-1' Light brown sandy silt with cobbles loose, granular, dry.

FILL

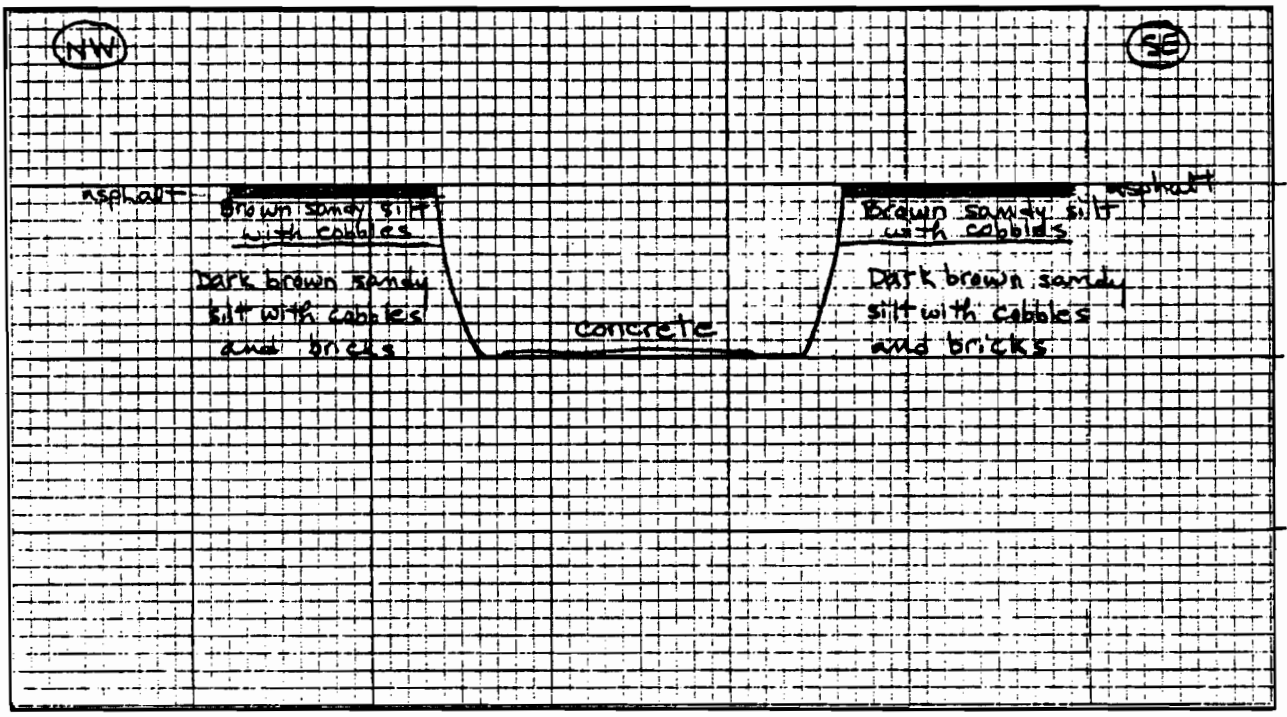
1'-3' Dark brown silty fill with cobbles, bricks, and concrete. loose, dry. and granular.

3' Concrete obstruction - refusal.

TEST PIT RECORD
PROFILE ALONG TEST PIT- 3

SITE NYSEG Mechanicville

DEPTH (FT) SCALE 1" = 3 FT



NOTES:

Test pit dimensions (L x W x D): 7' x 2' x 3'

PI meter readings at background in ambient air and at soil. No visible signs of coal tar or other contamination. Test pit was abandoned after numerous attempts to break through a concrete obstruction encountered at 3.0'.

No groundwater seepage

SAMPLES OBTAINED

NO.	DEPTH (FT)	INIT. SER. NO.	HD. SP. VOA PPM
S-1			
S-2			
S-3			
S-4		No Samples	
S-5			
S-6			
S-7			
S-8			

REFERENCE: FIELD BOOK, PG. _____
ATTACHMENTS _____

Christina Moore
SIGNATURE

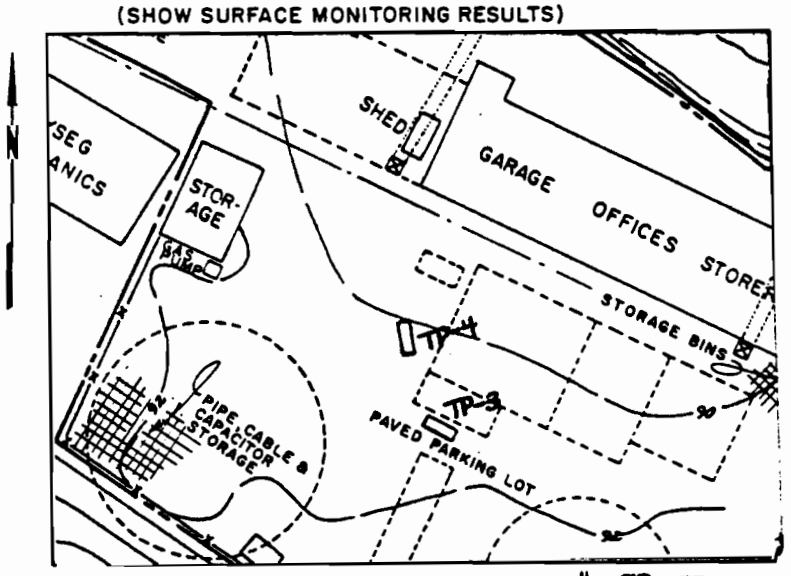
TEST PIT RECORD

SITE Mechanicville NYSEG

TEST PIT TP-4 DATE 7/21/86 TIME ST. 14:40 END 15:00

COORDINATES N/A GRID ELEMENT N/A

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 50 FT

CREW MEMBERS

1. SWibby
2. CMoore
3. PT } Maloy (Empire)
4. RC }
5.
6.

MONITOR. EQUIPMENT

PI METER	(Y)	N
EXPLOSIVE GAS	(Y)	N
AVAIL. OXYGEN	(Y)	N
OVA	Y	(N)

OTHER Radiation meter

PHOTOGRAPHS, ROLL #1

EXPOSURE #6, 7, 8

NOTES

0.1' – 0.3' Light brown sandy silt w/ cobbles loose and dry

0.3' – 1.0' Dark brown sandysilt w/ cobbles. Loose, dry.

1.0' – 1.5' Bricks

▽ 2.75' 1.5' – 3.0' Light brown sand, medium to fine

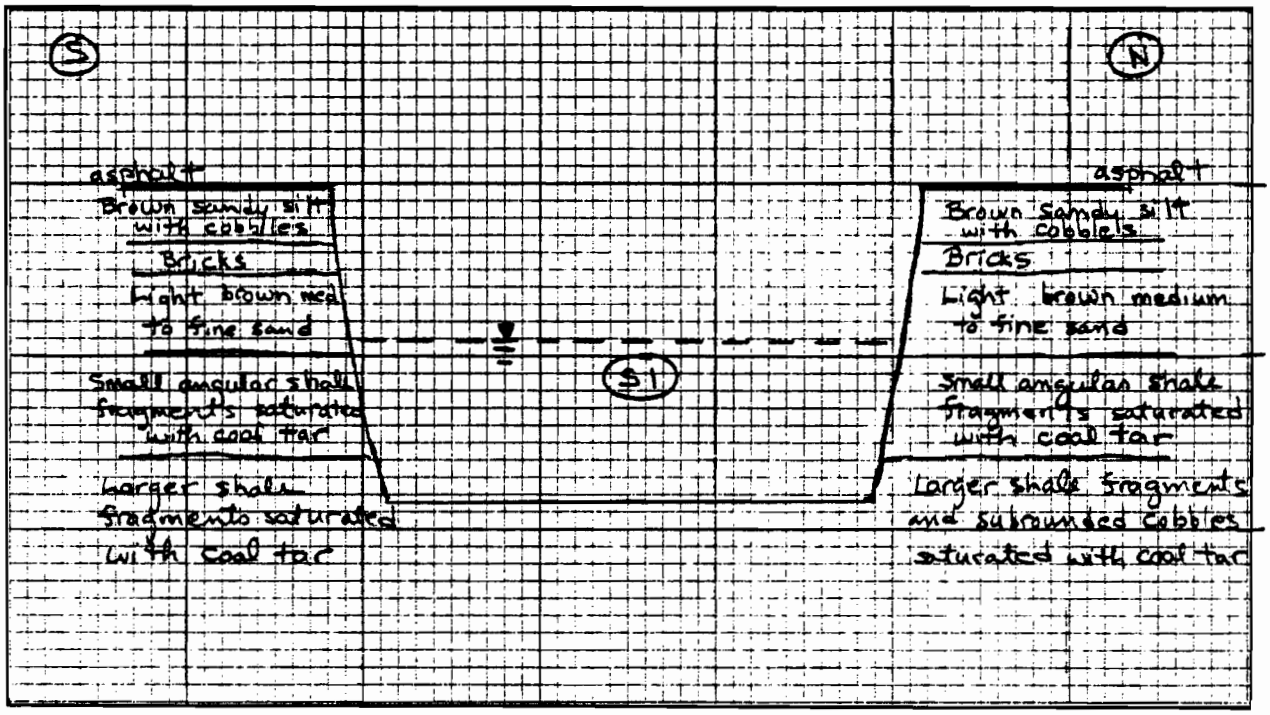
PI – 30 → 40ppm 3.0' – 4.75' angular shale rock fragments saturated with coal tar

4.75' – 5.6' Larger angular shale fragments and subrounded cobbles within clayey silt matrix. Saturated with coal tar

TEST PIT RECORD
PROFILE ALONG TEST PIT- 4

SITE NYSEG Mechanicville

DEPTH (FT) SCALE 1" = 3 FT



NOTES:

Test pit dimensions (LxWxD): 10' x 2' x 5.5'

PI meter readings of 30-40 ppm near sampled soil.

Coal tar observed from 3' to bottom of pit.

Water flowed rapidly into the pit from the SE corner

SAMPLES OBTAINED

NO.	DEPTH (FT)	INIT. SER. NO.	HD. SP. VOA PPM
S-1	3.0'-4.0'	MEEITPXX04/1	
S-2			
S-3			
S-4			
S-5			
S-6			
S-7			
S-8			

REFERENCE: FIELD BOOK, PG. _____
ATTACHMENTS _____

Christina Moore
SIGNATURE

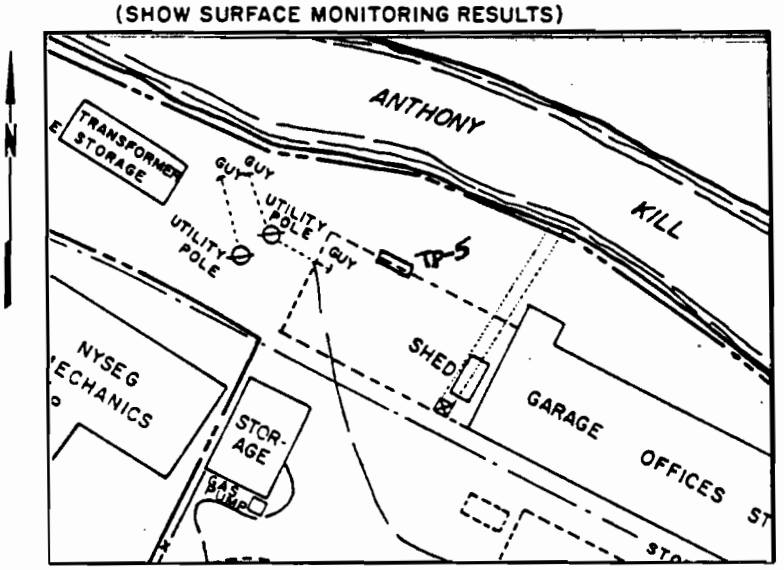
TEST PIT RECORD

SITE Mechanicville, NYSEG 4945-02

TEST PIT TP-5 DATE 7/21/86 TIME ST. 12:50 END 13:45

COORDINATES N/A GRID ELEMENT N/A

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 50 FT

CREW MEMBERS

1. SWibby
2. CMoore
3. PT } Maloy (Empire)
4. RC }
5.
6.

MONITOR EQUIPMENT

PI METER	(Y)	N
EXPLOSIVE GAS	(Y)	N
AVAIL. OXYGEN	(Y)	N
OVA	Y	(N)

OTHER Radiation meter

PHOTOGRAPHS, ROLL # 1

EXPOSURE # 2, 3, 4, 5

NOTES 0'-1.3' Light brown sandy silt with cobbles

1.3'-3.0' Dark brown sandy silt with angular cobbles (Exposed tile drain at approx. 2')

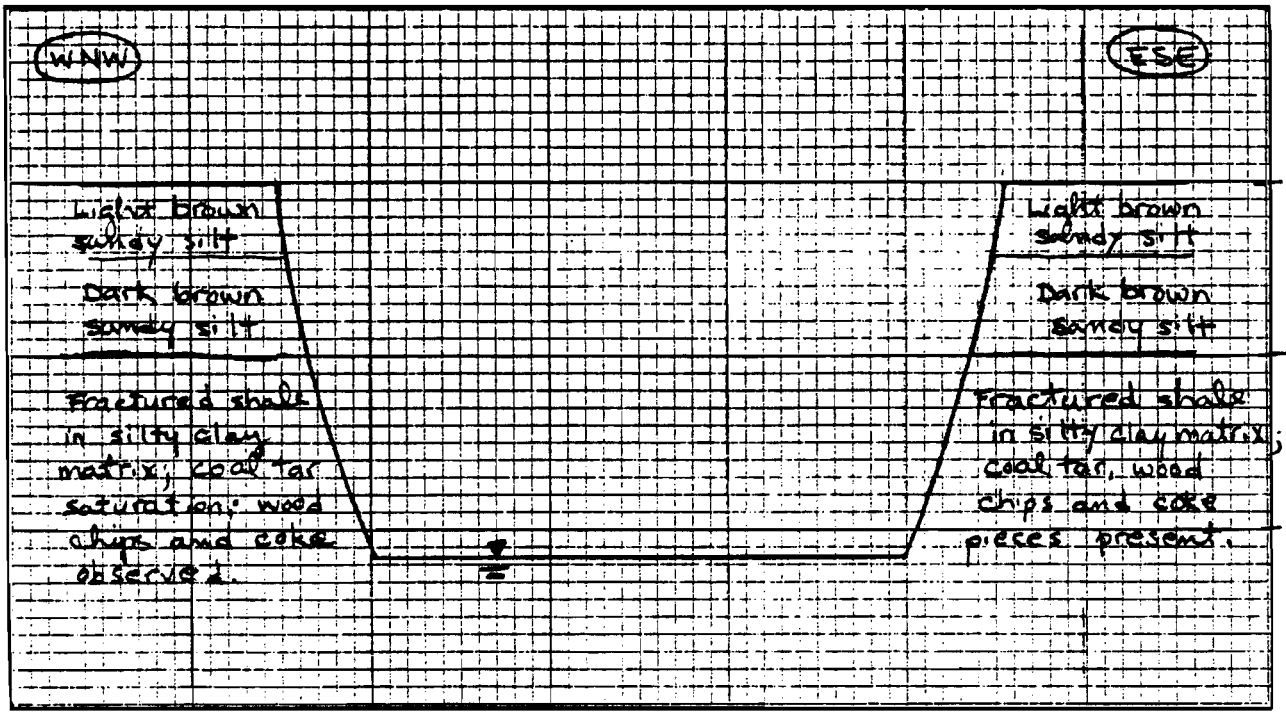
3.0-6.5' Highly fractured shale, weathered with silt and clay soil, loose. Wood chips and coke fragments present, saturated with coal tar.

▽ 6.5' Fractured bedrock surface; coal tar saturation; groundwater seepage.

TEST PIT RECORD
PROFILE ALONG TEST PIT- S

SITE NYSEG Mechanicville

DEPTH (FT) SCALE 1" = 3 FT



NOTES:

Test pit dimensions (LxWxD): 12.5' x 2' x 6.5'

Coal tar saturation from 3' to bottom of pit.

PI meter reading of 50 ppm over saturated soil.

Groundwater seepage observed at bottom of pit.

Tile drain uncovered at approx. 2'.

SAMPLES OBTAINED

NO.	DEPTH (FT)	INIT. SER. NO.	HD. SP. VOA PPM
S-1	3.0'-4.0'	MEEXTPXX05/11	
S-2	4.0'-6.0'	MEEITPXX05/21	
S-3		(GC/MS)	
S-4			
S-5			
S-6			
S-7			
S-8			
Dup of S1	3.0'-4.0'	MEEXTPXXDU/11	

REFERENCE: FIELD BOOK, PG. _____

ATTACHMENTS _____

Christina Moore

SIGNATURE

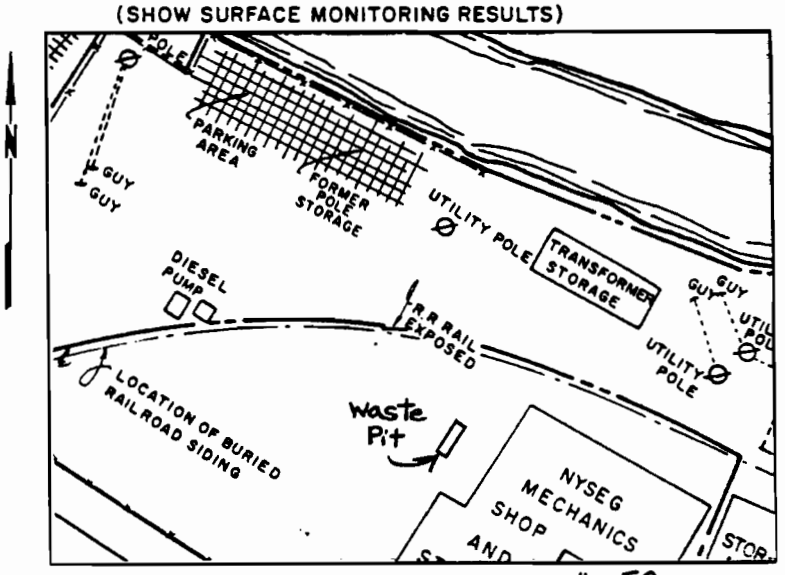
TEST PIT RECORD

SITE Mechanicville - NYSEG 4945-02

TEST PIT Waste Pit DATE 7/21/86 TIME ST. 1000 END 1030

COORDINATES N/A GRID ELEMENT N/A

SKETCH MAP OF TEST PIT SITE
(SHOW SURFACE MONITORING RESULTS)



SCALE 1" = 50 FT

CREW MEMBERS
1. S.W. Ibby
2. C. Moore
3. PT } Maloy (Empire)
4. RC }
5.
6.

MONITOR EQUIPMENT
PI METER (Y) N
EXPLOSIVE GAS (Y) N
AVAIL. OXYGEN (Y) N
OVA Y (N)
OTHER Radiation Meter
PHOTOGRAPHS, ROLL #1
EXPOSURE # 0

NOTES

0' – 0.3' Brown, sandy fill with cobbles.

0.3' - 0.7' Asphalt

0.7' - 1.2' Brown sandy fill with cobbles

1.2' - 4.0' Brown to black sandy fill with clinkers, cobbles brick fragments, cobbles, and white/gray ash.

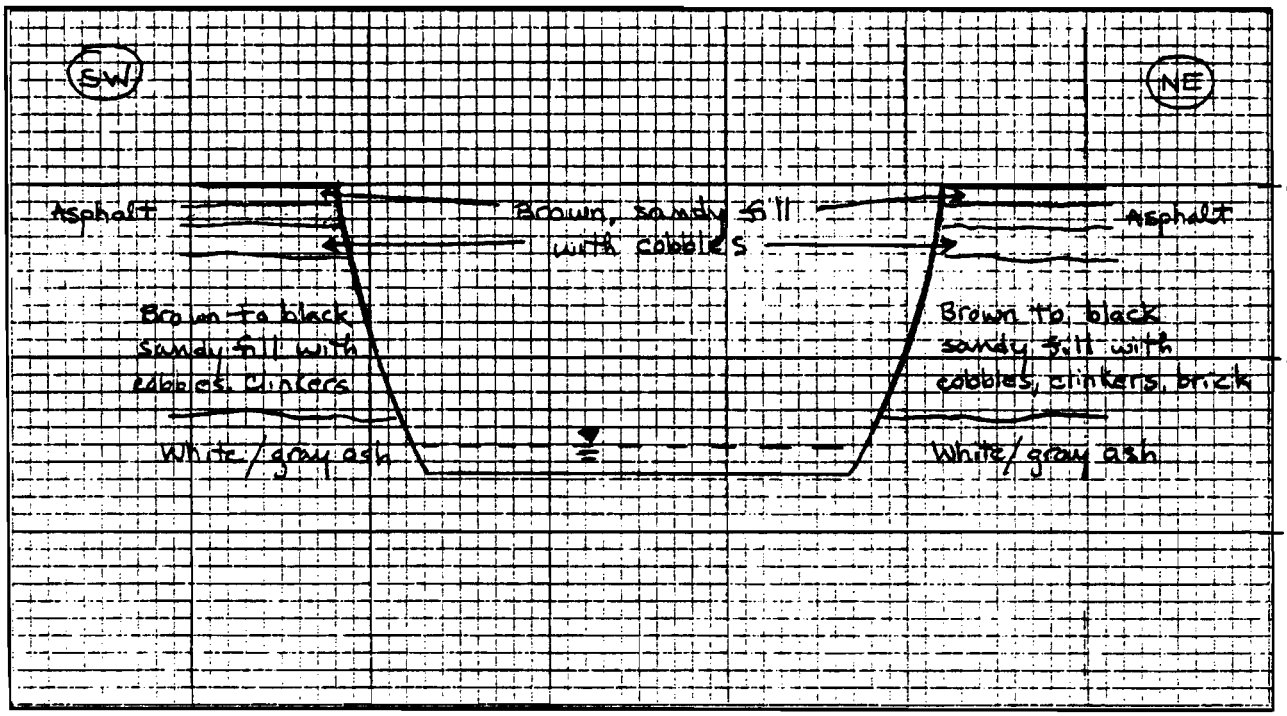
4.0' - 5.0' White/gray ash containing coke, clinkers, some wood, cobbles, and cinders grading back into cobbly brown fill.

$\bar{x}$ at 4.5'

TEST PIT RECORD
PROFILE ALONG TEST PIT- Waste Pit

SITE Mechanicville

DEPTH (FT) SCALE 1" = 3 FT



NOTES:

W x L x D
Test pit dimensions: 2.5' x 10' x 5'
No visible coal tar but ash, coke and clinkers present.
PI readings at background level.

SAMPLES OBTAINED No Samples

NO.	DEPTH (FT)	INIT. SER. NO.	HD. SP. VOA PPM
S-1			
S-2			
S-3			
S-4			
S-5			
S-6			
S-7			
S-8			

REFERENCE: FIELD BOOK, PG. _____
ATTACHMENTS _____

Christina Moore
SIGNATURE

APPENDIX A-2

BORING LOGS
AND
FIELD OBSERVATIONS

DRILLING OBSERVATIONS
MECHANICVILLE SITE

Test Pit	Total Depth (ft)	Visual Appearance	Odor and PID Characterization	Samples Collected
B-1	20.2	Black coke ash up to 3mm diameter, from 3.5 to 4.0 ft. Brick fragments and glass encountered from surface to 8.0 ft. Dark gray shale bedrock at 12.2 ft.	No unusual odors. PID-background levels.**	Sample B-1/S-1 from 8.0 to 10.0 ft.*
B-2	16.2	Sandy to gravelly fill with shale fragments from 0.5 to 6.0 ft. weathered shale bedrock at 9.4 feet. No visual signs of coal tar wastes encountered in boring.	No unusual odors. PID-headspace reading of 13 ppm on soil from 4.0 to 6.0 feet. Background levels elsewhere.	Sample B-2/S-1 from 8.0 to 9.5 ft.*
B-3	9.2	Black stained wood chips from 2.0 to 4.0 ft. Trace coal tar-stained organics and fly ash from 4.0 to 6.0 ft., and coal tar staining in sandy silt and shale chips from 6.0 to 8.0 ft. Coal tar stains from 8.0 to 9.2 ft. on weathered bedrock with little silt and fine sand.	PID headspace readings of 270 ppm and 250 ppm from 4.0 to 6.0 ft. and 6.0 to 8.0 ft., respectively.	Sample B-3/S-1 from 4.0 to 6.0 ft.* Sample B-3/S-2 from 6.0 to 8.0
B-4	16.8	Brick chips from 4.0 to 6.0 ft. Coal tar staining noted from 6.0 to 14.0 ft. and 16 to 16.8 ft. Weathered bedrock and shale fragments predominant from 8 to 16 ft.	Coal tar odor from 4.0 - 6.0 ft. PID-ambient air readings of 10 ppm and 2 ppm at 6.0 to 8.0 ft. and 8.0 to 12.0 ft. PID-headspace readings of 10 to 70 ppm from depths of 4.0 to 12.0 ft.	Sample B-4/S-1 from 6.0 to 8.0 ft.*

DRILLING OBSERVATIONS (continued)

Test Pit	Total Depth (ft)	Visual Appearance	Odor and PID Characterization	Samples Collected
B-5	19.4	Fill material with brick, coal clinkers, fly ash and shale chips from 6.0 to 8.0 ft. Predominantly sand and gravel with organics, coal clinkers, and wood chips from 8.0 to 9.6 ft. Coal tar sheen on brown silt with shale chips from 10.5 to 11.5 ft. Bedrock at 11.5 ft.	PID background levels for ambient air. PID-headspace readings of 22 ppm and 175 ppm from 10.0 to 10.9 ft and 10.5 to 11.5 ft., respectively.	Sample B-5/S-1 from 10.0 to 10.9 ft.* Sample B-5/S-2 from 10.5 to 11.5 ft.
B-6	32.0	Casing driven to bedrock at 17 ft. Dark gray shale bedrock thinly laminated, hard, broken, and unweathered.	PID-ambient background levels. 250 - 450 ppm off of augers at 1.5 to 2.5 ft. PID-headspace readings of 300 ppm at 9.2 ft. and background levels from 17.0 to 22.0 ft.	No samples collected.
B-7	9.0	Casing spun through concrete pad (0 to 3.0 ft) and spoon pounded to 7.0 ft. Coarse sandy fill with pebbles and shale fragments from 7.0 to 9.0 ft.	No ambient air or headspace readings taken.	Sample B-7/S-1 from 7.0 to 9.0 ft.*
B-8	17.4	Trace organics from 4.0 to 5.2 ft. Black stains on silt fill and shale fragments from 6 to 6.3 ft. Some coal tar visible on silt with cobbles from 9.5 to 13.5 ft. Extensive coal tar from 13.5 to 15.5 ft. on silty fill and shale fragments. Black stained silty sand from 15.5 to 17.4 ft.	Slight odor from 4.0 to 6.3 ft. and 9.5 to 11.5 ft. PID-ambient air readings of 1-2 ppm from 4.0 to 5.2 ft. PID-headspace readings of 1-2 ppm, 20 ppm, and 30 ppm from 4.0 to 5.2 ft., 6 to 6.3 ft, and 7.5 to 9.5 ft, respectively.	Sample B-8/S-1 from 9.5 to 11.5 ft. Sample B-8/S-2 from 13.5 to 15.5 ft.* Sample B-8/S-3 from 15.5 to 17.5 ft.*

* Samples analyzed by ERCO.

** Background PID levels represent ambient air levels obtained outside and upwind of the site boundaries. At the Mechanicville site, background levels were generally less than 5 ppm.

MECHANICVILLE BORING LOG

BORING NO. B-1

CLIENT NYSEG			PROJECT NO. 4045-02
CONTRACTOR EMPIRE SOILS	DATE STARTED 7/23/86		COMPLETED 7/24/86
METHOD HSA/NX CORE	CASING SIZE 4.25 I.D.	HNU (1.7) 10.2	PROTECTION LEVEL D
GROUND EL. 95.9 Rel.	SOIL DRILLED 11.0'	ROCK DRILLED 9.2'	TOTAL DEPTH 20.2'
LOGGED BY L. ESPY	CHECKED BY CM	DATE 9/22/86	▽ BELOW GROUND 8.65' 7-25-86

DEPTH (FT)	HNU AMBIENT AIR	SAMPLE NO. & TYPE NO.	SAMPLE	CLP	GC	OTHER	HNU HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION	SOIL CLASS OR ROCK FRACTURES	BLOWS/6-IN OR RQD % (20 40 60 80 100)	WELL DATA
0	Bkgd.	D.J. S-1					Bkgd.	0-2.0' Light brown sandy FILL with trace clay, loose, dry. Some glass, moderate amount of roots and organics. Iron staining on surface. Recovery: .5/2.0	FILL	3 6 7 10	
2.5	Bkgd	D.J. S-2					Bkgd	2-3.5' Brown FILL some as above. 3.5-4.0' Black coke ASH, up to 3mm diameter, loose, dry. Highly oxidized from 3.75' to 3.8'. .7/2.0	FILL	7 4 3 3	
5.0	Bkgd.	D.J. S-3					Bkgd.	4-6.0' Dark brown to black silty FILL with up to 1" diameter gravel, some organics, brick fragments and glass, dense, moist, some iron staining. .6/2.0	FILL	4 3 2 3	
7.5	Bkgd.	D.J. S-4					Bkgd.	6-8.0' Brown, silty FILL grading upwards to dark brown silty FILL, some gravel and glass, loose, very moist. .2/2.0	FILL	5 5 3 3	
10		ANYL. S-1 D.J. S-5					Bkgd.	8-10.0' Brown, gravelly SAND, up to 4 mm diameter, somewhat dense, dry. 9.4-9.6' - Black, organic matter with grass 1.0/2.0	SAND	5 5 4 4	
12.5	Bkgd.	R-1					Bkgd.	10-11.9' Brown, gravelly SAND with dry shale fragments up to 1 inch throughout, dense to very dense, dry. 11-11.9' - weathered Shale with some silt, little oxidation. Refusal at 11.9' 1.5/2.0	SAND	12 32 77 100/.4	
								BEDROCK AT 12.2'			
								R-1 12.2-13.6' 30B 12.2'. SPIN CASING TO 12.6'. Recovery = 0/1.4' = 0%	SHALE		
15.0	Bkgd.	R-2					Bkgd.	R-2 13.6-17.2' Dark grey SHALE, laminated (1/8" bedding units), hard, very broken, weathering (staining) along bedding planes only. Bedding dips 30°. Primary fractures along bedding planes, secondary, hairline, fractures perpendicular to primary fractures and 1/2" in length. Recovery = 85% RQD = .7'/3.6' = 19%	SHALE	19%	
17.5	Bkgd.	R-3					Bkgd.	R-3 17.0-20.2' (1.1 Ft. CAVE-IN) Dark grey SHALE, same as above. Recovery = 95% RQD = 23%	SHALE	23%	CAVE-IN
20.0											

* U = THIN WALL TUBE S = SPLIT SPOON R = ROCK

EC JORDAN CO

MECHANICVILLE BORING LOG

BORING NO. B-1

CLIENT NYSEG			PROJECT NO. 4945-03
CONTRACTOR EMPIRE SOILS	DATE STARTED 7/23/86		COMPLETED 7/24/86
METHOD HSA/NX CORE	CASING SIZE 4.25 I.D.	HNU (LT) 10.2	PROTECTION LEVEL D
GROUND EL. 95.9 Ref.	SOIL DRILLED 11.0'	ROCK DRILLED 9.2'	TOTAL DEPTH 20.2'
LOGGED BY L. ESPY	CHECKED BY CM	DATE 9/22/86	▽ BELOW GROUND 8.65' 7-25 86

DEPTH (FT)	HNU AMBIENT AIR	SAMPLE NO. & TYPE NO.	SAMPLE CLP	SAMPLE QC	OTHER	HNU HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION	SOIL CLASS OR ROCK FRACTURES	BLOWS/6-IN OR RQD % (20 40 60 80 100)	WELL DATA
20.0		R-3					R-3 Cont.	SHALE		CAVE-IN
							BOB 20.2 FT. CAVE-IN TO 18.9			
22.5										

*U = THIN WALL TUBE S = SPLIT SPOON R = ROCK

FIELD LOG FOR BORING IN ROCK - A.

CONVENTIONAL ROCK DRILLING

PROJECT NO. 4945-02
BORING NO. B-1 (M)
PAGE 1 OF 1

LOGGED BY L. ESPY DATE 7/23/86 /7/24/86
CHECKED BY JWP DATE 9/22/86

BIT USE
N - NEW
R - RESET
U - USED

DEPTH	FOR EACH RUN								DRILLING		DRILL WATER RETURN %	COMMENTS ON DRILLING AND SAMPLING
	SAMPLE TYPE AND NO.	TOP DEPTH FT.	IN.	LGTH. FT IN.	RECOVERY FT IN.	RECOVERY %	ROD IN.	ROD %	BIT USE	TIME MIN./FT.		
	R-1	12.2	'	1.4'	0	0	0	0	U	-	NA	1.4 FEET OF Granular material caved in. Washed out bit. R-2. Redrilled 12.2 - 13.6'.
	R-2	13.6	'	3.6'	3.06'	85%	.7'	19%	U	Approx 8 min/ft	NA	Return water muddy brown color.
				ROD FOR R-2 - 2 PIECES								1.1 FT. CAVE-IN BEFORE STARTING 17.2.
	R-3	17.2		3.0'	2.9'	95%	.7'	23%	U	6-7 min/ft	NA	
				ROD FOR R-3 - 1 PIECE								
	BOB	20.2										

MECHANICVILLE BORING LOG

BORING NO. B-2

CLIENT NYSEG			PROJECT NO. 4945-[illegible]
CONTRACTOR EMPIRE SOILS	DATE STARTED 8/1/86		COMPLETED 8/1/86
METHOD HSA/NX CORE	CASING SIZE 4.25 I.D.	HNU (LT) 10.2	PROTECTION LEVEL D
GROUND EL. 91.6 Ref.	SOIL DRILLED 9.5'	ROCK DRILLED 6.7'	TOTAL DEPTH 16.2
LOGGED BY L. ESPY	CHECKED BY CM	DATE 9/22/86	▽ BELOW GROUND 5.94' 8-1-86

DEPTH (FT)	HNU AMBIENT AIR	SAMPLE NO. & TYPE NO.	SAMPLE CLP	SAMPLE GC	OTHER - WATER LEVEL HNU HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION	SOIL CLASS OR ROCK FRACTURES	BLOWS/6-IN OR RQD % (20 40 60 80 100)	WELL DATA
0	Bkgd.	D.J. S-1			Bkgd.	0.5-2.0' Black, sandy to gravelly FILL, with rounded pebbles, Loose, dry.	FILL	12 | 14 | 8	
2.5	Bkgd.	D.J. S-2			Bkgd.	2-4' FILL, with 3 discrete layers: 2-3.4' Calcite, blocky (2" dia.) dry, angular chunks 3.4-3.9' Brown silty SAND, loose, dry 3.9-4.0' - Dark grey SHALE fragments in moist silty matrix. Very Wet at 3.8'. REC. 55%	FILL	6 | 10 | 3 | 4	
5.0	Bkgd.	D.J. S-3			13 ppm	4-6' Sandy to gravelly FILL with 2" pebbles, subrounded to 5.7'. 5.7-6.0'-Greenish-grey SILT to clayey SILT with some iron staining, trace organics, dense, moist. Recovery 35%	FILL / SILT	3 | 3 | 1 | 2	
7.5'	Bkgd.	D.J. S-4			Bkgd.	6-8' Orangish-grey clayey SILT with subrounded pebbles, dense, moist grading downwards to orangish grey silty coarse SAND with angular SHALE fragments, dense, damp. REC. 50%	SILT	3 | 12 | 6 | 14	
10.0	Bkgd.	D.J S-5 ANM-S-1			Bkgd.	8-9.5' Dark grey silty coarse SAND, angular to 9.4' At 9.4' - Dark grey angular SHALE fragments, very thinly bedded, dry. REC. 45%	SAND	12 | 40 | 100/5	
12.5	Bkgd.	R-1			Bkgd.	Weathered BEDROCK AT 9.4' SET CASING AT 10.6 WASH OUT HOLE. BEGIN CORING R-1 9.5-13.5' Dark grey SHALE with 25% calcite in top 2/10 ft., v. thinly bedded (1/4-1"), hard, v. broken to broken, some weathering along bedding fractures (staining), calcite veins along bedding planes, bedding dips 30°. Recovery = 4.5/4.0' (cave-in) RQD = 54%	SHALE		
15.0	Bkgd.	R-2			Bkgd.	R-2 13.5-16.2' Dark grey SHALE, massive, hard, unweathered, only 2 mechanical breaks which are along bedding planes. Recovery = 100% RQD = 100%	SHALE		
17.5						BOB 16.2'			
20.0'									

*U = THIN WALL TUBE S = SPLIT SPOON R = ROCK

EC JORDAN CO.

FIELD LOG FOR BORING IN ROCK - A.

NYSEG Mechanicville, NY

PROJECT NO. 4945-02
BORING NO. B-2
PAGE 1 OF 1
LOGGED BY L. ESPY DATE 8/1/86
CHECKED BY JVP DATE 9/22/86

BIT USE
N - NEW
R - RESET
U - USED

DEPTH	FOR EACH RUN								DRILLING		DRILL WATER RETURN %	COMMENTS ON DRILLING AND SAMPLING
	SAMPLE TYPE AND NO.	TOP DEPTH FT. IN.	LGTH. FT. IN.	RECOVERY FT. IN.	RECOVERY %	ROD IN.	ROD %		BIT USE	TIME MIN./FT.		
9.5	R-1	9.5'	4'	4.5'	100+	NA	54%		U	6/Ft	NA	4' RUN.
	R-2	13.5'	2.7'	2.5	93%	NA	100%		U	6/Ft	NA	2.7' Run
		16.2										

MECHANICVILLE BORING LOG

BORING NO. B-3

CLIENT NYSEG			PROJECT NO. 4995-02
CONTRACTOR EMPIRE SOILS	DATE STARTED 8/5/86		COMPLETED 8/6/86
METHOD H.S. AUGER	CASING SIZE 4.25' ID	HNU (11.7) / 10.2	PROTECTION LEVEL C
GROUND EL. 87.4 Rel.	SOIL DRILLED 9.2'	ROCK DRILLED N/A	TOTAL DEPTH 9.2'
LOGGED BY SNW	CHECKED BY CM	DATE 9/22/86	▽ BELOW GROUND 2.5' 8/14/86

PI METER MALFUNCTIONING
SUSPECT AMBIENT AIR DATA

DEPTH (FT)	HNU AMBIENT AIR	SAMPLE NO. & TYPE NO.	SAMPLE	CLP	GC	OTHER	HNU HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION	SOIL CLASS OR ROCK FRACTURES	BLOWS/6-IN OR RQD % (20 40 60 80 100)	WELL DATA	ELEV. (FT)
0								0.5' Asphalt				
		D.J. S-1						0.5'-2.0' Black, fn-cs sand, some gravel and angular shale chips, grading to sandy silt and shale chips; Dry; med. dense .75'/1.5'	Fill	5 4 3		
		D.J. S-2						2.0'-4.0' Tan to gray silty sand w/ angular shale chips; some black stained wood chips. loose; moist. 30% shale chips. Recovery .8'/2.0'	Fill	5 4 3 3		
5		Anly. S-1					270 (8/11)	4.0'-6.0' Black silt (75%) w/ little angular shale chips grading to silt w/ some shale chips; trace coal tar stained org., wood and fly ash; loose; wet. 1.8'/2.0'	Fill	1 1 1 1		
		Anly S-2					250 (8/11)	6.0'-8.0' Black sandy silt w/ shale chips and wood fragments: loose; wet; friable; Coal tar stained; dry very fractured shale in the end of the sample; iron stained; horiz. and vertical fractures (Rec. 1.3'/2.0')	Fill & WX Bdk			
								8.0-9.2' Weathered bedrock w/ little silt and fine sand; Horiz. and vert. fractures; platy and angular rock fragments; Coal tar stains, loose and wet at 8.0-8.3'; Tan, dry and dense at 8.3'-9.2'	WX Bdk	15 72 100/.2		
10												
								Bottom of boring at 9.2'				
								Weathered bedrock at 8.0'-9.2'				
								Bedrock at 9.2'				
15												
20												

* U = THIN WALL TUBE S = SPLIT SPOON R = ROCK

EC JORDAN CO.

FORM A (HAZMAT)

MECHANICVILLE BORING LOG

BORING NO. B-4

CLIENT NYSEG			PROJECT NO. 4945-02
CONTRACTOR EMPIRE SOILS	DATE STARTED 7/29/86		COMPLETED 7/30/86
METHOD HSA/NX CORE	CASING SIZE 4.25 I.D.	HNU 11.3/10.2	PROTECTION LEVEL D/C
GROUND EL. 91.0 Rel.	SOIL DRILLED 16.8	ROCK DRILLED NONE	TOTAL DEPTH 16.8
LOGGED BY SNW	CHECKED BY CM	DATE 9/22/86	▽ BELOW GROUND 3.2' (7-29-86)

DEPTH (FT)	HNU AMBIENT AIR	SAMPLE NO. & TYPE NO.	SAMPLE CLP	GC	OTHER	HNU HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION	SOIL CLASS OR ROCK FRACTURES	BLOWS/6-IN OR RQD % (20 40 60 80 100)	WELL DATA	ELEV
	Bkgd						Auger through Pavement to .5				
	Bkgd	D.J. S-1				Bkgd	.5-2.0' Light Brown Sand Fill w/ angular to sub-rounded gravel. Ash, brick chips, Black staining at 1.2' below G.S. Loose and dry. .7/1.5	Fill	13 9 6		
2.5	Bkgd	N.R.				Bkgd.	2.0-4.0' No Recovery Boulder was dug out by hand. 0/2.0	Fill	13 12 7 3		
5.0	Bkgd	D.J. S-2				10	4.0'-6.0' Black to Dark Gray Sandy Silt Fill w/ sub rounded Fine gravel and brick chips. Coal tar odor. Loose and Friable. Dry. 1.5/2.0	Fill	2 4 2 2		
7.5	10ppm	D.J. S-3 Anly G.C. only/MS				70+	6.0'-8.0' Black to Brown Sandy Fill w/ small sub rounded to angular gravel, brick chips, loose. wet. grades into - Silty weathered bedrock w/ shale fragments, heavily coal tar stained and moderatly oxidized. 1.5/2.0	Fill	4 8 11 14		
10.0	2	D.J. S-4				20+	8.0'-10.0' Black to Brown Silty Weathered Bedrock (50% silt), angular gravel (shale). grading into less Silty Clay weathered bedrock, coal tar present throughout - 85% Rock Material 2.0/2.0	Fill	14 19 21 31		
		D.J. S-5				70+	10'-12' Clayey Silt weathered Bedrock, 75% angular gravel (shale), Coal tar stained loose, wet. 1.5/2.0	Fill	11 12 12 3		
12.5	Bkgd.	D.J. S-6				Bkgd.	12'-14' Gray Broken Shale Fragments w/ Silt, heavily stained w/ Coal tar. Loose. wet. 1.0/2.0	Fill	1 1 30 47		
15.0	Bkgd.	D.J. S-7				Bkgd.	14-16' Black Silt w/ angular shale chips gravel size. Loose. Wet 50% silt 50% Rck .2/2.0	Fill	2 1 0 2		
	Bkgd.	D.J. S-8				Bkgd.	16-16.8 Tan to Lgt Gray Silt Clay Till w/ small sub rounded pebbles + Fine gravel in the till matrix. Organics w/ Coal tar staining in root canals. Dry. Dessicated. Tight .6/1.1	Till	2 1 100/.1		
17.5							Refusal @ 16.8' EOB - 16.8'				
20.0											

* U = THIN WALL TUBE S = SPLIT SPOON R = ROCK

EC JORDAN CO

FORM A (HAZMAT)

MECHANICVILLE BORING LOG

BORING NO. B-5

CLIENT NYSEG			PROJECT NO. 4945-02
CONTRACTOR EMPIRE SOILS	DATE STARTED 8/4/86		COMPLETED 8/5/86
METHOD HSA/NX CORE	CASING SIZE 4.25 I.D. /NX-D	HNU 11.7/10.2	PROTECTION LEVEL D/C
GROUND EL. 88.4 Rel.	SOIL DRILLED 11.5'	ROCK DRILLED 7.9'	TOTAL DEPTH 19.4
LOGGED BY SNW	CHECKED BY CM	DATE 9/22/86	▽ BELOW GROUND 10.0' 8/5/86

DEPTH (FT)	HNU AMBIENT AIR	SAMPLE NO. & TYPE NO.	SAMPLE CLP	SAMPLE GC	OTHER	HNU HEADSPACE (PPM)	SOIL/ROCK DESCRIPTION	SOIL CLASS OR ROCK FRACTURES	BLOWS/6-IN OR RQD % (20 40 60 80 100)	WELL DATA ELEV.
	Bkgd.	D.J. S-1				Bkgd	0-2.0 Dk. Brown Silty Sand Fill w/angular gravel, organics, loose, moist. Rec. 1.6/2.0	Fill	3 6 6 4	
2.5	Bkgd.	D.J. S-2				Bkgd	2.0-4.0 Lgt. Brown angular gravel Fill w/ Sand and silt interbedded, oxidation Staining on shale chips. Loose. Dry. 80% Rock Material. 1.0/2.0	Fill	3 3 3 2	
5.0	Bkgd	D.J. S-3				Bkgd	4.0-6.0 Dk. Brown to Brown Silty Gravel Fill w/ Fine Sand w/ some Black Stained lenses. Loose. Moist. 65% angular Shale gravel. 1.2/2.0	Fill	4 2 2 3	
7.5	P.I. MALFUNCTIONING	D.J. S-4					6.0-8.0' Fill - Brick, Coal Clinkers, Brown Sandy Silt, fly ash, shale chips. Mostly Brick (75%) 1.0/2.0	Fill	4 7 11 7	
		D.J S-5					8-9.6' Dk. Brown to Brown Sand Silt Fill w/ gravel, organics, coal clinkers, wood chips. predominately sand + gravel. 9/1.6	Fill	7 12 19 100/1.1	
10.0							Auger to 10'			
		Amly S-1				22	10.0-10.9' Dk. Brown Silt w/ Rck (Shale) chips-gravel size organics, Mod. Loose, wet .5/.9	SILT	15 100/.4	
		Amly S-2				175	10.5-11.5 Dk. Brown Silt w/ angular Shale chips (gravel) Coal tar sheen, loose, wet .9/1.0	SILT	21 52 100/0	
							Bedrock at 11.5			
12.5							R-1 10.6-11.6 Metasedimentary Erratic Boulder 11.6-12.9 - Void Space - Sediment, wood chips shale fragments 12.4-15.3 - Gray shale, thin darker laminations (1-2 mm thick spaced every 1/2" to 1", Hard, Massive Calcite inclusions. Unweathered to trace weathering, 30-40° Bedding planes. Fractures occur at 60° across bedding planes. Rec. 4.45/5.0 = 89%	SHALE		
15.0							R-2 15.34-16.1 Gray Shale same as above No Natural Fractures Rec-76%	SHALE	Not Determinable Due to Coring Problems	
17.5							R-3 16.1-19.5 Gray Shale same as above, No Natural Fractures. Rec. = 100% RQD = 88%	SHALE		
20.0							BOB - 19.4			

*U = THIN WALL TUBE S = SPLIT SPOON R = ROCK

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FIELD LOG FOR BORING IN ROCK - A.

BIT USE
N - NEW
R - RESET
U - USED

PROJECT NO. 494502
BORING NO. B-5
PAGE 1 OF 1
LOGGED BY SNW DATE 8/4/86 - 8/5/86
CHECKED BY JWP DATE 9/22/86

DEPTH	FOR EACH RUN								DRILLING		DRILL WATER RETURN %	COMMENTS ON DRILLING AND SAMPLING
	SAMPLE TYPE AND NO.	TOP DEPTH FT.	TOP DEPTH IN.	LGTH. IN.	RECOVERY IN.	RECOVERY %	RQD IN.	RQD %	BIT USE	TIME MIN./FT.		
	R-1	10	6	5.0	4.45	89%		89%	U	9/ft		
	R-2	15	3	1.3	1.0	76%		NA*	U	*		* Due to mechanical problems RQD cannot be accurately interpreted
	R-3	16	1	3.4	3.5	100%		86%	U	9/ft		

MECHANICVILLE BORING LOG

BORING NO. B-6

CLIENT NYSEG			PROJECT NO. 4945-02
CONTRACTOR EMPIRE SOILS	DATE STARTED 7/24/86		COMPLETED 7/29/86
METHOD HSA/NX CORE	CASING SIZE 4.25" I.D.	HNU (1.7) 10.2	PROTECTION LEVEL C/D
GROUND EL. 91.0 Rel.	SOIL DRILLED 17'	ROCK DRILLED 15'	TOTAL DEPTH 32.0
LOGGED BY L. ESPY	CHECKED BY CM	DATE 9/22/86	▽ BELOW GROUND Unknown

DEPTH (FT)	HNU AMBIENT AIR	SAMPLE NO. & TYPE NO.	SAMPLE CLP	QC	CASING BLOW COUNTS/FT. & OTHER	HNU HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION	SOIL CLASS OR ROCK FRACTURES	BLOWS/6-IN OR RQD % (20 40 60 80 100)	WELL DATA
0							DRIVING CASING TO BDRK. NO SAMPLING.			NO MONITORING WELL INSTALLATION
					47	250-450 ppm off Augers	AUGER TOP 0.5' ASPHALT & FILL. DIFFICULT TO KEEP CASING STRAIGHT.			
	Bkgd.				48					
2.5'					49					
					30		3.5' Standing water			
5.0'							BLOWS NOT RECORDED			
	Bkgd.									
7.5					11					
					12		BLOWS NOT RECORDED			
	Bkgd.					300 ppm	9.2' - DRIVING DIFFICULT AT 9.2'. CASING KICKED OUT AT ANGLE; POSSIBLE COBBLE.			
10.0'					17					
					19					
					25					
12.5					43					
					18					
15.0'					35		14.3' CUTTINGS IN RINSEWATER LOOK LIKE WEATHERED ROCK.			
							16.4' DRIVING DIFFICULT. ROLLER-BIT FROM 16.4-17.0' TO REAM & WASH HOLE.			
17.5		R-1				Bkgd	R-1 17.0-22.0' Dark grey SHALE, very thinly bedded (30° dip), hard, broken. Unweathered except along bedding planes. Recovery - 90% RQD - 71%			
	Bkgd.									
20.0'										

*U = THIN WALL TUBE S = SPLIT SPOON R = ROCK

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MECHANICVILLE BORING LOG

BORING NO. B-6

CLIENT NYSEG			PROJECT NO. 4945-22
CONTRACTOR EMPIRE SOILS	DATE STARTED 7/24/86		COMPLETED 7/29/86
METHOD HSA/NX CORE	CASING SIZE 4.25" I.D.	HNU (1.7) 10.2	PROTECTION LEVEL C/D
GROUND EL 91.0 Rel.	SOIL DRILLED 17'	ROCK DRILLED 15'	TOTAL DEPTH 32.0'
LOGGED BY L. ESPY	CHECKED BY CM	DATE 9/22/86	▽ BELOW GROUND Unknown

DEPTH (FT)	HNU AMBIENT AIR	SAMPLE NO. & TYPE NO.	SAMPLE CLP	SAMPLE GC	OTHER	HNU HEADSPACE (PPM)	SOIL/ROCK DESCRIPTION	SOIL CLASS OR ROCK FRACTURES	BLOWS/6-IN OR RQD % (20 40 60 80 100)	WELL DATA EL
20.0		R-1 (con't)					R-1 (con't) See page 1 for description.	SHALE BDRK		
22.5	Bkgd	R-2				Bkgd.	R-2 22.0-27.0' Dark grey SHALE, thinly laminated (.03-.1"), hard, broken, unweathered. Iron oxidation staining in upper (17-18) fractures. Bedding laminae offset by vertical, discontinuous fractures and foldmy. Fractures occur along calcite (30-40°) inclusions. Minor amount of inclusions, concoidal in shape. Recovery - 102% RQD - 80%	SHALE 24.7		
25.0										
30.0	Bkgd.	R-3				Bkgd.	R-3 27.0-32.0' Dark grey SHALE, same as above except fewer inclusions than in R-2. Fractures perpendicular to bedding at 45-90°. Some evidence of deformation. Recovery = 100% RQD = 83%	SHALE		
35.0							BOB 32.0'			

*U = THIN WALL TUBE S = SPLIT SPOON R = ROCK

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FIELD LOG FOR BORING IN ROCK - A.

BIT USE
N - NEW
R - RESET
U - USED

PROJECT NO. 4945-02
BORING NO. B-6
PAGE 1 OF 1
LOGGED BY SNW/L.ESPY DATE 7/28/86 - 7/29/86
CHECKED BY JWP DATE 9/22/86

DEPTH	FOR EACH RUN								DRILLING		DRILL WATER RETURN %	COMMENTS ON DRILLING AND SAMPLING
	SAMPLE TYPE AND NO.	TOP DEPTH FT.	TOP DEPTH IN.	LGTH. IN.	RECOVERY IN.	RECOVERY %	ROD IN.	ROD %	BIT USE	TIME MIN./FT.		
17.0'	R-1	17.	0	5'	4.5'	90%	NA	71%	U	NA	NA	MANY MECHANICAL Breaks in Rock, Few Natural
22.0	R-2	22.	0	5'	5.0	102%	NA	80%	U	9/ft	NA	Mechanical breaks, fractures along calcite inclusions
32.0	R-3	32.	0	5'	5.0	100%	NA	83%	U	8/ft.	NA	Vertical to Near Vertical discontinuous fractures present.

MECHANICVILLE BORING LOG

BORING NO. B-7

CLIENT NYSEG			PROJECT NO. 4945-02
CONTRACTOR EMPIRE SOILS	DATE STARTED 7/31/86		COMPLETED 8/1/86
METHOD HSA/NX CORE	CASING SIZE 4.25" ID	HNU (LT) 10.2	PROTECTION LEVEL D
GROUND EL. 91.8 Rel.	SOIL DRILLED 8.8'	ROCK DRILLED NONE	TOTAL DEPTH 9.0
LOGGED BY L. ESPY	CHECKED BY CM	DATE 9/22/86	▽ BELOW GROUND 3.9

DEPTH (FT)	HNU AMBIENT AIR	SAMPLE NO. & TYPE NO.	SAMPLE CLP	SAMPLE GC	OTHER - WATER LEVEL HNU HEADSPACE (PPM)	SOIL/ROCK DESCRIPTION	SOIL CLASS OR ROCK FRACTURES	BLOWS/6-IN OR RQD % (20 40 60 80 100)	WELL DATA
0						SPIN CASING THRU CONCRETE PAD.	ASPHALT		
						0-.3 - ASPHALT	CONCRETE		
						.3-1.2 CONCRETE PAD	VOID		
						1.2-2.1 VOID	FILL		
2.5					3.0 ▽	2.1-3.0 BOULDER FILL			
		NO RECOVERY				3-5' Pound spoon. 0% Recovery	3.9 ▽	2 2 2 2	
5.0						5-7' Pound spoon. Recovery 5% - all wash		8 5 3 3	
7.5		ANYL. S-1 DJ S-1				7-9' Dark grey coarse sandy FILL with some 1-2" pebbles, trace clay. Trace wood (may have fallen into hole), calcite piece (1" diam), weathered shale fragments at 8.8-9' - Dark grey, thinly bedded 1" long.	FILL	7 15 53 85	CAVE-IN
10.0						BOB 9.0'	Bdrk.		
15.0									
20.0									

*U = THIN WALL TUBE S = SPLIT SPOON R = ROCK

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MECHANICVILLE BORING LOG

BORING NO. B-8

CLIENT NYSEG			PROJECT NO. 1945-12
CONTRACTOR EMPIRE SOILS	DATE STARTED 8/6/86		COMPLETED 8/6/86
METHOD HSA/NX CORE	CASING SIZE 4.25" I.D.	HNU (1.7)/(10.2) TIP-11.3 HNU-10.7	PROTECTION LEVEL D/C
GROUND EL. 93.2 Rel.	SOIL DRILLED 17.4'	ROCK DRILLED NONE	TOTAL DEPTH / 17.4'
LOGGED BY SNW	CHECKED BY CM	DATE 9/22/86	▽ BELOW GROUND 9.5-13.5' (APPROX)

DEPTH (FT)	HNU AMBIENT AIR	SAMPLE NO. & TYPE NO.	SAMPLE CLP	QC	OTHER	HNU HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION	SOIL CLASS OR ROCK FRACTURES	BLOWS/6-IN OR RQD % (20 40 60 80 100)	WELL DATA
0							AUGER THRU ASPHALT TO 0.5'			
.5	Bkgd	D.J. S-1				Bkgd.	.5-2' Lgt. brown to brown Sandy FILL with cobbles and pebbles, platey to rounded, loose, dry, oxidized sediments. Broken rock Rec. 1.0/1.5	FILL	10 12 8	
2.5	Bkgd	D.J. S-2				Bkgd.	2-4' Lgt. brown to brown sandy SILT FILL w/ coal clinkers (oxidized). and trace subrounded brick and cobbles. Platey shale chips, loose to compact, dry. REC. 1.3/2.0	FILL	12 29 13 14	
5.0	1-2 ppm	D.J. S-3				1-2 ppm	4-5.2' Brown sandy FILL grading to silt Fill with depth, with concrete chips, dry, oxidized shale fragments, subrounded boulder pebbles at 4.7'. Trace organics. Compact, moist. Slight, coal tar odor throuout .9/1.2	FILL	10 20 100/.2	
	Bkgd.	D.J. S-4				20 ppm (shoe)	6-6.3' Brown silt FILL w/ rounded cobbles, platey shale fragments, and brick shards. Coal tar odor and black stains. Loose and moist. Obstruction from 5.2-7.2. Augered thru. .3/.3	FILL	100/.3	
7.5	Bkgd.	D.J. S-5 NO REC.				30 ppm (shoe)	7.5-9.5' Brown silt on outside of spoon. No Recovery. 30 ppm off spoon, no staining. Rec. 0/2.0	UNK.	3 2 3 3	
10.0	Bkgd	ANYL. S-1 D.J. S-6				Bkgd	9.5-11.5' Brown silt w/ pebbles and cobbles, very loose, saturated. Slight coal tar odor, some coal tar present. REC. 2.0/2.0	SILT FILL	4 6 7 9	
12.5		D.J. S-7 (wood) S-8 (soil)				Bkgd.	11.5-13.5' Brown silt w/ pebbles and cobbles, very loose, saturated. Coal tar present at 13.3-13.5'. Wood fibers at 13.0' REC. .9/2.0	SILT FILL	9 12 32 8	
15.0		ANYL. S-2				Bkgd.	13.5-15.5' - Silty FILL w/ shale fragments and subrounded cobbles, loose, saturated. Extensive COAL TAR. REC. 1.2/2.0	FILL	6 2 2 3	
17.5	Bkgd.	GC/MS ANYL. S-3				50-100 ppm	15.5-17.4' Black stained silty SAND with subrounded cobbles, pebbles and shale chips, loose, Saturated. REFUSAL AT 17.4'. REC. 1.3/2.0	SILT-SAND	3 3 2 100/.4	
20.0							BOB 17.4'			

NO MONITORING WELL INSTALLATION

*U = THIN WALL TUBE S = SPLIT SPOON R = ROCK

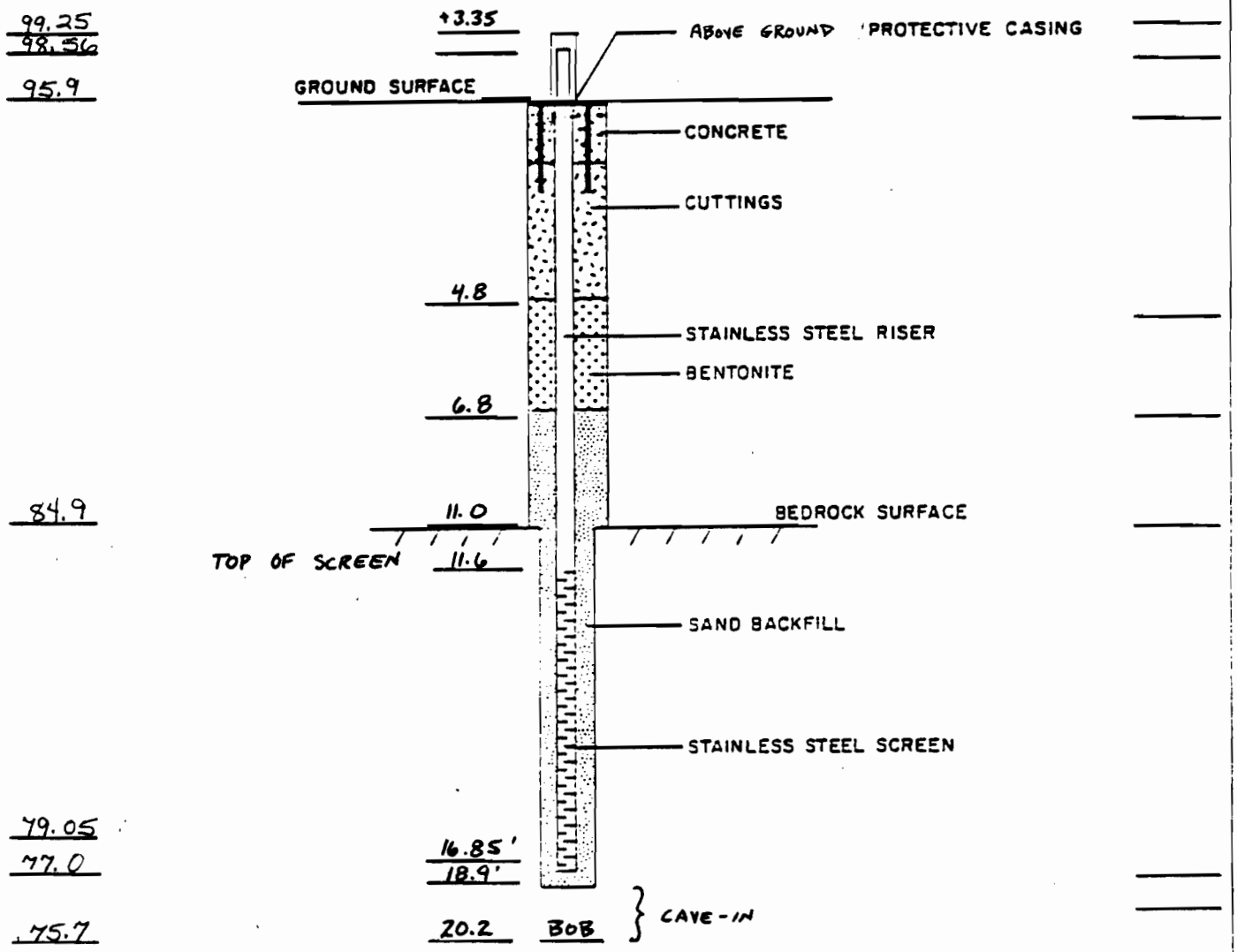
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APPENDIX A-3

MONITORING WELL INSTALLATION DIAGRAMS

MONITORING WELL INSTALLATION DIAGRAM

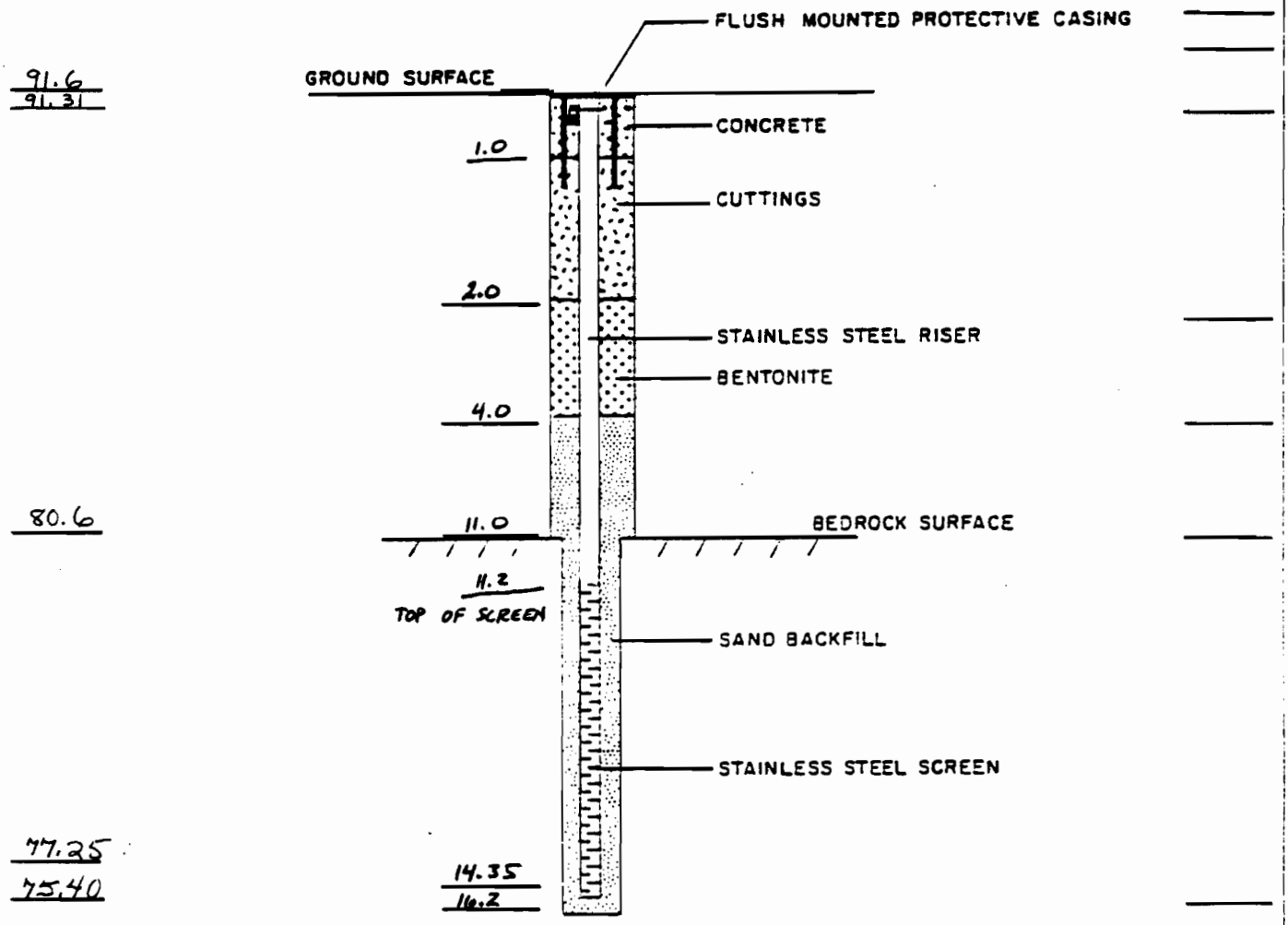
PROJECT NO.	PROJECT NAME	WELL NO.
4945-02	NYSEG MECHANICVILLE	MW-1
INSTALLED BY	**DATE INSTALLED**	**BORING DIAMETER**
L. ESPY, S. WIBBY	8/1/86	8.75"
WELL DIAMETER	**WELL MATERIAL**	**BACKFILL MATERIAL**
2.0"	SS	#3 JERSEY SAND



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MONITORING WELL INSTALLATION DIAGRAM

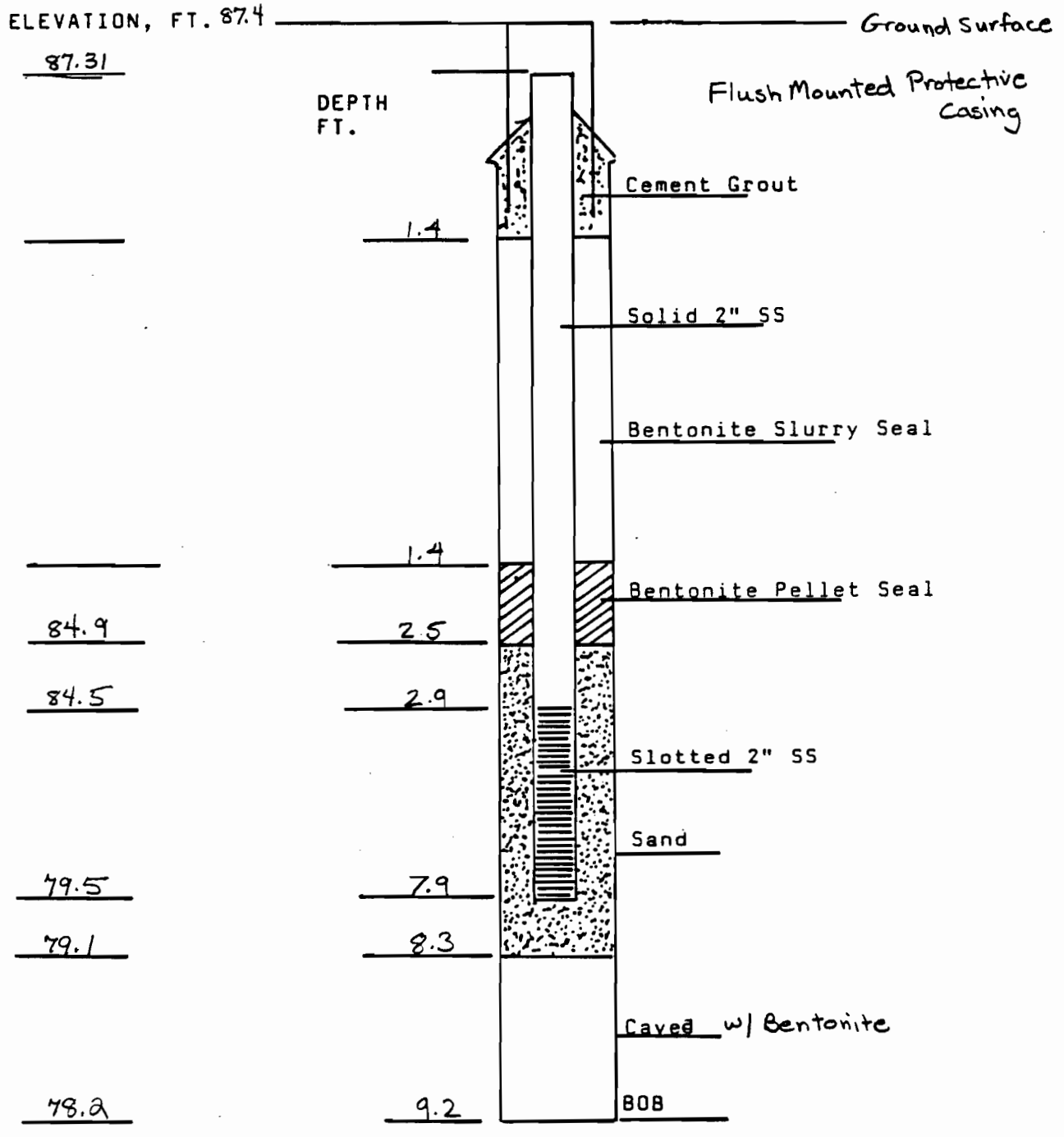
PROJECT NO.	PROJECT NAME	WELL NO.
4945-02	NYSEG MECHANICVILLE	MW-2
INSTALLED BY	**DATE INSTALLED**	**BORING DIAMETER**
L. ESPY, S. WIBBY	8/1/86	8.75"
WELL DIAMETER	**WELL MATERIAL**	**BACKFILL MATERIAL**
2.0"	SS	#3 JERSEY SAND



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WELL INSTALLATION DETAILS

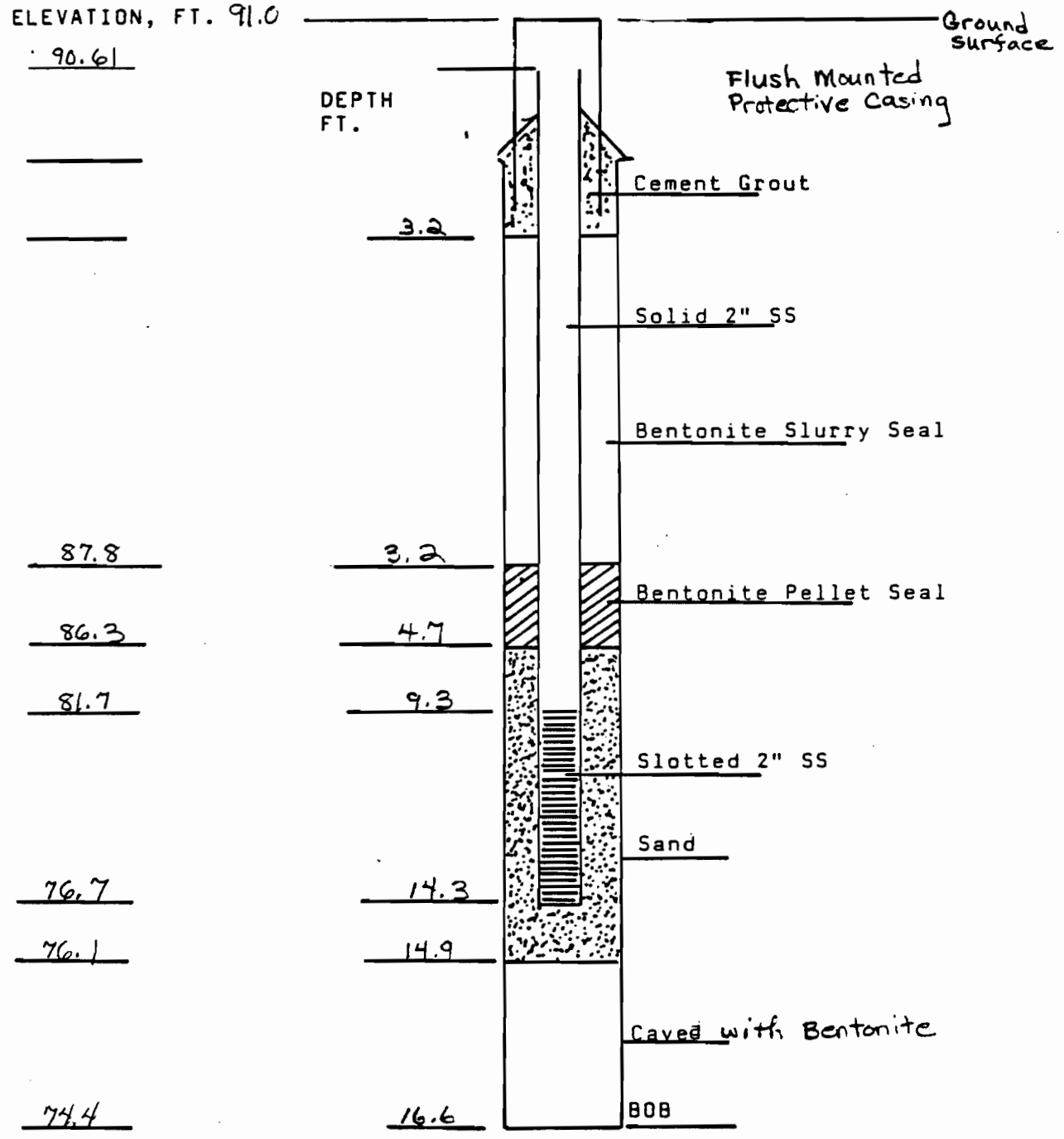
Project No. 4945-02	Project Name NYSEG MECHANICVILLE	Well No. MW-3
Installed By SNW/JWP	Date Installed 8/6/86	Boring Diameter 8.75"
Well Diameter 2"	Well Material SS	Backfill Material #3 Jersey Sand



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WELL INSTALLATION DETAILS

Project No. 4945-02	Project Name NYSEG Mechanicville	Well No. MW-4
Installed By SNW, LWE, ICM	Date Installed 7/30/86	Boring Diameter 8.75"
Well Diameter 2"	Well Material Stainless Steel	Backfill Material #3 Jersey sand

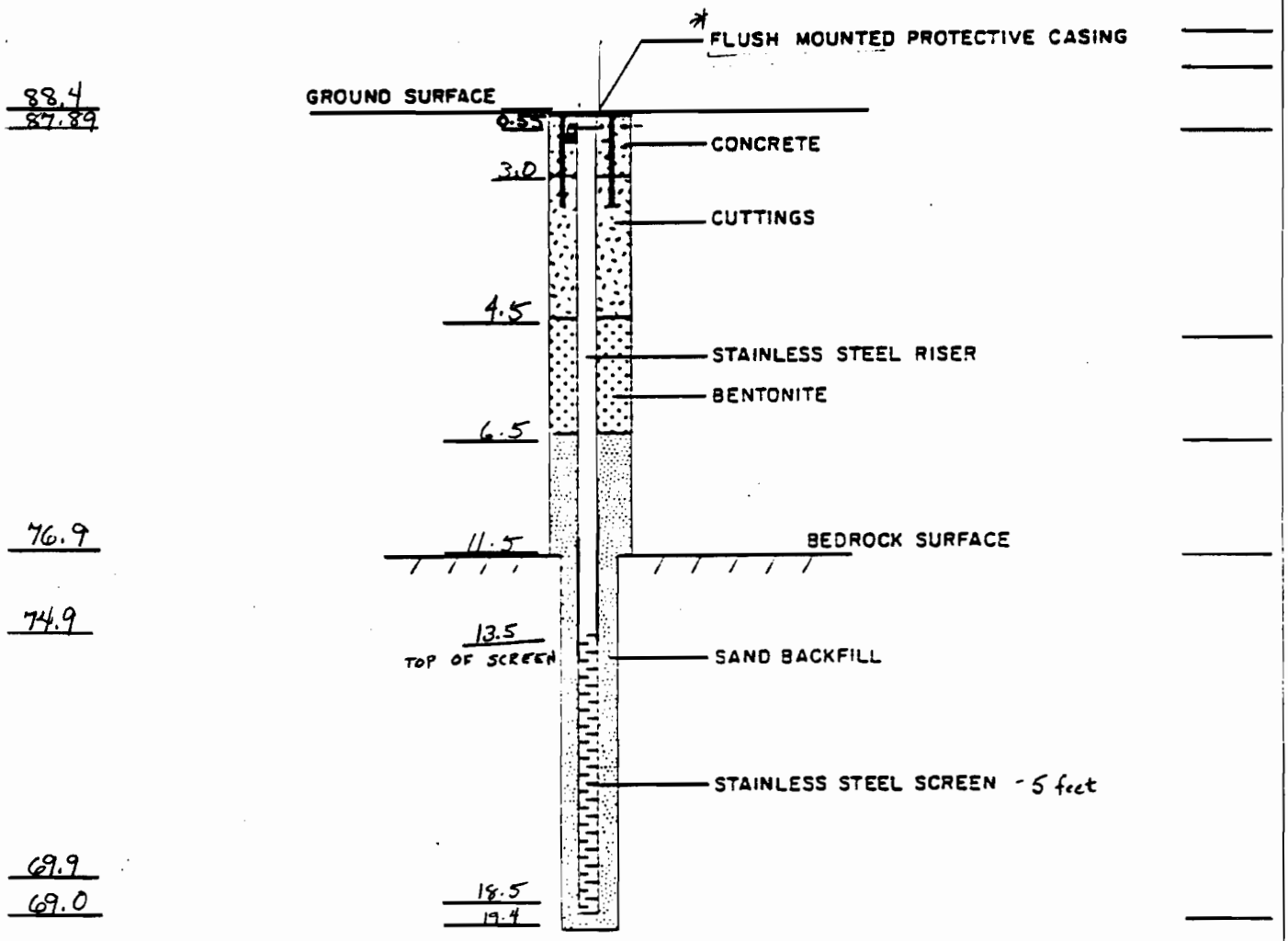


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MONITORING WELL INSTALLATION DIAGRAM

PROJECT NO.	PROJECT NAME	WELL NO.
4945-02	NYSEG MECHANICVILLE	MW-5
INSTALLED BY	**DATE INSTALLED**	**BORING DIAMETER**
SNW ; JWP	8/5/86	8.75"
WELL DIAMETER	**WELL MATERIAL**	**BACKFILL MATERIAL**
2.0"	SS	#3 Jersey Sand

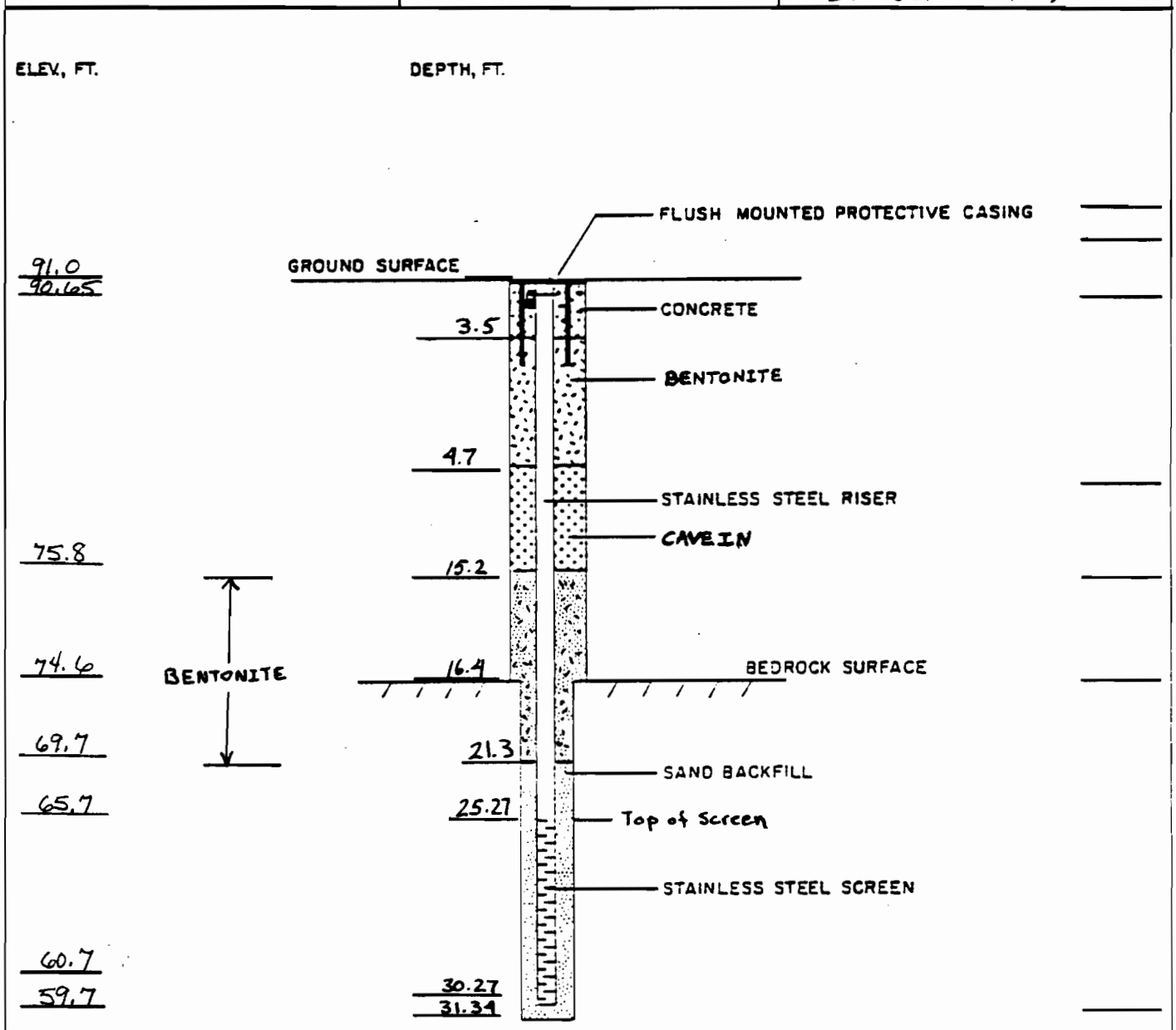
ELEV., FT. DEPTH, FT.



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MONITORING WELL INSTALLATION DIAGRAM

PROJECT NO.	PROJECT NAME	WELL NO.
4945-02	NYSEG MECHANICVILLE	MW-6
INSTALLED BY	**DATE INSTALLED**	**BORING DIAMETER**
SNW	7-29-86	4.0"
WELL DIAMETER	**WELL MATERIAL**	**BACKFILL MATERIAL**
2.0"	SS	#3 JERSEY SAND



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APPENDIX A-4

PERMEABILITY TEST METHODS AND CALCULATIONS

PERMEABILITY TEST METHODS

FALLING HEAD METHOD

In this method the monitoring well/piezometer is filled with water which is then allowed to seep into the soil. Measurements are made of the water level in the monitoring well/piezometer over a give period time. These measurements are continued until the rate of decrease becomes negligible or until sufficient readings have been obtained to satisfactorily determine the permeability.

PACKER TEST

This method is used to test the permeability of the bedrock. Water is introduced under pressure to the monitoring well/piezometer through tubing that discharges the water into a packed area which allows water to seep only within the bedrock layer. The rest of the test follows the principle of the falling head test.

PERMEABILITY TEST RESULTS
MECHANICVILLE SITE

STRATA TESTED	TEST LOCATION	TYPE TEST	PERMEABILITY cm/sec	PERMEABILITY ft/day	REMARKS
Soil and Rock	MW-1	In Situ	9.5×10^{-4}	2.7	Falling Head
Soil and Rock	MW-2	In Situ	1.1×10^{-3}	3.1	Falling Head
Soil	MW-3	In Situ	1.6×10^{-4}	0.45	Falling Head
Soil and Rock	MW-4	In Situ	1.9×10^{-4}	0.54	Falling Head
Soil and Rock	MW-5	In Situ	5.4×10^{-4}	1.5	Falling Head
Soil and Rock	MW-6	In Situ	7.5×10^{-5}	0.21	Falling Head
Rock	MW-6	In Situ	(1) 1.8×10^{-4} (2) 2.0×10^{-4}	0.51 0.57	Packer Test (15 psi) Packer Test (30 psi)

PERMEABILITY DATA SHEET
MECHANICVILLE SITE
EXAMPLE CALCULATION

WELL NO.: MECHANICVILLE MW-1

Permeability determined by falling head test

Equation: $$K_h = \frac{(d^2)\ \ln\ (4mL/D)}{(8)(L)(t_1 - t_2)} \cdot \ln\ (H_1/H_2)$$

m = transformation ratio = 1
L = length of monitored zone = 12.1 feet
D = diameter of boringhole = 7.5 inches
d = diameter of well pipe = 2 inches

t_1 = time when flow rate begins to stabilize = 50 seconds
H_1 = head at t_1 = 0.61 feet
t_2 = time when flow rate stabilization drops = 180 seconds
H_2 = head at t_2 = .03 feet

APPENDIX A-5

GROUNDWATER LEVEL DATA

GROUNDWATER LEVEL DATA
MECHANICVILLE SITE

LOCATION	GROUND ELEVATION (FT. - RELATIVE)	RISER ELEVATION (FT. - RELATIVE)	-WATER ELEVATION (FT. - RELATIVE)- 8/5/86	9/9/86	12/2/86	3/10/87	6/2/87
MW-1	95.9	98.6	87.3	87.3	87.6	88.4	87.4
MW-2	91.6	91.3	88.1	88.9	89.0	89.0	88.4
MW-3	87.4	87.3	NA	84.6	85.1	85.7	83.6
MW-4	91.0	90.6	86.8	87.1	88.1	88.1	87.6
MW-5	88.4	87.9	78.4	78.2	78.9	NA	79.9
MW-6	91.0	90.7	86.8	86.9	86.9	87.7	87.2
P-1	92.5	95.0	85.7	85.5	86.7	86.40	85.5
P-2	95.2	98.8	87.1	86.9	87.6	89.70	86.9
P-3	91.8	91.8	88.6	89.7	91.8	89.30	88.5

APPENDIX A-6

MONITORING WELL SAMPLING PROCEDURES

MONITORING OF GROUNDWATER WELLS

1. Check the well for proper identification and location.

2. Measure and record the height of protective casing.

3. After unlocking the well and removing any well caps, measure and record the ambient and well-mouth organic vapor levels using the photoionization meter. If the ambient air quality at breathing level reaches 5 ppm, the sampler shall utilize the appropriate safety equipment as described in the Health and Safety Plan.

4. Using the electronic water level meter, measure and record the static water level in the well to the nearest 0.01 foot. Measure also the depth to the well bottom from a constant reference point on the top of the well riser. Upon removing the water level wire, rinse it with laboratory-grade isopropanol or ethanol and then distilled water.

5. Calculate the volume of stagnant water in the well casing. Volume in liters equals 0.154 times the square of the inside diameter of the casing (in inches) times the depth of water (in feet).

SAMPLING OF GROUNDWATER MONITORING WELLS

Following the measurements and calculations described above, sampling will commence in the sequence below:

1. Lower the submersible pump or peristaltic pump intake into the well. For shallow groundwater situations, the intake of the suction tubing or of the submersible pump will be lowered to the top of the well screen and the well purged three to five times the calculated volume. Alternatives to this procedure may be necessary if one of the following conditions exist:

   a. If the well screen is very large, making pumping from the top impractical, the suction line or submersible pump should be lowered to the approximate mid-point of the screened portion of the well.

   b. If the well is situated in tight formations such as tills, clays or rock, the purging of the well should be performed from very near the bottom of the well screen. This will facilitate complete removal of standing well water.

2. Connect the instrumentation header to the pump discharge and begin flushing the well. Monitor the in situ parameters (pH, Eh, temperature, and specific conductivity) and measure the volume of groundwater being pumped. Alternately, in situ parameters may be monitored in a beaker filled from the pump discharge. Purging of the standing well water is considered complete when one of the following is achieved:

   a. at least three well volumes have been purged and in situ parameters stabilized, or

b. five well volumes have been purged, or

c. the well has been pumped dry.

3. Record the in situ parameters.

4. After purging, lower the pump intake or bailer, as appropriate for the parameters of concern (i.e. bailer for volatiles; and bailer, peristaltic or submersible pump for all other parameters) to the middle of the screened interval. If the analysis to be performed is for lighter-than-water chemical species, then the pump or bailer should be lowered to the top of the water column for sample collection.

5. Collect the sample(s).

   Volatile and semi-volatile samples are filled directly from the bailer with as little agitation as possible.

   Other samples will be placed directly into the appropriate container from the discharge tubing of the pump or bailer. Where filtration is required, an in-line filter should be used, if possible. Vacuum filtration is an alternative to an in-line device (see attached Table).

6. Remove the pump from the well and decontaminate the pump and tubing by flushing with isopropanol; up to one gallon of the solvent is used as needed. Rinse the pump and tubing with one liter of distilled water for every 40 feet of tubing.

7. Complete sample data records after each well is sampled.

8. Secure the well cap and lock.

STANDARD FIELD FILTRATION PROCEDURES

A. IN-LINE FILTRATION

EQUIPMENT

1. A portable 102-mm acrylic backflushing filter unit
2. 102-mm diameter filter papers, 0.45 µm membrane filters
3. Reagent rinse water (ASTM Type II or better)
4. 20% v/v nitric acid rinse solution

PROCEDURES

1. Attach in-line filter assembly, after assembling filter paper into filter holder, to discharge line of sampling pump. Open by-pass valve completely.
2. Turn sampling pump on, slowly turn by-pass valve closed, allowing flow into the filter. Remove trapped air through the filter bleed valve, if necessary.
3. Discard the initial 100 mℓ ± of filtrate. Collect subsequent filtrate into sample bottle.
4. Rinse barrel and filter holder assembly between samples with three rinses of reagent water. The rinse sequence when elemental parameters will be analyzed is: reagent water - 20% v/v nitric acid - reagent water.

B. VACUUM FILTRATION

EQUIPMENT

1. Two sets of either glass funnel type or self-contained polysulfone filters with sintered glass discs or polysulfone filter plates
2. 47-mm diameter filter papers, 0.45 µm membrane filters
3. Vacuum pump or ISCO peristaltic pump with silicone tubing
4. Reagent rinse water (ASTM Type II or better)
5. 20% v/v nitric acid rinse solution

PROCEDURES

1. Thoroughly rinse sintered glass disc, filter funnel, and stem or polysulfone filter units with reagent water.
2. On the basis of visual clarity of sample, prefiltering with larger pore filters may be required. If sample has a heavy clay content, organics, or suspended matter, prefiltration through a 3.0- or 5.0-µm membrane filter may be necessary.
3. Place membrane filter on filter holder with minimum handling.
4. Attach filter holder with filter to filter funnel and receiver.
5. Swirl and slowly pour sample bottle into filter funnel.
6. Attach suction tubing to filter flask and vacuum pump (or ISCO pump). Pump is turned on in the vacuum mode.
7. Filter a small portion of the sample and discard filtrate after rinsing flask with sample filtrate.
8. If prefiltering was required, pass sample through a 0.45-µm membrane filter using another filtering apparatus.
9. Transfer filtered sample to appropriate bottles.
10. Rinse filtration equipment between samples with at least three rinses of reagent water. The rinse sequence, when elemental parameters are to be analyzed, is: reagent water - 20% v/v nitric acid - reagent water.

C. PRESSURE FILTRATION

EQUIPMENT

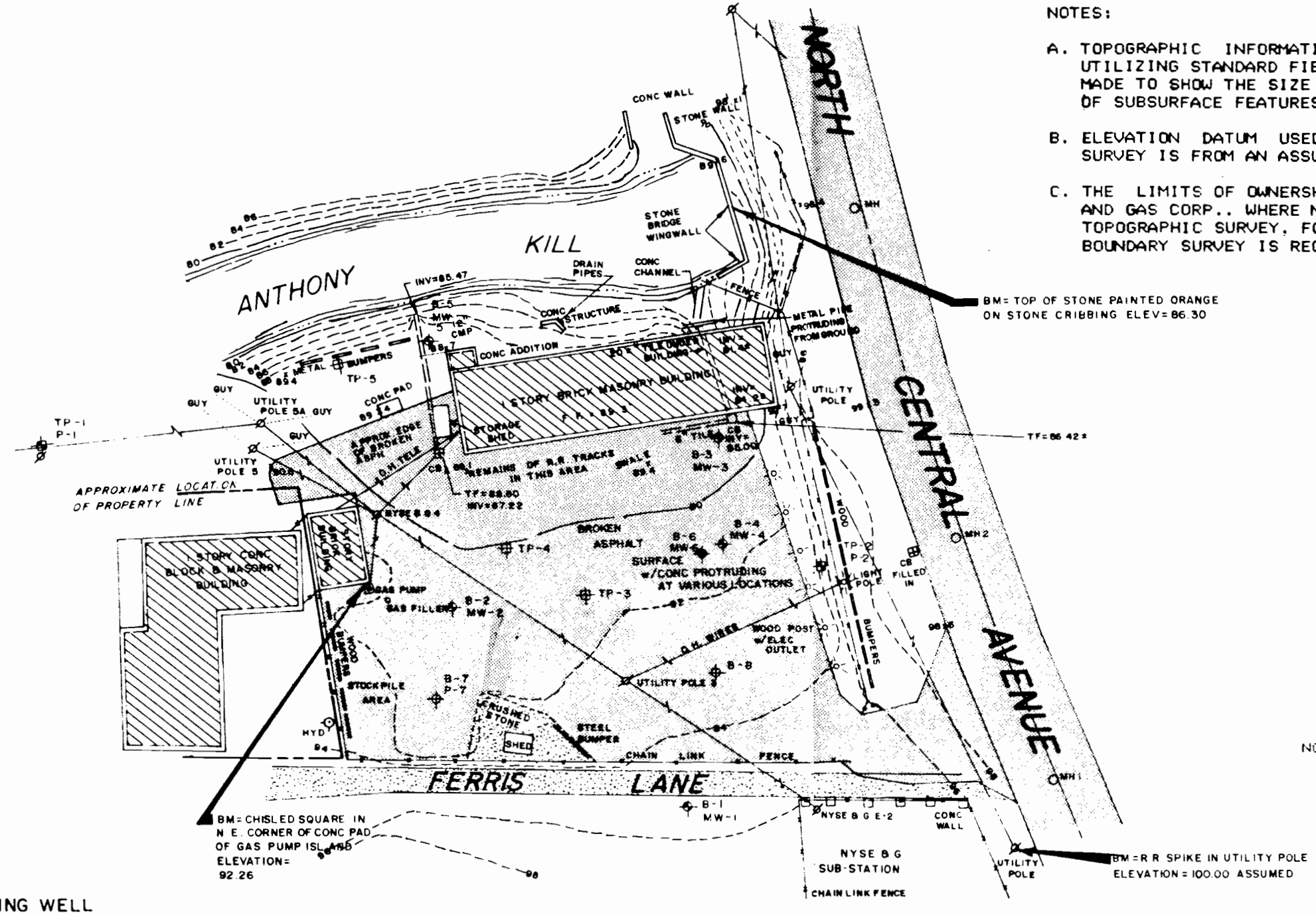
1. Pressure filter apparatus consisting of 1 liter barrel filter, filter holder and pressure hose connectors
2. Source of pressurized gas, i.e., tank of nitrogen, argon, etc.
3. 147 mm filter papers, 0.45 µm membrane filter
4. Reagent rinse water (ASTM Type II or better)
5. 20% v/v nitric acid rinse solution

PROCEDURES

1. If filter barrel has sample valve, assemble filter assembly with 0.45 µm membrane filter and attach pressure hose.
2. If filter barrel does not have a sample valve, assemble filter paper on filter holder.
3. Turn barrel upside down and pour sample into barrel.
4. Place filter holder and filter onto barrel assembly, making sure to align O-ring for a positive seal.
5. Attach swing-away bolts and tighten hand-tight.
6. Turn over filter assembly and attach pressure hose assembly.
7. Slowly turn on pressurized gas and increase pressure regulator to a maximum of 20 psi.
8. Collect filtrate from bottom of barrel assembly.
9. Rinse barrel and filter holder assembly between samples with three rinses of reagent water. The rinse sequence when elemental parameters will be determined is: reagent water - 20% v/v nitric acid - reagent water.

APPENDIX A-7

SITE SURVEY MAP



NOTES:

A. TOPOGRAPHIC INFORMATION SHOWN HEREON HAS BEEN COMPILED UTILIZING STANDARD FIELD SURVEY PROCEDURES. NO ATTEMPT HAS BEEN MADE TO SHOW THE SIZE AND LOCATION OF ANY UNDERGROUND UTILITIES OF SUBSURFACE FEATURES WHICH MAY EXIST.

B. ELEVATION DATUM USED IN CONNECTION WITH THE PREPARATION OF SURVEY IS FROM AN ASSUMED DATUM.

C. THE LIMITS OF OWNERSHIP OF LANDS OF NEW YORK STATE ELECTRIC AND GAS CORP.. WHERE NOT READILY APPARENT AT THE TIME OF THIS TOPOGRAPHIC SURVEY. FOR LOCATION OF PERTINENT PROPERTY LINES A BOUNDARY SURVEY IS RECOMMENDED.

MONITORING DEVICE			ELEVATION
MONITORING WELL		#1	98.56
"	"	#2	91.31
"	"	#3	87.31
"	"	#4	90.61
"	"	#5	87.89
"	"	#6	90.68
BORING	#1	GROUND	95.9
"	#2	"	91.6
"	#3	"	87.4
"	#4	"	91.0
"	#5	"	88.4
"	#6	"	91.0
"	#7	"	91.8
"	#8	"	93.2
PIEZOMETER		#1	95.02
"		#2	98.89
"		#7	91.76
TEST PIT		#1	92.5
"	"	#2	95.2
"	"	#3	91.4
"	"	#4	90.3
"	"	#5	89.1

NOTE: ELEVATION OF MONITORING WELLS AND PIEZOMETERS TAKEN AT TOP OF EXISTING NOTCH CUT IN TOP OF P.V.C. PIPE.

ABBREVIATIONS

M.W. = MONITORING WELL
P = PIEZOMETER
T.P. = TEST PIT
B = BORING

NOTE: MONITORING DEVICE SYMBOLS SHOWN HERE ON ARE FROM SITE PLAN SHOWING PROPOSED EXPLORATION LOCATIONS PREPARED BY E C JORDAN CO.

RECORD OF WORK	DATE		
	6-26-86	PREPARED FOR E C JORDAN CO	D.A.F.
	10 7 86	MONITORING LOCATIONS & DATA ADDED E C JORDAN	D.A.F

TOPOGRAPHIC SURVEY
PORTION OF LANDS OF
NEW YORK STATE ELECTRIC & GAS CORP.
(MECHANICVILLE SITE)

TOWN OF MECHANICVILLE — COUNTY: SARATOGA, N.Y.

SCALE: 1"=50' — DATE: JUNE 26,1986

DAVID A. FLANDERS ASSOCIATES
6 MORNINGSIDE DRIVE
BALLSTON LAKE, NEW YORK

MAP BY: DAVID A FLANDERS — LIC. NO: 49,134

86-72-S

APPENDIX B

CHEMICAL DATA

APPENDIX B-1

ANALYTICAL METHODS
AND
REPRESENTATIVE WASTE CHARACTERIZATION

ANALYTICAL METHODS[1]
MECHANICVILLE SITE

Analytical Parameter	Soils and Sediments	Groundwater and Surface Water
Volatile Organic Compounds	Method 8020 with confirmatory analysis of 2 soil samples and one round of sediments using Method 8240	Method 602 for Round 1 samples; Method 624 for subsequent sampling rounds
Semi-Volatile Organic Compounds	Method 8310 with confirmatory analysis of 2 soil samples and one round of sediments using Method 8270	Method 610 for Round 1 samples; Method 625 for subsequent sampling rounds
Cyanide - Total and Ferro-Ferricyanide	Method 9010	Method 335.2
Total Organic Carbon	Method 9060	Method 415.1
Total Phenolics	Method 420.1	Method 420.1
Iron and Zinc	Method 200.7 with 3050	Method 200.7

[1] Method numbers refer to USEPA methods (USEPA, 1983) unless otherwise noted.

ORGANIC COMPOUNDS IN COAL TAR STORAGE VESSELS
ITHACA-COURT STREET SITE

	Coal Tar Samples		Aqueous Sample
	Vessel A[1]	Vessel B[2]	Vessel B
Volatile Organics	(mg/kg)	(mg/kg)	(mg/ℓ)
Minimum Detection Limit (MDL)	(10)	(48)	(0.002)
Volatile Aromatics			
Benzene	1,900	1,800	80.0
Toluene	2,200	2,600	33.0
Ethylbenzene	120	140	ND[3]
Total Xylene	2,200	1,900	5.6
Styrene	910	1,100	4.2
Total Volatiles	7,330	7,540	122.8
Semivolatile Organics			
Minimum Detection Limit (MDL)	(1,500)	(2,800)	(1.6)
PAH			
Acenaphthene	T[4]	T	ND
Acenaphthylene	10,000	33,000	T
Anthracene	7,800	16,000	ND
Benzo(a)anthracene	4,200	5,600	ND
Benzo(a)pyrene	4,000	5,200	ND
Benzo(g,h,i)perylene	T	T	ND
Benzo(k)fluoranthene) coeluted Benzo(b)fluoranthene)	5,200	4,900	ND
Chrysene	4,300	6,300	ND
Dibenzo(a,h)anthracene	T	T	ND
Fluoranthene	12,000	16,000	ND
Fluorene	5,400	15,000	ND
Indeno(1,2,3-cd)pyrene	T	T	ND
Naphthalene	55,000	180,000	ND
Phenanthrene	24,000	40,000	ND
Pyrene	12,000	10,000	ND
Other			
Phenol	2,700	T	48.0
2,4-Dimethylphenol	ND	ND	2.6
2,4-Dichlorophenol	T	ND	ND
Total Semivolatiles	146,600	332,000	50.6

[1] Vessel A is located adjacent to Markles Flats.
[2] Vessel B is located next to the swimming pool.
[3] ND = Not Detected
[4] T = Detected in trace concentrations at or below the MDL.

6.87.14T
0019.0.0

METALS, TOTAL ORGANIC HALIDES, AND IGNITABILITY
RESULTS FOR COAL TAR STORAGE VESSEL SAMPLES
ITHACA-COURT STREET SITE

	Coal Tar Samples		Aqueous Sample
	Vessel A[1]	Vessel B[2]	Vessel B
EP Toxicity Metals[3]	(mg/ℓ)	(mg/ℓ)	(mg/ℓ)
Ag	ND	ND	0.0033
As	0.39[4]	2.1[4]	0.014
Ba	ND	ND	0.140
Cd	ND	ND	ND
Cr	ND	ND	0.015
Hg	ND	ND	0.0002
Pb	ND	3.7[4]	0.028
Se	ND	ND	ND
Other Metals			
Cu	ND	ND	0.023
Ni	ND	ND	0.011
Ti	1.7[4]	1.8[4]	ND
Zn	0.31[4]	1.4[4]	0.065
Total Organic Halides	(mg/kg)	(mg/kg)	(mg/ℓ)
TOX, as Chlorine	830	870	0.39
Ignitability	(°F)	(°F)	
Flash Point	99	81	NA[2]

[1] ND = Not Detected
[2] NA = Not Analyzed
[3] Metals in coal tar samples were analyzed following extraction procedure (EP).
[4] EP toxicity limits for the detected metals are: As and Pb, 5 mg/ℓ; Ti and Zn, none specified.

6.87.14T
0020.0.0

AN ANALYSIS OF SPENT OXIDE WASTES[1]

Component	Percent
Free sulfur	44.70
Moisture	17.88
Ferric monohydrate	5.26
Ferrous monohydrate	6.25
Basic ferric sulfate	1.25
Ferric ammonium ferrocyanide	3.80
Ferrosoferric ammonium ferrocyanide	2.50
Ferric pyridic ferrocyanide	1.20
Organic matter peat fiber	4.68
Tar	1.21
Silica	1.05
Naphthalene	0.72
Pyridine sulfate	0.77
Ammonium sulfate	2.06
Calcium sulfate	0.12
Ferrous sulfate	0.02
Ammonium thiocyanate	1.30
Sulfur otherwise combined	1.33
Ogranic matter soluble in alkalies (humus)	1.54
Combined water and loss (by difference)	2.36
	100.00

[1] Utility Solid Waste Activities Group (USWAG), 1984. Handbook on Manufactured Gas Plant Sites. Prepared by Environmental Research and Technology, Inc. and Koppers Co., Inc., for the USWAG Superfund Committee, Washington, D.C. p. 3-46.

APPENDIX B-2

MINIMUM DETECTION LIMITS
AND
QUALITY ASSURANCE SAMPLE RESULTS

12/17/87

MINIMUM DETECTION LIMITS (1)
MECHANICVILLE SITE

	‡TEST PITS (MG/KG)‡					
SAMPLE IDENTIFIER	TP-1/S-1	TP-2/S-1	TP-4/S-1	TP-5/S-1	TP-5/S-1 DUP	TP-5/S-1 GC/MS
VOLATILE AROMATICS	0.022	0.051	0.024	0.099	0.094	0.096
ACETONE	--	(2) --	--	--	--	2.4
METHYLENE CHLORIDE	--	--	--	--	--	0.2
CARBON DISULFIDE	--	--	--	--	--	0.4
SEMIVOLATILE ORGANICS	0.043	11.0	5.7	78.0	93.0	13.0
IRON	10.0	10.0	10.0	10.0	10.0	--
ZINC	2.0	2.0	2.0	2.0	2.0	--
CYANIDE	0.3	0.3	0.3	0.3	0.3	--
TOTAL RECOVERABLE PHENOLICS	0.2	0.2	0.2	0.2	0.2	--
TOTAL ORGANIC CARBON	100	100	100	100	100	--

	‡BORINGS (MG/KG)‡							
SAMPLE IDENTIFIER	B-1/S-1	B-2/S-1	B-3/S-1	B-4/S-1	B-5/S-1	B-7/S-1	B-8/S-1	B-8/S-1 GC/MS
VOLATILE AROMATICS	0.043	0.052	0.56	0.028	0.54	0.052	10.0	3.6
ACETONE	--	--	--	--	--	--	--	90.0
METHYLENE CHLORIDE	--	--	--	--	--	--	--	9.0
CARBON DISULFIDE	--	--	--	--	--	--	--	3.6
SEMIVOLATILE ORGANICS	5	0.55	170	24	54	0.65	61	130
IRON	10	10	10	10	10	10	10	--
ZINC	2	2	2	2	2	2	2	--
CYANIDE	1	1	1	1	1	1	1	--
TOTAL RECOVERABLE PHENOLICS	1	1	1	1	1	1	1	--
TOTAL ORGANIC CARBON	1000	1000	1000	1000	1000	1000	1000	--

	‡ GROUNDWATER (MG/L) ‡														
SAMPLE IDENTIFIER ORGANICS ANALYSIS	MW-101 HPLC	MW-101 GC/MS	MW-201 GC/MS	MW-301 GC/MS	MW-401 GC/MS	MW-102 HPLC	MW-202 GC/MS	MW-202 GC/MS DUP	MW-302 GC/MS	MW-402 GC/MS	MW-103 HPLC	MW-103 GC/MS	MW-203 GC/MS	MW-303 GC/MS	MW-403 GC/MS
VOLATILE AROMATICS	0.001	0.002	0.005	0.010	0.005	0.001	0.005	0.005	0.010	0.005	0.050	0.020	0.250	0.010	0.050
ACETONE	--	0.010	0.010	0.010	0.010	--	0.010	0.010	0.010	0.010	--	0.500	0.500	0.010	0.100
METHYLENE CHLORIDE	--	0.050	0.050	0.010	0.005	--	0.050	0.050	0.010	0.005	--	0.050	0.250	0.010	0.050
SEMIVOLATILE ORGANICS	0.020	0.020	0.010	0.010	0.010	0.020	0.010	0.010	0.010	0.050	0.200	0.200	0.010	0.010	0.100
IRON	0.1	--	0.03	0.1	0.1	0.1	0.03	0.03	0.1	0.1	0.1	--	0.03	0.1	0.1
ZINC	0.01	--	0.005	0.02	0.020	0.01	0.005	0.005	0.02	0.02	0.01	--	0.005	0.02	0.02
CYANIDE	0.01	--	0.01	0.02	0.010	0.01	0.01	0.01	0.02	0.01	0.01	--	0.01	0.02	0.01
TOTAL RECOVERABLE PHENOLICS	0.01	--	--	--	0.005	0.01	--	--	--	0.005	0.01	--	--	--	0.005
TOTAL ORGANIC CARBON	0.5	--	5	5	5	0.5	5	5	5	5	0.5	5	5	5	5
SULFATE	--	--	1	--	1	--	1	1	--	1	--	--	1	--	1

MINIMUM DETECTION LIMITS (1) (CONT'D)
MECHANICVILLE SITE

#GROUNDWATER (MG/L)#

SAMPLE IDENTIFIER	MW-104	MW-204	MW-304	MW-404	MW-105	MW-205	MW-405	MW-405 DUP	MW-106	MW-106 DUP	MW-206	MW-306	MW-306 DUP	MW-406
ORGANICS ANALYSIS	HPLC	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS	HPLC	HPLC	GC/MS	GC/MS	GC/MS	GC/MS
VOLATILE AROMATICS	0.050	0.050	0.010	0.050	0.010	0.100	0.050	0.050	0.050	0.050	0.250	0.010	0.010	0.050
ACETONE	--	0.100	0.010	0.100	--	0.200	0.100	0.100	--	--	0.500	0.010	0.010	0.100
METHYLENE CHLORIDE	--	0.050	0.010	0.050	--	0.100	8.500	8.500	--	--	0.250	0.010	0.010	0.050
SEMIVOLATILE ORGANICS	0.200	0.010	0.010	0.100	0.200	0.010	0.100	0.100	4.000	4.000	0.010	0.010	0.010	0.500
IRON	0.1	0.03	0.1	0.1	0.1	0.03	0.1	0.1	0.1	0.1	0.03	0.1	0.1	0.1
ZINC	0.01	0.005	0.02	0.02	0.01	0.005	0.02	0.02	0.01	0.01	0.005	0.02	0.02	0.02
CYANIDE	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01
TOTAL RECOVERABLE PHENOLICS	0.01	--	--	0.005	0.01	--	0.005	0.005	0.01	0.01	--	--	--	0.005
TOTAL ORGANIC CARBON	0.5	5	5	5	0.5	5	5	5	0.5	0.5	5	5	5	5
SULFATE	--	1	1	1	--	1	1	1	--	--	1	--	--	1

#SURFACE WATER (MG/L)#

SAMPLE IDENTIFIER	SW-101	SW-201	SW-301	SW-301 DUP	SW-401	SW-102	SW-202	SW-202 DUP	SW-302	SW-402	SW-402 DUP	SW-103	SW-203	SW-303	SW-403
ORGANICS ANALYSIS	HPLC	GC/MS	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS
VOLATILE AROMATICS	0.001	0.005	0.010	0.010	0.005	0.001	0.005	0.005	0.010	0.005	0.005	0.001	0.005	0.010	0.005
ACETONE	--	0.010	0.010	0.010	0.010	--	0.010	0.010	0.010	0.010	0.010	--	0.010	0.010	0.010
METHYLENE CHLORIDE	--	0.005	0.010	0.010	0.005	--	0.005	0.005	0.010	0.005	0.005	--	0.005	0.010	0.005
SEMIVOLATILE ORGANICS	0.020	0.010	0.010	0.010	0.010	0.020	0.010	0.010	0.010	0.010	0.010	0.020	0.010	0.010	0.010
IRON	0.1	0.03	0.1	0.1	0.1	0.1	0.03	0.03	0.1	0.1	0.1	0.1	0.03	0.1	0.1
ZINC	0.01	0.005	0.02	0.02	0.02	0.01	0.005	0.005	0.02	0.02	0.02	0.01	0.005	0.02	0.02
CYANIDE	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
TOTAL RECOVERABLE PHENOLICS	0.01	--	--	--	0.005	0.01	--	--	--	0.005	0.005	0.01	--	--	0.005
TOTAL ORGANIC CARBON	0.5	5	5	5	5	0.5	5	5	5	5	5	0.5	5	5	5
SULFATE	--	1	--	--	--	--	1	1	--	--	--	--	1	--	--

#SEDIMENTS (MG/KG)#

SAMPLE IDENTIFIER	SED-101	SED-201	SED-301 GC/MS	SED-301 DUP	SED-401 GC/MS	SED-102	SED-202	SED-202 DUP	SED-302 GC/MS	SED-402 GC/MS	SED-402 DUP	SED-103	SED-103 DUP	SED-203	SED-303 GC/MS	SED-403 GC/MS
VOLATILE AROMATICS	0.024	0.025	0.080	0.062	1.000	0.025	0.028	0.025	0.070	1.000	1.000	0.025	0.024	0.027	0.066	1.000
ACETONE	--	--	2.000	1.600	1.000	--	--	--	1.700	1.000	1.000	--	--	--	1.700	1.000
SEMIVOLATILE ORGANICS	0.420	0.360	1.100	1.100	0.600	0.410	0.510	0.900	0.940	0.600	0.600	0.500	0.520	0.310	0.990	0.600
IRON	0.1	9200	5	5	2	0.1	19000	16000	5	2	2	0.1	0.1	20000	5	2
ZINC	0.01	36	5	5	0.5	0.01	69	100	5	0.5	0.5	0.01	0.01	88	5	0.5
CYANIDE	0.01	0.1	0.01	0.01	0.3	0.01	0.1	0.1	0.01	0.3	0.3	0.01	0.01	0.1	0.01	0.3
TOTAL RECOVERABLE PHENOLICS	0.01	0.01	0.01	0.01	0.2	0.01	0.01	0.01	0.01	0.2	0.2	0.01	0.01	0.01	0.01	0.2
TOTAL ORGANIC CARBON	0.5	4600	100	100	100	0.5	3500	7600	200	100	100	0.5	0.5	4600	100	100
SULFATE	--	32	--	--	--	--	32	32	--	--	--	--	--	32	--	--

(1) NOMINAL DETECTION LIMITS WERE USED WHEN MDLs WERE NOT REPORTED BY THE LABORATORY.
(2) -- NOT ANALYZED

CHEMICALS FOUND IN QUALITY ASSURANCE SAMPLES
MECHANICVILLE SITE

SITE IDENTIFIER	SAMPLER BLANK				TRIP BLANK				FILTRATION BLANK			
SAMPLE IDENTIFIER	SB-101	SB-201	SB-301	SB-401	TB-101	TB-201	TB-301	TB-401	FB-101	FB-201	FB-301	FB-401
ORGANICS ANALYSIS (1)	HPLC	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS	HPLC	HPLC	HPLC	HPLC
DATE OF SAMPLE COLLECTION	9/9/86	12/2/86	3/10/87	6/2/87	9/9/86	12/2/86	3/10/87	6/2/87	9/9/86	12/2/86	3/10/87	6/2/87
VOLATILE ORGANICS (MG/L)												
-VOLATILE AROMATICS-												
BENZENE	ND (2)	ND	ND	ND	ND	ND	ND	ND	--	--	--	--
TOLUENE	ND	ND	ND	ND	ND	0.006	ND	ND	--	--	--	--
ETHYLBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--
STYRENE	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--
TOTAL XYLENE	-- (3)	ND	ND	ND	--	ND	ND	ND	--	--	--	--
m - XYLENE	ND	--	--	--	ND	--	--	--	--	--	--	--
o - XYLENE	ND	--	--	--	ND	--	--	--	--	--	--	--
p - XYLENE	ND	--	--	--	ND	--	--	--	--	--	--	--
TRIMETHYLBENZENE	ND	--	--	--	ND	--	--	--	--	--	--	--
-OTHER-												
ACETONE	--	0.043@	ND	ND	--	ND	0.024@	ND	--	--	--	--
METHYLENE CHLORIDE	--	ND	ND	0.006	--	(4)	0.009@	ND	--	--	--	--
TOTAL VOLATILE AROMATICS	ND	ND	ND	ND	ND	0.006	ND	ND	--	--	--	--
SEMIVOLATILE ORGANICS (MG/L)												
-PAH-												
ACENAPHTHENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
ACENAPHTHYLENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
ANTHRACENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
BENZO(b)FLUORANTHENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
BENZO(k)FLUORANTHENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
BENZO(g,h,i)PERYLENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
BENZO(a)ANTHRACENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
BENZO(a)PYRENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
CHRYSENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
DIBENZO(a,h)ANTHRACENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
FLUORANTHENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
FLUORENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
INDENO(1,2,3,-cd)PYRENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
NAPHTHALENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
PHENANTHRENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
PYRENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
-OTHER-												
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	0.015	0.080	--	--	--	--	--	--	--	--
2-METHYLNAPTHALENE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
TOTAL PAH	ND	ND	ND	ND	--	--	--	--	--	--	--	--

CHEMICALS FOUND IN QUALITY ASSURANCE SAMPLES (CON'T)
MECHANICVILLE SITE

SITE IDENTIFIER	SAMPLER BLANK				TRIP BLANK				FILTRATION BLANK			
SAMPLE IDENTIFIER	SB-101	SB-201	SB-301	SB-401	TB-101	TB-201	TB-301	TB-401	FB-101	FB-201	FB-301	FB-401
ORGANICS ANALYSIS (1)	HPLC	GC/MS	GC/MS	GC/MS	HPLC	GC/MS	GC/MS	GC/MS	HPLC	HPLC	HPLC	HPLC
DATE OF SAMPLE COLLECTION	9/9/86	12/2/86	3/10/87	6/2/87	9/9/86	12/2/86	3/10/87	6/2/87	9/9/86	12/2/86	3/10/87	6/2/87
OTHER CHEMICALS (MG/L)												
-METALS-												
IRON	ND	ND	0.09	ND	--	--	--	--	ND	ND	ND	ND
ZINC	ND	0.012	ND	ND	--	--	--	--	ND	0.014	ND	ND
-CYANIDE-												
TOTAL CYANIDE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
AMENABLE CYANIDE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
FERRO-FERRI CYANIDE	ND	ND	ND	ND	--	--	--	--	--	--	--	--
-OTHER-												
TOTAL RECOVERABLE PHENOLICS	0.012	--	--	ND	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON	ND	1	2.3	1.0	--	--	--	--	ND	1	4.1	2.8
SULFATE	--	4.0	--	--	--	--	--	--	--	4.0	--	--

NOTES:
(1) INDICATES WHETHER SAMPLE VALUES WERE OBTAINED BY GC/MS OR HPLC METHODS.
(2) ND = NOT DETECTED (SEE APPENDIX B-2 FOR MINIMUM DETECTION LIMITS).
(3) -- = NOT ANALYZED
(4) TRACE CONCENTRATIONS DETECTED BELOW THE QUANTIFIABLE REPORTING LIMIT.

12/17/87

QUALITY ASSURANCE SAMPLES
MINIMUM DETECTION LIMITS (1)
MECHANICVILLE SITE

SITE IDENTIFIER	SAMPLER BLANK				TRIP BLANK				FILTRATION BLANK			
DATE OF SAMPLE COLLECTION	9/9/86	12/2/86	3/11/87	6/2/87	9/9/86	12/2/86	3/11/87	6/2/87	9/9/86	12/2/86	3/11/87	6/2/87
VOLATILE AROMATICS	0.001	0.005	0.010	0.005	0.001	0.005	0.010	0.005	-- (2)	--	--	--
ACETONE	0.002	0.010	0.010	0.010	0.002	0.010	0.010	0.010	--	--	--	--
METHYLENE CHLORIDE	0.001	0.005	0.010	0.005	0.001	0.005	0.010	0.005	--	--	--	--
SEMIVOLATILE ORGANICS	0.02	0.010	0.010	0.010	--	--	--	--	--	--	--	--
IRON	0.10	0.03	0.05	0.100	--	--	--	--	0.10	0.03	0.05	0.100
ZINC	0.010	0.005	0.01	0.020	--	--	--	--	0.010	0.005	0.01	0.020
TOTAL CYANIDE	0.010	0.01	0.01	0.01	--	--	--	--	--	--	--	--
TOTAL ORGANIC CARBON	0.50	5	5	5	--	--	--	--	0.50	5	5	5
TOTAL RECOVERABLE PHENOLICS	0.01	--	--	0.005	--	--	--	--	--	--	--	--
SULFATE	--	1	--	--	--	--	--	--	--	1	--	--

(1) NOMINAL DETECTION LIMITS WERE USED WHERE MDLs WERE NOT REPORTED BY THE LABORATORY.
(2) -- NOT ANALYZED

APPENDIX B-3

SOLUBILITY DATA

SOLUBILITIES OF PAHs IN WATER (mg/ℓ)[1]

Compound	Verschueren[2]	EPA Treatability Manual[3]
Acenaphthene	--	3.42
Acenaphthylene	3.93	3.93
Anthracene	1.29	0.073
Benzo(a)anthracene	0.044 at 24°C	0.014
Benzo(a)pyrene	0.003 at 20°C	0.0038
Benzo(b)fluoranthene	--	NA[4]
Benzo(k)fluoranthene	--	0.00055
Benzo(g,h,i)perylene	0.00026	0.00026
Chrysene	0.006	0.002
Dibenzo(a,h)anthracene	--	0.0005
Fluoranthene	0.120 at 24°C	0.26
Fluorene	1.9	1.98
Indeno(1,2,3-cd)pyrene	--	0.62
Naphthalene	30.0 at 20°C	34.4
Phenanthrene	0.816 at 21°C	1.29
Pyrene	0.032 at 24°C	0.14

[1] All values are calculated at 25°C unless otherwise noted.

[2] Verschueren, K. Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Company, New York, New York 1977.

[3] USEPA, Treatability Manual Volume I: Treatability Data, Office of Research and Development, Washington, DC EPA-600/2-82-001a. September 1981 (Revised).

[4] NA - Not available.