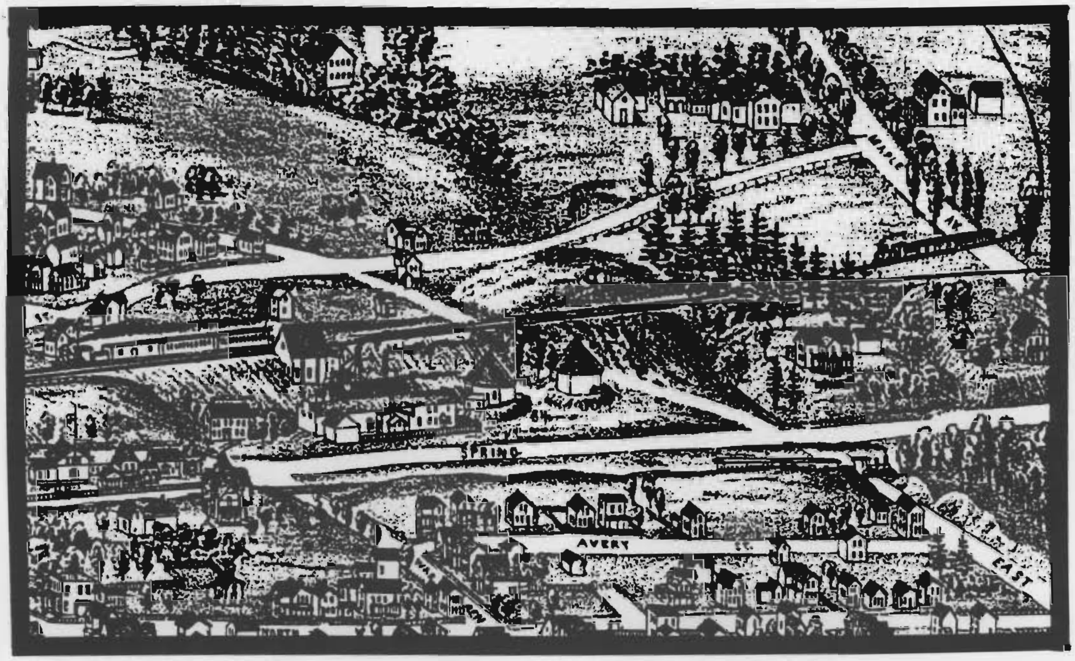
WORK PLAN FOR REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

FOR THE
NIAGARA MOHAWK POWER CORPORATION SITE
SARATOGA SPRINGS, NEW YORK



MAY 2, 1990

ON BEHALF OF
NIAGARA MOHAWK POWER CORPORATION

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ATLANTIC
ENVIRONMENTAL SERVICES, INC. 188 NORWICH AVENUE COLCHESTER, CONNECTICUT 06415 (203) 537-0751

WORK PLAN FOR REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

FOR THE

NIAGARA MOHAWK POWER CORPORATION SITE
SARATOGA SPRINGS, NEW YORK

PREPARED FOR:

NIAGARA MOHAWK POWER CORPORATION

ATLANTIC PROJECT NO.: 1283-03-01

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EXPLANATORY NOTE

Niagara Mohawk Power Corporation (NMPC) has not yet selected a contractor to implement the RI/FS at the Site addressed by this document. Due to company contracting policy, an RI/FS contractor will be selected based on a NMPC selection procedure started after final acceptance of the RI/FS Work Plan and supporting plans by EPA. Even though Atlantic Environmental Services, Inc. (Atlantic) is the preparer of this document, it should not be presumed that Atlantic will be the eventual RI/FS contractor.

Throughout this document, reference is given to recent publications by the Gas Research Institute and the Electric Power Research Institute. These organizations have and are conducting applied research directed specifically at managing the restoration of former manufactured gas plant (MGP) sites. NMPC recognizes that results of ongoing research in the MGP area cannot be used as substitutes for EPA policy and protocol, however, it does wish to identify those publications from the utility research area that should be considered when addressing particular investigative or remedial issues. These publications are readily available and it is recommended that the eventual RI/FS contractor for the NMPC Site be aware of them.

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1.0 INTRODUCTION

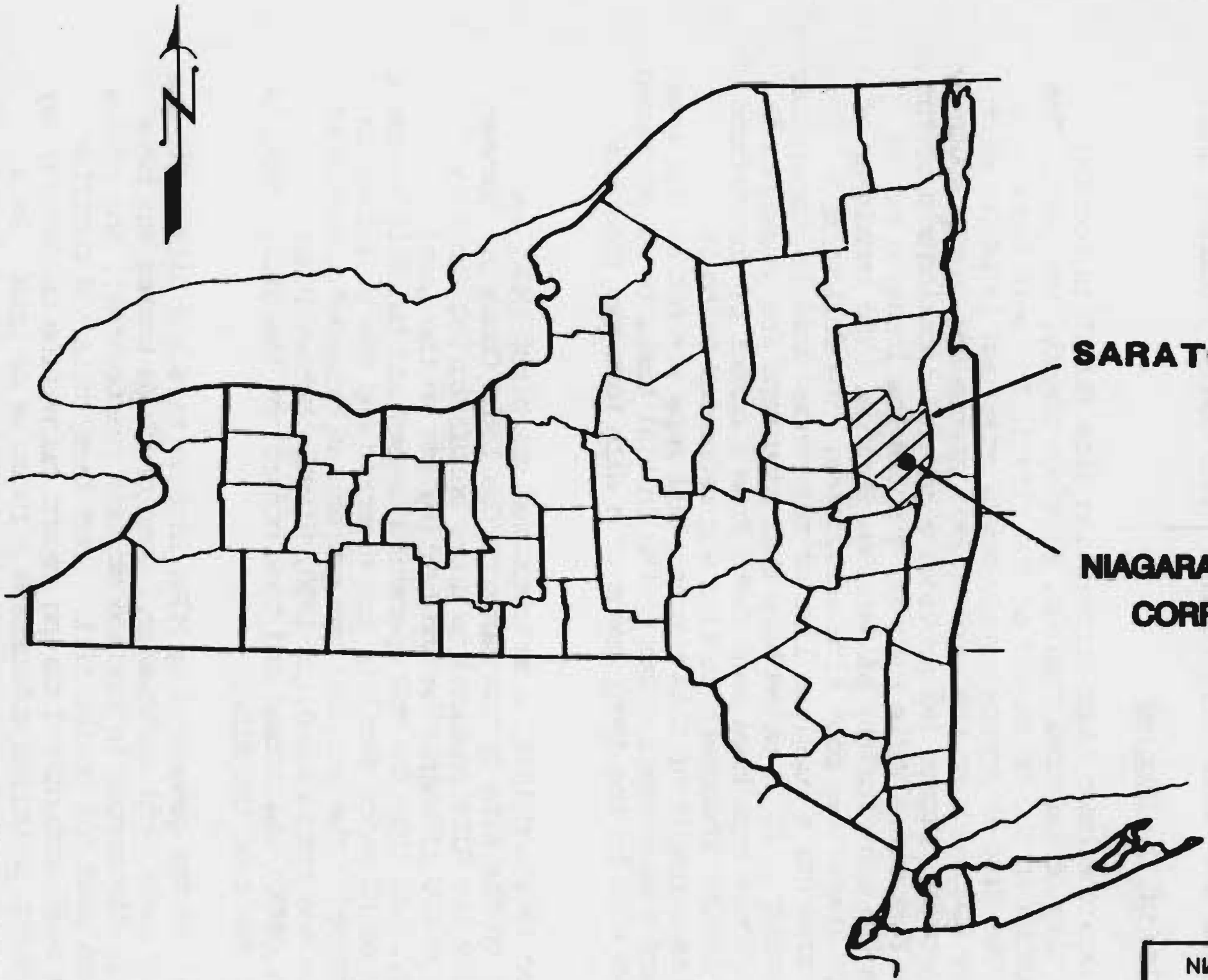
On October 2, 1989, the Administrative Order on Consent (Index No. II CERCLA-90228) between Niagara Mohawk Power Corporation (NMPC) and the United States Environmental Protection Agency (USEPA) Region II became effective covering the conduct of a Remedial Investigation/Feasibility Study (RI/FS) at the NMPC Site. The RI/FS described herein will be performed in accordance with the requirements of CERCLA, the NCP, 40 CFR Part 300 (and any amendments thereto), and all applicable EPA guidance documents, including the EPA document entitled "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA", October 1988.

1.1 Overview of the Problem

The Niagara Mohawk Power Corporation Site (Site) is located within the City of Saratoga Springs, Saratoga County, New York. The Site is located in the north end of the city in the main commercial district. The Site is approximately seven acres and is bordered on the north by Route 50, on the east by East Avenue and on the south by Excelsior Avenue. Figure 1-1 provides a general location map of the Site in New York State while Figure 1-2 shows the location of the Site within the municipality of Saratoga Springs. The remainder of this section summarizes past site activities. The following subsection presents a complete list of references used in preparation of this document. It is noted here that many maps are presented in this plan. These maps have been taken from a number of the sources referenced in the subsequent section and recreated using PC software. As a result of this process, all maps are not at the same scale nor are scales exact. One of the initial tasks to be performed in the RI/FS will be the development of a site base map (Section 5.3.4).

Between 1868 and 1873, a manufactured gas plant (MGP) was constructed on the Site by the Saratoga Gas Light Company. Between 1873 and 1929 the Site remained as a gas manufacturing facility providing low BTU illumination and heating gas to the local municipality. In 1929 the MGP operation ceased and the Site became a service and maintenance facility for electric and gas utilities in Saratoga Springs. The original gas company experienced a number of acquisitions and mergers and, in 1950, Niagara Mohawk Power Corporation (NMPC) was formed and took control of the Site. NMPC is the current owner of the Site.

Typical wastes generated by MGPs include tars and oils, ash, gas purification waste, and wastewater. Some of these wastes may have been directly discharged to surface streams (wastewater), and others may have been used for onsite fill. Some tars, oils and purifier wastes have been encountered during recent excavation onsite and may still be present in buried subsurface structures or pits. As a



NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 1-1
REGIONAL LOCATION MAP

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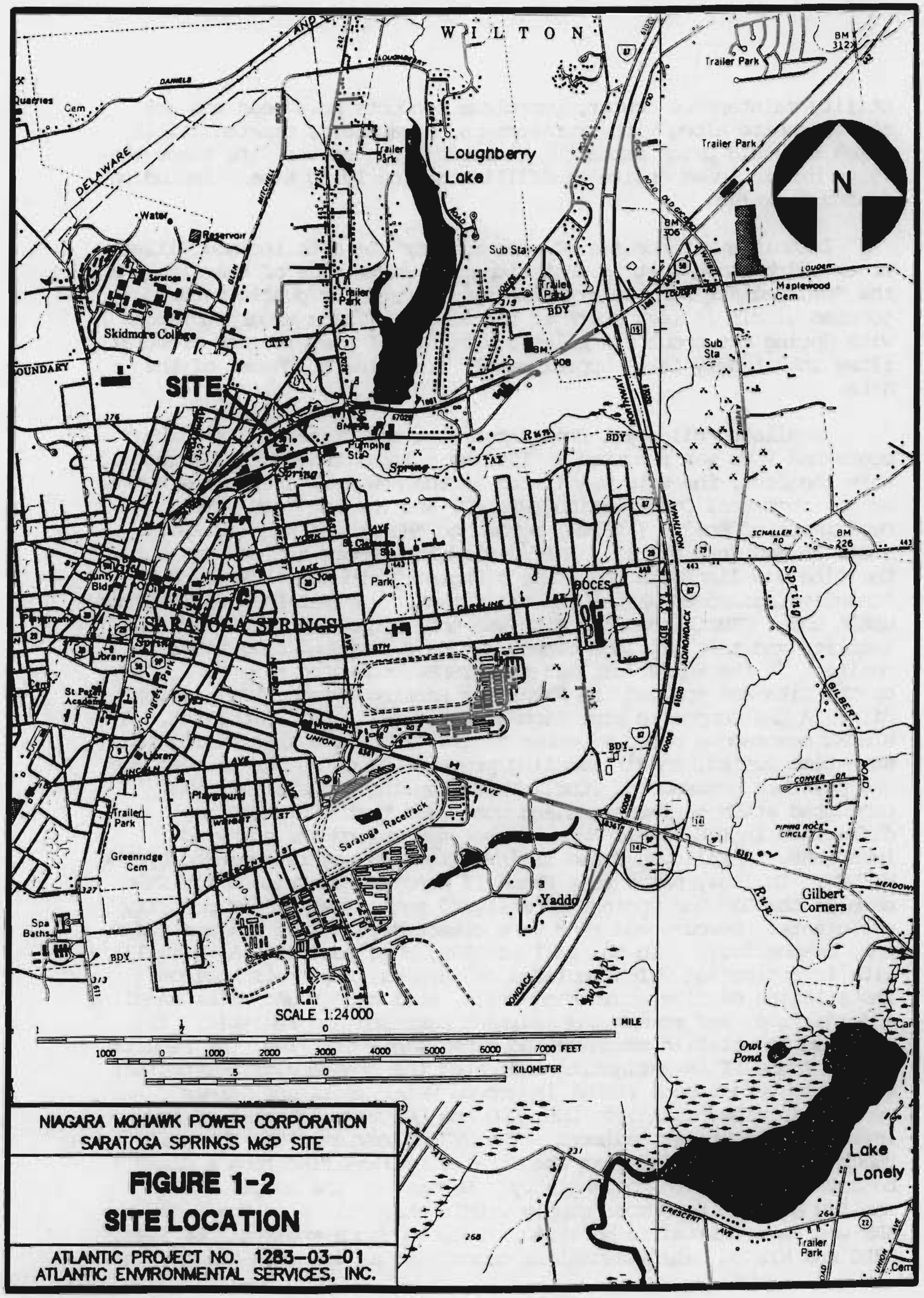

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 1-2
SITE LOCATION

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utility maintenance center, petroleum products have been and are stored onsite along with transformers, capacitors, treated utility poles and cold patch asphalt. Historical use of the Site since the 1950s has included onsite landfilling of low lying areas, including drainage swales.

Immediate waterbodies of concern near the Site include Village Brook which flows west to east along the south side of the Site and the "Old Red Spring", an artesian spring used for public water, located within 75 feet south of the Site. Village Brook converges with Spring Run about 0.4 miles downstream of the Site and eventually flows into Lonely Lake, approximately 3.5 miles southeast of the Site.

An alleged oil spill from capacitors and transformers which contained PCBs was reported in 1980 by a local resident. Because of this incident, the Site was listed in the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) report on "Hazardous Waste Disposal Sites in New York State". NMPC denied the report and subsequently the Site was listed in the State's Registry and Annual Reports of "Inactive Hazardous Waste Disposal Sites". In 1982 NMPC notified the USEPA under CERCLA that the Site was once a gas manufacturing facility and that previous owners may have disposed coal tars onsite. In the summer of 1983 the NYSDEC conducted a Phase I study of the Site and applied the Hazardous Ranking System (HRS) to the Site. A HRS composite migration score of 13.11 was calculated. A NYSDEC memorandum dated November 3, 1983 indicates that during this same time period, an air sampling program was conducted to evaluate the possible presence of PCBs. This sampling and analysis was conducted at three locations and concluded that there was no difference in PCB levels observed between upwind and downwind locations. A followup Phase II investigation was recommended by the NYSDEC. In 1984, prior to a Phase II study, a contractor for NMPC sampled the Old Red Spring and analyzed water samples for priority pollutants. Mercury and zinc were detected at 0.0082 ppm and 0.060 ppm, respectively. In the fall of 1985, NMPC conducted a Phase II site investigation which included geophysics, five soil borings, installation of five monitoring wells, soil and ground water sampling and analysis, and stream and sediment sampling and analysis. In addition to volatile organics and other semi-volatiles, the results of the Phase II investigation indicated the presence of polynuclear aromatic hydrocarbons (PAHs) in ground water, soil and stream sediments. The pesticides DDE, DDD and DDT were detected at low levels in the stream sediment. The NYSDEC reviewed the Phase II report and recommended that the Site be reclassified from a Class 3 to a Class 2 site in the Registry. Because of the usage of the shallow aquifer for water supply within three miles of the Site, the HRS was recalculated to be 46.60. Between March and April of 1986, NMPC and NYSDEC held discussions concerning an Order on Consent to conduct a state mandated RI/FS. On May 13, 1987 a spill of approximately thirty gallons of PCB-contaminated regulator fluid from a 55 gallon drum occurred at the Site. NYSDEC was notified and a NYSDEC representative observed the excavation and removal of contaminated soil.

The total quantity of waste at the Site is not known at the present time. Based on the Phase II study, a minimum of 1,550 cubic yards of coal tar related waste was estimated to be buried at the Site. With the exception of the presence of purifier wastes at certain surface soil areas, there are no other visible surface manifestations of gas plant waste. According to the NYSDOH District Office in Glens Falls, nine public water supply wells serving a reported population of 1,250 are located within a three mile radius of the Site. In addition, approximately 500 private wells are located within the same three mile radius. The public and private wells draw water from the same aquifer.

1.2 Project Approach to Development of the Work Plan

Preparation of this Work Plan was accomplished based on the requirements of the Administrative Order on Consent plus the recommendations provided to NMPC's contractor, Atlantic, at meetings with the USEPA at the Region II headquarters held on September 13, 1989 and February 7, 1990.

The Work Plan presents NMPC's technical scope of work as well as a schedule and management plan for performing an RI/FS at the Site.

NMPC's approach to the development of this Work Plan is based on a thorough review of the Phase II report, a working knowledge of problems associated with former MGP operations, interviews with one former and one existing NMPC employee familiar with the Site, and a historical and background analysis of the Site. The data available at present to complete an RI/FS is limited and the Work Plan addresses what additional data need to be acquired. The existing site documentation includes the following reports:

Analytical Report by Ecology and Environment, Inc., November 1982

This report presents the results of GC/MS analyses for PAH compounds in drinking water from the Old Red Spring and sediment from the Village Brook southeast of the Site. GC/MS analytical results indicated there were no polynuclear aromatic hydrocarbons (PAHs) above detection limits.

Analytical Report by Ebasco Services, Inc., January 1984

This report provides results of volatile organic, priority pollutant metals and acid/base neutral extractable organics analysis on water collected from the Old Red Spring on November 3, 1983. GC/MS analytical results indicated there were no volatile organics above detection limits and that low levels of some metals were detected. Preliminary metals analysis detected antimony (6.2 ppb), arsenic (16.1 ppb), selenium (22.8 ppb) and thallium (22.5 ppb). However, as per Hittman Ebasco Associates, Inc.'s (laboratory performing analysis for Ebasco) January 17, 1984 correspondence, final metals data was conveyed indicating detectable amounts of cadmium (2 ppb) and silver (0.6 ppb).

Phase I Report - Engineering Investigations and Evaluation at Inactive Hazardous Waste Disposal Sites, Niagara Mohawk Saratoga County, New York, September 1984.

This report was produced for the NYSDEC by Engineering Science in association with Dames and Moore. It includes the results of a calculation of the HRS score. The HRS score was calculated at 13.11.

In response to the draft Phase I report, the NYSDEC conducted air monitoring for PCBs at the Site on October 11, 1983. The results of the monitoring concluded that there was no difference in PCB levels between upwind and downwind locations (NYSDEC, November 3, 1983).

Analytical Report by Ebasco Services, Inc., December 1984

The analysis was conducted by CompuChem Laboratories for Ebasco and included a priority pollutant analysis of water collected from the Old Red Spring on August 13, 1984. The results include volatile organics, acid extractable organics, base-neutral extractable organics, pesticides and PCBs, and inorganic priority pollutants. Mercury and zinc were detected at 0.0082 ppm and 0.060 ppm, respectively.

Phase II Site Investigation Saratoga Springs Site, May 1986

A Phase II investigation was performed at the Site by Calocerinos and Spina Consulting Engineers for NMPC. The investigation included:

- geophysical survey - terrain conductivity, resistivity and magnetometer survey;
- borings and soil sampling at five locations;
- installation of five monitoring wells;
- surface soil sampling at three locations;
- sediment sampling at two locations;

- o surface water sampling at two locations;
- o field permeability testing on five wells via slug tests;
- o ground water sampling at five new monitoring wells plus the Old Red Spring (public water supply);
- o calculation of hydraulic gradient; and
- o calculation of a Hazard Ranking System (HRS) score.

This investigation represents the most detailed study of site contamination up until May 1986. The results indicated shallow surface contamination (both soil and water) by volatile organic compounds, PAH compounds and metals. Surface soils taken from the northwestern corner of the Site contained high levels of PAHs and low levels of pesticides. Stream sediments both upstream and downstream of the Site contained PAHs, pesticides and metals. This report stated that neither the stream water nor the Old Red Spring water contained contamination from the Site at detectable levels.

<u>USEPA Site Analysis Niagara Mohawk Power Corporation. Saratoga Springs, New York</u>. TS-PIC-89050, August 1989.

This is a review of site aerial photographs from June 1961 to May 1989. The following is a summary of USEPA interpretation of these photographs.

1961: The Niagara Mohawk facility is in operation. Three buildings are onsite. There is a circular concrete foundation which was the base of gas holder No. 6 (see Section 2.1.3). There is a looped shaped access road south of the roundhouse which leads past a waste disposal area. (According to a former employee of Niagara Mohawk, this waste disposal area located south and east of the roundhouse had been low lying areas where excavated soils and road bed materials from the installation of gas pipelines in and around Saratoga Springs were placed.) There are dark toned areas which may be ground stains in this and many of the photographs. (According to the former Niagara Mohawk employee, these areas may be cold patch asphalt which was typically stored directly on the ground or on the eastern side of the Site.) There is a storage area in the northwest corner of the Site.

1964: Material has been added to the waste disposal area south of the roundhouse. Near the Site to the northwest and northeast are a waste disposal area and a small auto junkyard, Old Red Spring is visible, and storage areas are located in the northern border of the property.

1968: North of the Site a highway is being constructed on top of an old railroad right of way. The waste disposal area visible in 1964 is no longer visible. There is a fill area to the west, and the auto junkyard has moved to the south.

1971: The waste disposal area has expanded. Drums are visible in the northern storage area; according to Niagara Mohawk, these drums may have been used to store electrical transformers or capacitors. The fill area to the west has expanded. A possible culvert is visible along the eastern edge of the Site.

1974: The waste disposal area has been filled and graded in the southeastern portion of the Site. Much of the eastern as well as the northern border of the Site is now being used for the open storage of material, and a culvert is located at the southeastern portion of the Site.

1989: The Site has changed little. Drums are visible. The use of the drums is mentioned above.

Summary of NMPC Employee Interview

Mr. Francis Cunningham, an ex-NMPC employee, was interviewed by Atlantic to discuss his recollection of past activities at the Site. The EPA Site Analysis Report was reviewed during the interview with F. Cunningham, who worked at the Site between 1934 and 1979. The report discussed two principal activities onsite: the disposal of waste onsite between 1961 and 1971, and the filling of surface drainage ways on the southern and eastern sides of the Site between 1961 and 1974. The waste disposal areas located south and east of the roundhouse were low lying areas where excavated soils and road bed materials from the installation of gas pipelines in and around Saratoga Springs were placed. The material was not considered hazardous by NMPC. The mounds were probably recently dumped material. The dark toned areas and ground stains indicated in many of the photographs were probably cold patch asphalt which was typically stored directly on the ground on the eastern side of the Site. The large, circular concrete foundation observed in the northwestern corner was correctly indicated as the base of a 500,000 cubic foot gas holder, however it was not a pit holder as suggested by the report. The horizontal tank (HT) noted in the 1961 photograph was not verifiable by Mr. Cunningham. Areas of open storage of materials and the slow filling of low lying areas were correctly indicated by the report.

The 1964 report was correct in identifying the auto junkyard to the northeast of the Site which was in very close proximity to a clean sand borrow area used by NMPC for bedding material for gas pipelines. The junkyard to the northwest of the Site in 1964 has been removed with the construction of Route 50 (the new arterial into

Saratoga Springs). The two springs shown at "Red Spring" are questionable since only one spring exists there today. The other spring is correctly identified and the "Poss Spring" is actually Village Brook which flows through the valley.

Even though some drums may have been stored on the property, the multiple fixtures depicted in the 1974 photograph as drums were more likely electrical transformers or capacitors. The vertical tanks indicated in 1974 and 1989 were probably large transformers used in substations.

Other sources of available data are:

- Niagara Mohawk Power Corporation. Response to EPA Request for Information Under 42 U.S.C., 9604, 6927, March 1989.

- Niagara Mohawk Power Corporation. Site Fact Sheet, Saratoga Springs Site.

- Niagara Mohawk internal document chronicling the history of site investigations between 1980 and 1986.

- Adirondack Electric Power Corporation. Predecessor Companies, 1853 to 1920. (A synopsis of ownership of the Site between 1853 and 1950 with the final consolidation of Niagara Mohawk.)

- SITE PLANS AND MAPS

  1. New topographic atlas of Saratoga County, 1866.
  2. Combination atlas of Saratoga Springs and Ballston Spa, 1876.
  3. Aerial lithograph, Saratoga Springs, New York, Burleigh Lithographic Est., 1888.
  4. Sanborn Insurance Map, 1900.
  5. USGS 15 Minute Quadrangle; Saratoga, 1902.
  6. Adirondack Power & Light Plan E-8174; Gas Works Property, 1907 Tracing.
  7. USGS 15 Minute Quadrangle; Saratoga, 1910.
  8. Adirondack Power & Light Key Map E-1417, 1922.
  9. New York Power & Light Plan I-1328; Saratoga Gas Plant Yard Piping, 1934.
  10. New York Power & Light Plan F-3681; Saratoga Gas Plant Fence Plan, 1941.
  11. Sanborn Insurance Map, 1950.
  12. Test Boring Location Map/Building Plan, Niagara Mohawk Internal Correspondence 55-01-013, 1965.
  13. Test Boring Location Map, Soil Testing Services, Inc., 1973.

14. Niagara Mohawk Power Plan C-16764-E; Saratoga Service Building Plot Plan, 1973.
15. Niagara Mohawk Power Plan SC-730251, Saratoga Service Building Test Borings, 1973.
16. Niagara Mohawk Power Plan QQQ-583; Test Boring Location Map, 1984.
17. Calocerinos & Spina Phase II Site Investigation Figures, 1986.
18. Site Plan for Niagara Mohawk Power Corporation, Richard E. Jones Associates, 1988.
19. Concept Plan for Niagara Mohawk Power Corporation, Richard E. Jones Associates, 1988.
20. Zoning Map, City of Saratoga Springs, Revised 1988.

- EXISTING SITE PHOTOGRAPHS

  1. Photograph of Saratoga Gas, Electric Light & Power Plant, 1903.
  2. Photograph of Saratoga Gas, Electric Light & Power Company Substation, 1903.
  3. Aerial Photograph, 6/5/61; EPA TS-PIC-89050, August 1989.
  4. Aerial Photograph, 4/5/64; EPA TS-PIC-89050, August 1989.
  5. Aerial Photograph, 8/15/68; EPA TS-PIC-89050, August 1989.
  6. Aerial Photograph, 4/18/71; EPA TS-PIC-89050, August 1989.
  7. Aerial Photograph, 3/20/74; EPA TS-PIC-89050, August 1989.
  8. Aerial Photograph, 5/25/89; EPA TS-PIC-89050, August 1989.

- TEXTUAL REFERENCES

  1. Hudson River Water Power Company, 1903, The Story of A Great Enterprise, pp. 95-101.

  2. Brown's Directory of American Gas Plants, 1906-1926.

  3. Annual Report, Public Service Commission of New York, 1906-1931.

- INTERVIEWS

  1. Interview with Eugene Derby; Employed at Saratoga 1955-present, conducted 9/21/89 by Paul Gruntmeyer, Atlantic Environmental Services, Inc.

2. Interview with Francis Cunningham; Employed 1934-1979 at Saratoga facility; Father employed at Gas Works 1919-1944. Conducted 9/27/89 by John Ripp and Paul Gruntmeyer, Atlantic Environmental Services, Inc.

1.3 Definition of Terms

Term	Definition/Connotation
ARAR	Applicable or Relevant and Appropriate Requirements
ASTM	American Society of Testing and Materials
BNA	Base Neutral Acid
BOD	Biochemical Oxygen Demand
CERCLA	Comprehensive Environmental Response Compensation and Liability Act of 1980 (PL96-510). CERCLA is also known as Superfund and was amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA).
CGI	Combustible Gas Indicator
CLP	Contract Laboratory Program
CRP	Community Relations Plan: A plan that defines the community relations activities to be conducted during the Remedial Investigation/ Feasibility Study (RI/FS).
Dia.	Diameter
DNAPL	Dense non-aqueous phase liquid
DQO	Data Quality Objective: Statements that specify the data needed to support decisions regarding remedial response activities.
EBOS	Environmental Behavior of Organic Substances: A multi-year research program to advance the understanding of organic wastes derived at utility sites.
EM	Electromagnetic
EPA	Environmental Protection Agency (USEPA)

EPA - ESD	Environmental Protection Agency - Environmental Services Division
EPRI	Electric Power Research Institute
ERA	Expedited Response Actions
FCR	Field Change Request
FID	Flame Ionization Device: used for determining organic contamination on a real time basis.
FOL	Field Operations Leader
FOP	Field Operations Plan: Defines in detail the field activities to be used at a site. The FOP includes the Site Management Plan (SMP), the Field Sampling and Analysis Plan (FSAP) and the Health and Safety Plan (HASP).
FS	Feasibility Study
GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrometer
GRI	Gas Research Institute
HASP	Health and Safety Plan: Defines in detail the health and safety program to be implemented during field activities at a site.
HNu	Photoionization device: Used for determining organic contamination on a real time basis.
HRS	Hazard Ranking System
H_2S	Hydrogen Sulfide
HSO	Health and Safety Officer
LOE	Level of Effort
LT	Less than
MCL	Maximum Contaminant Level: Established under the Safe Drinking Water Act.
MCLG	Maximum Contaminant Level Goal: Established under the Safe Drinking Water Act.

MG/KG	Milligram per kilogram
MG/L	Milligram per liter
MGP	Manufactured Gas Plant
MSL	Mean Sea Level
NCP	National Contingency Plan
NCR	Nonconformance Report
NGVD	National Geodetic Vertical Datum
NMPC	Niagara Mohawk Power Corporation
NPL	National Priorities List: A list of sites identified for remediation under CERCLA.
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSM	New York Site Museum
OD	Outside Diameter
ODC	Other Direct Costs
Offsite	Located outside the physical bounds of the site.
Onsite	Located within the physical bounds of the site.
Operable Unit	A discrete action that comprises an incremental step toward a final remedy.
OSWER-EPA	Office of Solid Waste and Emergency Response
OVA	Organic Vapor Analyzer (onsite organic vapor monitoring device)
PAH	Polynuclear Aromatic Hydrocarbon
PARCC	Precision, Accuracy, Representativeness, Completeness, Comparability
PCBs	Polychlorinated biphenyls

PCE	Perchloroethylene: Synonymous to tetrachloroethylene
PID	Photoionization detector
ppb	Part per billion
ppm	Part per million
PRP	Potentially responsible party
psi	Pounds per square inch
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RAS	Routine Analytical Services
REM	Remedial Engineering Management Control Program
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RM	Regional Manager
SAP	Sampling and Analysis Plan: Defines in detail the sampling, analysis and other data gathering activities to be used at a site.
SARA	Superfund Amendments and Reauthorization Act of 1986 (PL 99-499)
SAS	Special Analytical Services
SHPO	State Historic/Preservation Office
SM	Site Manager
SMP	Site Management Plan: Describes the management activities and personnel responsibilities to be implemented during the remedial investigation/feasibility study.
SOP	Standard Operating Procedures

TAL	Target Analyte List (23 metals and cyanide)
TCE	Trichloroethylene
TCL	Target Compound List (127 organic compounds)
TDS	Total Dissolved Solids
TLV	Threshold Limit Value
TSS	Total Suspended Solids
UG/KG	Microgram per kilogram (ppb)
UG/L	Microgram per liter (ppb)
USEPA	United States Environmental Protection Agency
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
Waste Cell	A discrete geographic location known or suspected to contain contaminants.
WP	Work Plan: Describes in detail the objectives, activities and cost of the remedial investigation/feasibility study.
WPM	Work Plan Memorandum: Describes the activities and costs required to produce a work plan.

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2.0 SCOPING OF THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY: SITE BACKGROUND, SETTING AND CHARACTERISTICS

The following section provides a review of the Site history from the original construction of the manufactured gas plant (MGP) to a review of recent aerial photographs of the Site with a former employee of NMPC who worked at the gas plant. This section is to serve as a basis for the design of the RI/FS.

2.1 Site Location and History

2.1.1 Site Location

The Saratoga Springs MGP Site is located northwest of the intersection of Excelsior and East Avenues in Saratoga Springs, New York. The Site is bounded by Excelsior Avenue on the south, East Avenue on the east, and New York Route 50 on the north. Figure 1-2 shows the general location of the Site and Figure 2-1 provides an existing site plan.

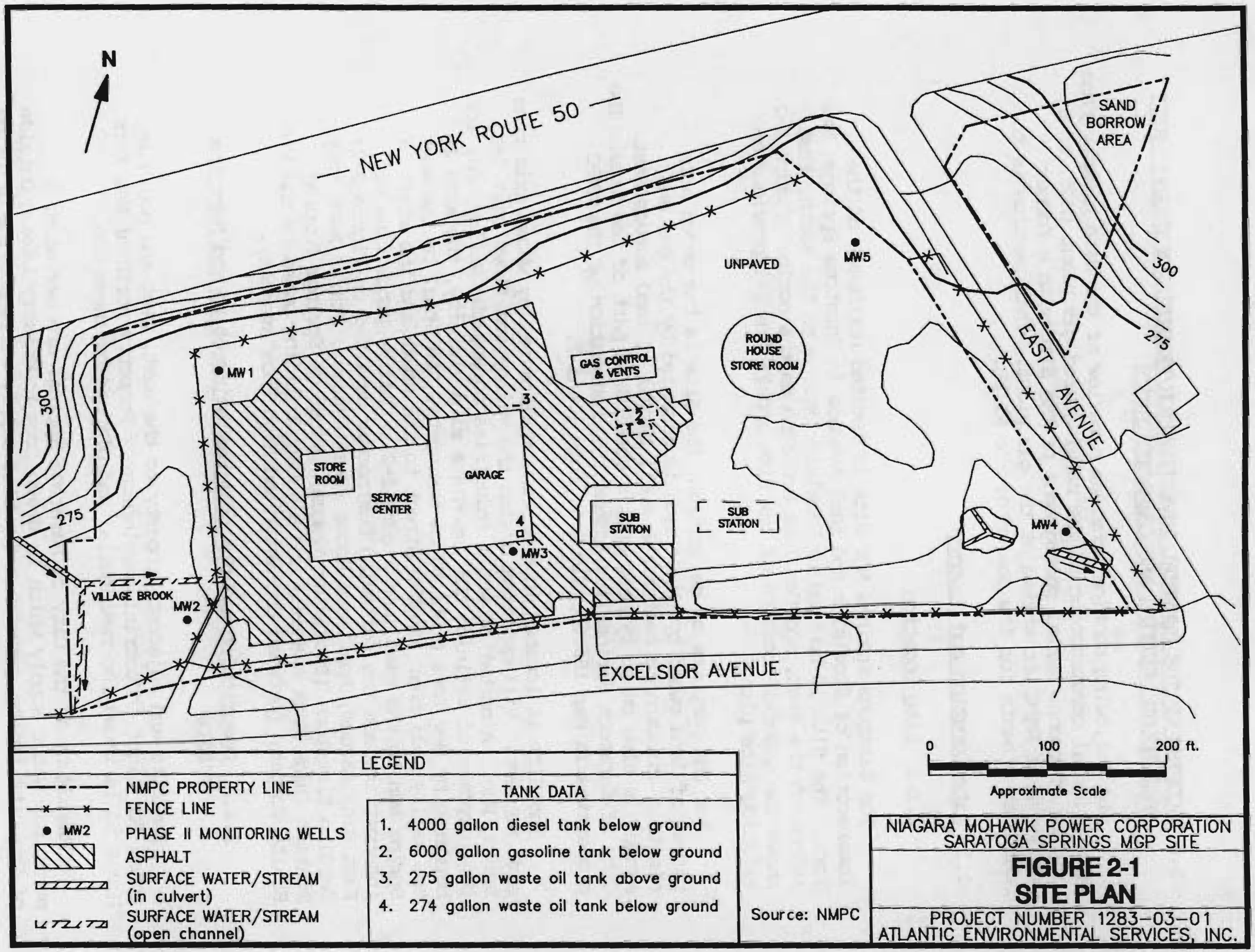
For the purposes of definition, the Site is the seven acre parcel of land owned by NMPC which is occupied by the gas and electric maintenance center. A small parcel of land across East Avenue is also owned by NMPC and is considered part of the Site. The City of Saratoga Springs Tax Assessor's designation of the NMPC properties is Map 166.05, Block 5, Lots 1 and 2.

The Site is located in a narrow, shallow valley whose axis runs east to west. Village Brook drains the valley and flows east into Spring Run. A number of small industries occupy the valley and, for the purposes of defining the immediate site vicinity, the area is bordered by New York Route 50 to the north, SPA Steel to the west, the valley wall near Bingham Street to the south and the start of Spring Run to the east (see Figure 2-2). Nearby properties of interest include the following businesses depicted on Figure 2-2: East Side Garage, Appliance House (East Avenue); Starks Auto Body, Bardino Firestone (Excelsior Avenue); Saratoga Springs Pumping Station (High Rock Avenue); and a vacant building owned by the Van Raalte Company (between Excelsior and High Rock Avenues).

2.1.2 Description and Use of Areas Adjacent to and Near the Site

The Site and adjacent property to the east, west and south is zoned for light industrial development. Property north of New York Route 50 is zoned for residential and planned business use.

Residents of the City of Saratoga Springs are served by a municipal water supply which is drawn from Loughberry Lake. Outside of the city limits, private and public supply wells provide drinking



TANK DATA

1. 4000 gallon diesel tank below ground
2. 6000 gallon gasoline tank below ground
3. 275 gallon waste oil tank above ground
4. 274 gallon waste oil tank below ground

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-1
SITE PLAN

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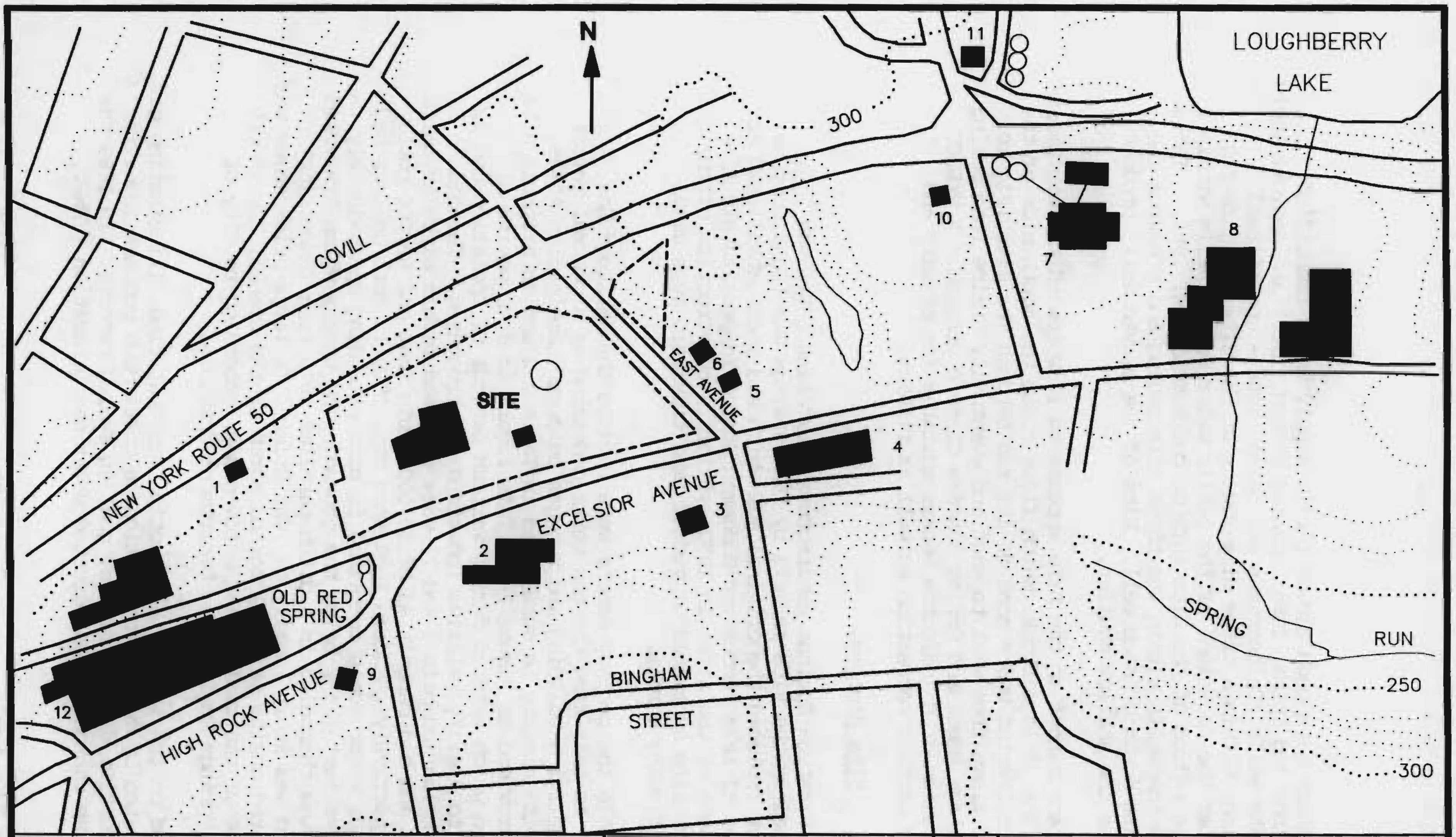

LEGEND

1. SPA STEEL
2. BARDINO'S FIRESTONE
3. STARKS AUTOBODY
4. PUBLIC SKATING RINK
5. APPLIANCE HOUSE
6. EAST SIDE GARAGE
7. WATER WORKS
8. SARATOGA DAIRY
9. PUMP STATION (SEWAGE)
10. SUNOCO STATION
11. MOBIL STATION
12. VACANT BUILDING(FORMERLY EMPIRE SPRING)

.... = CONTOUR LINE

CONTOUR INTERVAL = 10 FEET

0 200 400 600 FT.

Approximate Scale

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-2

SITE VICINITY

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water. There have been eleven public supply wells identified (Calocerinos and Spina, 1986; updated NYSDOH, 1989) and approximately 500 private wells (Calocerinos and Spina, 1986 - unconfirmed information) within a three mile radius of the Site. Figure 2-3 illustrates the locations of the public water supply wells within a three mile radius of the Site (NYSDOH correspondence, 1986). Table 2-1 lists the wells within the three mile radius and presents the approximate depth of each well. Nine of the eleven wells produce water from the shallow aquifer.

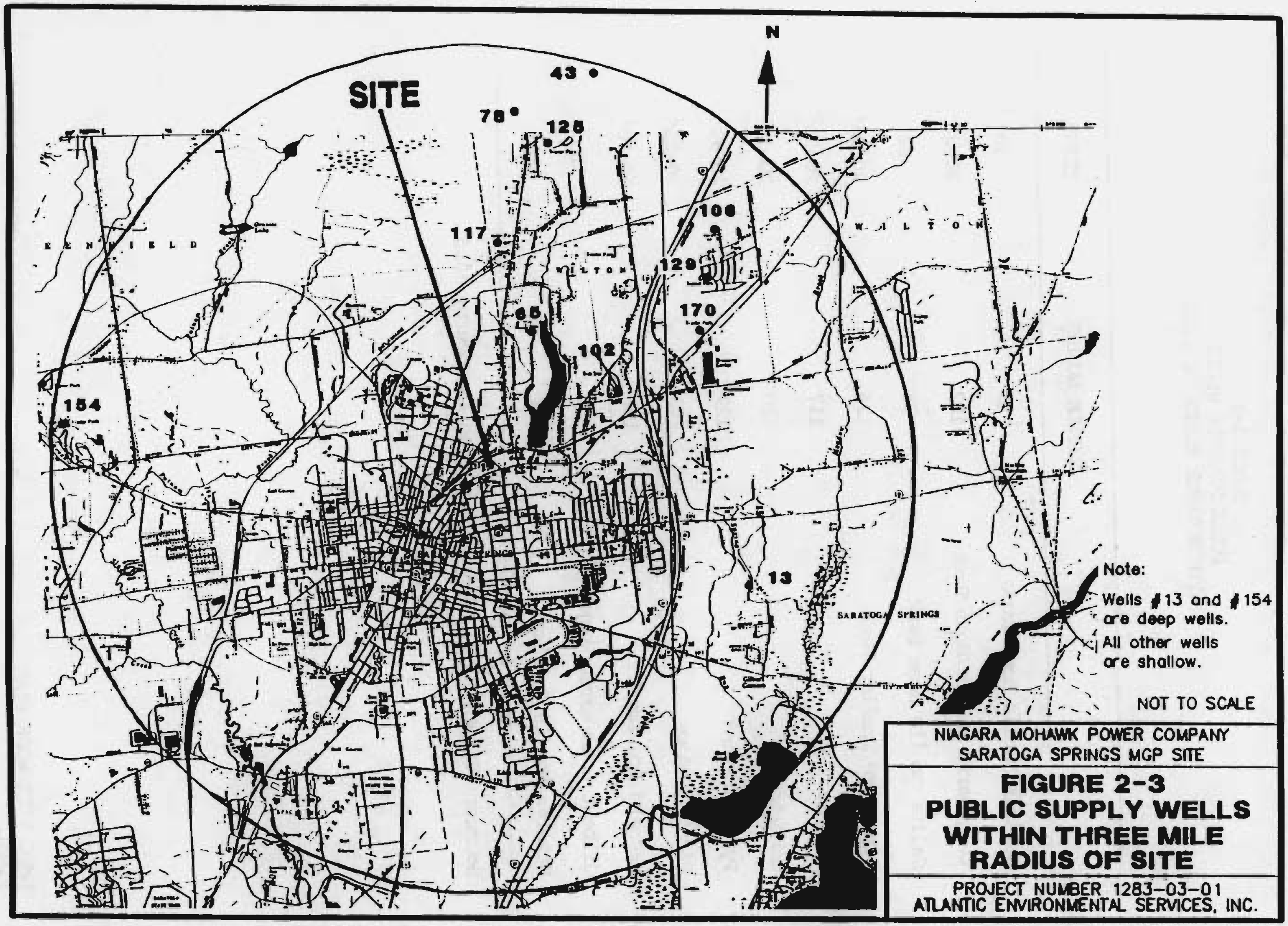
Surface runoff on the Site appears to flow toward the southeast corner. The Village Brook, which flows along the south side of the Site, is culverted under most of its run through the Site (Figure 2-1). It flows from west to east and eventually drains into Spring Run. Village Brook and Spring Run are Class D streams. A NYSDEC classification of D indicates waters suitable for primary and secondary contact recreation as well as fishing.

2.1.3 Site History

The Saratoga Springs manufactured gas plant (MGP) was established on the Site in 1873 by the Saratoga Gas Light Company. This plant replaced the original MGP which had been established at the corner of Lake Avenue and Hodgeman Street (approximately five blocks south of the Site) in 1853. Prior to construction of the gas plant, the Site consisted of vacant land traversed by a small eastward flowing stream.

In 1876 the company assets were sold to the Saratoga Gas Company. At that time the gas works consisted of a central retort house, purifying building and two gas holders (Combination Atlas, 1876). Site history is summarized in Table 2-2 and an historic site plan is provided as Figure 2-4. This figure is a composite of structures which existed during various periods of operation and is intended to clarify relative locations of structures. The gas holders (holder numbers 1 and 2) were enclosed within circular brick buildings and had capacities of 50,000 cubic feet and 60,000 cubic feet, respectively (Sanborn Insurance Map, 1900). Both holders had below grade water seals contained in pits extending approximately twenty-five feet (25') below the ground. The stream which traversed the Site was channeled in a ditch parallel to Spring (Excelsior) Avenue and was known locally as "Gas Creek". A large brick sewer was also located onsite parallel to and north of the creek. The invert of this sewer was twelve feet below grade, according to City of Saratoga Springs Engineering Department drawings.

Based on the industrial practice for that time, illuminating gas was generated by coal carbonization, a continuous process involving the destructive distillation of coal in sealed retorts. In 1886 the process was changed to carburetted water gas generation (HRWPC,



Note:
Wells #13 and #154 are deep wells.
All other wells are shallow.

NOT TO SCALE

NIAGARA MOHAWK POWER COMPANY
SARATOGA SPRINGS MGP SITE

FIGURE 2-3
PUBLIC SUPPLY WELLS WITHIN THREE MILE RADIUS OF SITE

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ATLANTIC ENVIRONMENTAL SERVICES, INC.

TABLE 2-1
PUBLIC SUPPLY WELLS WITHIN THREE MILES OF SITE

	SYSTEM NUMBER	DEPTH
Daniels Mobile Home Park	65	20′
Loughberry Mobile Home Park	102	20-30′
Gailor Mobile Home Park	78	22′
Pine View Trailer Park	125	20-30′
Moskos	117	20-30′
Cobblestone	170	20-30′
Pyramid Pines	129	20-30′
Birch Meadows	43	20-25′
Mansard Apartments	106	20-30′
Gilbert Road Water Works	13	125′
Utter's Mobile Estates	154	110′

Source: Calocerinos & Spina Consulting Engineers, 1986.

TABLE 2-2

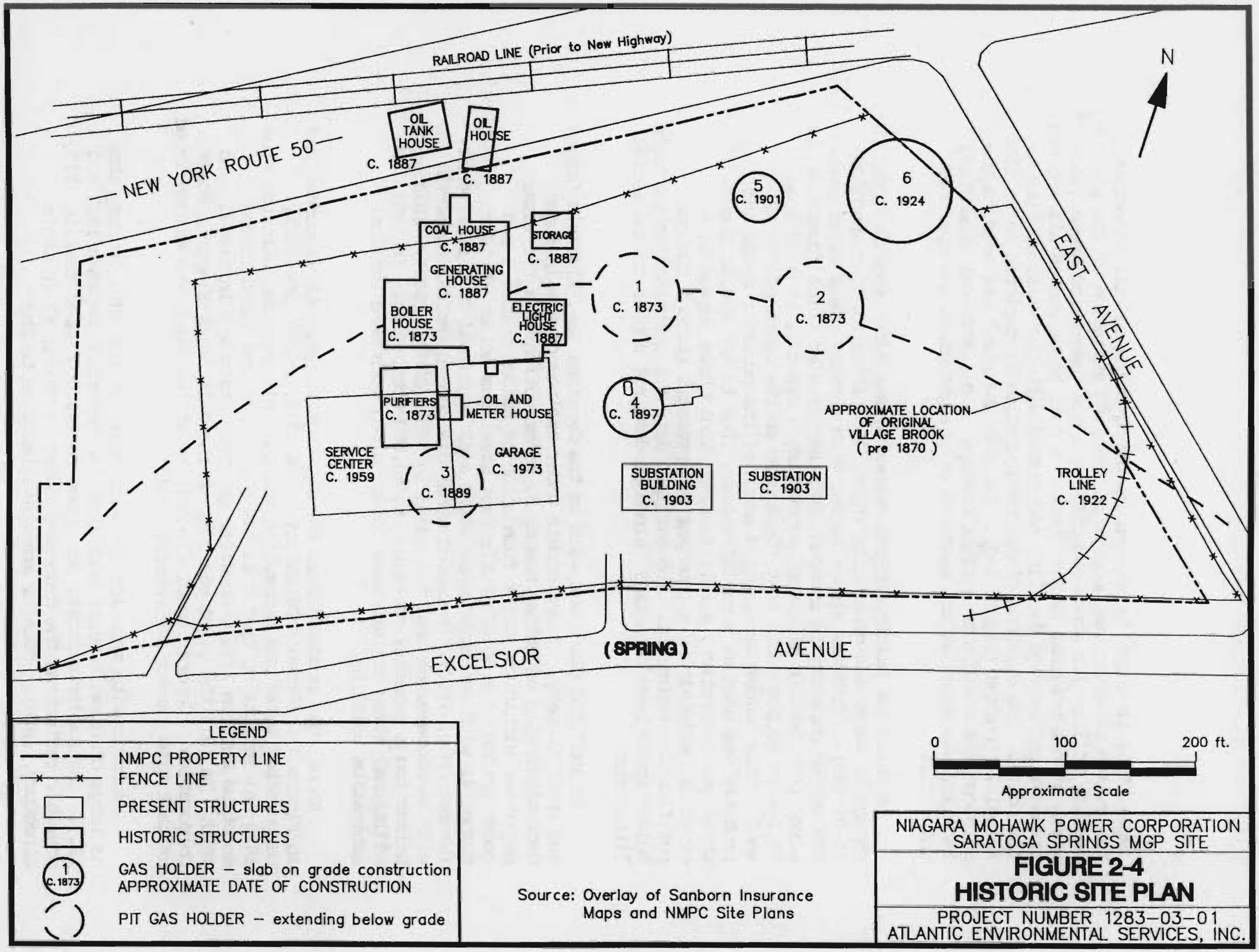
SITE HISTORY

1868-1873	Acquisition of Site by Saratoga Gas Light Company. Construction of gas works at current site, including retort house, purifier house and two gas holder buildings (Holder #1 and #2).
1876	Assets sold to Saratoga Gas Company.
1886	Carburetted water gas (CWG) added to production processes. Expansion of plant: generating house, coal and oil transfer facilities, electric generating house.
1876-1888	East Avenue constructed across eastern portion of site.
1887	Assets sold to Saratoga Gas and Electric Light Company.
1889	Construction of relief holder south of purifier house (Holder #3).
1897	Assets sold to Saratoga Gas, Electric Light and Power Company. Holder #3 decommissioned and converted to tar/water separator. Addition of steel gas holder with above-grade tank (Holder #4).
1901	Installation of Holder #5 (steel holder with above-grade seal).
1903	Installation of two large horizontal boilers and large brick stack (125 feet high). Construction of substation building and decommissioning of electric light plant.
1906	Annual gas production 44,108,900 cubic feet. Holder capacity reported as 200,000 cubic feet. Gas produced by carburetted water gas (CWG) only.
1911	Assets sold to Adirondack Electric Power Company. Discontinuation of electric power generation onsite.
1919	Gas holder capacity reduced to 140,000 cubic feet. Possible decommissioning of Holder #2.
1920	Assets sold to Adirondack Power and Light Corporation.

TABLE 2-2 (CONTINUED)

SITE HISTORY

1924	Peak annual production (95,442,709 cubic feet). Construction of large (500,000 cubic foot) triple lift steel gas holder (Holder #6). Holder capacity reported as 700,000 cubic feet.
1927	Consolidation of New York Power and Light Corporation.
1928	Final complete year of gas production (95,000,000 cubic feet).
1929	Gas production terminated. Saratoga gas plant converted to storage/distribution facility. Gas obtained from Schenectady and Troy MGP facilities.
1929-1934	Demolition of Holder #1 and Holder #4. Demolition of gas generating house, coal storage and oil transfer buildings. Conversion of Holder #2 into garage building.
1933	Decommissioning of tar/water separator. Holder #3 tar pit filled.
1934-1941	Demolition of Holder #5.
1950	Consolidation of Niagara Mohawk Power Corporation.
1958-1959	Demolition of gas plant buildings; construction of NMPC Saratoga Springs Service Center facility.
1960	Demolition of Holder #6.
1968	Construction of North-South Arterial (NY Route 50) along northern boundary of site.
1973	Construction of garage addition to service center.
1986	Installation of new fiberglass 4,000 gallon diesel and 6,000 gallon gasoline underground storage tanks.



Source: Overlay of Sanborn Insurance Maps and NMPC Site Plans

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-4
HISTORIC SITE PLAN

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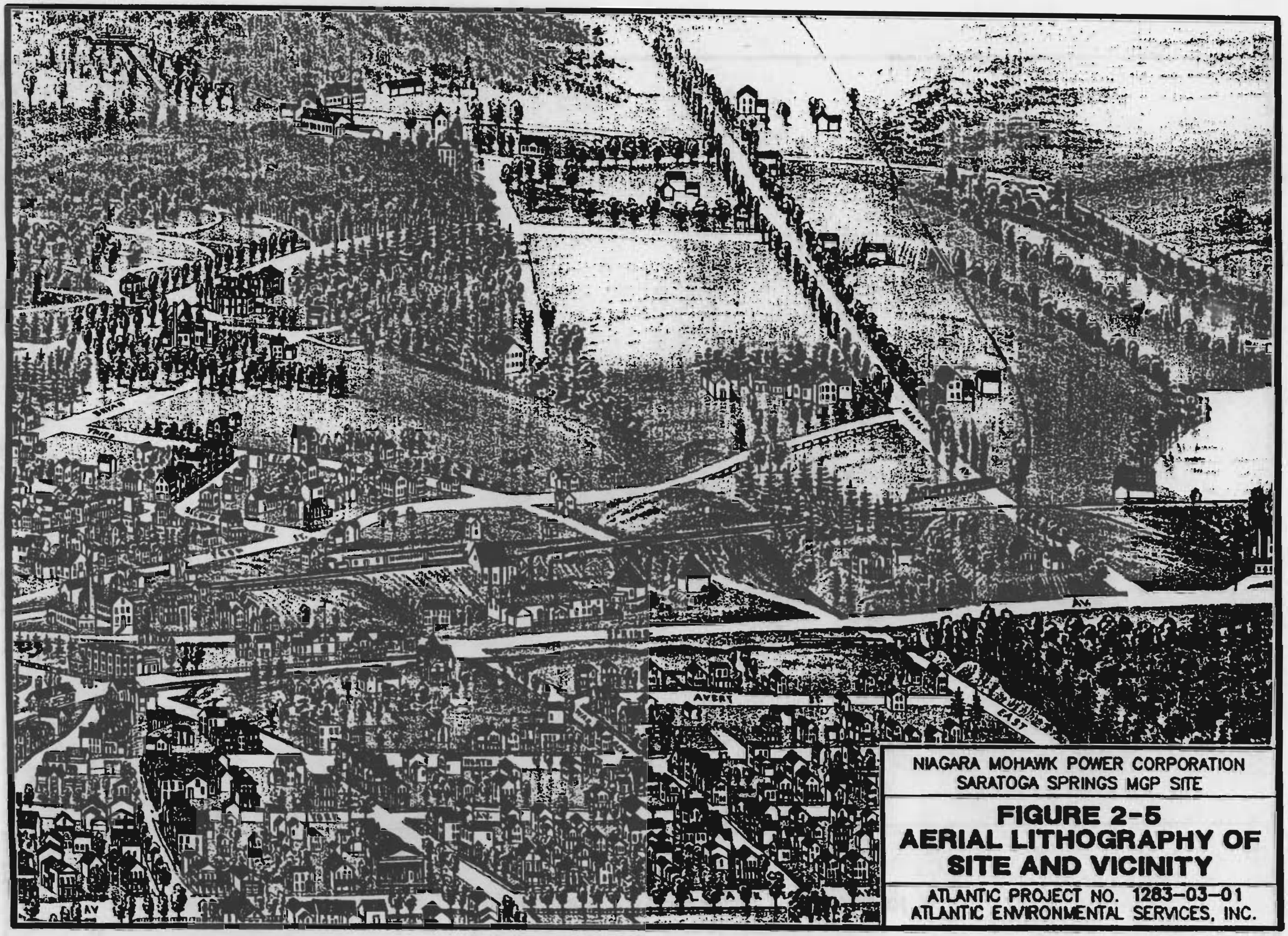
1903). This is a cyclic process involving steam and oil injection. The switch to water gas generation involved expansion of the plant to include boilers for steam generation, a gas generating house (located north of the original retort house), a coal house and an oil and coal transfer and storage facility associated with the railroad line to the north. The expanded plant configuration is depicted in an 1888 aerial lithograph (Figure 2-5). In 1887 the plant was sold to the Saratoga Gas and Electric Light Company. An electrical generating facility was added at the east end of the gas plant and operated until 1911.

A third gas holder (Holder number 3) was added shortly after the change to water gas generation (NIMO, 1965 Internal Correspondence 55-01-013). This was also a holder with a below grade water seal. The holder capacity is unknown, but the circular brick foundation is sixty (60) feet in diameter, suggesting a capacity ranging from 35,000 to 60,000 cubic feet, depending on the depth of the water seal. This holder was located south of the purifier house and probably was used as a relief holder. Due to the cyclic nature of water gas generation, a relief holder would have served as a governor, maintaining a constant gas pressure through the gas purification equipment. The earliest date for installation for this holder would have been 1889, since it does not appear in the aerial lithograph.

In 1897 the plant was sold to the Saratoga Gas, Electric Light and Power Company. Improvements under the new owners included decommissioning of Holder Number 3, construction of a tar/water separator within the brick foundation of Holder number 3 and construction of a 30,000 cubic foot steel gas holder (Holder number 4) with an above grade water seal contained in a steel tank (Sanborn Map, 1900). A second steel gas holder (Holder number 5) with an above-grade seal was added in 1901 (HRWPC, 1903). This holder had a capacity of 40,000 to 60,000 cubic feet. In 1903, two additional steam boilers were added, along with an electrical substation building.

Annual gas production at the Saratoga Springs MGP is summarized in Figure 2-6 (Brown's Directory, 1906-1926; PSCNY 1906-1931). Carburetted water gas generation was the only process indicated from 1890 on, indicating that coal gas generation was discontinued sometime between 1886 when water gas production was initiated, and 1890. In 1911 the plant was sold to the Adirondack Electric Power Corporation. Generation of electricity at the plant was discontinued at that time (Brown's Directory, 1912).

Historic site maps for the early part of the 20th Century show no large changes in plant configuration occurring between 1903 and 1923. Gas holder capacity decreased to 140,000 cubic feet in 1919, possibly reflecting the decommissioning of Holder #2 (Brown's Directory, 1920). Details are unavailable as to the



NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-5
AERIAL LITHOGRAPHY OF SITE AND VICINITY

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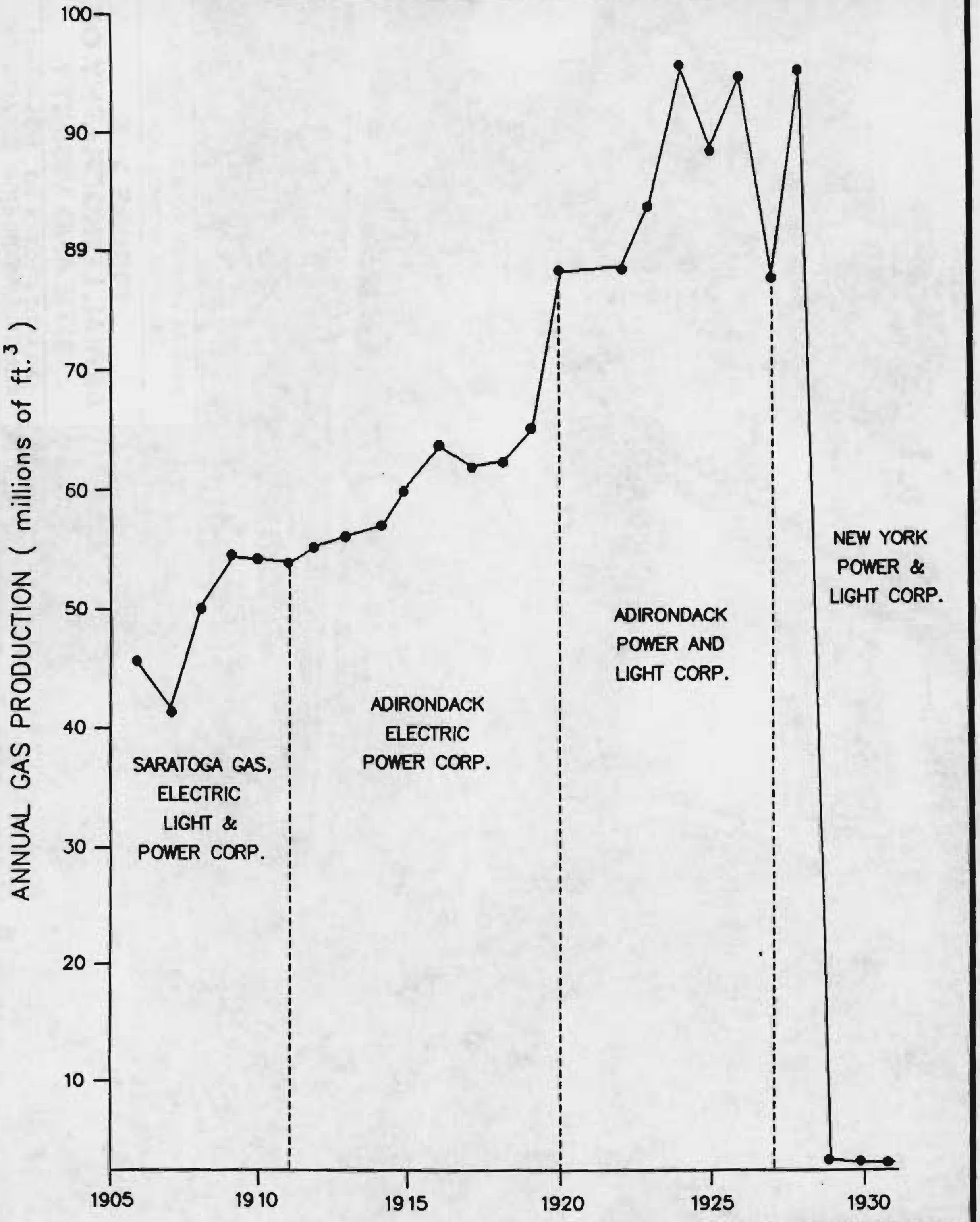
ATLANTIC ENVIRONMENTAL SERVICES, INC.



Source: Brown's Directory of American Gas Plants
1906 – 1926,
Annual Report of Public Service Commission
of New York 1906 – 1931

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-6
GAS PRODUCTION

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decommissioning and demolition of the gas holder or as to the fate of waste products contained within the holder. A 1922 site plan (AP&L, 1922) shows a trolley line crossing the southeast corner of the Site at the intersection of East and Excelsior Avenues. In 1924 a peak annual production of 95,442,709 cubic feet was attained. A large (500,000 cubic feet) triple lift steel gas holder (Holder #6) was constructed at the northeast corner of the Site in 1924, increasing total holder capacity to 700,000 cubic feet. This holder also had a water seal contained in an above ground steel tank (Brown's Directory, 1925). In 1927 the Adirondack Electric Power Corporation was consolidated with New York Power and Light Corporation. The last full year of gas production at Saratoga Springs was 1928 (95,000,000 cubic feet) (PSCNY, 1929).

In 1929 gas production was discontinued at the Saratoga Springs MGP and the facility was converted to a storage/distribution facility. The gas generation equipment was maintained for supplemental (peak shaving) production. Gas generated at the Schenectady and Troy MGP facilities was piped to Saratoga Springs and stored onsite. Gas holder numbers 1 and 4 were demolished between 1929 and 1934. Neither holder appeared on a 1934 plant piping diagram. The demolition of these holders probably coincided with demolition of the generating house and the oil transfer buildings between 1929 and 1934. The circular brick building surrounding Holder number 2 was converted into a garage building prior to 1934. The tar/water separator in the Holder number 3 pit was decommissioned and filled in 1933 (F. Cunningham, 1989). Between 1934 and 1941 Holder number 5 was demolished; the only gas holder indicated in a 1941 site plan was Holder number 6.

In a recent interview with F. Cunningham, a former NMPC employee whose father worked as a gas maker, it was related that the reason the tar/water separator was closed was because a stray dog had wandered onto the Site, fell into the tar pit and proceeded to clean himself in the gas plant superintendent's new 1933 Chevrolet. The next day Holder number 3 was filled in.

In 1950, the New York Power and Light Company was consolidated with Niagara Mohawk Power Corporation, the current site owner. In 1958-59, the original gas plant buildings were demolished and a new service center building was constructed. The new building contained offices and a garage for vehicle servicing. Holder number 6 was demolished in 1960. The concrete foundation of Holder number 6 is visible in the 1961 aerial photograph (<u>Site Analysis Report</u>, EPA, August 1989). During 1965, test borings drilled along the east side of the service center building for a new extension resulted in identification of coal tar in the shallow subsurface (NMPC Internal Memo, August 18, 1983). The southeast corner of the service center building had been constructed over the Holder number 3 pit/tar-water separator. During 1968, extensive road construction activity occurred along the north property line as the North-South Arterial (NY Route 50) was constructed. An area of fill from highway construction encroached onto the northwest corner of the Niagara Mohawk property. In 1973 a garage was constructed on the east side of the service center building. Documentation of test borings drilled for geotechnical evaluation confirms the presence of subsurface hydrocarbon "coal tar" contamination (Soil Testing Services, Inc.; April - May, 1973). A 1974 aerial photograph documents the culverting of the creek onsite from the substation to the southeast corner.

2.2 Site Characterization - General Aspects

2.2.1 Current Use of Site Facility

The Site is presently used as a district service facility and headquarters for the NMPC electric line, natural gas and tree trimming crews servicing the Saratoga District. Also housed onsite are a planning department, a regional meter and test department, a vehicle repair and maintenance facility and an office staff. A current site plan is presented as Figure 2-1.

The majority of the Site is secured by a chain link fence and access is through two entrances from Excelsior Avenue.

Vehicle repair and maintenance activities include the storage and use of unleaded gasoline and diesel fuel and the generation of waste engine lubricating oil. Gasoline and diesel fuel are stored onsite in underground storage tanks located between the garage building, the substation building and the roundhouse (see Figure 2-1). These tanks were installed in 1988 to replace previously existing tanks. Diesel fuel is stored in a 4,000 gallon tank and unleaded gasoline is stored in a 6,000 gallon tank. There are no records of releases from these tanks or the ones which were replaced in 1988, nor are there any records to indicate that the tanks were tested in any way.

Waste engine lubricating oil is the only hazardous waste currently generated by vehicle maintenance activities onsite. A 275 gallon retrieval and temporary storage tank for this oil is located in the vehicle storage area of the garage building (Figure 2-1). The tank was installed in 1974 and is enclosed in concrete approximately three feet below the floor. The tank is part of an oil-water separator system used to recover oil mixed with other materials.

An above ground, 275 gallon storage tank is used for storage of waste engine lubricating oil prior to disposal offsite. This tank is located adjacent to the northeast corner of the shop building and was installed in January, 1980. This tank is pumped out at two to three month intervals by Safety Kleen Oil Services, Inc., and disposed of at the Norlite facilities in Cohoes, New York. Disposal in this manner has been conducted since 1985 when used oil became regulated as a potentially hazardous waste. Prior to 1974, all vehicle service was done at local automotive servicing establishments, therefore, there was no onsite generation or storage of waste oils. Between 1974 and 1980, waste oil was stored inside the garage in 55 gallon drums and sold to others. Between 1980 and 1985, waste oils were stored in the present 275 gallon, above ground tank, located adjacent to the northeast corner of the garage building.

Electric distribution transformers and other equipment are stored for purposes of inventory control and electric service reliability. In accordance with the Toxic Substances Control Act (40 CFR Section 761.65(c)), PCB items are temporarily stored at the Site for no longer than thirty days before consolidation of such items at NMPC's treatment, storage and disposal (TSD) facility in Albany, New York. At the Site, PCB items are temporarily stored outside the northwest corner of the shop building. PCB-contaminated regulator fluid has been temporarily stored at this onsite location in 55 gallon drums. A spill resulting from the accidental puncture of one of these drums occurred on May 13, 1987. Approximately thirty gallons of fluid escaped. The NYSDEC was notified and sent a representative to observe the cleanup of saturated soils.

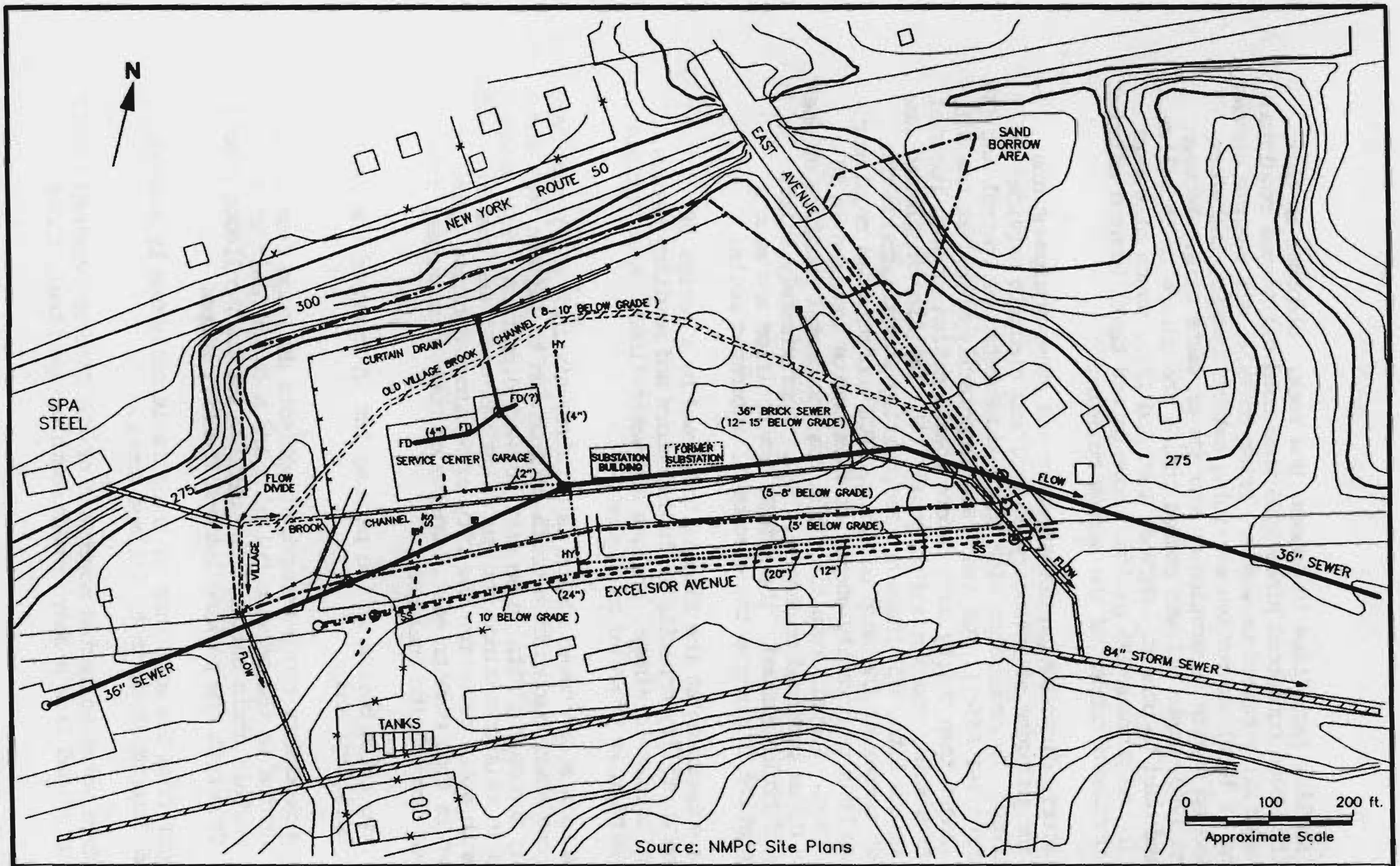
The subsurface at the Site is traversed by a series of underground utility conduits including storm and sanitary sewers, culverted surface drainage, and gas and water lines. A subsurface utilities plan is provided as Figure 2-7.

The main storm sewer onsite is a thirty-six inch (36") circular, brick storm sewer buried at a depth of from ten to fifteen feet and extending across the Site in an east to west direction. This sewer has been in existence since the gas plant was built and was once part of the main storm sewer for the City of Saratoga Springs. Flow in the sewer is from west to east. Onsite sources (discharges) into this sewer from onsite include:

- two catch basins in the parking lot in front of the service building; and
- a secondary storm sewer that collects drainage from floor drains in the service building and a catch basin on a curtain drain north of the parking lot that collects runoff from both the parking lot and the hill slope.

Runoff from the east side of the Site is collected by a catch basin and directs it south to Village Brook.

Surface water collected northwest of the Site as overland runoff from Route 50 and from a storm sewer south of Spa Steel, flows



Source: NMPC Site Plans

LEGEND

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-7
UNDERGROUND UTILITIES AND CONDUITS

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southeast toward Village Brook. The majority of this drainage flows south in a culvert to an eighty-four inch storm sewer located south of Excelsior Avenue. The remainder of the water flows east through the Site.

Near the west fence line, Village Brook flows into a culvert that crosses the Site and surfaces in a ditch in the southeast corner. The brook flows into another culvert as it leaves the Site and flows southeast to the eighty-four inch storm sewer that empties into Spring Run.

As illustrated in Figure 2-7, there is a flow divide on Village Brook on the western side of the Site with the majority of flow going south and a fraction of flow moving west to east through the Site.

A sanitary sewer line extends from the service center building to a twenty-four inch (24") sanitary sewer main below Excelsior Avenue. The sanitary sewer line along Excelsior is approximately ten feet below grade. An eight inch sewer line extends along East Avenue and connects with the main at the intersection of Excelsior and East Avenues.

Water lines onsite extend from two water lines on Excelsior Avenue to the service building and hydrants onsite. Water lines onsite range from two to four inches in diameter. Water mains on Excelsior are twelve and twenty inches in diameter and are located approximately five feet below grade.

2.2.2 Hydrogeologic Characteristics

Site Area Soils

Although site specific soil data are limited at this time, some generalizations can be made from the previous studies. These data sources include the 1965, 1973 and 1984 geotechnical boring logs, and the 1986 Phase II report data. In addition, the Site area soils have been mapped by the Saratoga County Soil and Water Conservation District, and are described as follows:

The level southern portion of the Site is characterized by deep sandy soil deposited as glacial outwash. This soil is moderately well drained with very low porosity and high permeability.

The soil on the majority of the north slope is a silt loam deposited as shallow till. The soil is moderately well to well drained and has moderate porosity and permeability.

Soils on the slope in the northeast corner of the Site are loamy, fine sands deposited in glacial outwash. This soil is considered well drained and potentially highly erodible, and is characterized by low porosity and high permeability.

Physiography

The Site is located within the Hudson-Mohawk Lowland physiographic province (Broughton, et al., 1966). The general topography of the province is characterized by low elevation and relief due to erosion along outcrops of weak rocks. The province is primarily underlain by Ordovician Shales. In the upper Hudson River valley the Lowland is bordered to the west by the Adirondack Highlands which are underlain by Precambrian crystalline rocks, and to the east by the folded and fractured sedimentary rocks of the Taconic Highlands. The low relief of the province is punctuated west of Saratoga Springs by several escarpments, which are the topographic expression of northeast trending normal faults. The escarpment bordering the Site to the north is an expression of the Saratoga Fault, the easternmost normal fault in the series. This escarpment continues south and west, paralleling Maple Street and Broadway.

Regional Hydrogeology

The bedrock hydrogeology of the Site is dominated by a marine shelf sequence of clastic and carbonate sedimentary rocks deposited during the Upper Cambrian and Lower Ordovician. Bedrock aquifers are located in the basal clastic Potsdam Formation and in the overlying Galway Formation (sandy dolomites and calcareous sandstones) and Gailor Dolomite. The primary bedrock aquifer is located within the Gailor Dolomites where average well yields are thirty gallons per minute (30 gpm) (Heath et al., 1963). The marine shelf sequence is overlain by a thin sequence of Middle Ordovician limestones (Amsterdam/Glens Falls Limestones), which are subsequently overlain by the Upper Middle Ordovician Canajoharie Shale. The black shale unit is areally extensive south and east of Saratoga Springs and acts as an aquitard confining the ground water of the Gailor Dolomite and lower units. The bedrock stratigraphic sequence is summarized in Table 2-3. A map of the bedrock geology of the Saratoga Springs area is provided as Figure 2-8.

The sedimentary sequence is relatively undeformed in the Saratoga vicinity. The beds are generally flat-lying with a gentle dip to the south and east. Local distortions of the regional bedding occur near fault contacts (Heath et al., 1963). The beds are not folded, in contrast with extensively folded and fractured shales to the east. The eastern sequences correlate to the rocks of the Taconic Highlands and have overthrusted the shelf sequence along reverse faults. The primary structural control in the Saratoga region has been faulting along a series of northeast trending normal faults. The faults are post-Ordovician, but may have been reactivated several times.

The faults are nearly vertical and the sense of displacement is down to the east. The greatest vertical displacement (1,000-1,500

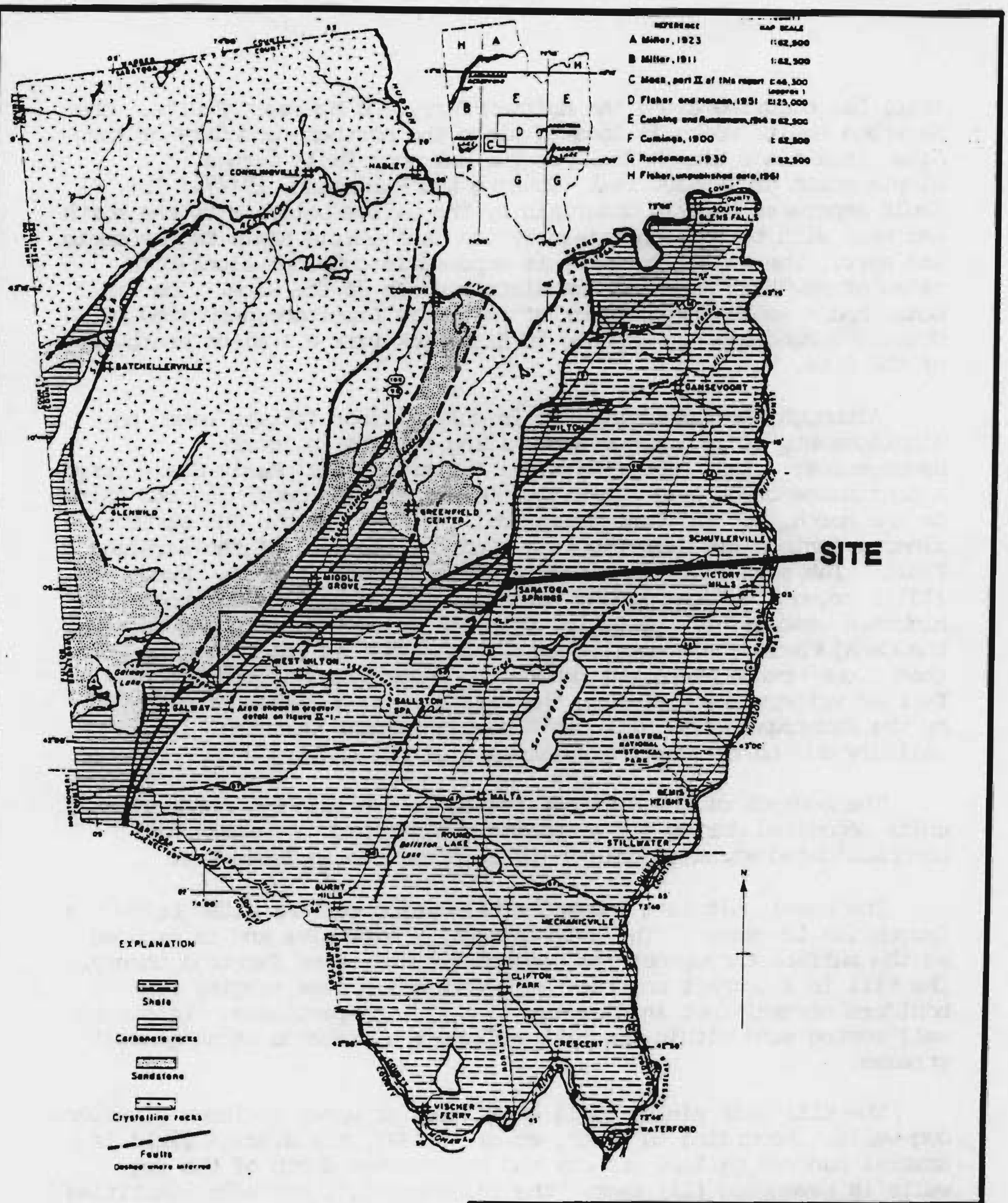
TABLE 2-3
BEDROCK HYDROGEOLOGICAL UNITS

AGE	FORMATION	THICKNESS (FEET)	DESCRIPTION	HYDROGEOLOGY
Middle Ordovician (Trenton)	Canajoharie Shale	30-500+	Soft, black carbonaceous, more or less calcareous shale	Areally extensive formation. Yield of wells averages 7 gpm
(Lower Trenton)	Glens Falls Limestone	50	Thin-bedded, blue-black, fine-grained fossiliferous limestone containing thin shale beds.	Not important as source of water. Areally restricted.
(Upper Black River)	Amsterdam Limestone	50	Thick bedded massive blue-black fossiliferous limestone	Not important as source of water. Areally restricted.
		UNCONFORMITY		
Lower Ordovician	Gailor Dolomite (Fisser & Hanson, 1951)	300-400	Massive beds of dark grey to light grey non-fossiliferous dolomite, primarily fine-grained. Containing black to dark gray chert and vugs lined with calcite, dolomite and quartz.	Yield of wells averages 30 gpm. Primary bedrock aquifer. Supplies large quantities of water to areas north and east of Saratoga Springs Yields mineral water at Saratoga Springs.
Upper Cambrian	Galway Formation	120-150	Alternating sandy dolomites, dolomitic sandstones and calcareous sandstones. Sandstones abundant near base; dolomite abundant near top.	Yield of wells average 20 gpm.

TABLE 2-3 (CONTINUED)
BEDROCK HYDROGEOLOGICAL UNITS

AGE	FORMATION	THICKNESS (FEET)	DESCRIPTION	HYDROGEOLOGY
	Potsdam Formation	50-150	Lower clastic sandstone with occasional bands of calcareous sandstone. Basal transgressive unit.	Yield of wells averag 10 gpm.
		UNCONFORMITY		
Precambrian (Grenville)	Crystalline Rocks Undifferentiated	---	Highly metamorphosed sediments gneisses, schists, quartzites and marbles intruded by syenites and granites.	Yield 3 wells average 6 gpm.

(AFTER HEATH, ET AL., 1963)



NOT TO SCALE

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-8
BEDROCK GEOLOGY OF SARATOGA SPRINGS AND VICINITY

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feet) has occurred along the Hoffman Ferry and McGregor Faults. The Saratoga Fault, which is located along the northern boundary of the Site, is a minor branch fault of the McGregor Fault with a displacement of 160-200 feet (Cushing and Ruedemann, 1914). The fault separates terrain underlain by the Gailor Dolomite to the north and west with terrain underlain by the Canajoharie Shale to the south and east. The Gailor Dolomite is exposed in outcrops along both sides of New York Route 50 immediately north of the Site. The fault scarp and a wedge shaped block of Amsterdam Limestone described by Cushing & Ruedemann is exposed in High Rock Park 0.3 miles southwest of the Site.

Although the Saratoga Fault is only a minor feature based on displacement, it is a major controlling feature in local hydrogeology. East of the Saratoga Fault the Canajoharie Shale forms a continuous cover over the Gailor Dolomite. The confining bed thins to the north, but thickens dramatically to the south. The Saratoga mineral springs are situated in a band located east of the Saratoga Fault. The source of the mineral water is controversial. Ruedemann (1914) argues that the ground water originates east of Saratoga and migrates westward in the Gailor Dolomite below the confining cover of the Canajoharie Shale until the Saratoga Fault is reached. The water then flows upward along the fault zone under artesian conditions. Earlier writers speculated on the existence of a deep source tapped by the Saratoga Fault, although Ruedemann argues that this is unlikely due to the small displacement of the fault.

The bedrock of the Saratoga region is overlain by unconsolidated units deposited during the Wisconsin glaciation. A summary of unconsolidated stratigraphic units is presented in Table 2-4.

The basal unit is a lodgement till which was deposited below the Laurentide ice sheet. The unit is areally extensive and is exposed at the surface throughout the western two-thirds of Saratoga County. The till is a compact unsorted unit with grain size ranging from boulders several feet in diameter to clay size particles. Lenses of well sorted sand within the till reflect the presence of subglacial streams.

The till unit yields small quantities of water to large diameter dug wells. According to Heath, et al. (1963), the average yield is several hundred gallons per day and the average depth of the dug wells is seventeen (17) feet. The lodgement till has been identified below the Site in test borings drilled by Soil Testing Services in 1973. The upper surface of the till is 35-40 feet below grade. The thickness of the till is unknown. The upland which forms the southern boundary of Village Brook Valley is reportedly underlain by till, contrasting with the bedrock scarp along the northern boundary.

TABLE 2-4
UNCONSOLIDATED HYDROGEOLOGIC/STRATIGRAPHIC UNITS

AGE		SITE THICKNESS		
Recent	Fill	10-13.5	Fine-medium grained sand with brick, coal, coal ash, clinker and slag fragments.	Generally above saturated zone. Restricted to site. Not important water bearing unit.
Recent	Alluvium/Peat	5-10	Fine-medium sand with some silt and trace gravel. Peat layers contain fine-coarse sand, trace silt.	Not important as source of water due to limited extent and thickness. Restricted to discontinuous area adjacent to streams.
Pleistocene	Lake-Bottom Deposits	10-15	Silty clay, grey, moist, soft to medium stiff.	Yields little water. Generally acts as confining bed where underlain by permeable deposits.
	Till	20-40	Heterogeneous mixture of boulders, gravel, sand, silt and clay deposited by glacial ice. Locally referred to as "hardpan".	Areally extensive. Will yield small supplies of water to large diameter dug wells.

(AFTER HEATH, ET AL., 1963)
CALOCERINOS AND SPINA, 1986

The basal lodgement till is overlain by lacustrine clay which was deposited on the bottom of glacial Lake Albanny after retreat of glacial ice. The clay was deposited in deep water in the central portion of the lake as rock flour settled from glacial meltwaters. Coarser grained stratified units were confined to the lake margins as deltas. The clay unit has been identified above the till at the Site, and has an upper surface at the 13.5 to 24.5 foot depth (C&S, 1986). The clay unit is confined to the bottom of present day valleys; it has generally eroded from upland areas. The clay unit does not yield water in usable quantities and exists as a lower confining unit to overlying alluvial sands and gravels.

The glacial lake clay is overlain by post-glacial alluvial sand and gravel throughout the eastern portion of Saratoga County. At the Site the clay is generally overlain by a silty sand unit. The upper surface of the clay generally slopes southward away from the fault scarp and in the southern half of the Site the clay is overlain by a fresh water peat deposit, presumably deposited in a swampy lowland. The 1973 and 1985 borehole data indicate that a buried stream channel may traverse the central portion of the Site between the old and present day Village Brook channels. Based on these data, the upper surface of the lake clay is present at greater depth and a clean sand is present between the clay and the overlying peat. The upper surface of the peat is located at approximately 13.5 feet below grade. The uppermost stratigraphic unit at the Site is fill material which is present up to twelve (12) feet in depth onsite.

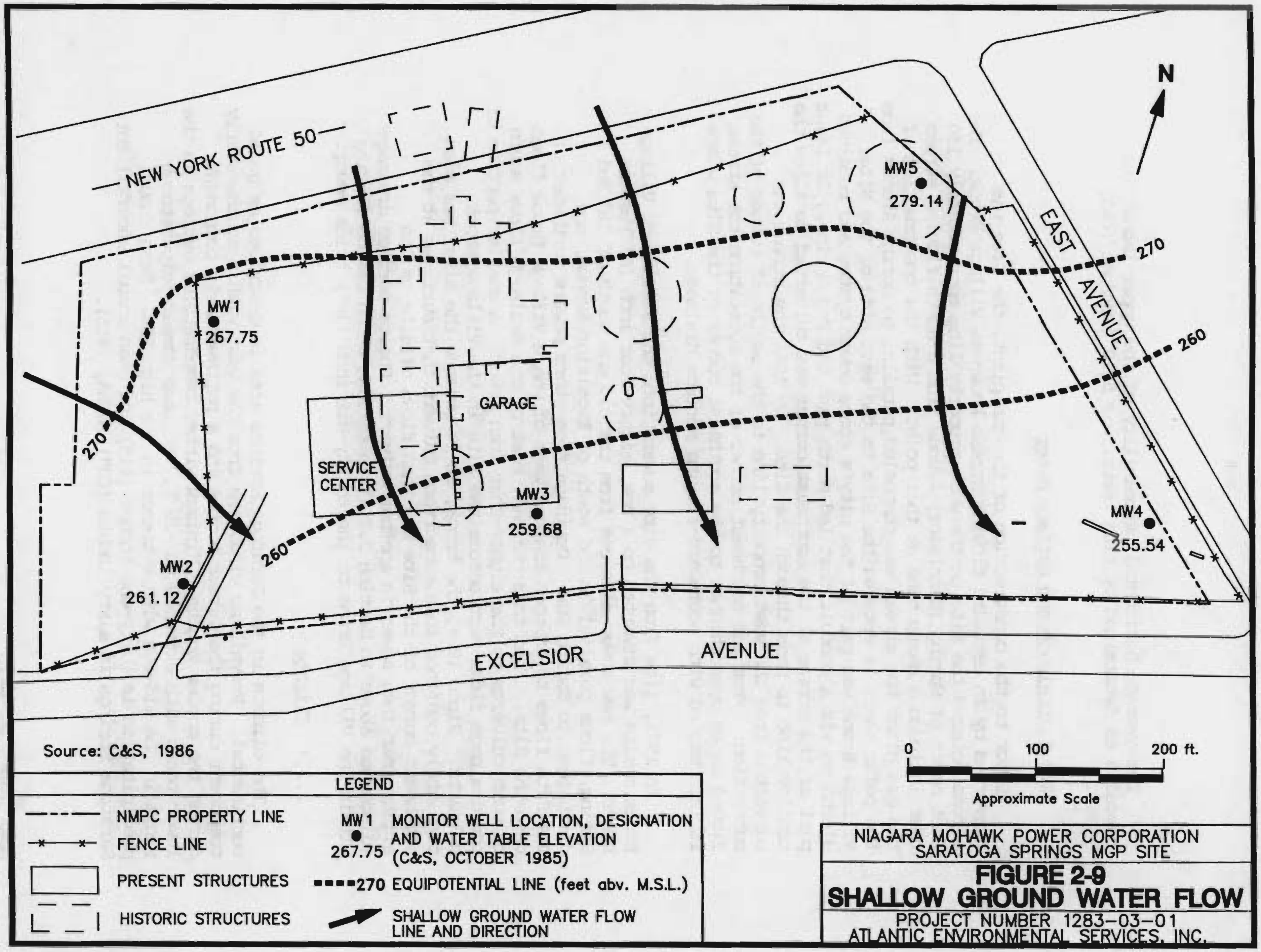
Site Hydrogeology

The shallow ground water flow configuration of the Site is shown on Figure 2-9, based on water levels and survey data measured by C&S in 1985 (C&S, 1986). However, there is evidence that the water table at MW-5 (Figure 2-9) was incorrectly surveyed.

Ground water flow in the upper lacustrine sandy layer parallels topography. Principal flow directions are from the valley walls toward the Village Brook. The upper lacustrine layer is underlain by low permeability clays and glacial till which serve as a confining layer for the underlying fractured bedrock aquifer.

Recharge areas for the shallow aquifer consist of unconsolidated sediments on the valley walls and the land surface directly above the deposits. Recharge to the bedrock aquifer occurs where bedrock outcrops or is overlain by permeable, unconsolidated sediments.

Shallow ground water discharges to the creek and to the Village Brook. Ground water in the fractured bedrock aquifer discharges to the surface along the Saratoga Fault trace and to bedrock wells as confirmed by the presence of Old Red Spring and other artesian wells to the east of the fault.



Source: C&S, 1986

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-9
SHALLOW GROUND WATER FLOW

PROJECT NUMBER 1283-03-01
ATLANTIC ENVIRONMENTAL SERVICES, INC.

The average horizontal permeability of the upper lacustrine deposits as determined by slug tests, was $5x10^{-3}$ cm/sec (C&S, 1986).

2.2.3 Drainage and Surface Water

Prior to the construction of the gas plant, the Site was traversed by an eastward flowing stream known as Village Brook. The stream entered the Site on the west property line approximately 150 feet north of Spring (Excelsior) Avenue from a north flowing stream that included a sharp bend at that point. With the construction of the gas plant the stream was channeled parallel to Spring Avenue from the point where it entered the Site to the east side of the Site. Village Brook was part of the city's storm sewer system and received discharge via a conduit that led north past Old Red Spring. At least part of the stream at the southeast corner was culverted to allow the trolley line to pass through the Site. By 1961 the stream was culverted from the west property line to the southeast corner of the substation. From the southeast corner of the substation the stream flowed in an open channel to the southeast corner of the Site where it intersected with southward-flowing surface drainage.

In 1971, flow from the city sewers into the section of Village Brook onsite was diverted to a new, eighty-four inch (84") storm sewer. The new sewer diverges from the old one south of Old Red Spring, flows parallel to and south of Excelsior Avenue, and discharges to Spring Run. Drainage from storm sewers northwest of the Site flows to an open channel west of where Village Brook flows onto the Site. From this channel, most of the drainage flows south through culverts to the eighty-four inch sewer. A smaller portion of the drainage flows east across the Site in the Village Brook culverts. Since 1974, the brook, as it crosses the Site, has been completely confined to a subsurface culvert that surfaces at the southeast corner of the Site and then flows offsite to the eighty-four inch sewer in another culvert. Onsite surface drainage (discussed above in Section 2.2.1) is through catch basins flowing within the Village Brook or the thirty-six inch (36") brick sewer.

2.2.4 Climate

The climate in the Saratoga Springs area is described as humid continental. Prevailing winds are from the west with a southwesterly component during the warmer months and a northwesterly component during the cooler months. Minimum winter temperatures average in the lower teens with extremes to -20°F. Maximum summer temperatures range in the mid-80s with extremes in the high 90s. Mean annual precipitation is forty-one inches (41") and mean annual snowfall for Saratoga Springs is sixty inches (60") (NOAA, 1985).

Climatic trends affecting the Site include wind direction, temperature extremes, and precipitation. Site specific wind direction most likely contains an east-west component due to the location of the Site in an east-west trending valley. Wind patterns may transport dust from excavations onsite toward the residential area to the east. Increased precipitation from March through September results in increased infiltration in unpaved areas and percolation through and runoff from uncovered fill areas onsite.

2.3 Site Characterization - Chemical Contaminants

The data utilized within the scoping process for this Work Plan include the results of investigations performed by Ecology and Environment, Inc. (E&E, 1982); Ebasco Services Incorporated (Ebasco, 1983, 1984, 1986); and Calocerinos and Spina (C&S, 1986). In evaluating data for use within the RI/FS process, the following factors are taken into consideration:

- Age of the data,
- Analytical methods used,
- Detection limits of methods used, and
- QA/QC procedures and documentation.

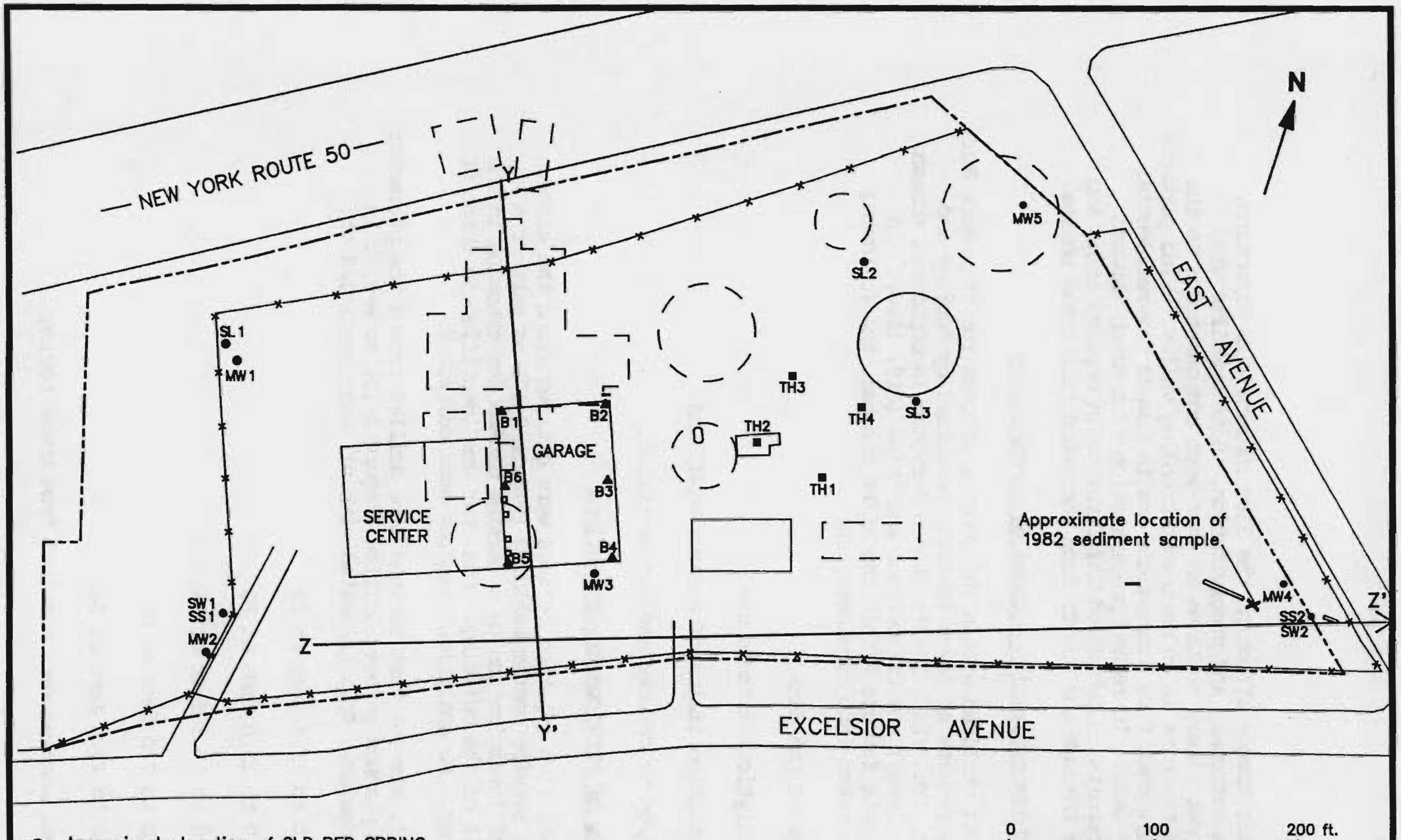
Results of Previous Investigations

In 1965, five (5) test borings were drilled along the eastern side of the service center building (Figure 2-10) as part of a geotechnical investigation to determine causes for cracking in the eastern wall of the building. Coal tar was identified in three of these borings. No analytical samples were collected.

In 1973, six (6) test borings were drilled around the perimeter of the then planned garage addition (Figure 2-10) to assist in foundation design. Soil permeated with oil was identified at:

- 2.0 to 23.5 feet at B2
- 2.0 to 13.0 feet at B3
- 6.0 to 17.5 feet at B4
- 4.0 to 7.0 feet at B5
- 2.0 to 23.5 feet at B6

No analytical samples were obtained from these borings.



Approximate location of OLD RED SPRING
75 feet from Southwest corner of NMPC property line

0 100 200 ft.
Approximate Scale

LEGEND

- - - NMPC PROPERTY LINE
-x-x- FENCE LINE
Y——Y' CROSS-SECTION LOCATION (Figures 2-12, 2-13)
▭ PRESENT STRUCTURES
⌞ _ ⌟ HISTORIC STRUCTURES

● C&S SAMPLING LOCATIONS (1985)
MW-1 – Monitoring Well
SL-1 – Surface Soil Sample
SW-1 – Surface Water Sample
SS-1 – Sediment Sample
■ 1984 TEST BORINGS
▲ 1973 TEST BORINGS
▫ 1965 TEST BORINGS

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-10
PREVIOUS SAMPLE LOCATIONS

PROJECT NUMBER 1283-03-01
ATLANTIC ENVIRONMENTAL SERVICES, INC.

In October of 1982, a water sample from a drinking fountain that draws from Old Red Spring and a sediment sample from the Site's southeast drainage ditch were collected and submitted to Ecology and Environment, Inc. (Figure 2-10). The samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) by GC/MS methods. No PAHs were detected in either sample above laboratory detection limits (7 ug/l for water, 1 mg/l for sediment). Because of the age of the data and the lack of QA/QC procedures and documentation, the data generated in these analyses cannot be used in a quantitative assessment of site conditions.

In 1983, subsequent to the initial HRS rating of the Site by NYSDEC, ambient air monitoring of PCBs was conducted. An NYSDEC memo dated November 3, 1983 indicates that three locations on the Site were monitored and no difference in PCB levels was observed between upwind and downwind locations.

Ground water from Old Red Spring was tested again in November, 1983. Ebasco collected water samples on two separate dates in November, 1983 and analyzed them for volatiles (benzene, toluene, total xylenes), priority pollutant metals, and acid/base neutrals by GC/MS methods. Data collected in this investigation did not include QA/QC documentation and therefore is only of qualitative use in this RI/FS study.

The results indicated there were no volatile organics above the detection limit of 1 ug/l. The metals analysis indicated the presence of antimony at 6.2 ug/l, arsenic at 16.1 ug/L, selenium at 22.8 ug/l and thallium at 22.5 ug/l. Comparing these values to NYS Standards for Class GA ground water, only selenium is in exceedance of its 20 ug/l standard. An additional water sample was taken from Old Red Spring on August 13, 1984 by Ebasco and analyzed for priority pollutants, including pesticides and PCBs. The analysis was performed by CompuChem, a CLP laboratory. Only limited QA/QC data was presented including analytical methods, detection limits and chromatograms. Since a full QA/QC report includes MS, MSD blank analysis or chain-of-custody, the data can only be considered in a qualitative manner. The results showed that only mercury at 8.2 ug/l and zinc at 60 ug/l were detected in the Old Red Spring. A comparison to the 1983 results shows that the detection limits in 1984 were higher than those in the 1983 data for antimony, arsenic and thallium, therefore a comparison is not possible. Selenium was comparable and was not present in the 1984 sample round. The value for mercury exceeded the NYS Standard of 2 ug/l for Class GA ground water.

In 1984, four (4) test borings were drilled north of the substation building (Figure 2-10) to assist in the design of a new underground storage tank facility. No evidence of oil or coal tar was noted in these test borings. However, no analytical samples were obtained during this investigation.

In 1985, Calocerinos & Spina conducted a NYSDEC Phase II Investigation for NMPC to determine the nature and extent of hazardous waste contamination at the Site. The investigation consisted of geophysical surveys, the installation of monitoring wells, and soil, sediment, ground water, spring water, surface water, and air sampling. Ground water and spring water, soil, sediment and surface water samples were analyzed for volatile and semi-volatile organics on the NYSDEC Hazardous Substance List by CompuChem Laboratories according to Contract Laboratory (CLP) Protocols. Each sample was also analyzed for twenty-four metals, total cyanide and percent solids by the Calocerinos and Spina Environmental Laboratory. Laboratory reports and QA/QC documentation did not accompany the data generated by the C&S Laboratory, and therefore the data can only be used in a qualitative sense. Table 2-5 presents a summary of the maximum detected levels for various chemical parameters for both soil and water samples analyzed during the Phase II study. Sample locations are also identified as are the laboratory method detection limits. Sample locations can be referenced to Figure 2-10. Chemical data generated by the NYSDEC Phase II Site Investigation are summarized in the following subsections.

Laboratory method detection limits identified in Table 2-5 are values taken from the Phase II analytical data. Detection limit values in the table represent the range of values reported by the laboratory for Phase II analysis. No generalizations can be made about the value of the Phase II laboratory data relative to ARARs because in some cases (e.g., acenaphthylene) the laboratory detection limits are lower than ARARs and in other cases (e.g., benzene), the detection limits exceed ARARs.

The highest concentrations of volatile organics in both subsurface soil and ground water were detected in MW-2 and MW-3 on the southwest portion of the Site. Generally, the highest levels of semi-volatiles in ground water were found on the western portion of the Site at MW-1, MW-2 and MW-3. Maximum levels of semi-volatiles were detected in subsurface soil at MW-2 and MW-3, in surface soils at SL-1 in the northwest corner, and in sediments in SS-2, the downstream sample. Pesticides were detected in the upstream and downstream sediment samples only. The maximum levels of inorganics in water were detected in the upstream and downstream surface water samples. The highest levels of inorganics in subsurface soils were detected at MW-5 in the northeast corner of the Site, and MW-2 in the southwest corner. Surface soils in the northwest corner (SL-1) and south of the roundhouse garage (SL-3), exhibited high levels of inorganics, including cyanide and heavy metals. High levels of inorganics were also detected in sediment samples downstream of the Site.

2.3.1 Onsite Sources of Contamination

Onsite sources of contamination have been identified from site

TABLE 2-5
MAXIMUM CONTAMINANT LEVELS

	SOIL			WATER		
PARAMETERS	HIGHEST CONCENTRATION (ppm)	DETECTION LIMIT (ppm)	SAMPLE ID	HIGHEST CONCENTRATION (ppb)	DETECTION LIMIT (ppb)	SAMPLE ID
VOLATILE ORGANICS						
Chloromethane	ND	.010		ND	10	
Bromomethane	ND	.010		ND	10	
Vinyl Chloride	ND	.010		ND	10	
Chloroethane	ND	.010		ND	10	
Methylene Chloride	.150	.012	MW-2 (12-21')	ND	10	
Acetone	.014	.010	MW-5 (8-13')	160	10	MW-3
Carbon Disulfide	ND	.005		ND	5	
1,1 Dichloroethene	ND	.005		ND	5	
1,1 Dichloroethane	ND	.005		ND	5	
Trans 1,2 Dichloroethene	ND	.005		ND	5	
Chloroform	.020	.005	MW-3 (14-19')	ND	5	
1,2-Dichloroethane	ND	.005		ND	5	
2-Butanone	ND	.007		ND	10	
1,1,1-Trichloroethane	ND	.005		ND	5	
Carbon Tetrachloride	ND	.005		ND	5	
Vinyl Acetate	ND	.010		ND	10	
Bromodichloromethane	ND	.005		ND	5	
1,1,2,2-Tetrachloroethane	ND	.005		ND	5	
1,2-Dichloropropane	ND	.005		ND	5	
trans-1,3-Dichloropropene	ND	.005		ND	5	
Trichloroethene	ND	.005		ND	5	
Dibromochloromethane	ND	.005		ND	5	
1,1,2-Trichloroethane	ND	.005		ND	5	
Benzene	.013	.005	MW-2 (12-21')	4,200	5	MW-3
cis-1,3-Dichloropropene	ND	.005		ND	5	
2-Chloroethyl Vinyl Ether	ND	.010		ND	10	
Bromoform	ND	.005		ND	5	
2-Hexanone	ND	.010		ND	10	
4-Methyl-2-pentanone	ND	.010		ND	10	
Tetrachloroethene	ND	.005		ND	5	
Toluene	.020	.005	MW-3 (14-19')	2,100	5	MW-2
Chlorobenzene	ND	.005		ND	5	
Ethyl Benzene	.750	.005	MW-3 (14-19')	1,700	5	
Styrene	ND	.005		ND	5	
Xylenes	1.0	.005	MW-3 (14-19')	2,300	5	MW-3

TABLE 2-5 (continued)
MAXIMUM CONTAMINANT LEVELS

	SOIL			WATER		
PARAMETERS	HIGHEST CONCENTRATION (ppm)	DETECTION LIMIT (ppm)	SAMPLE ID	HIGHEST CONCENTRATION (ppb)	DETECTION LIMIT (ppb)	SAMPLE ID
SEMI-VOLATILE ORGANICS						
N-Nitrosodimethylamine	ND	.350		ND	20	
Phenol	ND	.350		529	20	MW-3
Aniline	ND	.350		ND	20	
bis (2-Chloroethyl) ether	ND	.350		ND	20	
2-Chlorophenol	ND	.350		ND	20	
1,3-Dichlorobenzene	ND	.350		ND	20	
1,4-Dichlorobenzene	ND	.350		ND	20	
Benzyl Alcohol	ND	.350		ND	20	
1,2-Dichlorobenzene	ND	.350		ND	20	
2-Methylphenol	ND	.350		ND	20	
bis (2-Chloroisopropyl) ether	ND	.350		ND	20	
4-Methylphenol	.600	.350	SS-2	ND	20	
N-Nitroso-Dipropylamine	ND	.350		ND	20	
Hexachloroethane	ND	.350		ND	20	
Nitrobenzene	ND	.350		ND	20	
Isophorone	ND	.350		ND	20	
2-Nitrophenol	ND	.350		ND	20	
2,4-Dimethylphenol	ND	.350		32	20	MW-3
Benzoic Acid	.250	.250	SS-2	ND	100	
bis (2-Chloroethoxy) methane	ND	.350		ND	20	
2,4-Dichlorophenol	ND	.350		ND	20	
1,2,4-Trichlorobenzene	ND	.350		ND	20	
Naphthalene	13	.130	MW-3 (14-19')	6,800	20	MW-2
4-Chloroaniline	ND	.350		ND	20	
Hexachlorobutadiene	ND	.350		ND	20	
4-Chloro-3-Methylphenol	ND	.350		ND	20	
2-Methylnaphthalene	41	.096	MW-3 (14-19')	1,100	20	MW-2,MW-3
Hexachlorocyclopentadiene	ND	.350		ND	20	
2,4,6 Trichlorophenol	ND	.350		ND	20	
2,4,5 Trichlorophenol	ND	.350		ND	100	
2-Chloronaphthalene	ND	.350		ND	20	
2-Nitroaniline	ND	1.8		ND	100	
Dimethyl Phthalate	ND	.350		ND	20	
Acenaphthylene	130	---	SL-1 (1-2')	6.6	20	MW-1
3-Nitroaniline	140	1.8	SL-1 (1-2')	ND	100	
Acenaphthene	98	.3	MW-3 (14-19')	330	20	MW-2
2,4-Dinitrophenol	ND	1.8		ND	100	
4-Nitrophenol	ND	1.8		ND	100	
Dibenzofuran	7.8	.350	MW-2 (12-21')	ND	20	
2,4 Dinitrotoluene	.081	.081	SS-2	ND	20	
2,6 Dinitrotoluene	ND	.350		ND	20	
Diethylphthalate	ND	.350		2.2	20	Old Red Spring
4 Chlorophenyl Phenyl	ND	.350		ND	20	
Fluorene	50	.420	MW-3 (14-19')	82	20	MW-3

TABLE 2-5 (continued)
MAXIMUM CONTAMINANT LEVELS

	SOIL			WATER		
PARAMETERS	HIGHEST CONCENTRATION (ppm)	DETECTION LIMIT (ppm)	SAMPLE ID	HIGHEST CONCENTRATION (ppb)	DETECTION LIMIT (ppb)	SAMPLE ID
SEMI-VOLATILES Continued						
2,4-Dinitrotoluene	.081	.081	SS-2	ND	20	
2,6-Dinitrotoluene	ND	.350		ND	20	
Diethylphthalate	ND	.350		2.2	20	Old Red Spring
4-Chlorophenyl Phenyl ether	ND	.350		ND	20	
Fluorene	50	.420	MW-3 (14-19')	82	20	MW-3
4-Nitroaniline	ND	.350		ND	100	
4,6-Dinitro-2-methylphenol	ND	.350		ND	100	
N-nitrosodiphenylamine	.120	.120	SL-2 (1-2')	ND	20	
4-Bromophenyl Phenyl ether	ND	.350		ND	20	
Hexachlorobenzene	ND	.350		ND	20	
Pentachlorophenol	ND	1.8		ND	100	
Phenanthrene	160	.090	MW-3 (14-19')	80	20	MW-3
Anthracene	53	.350	MW-3 (14-19')	42	20	MW-4
Di-n-butylphthalate	.180	.180	SS-2	22	20	MW-1
Fluoranthene	220	.140	SL-1 (1-2')	26	20	MW-1
Benzidine	ND	2.6		ND	100	
Pyrene	320	NA	SL-1 (1-2')	53	20	
Butyl Benzyl Phthalate	.520	.350	SS-2	ND	20	
3,3-Dichlorobenzidine	ND	.70		ND	40	
Benzo(a)anthracene	300	.340	SL-1 (1-2')	22	20	MW-1
bis (2-ethylhexyl) phthalate	1.2	.520	SS-2	3.2	20	MW-1
Chrysene	270	NA	SL-1 (1-2')	25	20	MW-1
Di-n-octyl Phthalate	.240	.240	SS-2	ND	20	
Benzo (b) fluoranthene	380	NA	SL-1 (1-2')	26	20	MW-1
Benzo (k) fluoranthene	380	NA	SL-1 (1-2')	26	20	MW-1
Benzo (a) pyrene	320	NA	SL-1 (1-2')	ND	20	
Indeno (1,2,3-cd) pyrene	94	NA	SL-1 (1-2')	ND	20	
Dibenz (a,h) anthracene	39	.520	SL-1 (1-2')	ND	20	
Benzo (g,h,i) perylene	99	NA	SL-1 (1-2')	ND	20	

TABLE 2-5 (continued)
MAXIMUM CONTAMINANT LEVELS

	SOIL			WATER		
PARAMETERS	HIGHEST CONCENTRATION (ppm)	DETECTION LIMIT (ppm)	SAMPLE ID	HIGHEST CONCENTRATION (ppb)	DETECTION LIMIT (ppb)	SAMPLE ID
PESTICIDES						
Alpha - BHC	ND	.002		ND	.05	
Beta - BHC	ND	.002		ND	.05	
Delta - BHC	ND	.002		ND	.05	
Gamma - BHC (Lindane)	ND	.002		ND	.05	
Heptachlor	ND	.002		ND	.05	
Aldrin	ND	.002		ND	.05	
Heptachlor Epoxide	ND	.002		ND	.05	
Endosulfan I	ND	.002		ND	.05	
Dieldrin	ND	.002		ND	.10	
4-4' - DDE	.068	.004	SS-1	ND	.10	
Endrin	ND	.004		ND	.10	
Endosulfan II	ND	.004		ND	.10	
4-4' - DDD	1.1	.004	SS-2	ND	.10	
Endrin Aldehyde	ND	.004		ND	.10	
Endosulfan Sulfate	ND	.004		ND	.10	
4-4 - DDT	1.2	.004	SS-2	ND	.10	
Methoxychlor	ND	.021		ND	.05	
Endrin Ketone	ND	.004		ND	.10	
Chlordane	ND	.021		ND	.05	
Toxaphene	ND	.041		ND	1.0	
PCBs						
Araclor 1016	ND	.021		ND	.5	
Araclor 1221	ND	.021		ND	.5	
Araclor 1232	ND	.021		ND	.5	
Araclor 1242	ND	.021		ND	.5	
Araclor 1248	ND	.021		ND	.5	
Araclor 1254	ND	.021		ND	1.0	
Araclor 1260	ND	.021		ND	1.0	

TABLE 2-5 (continued)
MAXIMUM CONTAMINANT LEVELS

	SOIL			WATER		
PARAMETERS	HIGHEST CONCENTRATION (ppm)	DETECTION LIMIT (ppm)	SAMPLE ID	HIGHEST CONCENTRATION (ppb)	DETECTION LIMIT (ppb)	SAMPLE ID
INORGANICS						
Cyanide	3.78	NA	SL-1 (1-2')	226	NA	SW-2
Aluminum	17,500	NA	MW-5 (8-13')	41,000	NA	SW-2
Antimony	ND	NA		ND	NA	
Arsenic	10	NA	SL-1 (1-2')	ND	NA	
Barium	190	NA	MW-2 (12-21')	3,300	NA	SW-1
Beryllium	ND	NA		9	NA	SW-1
Cadmium	1.0	NA	SS-2	45	NA	SW-1
Calcium	37,500	NA	SL-3 (1')	920,000	NA	SW-1
Chromium	22	NA	MW-5 (8-13')	100	NA	SW-1
Cobalt	ND	NA		ND	NA	
Copper	60	NA	SL-1 (1-2')	1,100	NA	SW-1
Iron	28,000	NA	MW-5 (8-13')	480,000	NA	SW-1
Lead	360	NA	SS-2	5,300	NA	SW-1
Magnesium	14,000	NA	MW-5 (8-13')	260,000	NA	SW-1
Manganese	550	NA	MW-5 (8-13')	16,000	NA	SW-1
Mercury	.88	NA	SL-1 (1-2')	6	NA	SW-2
Nickel	26	NA	MW-2 (12-21')	110	NA	SW-1
Potassium	6,000	NA	MW-5 (8-13')	29,000	NA	Old Red Spring
Selenium	3.7	NA	SL-1 (1-2')	ND	NA	
Silver	ND	NA		ND	NA	
Sodium	600	NA	MW-2 (12-21')	160,000	NA	MW-1
Thallium	ND	NA		ND	NA	
Tin	ND	NA		ND	NA	
Vanadium	29	NA	MW-5 (8-13')	500	NA	SW-1
Zinc	230	NA	SS-2	13,000	NA	SW-1

NOTES:
1. Refer to Figure 2-10 for sample locations.
2. ND - Not detected.
   NA - Not available.
3. Source: C&S, 1986.

historical information as well as the results of the NYSDEC Phase II site investigation.

Site history data indicate the following areas of concern associated with past manufactured gas generating operations and/or utility operations:

- three below grade gas holders;
- purifier waste disposal areas (e.g., along the western boundary);
- general tar handling areas;
- former location of coal and oil depot associated with the railroad line;
- former transformer/capacitor storage area;
- electric equipment disposal area beneath the floor of the existing Round House Garage (Holder number 2, pit type);
- former oil storage area; and
- former and current location of underground gas and diesel tanks.

Sources identified in previous site investigations include:

- tar in fill, sand, and peat layers beneath the Site; and
- stream sediments contaminated with organics, metals and pesticides.

2.3.2 Chemical Characteristics of Shallow Soil

An analysis of the chemical characteristics of site soils is provided through a review of the 1986 NYSDEC Phase II investigation data. Sample locations for test borings and surface soil samples are shown on Figure 2-10. Analytical results are provided in Tables 2-6 through 2-9.

Soil samples were obtained from test borings to a maximum depth of fifteen feet below the surface at five locations onsite. Each sample was a composite of soil from all depths which contained waste materials. In addition, composite surface soil samples were collected at three locations across the Site. All soils were analyzed for volatile organics, semi-volatile organics and pesticides/PCBs on the Hazardous Substances List (now part of the

TABLE 2-6
VOLATILE ORGANICS RESULTS FOR PHASE II SOIL SAMPLES

PARAMETERS	DETECTION LIMITS	SAMPLE ID	SL-1	SL-2	SL-3	MW-1	MW-2	MW-3	MW-4	MW-5
		DEPTH BELOW SURFACE (ft.)	1-2'	1-2'	1'	6-11'	12-21'	14-19'	10-15'	8-13'
Chloromethane	.010-.074		U	U	U	U	U	U	U	U
Bromomethane	.010-.074		U	U	U	U	U	U	U	U
Vinyl Chloride	.010-.074		U	U	U	U	U	U	U	U
Chloroethane	.010-.074		U	U	U	U	U	U	U	U
Methylene Chloride	.012-.150		.044B	.012B	.0049J	.0091B	.150B	.087B	.040B	.045B
Acetone	.010-.074		.0046J	U	U	U	U	U	U	.014
Carbon Disulfide	.0053-.037		U	U	U	U	U	U	U	U
1,1-Dichloroethene	.0053-.037		U	U	U	U	U	U	U	U
1,1-Dichloroethane	.0053-.037		U	U	U	U	U	U	U	U
trans 1,2 Dichloroethene	.0053-.037		U	U	U	U	U	U	U	U
Chloroform	.0053-.020		U	U	U	U	U	.020J	U	U
1,2-Dichloroethane	.0053-.037		U	U	U	U	U	U	U	U
2-Butanone	.010-.074		U	U	U	U	U	U	U	U
1,1,1 Trichloroethane	.0053-.037		U	U	U	U	U	U	U	U
Carbon Tetrachloride	.0053-.037		U	U	U	U	U	U	U	U
Vinyl Acetate	.010-.074		U	U	U	U	U	U	U	U
Bromodichloromethane	.0053-.037		U	U	U	U	U	U	U	U
1,1,2,2-Tetrachloroethane	.0053-.037		U	U	U	U	U	U	U	U
1,2 Dichloropropane	.0053-.037		U	U	U	U	U	U	U	U
trans-1,3 Dichloropropene	.0053-.037		U	U	U	U	U	U	U	U
Trichloroethene	.0053-.037		U	U	U	U	U	U	U	U
Dibromochloromethane	.0053-.037		U	U	U	U	U	U	U	U
1,1,2-Trichloroethane	.0053-.037		U	U	U	U	U	U	U	U
Benzene	.0053-.037		U	U	U	U	.013	U	U	U
cis-1,3-Dichloropropene	.0053-.037		U	U	U	U	U	U	U	U
2-Chloroethyl Vinyl Ether	.010-.074		U	U	U	U	U	U	U	U
Bromoform	.0053-.037		U	U	U	U	U	U	U	U
2-Hexanone	.010-.074		U	U	U	U	U	U	U	U
4-Methyl-2-pentanone	.010-.074		U	U	U	U	U	U	U	U
Tetrachloroethene	.0053-.037		U	U	U	U	U	U	U	U
Toluene	.0053-.020		U	U	U	U	U	.020J	U	U
Chlorobenzene	.0053-.037		U	U	U	U	U	U	U	U
Ethyl Benzene	.0053-.0069		U	U	U	U	.021	.750	U	U
Styrene	.0053-.037		U	U	U	U	U	U	U	U
Xylenes, total	.0053-.037		U	U	U	U	.022	1.0	U	U

NOTES:

1. Results assumed to be DQO Level III.
2. All parameters are given in mg/kg dry weight (ppm).
3. U - Not detected.
   J - Estimated value.
   B - Analyte found in the blank as well as sample.
4. Detection limits given are ranges compiled from analyses of all soil samples.
5. Method: Not Provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-7
SEMI-VOLATILE ORGANICS RESULTS FOR PHASE II SOIL SAMPLES

PARAMETERS	DETECTION LIMITS	SAMPLE ID	SL-1	SL-2	SL-3	MW-1	MW-2	MW-3	MW-4	MW-5
		DEPTH BELOW SURFACE (ft.)	1-2'	1-2'	1'	6-11'	12-21'	14-19'	10-15'	8-13'
N-Nitrosodimethylamine	.350-28		U	U	U	U	U	U	U	U
Phenol	.350-28		U	U	U	U	U	U	U	U
Aniline	.350-28		U	U	U	U	U	U	U	U
bis (2-Chloroethyl) ether	.350-28		U	U	U	U	U	U	U	U
2-Chlorophenol	.350-28		U	U	U	U	U	U	U	U
1,3-Dichlorobenzene	.350-28		U	U	U	U	U	U	U	U
1,4-Dichlorobenzene	.350-28		U	U	U	U	U	U	U	U
Benzyl Alcohol	.350-28		U	U	U	U	U	U	U	U
1,2-Dichlorobenzene	.350-28		U	U	U	U	U	U	U	U
2-Methylphenol	.350-28		U	U	U	U	U	U	U	U
bis (2-Chloroisopropyl) ether	.350-28		U	U	U	U	U	U	U	U
4-Methylphenol	.350-28		U	U	U	U	U	U	U	U
N-Nitroso-Dipropylamine	.350-28		U	U	U	U	U	U	U	U
Hexachloroethane	.350-28		U	U	U	U	U	U	U	U
Nitrobenzene	.350-28		U	U	U	U	U	U	U	U
Isophorone	.350-28		U	U	U	U	U	U	U	U
2-Nitrophenol	.350-28		U	U	U	U	U	U	U	U
2,4-Dimethylphenol	.350-28		U	U	U	U	U	U	U	U
Benzoic Acid	1.8-140		U	U	U	U	U	U	U	U
bis (2-Chloroethoxy) methane	.350-28		U	U	U	U	U	U	U	U
2,4-Dichlorophenol	.350-28		U	U	U	U	U	U	U	U
1,2,4-Trichlorobenzene	.350-28		U	U	U	U	U	U	U	U
Naphthalene	.130-13		.0093J	.160J	U	.130J	.220J	13J	U	U
4-Chloroaniline	.350-28		U	U	U	U	U	U	U	U
Hexachlorobutadiene	.350-28		U	U	U	U	U	U	U	U
4-Chloro-3-Methylphenol	.350-28		U	U	U	U	U	U	U	U
2-Methylnaphthalene	.096-41		.0058J	.096J	U	.210J	U	41J	U	U
Hexachlorocyclopentadiene	.350-28		U	U	U	U	U	U	U	U
2,4,6 Trichlorophenol	.350-28		U	U	U	U	U	U	U	U
2,4,5 Trichlorophenol	1.8-140		U	U	U	U	U	U	U	U
2-Chloronaphthalene	.350-28		U	U	U	U	U	U	U	U
2-Nitroaniline	1.8-140		U	U	U	U	U	U	U	U
Dimethyl Phthalate	.350-28		U	U	U	U	U	U	U	U
Acenaphthylene	NA		130	1.2	U	.690	U	9.8J	U	U
3-Nitroaniline	1.8-140		140J	U	U	U	U	U	U	U
Acenaphthene	NA		U	.060J	U	.200J	U	98	12J	U
2,4-Dinitrophenol	1.8-140		U	U	U	U	U	U	U	U
4 Nitrophenol	1.8-140		U	U	U	U	U	U	U	U
Dibenzofuran	.350-28		U	U	.280J	U	7.8J	U	U	U
2,4-Dinitrotoluene	.350-28		U	U	U	U	U	U	U	U
2,6-Dinitrotoluene	.350-28		U	U	U	U	U	U	U	U
Diethylphthalate	.350-28		U	U	U	U	U	U	U	U
4-Chlorophenyl Phenyl ether	.350-28		U	U	U	U	U	U	U	U
Fluorene	NA		.0093J	.200J	U	.670J	U	60	7J	U

TABLE 2-7 (continued)
SEMI-VOLATILE ORGANICS RESULTS FOR PHASE II SOIL SAMPLES

PARAMETERS	DETECTION LIMITS	SAMPLE ID	SL-1	SL-2	SL-3	MW-1	MW-2	MW-3	MW-4	MW-5
		DEPTH BELOW SURFACE (ft.)	1-2'	1-2'	1'	6-11'	12-21'	14-19'	10-15'	8-13'
4-Nitroaniline	.350-28		U	U	U	U	U	U	U	U
4,6-Dinitro-2-methylphenol	.350-28		U	U	U	U	U	U	U	U
N-nitrosodiphenylamine (1)	.350-28		U	.120J	U	U	U	U	U	U
4-Bromophenyl Phenyl ether	.350-28		U	U	U	U	U	U	U	U
Hexachlorobenzene	.350-28		U	U	U	U	U	U	U	U
Pentachlorophenol	1.8-140		U	U	U	U	U	U	U	U
Phenanthrene	.090-.350		24J	.420	U	5.4	.090J	160	33	U
Anthracene	.350-.450		32	.450	U	6.2	U	53	24J	U
Di-n-butylphthalate	.044-28		U	.044J	U	.054J	U	U	U	U
Fluoranthene	.140-.400		220	1.8	U	4.5	.140J	54	25J	U
Benzidine			U	U	U	U	U	U	U	U
Pyrene			320	2.1	U	6	.160J	99	40	U
Butyl Benzyl Phthalate	.350-28		U	U	U	U	U	U	U	U
3,3-Dichlorobenzidine	.700-56		U	U	U	U	U	U	U	U
Benzo(a)anthracene	.340-.400		300	1.9	U	5.8	.340J	28	13J	U
bis (2-ethylhexyl) phthalate	26-28		U	.066J	.042J	.190J	.250J	U	U	.220J
Chrysene	NA		270	2.1	U	6	.160J	99	40	U
Di-n-octyl Phthalate	NA		U	U	U	U	U	U	U	U
Benzo (b) fluoranthene	NA		380	4.1	U	2.3	U	25	15J	U
Benzo (k) fluoranthene	NA		380	4.1	U	2.3	U	25	15J	U
Benzo (a) pyrene	NA		320	3.2	U	2.2	.300J	23	14J	U
Indeno (1,2,3-cd) pyrene	NA		94	1.8	U	.590	U	U	U	U
Dibenz (a,h) anthracene	NA		39	.520	U	.280J	U	U	U	U
Benzo (g,h,i) perylene	NA		99	2.4	U	.690	U	U	U	U

NOTES:
1. Results assumed to be DQO Level III.
2. All results given in mg/l (ppm).
3. U - Not detected.
   J - Estimated value.
   NA - Not available.
4. Detection limits given are ranges compiled from analyses of all soil samples.
5. Method: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-8
PESTICIDE/PCB RESULTS FOR PHASE II SOIL SAMPLES

PARAMETERS	DETECTION LIMITS	SAMPLE ID	SL-1	SL-2	SL-3	MW-1	MW-2	MW-3	MW-4	MW-5
		DEPTH BELOW SURFACE (ft.)	1-2'	1-2'	1'	6-11'	12-21'	14-19'	10-15'	8-13'
PESTICIDES										
Alpha - BHC	.0021-.180		U	U	U	U	U	U	U	U
Beta - BHC	.0021-.180		U	U	U	U	U	U	U	U
Delta - BHC	.0021-.180		U	U	U	U	U	U	U	U
Gamma - BHC (Lindane)	.0021-.180		U	U	U	U	U	U	U	U
Heptachlor	.0021-.180		U	U	U	U	U	U	U	U
Aldrin	.0021-.180		U	U	U	U	U	U	U	U
Heptachlor Epoxide	.0021-.180		U	U	U	U	U	U	U	U
Endosulfan I	.0021-.180		U	U	U	U	U	U	U	U
Dieldrin	.0041-.360		U	U	U	U	U	U	U	U
4-4' - DDE	.0041-.360		U	.0099	.0053	U	U	U	U	U
Endrin	.0041-.360		U	U	U	U	U	U	U	U
Endosulfan II	.0041-.360		U	U	U	U	U	U	U	U
4-4' - DDD	.0041-.360		U	.023	U	U	U	U	U	U
Endrin Aldehyde	.0041-.360		U	U	U	U	U	U	U	U
Endosulfan Sulfate	.0041-.360		U	U	U	U	U	U	U	U
4-4' - DDT	.0041-.360		U	U	U	U	U	U	U	U
Methoxychlor	.021-1.8		U	U	U	U	U	U	U	U
Endrin Ketone	.0041-.360		U	U	U	U	U	U	U	U
Chlordane	.021-1.8		U	U	U	U	U	U	U	U
Toxaphene	.0041-.360		U	U	U	U	U	U	U	U
PCBS										
Araclor 1016	.021-1.8		U	U	U	U	U	U	U	U
Araclor 1221	.021-1.8		U	U	U	U	U	U	U	U
Araclor 1232	.021-1.8		U	U	U	U	U	U	U	U
Araclor 1242	.021-1.8		U	U	U	U	U	U	U	U
Araclor 1248	.021-1.8		U	U	U	U	U	U	U	U
Araclor 1254	.0041-.360		U	U	U	U	U	U	U	U
Araclor 1260	.0041-.360		U	U	U	U	U	U	U	U

NOTES:

1. Results assumed to be DQO Level III.
2. All parameters are given in mg/kg (ppm).
3. U - Not detected.
4. Detection limits given are ranges compiled from analyses of all soil samples.
5. Method: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-9
INORGANICS RESULTS FOR PHASE II SOIL SAMPLES

		SAMPLE ID	SL-1	SL-2	SL-3	MW-1	MW-2	MW-3	MW-4	MW-5
PARAMETERS	USEPA METHOD OF ANALYSIS	DEPTH BELOW SURFACE (ft.)	1-2'	1-2'	1'	6-11'	12-21'	14-19'	10-15'	8-13'
Cyanide	335.3		3.78	0.22	U	U	0.08	0.20	U	U
Aluminum	202.1		5,000	6,500	8,500	U	13,000	9,000	U	17,500
Antimony	204.1		U	U	U	U	U	U	U	U
Arsenic	206.3		10	4.0	7.5	U	5	1.4	U	5
Barium	208.1		70	50	170	U	190	80	U	170
Beryllium	210.1		U	U	U	U	U	U	U	U
Cadmium	213.1		U	U	U	U	U	U	U	U
Calcium	215.1		2,500	10,000	37,500	U	32,500	2,000	U	35,000
Chromium	218.1		8.5	9.0	9.5	U	17	10	U	22
Cobalt	219.1		U	U	U	U	U	U	U	U
Copper	220.1		60	19	16	U	17	7	U	22
Iron	236.1		16,100	13,200	16,700	U	23,000	8,950	U	28,000
Lead	239.1		185	230	5.0	U	5.0	3.5	U	6.0
Magnesium	242.1		13,000	4,000	11,000	U	10,000	2,500	U	14,000
Manganese	243.1		165	210	410	U	420	75	U	550
Mercury	245.1		0.88	0.12		U			U	
Nickel	249.1		11	9.5	11	U	26	8.0	U	21
Potassium	258.1		1,150	1,100	2,000	U	3,400	1,050	U	6,000
Selenium	270.2		3.7	0.38	0.065	U	0.18	0.32	U	0.065
Silver	272.1		U	U	U	U	U	U	U	U
Sodium	273.1		200	150	250	U	600	150	U	400
Thallium	279.1		U	U	U	U	U	U	U	U
Tin	282.1		U	U	U	U	U	U	U	U
Vanadium	286.1		U	U	U	U	U	U	U	29
Zinc	289.1		210	75	75	55	55		35	50

NOTES:
1. Results assumed to be DQO Level III.
2. Results are given in mg/kg wet weight (ppm).
3. U - Not detected.
4. Detection limits not provided.
5. Methods: Provided above.
6. Laboratory: Calocerinos & Spina Consulting Engineers.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

Target Compound List, TCL) as well as twenty-four metals, cyanide, and percent solids.

Based on the limited Phase II data, surface soil contamination was greatest at the northwest corner of the Site (SL-1) where PAHs constituted 0.4% by weight of the soil. Low levels of PAHs and low levels of the pesticides DDE and DDD were identified in the surface sample taken from north of the Round House garage (SL-2). Metals were detected in all three surface soil samples. Reference to Table 2-9 shows that, in addition to common rock forming metals, low levels of some toxic metals were also detected. In order to put the metal levels into proper perspective for the Site, determination of background levels will be necessary.

Analytical results for deeper soil borings showed that PAHs were present at all locations except the northeast corner of the Site. However, due to the limited nature of the Phase II sampling and analysis program, this does no preclude this area from the need for further study. Petroleum hydrocarbons were detected in samples from MW-3 and at lower levels from MW-2. Metals were detected in the southwest, central and northeast portions of the Site. Zinc was the only metal detected in subsurface soils in the northwest and southeast portions of the Site. No PCBs or pesticides were detected in any of the subsurface soil samples.

2.3.3 Chemical Characteristics of Sediments

Stream sediment samples were collected from the Village Brook upstream and downstream of the Site.

Chemical characteristics of stream sediments were determined based on a review of 1986 Phase II investigation data. Sample locations are shown on Figure 2-10. A summary of sediment analytical results is provided as Tables 2-10 through 2-13.

Metals, PAHs and pesticides (DDD and DDT) were identified in both upstream and downstream sediment samples. In the case of both metals and PAHs, the concentrations in the downstream samples were greater than those in the upstream samples.

2.3.4 Chemical Characteristics of Ground Water

Chemical characteristics of the onsite ground water were determined through a review of NYSDEC Phase II investigation data. One ground water sample from each of five monitoring wells was obtained and analyzed as part of the field investigation. The locations of the monitoring wells are shown on Figure 2-10 and well construction details are provided on Table 2-14. Laboratory results are provided as Tables 2-15 through 2-18.

TABLE 2-10
VOLATILE ORGANICS RESULTS FOR PHASE II SEDIMENT SAMPLES

PARAMETERS	DETECTION LIMITS	SAMPLE ID SAMPLE LOCATION	SS-1 UPSTREAM	SS-2 DOWNSTREAM
Chloromethane	.015-.023		U	U
Bromomethane	.015-.023		U	U
Vinyl Chloride	.015-.023		U	U
Chloroethane	.015-.023		U	U
Methylene Chloride	.014-.027		B	B
Acetone	.028-.052		B	B
Carbon Disulfide	.0077-.012		U	U
1,1-Dichloroethene	.0077-.012		U	U
1,1-Dichloroethane	.0077-.012		U	U
trans 1,2 Dichloroethene	.0077-.012		U	U
Chloroform	.0077-.012		U	U
1,2 Dichloroethane	.0077-.012		U	U
2 Butanone	.0077-.012		U	U
1,1,1 Trichloroethane	.0077-.012		U	U
Carbon Tetrachloride	.0077-.012		U	U
Vinyl Acetate	.015-.023		U	U
Bromodichloromethane	.0077-.012		U	U
1,1,2,2 Tetrachloroethane	.0077-.012		U	U
1,2 Dichloropropane	.0077-.012		U	U
trans 1,3 Dichloropropene	.0077-.012		U	U
Trichloroethene	.0077-.012		U	U
Dibromochloromethane	.0077-.012		U	U
1,1,2-Trichloroethane	.0077-.012		U	U
Benzene	.0077-.012		U	U
cis-1,3-Dichloropropene	.0077-.012		U	U
2-Chloroethyl Vinyl Ether	.015-.023		U	U
Bromoform	.0077-.012		U	U
2-Hexanone	.015-.023		U	U
4-Methyl-2-Pentanone	.015-.023		U	U
Tetrachloroethene	.0077-.012		U	U
Toluene	.0077-.012		U	U
Chlorobenzene	.0077-.012		U	U
Ethyl Benzene	.0077-.012		U	U
Styrene	.0077-.012		U	U
Xylenes	.0077-.012		U	U

NOTES:

1. Results assumed to be DQO Level III.
2. All parameters given in mg/kg dry weight (ppm).
3. U - Not detected.
   B - Analyte found in the blank as well as sample.
4. Detection limits given are ranges compiled from analyses of all sediment samples.
5. Method: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-11
SEMI-VOLATILE ORGANICS RESULTS FOR PHASE II SEDIMENT SAMPLES

PARAMETERS ORGANICS	DETECTION LIMITS	SAMPLE ID SAMPLE LOCATION	SS-1 UPSTREAM	SS-2 DOWNSTREAM
SEMI-VOLATILES (PAHs)				
N-Nitrosodimethylamine	.520-.810		U	U
Phenol	.520-.810		U	U
Aniline	.520-.810		U	U
bis (2-Chloroethyl) ether	.520-.810		U	U
2-Chlorophenol	.520-.810		U	U
1,3-Dichlorobenzene	.520-.810		U	U
1,4-Dichlorobenzene	.520-.810		U	U
Benzyl Alcohol	.520-.810		U	U
1,2-Dichlorobenzene	.520-.810		U	U
2-Methylphenol	.520-.810		U	U
bis (2-Chloroisopropyl) ether	.520-.810		U	U
4-Methylphenol	.520		U	.600J
N-Nitroso-Dipropylamine	.520-.810		U	U
Hexachloroethane	.520-.810		U	U
Nitrobenzene	.520-.810		U	U
Isophorone	.520-.810		U	U
2-Nitrophenol	.520-.810		U	U
2,4 Dimethylphenol	.520-.810		U	U
Benzoic Acid	NA		U	.250J
bis (2-Chloroethoxy) methane	.520-.810		U	U
2,4-Dichlorophenol	.520-.810		U	U
1,2,4 Trichlorobenzene	.520-.810		U	U
Naphthalene	.520		U	.580J
4-Chloroaniline	.520-.810		U	U
Hexachlorobutadiene	.520-.810		U	U
4-Chloro-3-methylphenol	.520-.810		U	U
2-Methylnaphthalene	.280-.520		U	.280J
Hexachlorocyclopentadiene	.520-.810		U	U
2,4,6 Trichlorophenol	.520-.810		U	U
2,4,5 Trichlorophenol	2.6-4.1		U	U
2-Chloronaphthalene	.520-.810		U	U
2-Nitroaniline	2.6-4.1		U	U
Dimethyl Phthalate	.520-.810		U	U
Acenaphthylene	NA		.340J	.830
3-Nitroaniline	2.6-4.1		U	U
Acenaphthene	.300-.520		U	.300J
2,4-Dinitrophenol	2.6-4.1		U	U
4-Nitrophenol	2.6-4.1		U	U
Dibenzofuran	.098-.520		U	.098J
2,4 Dinitrotoluene	.081-.520		U	.081J
2,6 Dinitrotoluene	.520-.810		U	U
Diethylphthalate	.520-.810		U	U
4-Chlorophenyl Phenyl ether	.520-.810		U	U
Fluorene	.420-.520		U	.420J
4-Nitroaniline	2.6-4.1		U	U

TABLE 2-11 (continued)
SEMI-VOLATILE ORGANICS RESULTS FOR PHASE II SEDIMENT SAMPLES

PARAMETERS	DETECTION	SAMPLE ID	SS-1	SS-2
ORGANICS	LIMITS	SAMPLE LOCATION	UPSTREAM	DOWNSTREAM
4,6-Dinitro-2-methylphenol	2.6-4.1		U	U
N-nitrosodiphenylamine (1)	.520-.810		U	U
4-Bromophenyl Phenyl ether	.520-.810		U	U
Hexachlorobenzene	.520-.810		U	U
Pentachlorophenol	2.6-4.1		U	U
Phenanthrene	NA		.440J	3.9
Anthracene	.520-.810		U	U
Di-n-butylphthalate	.180-.520		U	.180J
Fluoranthene	NA		1.2	6.3
Benzidine	2.6-4.1		U	U
Pyrene	NA		1.2	10
Butyl Benzyl Phthalate	.520		U	.520J
3,3-Dichlorobenzidine	1.0-1.6		U	U
Benzo(a)anthracene	NA		.780	4.9
bis (2-ethylhexyl) phthalate	.520		U	1.2
Chrysene	NA		.850	5.5
Di-n-octyl Phthalate	.240-.520		U	.240J
Benzo(b)fluoranthene	NA		1.9	5.7
Benzo(k)fluoranthene	NA		1.9	7.5
Benzo(a)pyrene	NA		1.4	3.7
Indeno(1,2,3-cd)pyrene	NA		.540	1.4
Dibenz(a,h)anthracene	.520-.810		U	U
Benzo(g,h,i)perylene	NA		1.3	1.4

NOTES:

1. Results are assumed to be DQO Level III.
2. All parameters are given in mg/kg dry weight (ppm).
3. Detection limits given are ranges compiled from analyses of all sediment samples.
4. U - Not detected.
   J - Indicates an estimated value.
   NA - Not available.
5. Method: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-12
PESTICIDE/PCBs RESULTS FOR PHASE II SEDIMENT SAMPLES

PARAMETER	DETECTION LIMIT	SAMPLE ID SAMPLE LOCATION	SS-1 UPSTREAM	SS-2 DOWNSTREAM
Alpha - BHC	.031-.096		U	U
Beta - BHC	.031-.096		U	U
Delta - BHC	.031-.096		U	U
Gamma - BHC (Lindane)	.031-.096		U	U
Heptachlor	.031-.096		U	U
Aldrin	.031-.096		U	U
Heptachlor Epoxide	.031-.096		U	U
Endosulfan I	.031-.096		U	U
Dieldrin	.062-.190		U	U
4-4' - DDE	<.190		.068	U
Endrin	.062-.190		U	U
Endosulfan II	.062-.190		U	U
4-4' - DDD	NA		.130	1.1
Endrin Aldehyde	.062-.190		U	U
Endosulfan Sulfate	.062-.190		U	U
4,4' - DDT	NA		.180	1.2
Methoxychlor	.310-.960		U	U
Endrin Ketone	.062-.190		U	U
Chlordane	.310-.960		U	U
Toxaphene	.620-1.9		U	U
PCBs				
Araclor 1016	.310-.960		U	U
Araclor 1221	.310-.960		U	U
Araclor 1232	.310-.960		U	U
Araclor 1242	.310-.960		U	U
Araclor 1248	.310-.960		U	U
Araclor 1254	.620-1.9		U	U
Araclor 1260	.620-1.9		U	U

NOTES:

1. Results assumed to be DQO Level III.
2. All parameters are given in mg/l (ppm).
3. U - Not detected.
   NA - Not available.
4. Detection limits given are ranges compiled from analyses of all sediment samples.
5. Method: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-13
INORGANICS RESULTS FOR PHASE II SEDIMENT SAMPLES

PARAMETER	SAMPLE ID SAMPLE LOCATION	SS-1 UPSTREAM	SS-2 DOWNSTREAM
Cyanide		0.79	1.78
Aluminum		2600	2700
Antimony		U	U
Arsenic		1.62	3.5
Barium		27	110
Beryllium		U	U
Cadmium		U	1.0
Calcium		8100	15,000
Chromium		2.9	9.7
Cobalt		U	U
Copper		9.6	42
Iron		5300	8600
Lead		50	360
Magnesium		4300	8000
Manganese		90	180
Mercury		U	0.43
Nickel		4.2	10
Potassium		180	230
Selenium		U	U
Silver		U	U
Sodium		140	240
Thallium		U	U
Tin		U	U
Vanadium		U	U
Zinc		70	230

NOTES:
1. Results assumed to be DQO Level II.
2. Results given in mg/kg wet weight (ppm).
3. U - Not detected.
4. Detection limits not provided.
5. Methods: Same as Table 2-9.
6. Laboratory: Calocerinos and Spina Consulting Eng
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-14
SUMMARY OF EXISTING MONITORING WELLS

WELL DESIGNATION	AQUIFER SAMPLED	GROUND SURFACE ELEVATION	TOTAL DEPTH OF BORING	REPORTED GROUND WATER ELEVATION	REPORTED DEPTH TO BEDROCK	SCREEN DEPTH	WELL CONSTRUCTION
MW-1	Unconsolidated	272.5	9'	267.75'	Not Encountered	3-9'	6.25" diameter boring to 9'; 2" diameter steel screen from 3 to 9 feet; 4" diameter steel casing with locking cap; graded sand pack, bentonite seal.
MW-2	Unconsolidated	268.0	18'	261.12'	Not Encountered	6-18'	6.25" diameter boring to 18'; 2" diameter steel screen from 6-18'; graded sand pack, bentonite seal; 4" diameter steel casing with locking cap.
MW-3	Unconsolidated	271.0	19.5'	259.68'	Not Encountered	7.5-19.5'	6.25" diameter boring to 19.5'; 2" diameter steel screen from 7.5' to 19.5'; graded sand pack from 6.8' to 19.5'; bentonite seal; 4" diameter steel casing with locking cap.
MW-4	Unconsolidated	263.5	17.5'	255.54'	Not Encountered	5.5-17.5'	6.25" diameter boring to 17.5'; 2" diameter steel screen from 5.5' to 17.5'; graded sand pack from 5' to 17.5'; bentonite seal; 4" diameter steel casing with locking cap.
MW-5	Unconsolidated	269.0*	14.5'	*	Not Encountered	2.5-14.5'	6.25" diameter boring to 14.5'; 2" diameter steel screen from 2.5' to 14.5'; graded sand pack from 2.5 to 14.5'; bentonite seal; 4" diameter steel casing with locking cap.

NOTES:

1. * - Ground water and well elevation data reported were not consistent with known site topographic information.
2. Wells installed by Calocerinos and Spina Consulting Engineers, November 1985.

TABLE 2-15
VOLATILE ORGANICS RESULTS FOR PHASE II GROUND WATER SAMPLES

PARAMETERS	DETECTION LIMIT	SAMPLE ID	MW-1	MW-2	MW-3	MW-4	MW-5	OLD RED SPRING	NYSDEC GROUND WATER STANDARDS (CLASS GA)
Chloromethane	10-250		U	U	U	U	U	U	
Bromomethane	10-250		U	U	U	U	U	U	
Vinyl Chloride	10-250		U	U	U	U	U	U	5
Chloroethane	10-250		U	U	U	U	U	U	
Methylene Chloride	5-120		U	U	U	U	U	U	
Acetone	10-250		U	U	160J	U	3.6J	U	
Carbon Disulfide	5-120		U	U	U	U	U	U	
1,1 Dichloroethene	5-120		U	U	U	U	U	U	
1,1 Dichloroethane	5-120		U	U	U	U	U	U	
Trans 1,2 Dichloroethane	5-120		U	U	U	U	U	U	
Chloroform	5-120		U	U	U	U	U	U	100
1,2 Dichloroethane	5-120		U	U	U	U	U	U	5
2 Butanone	10-250		U	U	U	U	U	U	
1,1,1 Trichloroethane	5-120		U	U	U	U	U	U	
Carbon Tetrachloride	5-120		U	U	U	U	U	U	5
Vinyl Acetate	10-250		U	U	U	U	U	U	
Bromodichloromethane	5-120		U	U	U	U	U	U	
1,1,2,2 Tetrachloroethane	5-120		U	U	U	U	U	U	
1,2 Dichloropropane	5-120		U	U	U	U	U	U	
Trans 1,3 Dichloropropene	5-120		U	U	U	U	U	U	
Trichloroethene	5-120		U	U	U	U	U	U	
Dibromochloromethane	5-120		U	U	U	U	U	U	
1,1,2 Trichloroethane	5-120		U	U	U	U	U	U	
Benzene	5		1.7JB	3,300	4,200	U	U	U	1 (MCL)
Cis 1,3 Dichloropropene	5-120		U	U	U	U	U	U	
2 Chloroethyl Vinyl Ether	10-250		U	U	U	U	U	U	
Bromoform	5-120		U	U	U	U	U	U	
2 Hexanone	10-250		U	U	U	U	U	U	
4-Methyl-2-Pentanone	10-250		U	U	U	U	U	U	
Tetrachloroethene	5-120		U	U	U	U	U	U	
Toluene	5		1.1J	2,100	1,100	U	U	U	
Chlorobenzene	5-120		U	U	U	U	U	U	
Ethyl Benzene	5		U	1,100	1,700	U	U	U	
Styrene	5-120		U	U	U	U	U	U	931
Xylenes, Total	5		U	1,300	2,300	U	U	U	

NOTES:
1. Results assumed to be DQO Level III.
2. All results and standards given in ug/l (ppb).
3. U - Not detected.
   J - Estimated value (below detection limit).
   B - Analyte found in blank as well as sample.
   MCL - Maximum Contaminant Level.
4. Detection limits provided are ranges compiled from analyses of all ground water samples.
5. Methods: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-16
SEMI-VOLATILE ORGANICS RESULTS FOR PHASE II GROUND WATER SAMPLES

PARAMETERS ORGANICS	DETECTION LIMIT	SAMPLE ID	MW-1	MW-2	MW-3	MW-4	MW-5	OLD RED SPRING	NYSDEC GROUND WATER STANDARDS (CLASS GA)
N-Nitrosodimethylamine	20-1000		U	U	U	U	U	U	----
Phenol	20-1000		U	U	529	U	U	U	1
Aniline	20-1000		U	U	U	U	U	U	----
bis (2-Chloroethyl) ether	20-1000		U	U	U	U	U	U	1.0
2-Chlorophenol	20-1000		U	U	U	U	U	U	----
1,3 Dichlorobenzene	20-1000		U	U	U	U	U	U	----
1,4 Dichlorobenzene	20-1000		U	U	U	U	U	U	----
Benzyl Alcohol	20-1000		U	U	U	U	U	U	----
1,2 Dichlorobenzene	20-1000		U	U	U	U	U	U	----
2-Methylphenol	20-1000		U	U	U	U	U	U	----
bis (2-Chloroisopropyl) ether	20-1000		U	U	U	U	U	U	----
4-Methylphenol	20-1000		U	U	U	U	U	U	----
N-Nitroso-Dipropylamine	20-1000		U	U	U	U	U	U	----
Hexachloroethane	20-1000		U	U	U	U	U	U	----
Nitrobenzene	20-1000		U	U	U	U	U	U	----
Isophorone	20-1000		U	U	U	U	U	U	----
2-Nitrophenol	20-1000		U	U	U	U	U	U	----
2,4 Dimethylphenol	20-1000		U	U	32J	U	U	U	----
Benzoic Acid	100-5000		U	U	U	U	U	U	----
bis (2-Chloroethoxyl) methane	20-1000		U	U	U	U	U	U	----
2,4-Dichlorophenol	20-1000		U	U	U	U	U	U	----
1,2,4 Trichlorobenzene	20-1000		U	U	U	U	U	U	----
Naphthalene	20		U	6800	3200	2.8J	U	U	----
4-Chloroaniline	20-1000		U	U	U	U	U	U	----
Hexachlorobutadiene	20-1000		U	U	U	U	U	U	----
4-Chloro-3-methyl phenol	20-1000		U	U	U	U	U	U	----
2-Methylnaphthalene	20		U	1100	1100	U	U	U	----
Hexachlorocyclopentadiene	20-1000		U	U	U	U	U	U	----
2,4,6 Trichlorophenol	20-1000		U	U	U	U	U	U	----
2,4,5 Trichlorophenol	100-5000		U	U	U	U	U	U	----
2-Chloronaphthalene	20-100		U	U	U	U	U	U	----
2-Nitroaniline	100-5000		U	U	U	U	U	U	----
Dimethyl Phthalate	20-1000		U	U	U	U	U	U	----
Acenaphthylene	20-1000		6.6J	U	U	2.2J	U	U	----
3-Nitroaniline	100-5000		U	U	U	U	U	U	----
Acenaphthene	20		U	330J	290	18J	U	U	----
2,4-Dinitrophenol	100-5000		U	U	U	U	U	U	----
4-Nitrophenol	100-5000		U	U	U	U	U	U	----
Dibenzofuran	100-5000		U	U	U	U	U	U	----
2,4 Dinitrotoluene	20-1000		U	U	U	U	U	U	----
2,6 Dinitrotoluene	20-1000		U	U	U	U	U	U	----
Diethylphthalate	20-1000		U	U	U	U	U	2.2J	----

TABLE 2-16 (continued)
SEMI-VOLATILE ORGANICS RESULTS FOR PHASE II GROUND WATER SAMPLES

PARAMETERS ORGANICS	DETECTION LIMIT	SAMPLE ID	MW-1	MW-2	MW-3	MW-4	MW-5	OLD RED SPRING	NYSDEC GROUND WATER STANDARDS (CLASS GA)
4-Chloropherhyl Phenyl ether	20-1000		U	U	U	U	U	U	----
Fluorene	20-1000		U	U	82J	7.2J	U	U	----
4-Nitroaniline	100-5000		U	U	U	U	U	U	----
4,6-Dinitro-2-methylphenol	100-5000		U	U	U	U	U	U	----
N-nitrosodiphenylamine (1)	20-1000		U	U	U	U	U	U	----
4-Bromophenyl Phenyl ether	20-1000		U	U	U	U	U	U	----
Hexachlorobenzene	20-1000		U	U	U	U	U	U	0.35
Pentachlorophenol	100-5000		U	U	U	U	U	U	20
Phenanthrene	20-1000		21	U	80J	22	U	U	----
Anthracene	20-1000		15J	U	U	42	U	U	----
Di-n-butylphthalate	20-1000		22J	U	U	U	U	U	770
Fluoranthene	20-1000		26	U	U	17J	U	U	----
Benzidine	100-5000		U	U	U	U	U	U	----
Pyrene	20-1000		53	U	U	25	U	U	----
Butyl Benzyl Phthalate	20-1000		U	U	U	U	U	U	----
3,3-Dichlorobenzidine	40-2000		U	U	U	U	U	U	----
Benzo(a)anthracene	20-1000		22	U	U	8.8J	U	U	----
bis (2-ethylhexyl) phthalate	20-1000		3.2J	U	U	U	U	U	4,200
Chrysene	20-1000		25	U	U	13J	U	U	----
Di-n-octyl Phthalate	20-1000		U	U	U	U	U	U	----
Benzo(b)fluoranthene	20-1000		26	U	U	3.2J	U	U	----
Benzo(k)fluoranthene	20-1000		26	U	U	6.0J	U	U	----
Indeno(1,2,3-cd)pyrene	20-1000		U	U	U	U	U	U	----
Dibenz(a,h)anthracene	20-1000		U	U	U	U	U	U	----
Benzo(g,h,i)perylene	20-1000		U	U	U	U	U	U	----

NOTES:
1. Results assumed to be DQO Level III.
2. Results and standards given in ug/l (ppb).
3. U - Not detected.
   J - Estimated value (below detection limit).
4. Detection limits given are ranges compiled from analyses of all soil samples.
5. Method: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-17
PESTICIDES/PCBs RESULTS FOR PHASE II GROUND WATER SAMPLES

PARAMETER	DETECTION LIMITS (ug/l)	SAMPLE ID	MW-1	MW-2	MW-3	MW-4	MW-5	OLD RED SPRING	NYSDEC GROUND WATER STANDARDS (CLASS GA)
Alpha - BHC	0.05		U	U	U	U	U	U	ND
Beta - BHC	0.05		U	U	U	U	U	U	ND
Delta - BHC	0.05		U	U	U	U	U	U	ND
Gamma - BHC (Lindane)	0.05		U	U	U	U	U	U	ND
Heptachlor	0.05		U	U	U	U	U	U	ND
Aldrin	0.05		U	U	U	U	U	U	ND
Heptachlor Epoxide	0.05		U	U	U	U	U	U	----
Endosulfan I	0.05		U	U	U	U	U	U	----
Dieldrin	0.10		U	U	U	U	U	U	ND
4-4' - DDE	0.10		U	U	U	U	U	U	----
Endrin	0.10		U	U	U	U	U	U	0.2
Endosulfan II	0.10		U	U	U	U	U	U	----
4-4' - DDD	0.10		U	U	U	U	U	U	----
Endrin Aldehyde	0.10		U	U	U	U	U	U	----
Endosulfan Sulfate	0.10		U	U	U	U	U	U	----
4-4' - DDT	0.10		U	U	U	U	U	U	ND
Methoxychlor	0.50		U	U	U	U	U	U	35.0
Endrin Ketone	0.10		U	U	U	U	U	U	----
Chlordane	0.50		U	U	U	U	U	U	0.1
Toxaphene	1.0		U	U	U	U	U	U	ND
PCBs									0.1
Araclor 1016	0.50		U	U	U	U	U	U	
Araclor 1221	0.50		U	U	U	U	U	U	
Araclor 1232	0.50		U	U	U	U	U	U	
Araclor 1242	0.50		U	U	U	U	U	U	
Araclor 1248	0.50		U	U	U	U	U	U	
Araclor 1254	1.0		U	U	U	U	U	U	
Araclor 1260	1.0		U	U	U	U	U	U	

NOTES:

1. Results assumed to be DQO Level III.
2. Results and standards given in ug/l (ppb).
3. U - Not detected.
   ND - Not detectable by tests or analytical determinations listed in the New York State CRR, Title 6, Chapter X, Section 7.03.4
4. Detection limits given are ranges compiled from analyses of all ground water samples.
5. Method: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-18
INORGANICS RESULTS FOR PHASE II GROUND WATER SAMPLES

PARAMETER SAMPLE ID	MW-1	MW-2	MW-3	MW-4	MW-5	OLD RED SPRING	NYSDEC GROUND WATER STANDARDS (CLASS GA)
Cyanide	U	175	28	U	11	U	200
Aluminum	U	U	U	U	U	U	----
Antimony	U	U	U	U	U	U	----
Arsenic	U	U	U	U	U	U	25
Barium	600	700	400	300	300	1,800	1,000
Beryllium	U	U	U	U	U	U	----
Cadmium	U	U	U	U	U	U	10
Calcium	97,000	104,000	100,000	105,000	46,000	194,000	----
Chromium	U	U	U	U	U	U	50
Cobalt	U	U	U	U	U	U	----
Copper	U	U	U	U	U	U	1,000
Iron	1,600	2,400	90	890	20	5,000	300
Lead	U	U	U	U	U	U	25
Magnesium	43,000	22,000	21,000	14,000	17,000	63,000	----
Manganese	370	610	590	1,500	50	170	300
Mercury	U	U	U	U	U	U	2
Nickel	20	U	U	U	U	U	----
Potassium	5,800	12,000	12,000	4,800	1,400	29,000	----
Selenium	U	U	U	U	U	U	20
Silver	U	U	U	U	U	U	50
Sodium	160,000	71,000	41,000	135,000	17,000	1,000	----
Thallium	U	U	U	U	U	U	----
Tin	U	U	U	U	U	U	----
Vanadium	U	U	U	U	U	U	----
Zinc	170	140	50	130	10	20	5,000

NOTES:

1. Results assumed to be DQO Level II.
2. All results and standards given in ug/l (ppb).
3. U - Not detected.
4. Detection limits not provided.
5. Methods: See Table 2-9.
6. Laboratory: Calocerinos and Spina Consulting Engineers.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

The highest levels of ground water contamination were identified in the southwest corner of the Site in samples from wells MW-2 and MW-3 which showed levels of volatile organics, semi-volatiles and metals in excess of New York State class GA ground water standards. Wells MW-1 (northwest corner) and MW-4 (southeast corner) contain detectable levels of PAHs and metals. MW-5 (northeast corner) has no organic contamination and the lowest levels of inorganics of any of the monitoring wells.

The Old Red Spring was sampled again in 1986 by C&S and analyzed for volatile organics, semi-volatile organics (PAHs), pesticides, PCBs, cyanide and metals. No levels of organics or cyanide were detected above detection limits. Even though a number of metals including barium, calcium, iron, magnesium, potassium, sodium and zinc were detected, iron was the only inorganic parameter detected in excess of NYS ground water standards.

2.3.5 Chemical Characteristics of Surface Water

The Village Brook is the primary surface waterbody affected by the Site. The Village Brook (previously referred to as Gas Creek) is channeled through a culvert across much of the Site and analytical information includes samples obtained upstream and downstream at the open channels in the corners of the Site. Chemical data on the Village Brook was summarized from a review of the Phase II data and is shown on Tables 2-19 through 2-22. Levels of copper, iron, mercury, vanadium and zinc in the upstream sample exceed NYSDEC standards. Measured levels of cyanide, copper, iron, mercury and vanadium in the downstream sample exceed NYSDEC Ambient Water Quality Standards.

2.3.6 Chemical Characteristics of Biota

Neither terrestrial nor aquatic biota were evaluated as part of previous investigations at the Site.

2.3.7 Chemical Characteristics of Air

Air monitoring was performed by Calocerinos and Spina as part of the NYSDEC Phase II evaluation of the Site. Air monitoring was conducted during the geophysical survey work and during the boring operations. During drilling, measurements were made to detect vapor releases to the atmosphere and to screen soil samples. Although data were not included in the C&S report for ambient air monitoring, the Phase II report states that no volatiles were detected. Data gathered by C&S can be used in a qualitative assessment of air quality onsite and up and downwind of the Site. Because of its age, limited scope and quantity, data cannot be used in a quantitative assessment of air quality at and around the Site.

TABLE 2-19
VOLATILE ORGANICS RESULTS FOR PHASE II SURFACE WATER SAMPLES

PARAMETERS	DETECTION LIMIT	SAMPLE ID SAMPLE LOCATION	SW-1 UPSTREAM	SW-2 DOWNSTREAM	NYSDEC AMBIENT WATER QUALITY STANDARD (CLASS D)
Chloromethane	10		U	U	-----
Bromomethane	10		U	U	-----
Vinyl Chloride	10		U	U	-----
Chloroethane	10		U	U	-----
Methylene Chloride	5		U	U	-----
Acetone	10		U	U	-----
Carbon Disulfide	5		U	U	-----
1,1 Dichloroethene	5		U	U	-----
1,1 Dichloroethane	5		U	U	-----
Trans 1,2 Dichloroethene	5		U	U	-----
Chloroform	5		U	U	-----
1,2-Dichloroethane	5		U	U	-----
2-Butanone	10		U	U	-----
1,1,1-Trichloroethane	5		U	U	-----
Carbon Tetrachloride	5		U	U	-----
Vinyl Acetate	10		U	U	-----
Bromodichloromethane	5		U	U	-----
1,1,2,2-Tetrachloroethane	5		U	U	-----
1,2-Dichloropropane	5		U	U	-----
trans-1,3-Dichloropropene	5		U	U	-----
Trichloroethene	5		U	U	-----
Dibromochloromethane	5		U	U	-----
1,1,2-Trichloroethane	5		U	U	-----
Benzene	5		U	U	6*
cis-1,3-Dichloropropene	5		U	U	-----
2-Chloroethyl Vinyl Ether	10		U	U	-----
Bromoform	5		U	U	-----
2-Hexanone	10		U	U	-----
4-Methyl-2-pentanone	10		U	U	-----
Tetrachloroethene	5		U	U	-----
Toluene	5		U	U	-----
Chlorobenzene	5		U	U	50
Ethyl Benzene	5		U	U	-----
Styrene	5		U	U	-----
Xylenes	5		U	U	-----

NOTES:

1. Results assumed to be DQO Level III.
2. All results and standards are in ug/l (ppb).
3. U - not detected.
   * - NYSDEC Ambient Water Quality Guidance Value for a Class D stream.
4. Detection limits provided are ranges compiled from analyses of all surface water samples.
5. Method: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-20

SEMI-VOLATILE ORGANICS RESULTS FOR PHASE II SURFACE WATER SAMPLES

PARAMETERS	DETECTION LIMIT	SAMPLE ID	SW-1	SW-2	NYSDEC AMBIENT WATER QUALITY STANDARD
N-Nitrosodimethylamine	20		U	U	----------
Phenol	20		U	U	5.0 (total unchlorinated phenols)
Aniline	20		U	U	----------
bis (2-Chloroethyl) ether	20		U	U	----------
2-Chlorophenol	20		U	U	----------
1,3-Dichlorobenzene	20		U	U	----------
1,4-Dichlorobenzene	20		U	U	----------
Benzyl Alcohol	20		U	U	----------
1,2-Dichlorobenzene	20		U	U	----------
2-Methylphenol	20		U	U	----------
bis (2-Chloroisopropyl) ether	20		U	U	----------
4-Methylphenol	20		U	U	----------
N-Nitroso-Dipropylamine	20		U	U	----------
Hexachloroethane	20		U	U	----------
Nitrobenzene	20		U	U	----------
Isophorone	20		U	U	----------
2-Nitrophenol	20		U	U	----------
2,4 Dimethylphenol	20		U	U	----------
Benzoic Acid	100		U	U	----------
bis (2-Chloroethoxy) methane	20		U	U	----------
2,4-Dichlorophenol	20		U	U	1.0 (total chlorinated phenols)
1,2,4 Trichlorobenzene	20		U	U	
Naphthalene	20		U	U	----------
4-Chloroaniline	20		U	U	----------
Hexachlorobutadiene	20		U	U	----------
4-Chloro-3-methylphenol	20		U	U	----------
2-Methylnaphthalene	20		U	U	----------
Hexachlorocyclopentadiene	20		U	U	----------
2,4,6 Trichlorophenol	20		U	U	----------
2,4,5 Trichlorophenol	100		U	U	----------
2-Chloronaphthalene	20		U	U	----------
2-Nitroaniline	100		U	U	----------
Dimethyl Phthalate	20		U	U	----------
Acenaphthylene	20		U	U	----------
3-Nitroaniline	100		U	U	----------
Acenaphthene	20		U	U	----------
2,4-Dinitrophenol	100		U	U	----------
4-Nitrophenol	100		U	U	----------
Dibenzofuran	20		U	U	----------
2,4 Dinitrotoluene	20		U	U	----------
2,6 Dinitrotoluene	20		U	U	----------
Diethylphthalate	20		U	U	----------
4-Chlorophenyl Phenyl ether	20		U	U	----------
Fluorene	20		U	U	----------

TABLE 2-20 (continued)
SEMI-VOLATILE ORGANICS RESULTS FOR PHASE II SURFACE WATER SAMPLES

PARAMETERS	DETECTION LIMIT	SAMPLE ID	SW-1	SW-2	NYSDEC AMBIENT WATER QUALITY STANDARD
4-Nitroaniline	100		U	U	----------
4,6-Dinitro-2-methylphenol	100		U	U	----------
N-nitrosodiphenylamine (1)	20		U	U	----------
4-Bromophenyl Phenyl ether	20		U	U	----------
Hexachlorobenzene	20		U	U	----------
Pentachlorophenol	100		U	U	1.0 (total chlorinated phenols)
Phenanthrene	20		U	U	----------
Anthrecene	20		U	U	----------
Di-n-butylphthalate	20		U	U	----------
Fluoranthene	20		U	U	----------
Benzidine	100		U	U	----------
Pyrene	20		U	U	----------
Butyl Benzyl Phthalate	20		U	U	----------
3,3-Dichlorobenzidine	40		U	U	----------
Benzo (a) anthracene	20		U	U	----------
bis (2-ethylhexyl) phthalate	20		U	U	----------
Chrysene	20		U	U	----------
Di-n-octyl Phthalate	20		U	U	----------
Benzo (b) fluoranthene	20		U	U	----------
Benzo (k) fluoranthene	20		U	U	----------
Benzo (a) pyrene	20		U	U	0.0012
Indeno (1,2,3-cd) pyrene	20		U	U	----------
Dibenz (a,h) anthracene	20		U	U	----------
Benzo (g,h,i) perylene	20		U	U	----------

NOTES:
1. Results assumed to be DQO Level III.
2. All results, detection limits, and standards in ug/l (ppb).
3. U - Not detected.
4. Detection limits provided are compiled from analyses of all surface water samples.
5. Methods: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-21
PESTICIDES/PCBs RESULTS FOR PHASE II SURFACE WATER SAMPLES

PARAMETERS	DETECTION LIMIT	SAMPLE ID	SW-1	SW-2	NYSDEC AMBIENT WATER QUALITY STANDARD (CLASS D)
		SAMPLE LOCATION	UPSTREAM	DOWNSTREAM	
PESTICIDES					
Alpha - BHC	.05		U	U	------
Beta - BHC	.05		U	U	------
Delta - BHC	.05		U	U	------
Gamma - BHC (Lindane)	.05		U	U	------
Heptachlor	.05		U	U	0.001
Aldrin	.05		U	U	0.001*
Heptachlor Epoxide	.05		U	U	0.001
Endosulfan I	.05		U	U	0.22
Dieldrin	.10-.11		U	U	0.001*
4-4'-DDE	.10-.11		U	U	0.001
Endrin	.10-.11		U	U	0.002
Endosulfan II	.10-.11		U	U	------
4-4'-DDD	.10-.11		U	U	0.001
Endrin Aldehyde	.10-.11		U	U	------
Endosulfan Sulfate	.10-.11		U	U	------
4,4'-DDT	.10-.11		U	U	0.001
Methoxychlor	.50-.56		U	U	------
Endrin Ketone	1.0-1.1		U	U	------
Chlordane	.50-.56		U	U	------
Toxaphene	1.0-1.1		U	U	1.6
PCBs					0.001
Araclor 1016	.50-.56		U	U	
Araclor 1221	.50-.56		U	U	
Araclor 1232	.50-.56		U	U	
Araclor 1242	.50-.56		U	U	
Araclor 1248	.50-.56		U	U	
Araclor 1254	1.0-1.1		U	U	
Araclor 1260	1.0-1.1		U	U	

NOTES:
1. Results assumed to be DQO Level III.
2. Results are given in ug/l (ppb).
3. U - Not detected.
   * - Applies to the sum of both Aldrin and Dieldrin.
4. Detection limits provided are compiled from analyses of all surface water samples.
5. Method: Not provided.
6. Laboratory: CompuChem.
7. Refer to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

TABLE 2-22
INORGANICS RESULTS FOR PHASE II SURFACE WATER SAMPLES

PARAMETERS	SAMPLE ID SAMPLE LOCATION	SW-1 UPSTREAM	SW-2 DOWNSTREAM	NYSDEC AMBIENT WATER QUALITY STANDARD (CLASS D)
Cyanide		72	226	220
Aluminum		830	41,000	
Antimony		U	U	
Arsenic		U	U	
Barium		3,300	850	
Beryllium		9	U	
Cadmium		45	28	210;54+
Calcium		920,000	270,000	
Chromium		100	70	31,000;11,000+
Cobalt		U	U	110*
Copper		1,100	450	492;158+
Iron		480,000	180,000	300
Lead		5,300	4,000	7,200;620+
Magnesium		260,000	90,000	
Manganese		16,000	1,400	
Mercury		5	6	0.2*
Nickel		110	100	26,900;10,700+
Potassium		11,000	21,000	
Selenium		U	U	
Silver		U	U	1,756,000;220,000
Sodium		92,000	103,000	
Thallium		U	U	20
Tin		U	U	
Vanadium		500	16	190
Zinc		13,000	2,100	5,000;2,200+

NOTES:

1. Results assumed to be DQO Level II.
2. All results, standards, and guidance values given in ug/l (ppb).
3. U - Not detected.
   * NYSDEC Ambient Water Quality Guidance Value for Class D Streams.
   \+ - indicates value based on hardness of each water sample.
4. Detection limits not provided.
5. Methods: See Table 2-9.
6. Laboratory: Calocerinos & Spina Consulting Engineers.
7. Refere to Figure 2-10 for sample locations.
8. Source: C&S, 1986.

2.3.8 Conceptual Site Model

A preliminary conceptual model of the Site is presented in Figure 2-11 and illustrated in Figures 2-12 and 2-13. This model is based on the Phase II Report (C&S, 1986) and recently acquired site historical information. Figure 2-11 represents a preliminary conceptual model based on the limited site data base. This model will be refined and added onto as the RI activities proceed and more data are collected. Primary sources of contaminants at the Site may likely include the below grade gas holders, purifier wastes disposed of onsite, and other wastes disposed of at the surface onsite. The release of contaminants from these sources may include seepage along underground conduits and more permeable layers, percolation and infiltration from the surface and stormwater runoff from the Site to area surface waterbodies.

Contaminated soil, ground water and stream sediments are not primary sources of contamination. However, because the limited data available indicate that contamination is present in each of these media, they are defined as a secondary source. This means that under certain conditions (i.e., disturbance of stream sediments) these media can cause secondary releases of contaminants. Other release mechanisms from secondary sources include percolation and infiltration of contaminants from soil to air and ground water; and from sediments to surface water through the disturbance of sediments.

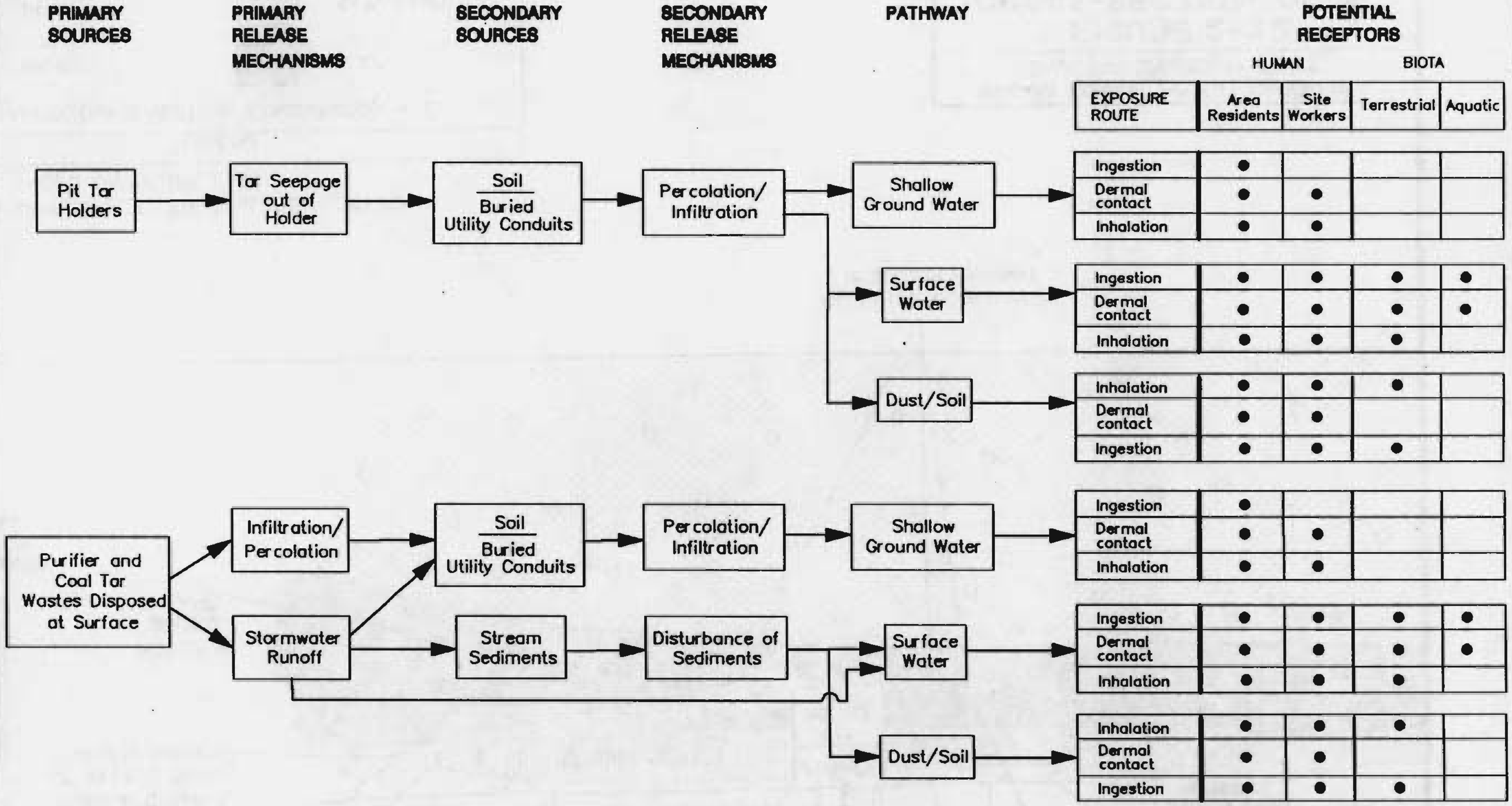
Potential receptors include inhalation of dust by workers disturbing contaminated soil; ingestion and dermal contact of shallow ground water by area residents using the water table aquifer; and human and biota receptors ingesting and coming into contact with surface water at or originating from the Site.

2.4 Applicable or Relevant and Appropriate Requirements (ARARs)

The ARARs identified below include established ARARs and "to be considered" (TBC) material. Section 121 of CERCLA requires, subject to specified exceptions, that remedial actions be undertaken in compliance with both state and federal applicable or relevant and appropriate environmental laws. ARAR/TBC listings are based upon EPA guidance published pursuant to Section 121 of CERCLA. The most recent USEPA interim guidance was published on August 27, 1987 (52 Federal Register 32496).

The CERCLA definition of ARARs is:

- o Any standard, requirement, criterion, or limitation under any federal environmental law; and

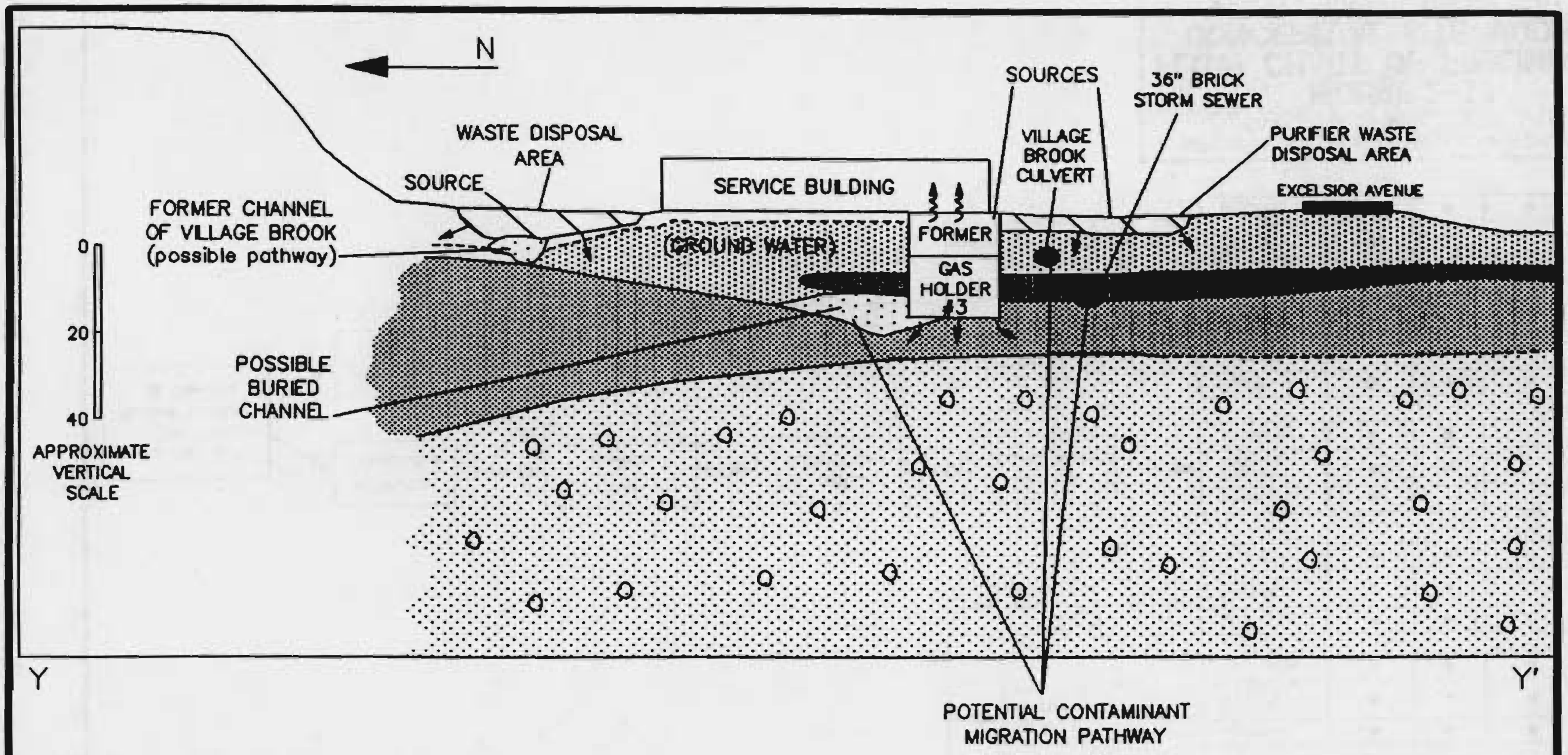


EXPOSURE ROUTE	Area Residents	Site Workers	Terrestrial	Aquatic
Ingestion	●			
Dermal contact	●	●		
Inhalation	●	●		
Ingestion	●	●	●	●
Dermal contact	●	●	●	●
Inhalation	●	●	●	
Inhalation	●	●	●	
Dermal contact	●	●		
Ingestion	●	●	●	
Ingestion	●			
Dermal contact	●	●		
Inhalation	●	●		
Ingestion	●	●	●	●
Dermal contact	●	●	●	●
Inhalation	●	●	●	
Inhalation	●	●	●	
Dermal contact	●	●		
Ingestion	●	●	●	

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-11
FLOW CHART OF PRELIMINARY CONCEPTUAL SITE MODEL

PROJECT NUMBER 1283-03-01
ATLANTIC ENVIRONMENTAL SERVICES, INC.



NOTE: APPROXIMATE CROSS-SECTION LOCATION SHOWN ON FIGURE 2-10.

LEGEND

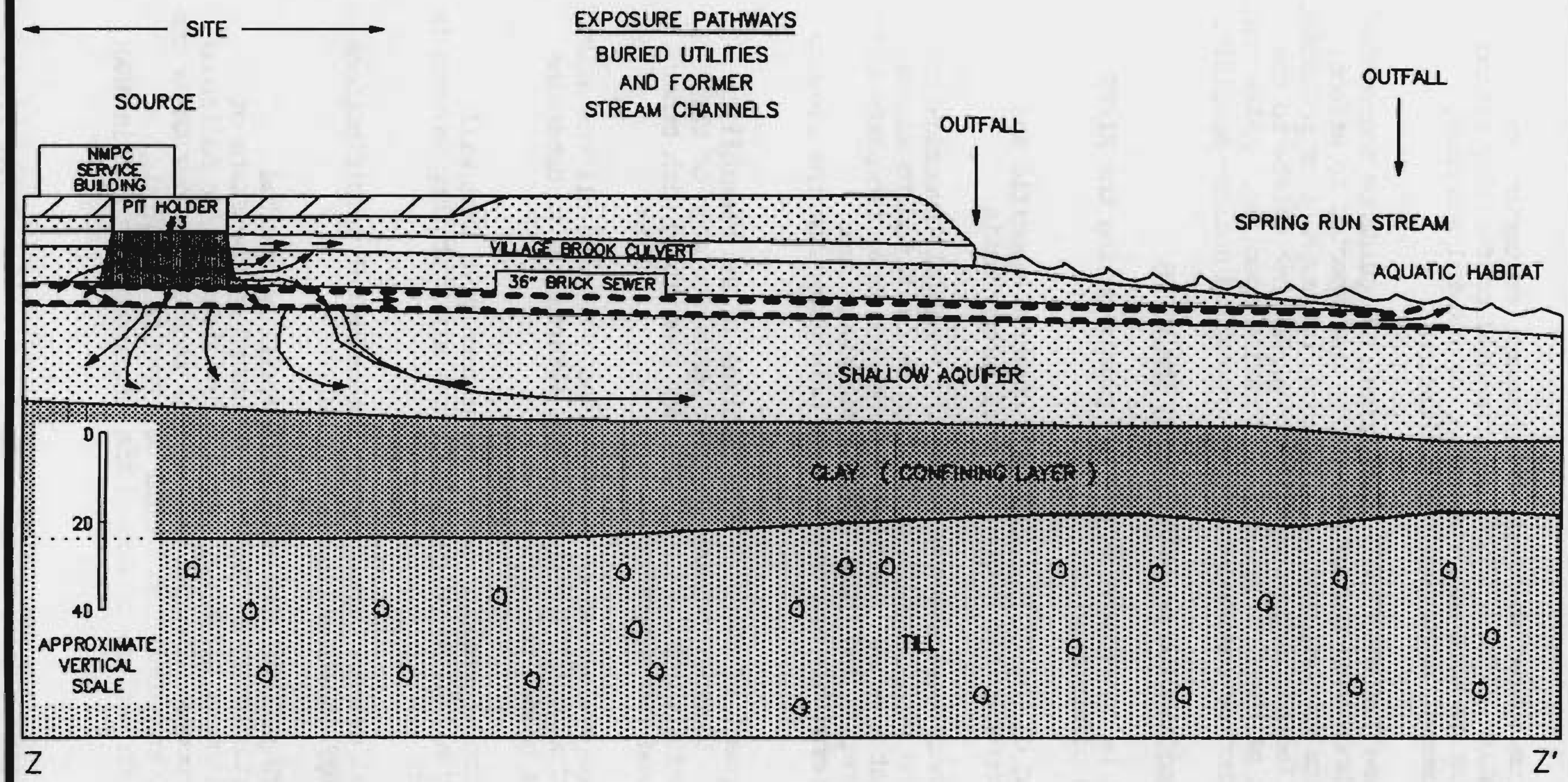
APPROXIMATE VERTICAL EXAGGERATION = 2X

▨	SAND	▨	CLAY
■	PEAT	▨	SILTY SAND
▨	TILL	▧	WASTE DISPOSAL AREA

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-12
CROSS-SECTION OF A CONCEPTUAL SITE MODEL

PROJECT NUMBER 1283-03-01
ATLANTIC ENVIRONMENTAL SERVICES, INC.



NOTE: APPROXIMATE CROSS-SECTION LOCATION SHOWN ON FIGURE 2-10.

LEGEND

APPROXIMATE VERTICAL EXAGGERATION = 2X

▨	FILL	▩	CLAY
▦	TILL	░	SILTY SAND

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 2-13
DOWNGRADIENT CONCEPTUAL SITE MODEL

PROJECT NUMBER 1283-03-01
ATLANTIC ENVIRONMENTAL SERVICES, INC.

- Any promulgated standard, requirement, criterion, or limitation under a state environmental or facility siting law that is more stringent than any federal standard, requirement, criterion, or limitation.

Within these jurisdictional boundaries, EPA guidance segregates ARARs in accordance with the activity they are expected to affect. ARARs that relate to the level of substance, contaminant or pollutant allowed are called contaminant-specific. ARARs that relate to the characteristics of the Site are called location-specific. ARARs that relate to a method of remedial response are called action- specific.

2.4.1 Consideration of ARARs During the RI/FS

ARARs will be considered at six key points during the RI/FS process. These points are:

- Scoping of the RI/FS. Identify chemical-specific and location-specific ARARs on a preliminary basis.
- Site characterization phase of the Remedial Investigation, when the public health evaluation is conducted to assess risks at a site. Identify the chemical-specific ARARs and TBC material and location-specific ARARs more comprehensively and use them to help determine the cleanup goals.
- Development of remedial alternatives in the Feasibility Study. Identify action-specific ARARs for each of the proposed alternatives and consider them along with other ARARs and TBC material.
- Detailed evaluation of alternatives. Examine all the ARARs and TBC material for each viable alternative to determine what is needed to comply.
- Selection of remedy. Select an alternative that will satisfy all ARARs unless one of the six statutory waivers is invoked.
- Remedial design. Ensure that the technical specifications of remedy construction meet ARARs.

As the RI/FS process continues, ARARs will be updated continually, particularly as guidance is issued by the State of New York. The list of ARARs may require revisions and/or additions during the RI process. Changes may also be required as new ARARs are issued. Primary consideration should be given to remedial alternatives which satisfy or exceed the requirements found in ARAR regulations.

ARARs will be used as a guide to establish the appropriate extent of site cleanup; to aid in scoping, formulating and selecting proposed treatment technologies; and to govern the implementation/operation of any selected action. At each interval, ARARs are identified and utilized by taking into account the following:

- contaminants suspected to be at the Site;
- chemical analyses to be performed;
- types of media to be sampled;
- geology and other site characteristics;
- use of the resource/media;
- level of exposure and risk;
- potential transport mechanisms;
- purpose and application of the potential ARARs; and
- remedial alternatives which will be considered for the Site.

2.4.2 Preliminary Identification of ARARs for the Saratoga Springs Site

The NCP and the EPA Interim Guidance define applicable requirements as the federal and state requirements for hazardous substances that would be legally applicable at the Site if this response were not undertaken under CERCLA Section 104. Relevant and appropriate requirements are defined as those federal and state requirements that, while not applicable, are designed to apply to problems similar to those encountered at this site. With respect to the selection of remedial alternatives, relevant and appropriate requirements are to be afforded the same weight and consideration as applicable requirements. The federal and New York regulatory requirements that could be potentially applicable or relevant and appropriate to the Saratoga Springs Site are listed in Table 2-23.

When ARARs do not exist for a particular chemical or when the existing ARARs are not protective of human health or the environment, other promulgated criteria advisories and guidance may be useful in evaluating and developing a remedial alternative. These criteria, advisories and guidance were developed by EPA, other federal agencies and the State of New York. The concepts and data underlying these requirements may be used at the Site in an appropriate way. The federal and State of New York regulatory requirements that could be considered are listed in Table 2-23.

It should be noted that many New York State Ground Water Quality Standards (6NYCRR, Part 703) are lower than analytical detection limits when standard USEPA CLP methods are used. Consequently, this Work Plan will provide for special analytical services for a number of ground water samples in critical areas. These analytical methods must achieve appropriately low detection and quantification limits, and many include Method 524.2 (drinking water method) for analysis of volatiles.

TABLE 2-23

NMPC SITE
PRELIMINARY LISTING OF POTENTIAL ARARs AND TBCs

CHEMICAL SPECIFIC ARARs

- o Federal and New York State Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) (40 CFR 141 and 10 NYCRR 5)
- o RCRA Ground Water Protection Standards Maximum Concentration Limits (40 CFR 264)
- o New York State Pollutant Discharge Elimination System (SPDES) (Standards for Stormwater, Runoff, and Surface Water/Ground Water Discharges) (6 NYCRR 750-757)
- o Clean Water Act - Water Quality Criteria (Gold Book, May 1, 1987)
- o New York State Surface Water Quality Standards for the Upper Hudson River Drainage Basin (6 NYCRR 702)
- o National Ambient Air Quality Standards (NAAQS) (40 CFR 50.6 and 50.7)
- o National Emission Standards for Hazardous Air Pollutants (NESHAPs)
- o New York State Ground Water Quality Standards (6NYCRR Part 703)
- o New York State Department of Health Part 5: Drinking Water Supplies of the New York Sanitary Code

LOCATION - SPECIFIC ARARs

- o Federal Dredge and Fill Section 404/10 Requirements (Excavation and Disposal of Dredged Material in a Wetland or Stream)
- o Review of New Sources and Modifications (40 CFR 51.165)
- o Executive Order 11990 (40CRF6, Appendix A) - Protection of Wetlands
- o Federal Wild and Scenic Rivers Act (16 USC 1531)

TABLE 2-23 CONTINUED

NMPC SITE
PRELIMINARY LISTING OF POTENTIAL ARARs AND TBCs

- New York State Endangered and Threatened Species of Fish and Wildlife Program (6NYCRR Part 182)
- New York State Freshwater Wetlands Law (ECL Article 24, 71 in Title 23)
- New York State Freshwater Wetlands Permit Requirements and Classifications (6 NYCRR 663 and 664)
- New York State SPDES Ground Water Effluent Standards
- City of Saratoga Sewer Ordinance January 1971

ACTION-SPECIFIC ARARs

- Federal and New York State Hazardous Waste Management Requirements (Capping Requirements, Onsite Containment, Dust Control, Tank Storage, and General Closure Standards (40 CFR 264 and 6 NYCRR 370-372)
- SPDES Procedures for Discharge to Surface Water (Reintroduction of Treated Effluent) (6 NYCRR 750-757)
- Federal and New York State Hazardous Waste Manifest Requirements for Offsite Waste Transport (40 CFR 262 and 6 NYCRR 372)
- Federal NSPS (40 CFR 60)
- New York Solid Waste Management Requirements for Nonhazardous Waste (6 NYCRR 360)
- DOT Rules for Hazardous Materials Transport (49 CFR 171)
- New York State Air Emission Requirements (VOC Emissions from Air Strippers and Process Vents and General Air Quality) (6 NYCRR 211, 212, and 257)
- RCRA Land Disposal Restrictions (40 CFR 268)
- OSHA Standards for Hazardous Materials Response (29 CFR 1904, 1910, 1926)
- Standards for Hazardous Waste Transporters (40 CFR 263)

TABLE 2-23 CONTINUED

NMPC SITE
PRELIMINARY LISTING OF POTENTIAL ARARs AND TBCs

TO BE CONSIDERED (TBC) MATERIAL

- Federal Safe Drinking Water Act (SDWA) Maximum Contaminant Level Goals (MCLGs)
- Fish and Wildlife Coordination Act Advisories
- Federal Guidelines for Specifications of Disposal Site for Dredged or Fill Material in Aquatic Ecosystem
- Federal Ambient Water Quality Criteria (AWQC) (Federal Clean Water Act - Section 304)
- New York State Ambient Water Quality Guidance Values (VOC Emissions)
- Underground Injection/Recirculation at Ground Water Remediation Sites TOG
- New York State Flood Hazard Area Construction Standards
- New York State Analytical Detectability for Toxic Pollutants Guidance
- New York State Air Guide 1 - Toxic Ambient Air Contaminants
- New York State Proposed Drinking Water Standards (10 NYCRR 5)
- Regional Authorization for Temporary Discharges
- Toxicity Testing in the SPDES Permit Program
- New York State Department of Conservation Technical Operational Guidance Series (TOGS) Ambient Water Quality Standards and Guidance Values

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3.0 SCOPING THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY

The following section addresses the need to perform a risk assessment and evaluates remedial alternatives and remediation data needs based on the present data base for the Site.

3.1 Risk Assessment

During the course of completing the RI/FS Studies, a formal risk assessment will be completed to direct the final focus of the FS work. The USEPA will perform this risk assessment using as input data the site specific information developed during the RI in accordance with this plan. The involvement of NMPC's RI/FS contractor in this risk assessment process will be an interaction to insure that necessary input data are provided to the USEPA.

3.1.1 Preliminary Risk Evaluation

A preliminary risk evaluation has been performed based on the limited available data for the Site to determine on a preliminary basis the nature of the potential health and environmental concerns posed by known contaminants at the Site. This qualitative evaluation was based on the results of the NMPC Phase II report including the chemical analyses, the results of multiple sampling and analyses of the Old Red Spring, the background and historical data assembled as part of this Work Plan, the geology and hydrogeology of the Site, the area land uses and population information, and NMPC's experience with similar MGP sites.

Actual sources of contamination were not investigated as part of previous site investigations however, from the operational history of the site, and based on available data and industry guidance documents, a number of sources are likely. These potential sources were verified in interviews of former employees of the gas plant. The sources include:

- Three (3) below grade gas holders which used below ground cavities to hold water which sealed the manufactured gas inside an expandable container. Tars condensed within the holders probably settled out in the holder bottoms. In one case, holder number 3 may have been used as a tar water separator. These pits may represent major source areas on the Site. Tars may contain volatile organics, PAHs, cyanides, and metals.

- Gas purifier waste disposal area. Purifier waste in the form of limestone dust and iron oxide box waste was probably disposed directly on the Site. Because of the solid nature and abundance of purifier waste, industry practice was to use it as fill material for low areas around MGP sites. The history of the Site indicates that onsite landfilling took place continuously. Purifier wastes contain cyanide, metals, sulfur and PAHs.

- Buried utility trenches. Utility trenches including the historical and present day location of Gas Creek (Village Brook) may act as major collecting points and transport routes for tars. It is known that drip boxes were periodically pumped out and the liquids dumped into Gas Creek. If historical utility trenches were connected to the holders or leaky gas mains, they probably acted as collection points for tars and oils. The types of contamination associated with these would be similar to the holder bottoms.

Other known or identified as potential minor source areas onsite are associated with surface spills from general tar handling operations, the oil house associated with the former rail depot at the gas plant, and transformer and capacitor storage areas. Also, a number of below ground gas, diesel and waste oil tanks associated with the NMPC operations may act as potential sources. Some potential offsite contributors of contaminants are the junkyard across East Avenue and the oil distribution company located across Excelsior Avenue.

Based on existing information, likely potential exposure pathways for contaminants include surface soil, subsurface soil, shallow ground water, stream sediment, surface water, airborne dust and biota. A brief description of each follows.

<u>Surface Soil</u> - The Site is mostly paved however, there are open, unpaved areas to the west and east. Contamination of surface soils in the northwest corner of the Site has been identified in the past. Site access is controlled by a chain link fence however, public exposure to soils just outside the fence could potentially occur through ingestion, inhalation and direct contact. The potential also exists for utility maintenance crews or anyone performing shallow excavations to be exposed to contaminated surface soils even under paved areas.

<u>Subsurface Soils</u> - As with surface soil, exposure to contaminants from subsurface soil by utility or construction crews working on the Site is possible. The ingestion and direct contact exposure routes are likely to coincide with possible inhalation of volatile organics associated with heavy deposits of tarry solids or pure tar. The extent and nature of heavily tar contaminated soils and dense non-aqueous phase liquid (DNAPL) will be addressed in the RI. Additional characterization of subsurface contamination, especially associated with the holders and utility trenches, will be addressed in the RI.

<u>Ground Water</u> - Shallow ground water beneath the Site has been analyzed and shown to be contaminated by volatile organics, PAHs and cyanide. Based on the NMPC Phase II Investigation, the shallow unconfined aquifer is apparently separated from the deeper confined aquifers by a layer of glaciolacustrine clay and till. Old Red Spring, which taps a deep aquifer, does not show any indication of contamination from the Site. Because there may be private domestic water supply wells in the shallow aquifer downgradient of the Site, an exposure pathway may exist in this aquifer. There is relatively little information available relative to the deeper bedrock aquifer. Therefore, the RI must address this unit in terms of determining characteristics and establishing the presence or absence of contaminants at the Site. The ground water flow direction is assumed to be to the southeast, in the same direction as the surface water streams, but will be addressed in the RI. Ground water from the deep aquifers exists under artesian conditions and would tend to preclude migration below the clay layer however, because tar may be present as DNAPL, it warrants further investigation in the deeper aquifer. Other neighboring potential sources of contamination would include solvents and petroleum products from local businesses engaged in auto salvage, auto body work and oil distribution.

Contaminants in the shallow ground water off the Site would be expected to include the more water soluble, mobile organic constituents of MGP tars. These would include the volatile organics and the two and three ring PAHs. DNAPL in ground water could be associated with areas very close to the Site.

Exposure to MGP site contaminants in ground water can occur via ingestion, inhalation and direct contact pathways. Limited data exist on contaminant migration away from the Site in the shallow aquifer. The RI will address the contamination of the shallow aquifer by the Site and distinguish between Site and neighboring industrial contributions. New and existing monitoring wells will be sampled in conjunction with the nearest reasonable downgradient private wells to assess this exposure pathway.

<u>Stream Sediment</u> - Village Brook was used during the MGP operation as a disposal point for wastewater and liquid wastes (drip box waste). Also, because of the proximity to pit holder number 3, direct discharges from the tar/water separator may have occurred. Samples of sediment upstream and downstream on the Site indicated the presence of PAHs and pesticides. Village Brook sediments therefore are contaminated and represent an exposure pathway for offsite migration, mainly by the resuspension of contaminants during high flow conditions or when sediments are disturbed by maintenance or construction activities around the stream. Exposure to PAHs and pesticides can occur through ingestion and direct contact. The RI

will address this exposure pathway by delineating the extent of contamination in both the historic stream bed(s) and the existing stream bed of Village Brook and Spring Run.

Surface Water - Two surface water features are associated with the Site. They are the old thirty-six inch (36") brick storm sewer and Village Brook, both of which flow east and eventually discharge into Spring Run. Even though no volatile or PAH contamination has been identified in Village Brook surface water, there is the likelihood that high flow discharges may carry resuspended contamination downstream. The brick sewer has not been sampled and, since it is a very old and deep feature of the Site, it may be carrying contaminated water from ground water or DNAPL inflow.

Exposure pathways include ingestion, inhalation and direct contact from both water features. The RI will address contaminant migration in both systems during different flow regimes. Impacts to Spring Run will be assessed.

Air - Organic vapors from heavily tar contaminated soils or pure tars are likely at MGP sites. Also fugitive dust from excavation may carry PAH compounds and ferro-ferric cyanide (purifier waste) compounds. Organic vapors on MGP sites rarely exceed OSHA Threshold Limit Values (TLVs) but can be a cause of headaches and nausea to onsite workers. Purifier wastes transmitted through the air can also cause headaches, nausea and eye irritations. Organic vapor monitoring has been limited during previous investigations to screening of soil samples.

The RI will address the air exposure pathway through sampling and analysis of ambient air during test pit operations. Also, indoor air quality will be addressed to determine the exposure pathway of volatile organics to employees working in the offices on the Site. The service center building contains offices which are located above holder number 3 which is a potential source area.

Biota - The transport of contaminants from the soil, sediment and surface water to local biota via food chains will be evaluated during the RI. The transfer of MGP site related contaminants to local food chains could result in their bioaccumulation and/or biomagnification in higher trophic levels leading to man.

3.1.2 Review of Existing Data Base

Based on the potential exposure pathways at the Site, and a review of the existing data base, the following data gaps for characterizing contamination and its migration potential have been identified:

- the presence and nature of subsurface structures or deposits which are considered potential sources of contamination on the Site;

- the presence and nature of contamination which may have entered and migrated through the historic Village Brook stream bed, the existing Village Brook stream bed and the 36" brick sewer and all other buried utility conduits which still exist onsite;

- additional data are required on surface soil contamination by purifier wastes, tar handling, transformer/capacitor storage areas, cold patch asphalt storage, and general recent petroleum product storage; and

- aquifer data to assess depth to ground water, local variations, hydraulic gradients, hydraulic connection between surface water and ground water, and impacts of utility and other subsurface channel ways on local flow directions.

3.2 Remediation Alternatives

With the analysis of existing site information and a conceptual understanding of the nature of sources, exposure pathways and potential receptors, potential remedial action objectives can be identified. The purpose of the following section therefore is to identify some of these remedial goals, address what the potential remedial data needs are and, if possible, what the potential for treatability studies is.

It is noted here that the following sections are not intended to establish the ultimate focus of the FS. NMPC recognizes that there is insufficient data available at this time to establish such a focus. However, the available data and the results of recent MGP site research (identified below) can provide preliminary direction for the FS program.

3.2.1 MGP Site Environmental Issues and Restoration Strategies

The Gas Research Institute (GRI) and the Electric Power Research Institute (EPRI) have been conducting programs to gather data regarding the nature and extent of site contamination at MGP sites and the typical exposure pathways and risks associated with that contamination. These research programs have resulted in publication of several documents which can be helpful in directing the FS relative to MGP wastes. The following are some of the publications which may be helpful in establishing the site remediation strategy:

- "Cotreatment of Manufactured Gas Plant Site Ground Waters with Municipal Wastewaters", GRI-88/0218, August, 1988;
- "Laboratory Study of Thermal Desorption of Contaminated Soils From Former Manufactured Gas Plant Sites", GRI-88/0161, August, 1988;
- "Engineering Scale Demonstration of Thermal Desorption Technology for Manufactured Gas Plant Site Soils", HWRIC and GRI, HWRIC RR-038, November, 1989;
- "Laboratory Study of the Effect of Thermal Treatment of the Metal Leaching Characteristics of Soil from Manufactured Gas Plant Sites", GRI/89-0243, November, 1989;
- "Fuel-Use Options for the Management of MGP Site Wastes", GRI/89-0023, February, 1989;
- "Laboratory- and Pilot-Scale Evaluation of Physical/ Chemical Treatment Technologies for MGP Site Groundwaters", GRI, (In Preparation);
- "Status Report: Bioremediation of Organic-Contaminated Soils and Sludges from Manufactured Gas Plant Sites", GRI (In Preparation); and
- "Microbiological Enhancement of Waste Degradation at Manufactured Gas Plant Sites", Topical Report Nos. 1 (February, 1987 - January, 1988) and 2 (February, 1988 - January, 1989), Institute of Gas Technology (under contract to the Gas Research Institute).

The "nature and extent" research is providing new insights with regard to clarification of the volumes and characteristics of the MGP site wastes which may require treatment. The "exposure and risk" research is providing a focus for site restoration by delineating the site contamination with the greatest potential risk to human health or the environment. Together, MGP site-specific waste and risk factors support a hierarchy of restoration strategies. NMPC recognizes the potential for identifying wastes other than MGP wastes and the need to address these wastes in the FS. However, the primary focus is expected to remain on MGP wastes. Some of the MGP factors and the resulting restoration strategies which have evolved from research and may be applicable to the site FS are presented below.

<u>MGP Site Waste Characteristics</u> - Five waste forms are typically found at MGP sites (GRI, 1988, Vol. I). These consist of free hydrocarbons (e.g., DNAPL), organic-contaminated soils and waters, purifier wastes, and mixed wastes. Free hydrocarbons are typically found in holder bottoms or, if they were managed onsite

during operation of the plant, in well-defined subsurface structures. In contrast, purifier wastes were often used as solid fill material and spread over large areas of the Site. Organic-contaminated soils range from high concentrations (near fringes of free hydrocarbon deposits) to low concentrations away from the source. Organic-contaminated water consists of low levels of contamination in ground water and surface runoff. Also, highly contaminated water from within gas holders may be present. Mixed wastes, which involve demolition debris combined with the other types of site wastes, are common; their presence depends upon when and how the gas plant was operated and decommissioned.

These five waste forms are typically dominated by six classes of chemicals. These are PAHs, volatile aromatic hydrocarbons, phenolics, inorganic sulfur and nitrogen, and metals. Phenolics are primarily associated with coal gas generation. Phenols would be expected at only low levels at the NMPC Site, since the primary process was carburetted water gas generation. Phenols may be present, however, due to coal gas generation during early plant operation. The specific chemical compounds within each class that are of interest at MGP sites are shown in Table 3-1 (GRI, 1988, Vol. I). The primary source of organics is coal tar. The sulfur and nitrogen originate from the gas processing residue such as the oxide box wastes. The source of the heavy metals is also the gas processing residues as well as residual coal ash.

<u>Exposure Pathways</u> - The risk issues generally associated with MGP sites are oriented toward human health effects and, more specifically, cancer. As such, the critical chemicals within the six general classes identified at MGP sites generally include Benzo(a)Pyrene and other potentially carcinogenic PAHs, benzene, and selected metals such as arsenic or cadmium. Cyanide, although not associated with cancer, may also be a concern at these sites due to its presence in the oxide box wastes (GRI, 1988, Vol. III).

Typical exposure pathways for these chemicals from MGP sites may include:

- leaking holders or tank failures (free hydrocarbon release);
- direct contact with soils through dermal contact or ingestion (contaminated surface soils);
- direct contact with aqueous sediments (surface runoff, tar seeps or historical disposal into waterbodies);
- ingestion of contaminated fish (contact with contaminated sediments, surface water or benthic organisms);
- ingestion of contaminated ground water (leaching of chemicals from sources or contaminated soils); and

TABLE 3-1
CHEMICALS OF INTEREST AT MGP SITES

INORGANICS	METALS	VOLATILE AROMATICS	PHENOLICS	POLYNUCLEAR AROMATIC HYDROCARBONS
Ammonia	Aluminum	Benzene**	Phenol	Acenaphthene
Cyanide	Antimony	Ethyl Benzene	2-Methylphenol	Acenaphthylene
Nitrate	Arsenic**	Toluene	4-Methylphenol	Anthracene
Sulfate	Barium	Total Xylenes	2,4-Dimethylphenol	Benzo(a)anthracene*
Sulfide	Cadmium*			Benzo(a)pyrene*
Thiocyanates	Chromium (VI)**			Benzo(b)fluoranthene*
	Copper			Benzo(g,h,i)perylene*
				Benzo(k)fluoranthene*
				Chrysene*
				Dibenzo(a,h)anthracene*
				Dibenzofuran
				Fluoranthene
				Fluorene
				Indeno(1,2,3-c,d)pyrene*
				Naphthalene
				Phenanthrene
				Pyrene
				2-Methylnaphthalene

NOTE: Table taken from GRI, 1988, Vol. I.

* Probable human carcinogen
** Human carcinogen

- inhalation of volatile aromatics (evolution from contaminated surface; evolution from subsurface during excavation; and migration from the subsurface gas phase to indoor air).

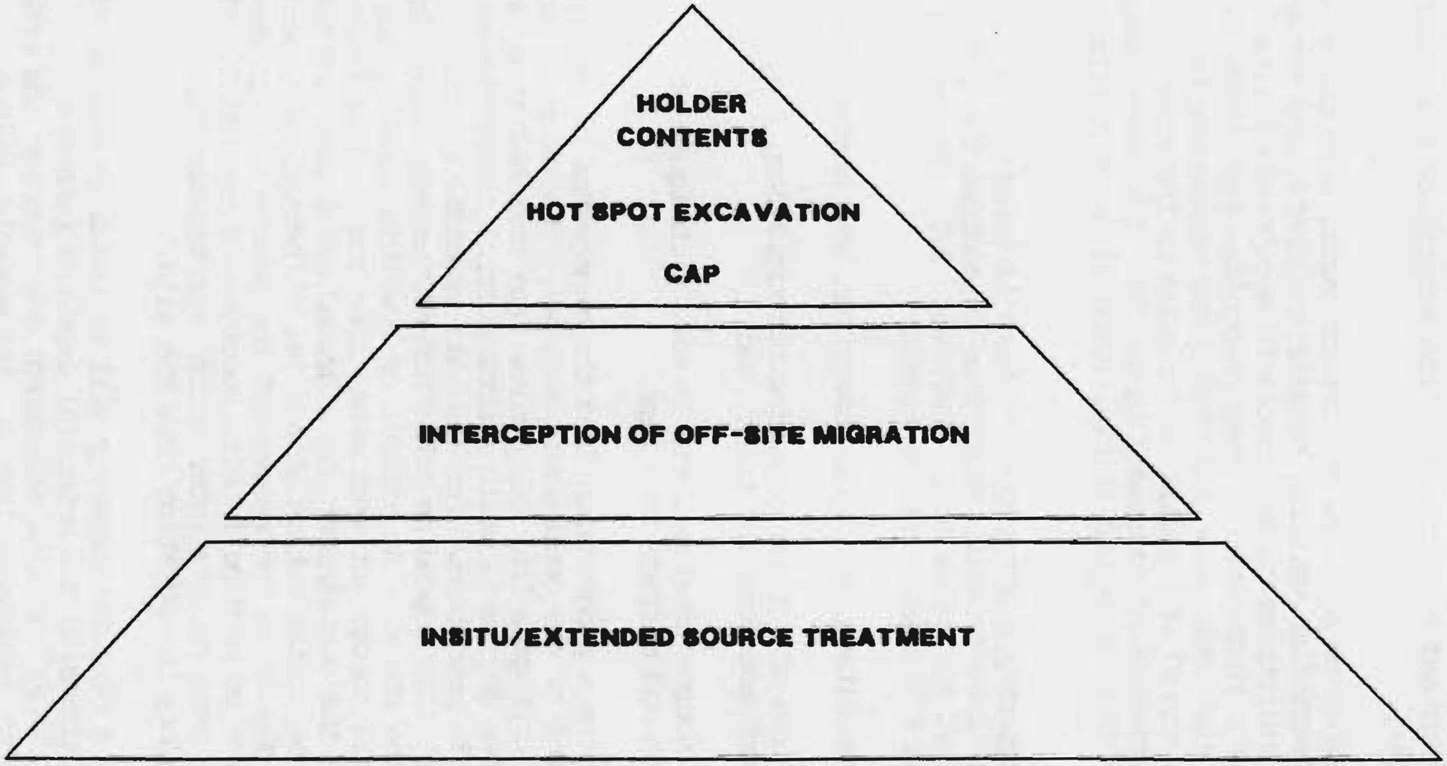
These potential exposure pathways may impact casual site users, site maintenance or remediation workers, offsite residents, and future site residents. Minimizing these impacts to acceptable limits is the primary goal of site restoration. NMPC recognizes that USEPA will perform the Site risk assessment and that other wastes may be identified during the RI which will be included in the risk assessment and subsequently addressed in the FS. The above factors are included only to provide the initial focus (i.e., a starting point).

Candidate Restoration Strategies - There is generally a natural hierarchy of restoration strategies to address the primary exposure pathways at MGP sites (GRI, 1988, Vol. IV). Figure 3-1 is an example of such a hierarchy and considers:

- holder demolition, hot spot excavation, and surface cover;
- interception of offsite ground water migration, i.e., containment and pump and treat; and
- extended source treatment via in situ techniques or excavation and surface treatment.

This example reflects a progression from the management of offsite migration to control of the contaminant sources. The range of actual site restoration strategies that can evolve from this hierarchy will vary in the relative degree to which source control or management of offsite migration is practiced. For the site specific FS for Saratoga, they will also depend on other non-MGP wastes which might be identified during the RI. An example of how this strategy may evolve is, one could forego hot spot excavation and in situ treatment and rely solely on the containment and a ground water pump and treat system to manage the contamination at a site. Alternatively, more emphasis could be placed on the removal of the source through more extensive excavation or perhaps in situ recovery or treatment. This would decrease the need for the interception and treatment of contaminants which may be migrating from the site.

Acceptance of a remedial strategy will be based in part on its effectiveness in addressing the potential exposure pathways identified during the RI and risk assessment and reducing the effects of these exposures to acceptable levels. For example, holder demolition, hot spot excavation, and surface cover may address the exposure due to tank failure, direct contact with surface soils, and inhalation of volatiles from the surface. It may also serve to



NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 3-1
HIERARCHY OF
RESTORATION STRATEGIES

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reduce the migration of contaminants to surface water and, hence, reduce the exposure due to contaminated aqueous sediments. However, it would not have an immediate effect on exposures due to offsite migration of contaminated ground water, which could in turn be addressed by a containment and/or pump and treat system.

3.2.2 Development of Specific Remedial Alternatives

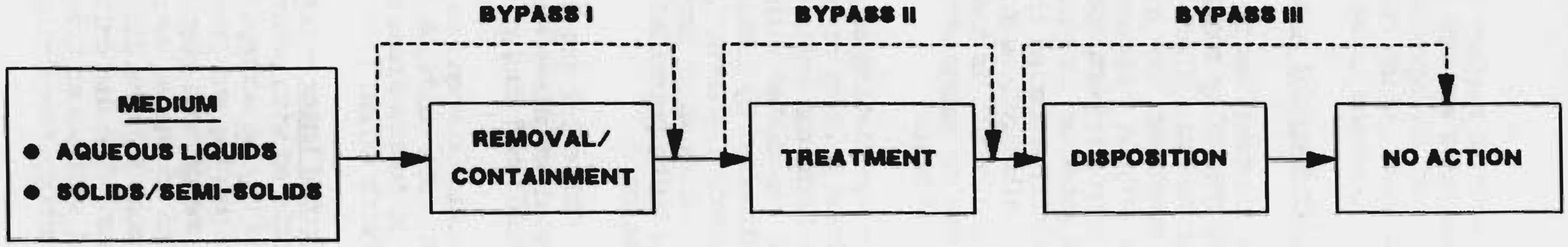
The development of remedial alternatives to address specific environmental issues at MGP sites generally requires the combination of individual remedial action components. These components may consist of removal/containment, treatment, and disposition, as shown in Figure 3-2. It is noted that various components are usually combined in a manner to form options for each specific contaminated media, e.g., contaminated ground water or free hydrocarbons. Various options for each waste issue identified during the RI would then be combined to form overall remedial alternatives for the Site. If all of the components are bypassed, the result is the "No Action" alternative (Figure 3-2). Examples of management options for possible waste issues are presented below:

Management of Source Areas - Remediation of source areas or "hot" spots at MGP sites may address holders or pits with liquid and heavy tars, areas with highly contaminated soils or sludges, or dense non-aqueous phase liquids (DNAPL) associated with ground water. These potential sources can be addressed by isolation, in-place treatment or removal/treatment/disposal alternatives. Table 3-2 provides a general list of technologies which have been identified from the GRI and EPRI research as being potentially applicable to these areas of MGP site contamination.

Technology options listed in Table 3-2 are among those which will be evaluated for the Site based on site-specific factors. These site-specific factors will be established during the RI.

The evaluation of remedial action components will comply with evaluation criteria identified in: EPA guidance (EPA, RI/FS Guidance, 1988. The remediation of source areas often eliminates a major portion of risk associated with sites.

Management of Contaminated Ground Water - Contaminated ground water plumes are often found associated with source areas at MGP sites. Management of these plumes may be accomplished using in situ treatment methods or ground water pumping and treatment. Surface treatment technologies involving one or more physical, chemical, or biological processes can be applied to pumped water. Following removal and treatment, the water must then be discharged to the environment in an acceptable manner. The disposition options for waters are to send them to a local wastewater treatment system (POTW), direct discharge to a waterbody (requiring a NPDES permit) or reinjection.



NOTE:

THE NO ACTION COMPONENT CAN BE ATTAINED BY COMBINING BYPASSES I, II, AND III.

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SARATOGA SPRINGS MGP SITE

FIGURE 3-2
REMEDIAL ACTION COMPONENTS

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TABLE 3-2

REMEDIAL TECHNOLOGIES FOR CONTAMINATED SOURCES AT MGP SITES

CONTAINMENT	Capping	
	Barriers	
REMOVAL	Excavation	- partial
		- complete
	Interception	- trenches
		- wells
IN SITU TREATMENT	Biological	
	Soil Washing	
	Fixation	
TREATMENT	Biological	
	Thermal Treatment	- Onsite Incineration
		- Offsite Incineration
		- Desorption
	Physical/Chemical	- Oil/water Separator
		- Activated Carbon
		- Air Stripping
		- Chemical Oxidation
		- Filtration
		- Fixation
		- Soil Washing
DISPOSITION	Landfill	- Onsite
		- Offsite
	Aqueous Liquids	- POTW
		- NPDES
		- Reinjection
	Recycle/Reuse	

Combinations of removal, treatment and disposition technologies that are practical, feasible and cost effective for the management of contaminated waters (both surface and ground waters) at the Site will be developed into remedial alternatives for further evaluation.

Management of Contaminated Soils/Sediments - The remediation of lightly contaminated soils and sediments may also be an important issue at an MGP site. These materials can be contained, treated in place or removed for treatment. As discussed in previous sections, a wide variety of technologies can be evaluated to develop management alternatives for these site wastes. The evaluation will determine which technologies are practical, feasible and cost effective for the NMPC Site.

3.2.3 Preliminary Evaluation of Specific Remedial Alternatives for the Site

While only limited site investigation data is available for the Site, certain observations can be made regarding the primary environmental issues that exist there. These observations include the following:

- The surface soils, shallow subsurface soils and shallow ground water are contaminated with PAH compounds.
- Coal tar has been qualitatively identified in geotechnical borings on the Site.
- Visual evidence of surface soils contaminated with oxide wastes was observed along the western boundary of the facility.
- The creek running through the Site has limited access within the facility boundaries; however, samples taken in the area that was accessible indicated the presence of PAHs and pesticides in the sediment.

Although the existing data for the Site is inadequate to define the threat to public health and the environment, several preliminary remedial response objectives may be formulated using the available information. These objectives are as follows:

- minimizing human and environmental exposure to contaminants present in the surface and subsurface soils and stream sediments;
- minimizing human and environmental exposure to contaminants present in ground water;

- minimizing human and environmental exposure to contaminants present in free hydrocarbon phases;
- minimizing environmental impacts due to the offsite migration of contaminants via surface water or ground water discharge into surface water; and
- meeting ARARs.

After additional data is collected at the Site and evaluated, the response objectives will be redefined and developed, or eliminated. A set of general response actions to achieve these objectives will be developed from the remediation technologies which were previously discussed. The screening of the technologies for their ability to meet the objectives will be completed during the FS, based on site specific issues, waste specific issues and technology issues. Technologies remaining after screening will be used to develop remediation alternatives for the Site. More details on this process are provided in Section 5.9.

3.2.4 Summary of Remediation Data Needs

Based on the information available for the NMPC Site, the following is a preliminary list of information required for screening and development of remedial alternatives:

- layout of facilities, including location of past processing facilities such as gas holders, tar separators, storage tanks, oxide boxes and gasification facilities;
- distribution and extent of organic and inorganic (cyanide) contamination in soil, sediment, ground water, surface water and air;
- nature and extent of DNAPL on the Site;
- ground water elevations and aquifer characteristics;
- thickness, extent and permeability of surface soils;
- depth to bedrock;
- ground water flow direction and velocities in the shallow zone;
- potential for vertical migration of contaminants; and
- hydraulic connections or barriers between various ground water zones.

This list of site characterization data will be modified as more information becomes available and remedial alternatives are developed.

4.0 WORK PLAN RATIONALE

4.1 Data Quality Objectives (DQO) Determination

DQOs are based on the concept that different data uses may require different data quality. Data quality is defined as the degree of certainty of a data set with respect to precision, accuracy, reproducibility, comparability, and completeness (PARCC). DQOs are qualitative and quantitative statements specifying the required quality of data required to support RI/FS activities including site screening, characterization and risk assessment, and to support engineering alternative evaluation and selection decisions. The DQO development process is integrated with the project planning process, and the results are incorporated into the Sampling and Analysis Plan (SAP). Within the SAP, data quality objectives will be specified for each data collection activity (e.g., matrix) associated with the remedial investigation. The five categories of data quality are as follows:

- o <u>Field Screening Using Portable Instruments (DQO Analytical Level 1</u>) provides the lowest data quality but the most rapid results, and is used for purposes of site health and safety monitoring, screening areas which may require detailed characterization. The data generated provides presence-absence of certain constituents and is generally qualitative rather than quantitative.

- o <u>Field Laboratory Analysis (DQO Analytical Level 2</u>) still provides results in real time or in several hours, and better quality data than Level 1. Analysis includes mobile-lab generated data and data generated by the use of analytical instruments which are carried in the field. Final results depend on suitable calibration standards, reference materials, sample preparation equipment, and trained operators. The data may be qualitative or quantitative.

- o <u>Engineering (DQO Analytical Level 3</u>) provides an intermediate level of data quality and may be used for site characterization, risk assessment and evaluation of alternatives. Engineering analysis includes mobile-lab generated data and standard commercial laboratory analyses without full CLP documentation. These data are both qualitative and quantitative.

- o <u>Routine Analytical Services (RAS) (DQO Analytical Level 4</u>) provide the highest level of data quality and are used for risk assessment, evaluation of alternatives and engineering design. These analyses require full CLP analytical protocols including reports and data validation procedures. The majority of the analytical data generated during the RI will be DQO Level 4.

- <u>Non-Standard Special Analytical Services (SAS) (DQO Analytical Level 5</u>) refers to analysis by non-standard procedures. For example, when specific or lower detection limits are warranted or the analyses are of a nature not routinely performed under the Contract Laboratory Program (CLP)/Routine Analytical Service (RAS) Program, SAS may be required. All CLP-SAS methods, associated QA/QC criteria and other method modifications to CLP-RAS analysis need to be screened and approved by EPA-MMB and the RLSC for Region II. CLP Special Analytical Services Forms normally need to be generated for this type of work.

As outlined by USEPA (1987), Data Quality Objectives (DQOs) are developed through a three-stage, interactive process. In Stage 1, the suspected sources and types of contaminants, the potential contaminant pathways and the potential receptors are identified to the greatest extent possible based on existing information about the site. This Work Plan is essentially the Stage I process. This stage establishes the framework for Stage 2, in which additional data needed to define the human health and environmental quality hazards associated with the site are identified. Also as part of Stage 2, those hazards potentially remaining after each of the remediation alternatives are implemented are identified and reviewed. The DQOs consider the numbers and types of samples believed to be necessary from each matrix to obtain sufficient representation of the conditions at the site, the parameters for which the samples need to be analyzed, and the precision, accuracy, and sensitivity of analysis that will be desired. PARCC information dictates the sampling scheme and analytical requirements and methods that will be developed as part of the DQO development in Stage 3. These results of the DQO development process are presented below as well as in the SAP. The rationale for specifications in precision, accuracy, sensitivity, analytical procedures, and numbers of samples in the sampling plan are also included therein. DQOs will be revised as needed based on the results of the data collected and the need for subsequent work tasks at the Site.

Consistent with the objectives of the RI/FS, the data objectives are to generate:

- information on the location and character of contaminant source areas;

- information on the extent and magnitude of contaminants in the surface and subsurface soils, stream sediments, surface and ground water, indoor air and potential fugitive emissions from excavations;

- information concerning the potential migration and rate of migration of contaminants of concern in ground water, air, and the food chain;
- information to assess the health and environmental risk of ingestion, inhalation and direct contact with various contaminated media;
- information on the physical nature of buried structures, buried utility conduits and related infrastructure in and around the NMPC Site; and
- information on the physical, chemical and RECRA hazardousness of tars, tarry soils, purifier waste and contaminated stream sediments for evaluation of remedial alternatives.

Section 4.2 of the Work Plan discusses the approach to the above listed RI/FS DQOs.

4.2 Work Plan Approach

4.2.1 Summary of Information Needed

The approach utilized in the development of this Work Plan is based on a review of existing information and the identification of data gaps concerning the NMPC Site. A review of existing site information is presented in Section 2.0 of this Work Plan.

The existing site data base contains data gaps which must be filled in order to evaluate the human health and environmental hazards associated with the Site. A preliminary summary of information needed is presented in Section 3.2.4.

In order to support risk assessment and remedial alternative selection tasks within the RI/FS process, Data Quality Objectives (DQOs) have been developed for the specific tasks outlined in Section 5.0 of this Work Plan. At this time, most DQO Analytical Levels (USEPA, March, 1987) will be utilized during the RI/FS with an emphasis on DQO Level 4.

DQO Level 1 data (Screening) will be provided during field screening activities which will include:

- geophysical investigation;
- head-space screening of soil samples;
- ground water parameters including pH, Eh, dissolved oxygen, turbidity and specific conductance measurements;

- health and safety monitoring activities; and
- confined space atmosphere testing using LEL meters (pit holders, sewers, capped basements).

DQO Level 2 data (Field Analysis) will be provided during the soil gas monitoring subtask. Quantitative data will be obtained by using a Photovac (field GC) with isothermal oven, capillary column and a photoionization detector (PID). Use of a mobile laboratory is not planned at this time.

DQO Level 3 data (Engineering) will be used when data are to be generated for feasibility study requirements or possibly in future repeated or for long term monitoring sampling activities.

DQO Level 4 data (RAS) will be provided for most laboratory analyses completed for all media during the initial RI program. An exception to this will be when detection levels consistent with ARARs cannot be met through RAS. Where USEPA Special Analytical Services can provide these lower detection limits, these methods will be followed.

DQO Level 5 data (Non-Standard) (SAS) will be provided for special laboratory analysis procedures required, including air samples and non-TCL analysis. This DQO level may apply to remedial alternative evaluation data needs along with other unique tests such as cyanide analysis in purifier wastes and drinking water analysis of critical samples.

4.2.2 Objectives of the Project

The need to define the potential environmental and public health hazards associated with the Site, and the need for a preliminary evaluation of the remedial alternatives and associated information has been established based on information described in Section 2.0. The objectives of the RI/FS for the Site are consistent with USEPA objectives described in guidance documents (USEPA, 1985). These objectives include the following:

- Complete the site characterization study begun in the NYSDEC Phase II Site Investigation to define the nature and extent of site related contamination by:
    - accurately locating and characterizing onsite contaminant source areas;
    - collection and study of additional data to characterize the Site as a whole;

- field investigations to fill the data gaps in the existing data base;
- sampling and testing of the soil, sediment, surface water, ground water, air and biota from the Site in downgradient or downstream areas; and
- analysis of the field and laboratory data to delineate the nature and extent of the contamination.

o Provide USEPA with environmental data and sampling analyses for use in USEPA's development of the risk assessment.

o Provide the USEPA with a list of alternatives which have been evaluated against the criteria identified in the USEPA RI/FS Guidance Document (October, 1989) by:

- identification and assembly of technology combinations into remedial alternatives;
- screening developed remedial alternatives against specific site requirements;
- providing a final detailed analysis of each alternative; and
- providing the USEPA with a list of detailed effective remediation alternatives that may be implemented at the Site.

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5.0 TASK PLAN FOR REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

The task plan elements for the NMPC Site RI/FS correspond to Tasks 1 through 12 as described in the USEPA Guidance for RI/FS Under CERCLA (USEPA, 1988). The need for Tasks 13, 14, and 15 (e.g., Response Action Planning) is not anticipated at this time and therefore are not included.

The following tasks are considered to be part of the RI:

- Task 1 - Project Planning
- Task 2 - Community Relations (EPA Region II - takes the lead)
- Task 3 - Field Investigation
- Task 4 - Sample Analyses/Validation
- Task 5 - Data Evaluation
- Task 6 - Risk Assessment (EPA Region II - takes the lead)
- Task 7 - Treatability Study/Pilot Testing
- Task 8 - Remedial Investigation Report

The following four tasks are considered to be part of the FS:

- Task 9 - Remedial Alternatives Screening
- Task 10 - Remedial Alternatives Evaluation
- Task 11 - Feasibility Study Report
- Task 12 - Post RI/FS Support

The following section describes each of the twelve tasks comprising the RI/FS for the Site. The order in which the tasks are presented is the general order in which they will be performed. To provide the opportunity for interaction between data collection and evaluation during the RI and development of remedial alternatives during the FS processes, several task elements of both the RI and FS will be performed concurrently. It is understood by NMPC that, upon a final review of the RI by the USEPA, the need to evaluate additional remedial alternatives will likely arise and will be required prior to USEPA approval of the final RI.

5.1 Task 1 - Project Planning

This task involves several subtasks which must be performed in order to produce the project planning documents and project schedule necessary to execute the RI/FS. These subtasks include: a kick off meeting at Region II (September 13, 1989); site visits and interviews with former employees (September 21 and 27, 1989); RI/FS brainstorming sessions; the evaluation of existing data; the preliminary identification of remedial alternatives; the preparation of a preliminary risk assessment by USEPA Region II technical staff; data quality objective determinations; the determination of ARARs; and scoping of the RI. Most of these activities have been completed for the preparation of the RI/FS Work Plan.

Once the Work Plan is approved by EPA, NMPC will submit for review a Sampling and Analysis Plan (SAP) which will include both a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP). Along with the SAP, a Health and Safety Plan (HASP) for all site activities will be provided to EPA.

The FSP will include information on the site background, sampling objectives, sample locations and frequency with maps, sample designation, sampling equipment and procedures and sampling handling and analysis.

The QAPP will provide a detailed project plan for QA/QC in accordance with EPA publications:

- <u>Test Methods for Evaluating Solid Waste (SW-846)</u> (most recent version)
- <u>Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans</u>, (USEPA QAMS-005/80)
- <u>Guidance for Preparation of Combined Work/Quality Assurance Project Plans for Environmental Monitoring</u> (USEPA Office of Water Regulations and Standards, May 1984)

Chain-of-Custody procedures will be detailed in the QAPP in accordance with:

- <u>National Enforcement Investigations Center Policies and Procedures Manual</u> (revised November, 1984)
- <u>National Enforcement Investigations Center Manual for the Evidence Audit</u> (September 1981 and in SW-846)

The laboratory chosen for working on the Site will follow EPA Methods, specifically those listed in:

- Contract Lab Program Statement of Work for Inorganic Analysis
- Contract Lab Program Statement of Work for Organic Analysis (dated February 1988 or updated)

The laboratory will also have participated in the EPA Contract Lab Program (CLP), or CLP equivalent QA/QC program.

The HASP will include site specific information, a hazard assessment, training requirements, monitoring procedures for site operations, safety and disposal procedures for field activities and other requirements in accordance with 29 CFR Section 1910.120, OSHA Hazardous Waste Operations Standards and the EPA Guidance Document, Standard Operating Safety Guides (OSWER, 1988).

5.2 Task 2 - Community Relations

USEPA Region II will take the lead in community relations with regard to the RI/FS at the Site. NMPC and their contractor will assist in support of a Community Relations Plan when requested.

5.3 Task 3 - Field Investigation

5.3.1 Objectives

The primary objective of the RI is to define and characterize the nature and extent of site-related contamination. Within this framework, secondary objectives include development of a data base that can be used to perform a formal risk assessment to determine the human health and environmental hazards posed by the Site. The second objective is to characterize the Site so that a feasibility study can be completed to evaluate a set of remedial alternatives with the goal of a final conceptual design.

Based on the available site history data, the information available from the previous site investigations and the regional geologic setting, the specific site data needs have been identified. It appears quite obvious that the three pit holders may be major sources of organic contamination in the shallow subsurface soils and the water table aquifer. The nature of these holders needs to be addressed in the field investigation. Questions regarding holder construction, integrity of the below ground structure wall, interior contents, and potential volatile emissions through their caps need to be answered by the RI. Purifier wastes are another source of contamination. Most likely, these materials were used as solid fill. The field investigation will delineate where purifier wastes were disposed of. A number of migration pathways for organically contaminated water or organically contaminated soil were tentatively identified. These include old stream channels, sewers, culverted streams and filled-in drainage swales. The field investigation will delineate these areas and characterize the contamination in each. The ground water path is a significant area to be addressed. The shallow aquifer under and downgradient of the Site will be characterized. Existing public and private wells which tap deep aquifers will also be analyzed. The influence of offsite sources on the shallow aquifer will be addressed also. Deep wells will be installed to assess the potential that site wastes have migrated into the bedrock aquifer. The impact of the Site on local biota, especially associated with the surface water systems, will be characterized.

With these specific objectives in mind, the Site characterization study will form a basis on which the potential hazards to public health and the environment will be assessed and also provide essential data to complete a feasibility study.

5.3.2 Approach

Throughout the work plan development process, an attempt has been made to integrate the remedial investigation and the feasibility study work elements to provide an interactive approach to the overall project. This approach will assure that appropriate, adequate and complete information will be obtained and unnecessary duplication of effort will be avoided.

The RI field investigation has been initiated through the development of this Work Plan. Available site information has been collected and reviewed. This information review has formed the basis for the preliminary evaluation of risk and discussion of the preliminary remedial alternatives as described earlier. The data requirements for the anticipated risk assessment and the FS alternative elements have been integrated into and provide the basis for the RI field investigation subtasks. In general, the RI will be conducted to characterize the contamination at the Site and to evaluate the actual or potential risk to human health and the environment posed by the Site. Investigation activities will focus on problem definition and result in data of adequate technical content to evaluate potential risks and to support the development and evaluation of remedial alternatives during the FS. The extent of investigation will be finalized during the remedial investigation. Additional site information will be obtained and evaluated during the RI/FS process.

The Field Investigation task will consist of the following subtasks:

- o Subcontracting Procurement
- o Site Reconnaissance Survey

- Topographic and Property Survey
- Mobilization
- Weir and Flume Installation and Surface Water Level Monitoring and Analysis
- Soil Gas Survey
- Geophysical Survey
- Surface Soil Sampling
- Surface Water and Sediment Sampling
- Test Pits
- Air Sampling and Analysis
- Soil Borings and Soil Sampling
- Monitoring Well Installation
- Permeability Testing
- Ground Water Sampling
- Residential Well Sampling
- Ecological Evaluation
- Cultural Resource Evaluation
- Task Management and Quality Control

The order in which the above subtasks appear is the general order in which they will be performed during the field investigation. This sequence is designed to provide an interactive approach to the investigation. Information obtained during the performance of one subtask will be evaluated and then utilized to support elements of subsequent subtasks or to modify those subtasks to permit collection of critical information. This process will provide for a continuous interaction between the NMPC contractor team and the USEPA Region II project manager. The following describes briefly the components and basic strategy for each subtask.

Once EPA has approved the Work Plan and associated RI/FS field plans, Niagara Mohawk Power Corporation will procure a contractor to perform the RI/FS. This contractor will serve as the principal investigator for the entire RI/FS.

Under the RI/FS contractor, it is likely that there will be subcontractors who may perform the following:

- site geophysical surveys including seismic refraction and possibly magnetometer;
- chemical analysis on all soil and water samples collected during the RI/FS. It is anticipated that all biological samples will be analyzed by the primary analytical laboratory;
- chemical analysis of air samples (both particulate and those collected for volatile organics);
- drilling test borings, collection of subsurface soil samples, and installation of monitoring wells. Test pit excavations will be handled through the drilling contractor; and
- facility support contracts including site trailer, sanitation facility, and phones.

5.3.3 Site Reconnaissance Survey

As part of the background review, the Site has been visited on a number of occasions, including a walking tour with a retired gas plant employee. However, at the start of the RI/FS a site reconnaissance survey will be conducted to include:

- review of all maps and plans identifying all subsurface sewers, clay pipes, utilities and manmade channels. A site walkover will include identification of all sewer and culvert access points in and around the Site. Manhole covers will be removed. Vapor monitoring, photographing and depth measurements will be taken to determine the nature of these subsurface access points for sampling purposes. If access is not available to all subsurface channels, those requiring identification or evaluation by either test pits or excavation will be indicated;
- a walking tour of Spring Run, the shallow receiving stream for the 36" brick sewer and Village Brook which flow through the Site. Photograph and visual documentation will be made of the nature of the stream, including all storm and sewer discharge points. Of particular interest will be the sediment depositional areas where MGP organics may have settled out. Preliminary identification of indigenous fish and other sensitive biota will take place.

- a meeting with contracted surveyors to lay out a site grid for use in locating soil gas samples, borings, test pits and surface soil samples.

- finalization of the location for the site office trailer, equipment storage area, port-a-jon, water and power access.

- identify specifically the private wells which will be sampled as part of the RI. Contacts with owners of these wells will be initiated by the USEPA and the NMPC contractor. One and possibly two private wells downgradient from the Site will be sampled.

5.3.4 Topographic and Property Survey

A number of topographic maps already exist for the Site and surrounding area. The New York State Department of Transportation (NYSDOT) has maps of the area on a 1" = 200' scale showing five foot contours. The NYSDOT map shows elevations referenced to mean sea level (MSL), the New York State grid system, and all pertinent area features including vegetated areas, buildings, and street lines. This map is an appropriate base map for purposes of depicting the RI sampling locations. A base map at a scale of 1 inch to 50 feet will be prepared by a licensed New York State surveyor. This map will include the newly installed (RI) monitoring wells and other sampling locations, land surface features, underground utilities, adjacent properties, existing well locations, and property boundaries. Additionally, this base map will include all known subsurface utility lines and be extended to show offsite drainage areas specifically from SPA steel, or properties south of Excelsior Avenue.

For a larger scale map of the site vicinity which would cover the Site in the context of Spring Run, Lonely Lake and area public water supply wells, a 1:9600 scale NYSDOT Urban Area Map would provide a sufficient base.

Field, topographic and location surveys will be provided by the surveyor. He/she will provide onsite grids and locate and provide elevation data for all borings, test pits, geophysical lines, sediment samples and monitoring wells. Third order accuracy will be utilized for field control. All sample locations will be measured to within 0.1 feet horizontally and 0.01 feet vertically.

The site base maps developed during the RI will be used as the basis for presenting geological and chemical information derived from the investigation. At a minimum, the following maps will be developed and presented in the RI report:

- ground water elevation (contour map);

- location map for geologic cross-sections, soil gas survey grid, surface soil sampling, sediment sampling, well locations, and geophysical profiles.
- top of first confining layer contour map;
- bedrock contour map;
- deep aquifer piezometric surface map;
- isopleth map for various volatile and semivolatile compounds in soil and ground water; and
- thickness of highly contaminated soils map.

Based on these maps and the appropriate field and laboratory data, cross-sections will be developed for geology, subsurface structures, and zones of contamination.

5.3.5 Mobilization/Field Services

This subtask will consist of site preparation including utility services, field personnel orientation, and equipment mobilization. Site preparation work will include the procurement of field office and equipment storage trailers and portable toilet facilities, and hook-up of electricity and telephone service.

Since NMPC employees work on the Site, a meeting with all NMPC supervisors will be held to inform them of the RI/FS activities and what to expect in terms of avoiding drill rigs, test pits and other safety hazards. It will be important to maintain a professional and open relationship with the utility employees so as to avoid miscommunication and potential conflicts. It is suggested that weekly status briefings be given to the NMPC supervisors while field activities are taking place. The initial meeting will cover the air monitoring and emergency procedures to be followed.

Each field team member will attend an onsite orientation meeting to become familiar with the history of the Site, health and safety requirements, and field procedures. Equipment mobilization will entail the ordering, purchase, and, if necessary, the fabrication of all sampling equipment needed for the field investigation. A complete inventory of available equipment will be conducted and any additional equipment required will be secured.

Equipment mobilization may include, but not be limited to, the following equipment:

- field office trailer (command post);

- field equipment storage (NMPC may be able to provide space);
- field sample preparation and laboratory trailer;
- drilling subcontractor equipment;
- sampling equipment;
- health and safety decon equipment; and
- utility hook-ups.

Site services (rental of trailers, utility hook-ups, field security, etc.) will be the responsibility of the NMPC contractor. The approximate location of the decon area and site facilities is shown on Figure 5-1. The final location of these facilities will be such as to avoid any areas where RI activities will occur.

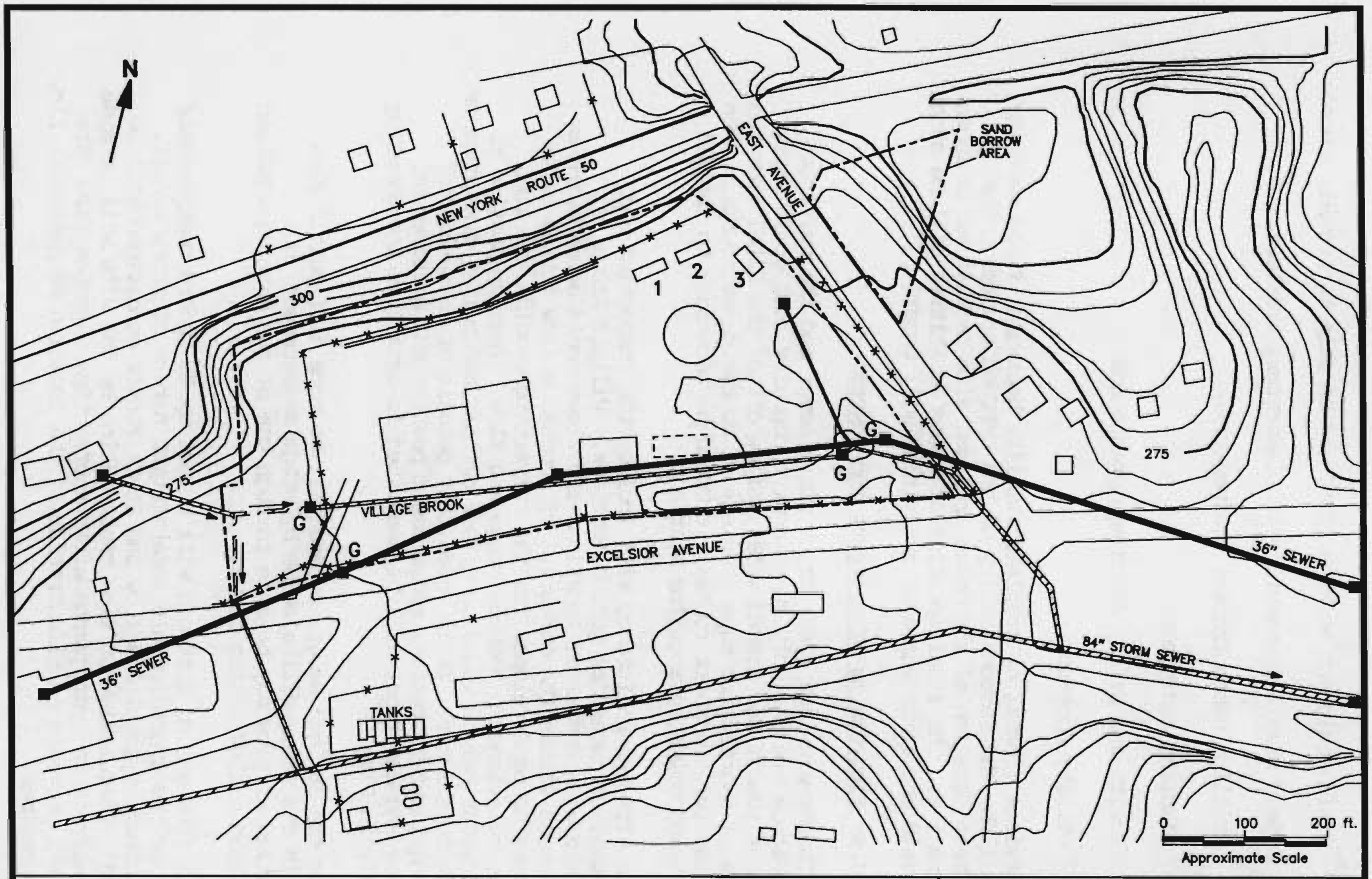
5.3.6 Flow Gaging of Culverts and Sewers

A thirty-six inch (36") brick storm sewer and the culverted Village Brook are the only known active conduits that could carry stormwater runoff and ground water inflow off of the Site. For the purposes of quantifying mass loadings of contaminants to Spring Run from these two transport routes, it would be necessary to install upstream and downstream gaging stations.

The site reconnaissance will include the inspection and measurement of potential gaging stations. Village Brook is accessible at a number of locations and flows could be measured by water levels within the culvert. Of course, a flow rating curve would have to be developed for the culvert to provide the site specific relationship between stage and flow. Instrumentation to measure water height would be either a float and pulley type gage or pressure transducer. It is noted that details of measurement, including instrumentation, measurement points, and measurement frequency and duration, will be described in detail in the Sampling and Analysis Plan.

For the 36 inch sewer, access will be more difficult. Flow gaging in the sewer will also be by stage measurement, but calculation of flow may be done through use of the Manning equation rather than a flow rating curve.

All flow gaging stations will be set up to record continuously because of the unpredictable intermittent nature of storm runoff. At a minimum, typical low flow and storm runoff conditions will be measured. Calculation of flow contribution by the site will be made using analysis of hydrographs after subtracting upstream flow data. Figure 5-1 provides an illustration of the location of potential flow gaging stations.



LEGEND

- · — NMPC PROPERTY LINE
—×—×— FENCE LINE
G FLOW GAGE
▨ SURFACE WATER/STREAM (in culvert)
▨ SURFACE WATER/STREAM (open channel)
━ 36" STORM SEWER

APPROXIMATE LOCATIONS

1 SITE OFFICE TRAILER
2 LAB AND SAMPLE PREP TRAILER
3 HEAVY EQUIPMENT DECONTAMINATION

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FIGURE 5-1
LOCATION OF SITE TRAILERS AND FLOW GAGING STATIONS

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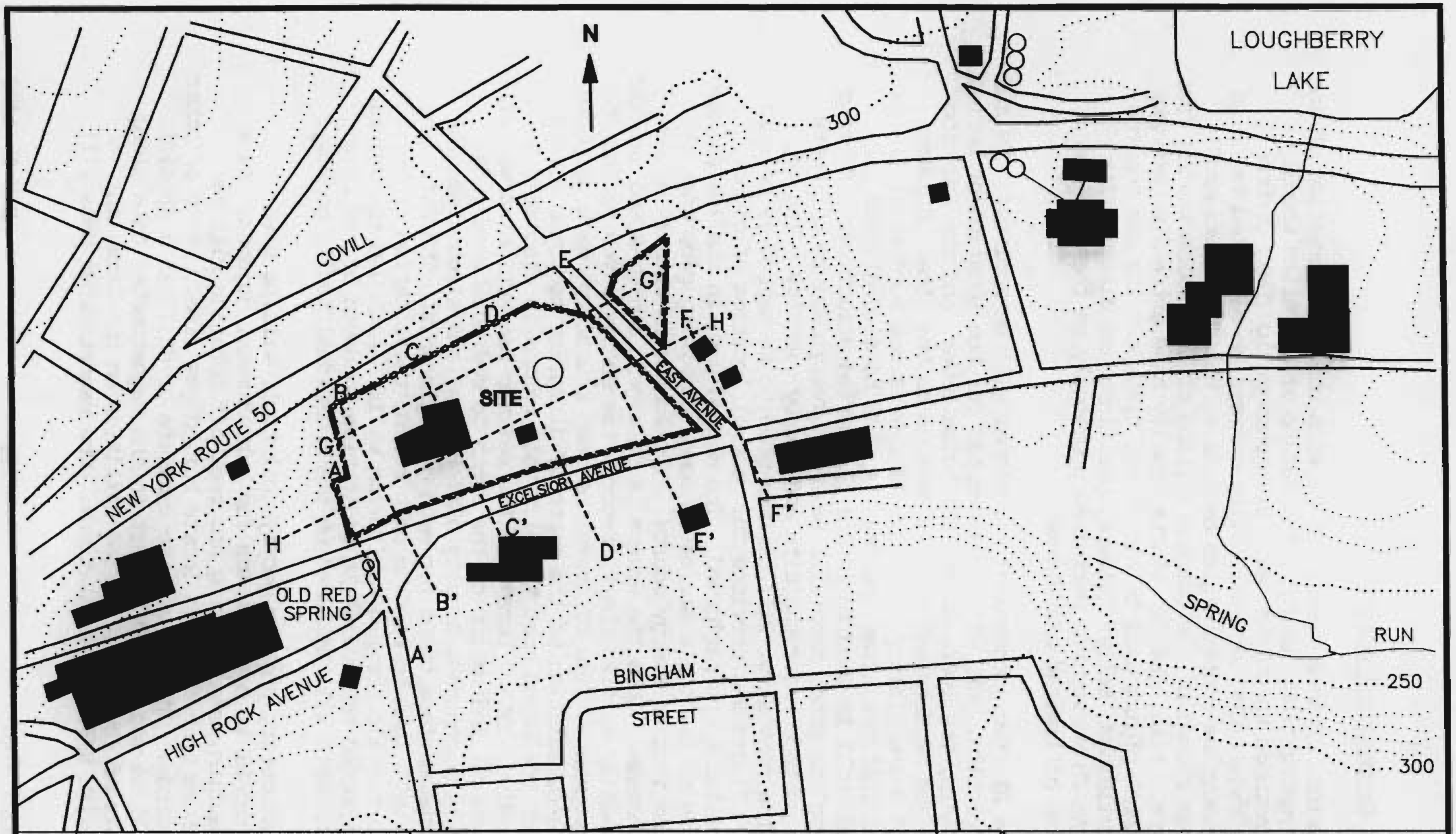
5.3.7 Geophysical Surveys

Geophysics, in some cases, can provide useful information on an MGP site investigation, however, the nature of MGP sites usually limits the methods to only a few. Electromagnetic (EM), ground penetrating radar (GPR) or resistivity surveys have limited value in locating subsurface contamination because of the strong, signal interferences caused by the surface filling of iron oxide wastes from MGP purifiers. Also, the gas plants usually have extensive networks of buried metal piping used to direct and transport the gas between generator buildings, relief holders, purifiers and distribution networks. An EM survey was performed previously on the Site and provided data of limited usefulness.

For the RI, two geophysical techniques will be applied: GPR and seismic refraction. GPR will be attempted for the location of buried stream channels, the route of the 36" brick sewer, and the location of the four gas holders not visibly obvious on the Site. Holders Number 2 and 6 are plainly visible. If GPR is not successful in locating the features after one day, it will be discontinued and other methods will be used to locate the buried structures. Seismic refraction on the other hand will be extensively used to delineate the bedrock surface under the Site and nearby vicinity. The top surface of the clay layer will be attempted to be mapped by seismic refraction. Figure 5-2 provides the general location of eight seismic profiles to be performed. The method used in shallow seismic refraction is to lay out a series of sound receiving geophones at known spacing from an energy source. The source is usually a heavy hammer or shotgun. Once the source is released, a high speed seismic recorder (usually a strip chart) records the energy waves picked up from each geophone. Time of travel between source and each geophone is used in a calculation of the depth of different geologic strata through which the sound must travel. This method is discussed in USEPA Compendium, 1987. Data from the seismic refraction survey will provide a general indication of the depth to bedrock, overlying strata with high contrast density differences, and allow a general mapping of the surface trend for each geologic unit. The data from this survey will then be used to help refine the location of borings and screen intervals for new monitoring wells. Although the seismic survey is expected to provide an indication to depth of the clay, final screen depth will be based on the individual boring geology.

A magnetometer, another geophysical tool, will be used throughout the RI to screen areas for buried metal objects. As a safety precaution, every boring and test pit location will be screened before excavation to locate buried gas lines, tanks or other metallic hazards. The decision to excavate or drill at a specific location will be made based in part on the magnetometer data along with a review of the map of buried utilities on the Site, and discussion with NMPC representatives. The magnetometer data will



LEGEND

▬▬▬▬	PROPERTY LINE
A -------- A'	SEISMIC LINE
....	CONTOUR LINE

CONTOUR INTERVAL = 10 FEET

0 200 400 600 FT.

Approximate Scale

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FIGURE 5-2
LOCATION OF SEISMIC REFRACTION PROFILES

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only be used as a safety technique and not as a contaminant location technique. However, it is noted that because buried utilities frequently provide conduits for contaminants, this tool may provide considerable insight to determining the final sampling locations.

5.3.8 Soil Gas Survey

Soil gas surveys are one of the new investigative techniques which have proven to be very useful screening techniques on MGP sites. Both the Gas Research Institute (GRI) and the Electric Power Research Institute (EPRI) have and are continuing research on the application of soil gas surveys in particular with regard to knowing what site factors may have the greatest influence in the success of soil gas analysis. In a recent paper given at the EPA/EPRI Environmental Research Conference, May 1989, soil gas surveys on MGP sites were reported to work well if the site was paved or capped, infiltration of precipitation was minimal, the water table was around ten feet, and high porosity soil and organic contamination was present in the unsaturated zone. Field GCs will provide greater resolution of volatile organics in the unsaturated zone when specific standard and instrument conditions are applied. The soil gas survey is intended as a site screening tool and provides a relative indication of levels of volatile organics. These surveys do not provide information on many other potential site contaminants such as PAHs, cyanide, metals and PCBs.

A soil gas survey will be conducted early in the RI to screen for areas having volatile organics in the unsaturated zone and to distinguish between coal tar and petroleum related contamination. At a minimum, the major hot spots of volatile organic contamination can be identified. The conditions at the Site are ideal in terms of being paved, having little infiltration, having a water table near ten feet deep, and high porosity shallow soils because of the fill used to grade off the Site in time.

Figure 5-3 presents an approximate grid for sample spacing for collection of soil vapor. For the main gas plant area and the sand borrow area, a fifty foot grid spacing will be used. If particular high concentration areas are located, the grid will be shortened to twenty-five feet. Also, vertical samples between the surface and eight feet will be taken at key hot spots to determine if the volatiles are from shallow or deeper soil zones. Soil gas samples will be taken within the garage building and in the roundhouse (Holder Number 2).

A portable GC with capillary or packed column, isothermal oven and PID will be employed. Standards for benzene (B), toluene (T), xylenes (X) and styrene (S) will be used to calibrate retention times. One out of every twenty samples will be split and collected on charcoal traps to be analyzed by GC/MS for confirmation of volatile constituents.

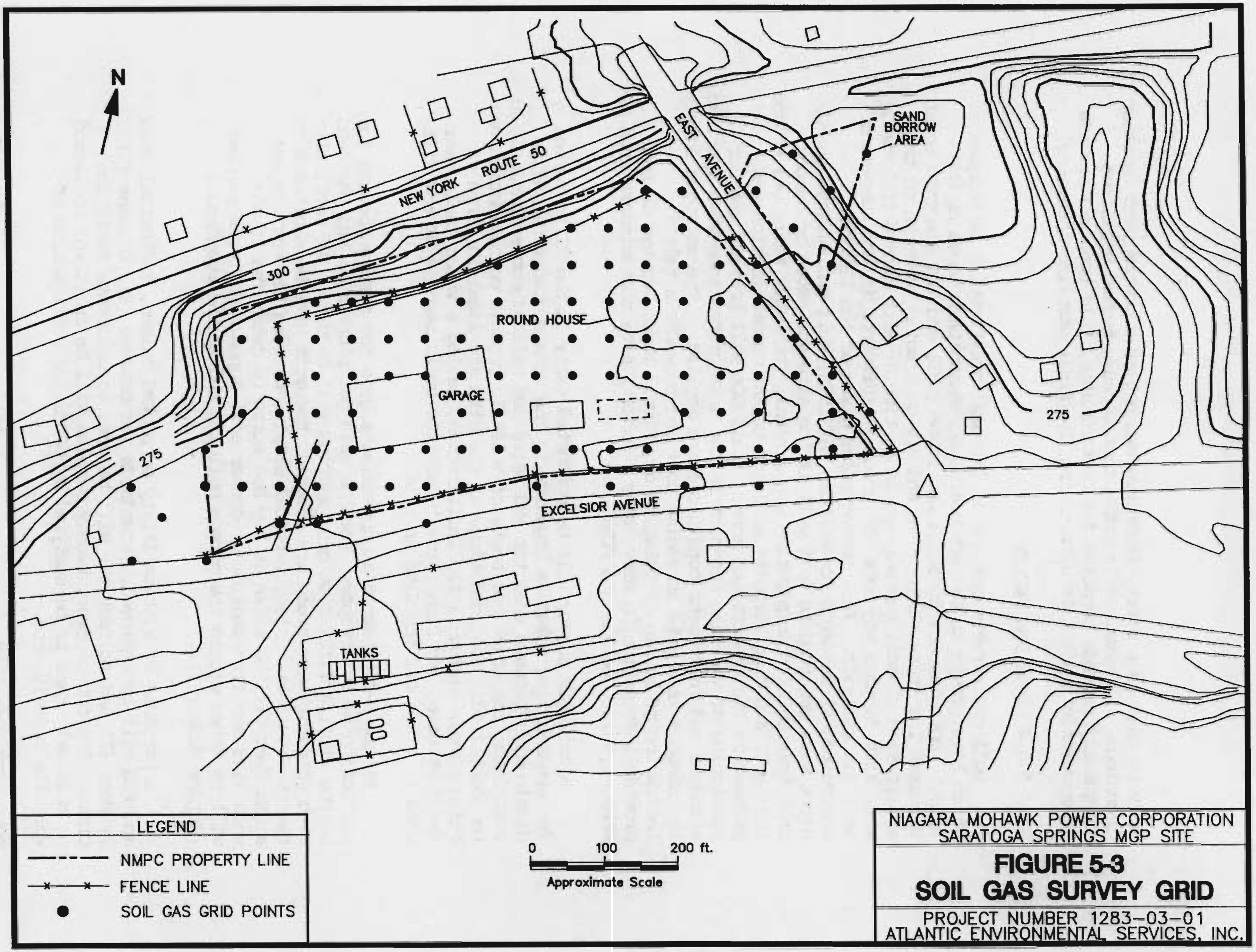

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FIGURE 5-3
SOIL GAS SURVEY GRID

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The results of the soil gas survey will be plotted by chromatograph types and total area counts for the entire site. The data obtained from the soil gas survey will also be used to help refine test pit locations and soil borings. It is noted that because soil gas is limited to detecting volatiles, it will be used as a screening tool for refining some of the test pit and boring locations. The results will be of limited usefulness in refining locations for test pits and borings which are directed at identifying such contaminants as PAHs, metals, cyanide, PCBs, etc. Also, areas not having volatile contamination in the soil air may still have other contaminants, therefore "soil gas" clean areas are not precluded from further testing and analysis.

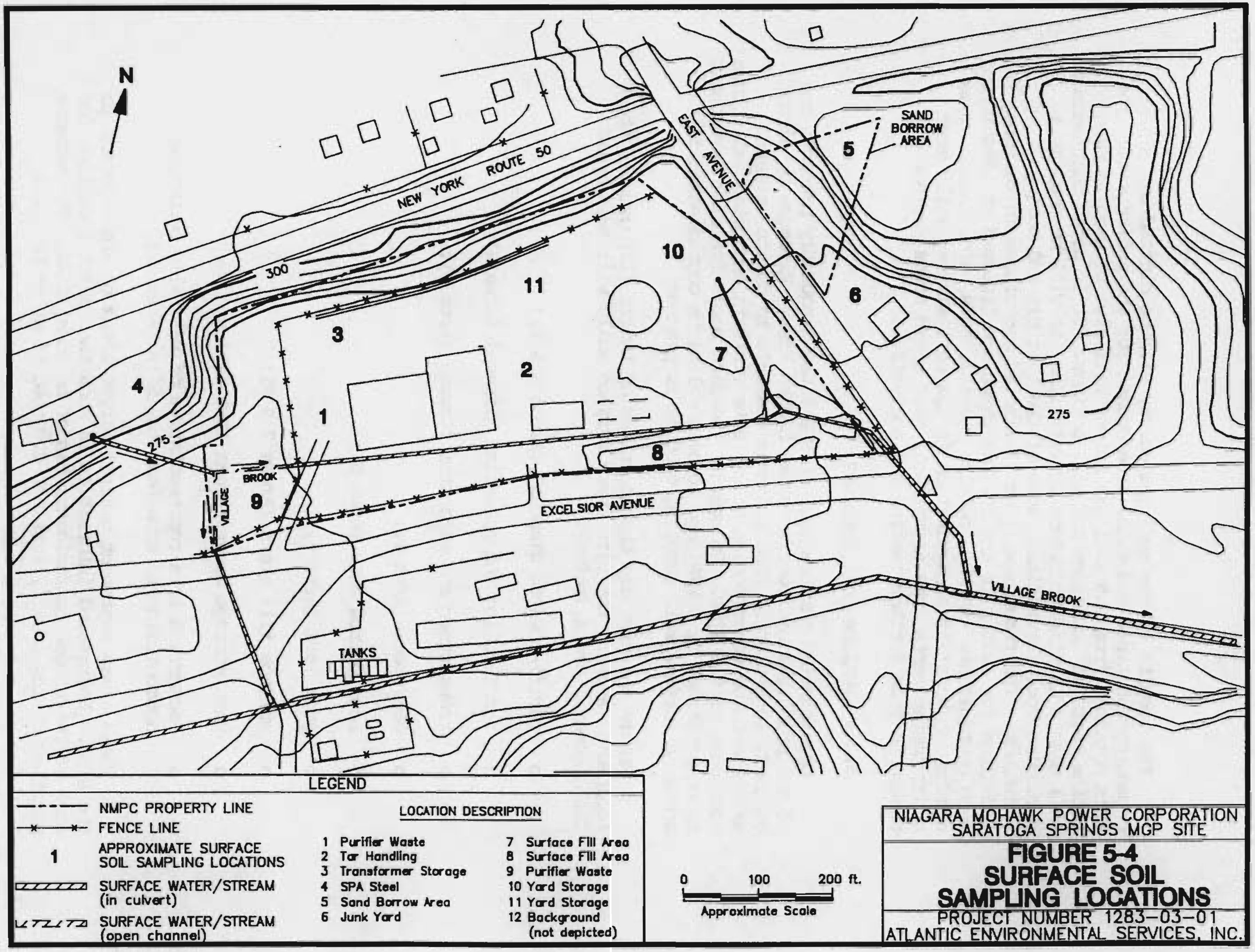
5.3.9 Surface Soil Sampling

Contaminated surface soil at MGP sites frequently presents one of the principal sources for human health risk. Exposure by direct contact, ingestion or inhalation is feasible to onsite workers, maintenance or construction crews, site visitors and potential future occupants of the Site. To support the data needs for risk assessment to be performed by USEPA, and to help delineate contaminated fill areas, a surface soil sampling subtask is planned.

Figure 5-4 provides the locations of twelve (12) general areas located on and off the Site where surface soils will be sampled. These general areas include:

- purifier waste disposal (Areas 1 & 9);
- tar handling and potential disposal (Area 2);
- transformer and capacitor storage (Area 3);
- SPA steel (Area 4);
- sand borrow area (Area 5);
- junk yard (Area 6);
- surface fill areas (Areas 7 & 8);
- yard storage areas (Areas 10 & 11); and
- background area representative of naturally occurring noncontaminated area near the Site (Area 12).

These areas represent general target areas on and adjacent to the Site. Background information is such that exact locations for some of the target contaminants cannot be identified. For example, purifier wastes usually were not disposed of at or near the



LEGEND

- NMPC PROPERTY LINE
- FENCE LINE
- 1 APPROXIMATE SURFACE SOIL SAMPLING LOCATIONS
- SURFACE WATER/STREAM (in culvert)
- SURFACE WATER/STREAM (open channel)

LOCATION DESCRIPTION

1 Purifier Waste
2 Tar Handling
3 Transformer Storage
4 SPA Steel
5 Sand Borrow Area
6 Junk Yard
7 Surface Fill Area
8 Surface Fill Area
9 Purifier Waste
10 Yard Storage
11 Yard Storage
12 Background (not depicted)

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FIGURE 5-4
SURFACE SOIL SAMPLING LOCATIONS

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purifiers, but were frequently spread out over other areas of a site, sometimes to fill in low areas. Two surface soil samples will be collected from each area (Areas 1-11).

A significant sample for comparing the levels of inorganics in the site soil will be the background sample. This location will be chosen based on a review of the local terrain and selected to represent the naturally occurring soils in the area. Three surface soil samples will be obtained from this area.

The methods used to collect the samples will be described in the Sampling and Analysis Plan (SAP). Analytes to be measured in the surface soils will include TCL cyanide, TCL metals, TCL BNA extractables, herbicides, TCL pesticides/PCBs and total petroleum hydrocarbons. Table 5-1 provides a summary of the number of samples, how they will be collected and preserved, and the analysis planned.

5.3.10 Surface Water and Sediment Sampling

Village Brook and the 36" brick storm sewer are the primary receiving surface waterbodies for storm runoff and possibly ground water inflow from the Site. Except for three open ditch areas on Village Brook, both channels are culverted through the Site. The primary area of concern is where these culverts empty out into Spring Run.

For the RI/FS, both surface water and sediment samples associated with the brook and sewer will be sampled. Water samples will be collected after the flow stations are installed. Two sample rounds will take place, one representing low flow conditions, and one representing high flow storm discharge or high ground water discharge conditions. Ten locations will be sampled as indicated on Figure 5-5. Table 5-2 provides a description of each sampling point.

The analytical strategy for the surface water bodies will be to collect data on TCL analytes and general water quality parameters during both low flow and high flow conditions. Since the impact from the Site on local stream water quality is not known at this time, both low and high flow conditions will be sampled. NMPC recognizes that if large amounts of contaminated soils are exposed at the surface, storm runoff could carry greater amounts of contaminants into the surface drainages during times of high flow. Therefore, analytical parameters will be the same for both low flow and high flow sampling rounds. Analytes to be measured will include TCL volatiles, TCL BNA extractables, TCL cyanide, TCL pesticides/PCBs and TCL metals. Oil and grease, pH, total suspended solids, chemical oxygen demand, biochemical oxygen demand and total organic carbon will be analyzed as indicators of general water quality and would be used in the feasibility study. Table 5-1 summarizes the number of samples and how they will be analyzed. Details on the analytical

TABLE 5-1

NMPC SITE SUMMARY OF FIELD SAMPLING AND ANALYSIS METHODS

				RI ANALYSIS					
SAMPLE TYPE (Media)	SAMPLE ROUNDS	NO. OF LOCATIONS	SAMPLES PER LOCATION	TCL VOLATILES	TCL BNA EXTRACTABLES	TCL METALS	TCL CYANIDE	TCL PESTICIDE'S/PCBs	FS ANALYSIS
Surface Soil	1	12	2*	X	X	X	X	X	Herbicides, total petroleum hydrocarbons
Surface Water (Sewer Brook)	2	10	1	X	X	X	X	X	Oil and grease, pH, TSS, COD, BOD5, TOC
Sediments	2	6	2	X	X	X	X	X	Herbicides, TOC, % solids, total volatiles
Test Pits	1	19	1	X	X	X	X		Bulk samples archived for treatability studies
Borings	1	22+	2	X	X	X	X		
Old Wells	2	5	1	X	X	X	X	X	
New Wells	2	13	1	X	X	X	X	X	
Public & Private Wells	3	13	1	X	X	X	X	X	
Soil Gas Trap	1	6	1						Volatiles and semi-volatiles
Indoor Air	1	4	1						Volatile organics
Test Pit Air Particulates	1	2	2						PAH, cyanide
Test Pit Air Volatiles	1	5	6						Volatile organics
Biota	1	3	2		X	X	X	X	

* Three samples obtained at background location.
\+ Two collocated borings (B1S & B7S) will not be sampled.

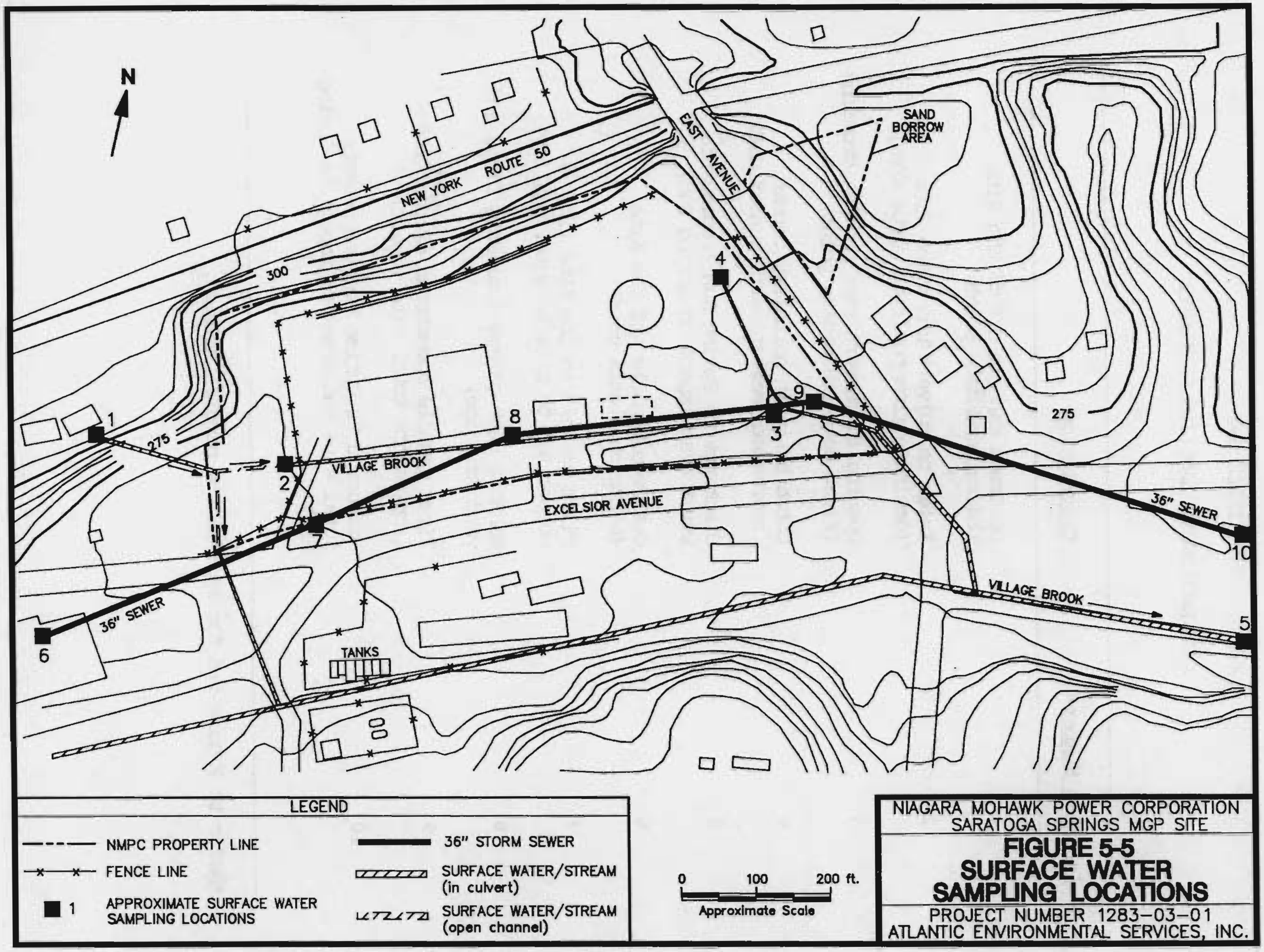

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FIGURE 5-5
SURFACE WATER SAMPLING LOCATIONS

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TABLE 5-2

SURFACE WATER SAMPLING RATIONALE

Location Number*	Description
1	Upstream manhole off of the Site (background data point)
2	Inlet to culvert under the Site (drainage from purifier waste area)
3	Opening in culvert rear trolley crossing (first downstream data point)
4	Catch basin in northeast corner (represents eastern site runoff data)
5	Discharge to Spring Run (represents worst case impact on Spring Run)
6	Upstream manhole off the Site (background data point)
7	First manhole on the Site (for comparison to offsite water quality)
8	Manhole near garage (collects floor and yard drainage)
9	First manhole downstream of the Site (represents total site impact)
10	Discharge to Spring Run (represents total site and areawide impact to Spring Run)

*Refer to Figure 5-5 for approximate sample location.

method, sample handling and holding times will be included in the SAP.

Sediment samples will be collected from the Village Brook drainage system in and around the Site. The results of long term discharges from ground water at an MGP site into surface stream may be better detected in the sediment than in the surface water. Many of the PAHs associated with MGP wastes have low solubility but high affinity toward adsorption onto organic soils. Organic content of stream sediments can have a significant effect on the concentration of the PAHs.

Because the accumulation of contaminants in stream channels is a dynamic condition and highly dependent on the discharge rate and flow regime, more than one round of sediment samples will be collected. For planning purposes, a low flow (quiescent) and high flow (either past storm flow or high water table inflow) condition will be sampled. Also because of the heterogeneity of depositional areas, for each sample location two samples (one from each side) of the stream bed will be collected.

Six sediment sample locations are planned as part of the RI/FS. Figure 5-6 illustrates the locations for sediment sampling. A description of sampling rationale for each of the initial locations is presented in Table 5-3.

The analytical program for sediment samples is based on the need for information regarding complete characterization of the Site and a preliminary evaluation of remediation data needs. Accordingly, TCL volatiles, TCL BNA extractables, TCL metals, TCL pesticides/PCBs, herbicides, total organic carbon, total percent solids and total volatile organics would be analyzed for in the sediments. Table 5-1 provides a synopsis of the initial sampling and analytical requirements for the sediment samples.

5.3.11 Test Pit Excavations

Test pit excavations are a proven valuable subsurface exploration technique at CERCLA and, in particular, MGP sites. Test pits excavated by backhoe at the Site will:

- o confirm the location, method of construction and general nature of the pit holders and verify if they are major tar source areas;
- o provide a means to determine the extensiveness and nature of landfilling on the Site;
- o provide a means to document the shallow (0-10 feet) stratigraphy;

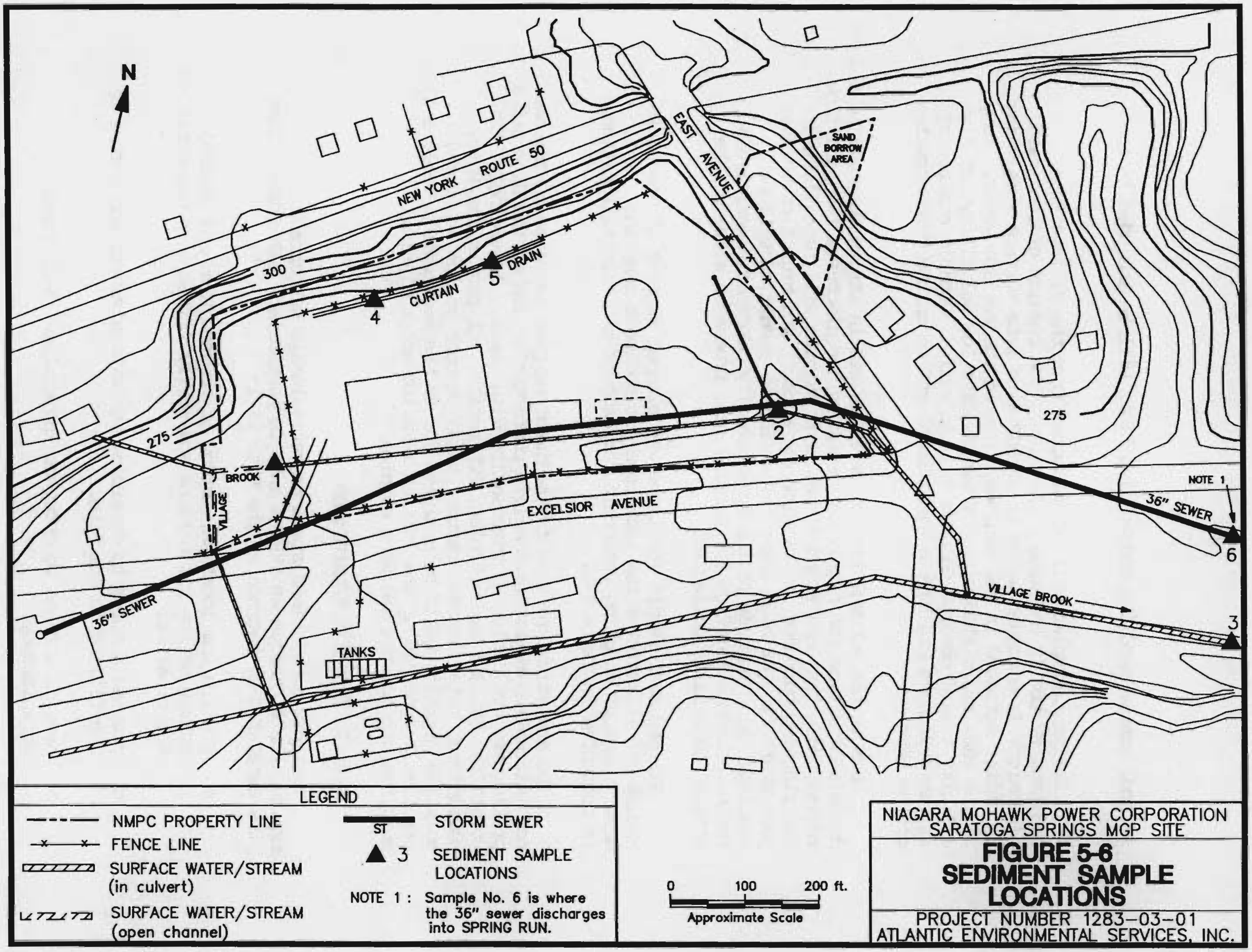

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FIGURE 5-6
SEDIMENT SAMPLE LOCATIONS

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TABLE 5-3
SEDIMENT SAMPLING RATIONALE

Location Number*	Description
1	Open ditch on upstream side of the Site (may represent purifier waste disposal area)
2	Open ditch on downstream side of the Site (area where spills from MGP operation would occur)
3	Discharge into Spring Run (indicative of sediment transport off the Site)
4-5	Curtain drain ditch behind old MGP plant (indicative of areas receiving runoff from old railroad bed, oil and coal depot on bluff)
6	Discharge of 36" brick sewer to Spring Run (indicative of sediment contamination from old sewer discharge)

*Refer to Figure 4-6 for approximate sample location.

- provide access to subsurface soils for target contaminant analysis;
- provide access for bulk tar and purifier waste samples to be archived until treatability tests are performed;
- provide information on other infrastructure, buried stream channels and contaminant migration pathways on the Site;
- allow for the sampling of ambient air during a simulated construction operation to determine the risk to human health from the inhalation exposure pathway; and
- help confirm clean fill areas around the Site.

Locations for up to nineteen (19) test pits have been identified (see Figure 5-7), however, their final location will be determined based on the results of the geophysical and soil gas surveys, a detailed inspection of the Site with respect to location of old structures, and the most recent determination of the location of buried utilities. If a test pit cannot be excavated due to some logistical constraint, borings as substitutes will be considered.

The specific procedure for excavating test pits includes screening each area ahead of time to check for buried utilities and performing a spot magnetometer reading. If no "live" electric or gas lines are under each location the excavation can begin. As soils are excavated, they are field characterized based on visual and odor observations and screening with an HNu. Although NMPC recognizes that contaminants other than MGP wastes may exist at the Site, the test pit program is directed specifically at MGP structures and suspected disposal areas. A recent GRI publication (GRI-89/0233) presents evidence that supports using odor to characterize some MGP wastes. Because of the very low odor threshold of some tar constituents, contamination at very low levels can be identified based on odor. Cover soils will be segregated from deeper contaminated soils during the excavation. If contaminated material is identified, it will be piled on a tarp to avoid spread of contaminants on the surface. If high hazard waste material is encountered while excavating a test pit, the test pit excavation shall cease. After the holes are opened and logged, the cleaner soils will be used to cover over the contaminated material which is placed back into the excavation.

Air monitoring will be performed at five (5) test pits for volatile organics and two (2) test pits for particulate analysis of PAHs and cyanide. Table 5-4 indicates at which test pits air sampling will be conducted. These pits represent where purifier waste, coal tar, gasoline and diesel may have been disposed of or leaked. Soil particles or dust associated with purifier waste areas

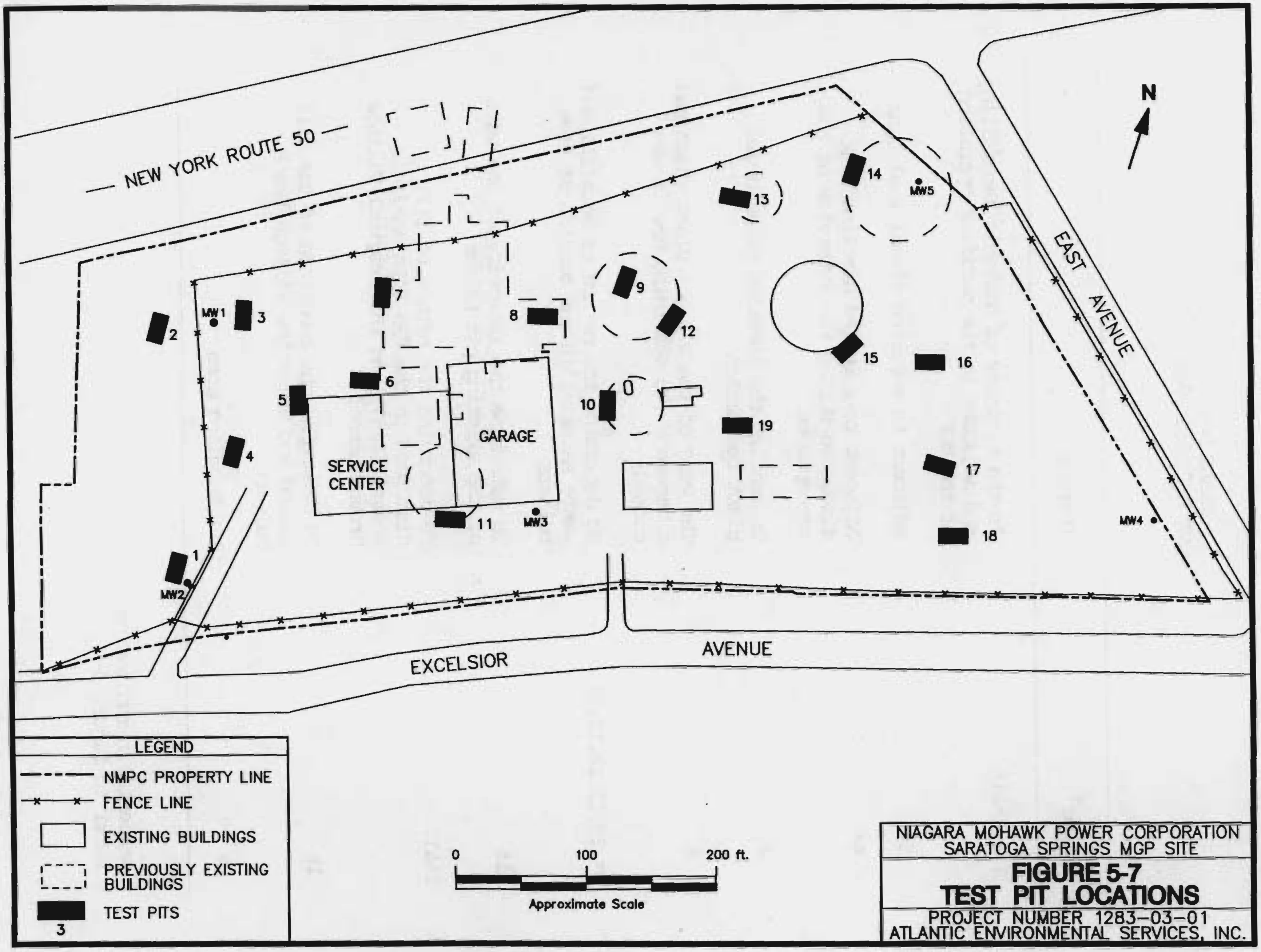

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FIGURE 5-7
TEST PIT LOCATIONS

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ATLANTIC ENVIRONMENTAL SERVICES, INC.

TABLE 5-4
TEST PIT RATIONALE

Number$^+$	Purpose
1,2,3*&4*	In the vicinity of historic landfilling and adjacent to the purifier operation of the MGP
5*	Adjacent to a buried diesel fuel tank
6*	Adjacent to a buried gasoline tank discussed during the interview of the ex-employee
7	To confirm the location of main gas plant foundation
8	The wing of the old gas plant which had a basement (to determine how it was closed)
9*,10,11,12,13,14	To determine the nature of backfill and waste material in and outside of five holders
15	To determine the integrity of the wall of the existing pit holder
16&17	To determine the nature of fill discussed in the EPA Site Analysis Report (1989) and the original Village Brook channel
18	To determine the condition of the fill around and under the Village Brook culvert
19	Tar handling area

* Ambient air monitoring
\+ Refer to Figure 5-7

is odorous and inhalation can potentially cause acute health problems. Also, because purifier waste contains metals and PAHs, the measurement of airborne contaminants will serve as a good indicator of the potential health risks to construction or maintenance crews through the inhalation exposure pathway for the entire site. The methods for air monitoring are discussed in section 5.3.16.

Table 5-4 provides the rationale for each of the nineteen (19) test pits. A minimum of one analytical sample for analysis of TCL volatiles, TCL BNA extractables, TCL metals and TCL cyanide will be taken from each test pit. Final selection of which samples are collected for chemical characterization will be based on what is encountered in the test pits. Special attention will be placed on contaminated material associated with buried structures, stream channels, utility conduits and waste fills. Test pits which are excavated into buried structures (old basements or holders) will be closed with a two inch (2") PVC piezometer to determine head differences of any water or liquids held within the buried structure. These piezometers will not be constructed according to any specification nor will they be sampled for analytical purposes. They will be used only as an indicator of relative water levels within buried structures. Any data obtained from these piezometers will be used very cautiously. Past experience with such installations has been useful in evaluating the integrity of such structures. Ground water elevations recorded from these piezometers will not be used in the generation of piezometric surface maps for the Site. Bulk samples of tars or other concentrated wastes from test pits will be stored in five gallon plastic buckets and archived for possible treatability studies. No test pits are planned for any offsite areas.

5.3.12 Soil Borings and Well Installations

A soil boring program is designed to characterize the nature of the subsurface soils under the Site, extend the data base developed by previous borings, determine the extent of soil contamination in the vicinity of the Site by the MGP operations and other surrounding potential sources, determine if buried stream beds or bedding material from buried sewers or culverts are acting as migration routes and determine if contamination is moving deeper than the shallow aquifer. The approximate locations of twenty-two (22) borings are shown in Figure 5-8. Nineteen of these borings will be shallow and three will be deep. Two of the deep borings will be co-located with shallow borings. Locations for these borings and the final number is subject to revision based on the results of the soil gas survey, geophysics and test pit excavations. Based on the test pit evaluation and initial borings, it may be necessary to complete additional borings to address the original Village Brook channel.

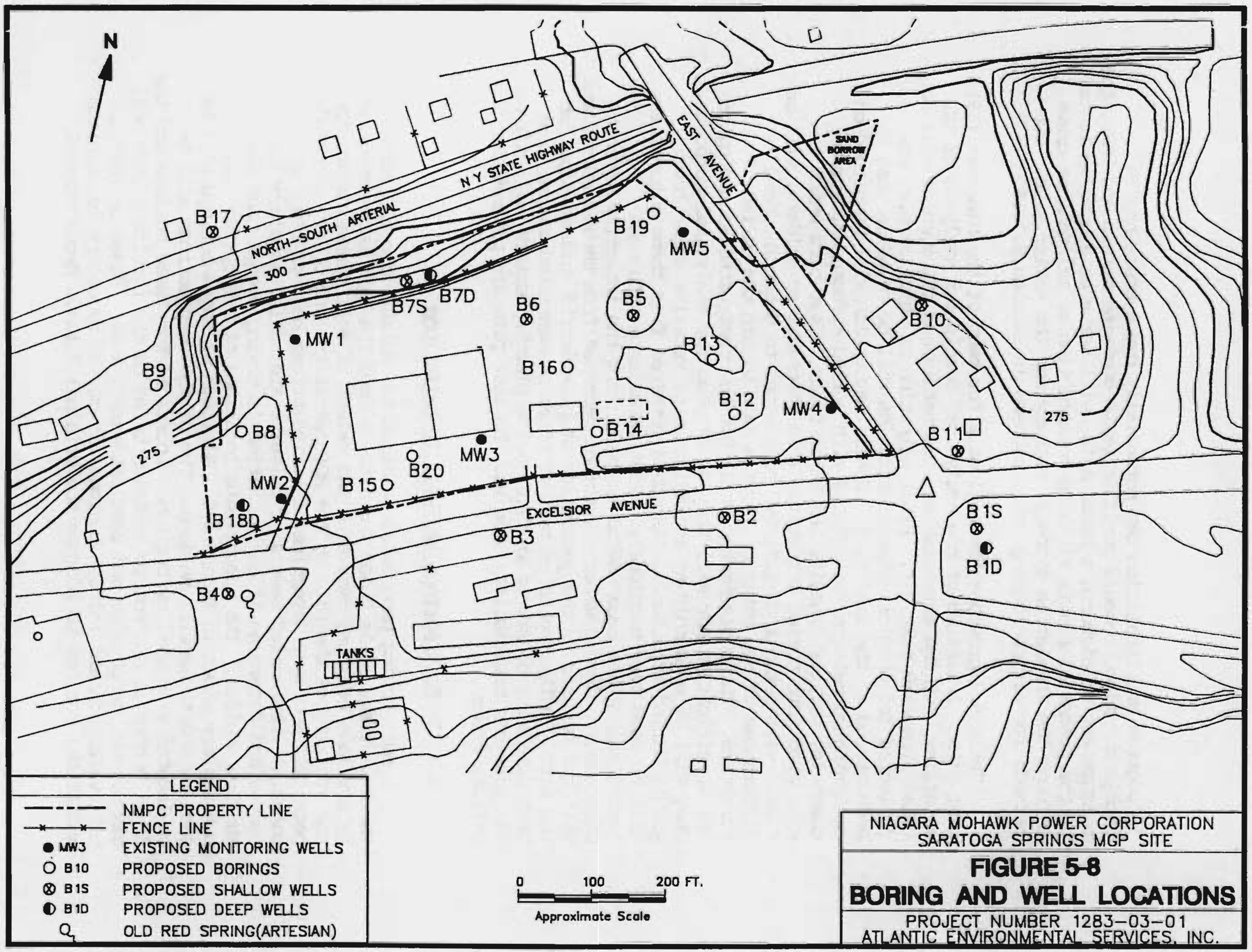

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FIGURE 5-8
BORING AND WELL LOCATIONS

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Five monitoring wells exist on the Site at present (Figure 5-8) and a review of their construction method indicates that they are usable for ground water characterization. Of the twenty-two (22) borings to be drilled, thirteen (13) will be finished as monitoring wells. All borings will be drilled using hollow stem auger (HSA), driven casing or rocking coring drilling techniques to approximate depths as indicated in Table 5-5. The completion depths are estimated based on the data from the previous Phase II report (C&S, 1986), the previous geotechnical borings, and the regional geology. HSA will be the preferred drilling method, however, HSA drilling should not be used to drill through potential confining layers. If such a layer is encountered, a driven casing method will be used with a telescoping casing to protect the deeper aquifer. EPA approval will be required for any drilling method other than HSA.

Although NMPC recognizes that the confining nature of the clay/till has not been determined absolutely, it appears to be continuous beneath the Site. The seismic survey may yield a general indication of depths to clay strata or bedrock. However, final monitoring well screen depths shall be based only on actual stratigraphic data obtained during boring. Because of the confining nature of the clay/till unit which appears to be underlying the Site, the focus of the subsurface investigation will be in the shallow aquifer. Three deep borings (B1D, B7D, and B18D) will be placed at perimeter locations around the Site to confirm the presence or absence of MGP contamination in the lower unit and to preliminarily establish gradient. The deep borings will be placed last and special precautions will be taken to insure not to penetrate any zones which contain DNAPL. The remaining borings will only be completed in the shallow overburden in and around the Site.

Each boring will be continuously sampled by split spoon for archiving and geologic logging, according to ASTM D-1586 (Standard Penetration Test). The deep borings will be sampled until five feet of clay or till has been encountered as determined with the USEPA's representative at the Site. At that time casing will be grouted into the clay or till to protect the lower aquifer from any shallow aquifer contamination leaking down the borehole. Once the grout has set, sampling will continue through the overburden until bedrock is encountered. At that time, a second casing will be grouted into place. Bedrock core samples will be taken at B1D, B7D, and B18D for at least twenty feet into rock. The adjacent shallow borings B1S and B7S will not be sampled due to their proximity to B1D and B7D. All other shallow borings will be continuously sampled until at least five feet of confining material is encountered, i.e., clay or tight till.

Monitoring wells or piezometers will be placed in each boring depending on purpose and location. For purposes of distinguishing between monitoring wells and piezometers, it is noted here that a

TABLE 5-5
SITE BORING SUMMARY

BORING NUMBER[3]	ESTIMATED TOTAL DEPTH[1]	BORING FINISHED AS[2]	PURPOSE
B1S	30	W	Monitoring downgradient shallow plume (nested with deep well)
B1D	85 (20' rock)	W	Monitoring deep aquifer water quality
B2	30	W	Determine areal extent of contamination (check for offsite sources)
B3	30	W	Determine areal extent of contamination (check for offsite sources)
B4	30	W	Upgradient shallow aquifer water quality (nested with Old Red Spring)
B5	25	W	Log interior of pit holder (finished as a 4" recovery well)
B6	25	W	Log interior of pit holder (finished as a 4" recovery well)
B7S	30	W	Determine if contamination is present from the coal and oil depot
B7D	85 (20' rock)	W	Monitoring rock aquifer quality
B8	30	P	Characterize soils in purifier waste landfill

TABLE 5-5 CONTINUED
SITE BORING SUMMARY

BORING NUMBER[3]	ESTIMATED TOTAL DEPTH[1]	BORING FINISHED AS[2]	PURPOSE
B9	55	P	Upgradient shallow soil characteristics near SPA Steel Works
B10	30	W	Offsite soil characteristics near junkyard
B11	30	W	Shallow aquifer characteristics downgradient of junkyard
B12	30	P	Evaluate contamination along path of 36" brick sewer
B13	30	P	Evaluate contamination near historic fill area
B14	30	P	Evaluate contamination along sewer and stream culvert
B15	30	P	Evaluate contamination along path of 36" brick sewer
B16	30	P	Evaluate contamination in yard area near holders
B17	55	W	Offsite well to determine upgradient (background water quality)
B18D	85 (into rock)	W	Monitoring rock aquifer quality
B19	30	P	Evaluate contamination adjacent to Holder #6
B20	20	P	Evaluate contamination adjacent to Holder #3

NOTES:

1. Depths in feet below ground surface.
2. W - refers to monitoring well
   P - refers to piezometer
3. S - indicates shallow well
   D - indicates rock well
4. Approximate locations shown on Figure 5-8.

monitoring well is constructed for purposes of determining specific aquifer characteristics and for collecting ground water analytical samples. Piezometers are constructed for the sole purpose of measuring ground water levels. Analytical samples will not be collected from piezometers. Monitoring wells will be constructed of two inch (2") stainless steel well screen and riser following the well construction details shown in Figure 5-9. Piezometers will be constructed using two inch PVC and screened at the water table. NMPC notes that two inch wells and piezometers may not be adequate for all purposes for which they may eventually be needed. These additional needs may include aquifer characteristic tests or the need to try to sample DNAPL. Should these requirements be determined to be necessary at a later date, additional wells and/or piezometers will be installed to address new data needs. Final well construction details and methodology will be described in the SAP.

Throughout the logging of each boring, organic vapors will be monitored and a visual/olfactory log will be made. Many contaminants from MGP sites are easily detected by smell due to their very low odor thresholds. By logging odors in the split spoons, zones of contamination are readily identified and are confirmed by the analytical program. Organic vapors will be mechanically monitored at all sites (e.g., HNu or OVA) and care should be taken to avoid inhalation of organic fumes. The site specific organic vapor monitoring for health and safety purposes will be described in detail in the site HASP.

The shallow wells will be screened with five foot screens placed just above the first confining layer. Screening at the confining layer is planned because of the denser than water nature of PAHs and the probability that PAHs will be identified at the Site. Recent research (EPRI/EPA, 1989) has shown that at MGP sites, PAH contamination was only detected in wells screened below the water table while water table wells showed no contamination. If, however, contamination is detected at the water table around the Site, additional shallow wells may be installed. For either water table or deeper wells, only five foot screens will be used. Screened intervals greater than ten feet could tend to dilute ground water concentration estimates and result in identifying a larger zone of lower concentrations rather than a true narrower zone of high concentrations.

Referring to Figure 5-8, it is obvious that monitoring wells will cover much of the valley where the Site is located. Unknown at this time is the impact to the valley ground water from the offsite properties. If, for instance, borings B-2 and B-3 show contamination from either offsite petroleum sources or the MGP site, additional borings and wells may be installed to determine the extent of contamination at these locations.

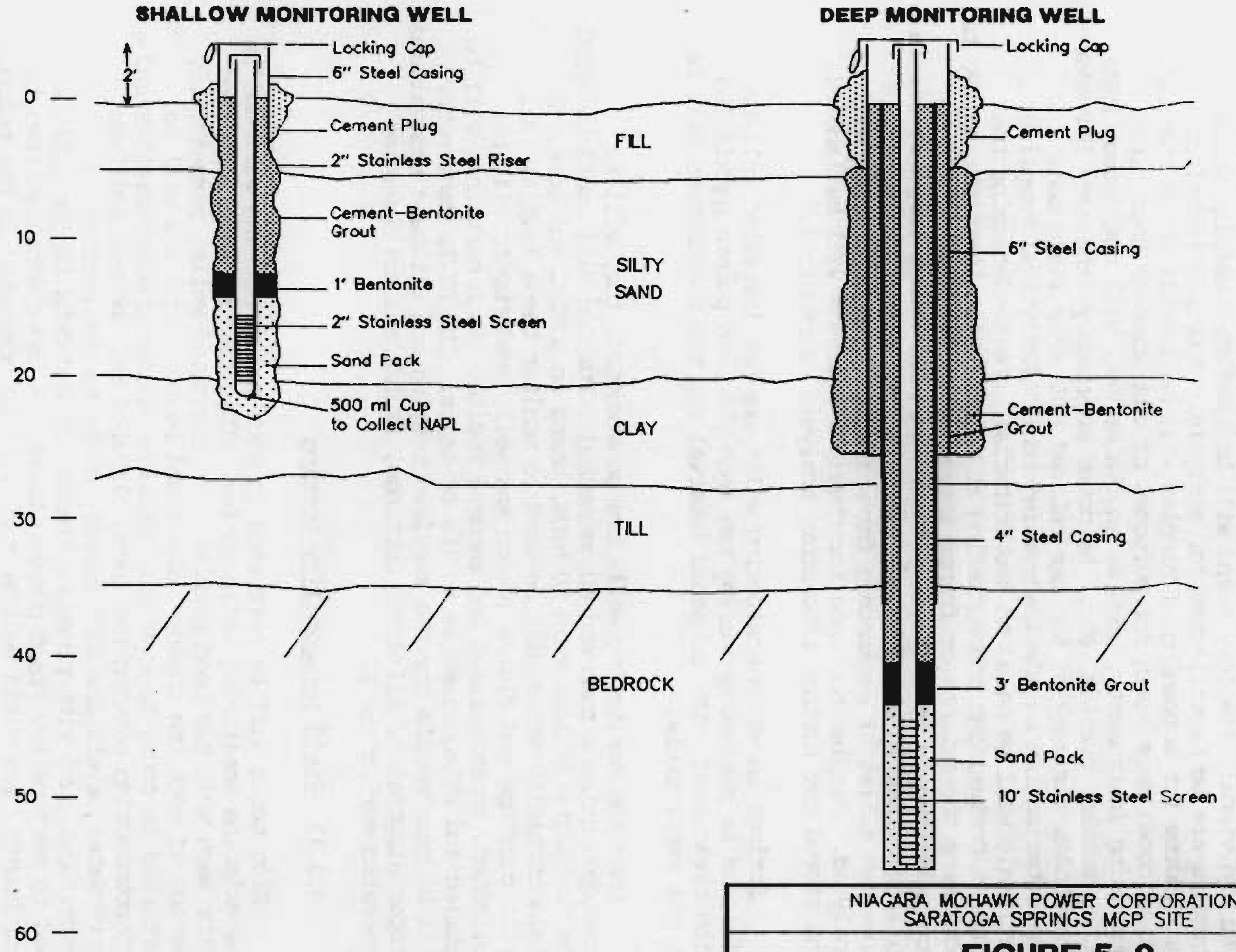

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FIGURE 5-9
MONITORING WELL CONSTRUCTION

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An average of at least two soil samples will be collected from each boring for analytical purposes. Collocated borings (1S & 7S) will not be sampled. Field screening by organic vapor analyzer or HNu and visual/olfactory means will be used to determine which samples are to be collected for analysis. Specific technical procedures for screening of samples will be identified in the SAP. It is noted here again for purposes of completeness that field screening instruments, such as an OVA or HNu, will not detect PAHs, PCBs, metals, cyanide, etc. As noted previously, the very low odor thresholds for many of the tar related PAHs make field odor characterization an ideal screening tool. Analytical sampling rationale will be based on two criteria: one to determine the highest contaminant concentration at a particular location and two to determine the extent (or fringe areas) of contamination. If no contamination is identified by screening techniques, one soil sample will be collected at the water table for analysis. Table 5-1 provides a list of parameters for which split spoon samples will be analyzed. Samples not used for chemical analysis will be labeled, and stored for further laboratory analysis as required.

Borings in which monitoring wells are not installed will be finished as piezometers using two inch PVC sand points backfilled with clean sand. The screened interval for the piezometers will be at the water table.

Once the monitoring wells are constructed, they will be developed using a pump and surge method. Pumping will continue until the turbidity is less than 50 NTUs, based on NYSDEC guidance. A field turbidity meter will be used to monitor these levels. All drill cuttings and fluids (decon and well development) will be collected, containerized and secured onsite. Each container will be labeled and categorized as to its contents. The RI/FS contractor will be responsible for the required testing and ultimate removal and proper disposal of all drill cuttings, fluids and solid wastes generated during the RI.

5.3.13 Field Permeability Testing

Slug tests will be performed in each new monitoring well and in the existing monitoring wells onsite. This task will be performed after each well has been sampled. In clustered wells, permeability testing of both the unconsolidated and bedrock aquifers will be performed in order to evaluate specific aquifer characteristics and interconnection between the unconsolidated and bedrock aquifers. Where water levels are sufficiently close to the surface, a centrifugal pump with pressure transducer and data logger will be used to perform low yield pumping tests. A short duration (two to four hours), low yield aquifer test will be completed in the bedrock monitoring wells. Monitoring of any response in the overburden wells of the cluster will allow the permeability of the overlying units to be more fully evaluated. Aquifer test will also provide data needed to evaluate treatment alternatives which may involve extraction wells. All aquifer testing will be performed by NMPC's contractor.

5.3.14 Ground Water Sampling

Two rounds of ground water samples will be obtained from all monitoring wells installed during the RI, and from all existing onsite wells. The samples will be analyzed for the parameters shown in Table 5-1. The first round of ground water samples will be collected approximately two weeks after the last monitoring well is developed. The second round of sampling will be conducted approximately one month after the data from the initial round is validated in order to confirm the analytical results of the first sampling round.

Some CLP protocols use detection limits that may exceed some ARARs. For instance, many New York State Ground Water Quality Standards (6NNYCRR Part 703) are lower than CLP detection limits. Therefore, on the second round of ground water sampling, those wells in critical areas (i.e., deep aquifers or plume fringes) will have organic analysis following EPA request for Special Analytical Services. Specifically, Method 524.2 (Drinking Water Methods) for volatiles will be used.

The procedure for sampling monitoring wells includes measuring the piezometric heads, checking for the presence of floating or sinking non-aqueous phase liquid (NAPL), slow purging (100 ml/minute) of each well of at least three well volumes using a peristaltic pump, or until pH and temperature have stabilized. Details of sampling procedures and sample handling will be provided in the SAP. At the time each sampling round is begun, water level measurements will be taken at all wells and piezometers. The general approach will be to collect all samples through the pump using dedicated teflon tubing and a very slow pump rate. It is noted here that if sufficiently flexible teflon tubing for the pump head cannot be obtained, all samples will be collected using dedicated stainless steel bailers.

5.3.15 Public and Private Well Sampling

The Old Red Spring and two downgradient private or public water supply wells (if present) will be sampled. Sampling from private and public wells in the area will be coordinated with the NYSDOH Glens Falls office. Sample results will be sent to NYSDOH when available prior to publication of the RI report. Samples from these supplies will be analyzed for the same parameters as the monitoring wells plus replicate samples. These water supplies will only be sampled once unless contamination is detected and then a second round of sampling will take place. Table 5-1 provides a listing of the analyses to be performed. At the time of writing of this Work Plan, only one public well, the Gilbert Road Water Works, has been identified in the Spring Run valley, located about two miles southeast of the Site (see Figure 2-3 and Table 2-1). If sufficient analytical data are available for the Gilbert well it may not be necessary to analyze an additional sample. Additional data need to be collected to identify possible additional public or private well locations which may warrant sampling.

5.3.16 Air Sampling and Analysis

To address potential health risks from the inhalation of organic vapors and potentially contaminated particulates, an air quality sampling task will be performed as part of the RI. Two types of air sampling and analysis will be conducted: indoor air associated with the offices inside the building which is located over one of the old pit holders, and volatile and particulate sampling associated with the test pit excavations.

For the indoor air samples, EPA Method T01, "Method for Determination of Volatile Organic Compounds in Ambient Air Using Tenax Adsorption and Analysis by GC/MS" will be employed. This method collects ambient indoor air on tenax through calibrated personnel sampling pumps. Three samplers will be placed at respiratory heights inside the rooms closest to the old holder and allowed to collect samples for an eight hour period at a flow rate of two liters per minute. Sampling will take place when the air is most quiescent, i.e., during evening hours. The samplers will be retrieved, sealed and refrigerated until analysis under DQO Analytical Level 5 SAS. The analytical method will include thermal desorption, cryogenic trapping and gas chromatographic analysis of the extract. Detection levels in the low ug/l range are achievable. Quantification of results will be done by factoring in air volume through each sampler. A fourth sample will be taken from outside the building for background purposes.

Volatile and particulate sampling will be conducted on selected test pit excavations. Volatile sampling will be performed over a course of one day of excavation work by placing tenax tubes upwind and downwind of five test pits. Because of the short time interval when a single test pit is open, the tenax tubes will be moved from location to location so a full eight hour sample can be collected. A set of three upwind and three downwind samples will be obtained with the analysis following the same procedures as the indoor air samples.

Particulate samples will be collected to determine the PAH and cyanide content of dust carried in ambient air from an excavation activity. In a report, "Project Summary - Stability of PAH Compounds Collected from Air on Quartz Fiber Filters and XAD-2 Resin (EPA, 1986), it has been found that medium volume air samplers be used with quartz fiber filters backed with XAD-2 resin traps to collect a range of PAH compounds. Of particular interest would be the potentially carcinogenic PAHs which are indicated in Table 3-1. These compounds fall into the 5 and 6 ring category analysis.

Particulates would be collected from two test pit excavations, one representing the purifier waste area and one representing a tar disposal area. Table 5-1 summarizes the number and types of analysis to be performed on all air samples. The results of the air program will provide quantitative data for the risk assessment of the inhalation exposure pathway for workers involved in site remediation and other subsurface maintenance and construction tasks.

5.3.17 Ecological and Biota Assessment

Ecological and biological resources of the Village Brook/Spring Run valley system will be identified in order to assess the effects on them potentially incurred by remediation alternatives, including no-action. As part of the Work Plan background review, the City of Saratoga Springs does not list the Site in the 100 year flood plain, however an ecological wetland and flood plain assessment of Spring Run will be conducted following guidelines presented in the CERCLA/SARA Environmental Review Manual (EPA Region II, 1988). It is noted that the State of New York uses different criteria than the Federal Government to define wetland (6NYCRR Part 664). Prior to the start of this task, the USEPA will resolve which criteria must be addressed and provide that guidance to NMPC. The most current FEMA flood plain map of the area will also be studied to identify present flood plains within the general area of the Site.

In addition, NYSDEC's Habitat Based Assessment will be used as guidance. Four sequential efforts are anticipated for this assessment:

- Information Review: acquisition and review of aerial photography, Soil Conservation Service Soil Survey Maps, National Wetland Inventory Maps and any published information or manuscripts. State and federal fish and wildlife agencies will be consulted regarding recreational species and rare species.
- Field Investigations: wetland delineation and observation of terrestrial and aquatic habitat.
- Description of Baseline Conditions: preparation of wetland maps and identification of major ecosystems occurring onsite as well as potential occurrence of rare species.

- Assessment: identification of potential effects of remedial alternatives, including no action, on ecological resources; and recommendation of mitigative measures as appropriate.

Along with the review biological sampling may be performed in Spring Run and possibly Lonely Lake. The decision to perform biological sampling in the water courses downstream from the Site will be based on the results of the literature and area review and consultation with the appropriate fish and wildlife protection agencies. Based on the results of the four step assessment, fish samples representing bottom and midwater fish potentially may be sampled for species composition and body burdens of TCL metals, TCL BNA extractables, TCL PCBs and pesticides and TCL cyanide in edible fillets and livers at at least three stations (to be field determined).

To assess the general biological conditions in the area, bottom dwelling invertebrates may also be sampled for community compositions at the same three stations. Sampling for grain size in the sediments will be performed also as part of the biological data base. The final locations and types of species samples will be determined early in the site investigation.

5.3.18 Cultural Resources

A state IA Cultural Resource literature search will be conducted in conjunction with the RI. This will consist of a file search of the archeological and architectural site files maintained by both the New York State Historic Preservation Office (SHPO) and the New York State Museum (NYSM). In addition, historic cartographic sources will be examined at the New York Public Library Map Room. Local histories will also be examined at these institutions.

A brief report will be written which will summarize the results of the literature review. An evaluation will be made of the Site's archeological sensitivity based on the sum of the information gathered during this task.

5.3.19 Task Management and Quality Control

All work conducted during the field investigation will be performed in accordance with the procedures outlined in the SAP.

5.4 Task 4 - Sample Analyses/Data Validation

5.4.1 Objective

The objective of Task 4 - Sample Analysis/Data Validation is to provide a complete and verifiable laboratory generated data base describing geotechnical and contaminant concentration parameters at the NMPC Site and vicinity. The data base, which will describe all site media, including air, surface water, ground water, soil, sediment and biota, will be used to assess public health and environmental risks associated with the Site and to provide data for the evaluation of remedial alternatives.

5.4.2 Laboratory Procurement

Analysis of samples collected during the site investigation will be performed in accordance with the DQOs established in Section 4.1 of this Work Plan. The analyses involving both RAS and SAS (DQO Levels 4 and 5) will be performed by laboratories which participate in the USEPA National Contract Laboratory Program (CLP) utilizing CLP analysis protocol. Although analysis of air samples is not covered under the CLP, it is planned to utilize a CLP laboratory to perform these analyses. The SAP will describe in detail the proposed air programs, including QA/QC requirements.

5.4.3 Field Quality Control Samples

Field quality control samples will include field replicate and/or duplicate samples of all media, rinse blanks of each type of sampler, trip blanks, DI water blanks (used in decontamination) and drilling water blanks. In addition, a certain percentage of extra samples will be collected for matrix spike and matrix spike duplicate (MS/MSD) by the laboratory. Details of the QA field program will be described in the SAP with supporting procedures in the QAPP. The drilling water and DI water blanks will be analyzed for full TCL organics and inorganics. Analysis of rinse and trip blanks will include TCL volatiles only.

5.4.4 Field Decontamination Procedures

As presented below, all equipment involved in field sampling activities will be decontaminated prior to and subsequent to sampling. Equipment leaving the Site will also be decontaminated as called for in the Health and Safety Plan. All drilling equipment and well casings will be steam ("hot water") cleaned prior to use. Pressurized hot water will be used to remove all visible excess material from the augers, the back of the drilling rig and other parts of the rig that contact augers, rods, and split-spoons.

Decontamination of the sampling equipment; e.g., bailers, split-spoons and scoops will be conducted according to the following procedure:

1. Alconox detergent and potable water scrub.
2. Potable water rinse.

3. Ten percent nitric acid rinse (when sampling for TCL inorganics). Carbon steel split spoons will be rinsed with a one percent nitric acid rinse.

4. Distilled water rinse or potable water rinse.

5. Methanol (pesticide grade) rinse (only for equipment involved in sampling for organics).

6. Deionized water rinse (only for equipment involved in sampling for organics).

7. Air dry (all equipment involved in sampling for organics and inorganics).

8. Wrap or cover exposed ends in aluminum foil when not in use.

5.4.5 Field Documentation Procedures

Each sampling team or individual performing a particular sampling activity is required to keep a bound weatherproof field notebook. These notebooks will contain sample particulars including sample number, time of sample location, sample descriptions, sampling method used, weather conditions, field measurements, name of sampler, and any other site-specific observations.

A master sample log and general site log will be maintained. The master sample log is a loose-leaf notebook containing the sample log sheets. A sample log sheet will be filled out for each sample from the information recorded in the field notebooks. A bound weatherproof general site log will be kept by the Field Operations Leader, or designated leader. The general site log will contain an abbreviated version of the notes listed in the team and individual field notebooks, as well as field analytical results, calibration of equipment, details on deviations from protocol, visitors' names, community contacts, laboratory addresses, and details on activities at the Site.

Chain-of-Custody Forms, Sample Labels, Custody Seals, and other sample documents shall be filled out according to CLP procedures.

Each sample will be designated by an alphanumeric code, which will identify the project site, sample type, sampling location, sample depth, and additional designations if needed. Replicates will not be specifically identified as such in the sample number, but will have a different (sequential) number which will be noted in the master sample log.

The project code for the Site is NMSS for Niagara Mohawk - Saratoga Springs.

The sample type will be designated by SED (stream sediment), SW (surface water), GW (ground water), SS (surface soil), A (air), SB (soil boring) or BIO (biological).

Where more than one sample is collected at a location, a description of sequence will be added to the sample identification, i.e., the second ground water sample taken from monitoring well MW-7 will be identified as NMSS-GW-7-02.

The field blanks obtained by rinsing the decontaminated sampling equipment will be designated as sample type FB, so the first field blank will be NMSS-FB-01. The deionized water blanks, obtained to check the water used for the field blanks, will be designated as NMSS-DIB-01.

The field team will indicate on the CLP paperwork which samples are for matrix spike, matrix spike duplicate (MS/MSD). Frequency for MS/MSD samples is one in twenty for each sample with the same concentration/matrix. The field team will ship samples within twenty-four (24) hours. If sampling shipment is delayed beyond 24 hours, the field crew team designee (normally the Field Operations Leader) will state within the comments section of the traffic report the reason for not shipping within 24 hours and the date CLP lab space was assigned.

The field crew team will list sampling dates next to each sample number on the traffic report if the samples listed on the traffic report are collected on different dates.

5.4.6 Data Validation

Validation of measurements is a systematic process of reviewing a body of data to provide assurance that the data are adequate for their intended use. The process includes the following activities:

- Auditing measurement system calibration, and calibration verification;
- Auditing quality control activities;
- Screening data sets for outliers;
- Reviewing data for technical credibility with respect to the sample location;
- Chain-of-Custody review;

- Checking intermediate calculations; and

- Certifying the previous processes.

Sample management and data validation will be performed by the NMPC contractor based on the general guidelines contained in "Laboratory Data Validation - Functional Guidelines for Evaluating Organic Analyses" (USEPA, 1984a), and "Laboratory Data Validation - Functional Guidelines for Evaluating Inorganic Analyses", Draft Technical Document (USEPA, 1984b). Data validation will be performed specifically in accordance with the following USEPA Region II Standard Operating Procedures (SOPs):

- SOP No. HW-2 for inorganic data, and

- SOP No. HW-6 for organic data.

Data validation will be performed by the NMPC contractor. However, the EPA Environmental Service Division (ESD), Edison, New Jersey office may provide support to EPA-ESD for data validation.

5.4.7 Task Management and Quality Control

Quality control during sample analysis procedures are described in the USEPA's CLP program (USEPA, 1986b).

Samples sent to the primary laboratory on CLP will be tracked to ensure the continuity and consistency of data and analyses throughout the sampling program. Tracking will include tabulating sampling and shipping dates; analyses performed; holding times, dates of extraction; dates of analysis; and dates of validation. The NMPC manager will be notified if problems develop with the sample analyses.

5.5 Task 5 - Data Evaluation

This task includes efforts related to the analysis of data once it has been verified that the data are acceptable. This task includes NMPC's contractor's data review, data reduction, summary and evaluation effort.

Analytical precision for the NMPC Site will be assessed by comparing split samples as well as collocated sampling locations. Knowledge of analyte data accuracy and precision within each matrix over the entire site and between locations is extremely important. The ability to test differences statistically between locations is critical to defining contaminant boundaries, estimating volumes requiring remediation, and developing treatment design criteria (cleanup levels) and cost.

All data collected will be analyzed to support a detailed evaluation of remedial alternatives. Site-specific characteristics will be compiled, mapped and analyzed including:

- Comparison, concentration, and physical state of contamination, e.g., source description, extent of NAPL;
- Area and volume of contaminated media;
- Soil engineering properties based on Unified Soil Classification System;
- Soil permeability and moisture content;
- Comparison of water and soil concentrations to ARARs
- Surface water contaminant loadings during dry and wet weather;
- Soil Chemistry - pH, organic matter content, estimated cation exchange capacity;
- Contaminant profiles;
- Concentrations in air;
- Concentrations in biota;
- Nature and extent of drainage ditch sediment contamination;
- Ground water contour maps;
- Hydraulic differences in aquifers; and
- Geologic cross-sections.

5.5.1 Data Reduction and Analysis

This task includes the data reduction and evaluation effort. The NMPC contractor will develop the best means to organize, analyze, interpret, and present the data to support the RI and FS including:

- preparation and interpretation of well logs and definition of stratigraphy;
- identification of the correlation between soil contamination at the Site and ground water contaminant concentrations;

- presentation of the field data to develop a picture of contaminant distribution at the Site. Source areas will be distinguished from NAPL plumes and contaminated ground water.

These analyses will provide information which will be incorporated into the risk assessment, the screening of remedial alternatives and in the detailed evaluation of remedial alternatives.

5.5.2 Ground Water Modeling

If the RI results indicate that a site-related NAPL or contaminated ground water plume extend beyond the boundaries of the Site, it will be important to estimate the extent of ground water contamination beyond the immediate Site vicinity. An optional second site investigation, primarily downgradient of the Site, may be undertaken for this purpose. It is proposed to utilize computerized ground water simulation models to plan the additional investigations.

Based on the results of the initial site investigation, the NMPC contractor will determine whether an additional field investigation involving ground water modeling is necessary to define the location and extent of the contaminant plume(s). One of the following three recommendations may be made to the USEPA after evaluating results of the initial RI:

- No ground water modeling is necessary;
- Ground water modeling with additional field investigations is necessary during an additional phase of the RI; or
- Ground water modeling is necessary but no additional field investigations are required.

If ground water modeling is ultimately recommended, the appropriate model (i.e., one-, two-, or three-dimensional) shall be specified at the conclusion of the RI.

The selected model will be the one which has been validated and generally accepted. It should have the capability to simulate the geohydrological conditions, environmental conditions (e.g., multiple pollution sources) and contaminant transport mechanisms in the area adjacent to the [illegible].

If one [illegible] latter two alternatives is recommended, a letter report documenting the recommendation will be submitted to the USEPA for review and approval. In the report, the following items will be addressed.

- Reasons for deciding on a model;
- Reasons for selecting a particular ground water model;
- Brief description of the selected model; and
- Scope of work and schedule required for the proposed ground water modeling effort and additional field investigation (if any).

The specific scope of work for the ground water modeling effort cannot be defined at present. If an additional task has to be conducted, a Technical Direction Memorandum will be prepared and submitted to the USEPA for review and approval.

5.6 Task 6 - Assessment of Risks

EPA will conduct the risk assessment and ecological assessment for the Site.

5.7 Task 7 - Treatability Study/Pilot Testing

The preliminary scoping of remedial alternatives for the Site will consider a number of developed and innovative technologies to address various aspects of site contamination. Some of these technologies should meet remedial response objectives, and will pass initial screening criteria. They then may require treatability studies (laboratory or field) to evaluate their applicability to the site-specific wastes, and to develop site-specific cost information for economic comparison to other alternatives.

No specific treatability studies have been recommended as part of this Work Plan, since the exact nature of site contamination has not been established. Treatability studies can be costly activities, therefore, they should only be conducted on those technologies which pass the initial screening criteria.

Once the nature and extent of site contamination has been determined, a decision process for determining the need for treatability testing will be enacted. This includes:

- determining data needs of potential remedies;
- reviewing existing data to determine sufficiency;
- performing treatability tests to determine performance, operating parameters and technology costs; and
- evaluating data to assure data quality objectives are met.

The NMPC contractor will meet with USEPA to discuss the need for performing any specific treatability studies when preliminary analytical results become available from the site investigation. Suggested scopes for such studies will be developed at that time. The treatability studies will be performed by the NMPC RI contractor to confirm the applicability of technologies to meet remedial response objectives. The NMPC contractor will submit written plans for treatability studies to USEPA for approval. While USEPA is evaluating the proposals, the NMPC contractor will commence preparing and issuing the necessary bid packages for selecting qualified contractors to perform the treatability studies. No contracts will be awarded until USEPA has approved the treatability plans.

5.8 Task 8 - Remedial Investigation Report

5.8.1 Introduction

Subsequent to the RI field investigation, laboratory analysis, data validation, data evaluation and risk assessment, a remedial investigation report will be developed for the NMPC Site. This report will present the information obtained during the RI in accordance with the Interim Final, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988). It is anticipated that the RI report will be produced concurrently with the FS report.

The RI report will summarize the data collected and the conclusions drawn from the investigative areas, and will include the following information:

- an updated site description;
- a description of all activities performed during the field investigation;
- technical memoranda documenting field activities;
- a description of the physical characteristics of the project study area;
- a description of the nature and extent of contamination;
- a description of contaminant fate and transports; and
- baseline risk assessment.

The RI report will contain calculation sheets which should provide the equations, conversion factors, units, raw data sheets, technical references and calculations for all RI calculated values cited in the RI. These will be provided in the RI report appendices.

5.8.2 Quality Control-Report Review

The Remedial Investigation report will be produced in a sequence which includes:

- review of the existing and developed data base;
- development of a draft RI report;
- review by the NMPC contractor project team;
- re-drafting and approval by the NMPC contractor project team;
- submission of the Draft RI Report to USEPA for review;
- re-drafting as necessary; and
- submission of the Final RI Report to USEPA.

5.8.3 Report Finalization

The Remedial Investigation Report will be produced in the draft report development/review sequence as indicated in Section 5.8.2. This sequence provides for four report review steps prior to submission of the Final RI Investigation Report to the USEPA. Following each review step, the report will be redrafted as necessary to incorporate into the report any comments and corrections indicated by the reviewers. The report finalization process will result in the production of a Final Remedial Investigation Report for the project.

5.9 Task 9 - Remedial Alternative Screening

Based on the results of the risk assessment (Task 6) and the established remedial response objectives, the initial screening of remedial alternatives will be performed according to the procedures recommended in the Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, 1988).

The development of remedial alternatives will be initiated at the completion of the RI study. This Work Plan includes a preliminary identification and discussion of remedial alternatives for MGP facilities in general. The process of identifying and screening specific alternatives for the NMPC Site will be ongoing throughout the RI, as new technology and site-specific data develop.

The objectives of Task 9 will be as follows:

- development of remedial response objectives and general response actions;

- identification and screening of remedial technologies; and
- development and screening of remedial alternatives.

5.9.1 Development of Remedial Response Objectives and General Response Actions

The data collected in the RI will be used with existing data to complete the development of the remedial response objectives for the Site. In order to develop these objectives, significant site contaminants and migration pathways will be identified. The contaminants and pathways will be used to establish remedial response objectives which will eliminate or minimize risk to public health and the environment. An examination of the ARARs with consideration to site-specific conditions will be included in this evaluation. General response actions will be developed to achieve these responses. The response objectives will be one of the major criteria for the screening of remedial technologies. The no-action alternative will be included as a baseline response action against which all other alternatives can be compared.

5.9.2 Identification of Applicable Technologies and Development of Alternatives

Based on the remedial response objectives and each general response action, potential treatment technologies will be identified. A pre-screening of these potential treatment technologies for suitability as part of a remedial alternatives will be conducted.

Technologies which may prove extremely difficult to implement, may not achieve the remedial objective in a reasonable time, or are inapplicable and infeasible based on the site conditions, will then be eliminated. An illustrative preliminary example of this task has been presented in Section 3.2 - Remedial Alternatives. This preliminary identification will be revised and elaborated on based on the results of the RI and the remedial response objectives. A revised list of potential remedial technologies and alternatives will then be developed.

Under this task, specific process options will be examined within each technology type. To satisfy USEPA requirements, technology types will be screened on the basis of technical feasibility and then process options will be evaluated on the basis of effectiveness, implementability and cost.

The development of alternatives requires combining appropriate remedial technologies in a manner that will satisfy the site remediation strategies or response objectives established in Section 3.0, and refined based on the results of the RI.

As required by SARA, source control actions will be developed in each of the following categories:

- An alternative for treatment that would eliminate, or minimize to the extent feasible, the need for long-term management (including monitoring) at the Site to one that would use treatment as a primary component of an alternative to address the principal threats at the Site.
- An alternative that relies on containment, with little or no treatment, but which protects human health and the environment by preventing potential exposure and/or by reducing mobility.
- A no-action alternative.

5.9.3 Screening of Remedial Alternatives

The list of potential remedial alternatives developed above will be screened. The objectives of this effort are to reduce the number of technologies and alternatives for further analysis while preserving a range of options. This screening will be accomplished by evaluating alternatives principally on the basis of effectiveness, implementability and cost as specified in USEPA's Guidance for Conducting RI/FS Under CERCLA (Draft, March 1988). These screening criteria are briefly described below:

- Effectiveness Evaluation

  The effectiveness evaluation will consider the capability of each remedial alternative to protect human health and the environment. Each alternative will be evaluated as to the protection it would provide, and the reductions in toxicity, mobility or volume it would achieve. Both short and long term components of effectiveness should be evaluated; short term referring to the construction and implementation period and long term referring to the period after the remedial action is complete.

- Implementability Evaluation

  The implementability evaluation will be used to measure both the technical and administrative feasibility of constructing, operating and maintaining a remedial action alternative. In addition, the availability of the technologies involved in a remedial alternative will also be considered.

Innovative technologies will be considered through the screening if there is a reasonable belief that they offer potential for better treatment performance or implementability, few or lesser adverse impacts than other available approaches, or lower costs than demonstrated technologies.

- Cost Evaluation

  Cost evaluation will include estimates of capital costs, annual operation and maintenance (O&M) costs, and present worth analyses. These conceptual cost estimates are order-of-magnitude estimates, and will be prepared based on:

  - Preliminary conceptual engineering for major construction components;
  - Unit costs of capital investment and general annual operation and maintenance Costs available from EPA documents (Compendium of Costs of Remedial Technologies at Hazardous Waste Sites, 1985d and Handbook: Remedial Action at Waste Disposal Sites, 1985c) and from the NMPC contractor in-house files.

At the completion of Task 9, a meeting will be held with EPA and State of New York to review the results of Remedial Alternative Screening and to decide on the list of remedial alternatives to be evaluated in detail in Task 10.

5.10 Detailed Analysis of Alternatives

The primary purpose of the detailed analysis of alternatives is to present information and alternative assessments which will allow a site remediation alternative to be selected. Each remediation alternative will be assessed against nine evaluation criteria which have been established by USEPA. These nine evaluation criteria are as follows:

- Short-term effectiveness,
- Long-term effectiveness and permanence,
- Reduction of toxicity, mobility or volume,
- Implementability,
- Cost,
- Compliance with ARARs,

- Overall protection of human health and the environment,
- State acceptance, and
- Community acceptance.

The results of this analysis will be presented in a manner which will allow the alternatives to be compared and an appropriate remedy for the Site to be selected. The evaluations conducted during this phase of the FS process will build upon the information developed in the earlier portions of the FS program. This phase will also incorporate the results of treatability studies. The detailed analysis of alternatives will include a better definition of each alternative, focusing on the volume or areas of wastes to be addressed, the technologies to be used, and any performance requirements which must be met. This will be presented in accordance with USEPA guidance and will include a complete description of the alternative, description of areas to be excavated and collected, locations of all potential discharges to surface or ground water, management option for treatment residuals, and any other information needed to adequately describe the alternative and document the logic behind the assembly of general response actions into specific remedial action alternatives.

The information which should be included in each of the evaluation criteria for the detailed analysis of alternatives is presented in Table 5-6, and discussed in the following sections. The FS will include a summary table highlighting the assessments for each of the alternatives.

5.10.1 Short-Term Effectiveness

The important aspects of this criteria include the impact during the construction and implementation of the alternative. Factors which must be considered include protection of workers and the community during the remedial actions, environmental impacts resulting from the alternatives, and the length of time required to achieve the response objectives.

5.10.2 Long-Term Effectiveness and Permanence

The objective of this criteria is to address the long-term results of the remedial action, after the alternative has been implemented. The magnitude of remaining risk at the Site must be determined, along with the potential risk associated with the remedial action. Any residuals or untreated wastes remaining at the Site must be controlled to ensure that any exposure to human and environmental receptors is within protective levels. If the alternative does not represent a destruction technology, the reliability of the alternative to provide this control must be evaluated.

TABLE 5-6
SITE DETAILED EVALUATION CRITERIA

SHORT-TERM EFFECTIVENESS

- Protection of the community during the remedial actions
- Protection of workers during the remedial actions
- Time until remedial response objectives are achieved
- Environmental impacts

LONG-TERM EFFECTIVENESS

- Magnitude of residual risks
- Adequacy of controls
- Reliability of controls

REDUCTION OF TOXICITY, MOBILITY AND VOLUME

- Treatment process and volume
- Amount of hazardous material destroyed or treated
- Reduction in toxicity, mobility or volume
- Irreversibility of the treatment
- Type and quantity of the treatment residuals

IMPLEMENTABILITY

- Ability to construct the technology
- Reliability of the technology
- Ease of undertaking additional remedial action, if needed
- Monitoring considerations
- Coordination with other agencies
- Availability of treatment, storage capacity, and disposal services
- Availability of necessary equipment and specialists
- Availability of prospective technologies

COSTS

- Capital costs
- Annual operating and maintenance costs
- Present worth analysis
- Accuracy and sensitivity of cost estimates

TABLE 5-6 (CONTINUED)

COMPLIANCE WITH ARARs

- Compliance with chemical-specific ARARs
- Compliance with location-specific ARARs
- Compliance with action-specific ARARs
- Compliance with appropriate criteria, advisories, and guidances

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

STATE ACCEPTANCE

COMMUNITY ACCEPTANCE

5.10.3 Reduction of Toxicity, Mobility, and Volume

The stated preference of actions at waste sites is to employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances. This criteria is satisfied by using technologies that reduce site contamination threats through destruction of toxic contaminants, reduction of the total mass of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of the total volume of contaminated media. Each of the alternatives will be evaluated with respect to the amount and type of hazardous materials that will be destroyed, the degree of expected reduction in toxicity, mobility or volume (as a percentage or order of magnitude), the degree to which the treatment is irreversible, and the type and quantity of treatment residuals remaining after treatment. An assessment will be made as to whether the treatment will reduce the principal threats associated with the site contaminants.

5.10.4 Implementability

This criteria addresses the technical and administrative feasibility of implementing each alternative. Specific technical factors which will be involved in this evaluation will include the technical difficulties and unknowns associated with the construction and operation of each alternative, the reliability of the technology to meet specific process efficiencies and performance goals, the potential need for additional remedial action following each alternative, and the ability to monitor the effectiveness of each remedial alternative. Administration feasibility deals with the need to coordinate with other agencies in the implementation of alternatives. Other factors which could affect the ability to implement an alternative are the availability of offsite facilities, requirements for specialized equipment, timing for implementation and the ability to obtain competitive bids.

5.10.5 Cost

The procedures used for cost estimates will use the document Remedial Action Costing Procedures Manual (USEPA, 1985). This document provides a comprehensive discussion of the requirements for CERCLA sites. The cost areas included in this evaluation are capital costs, annual costs, estimate accuracy, present worth analysis and a cost sensitivity analysis.

Capital costs will include direct and indirect costs associated with each technology. Direct costs include expenditures for equipment, labor, and materials necessary to install each remedial alternative. Indirect costs include expenditures for engineering, financial, and other services associated with alternatives.

Annual costs are post-construction costs required as part of the remediation activities. These costs are comprised of operating labor, maintenance materials and labor, chemicals and energy, disposal of residuals, sampling and analytical costs, administrative costs, insurance, taxes, and the cost of periodic site reviews. Estimates for potential future remedial actions should also be included at this point, if there is a reasonable expectation that a component of the alternative will fail.

The accuracy of the cost estimates developed should be equal to a study estimate with a +50 percent to -30 percent range. If the data developed during the site investigation does not allow this level of accuracy, the applicable percentage will be identified.

The present worth analysis will be used to evaluate expenditures that occur over different periods of time. This analysis will allow all costs to be adjusted to a common base year for a comparable analysis. Cost for each remedial alternative can be expressed as a single number. In order to conduct this analysis, assumptions will be made regarding the discount rate and the period of performance.

The final area in the cost evaluation will be a cost sensitivity analysis. This analysis will allow uncertainties associated with each remedial action to be factored into the evaluation. Variations in the design, quantity of waste materials, operating features, discount rates, and operating life of each alternative will be identified and evaluated. The use of the sensitivity analysis will consider factors that can significantly change the overall cost evaluation for an alternative.

5.10.6 Compliance with ARARs

The compliance with ARARs is the subject of this criteria. ARARs will include three general categories which are chemical-, location-, and action- specific. These ARARs will be identified in previous stages of the RI/FS process. The detailed evaluation of the technologies will summarize the impact of each alternative on achieving the ARARs for the Site. Under specific circumstances, not all ARARs have to be met; however, reasons for not achieving each will be addressed in the FS. When an ARAR will not be met, the basis for justifying one of the six waivers allowable under CERCLA 121(d)(4) should be discussed (USEPA, RI/FS Guidance, October 1988).

5.10.7 Overall Protection of Human Health and Environment

This criteria will serve as a final check to see that each alternative is protective of human health and the environment. The overall assessment in this evaluation will include factors assessed under other evaluation criteria previously discussed. The overall protectiveness will focus on how each specific alternative achieves protection over time. This evaluation will discuss how each source of contamination is eliminated, reduced, or controlled by each alternative.

5.10.8 State Acceptance

The technical and administrative issues and concerns of the State of New York will be addressed in this evaluation. Any comments from the NYSDEC during meetings with NMPC and USEPA will be addressed at this time for each of the alternatives. While no formal comments will have been obtained regarding the RI/FS at this time, later responses can be included as part of the formal review process. To the extent it is known, this evaluation will address features of the alternatives which NYSDEC has reservations about, or opposes.

5.10.9 Community Acceptance

This evaluation will incorporate public input into the alternative analysis. Several points during the RI/FS process will provide the public an opportunity to comment on the situation at the Site. Where possible, these public comments will be included in the evaluation of the remedial alternatives. Again, while no formal public comments will be provided during the preparation of the RI/FS, the response following the public comment period will be addressed in the responsiveness summary.

5.11 Task 11 - Feasibility Study Report

5.11.1 Introduction

An FS report will be prepared to summarize the activities performed and to present the results and associated conclusions for Tasks 1 through 10. The report will include a summary of laboratory treatability findings, a description of the initial screening process and the detailed evaluation of the remedial alternatives studied. The FS report will be prepared and presented in the following format as specified in the "Guidance for Conducting RI/FS Under CERCLA", (USEPA, 1988).

The Feasibility Study Report will be comprised of an executive summary and four sections. The executive summary will be a brief overview of the FS Study and the analysis underlying the remedial actions which were evaluated.

The introduction, Section 1.0, will provide background information regarding site location, facility history and operation, and waste discharges and regulatory actions. The nature of the problem, as identified through studies, will be presented. A summary of geohydrological conditions, remedial action objectives, and nature and extent of contamination addressed in RI Report will also be provided.

Section 2.0 will present the feasible technologies identified for general response actions, and the results of the remedial technology screening.

Section 3.0 will present the remedial alternatives developed by combining the technologies identified in the previous screening process. The results of initial screening of remedial alternatives, with respect to effectiveness, implementability and cost, will be described.

Section 4.0 will contain the detailed description of the cost and non-cost features of each remedial action alternative passing the initial screening in Section 3.0. The detailed evaluation of each remedial alternative with respect to nine evaluation criteria, 1) short-term effectiveness, 2) long-term effectiveness, 3) reduction of mobility, toxicity and volume, 4) implementability, 5) cost, 6) compliance with ARARs, 7) overall protection of human health and the environment, 8) state acceptance, and 9) community acceptance will be presented. A comparison of these alternatives will also be presented.

NMPC's FS Report will clearly establish the bases for EPA to select the preferred remedial alternative.

5.11.2 <u>Quality Control - Report Review</u>

The Feasibility Study Report will be produced in a sequence of review which includes:

- review the existing and developed data base;
- development of a Draft FS report;
- review by the NMPC project team;
- re-drafting and approval by the NMPC project team;
- submission of the Draft FS report to USEPA for review;
- re-drafting as necessary;
- public review and comment; and
- submission of Final FS report to USEPA.

5.11.3 <u>Report Finalization</u>

The Feasibility Study Report will be produced in the draft report-review sequence as indicated in Section 5.11.2. This sequence provides for four report review steps, including public review and comment, prior to submission of the Final Feasibility Report to the USEPA. Following each review step, the report will be re-drafted as necessary to incorporate any comments and corrections indicated by the reviewers into this report. The report finalization process will result in the production of a Final Feasibility Study Report for the project.

5.12 Task 12 - Post RI/FS Support

NMPC will provide support to the USEPA for requested assistance in activities following completion of the RI/FS. This may include assistance during the implementation of a USEPA-led Community Relations Plan.

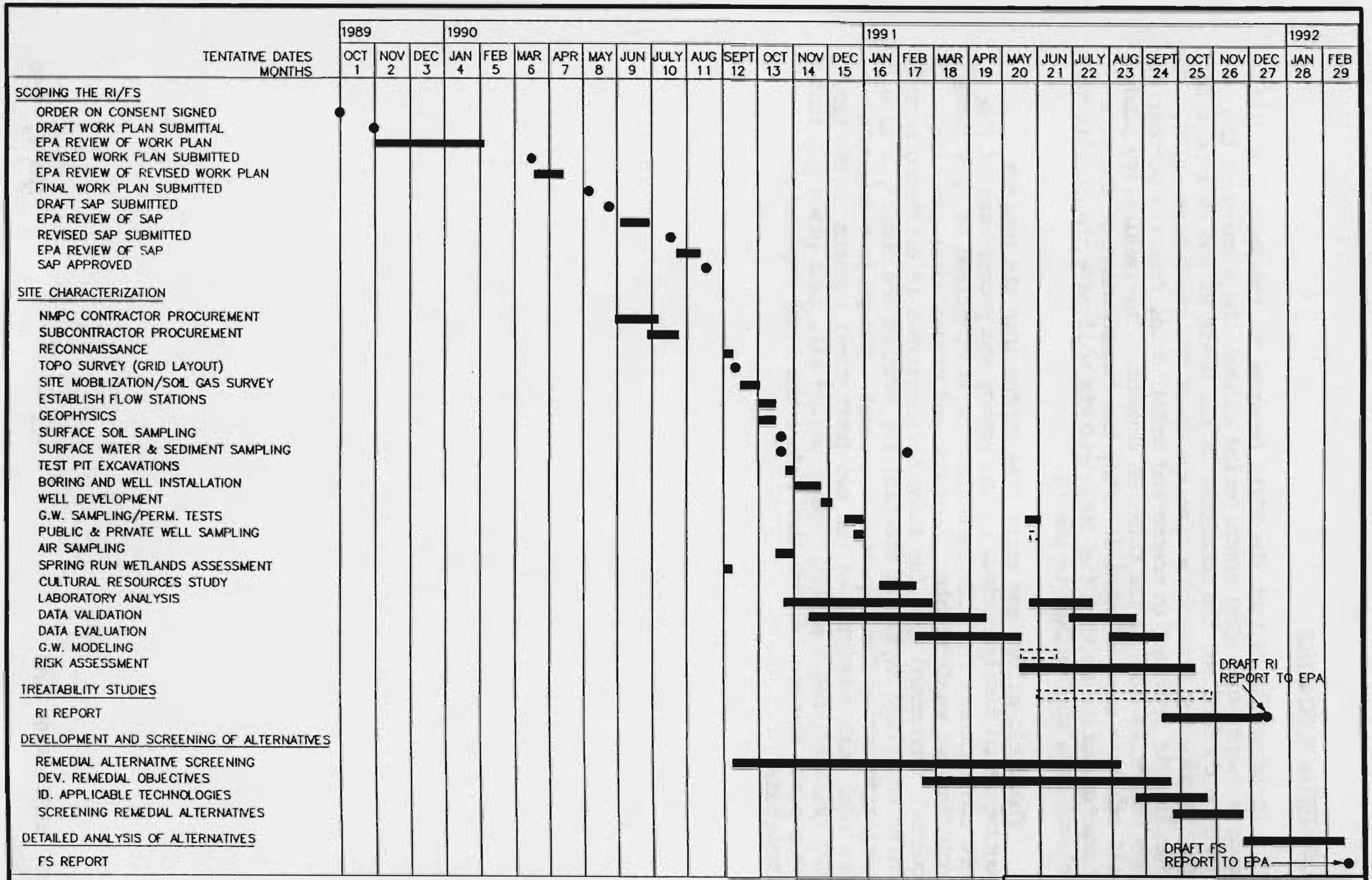
5.12.1 Community Relations

USEPA Region II will take the lead in preparing and implementing a Community Relations Plan.

6.0 PROJECT SCHEDULE

It is estimated that the RI/FS program for the NMPC Site will cover a twenty-nine (29) month period between the signing of the Order on Consent and the submittal of the draft RI and FS report to EPA. Figure 6-1 provides a timeline chart for the entire RI/FS. The time line is provided in months and actual dates from the October 2, 1989 effective date of the Order on Consent. The feasibility study will start as soon as possible after the commencement of the site characterization so that the field efforts will have the ability to collect data appropriate to the FS.

The field effort may start nine months into the program contingent on timely reviews by the agency and procurement of the NMPC contractor. The site investigation is comprised of many tasks, including two surface water, sediment and ground water sampling rounds. Turnaround time for laboratory analysis is estimated between thirty and sixty days. If treatability studies are chosen, a five month time period for them is not unusual. The project schedule concludes with submittal of the two draft final reports to the EPA. NMPC realizes that a public comment period will take place and that the reports may require revision before the final reports are submitted.



TENTATIVE TASK OR TIME FRAME BASED ON RESULTS OF THE RI

NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 6-1
RI/FS SCHEDULE

ATLANTIC PROJECT NO. 1283-03-01
ATLANTIC ENVIRONMENTAL SERVICES, INC.

7.0 PROJECT MANAGEMENT

7.1 Key Personnel and Organization

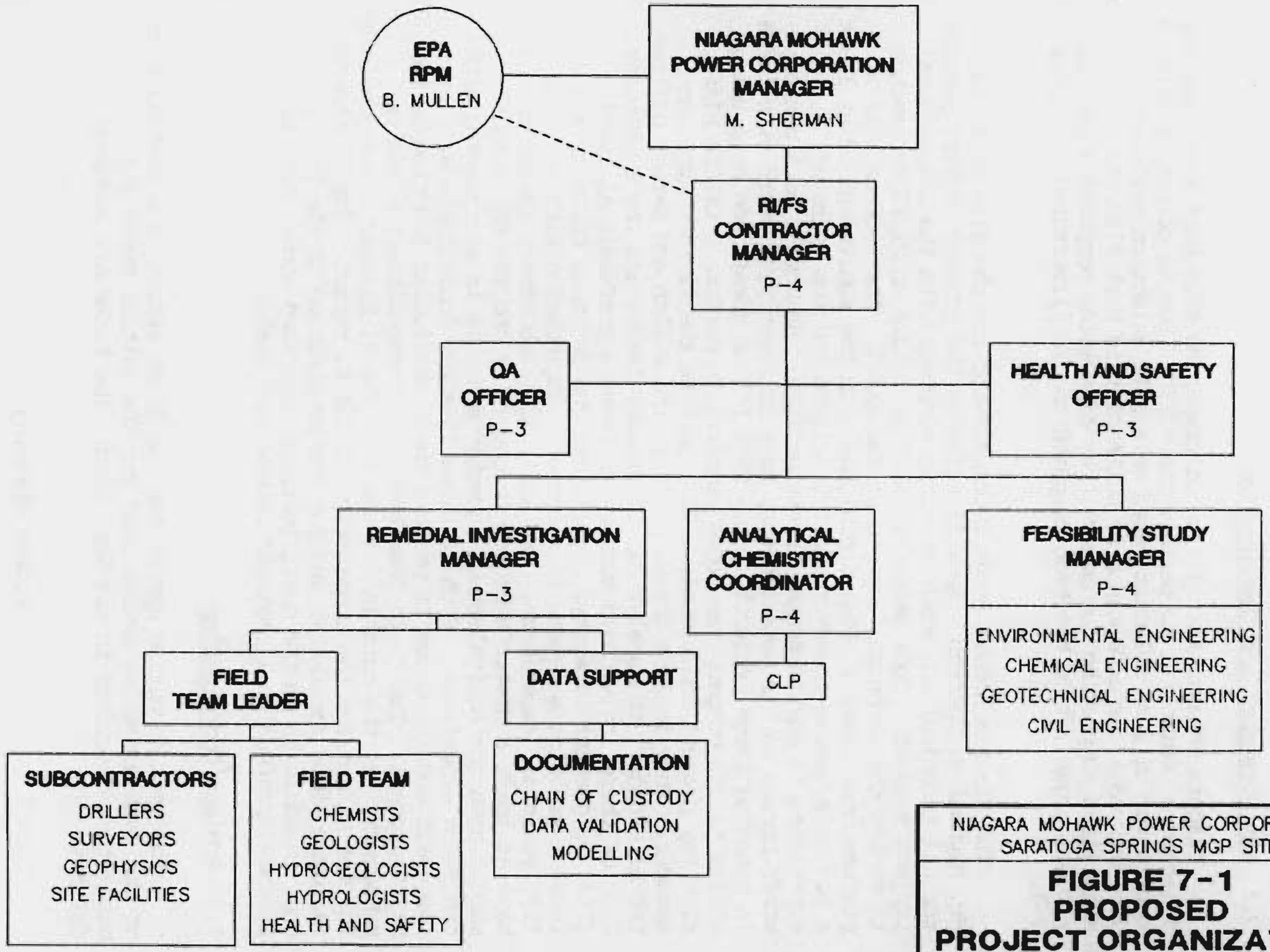
Niagara Mohawk, at the time of preparing this Work Plan, has not selected a contractor to perform the RI/FS. Due to company policy, a contractor will be selected based on a NMPC selection procedure implemented after acceptance by USEPA of this Work Plan and associated supporting documents. For discussion purposes a generic project organization has been prepared and is illustrated in Figure 7-1.

The Niagara Mohawk Project Coordinator for the Site RI/FS is Mr. Michael W. Sherman. He will serve as the primary contact person for all technical and administrative purposes with the EPA regional project manager. Once selected, NMPC will have an RI/FS contractor to manage the technical aspects of the RI/FS. That person will be a professional level 4 (PL4) individual with the equivalent of at least a Master's degree in environmental science and ten years of experience in environmental investigations. He should be a senior staff person in his organization, have at least five years experience in managing large projects (i.e., $500,000 or more), and have ready access to all company resources required to perform a CERCLA RI/FS. Five key project individuals will report to the RI/FS Contractor Manager. They include the QA Officer, the Health and Safety Officer, the RI Manager, the Analytical Laboratory Leader and the FS Manager. Each of these individuals must be at least a professional level 3 (PL3) or greater category. Qualifications for this category are at least a Bachelor's degree in science or engineering with at least five years of experience. The Analytical Laboratory Leader should have at least a Master's degree in chemistry and the FS Manager should have the equivalent of a Master's degree in engineering with ten years experience. Each of these five key individuals will have the staff and resources to perform their particular function in the RI/FS process. The Field Team Leader is responsible for onsite management for the duration of the RI. The RI Manager is responsible for the RI and for the preparation of the RI report. The FS Manager is responsible for the FS and for the preparation of the FS report and, in addition to the qualifications described above, must be a licensed professional engineer in New York State.

7.2 Project Coordination

The task numbering system for the RI/FS effort is a continuation of the task numbering system used for the initial tasks and activities described in the Work Plan. The tasks are numbered as follows:

Task 1	Project Planning



NIAGARA MOHAWK POWER CORPORATION
SARATOGA SPRINGS MGP SITE

FIGURE 7-1
PROPOSED
PROJECT ORGANIZATION

ATLANTIC PROJECT NO. 1283-03-01
ATLANTIC ENVIRONMENTAL SERVICES, INC.

Task 2	Community Relations
Task 3	Field Investigation
Task 4	Sample Analyses/Validation
Task 5	Data Evaluation
Task 6	Risk Assessment
Task 7	Treatability Study/Pilot Testing
Task 8	Preparation of Remedial Investigation Report
Task 9	Remedial Alternative Screening
Task 10	Detailed Evaluation of Remedial Alternatives
Task 11	Preparation of Feasibility Study Report
Task 12	Post RI/FS Support

The task list, in addition to a project schedule, comprise the baseline plans which form an integrated management information system against which work assignment progress can be measured. The baseline plans are a precise description of how the Work Assignment will be executed in terms of work scope, schedule, staffing and cost. The project schedule is presented in Section 6.0.

The site-specific quality assurance requirements will be in accordance with the Quality Assurance Project Plan to be developed as part of the Sampling Analysis Plan (SAP).

Data Management aspects of the program pertain to controlling and filing documents. The NMPC contractor will develop a program filing system that conforms to the requirements of the EPA to ensure that the documents are properly stored and filed. This guideline will be implemented to control and file all documents associated with the Site's RI/FS. The system includes document receipt control procedures, a file review and inspection system, and security measures.

In accordance with paragraph number 47 of the Order on Consent, the NMPC contractor shall prepare and provide NMPC and EPA with monthly progress reports which:

- describe the actions which have been taken toward achieving compliance with the Order during the previous month;

- include all results of sampling and tests and all other data received by Respondent during the previous month in the implementation of the work required;
- describe all actions, data and plans which are scheduled for the next month and provide other information relating to the progress of work as is customary in the industry;
- include information regarding percentage of completion, all delays encountered or anticipated that may affect the future schedule for completion of the work hereunder, and a description of all efforts made to mitigate those delays or anticipated delays.

These progress reports will be submitted to NMPC and EPA by the tenth (10th) day of each month.

7.3 Staff Training

The site specific training program for the NMPC contractor and subcontractors will include both technical and health and safety meetings and site briefings. The purpose of these meetings is to assure that the NMPC contractor and project subcontractors are aware of technical issues including field operations procedures and field documentation requirements, and health and safety issues.

Prior to the initiation of the field investigation, a project kickoff meeting will be held with members of the project team, the subcontractor's field personnel, and NMPC Site Operations Supervisors. A general overview of the project site investigation will be presented along with a detailed discussion of technical and health and safety requirements.

During the implementation of the RI field program, emphasis will be placed on sample acquisition and documentation methodology in accordance with the procedures outlines in the SAP. Every attempt will be made to assure that high quality field data is generated by the field investigation program. Required deviations from the SAP procedures will be documented on the Field Change Request Form and forwarded through the RI Manager to the Site Manager. The EPA Project Manager will be notified immediately of any deviations from the approved SAP procedures.

7.4 Problem Management

Problems which arise during the RI/FS will be reported through the chain of command established within the NMPC contractor project team. Resolution of problems will be expected by the RI/FS Contractor Manager, who has the ultimate responsibility for implementing and expediting the RI/FS.

The NMPC contractor's approach to technical problem management includes coordination between the RI Manager and Quality Assurance Officer through the process outlined by the Quality Assurance Project Plan. The Quality Assurance Project Plan provides for a sequence of reports, actions and orders to assure that problems encountered during the RI/FS are resolved. The Problem Management sequence of actions for the Saratoga Springs RI/FS process are discussed in the following sections.

7.4.1 Nonconformance Report

The Quality Assurance Officer or his designee will issue a Nonconformance Report (NCR) for each nonconforming condition identified, i.e., when objectives for precision, accuracy, completeness, representativeness or comparability are not satisfied or when unacceptable procedural practices or conditions are identified.

The Nonconformance Report will fully describe the conditions requiring corrective action, indicate the nature of the corrections required, and specify a schedule for compliance. The final authority for issuance of an NCR rests with the Quality Assurance Officer who will notify the RI/FS Contractor Manager.

7.4.2 Corrective Action

Upon the issuance of an NCR, it will be delivered to a responsible office of the analytical laboratory, the RI/FS Contractor Manager, the EPA RPM, the NMPC Project Coordinator, and/or any organization involved. The NCR will provide space for the responsible individual to indicate the nature of the corrective action taken, and will require appropriate documentation of such action. The corrective action taken will include measures to preclude a repetition of the original deficiency. After the NCR has been reviewed and the corrective action is acceptable, the Quality Assurance Officer will sign the NCR to this effect and inform the involved parties that the NCR has been satisfactorily resolved.

7.4.3 Stop-Work Order

If corrective actions are insufficient, or resolution cannot be reached, or results of prior work are indeterminate, work may be stopped by a Stop-Work Order. The Stop-Work Order can only be authorized by the RI/FS Contractor Manager, EPA RP Manager, NMPC Project Coordinator, or Quality Assurance Officer in writing. If there is a disagreement between the Quality Assurance Officer and the RI/FS Contractor Manager, the differences shall be brought to the attention of succeeding levels of management and the EPA RP Manager and NMPC Project Coordinator until resolution is achieved.

7.4.4 Stop-Work Corrective Action

The conditions under which the Stop-Work Order was issued will be described in sufficient detail to allow proper evaluation of the problems and to effect proper corrective action. Documentation of discussions, telecons, or correspondence which describe the actions taken to evaluate the problems, provide solutions, and verify implementation of solutions shall be attached to the Stop-Work Order and fully referenced in the appropriate spaces. Work shall not continue until the Stop-Work Order has been rescinded by the individual that authorized the stop work.

7.4.5 Cause and Action to Prevent Recurrence

The Quality Assurance Officer shall track the NCRs, analyze the corrective actions required, and take the necessary steps to resolve the causes of the nonconforming conditions in order to prevent recurrence.

7.4.6 Field Changes

The RI/FS Contractor Manager or his designee is responsible for all site activities. In this role the RI Manager is required to adjust site programs to accommodate site specific needs. When it becomes necessary to modify a program, individuals tasked with key field activities will notify the RI Manager of the anticipated change and implements the necessary changes. The NMPC Manager, RI/FS Contractor Manager and the USEPA will be notified when necessary. When a change is determined to be necessary, a written notification shall be submitted by the initiator of the change and a copy shall be attached to the file copy of the affected document. If unacceptable, the action taken during the period of deviation will be evaluated in order to determine the significance of any departure from established program practices and action taken. Modifications to some procedures may occur in the field through the cooperative agreement of the NMPC contractor and USEPA's oversight consultant. Any modifications which cannot be resolved in the field will be referred to USEPA.

The changes in the program are documented on a field change request which is signed by the initiator and RI Manager. A typical Field Change Request (FCR) Form utilized to document field changes is shown on Figure 7-2. The FCRs for each document shall be numbered serially starting with the number "1".

The RI Manager is responsible for the controlling, tracking and implementation of the identified changes. Completed field change requests are distributed to affected parties which will include: RI/FS Contractor Manager, RI Manager, Field Team Leader and Quality Assurance Officer.

7.4.7 Quality Assurance Reports to Management

7.4.7.1 Frequency

At monthly intervals, the Quality Assurance Officer will prepare and provide a quality assurance report to the NMPC Project Coordinator and EPA Remedial Project Manager on the performance of the Quality Assurance Program for the project. Potential problems which arise between regular reporting periods may be identified to program management at any time.

7.4.7.2 Contents

The reports to management will contain:

- Results of all system and performance audits conducted during the period;
- An assessment of the accuracy of measurement data, precision, completeness, representativeness, and comparability;
- A listing of the Nonconformance reports issued during the period, related corrective actions undertaken, and an assessment of the results of these actions; and
- Identification of significant quality assurance problems and recommended solution.

FIGURE 7-2
FIELD CHANGE REQUEST
-TYPICAL-

NIAGARA MOHAWK P.C. SITE I.D.	WORK CHARGE NUMBER	FIELD CHARGE NO.
		FCR

To______________________ Location________________ Date__________

Description:

Reason for Change:

Recommended Disposition:

Field Operations Leader (Signature) Date

Disposition:

Site Manager (Signature) Date

Distribution:
RI/FS Contractor Manager
Quality Assurance Officer
RI Manager
Field Team Leader

Others as required ______

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