Niagara Mohawk®

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Transmitted Via US Mail

December 5, 2001

Mr. John Spellman, P.E.
Project Manager
MGP Remedial Section
Bureau of Western Remedial Action
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-7017

Re: Greater Amsterdam Riverlink Park
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation Final Report
Amsterdam, New York

Dear John:

Attached for your files, and in accordance with the Voluntary Cleanup Agreement Index Number: D4-0001-99-03, please find four copies (one unbound) of Phase II Area Investigation Report for the Greater Amsterdam Riverlink Park, Amsterdam (Front Street) Former MGP Site.

This report was finalized in accordance with your May 14, 2001 letter approving our responses to the NYSDEC comments on the report.

Please feel free to contact me if you have any questions or require further information.

Sincerely,

Steven P. Stucker

cc: Dr. G. Anders Carlson, NYSDOH (one copy)
Ms. Jeanne L. Hewitt, NYSDOT (one copy)
Mr. Francis P. Gerace, P.E., NYSDOT (one copy)
Mr. John Dergosits, P.E., NYSCC (one copy)
Shannon Hoffman, Esq., NYSCC (one copy)
The Hon. Paul D. Tonko, New York State Assembly (one copy)
Mr. Karl Gustafson, City of Amsterdam (one copy)
Mr. Doug Nadler, Amsterdam Waterfront Commission (c/o Mayor's office, one copy)
Mr. Daniel Sitler, The Saratoga Associates (one copy)
Mr. David J. Ulm, BBL (one copy)
Mr. George M. Thomas, BBL (one copy)
Ms. M. Cathy Geraci, BBL (one copy)

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REPORT

Phase II Area Investigation Report

Greater Amsterdam Riverlink Park Amsterdam (Front Street) Former MGP Site

Niagara Mohawk Power Corporation
Syracuse, New York

December 2001

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Phase II Area Investigation Report

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CERTIFICATION

NIAGARA MOHAWK POWER CORPORATION

PHASE II AREA INVESTIGATION
GREATER AMSTERDAM RIVERLINK PARK
AMSTERDAM (FRONT STREET) FORMER MGP SITE
AMSTERDAM, NEW YORK

I, David J. Ulm, hereby certify that all activities that comprised the Phase II Investigation for the Amsterdam (Front Street) Former MGP were performed in substantial conformance with the New York State Department of Environmental Conservation (NYSDEC) approved October 1999 Draft Investigation Work Plan, Phase II Area, Greater Amsterdam Riverlink Park, Amsterdam (Front Street) Former MGP Site as modified by a letter dated November 18, 1999 from Niagara Mohawk Power Corporation to the New York State Department of Environmental Conservation.

David J. Ulm, Senior Vice President
Blasland, Bouck & Lee, Inc.
6723 Towpath Road
Syracuse, New York 13214

11/28/01
Date

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1. Introduction

1.1 General

This report summarizes the work performed for and the findings of the Phase II Area Investigation conducted at the Greater Amsterdam Riverlink Park (Park) in Amsterdam, New York. The location of Riverlink Park is shown on Figure 1. Blasland, Bouck & Lee, Inc. (BBL) performed the investigation, on behalf of the Niagara Mohawk Power Corporation (NMPC), to gather the information needed to develop a Remediation Work Plan (RWP) for a portion of the site identified as the "Phase II Area". The Riverlink Park and the limits of the Phase II Area are shown on Figure 2. The investigation followed the plan and procedures presented in the October 1999 *Draft Investigation Work Plan, Phase II Area* (BBL, 1999a), as modified by a letter dated November 18, 1999 from NMPC (collectively referred to hereafter as the *IWP*). The New York State Department of Environmental Conservation (NYSDEC) provided their approval of the *IWP* in a November 29, 1999 letter (NYSDEC, 1999).

The Riverlink Park consists of two adjacent properties, the New York State Department of Transportation (NYSDOT) property to the west, and the New York State Canal Corporation (NYSCC) property to the east. The site is defined in the Voluntary Cleanup Agreement (VCA), Index Number: D4-0001-99-03, as the property that was acquired by the State of New York in 1966 depicted on Map #100 as Parcel #126 in the City of Amsterdam, County of Montgomery and State of New York. Exhibit A of the VCA shows the general location of the site that consists of the NYSDOT property. The approximate limits of the NYSDOT property are also shown on Figure 2. Both the NYSCC and NYSDOT properties are being redeveloped into a waterfront park through funding largely provided by the State of New York and the City of Amsterdam. Additionally, the New York State Canal Corporation (NYSCC) recently completed the design, construction, and engineering oversight of a new canal terminal wall at the eastern end of the site which replaced the pre-existing deteriorating terminal wall in that area. Features of the proposed Riverlink Park are shown on Figure 2.

To expedite remediation and redevelopment of a portion of the site, the Riverlink Park was divided into two areas, the Phase I and Phase II Areas (Figures 2 and 3). The Phase I Area is that portion of the site that was targeted for expedited cleanup; accordingly, NMPC performed an Interim Remedial Measure Investigation (IRMI) and subsequently completed an Interim Remedial Measure (IRM) in that area in 1999. The Phase I Area consists of the following:

- The Riverlink Plaza (Figure 2);
- The area northwest of the Riverlink Plaza (near the proposed playground, see Figure 2);
- The portion of the Riverlink Park which extends from the Riverlink Plaza to the eastern site boundary; and
- A limited area to the west of the Phase I/Phase II Area boundary line, near RW-3 (Figure 3).

The IRMI was conducted from April to June 1999 and directly followed by the IRM, which was conducted from July 1999 to January 2000. The results of the IRMI and IRM were submitted to the NYSDEC in the following two documents, respectively:

- *Preliminary Interim Remedial Measure Investigation Report* (*IRMI Report*, BBL, 1999b); and
- *Draft Final Engineering Report, Riverlink Plaza Area, Interim Remedial Measure* (*IRM Report*, BBL, 2000).

1.2 Purpose of the Phase II Area Investigation

The purpose of the Phase II Area Investigation is to supplement the existing site information gathered during previous investigations and provide sufficient environmental information to evaluate potential human exposure pathways and to identify/evaluate potential environmental impacts associated with MGP-related material present in the Phase II Area. The purpose of the activities to be completed under the RWP will be to remediate the Phase II Area so that redevelopment of this area can resume, in accordance with the requirements of the VCA. For the purpose of this Investigation Report, the Phase II Area includes the areas where investigations were completed during implementation of the *IWP*. This includes the following:

- The area of the Riverlink Park, owned by the New York State Department of Transportation (NYSDOT), located immediately west of the Phase I/Phase II boundary (including the proposed areas of the Great Lawn and the Manufactured Rock Sculpture [Figure 2]);

- An area owned by the NYSDOT and Adicommco, Inc., located beneath and approximately 200 feet to the west of the State Route 30 bridge (Figure 3);

- The riverbank along the southern boundary of Phase II Area extending from the Phase I/Phase II boundary line to the confluence of North Chuctanunda Creek with the Mohawk River/Erie Canal (Mohawk River) (Figure 3); and

- Selected sampling locations in the Mohawk River (Figure 3).

1.3 Site Location and Background

As shown on Figure 1, the Riverlink Park is located along the northeastern bank of the Mohawk River in Amsterdam, New York, just southeast of the State Route 30 bridge over the Mohawk River. The Riverlink Park encompasses approximately 4.75 acres and consists of two adjacent properties, including the NYSDOT property to the west, and the New York State Canal Corporation (NYSCC) to the east (Figure 2).

As previously mentioned, the site is being redeveloped into a waterfront park. The redevelopment project had been delayed by the discovery of subsurface impacts relating to a former manufactured gas plant (MGP) located largely on the NYSDOT property. The MGP was owned and operated by Chuctanunda Gas Light Company and New York Power and Light Corporation, corporate predecessors of NMPC. The NYSDOT reported the discovery of the subsurface impacts to the NYSDEC and the report was designated NYSDEC Spill Report Case Number 9805979. On August 24, 1998, the NYSCC issued a Stop Work Order to the City of Amsterdam and all construction activities were suspended. Additional construction work for the park recommenced on September 5, 2000 in the Phase I Area following completion of the aforementioned IRM in that area.

Following the discovery of the environmental issues, the NYSDOT retained Harza Northeast (Utica, New York) to perform a Preliminary Site Assessment (PSA) of the Amsterdam Riverlink Park. The PSA subsurface investigations results were submitted to the NYSDEC in a *PSA Report* (Harza, 1999). The results suggested that soil and groundwater, primarily on the NYSDOT property, were affected by MGP-related constituents.

Since the PSA was completed, NMPC has conducted an IRMI and an IRM, as previously mentioned. Additionally, NMPC entered into a VCA on November 25, 1999 between the NYSDEC, the NYSDOT, and the NYSCC. The Phase II Area Investigation and subsequent investigation/remediation activities were/will be completed in accordance with that Agreement.

1.4 Existing Site Conditions

The following subsections summarize the existing site conditions and provide a summary of conditions at the Riverlink Park. This information was obtained from the PSA performed by Harza Northeast in 1998 and early 1999, as documented in the *PSA Report* (Harza 1999) and the IRMI and IRM performed by BBL in mid-to-late 1999, as documented in the *IRMI Report* (BBL, 1999b) and the *IRM Report* (BBL, 2000), respectively.

As discussed above, the approximately 4.75 acre proposed Riverlink Park will consists of two adjacent parcels, the NYSCC parcel to the east and the NYSDOT parcel to the west. As further discussed above, the park area was divided into a Phase I Area to the east, within which an IRM was completed in late 1999, and the Phase II Area that is the subject of this investigation. The Phase I Area is generally delineated by an 8-foot high chain link fence along the eastern and northern borders of the Phase I Area and a chain link fence installed in June 2000 along the Phase I/Phase II boundary line. The fence along the Phase I/Phase II boundary line was installed to serve as a delineation line during construction activities associated with the park in the Phase I Area. These construction activities were initiated in September 2000 and included installation of a block retaining wall, stairway footers, and surface grading. A storm sewer system exists approximately 10 to 15 feet below grade at the site. This storm sewer traverses the site, roughly north to south, across the Phase I/Phase II boundary line and discharges storm water from the City of Amsterdam via a 30-inch outfall (Figure 3). A previously constructed and completed overhead walkway and support tower is present near the northwestern corner of the Phase I Area. Existing conditions in the Phase II Area generally consist of an unvegetated or lightly vegetated ground surface with a rip-rap covered river bank along the southern edge of the area. An 8-foot high chain link fence is located along the northern border of the Phase II Area. This fence also extends to the northern edge of the riverbank just east of the Route 30 bridge. The NYSDOT property and the Phase II Area also extend further to the west, below the Route 30 bridge.

A brief overview of the IRM activities that were implemented in the Phase I Area is outlined below.

- Locally excavated soil from the Riverlink Plaza Area to remove MGP-related source materials and to provide for a 2-foot soil cover.

- Placed backfill to provide for a 2-foot soil cover (less the depth of topsoil to be placed by the Redevelopment Contractor) in areas which will not be covered by structures as part of the redevelopment of the Riverlink Plaza Area, and to provide grade elevations in the other areas which facilitate, to the extent appropriate/practicable, the redevelopment of these areas.

- Locally modified the existing storm sewer catch basins to minimize the potential for vapor migration out of the storm sewer system.

- Installed three non-aqueous-phase liquids (NAPL) recovery wells to facilitate the collection of NAPL in the areas where measurable thicknesses of NAPL have been previously observed in monitoring wells located within the Phase I Area.

- Handled and treated and/or disposed of waste materials generated during implementation of the IRM activities, in accordance with applicable rules and regulations.

Additionally, the three IRM activities outlined below were implemented in the Phase II Area to supplement the work completed in the Phase I Area.

- Removed approximately 500 gallons of tar/water within the tar/water separator structure located below grade west of the Riverlink Plaza Area (the tar/water separator on Figure 4), and subsequently removed the structure and the surrounding soil. Additional soil with MGP-related constituents was present in the sidewalls of this excavation.

- Installed three sentinel wells along the Phase I/Phase II line to monitor for NAPL and, if observed, collect NAPL (see Figure 4).

- Installed a hot-rolled, interlocking steel sheet piling shallow barrier wall east of former manufactured Gas Holder No. 2 (see Figure 4) as a means to limit the potential eastern migration of NAPL or oils that may be present within or around this former gas holder.

A detailed description of the Phase I Area IRM activities is presented in the *IRM Report*.

1.4.1 General Site History

The following summarizes the general history of the site, based on findings of the PSA.

- Chuctanunda Gas Light Company, a predecessor to NMPC, began operating an MGP on the NYSDOT property in 1866, and MGP operations continued until about 1932. After 1932, gas was piped in from Troy, New York. In about 1963, the NYSDOT appropriated the property from NMPC to construct the State Route 30 bridge over the Mohawk River. Construction of the bridge began around 1968 and was completed by 1972.

- The MGP operations changed and increased in capacity through time. At the time of shut down, the MGP appears to have consisted of three gas holders (the two westernmost of which were apparently constructed with below-grade foundations), several retort buildings, three purifying buildings, and several associated support buildings and structures (e.g., boiler, coal shed, tool shed, tar well). Figure 3 shows the approximate locations of the historic buildings and known subgrade structures formerly located on-site.

- The NYSCC property was used as a canal terminal for loading and unloading commercial goods along the Erie Canal. Commercial buildings, including warehouses, were present in the eastern portion of the site from the 1920s to the 1960s (Figure 3), and were demolished by 1968.

1.4.2 General Site Geology

The following bullets summarize the general stratigraphy beneath the Riverlink Park. This information was obtained from the *PSA Report* (Harza, 1999) and updated with data collected during the IRMI, IRM, and Phase II Area field investigative activities. A detailed description of the geology beneath the Phase II Area is provided in Section 3.2.

- Fill, ranging in thickness from approximately 2 feet to 21 feet, underlies the Riverlink Park. At former Gas Holder No. 1, located beneath the bridge, the fill over the holder floor is approximately 20 feet thick, at former Gas Holder No. 2 the fill is approximately 14 feet thick, and at former Gas Holder No. 3 (former Gas Holder No. 3 was removed during the IRM) the fill has a maximum thickness of 20 feet, based on backfilling during the IRM (BBL, 2000). The fill is approximately 21 feet thick along the new terminal wall as a result of construction of the previous terminal wall, as observed at boring SB-20 (BBL, 1999b). The fill generally thickens southward, toward the river, and contains considerable coarse materials, including cobbles, concrete, bricks, cinders, slag, wood, and metal debris.

- A silt unit underlies the fill materials, but is not present at all locations beneath the Park (especially along the northern boundary). Based on a review of boring logs, the silt is occasionally interbedded with sand lenses and stringers, and silt laminae.

- A sand-and-gravel unit underlies the silt. The sand-and-gravel unit has a relatively high hydraulic conductivity and is underlain by a relatively thin layer of discontinuous fine sand and silt, which overlies the bedrock. Depending on location, the fill, silt, sand and gravel, and lower silt are directly underlain by limestone bedrock.

- The surface of the limestone bedrock at the Park dips steeply toward the south with a more gentle dip component to the west. Bedrock is encountered at a shallow depth of approximately 3 feet below ground surface (bgs) near the northern property boundary and at a deeper depth of approximately 71 feet bgs at the southern property boundary, near the riverbank. The dip of the bedrock surface steepens dramatically immediately south of the Park, based on borings and geophysical data collected for construction of the State Route 30 bridge and repair of the terminal wall.

- The contact between the Trenton and Black River Groups limestone, and the Beekmantown Group limestone and dolostone is located near the Park based on the Geologic Map of New York, Hudson-Mohawk Sheet (New York State Museum and Science Service, 1970).

1.5 Investigation and Remediation Objectives

The objectives of the Phase II Area Investigation were to provide sufficient environmental information to evaluate potential human exposure pathways and to identify/evaluate potential environmental impacts associated with MGP-related material present in the Phase II Area. As presented in the *IWP*, the objectives of the subsequent remedial activities to be completed in the Phase II Area are to:

- Mitigate potential human exposure pathways and potential environmental threats associated with MGP-related material present in the Phase II Area (i.e., meet the state-mandated requirements of protecting human health and the environment);

- Address applicable Standards, Criteria, and Guidance (SCGs); and

- Provide a final remedy for the Phase II Area.

Additionally, the VCA requires that ". . . the proposed remedial plan must eliminate or mitigate all significant threats to the environment or public health determined to result from Existing Contamination[1] and must be sufficient to provide for safe implementation of the Contemplated Use[2] of the Site."

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[1] "Existing Contamination": hazardous substances ("hazardous substances"), which term shall mean any substance which appears on the list promulgated pursuant to ECL 37-0103, associated with the manufactured gas plant ("MGP") wastes which resulted from the MGP formerly operated on the Site. The term includes any contamination encountered during implementation of any Work Plan, the existence, nature and/or extent of which were not known at the time of approval of such Work Plan, to the extent such contamination is related to the operations of NMPC or its predecessors.

[2] "Contemplated Use": a public recreation area and a public highway, which areas will be maintained by the New York State Department of Transportation ("NYSDOT").

In support of the objectives, the Phase II Area Investigation activities address a Human Health Exposure Pathway Assessment (Section 4), and also identify potential environmental impacts by characterizing affected soils and groundwater in the Phase II Area, and surface water and surface sediments in the adjacent Mohawk River, using New York State SCGs.

1.6 Report Organization

This Phase II Area Investigation Report is organized into the following eight sections outlined below:

- Section 1 - The **Introduction** provides a summary of the project background and presents the project objectives.
- Section 2 - Describes the tasks comprising the **Investigation Activities** including the Geophysical Investigation, Soil Investigation, Sediment Investigation, Groundwater Investigation, Surface-Water and Storm-Water Investigation, NAPL Monitoring and Removal Program, Riverbank Assessment, Qualitative Human Exposure Evaluation, Fish and Wildlife Impact Analysis, and Cultural Resources Investigation.
- Section 3 - Presents the **Field Investigation Results**.
- Section 4 - Presents the results of the **Qualitative Human Health Evaluation**.
- Section 5 - Presents the results of the **Fish and Wildlife Impact Analysis**.
- Section 6 - **Cultural Resources Evaluation**.
- Section 7 - Provides the **Summary** of the Phase II Area Investigation.
- Section 8 - Provides **Remedial Action Objectives** for the Phase II Area.
- Section 9 - Provides **References** used for preparing this Phase II Area Investigation Report.

2. Investigation Activities

2.1 General

This section presents a description of activities performed during the Phase II Area Investigation to meet the objectives set forth in Section 1.5. This investigation included the following efforts:

- Geophysical Investigation;
- Soil Investigation;
- Sediment Investigation;
- Groundwater Investigation;
- Surface-Water and Storm-Water Investigation;
- NAPL Monitoring and Removal Program;
- Riverbank Assessment;
- Qualitative Human Exposure Evaluation;
- Fish and Wildlife Impact Analysis; and
- Cultural Resources Investigation.

The field activities completed during the Phase II Area Investigation were performed in accordance with the *IWP* and the following supporting documents:

- The Field Sampling Plan (FSP), included as Appendix A of the *IWP*, provided field protocols used during the Phase II Area Investigation;

- The Quality Assurance Project Plan (QAPP), included as Appendix B of the *IWP*, provided general and laboratory procedures, including quality assurance/quality control (QA/QC) procedures used during the Phase II Area Investigation; and

- The Health and Safety Plan (HASP), included as Appendix C of the *IWP*, provided project-specific health and safety procedures followed by field personnel during the Phase II Area Investigation.

Field activities conducted in connection with this investigation were completed during several mobilizations between November 1999 and June 2000.

The field activities completed during the Phase II Area Investigation are described below.

2.2 Geophysical Investigation

A surface geophysical investigation was implemented in the Phase II Area to address the following investigation objectives:

- Provide data to supplement a previous geophysical investigation completed by Harza during the *PSA Report* (Harza, 1999) to delineate subsurface conditions (e.g., MGP-related structures and utilities);

- Identify possible subsurface preferential pathways (e.g., MGP-related piping) to the Mohawk River along the southern boundary of the Phase II Area; and

- Determine, if possible, the location of the "tar well" within the Phase II Area as shown on historical site maps and on Figure 3.

The geophysical investigation consisted of electromagnetic (EM) and ground penetrating radar (GPR) surveys that were conducted during the week of November 1, 1999. The EM and GPR surveys were performed in accordance with the procedures discussed in the *IWP*. A description of the procedures and results of the geophysical investigation were summarized in a December 3, 1999 letter to Mr. John Spellman, P.E., of the NYSDEC. That letter is provided in Appendix A. As a result of the findings of the geophysical investigation, three test pit locations (TP-33, TP-34, and TP-35) were recommended and subsequently completed, in addition to those previously recommended in the *IWP*.

2.3 Soil Investigation

The soil investigation was conducted to generate soil-quality and geologic data to:

- Define the concentration, and relative extent (horizontal and vertical) of MGP-related constituents in soil within the Phase II Area; and

- Update the working conceptual model of subsurface conditions at the Riverlink Park (as developed during the IRMI), including identifying subsurface structures (e.g., foundations and tanks), the nature and distribution of fill materials and other unconsolidated deposits, and the nature of and depth to bedrock.

The soil investigation included excavating test pits, drilling soil borings, and collecting subsurface soil samples. These activities were completed in accordance with procedures described in the FSP included in the *IWP*. Subsurface soil samples were collected from test pits and soil borings for visual characterization (i.e., staining, soil type, etc.) and headspace screening using a photoionization detector (PID). Visual observations and PID measurements were typically used as a basis for selecting soil samples for analytical analysis. All soil samples and associated Quality Assurance/Quality Control (QA/QC) samples were submitted to Galson Laboratories of East Syracuse, New York for analysis of benzene, toluene, ethylbenzene, and xylene (BTEX) (United States Protection Agency [USEPA] Method 8260), polynuclear aromatic hydrocarbons (PAHs) (USEPA Method 8270), and total cyanide (USEPA Method 9010), using NYSDEC Analytical Services Protocol (ASP) 1995 Methods with Category B Deliverables. In addition, some soil samples were submitted for analysis of total organic carbon (TOC) with results-only data deliverables.

Table 1 summarizes the test pit and soil boring samples that were submitted for laboratory analysis. A discussion of the test pit and soil boring installation procedures including subsurface soil collection is presented below. Test pit and soil boring locations are shown on Figure 3.

2.3.1 Test Pit Excavation

As part of the soil investigation, BBL's subcontractor, Nothnagle Drilling of Scottsville, New York, excavated eight test pits identified as TP-29, TP-30A, TP-30B, TP-31, TP-32, TP-33, TP-34, and TP-35 (Figure 3). The test pits were excavated, using a rubber-tired backhoe. A general description and rationale for each test pit is provided below.

Test Pit Identification	General Description/Rationale
TP-29	Investigate the presence of potential MGP-related materials near the former purifying house located immediately south of PSA test pit TP-24.
TP-30A/TP-30B	Assess potential MGP-related impacts near the "tar well" identified on historic site maps just northwest of former Gas Holder No. 2.
TP-31	Evaluate whether there may be potential MGP-related impacts associated with a cast-iron pipe observed approximately 3 feet below grade along the bank of the Mohawk River near MW-6.
TP-32	Assist in determining the type of construction and approximate size of former Gas Holder No. 1, as well as to assess the potential MGP-related impacts near this former gas holder.
TP-33	Assist in determining the type of construction and approximate size of former Gas Holder No. 2, as well as to assess the potential MGP-related impacts near the former gas holder, and investigate the cause of a geophysical anomaly identified during the geophysical investigation, as discussed in Section 2.2.
TP-34	Investigate the cause of a geophysical anomaly identified during the geophysical investigation, as discussed in Section 2.2.
TP-35	Investigate the cause of a geophysical anomaly identified during the geophysical investigation, as discussed in Section 2.2.

Subsurface conditions encountered at each test pit location and PID headspace screening measurements from soil samples obtained during test pit excavation are summarized in the test pit logs, presented in Appendix B. A description of materials encountered during test pit excavation is presented in Section 3.2.

2.3.2 Soil Boring/Bedrock Coring

A total of 13 soil borings and/or bedrock coreholes were drilled during the soil investigation. Borings and coreholes were drilled by Nothnagle Drilling using procedures described in the FSP included in the *IWP*. Borings/coreholes were installed as discussed below.

- Seven soil borings were installed to permit installation of overburden monitoring wells MW-1S, MW-4S, MW-6S, MW-6M, MW-15, MW-16S, and MW-16D and to assess the presence/absence of MGP-related constituents beneath the Phase II Area;

- One soil boring, SB-38, was drilled for the installation of monitoring well MW-15 and to delineate the extent of potential MGP-related impacts west of former Gas Holder No. 1. A sheen and odor were noted in soil at this location. Therefore, the extent of MGP-related impacts was not considered to be adequately defined. Given that the objective for this boring location was to define the western extent of MGP-related constituents and install a "clean" monitoring well, SB-38 was abandoned and soil boring/monitoring well MW-15 was installed approximately 50-feet further to the west at a location where sheen and odors were not noted; and

- Five soil borings/rock coreholes were installed to confirm the top of bedrock, evaluate/assess the presence/absence of MGP-related constituents in soil and rock beneath the Phase II Area, and to permit installation of bedrock monitoring wells MW-1R, MW-4R, MW-6R, MW-13, and MW-14.

Subsurface conditions encountered at each soil boring/bedrock corehole location are presented in Section 3.2 and are summarized in the boring logs presented in Appendix C.

2.4 Sediment Investigation

A sediment investigation was performed along the Mohawk River between November 17 and November 19, 1999 to gather data for evaluating the presence/absence of MGP-related materials in shallow river sediments in the vicinity of the Riverlink Park. In accordance with the *IWP*, sediment samples were collected along a series of seven transects located upgradient, adjacent to, and downgradient of the Park, each extending perpendicular to the northern riverbank (see Figure 3). At each transect, the following locations were selected for sample collection, as specified in the *IWP*:

- Sample location No. 1 approximately 25 feet south of the shoreline;
- Sample location No. 2 approximately 50 feet south of the shoreline;
- Sample location No. 3 approximately 75 feet south of the shoreline; and
- Sample location No. 4 approximately 100 feet south of the shoreline.

As such, a total of 28 locations were selected for sample collection. As indicated in the *IWP*, two samples were proposed for collection at each sample location, one surface-sediment (0 to 6 inches) and one near-surface sediment (between 6 inches and 3 feet, depending on field screening); therefore, collection of a total of 56 sediment samples was attempted during the sediment sampling program.

Due to lack of available soft sediment at several of proposed sampling locations, sediment samples could be collected at only 15 of the 28 proposed locations. Furthermore, a total of only 22 sediment samples could be collected from the 15 sediment sampling locations. All sediment samples and associated QA/QC samples were submitted to Galson Laboratories for analysis of BTEX, PAHs, and total cyanide, using NYSDEC ASP 1995 Methods with Category B deliverables. TOC samples were analyzed using the Lloyd Kahn Method with results-only deliverables. Table 1 lists the sediment samples that were collected and Figure 3 shows the sediment sample locations.

At each sample location, sediment sampling consisted of using either dedicated, disposable Lexan™ tubing or a hand-held dredge sampler to obtain shallow sediment samples. Initially, Lexan™ tubing was used at each location to attempt to obtain samples from the upper six inches and deeper, if possible. This approach was successful for collection of sediment at sampling locations SD-3 (0-0.6 feet), SD-8 (0-0.5 feet), and SD-8 (0.5-1 feet). The remainder of the sediment samples was collected with the hand-held dredge sampler. Sampling with both the Lexan™ tubing and the hand-held dredge sampler was tried and unsuccessful at the remaining locations. Upon removal from the river bottom, sediments were visually described and screened with a PID for the presence and relative concentration of VOCs. The sediment description included sediment type, PID measurements, indications of sheen/oil, if any, and the intervals where such materials were observed. Sediment characteristics and analytical results are discussed in Section 3.3.

2.5 Groundwater Investigation

The groundwater investigation was conducted to generate hydrogeologic and water-quality data necessary to:

- Estimate horizontal groundwater flow direction(s), hydraulic gradients, geologic-unit hydraulic conductivities, and groundwater discharge/mass loading to the Mohawk River from the Phase II Area;
- Identify MGP-related constituents and their extent in groundwater beneath the Phase II Area; and
- Identification of the presence and extent of light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) beneath the Phase II Area.

The groundwater investigation consisted of the following:

- Installing and developing seven overburden monitoring wells and five bedrock monitoring wells;
- Obtaining water level measurements from the 12 new monitoring wells, 10 existing monitoring wells, and the Mohawk River gauging point. Additionally, a network of seven pressure transducers was installed in selected monitoring wells to record water levels during the annual lowering of the Mohawk River;
- Completing in-situ hydraulic conductivity testing on all new monitoring wells not containing a measurable thickness of NAPL; and
- Conducting groundwater sampling of all on-site monitoring wells containing no measurable thickness of NAPL.

With the exception of MW-1R, monitoring wells were installed and developed, water levels were measured, and hydraulic conductivity testing was performed in substantial accordance with procedures described in the FSP included in the *IWP*. Due to difficult drilling conditions, monitoring well MW-1R was installed with a one-inch diameter PVC casing and well screen instead of a two-inch diameter PVC casing and screen. This change in scope of work was discussed with and approved by the NYSDEC prior to installation of the well. As such, a different groundwater sampling technique for sampling MW-1R was discussed with and approved by the NYSDEC. The different technique included using an inertial pump to purge and sample groundwater from MW-1R. All other monitoring wells were sampled using the "low-flow" technique as described in Section 2.5.3.

Groundwater samples and associated QA/QC samples were collected from monitoring wells and submitted to Galson Laboratories for analysis of BTEX, PAHs, total cyanide using NYSDEC ASP 1995 Methods with Category B deliverables, and total and dissolved iron and manganese, nitrate, nitrite, ammonia, sulfate, sulfide, and alkalinity with standard reporting requirements. In addition, groundwater samples were collected from each well and shipped to Microseeps, Inc. of Pittsburgh, Pennsylvania for analysis of methane, carbon monoxide, carbon dioxide, nitrogen, and dissolved oxygen.

Table 1 summarizes the groundwater samples submitted for laboratory analysis. A discussion of the monitoring well installation/development, hydraulic conductivity testing, water-level measurement, and groundwater sampling is presented below. Monitoring well locations are shown on Figure 3.

2.5.1 Monitoring Well Installation

A total of 12 monitoring wells were installed in support of the Phase II Area Investigation. Each monitoring well was installed by Nothnagle Drilling. The rationale for each monitoring well is summarized in the following table:

Monitoring Well Identification	General Description/Rationale
MW-1S	A water table monitoring well installed adjacent to the existing MW-1 cluster, to monitor for potential NAPL and characterize shallow overburden groundwater quality downgradient of former Gas Holder No. 2.
MW-1R	A monitoring well installed in the upper portion of the bedrock adjacent to the existing MW-1 cluster, to monitor for potential NAPL, and characterize bedrock groundwater quality downgradient of former Gas Holder No. 2.
MW-4S	A water table monitoring well installed adjacent to MW-4, to monitor for potential NAPL and characterize shallow overburden groundwater quality near the former below-grade tar/water separator that was removed during the IRM.
MW-4R	A monitoring well installed in the upper portion of the bedrock adjacent to MW-4, to monitor for potential NAPL, and characterize bedrock groundwater quality near the former below-grade tar/water separator. The boring was also used to confirm/refute the absence of the silt layer in this area, as indicated in the PSA Report.
MW-6S	A water table monitoring well installed adjacent to MW-6D, to monitor for potential NAPL and characterize shallow overburden groundwater quality downgradient of former Gas Holder No. 1.
MW-6M	Not identified in the *IWP*. A middle overburden monitoring well installed adjacent to MW-6, to monitor for potential NAPL and characterize middle overburden groundwater quality downgradient of former Gas Holder No. 1. MW-6M was installed based on a request by the NYSDEC due to the presence of NAPL observed in the middle overburden during the installation of MW-6R at this location.
MW-6R	A monitoring well installed in the upper portion of the bedrock adjacent to the existing MW-6, to monitor for potential NAPL, and characterize bedrock groundwater quality downgradient of former Gas Holder No. 1.
MW-13	An upgradient background monitoring well installed north of former Gas Holder No. 2 (near TP-19 and TP-24), to monitor groundwater quality along the upgradient side of the site.
MW-14	An upgradient background monitoring well installed north of former Gas Holder No. 1, to monitor groundwater quality upgradient of this former gas holder.
MW-15	A monitoring well installed west of former Gas Holder No. 1, to characterize overburden groundwater quality and define the extent of MGP-related constituents west of this former gas holder. The *IWP* had identified installation of both shallow and deep overburden monitoring wells at this location; however, saturated overburden was not encountered at this location, so a monitoring well was installed in the upper portion of the bedrock.
MW-16S	A monitoring well installed southwest of former Gas Holder No. 1, to monitor for potential NAPL and to characterize shallow overburden groundwater quality southwest of this former gas holder.
MW-16D	MW-16D A deep overburden monitoring well installed above bedrock and southwest of former Gas Holder No. 1, to monitor for potential NAPL, characterize deep overburden groundwater quality, and confirm the depth of bedrock southwest of this former gas holder.

Monitoring wells with no measurable thickness of NAPL were developed a minimum of 24 hours after installation, except well MW-6S. Shortly after installation, this well did not have sufficient water to permit development or sampling. After the river level was raised in the spring, the well had sufficient water, but also contained DNAPL, eliminating the need for development and sampling of groundwater. Table 2 summarizes the well-development data. Monitoring well construction details are provided in Table 3 and in the boring logs presented in Appendix C.

2.5.2 Aquifer Testing

Aquifer testing consisted of the following:

- Obtaining several complete/semi-complete rounds of water level measurements during November and December 1999 and January 2000. These were completed prior to the river lowering, during the river lowering, after the river lowering, and prior to groundwater sampling;
- Installation of pressure transducers at MW-7S, MW-7D, MW-4S, MW-4D, MW-4R, MW-13, and at the river gauging station to automatically measure the change in groundwater levels and the level of the Mohawk River during the annual lowering of the river during the period between November 17, 1999 and December 15, 1999; and
- In-situ hydraulic conductivity testing of newly installed monitoring wells not containing a measurable thickness of NAPL, including slug testing of MW-4R, MW-6R, MW-13, and MW-14 and specific capacity testing of MW-1S, MW-1M, MW-4S, MW-6M, MW-15, MW-16S, and MW-16D.

Following the installation of monitoring wells, elevations of the top of each monitoring well were surveyed on January 6, 2000, using the NYSCC datum, to the nearest hundredth of a foot by NMPC personnel. The water levels measured during the groundwater investigation were converted to water elevations based on the NMPC survey. These water levels are summarized in Table 4.

Approximately one week after monitoring well development, rising head slug testing and specific capacity testing was conducted to evaluate the hydraulic conductivity of the saturated material surrounding the saturated screened interval. Hydraulic conductivity testing was not performed on monitoring well MW-6S due to insufficient water in the well.

In accordance with the *IWP*, one of two different methods were used to evaluate the hydraulic conductivity tests based on the type of testing performed at each well. The Bouwer & Rice (1976; 1989) method was used to evaluate slug test data and Walton's (1962) method was used to evaluate specific capacity test data. The calculated hydraulic conductivity values for each well are provided in Table 5 and the calculations are provided in Appendix D.

2.5.3 Groundwater Sampling

BBL collected two rounds of groundwater samples, the first during the weeks of January 10 and January 17, 2000 and the second during the week of May 29, 2000. The first event represents groundwater conditions that occur during the winter, when the Mohawk River is maintained at a level approximately nine feet lower than its level during the boating season. The second event represents the groundwater conditions during the higher (summer-season) river level. Samples were not collected from monitoring wells having a measurable thickness of NAPL (i.e., MW-1S, MW-4D, MW-6S, and MW-7M). Prior to sampling a dedicated translucent bailer and/or an oil/water interface probe was used to determine whether NAPL was present in each well. Section 2.7 describes the NAPL monitoring and removal activities conducted during the Phase II Area Investigation.

Groundwater sampling was conducted using the "low-flow" technique to purge and collect samples from monitoring wells, except for monitoring well MW-1R, which was sampled using an inertial pump, as discussed earlier in this section. The "low-flow" sampling procedure included using a submersible Grundfos® pump and dedicated polyethylene tubing to pump groundwater from each monitoring well at a purge rate of approximately

100 to 500 milliliters (mL) per minute, depending on the yield of the well. Ground-water samples were collected directly from the pump tubing once groundwater quality measurements (pH, temperature, conductivity, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) stabilized to within 10-percent for three consecutive readings and turbidity measurements were less than 50 Nephelometric Turbidity Units (NTUs). Final water quality parameters measured at the time of sampling are provided in Table 6. Collected groundwater samples were analyzed for BTEX, PAHs, and total cyanide using NYSDEC ASP 1995 Methods with Category B deliverables and for select Natural Attenuation (NA) parameters (permanent gases, alkalinity, ammonia, nitrite/nitrate, sulfate, sulfide, and total and dissolved iron and manganese).

2.6 Surface-Water and Storm-Water Investigation

2.6.1 Surface-Water Sampling

BBL performed two surface-water sampling events in the Mohawk River, one representing the winter (low) level and the other representing the summer (high) level. The low-level event was conducted on March 21 and 22, 2000; the high-level event was conducted on May 31 and June 1, 2000.

BBL collected two samples at each of the seven sediment-sampling transects discussed in Section 2.4, one approximately 10 feet and another approximately 50 feet from the shoreline. Note that the location of the shoreline was different during the two sampling events due to the change in river level. Sampling transects are shown on Figure 3. In total, 14 samples were collected during each event.

Samples were collected in the middle of the water column at each location using procedures described in the FSP, included as Appendix A of the *IWP*. Samples were shipped to Galson Laboratories for analysis of BTEX, PAHs, and total cyanide (an amenable cyanide, if necessary) using NYSDEC ASP 95-1 Methods with Category B deliverables. BBL field staff measured the pH, temperature, conductivity, turbidity, DO, and ORP of each sample. These readings are provided in Table 7.

2.6.2 Storm-Water Sampling

Storm-water sampling was conducted on March 24, 2000 in accordance with procedures described in Appendix A of the *IWP*. Storm-water samples were collected from the following two locations at the site (see Figure 3):

- Catch-basin CB-9 (which receives stormwater from sources upstream of the Park); and
- The 30-inch (approximate diameter) storm-sewer outfall located at the west end of the terminal wall.

Upon collection, samples were hand-delivered to Galson Laboratories for analysis of BTEX, PAHs, and total cyanide using NYSDEC ASP 95-1 Methods with Category B deliverables.

The purpose of this sampling was to enable assessment of the quality of water discharging from the sewer to the Mohawk River and whether affected groundwater was leaking into the sewer between catch basin CB-9 and the outfall. The *IWP* proposed storm-water sampling from a catch basin located upgradient of the Park; however, field staff were unable to locate such a catch basin. For this reason, the most upstream catch basin, which receives water upstream of the Park, but is located within the Park area (catch basin CB-9), was sampled as the upgradient catch basin. Other storm water catch basins are located in the Park; however, they are above the water table and would not receive infiltrating groundwater.

2.7 NAPL Monitoring and Removal Program

Measurable thicknesses of NAPL have been identified in eight monitoring wells. Three of these wells, MW-1S, MW-6S, and MW-6M, were installed during this investigation. The remaining five were either installed during the PSA (MW-4D), the IRMI (MW-1M, MW-7M, and MW-8), or the IRM (S-1). Well MW-8 was decommissioned on July 15, 1999 as part of the IRM, and was replaced by recovery well RW-3. BBL began a NAPL monitoring and removal program at these wells in April 1999, and this program is currently ongoing. The program involves monitoring these wells for both LNAPL and DNAPL on at least a once-per-week basis using an oil/water interface probe. Additionally, all Phase I and Phase II Area monitoring wells are checked on a once-per-month basis for the presence of LNAPL or DNAPL. If a measurable thickness of NAPL is identified, the NAPL is removed using a peristaltic pump and dedicated polyethylene tubing. NAPL thickness measurements and volumes of NAPL removed from the wells are summarized in Table 8.

2.8 Riverbank Assessment

A riverbank assessment was conducted immediately after river lowering to further assess the nature and extent of oily sheens observed by BBL and the NYSDEC during the river lowering in 1998 to be emanating from a limited portion of the Mohawk River bank along the Phase II Area. This assessment consisted of making visual observations at a series of predetermined locations during the annual winter lowering of the Mohawk River. Observations were also recorded between the predetermined locations if potential MGP-related impacts were observed. Observations were recorded on four separate dates as follows:

- On December 2, 1999 immediately prior to river lowering;
- On December 3, 1999 after the river had been lowered approximately 6.5 feet;
- On December 6, 1999 after the river had been lowered a total of approximately 9 feet; and
- On December 15, 1999 after the river had been fully lowered to its winter level (approximately 9 to 10 feet lower than the high summer level).

The observation points were spaced approximately 50 feet along the bank extending west from the west end of the terminal wall to the confluence with North Chuctanunda Creek (approximately 600 feet in total). Each assessment consisted of walking along the bank using a probe to dig sediment and turn over rocks along the shoreline. The following observations were made during the course of each assessment:

- Absence/presence of sheens;
- Color of sheen, if present;
- Absence/presence of NAPL;
- Color of NAPL, if present;
- Apparent density of NAPL, if present (denser or lighter than water);
- Material from which the sheen/NAPL is emanating; and
- Nature and characteristics of the riverbank.

The field notes recorded during the riverbank assessment are provided in Appendix E and the results are discussed in Section 3.9.

2.9 Qualitative Human Exposure Evaluation

A human exposure evaluation was performed to qualitatively assess current and reasonable foreseeable human exposure pathways at the Phase II Area. The assessment identified elements necessary to establish a potentially complete exposure pathway, including source and location where exposure could occur, and a feasible route of exposure at the exposure point. The planned future use of the site as a public space was also considered. Potentially complete exposure pathways were identified based on current and likely future land uses. The results of the human exposure evaluation are provided in Section 4.

2.10 Fish and Wildlife Impact Analysis

A Fish and Wildlife Impact Analysis (FWIA) was completed for the Riverlink Park. The FWIA was performed in accordance with the NYSDEC (1994) guidance document *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (FWIA)*. The procedures defined in the FWIA guidance follow a step-wise process. The steps included in this assessment are as follows:

- Step I - Site Description
    - Step IA - Site description and maps
    - Step IB - Description of fish and wildlife resources
    - Step IC - Description of fish and wildlife resource values
    - Step ID - Identification of regulatory criteria applicable to fish and wildlife

- Step II - Contaminant-Specific Impact Assessment
    - Step IIA - Pathway analysis
    - Step IIB - Criteria-specific analysis

The initial steps (Steps IA through ID) of the FWIA are used to characterize the site and provide a description of fish and wildlife resources. The next steps (Step IIA through IIB) utilize the information from Step I to generate an exposure pathway evaluation (Step IIA). These results are then used to evaluate potential impacts to fish and wildlife (Step IIB) through a comparison of site concentrations to ecological risk-based criteria and standards.

2.11 Cultural Resources Investigation

A New York State Historic Preservation Office's (NYSHPO's) Stage IA Survey of the potential cultural resources at the Riverlink Park was conducted as part of the Phase II Area Investigation. The Stage IA Cultural Resources Survey was conducted by Pratt and Pratt Archeological Consultants, Inc. of Cazenovia, New York (Pratt and Pratt) to determine the presence or absence of significant cultural resources at the Riverlink Park.

A Stage IA Survey literature search was performed to evaluate the overall sensitivity of the Riverlink Park relating to the presence (if any) of potential significant cultural resources. In carrying out the literature search, sources at the NYSHPO, universities, local libraries, museums, historical societies, etc., were consulted. A field review of the Riverlink Park and surrounding areas was also made by Pratt and Pratt.

The results of the Stage IA Cultural Resources Survey are discussed in Section 6, and the report is provided in Appendix F.

3. Field Investigation Results

3.1 General

This section provides a discussion of the Phase II Area Field Investigation results. Interpretations from the *PSA Report* (Harza, 1999), *IRMI Report* (BBL, 1999), and *IRM Final Engineering Report* (BBL, 2000) have been incorporated into this discussion, where appropriate. This section updates the conceptual site geologic and hydrogeologic model described in the *IRMI Report*, and presents a discussion of the soil, sediment, groundwater, and surface-water analytical data. A Data Usability Summary Report (DUSR) is included in Appendix G.

3.2 Soil Investigation Results

3.2.1 General

The following discussion of the geology beneath the Phase II Area describes characteristics and probable origin of the geologic units encountered during field activities. Specifically, the geologic descriptions presented in this section are based on the following:

- Observations of subsurface materials encountered during test pit excavation and drilling activities conducted during the Phase II Area Investigation;
- The results of the geophysical investigation completed during the Phase II Area Investigation (included as Appendix A);
- Observations of subsurface materials encountered during test pit excavation and drilling activities conducted during the IRMI (BBL, 1999) (Figure 3);
- Observations of subsurface materials encountered during drilling and excavation activities conducted in support of the IRM (BBL, 2000) completed in the Riverlink Plaza Area (Figure 2);
- Review of subsurface soil boring and test pit logs completed by Harza during the PSA (Harza ,1999); and
- Subsurface information collected by the NYSDOT prior to construction of the State Route 30 bridge over the Mohawk River (and the western portion of the Phase II Area) and the NYSCC prior to reconstruction of the Riverlink Plaza Area Terminal Wall (located in the Phase I Area).

3.2.2 Overburden Geology

The results of the subsurface field activities suggest that the Phase II Area of the site is generally underlain by four main overburden units, including, from upper to lowest unit: a fill unit, a silt unit, a sand-and-gravel unit, and a basal fine sand-and-silt unit with varying amounts of clay. A geologic cross-section location map is provided on Figure 4 and the corresponding cross-sections depicting the overburden stratigraphy are on Figures 5, 6, and 7.

3.2.2.1 Fill Unit

The fill unit is encountered at the ground surface across the Phase II Area. Based on soil borings in and around the Phase II Area, the thickness of the fill ranges from approximately 3.5 feet at soil boring SB-7 (Harza, 1999) to at least 20 feet at soil boring SB-13 (located inside former Gas Holder No. 1). The fill unit is generally composed of a heterogeneous mixture of silt, sand, gravel, shell fragments, demolition debris (including bricks, wood, concrete, metal), subsurface structures, and MGP-related waste (ash or ash-like material [potential purifier waste], slag, cinders, hardened coal tar, coke, etc.). The fill thickness generally increases from north, where it directly overlies bedrock, to south, where it appears to be thickest along the bank of the Mohawk River. The fill ranges in thickness along the Mohawk River from approximately 10 feet at monitoring well clusters MW-6 and MW-7 to 16 feet at monitoring well cluster MW-4.

Observations made during the Phase II Area Investigation and previous investigations indicate that the fill has been affected by MGP-related materials. These observations are summarized in the following table:

Observation	Location and Depth
Black Staining	Throughout the fill at monitoring well cluster MW-1 and at monitoring well MW-12; 14 to 16 feet bgs at cluster MW-4; and in almost all test pits.
Blue Staining	From 3 to 8 feet bgs in white ash-like material at monitoring well cluster MW-6; 3 to 10 feet bgs in white ash-like material in test pit TP-31; 3-inch layer of white ash-like material in TP-30B at 2 feet bgs; and 2 to 7 feet bgs on bricks in TP-33.
Sheen Only	At approximately 10 to 15 feet bgs (across the water table interval) at monitoring well clusters MW-4 and MW-7 and monitoring well MW-12; at the water table (about 10 feet bgs) outside of former Gas Holder No. 2 (at TP-33); on a perched zone of water inside former Gas Holder No. 2 (TP-33 at a depth of about 9 feet bgs); and at 18.5 feet bgs at soil boring SB-13 (inside former Gas Holder No. 1 during the PSA).
Brown Oil	At the water table at monitoring well cluster MW-1, test pits TP-29 and TP-31, outside former Gas Holder No. 1 (in TP-32); and inside former Gas Holder No. 2 (at TP-33); and at 3 to 5 feet bgs in TP-12 (near the former oil/water separator during the PSA); at 12.5 to 13.7 feet at SB-11 (inside former Gas Holder No. 2 during the PSA);
Tar	A 6-inch layer at 10 feet bgs at monitoring well MW-12; at the bottom of test pit TP-31 (approximately 13 feet bgs); a one-foot layer starting at approximately 2 to 3 feet bgs in TP-34; at 4.5 to 5 feet bgs and 6 to 7 feet bgs in TP-11 (PSA); at 5 feet bgs in TP-12 (near the former oil/water separator during the PSA); at 1 to 1.5 feet bgs in TP-13 (PSA); at 1 foot bgs in TP-14 (PSA); and at 11 to 12 feet bgs in TP-20 (PSA).

Subsurface structures encountered within the fill unit during the field activities include the following:

- Gas holder walls;
- Foundations of two purifying houses and a coke house (identified based on historic site maps);
- Piping likely related to the manufactured gas process; and
- Concrete piers relating to the construction of the State Route 30 bridge.

The test pit cross-sections, included in Appendix B, provide details regarding the appearances and locations of former MGP-related subsurface structures encountered.

3.2.2.2 Silt Unit

The silt unit underlies the fill unit in the Phase II Area, however, it appears to thin to the west at monitoring well cluster MW-16 and pinch-out to the north against the steeply dipping bedrock surface, as shown on the cross-sections presented on Figures 5 and 6, respectively. The silt, interpreted as a recent floodplain alluvial deposit (NYSGS, 1987), ranges in thickness from not observed at monitoring wells MW-13, MW-14, and MW-15 to as much as 20 feet at monitoring well cluster MW-4. The unit is mostly dark gray to black with some brown intervals (especially to the west) and occasional horizons of degraded plant matter. This unit contains varying amounts of fine sand, and fine to medium sand and clay lenses. The fine to medium sand lenses are more prevalent at the base of the silt and may represent a transition zone between the silt and underlying sand and gravel, as indicated in the boring log for MW-4R (Appendix C). The transition zone is interpreted to be discontinuous because it was not observed at all boring locations that penetrated through the silt unit.

Prior to site development, the silt surface likely represented the original land surface, except along the northern boundary of the site, where bedrock occurs at or near the surface. Development of the site resulted in the silt being covered with a layer of fill, as discussed above. In addition, it appears that portions of the fill were excavated to construct Gas Holder No. 1 and Gas Holder No. 2.

Visual observations made during the installation of monitoring wells indicate that the silt unit has locally been affected by MGP-related materials. These observations are summarized in the following table:

Observation	Location and Depth (ft. bgs)
Black Staining	Throughout silt at monitoring well clusters MW-1, MW-4, MW-6, MW-7, monitoring well MW-12, and recovery well RW-3; 15 to 16 feet bgs at recovery well RW-1; 14 to 16 feet bgs at sentinel well S-3.
Sheen Only	At the water table and throughout the saturated silt thickness at monitoring well clusters MW-4 and MW-7; at 15 to 20 feet bgs at sentinel wells S-1, S-2, and S-3; throughout the silt at recovery well RW-1; at 9 feet bgs at SB-5 (PSA); at 13 feet bgs at SB-15 (PSA)
Brown Oil	At the water table and throughout the saturated silt thickness at monitoring well clusters MW-1 and MW-6 and recovery well RW-3; at 20 to 28 feet bgs at sentinel well S-1; 29 to 30 feet at S-2; 23 to 26 feet at S-3; and 23.5 to 27 feet at recovery well RW-1.

3.2.2.3 Sand-and-Gravel/Sand Unit

The "Surficial Geology of New York, Hudson-Mohawk Sheet" (NYSGS, 1987) indicates that the sand and gravel at the site is likely a Pleistocene deltaic deposit resulting from glacial stream flow into Glacial Lake Amsterdam. The sand-and-gravel unit is located beneath the alluvial silt at the site. The interface between the silt unit and sand-and-gravel unit is relatively flat in the eastern portion of the Phase II Area and gradually rises to the west. There is also a lateral transition within the sand-and-gravel unit between monitoring well clusters MW-6 to the east and MW-16 to the west (Figure 5). As shown in the subsurface logs for these wells (Appendix C), the transition is represented by the stratified sand and gravel to the east grading to a predominately fine sand to the west.

The sand-and-gravel unit encountered during the Phase II Area Investigation is dark brown to gray and is composed of stratified fine to coarse sands and fine to coarse gravels, with occasional lenses of silt. The sand-and-gravel unit is the thickest overburden unit beneath the Phase II Area with a thickness ranging from not observed at the monitoring wells along the northern site boundary to approximately 24 feet at monitoring well cluster MW-6. Generally, the unit is thickest to the south, along the riverbank, and thinnest to the north, where it pinches out against the rising bedrock surface.

Visual observations made during soil boring installations indicate that the sand-and-gravel unit encountered in the Phase II Area has locally been affected by MGP-related materials. These observations are summarized in the following table:

Observation	Location and Depth (ft. bgs)
Sheen Only	At 45 feet bgs at monitoring well cluster MW-1; throughout the sand and gravel at monitoring well clusters MW-4, MW-6, monitoring well MW-12, and sentinel well S-3; at 43 to 47 feet bgs at the MW-7 cluster; at 32 to 37 feet at sentinel well S-2.
Brown Oil	In the upper few feet of sand and gravel at monitoring well clusters MW-1, MW-4, and MW-7, sentinel well S-2, and recovery well RW-3; at 35 to 37 feet at sentinel well S-3; throughout the sand and gravel at cluster MW-6.

3.2.2.4 Fine Sand-and-Silt Unit

Where present, the fine sand-and-silt unit occurs beneath the sand-and-gravel unit, immediately above bedrock. This unit could be a Pleistocene deltaic alluvium deposited prior to deposition of the overlying sand-and-gravel unit (NYSGS, 1987). The fine sand-and-silt unit ranges in thickness from approximately five feet at monitoring well cluster MW-4 to 10 feet at monitoring well cluster MW-6. As indicated in the boring log for monitoring well MW-16D, the fine sand-and-silt was not found at the western limits of the Phase II Area. Additionally, as shown on the north to south trending cross sections (Figures 6 and 7), this unit pinches out to the north against the rising bedrock surface.

The fine sand-and-silt unit encountered during the Phase II Area Investigation is generally composed of gray interbedded fine sand and silt layers with occasional clay seams. At the southeastern portion of the Phase II Area, the fine sand-and-silt unit is underlain by a thin layer of sand and gravel, as indicated by the boring logs for monitoring well cluster MW-1 (Appendix C) and MW-7 (IRMI Report, BBL, 1999b).

Visual observations made during drilling indicate that the fine sand-and-silt unit encountered in the Phase II Area has minimally been affected by MGP-related materials. These observations are summarized in the following table:

Observation	Location and Depth (ft. bgs)
Sheen Only	At 58 to 62.5 feet bgs at monitoring well cluster MW-4.
Brown Oil	At 62.5 to 64 feet bgs at monitoring well cluster MW-4 and throughout the fine sand-and-silt at monitoring well cluster MW-6.

3.2.3 Bedrock Geology

The "Geologic Map of New York, Hudson-Mohawk Sheet" (NYSGS, 1987) indicates the bedrock beneath the site as either a lower Ordovician age limestone or dolostone belonging to the Beekmantown or a middle Ordovician age limestone belonging to the Trenton and Black River Groups. Bedrock was cored and described at monitoring well locations MW-1R, MW-4R, MW-6R, MW-13, MW-14, MW-15, and MW-16D.

The bedrock surface slopes steeply toward the Mohawk River with a more gentle dip to the east. Based on geotechnical data collected during construction of the new canal terminal wall and historical boring data associated with the construction of the State Route 30 bridge, the bedrock slope appears to steepen dramatically near the river shoreline (Figures 6 and 7). The bedrock depth/elevation beneath the Phase II Area ranges from 5 feet bgs/270 feet at soil boring SB-7 to approximately 71 feet bgs/199 feet at MW-4R. The elevation of the bedrock surface drops to 160 feet further south of the site, based on borings completed for the construction of the State Route 30 bridge by the NYSDOT.

The upper 15 feet of bedrock in the Phase II Area is characterized as moderately to highly fractured gray limestone with iron-stained silt in the fractures. The limestone bedding is thinly laminated (closely spaced) and appears to be oriented horizontal to subhorizontal.

Based on visual observations of cores obtained from the upper 15 feet of the bedrock at monitoring wells installed into bedrock in the Phase II Area, the bedrock appears unaffected by MGP-related materials. However, during the one sampling event at MW-10R, low concentrations of BTEX (24 ppb total) were detected in groundwater collected from MW-10R (since abandoned) which located in the Phase I Area (Figure 3). PAHs and cyanide were not detected in groundwater from this well.

3.2.4 Soil Analytical Results

The soil analytical results are summarized in this section according to three MGP indicator constituent classes: 1) total BTEX, 2) total PAHs, and 3) total cyanide. Figure 8 and Table 9 present the results, and Appendix G includes the laboratory data sheets. This discussion includes analytical data generated by this investigation, the PSA, and the IRMI, and is limited to samples collected in the Phase II Area (i.e., excluding the results from soil samples collected east of the Phase I/Phase II boundary line). Soil data from the PSA and IRMI were presented in the *IRMI Report* (BBL, 1999b).

3.2.4.1 Soil BTEX Analytical Results

The distribution of BTEX in Phase II Area soils is summarized in the following table:

Geologic Unit	N	Range (ppm)	ND	Highest BTEX Detections/Locations
Fill Unit	34	0.002 to 11,000	8	The highest BTEX detections in the fill unit are from soil samples collected inside of former Gas Holder No. 1. These detections include 11,000 ppm at 16 to 19.5 feet bgs at SB-13 and 2,009 ppm at 14.5 feet bgs in TP-32. Also, one sample collected immediately outside of former Gas Holder No. 1 contained a 323 ppm of BTEX. This sample was collected at 9 feet bgs in TP-32. Other relatively high detections were from samples collected at the base of test pit TP-31 in the southern portion of the Phase II Area. These detections ranged from 19.96 ppm to 228 ppm. In addition, two of four samples collected during the PSA for TCLP analysis exhibited concentrations of benzene, which exhibits the hazardous characteristic of toxicity. These samples were collected from 12 to 13.7 feet bgs at SB-11 (0.54 ppm) and from 1 to 2 feet bgs at TP-16A (4.5 ppm)[1].
Silt Unit	5	5.62 to 87.40	1	The highest BTEX detection (87.40 ppm) within the silt unit is from a soil sample collected from 12 to 16 feet bgs at SB-15. This boring, completed during the PSA, is located near former Gas Holder No.1. Other relatively high BTEX concentrations were detected in soil samples collected at the soil boring for MW-1D located immediately downgradient of former Gas Holder No. 2. These samples, collected during the PSA, include the 10 to 14 feet and 16 to 20 feet bgs intervals at 29.10 ppm and 45.90 ppm, respectively.
Sand-and Gravel Unit	6	0.029 to 19.50	1	The highest detections of BTEX within the sand-and-gravel unit were from samples collected during the PSA at the soil boring for monitoring well MW-6D which is located downgradient of former Gas Holder No. 1. These detections include 16.50 ppm and 19.50 ppm at the 20 to 21.6 feet and 38 to 40 feet bgs intervals, respectively. Additionally, 13.90 ppm of BTEX was detected at 50 to 52 feet bgs in soil from monitoring well MW-4D (PSA well). MW-4D is located near the former tar/water separator (Figure 3).
Fine Sand-and-Silt Unit	6	0.002 to 1,180	0	As with the sand-and-gravel unit, the highest concentrations of BTEX detected within the lower fine sand-and-silt unit were from samples collected at the MW-6 monitoring well location. These include the 46 to 48 foot (PSA sample), 52 to 54 foot, and 54 to 56 foot bgs intervals at 25.40 ppm 1,180 ppm, and 36.9 ppm, respectively. Additionally, a soil sample collected during the PSA from 60- to 62-foot bgs interval at monitoring well MW-4D had a BTEX concentration of 24.40 ppm.

Notes:
N = Total number of samples collected.
Range = Range of detected concentrations.
ND = Number of samples having no detections.
ppm = Parts per million equivalent to milligrams per kilogram (mg/kg).

[1] Section 6.2.2 of the PSA indicates that a soil sample collected from test pit TP-20 exhibited concentrations of 8 ppm for benzene, which exhibits the hazardous characteristics of toxicity; however, the laboratory data sheets, provided as Appendix H of the PSA, indicate the concentration to be 8 ppb.

As expected, the samples that contained the highest concentrations of BTEX were those that contained NAPLs consisting of separate-phase product and/or sheens.

3.2.4.2 Soil PAH Analytical Results

The distribution of PAHs detected in subsurface soil is summarized in the following table:

Geologic Unit	N	Range (ppm)	ND	Highest PAH Detections/Locations
Fill Unit	34	0.651 to 99,440	1	The highest concentration of PAHs (99,440 ppm) in the fill unit was detected in a sample collected from a layer of hardened tar at 2 feet bgs at test pit TP-34 north of Gas Holder No. 2. Other elevated concentrations of PAHs were detected in samples collected at the base of test pit TP-31 (581 ppm, 5,920 ppm, and 21,990 ppm), inside former Gas Holder No. 1 (SB-13[16-19.5] at 5,067 ppm and 14.5 feet bgs in TP-32 at 5,145 ppm), outside former Gas Holder No. 1 (9 feet bgs in TP-32 at 797.1 ppm), at 12 to 16 feet bgs at MW-4 (2,136 ppm) located near the former tar/water separator, at 9 feet bgs at TP-29 (2,754.1 ppm), and at 12 to 14 feet bgs at MW-6D (562.50 ppm) located downgradient of former Gas Holder No. 1.
Silt Unit	5	16.148 to 411.52	0	The highest concentrations of PAHs detected in the silt unit were from samples collected during the PSA from the soil boring for monitoring well MW-1D (10 to 14 feet bgs and 16 to 20 feet bgs at 362.64 ppm and 411.52 ppm, respectively) which is located near former Gas Holder No. 2. The next highest PAH concentration was detected at a PSA sample collected at the 12 to 16 feet bgs interval from SB-15 (55.05 ppm), which is located immediately downgradient of former Gas Holder No. 1.
Sand-and-Gravel Unit	6	0.049 to 460.50	1	Soil samples collected during the PSA at the MW-6D location exhibited the highest concentration of PAHs detected in the sand-and-gravel unit. These detections were 460.50 ppm at the 20 to 21.6 feet bgs interval and 266.50 ppm at the 38 to 40 feet bgs interval. The 50 to 52 feet bgs soil interval at MW-4D contained the next highest concentration (96.59 ppm) of PAHs detected in this unit.
Fine Sand-and-Silt Unit	6	0.227 to 6,350	0	The soil sample collected at 52 to 54 feet bgs in the soil boring for monitoring well MW-6R contained the highest concentration of PAHs detected (6,350 ppm) in the lower fine sand-and-silt unit. The next highest concentration of PAHs detected in this unit was 69.430 ppm at 60 to 62 feet bgs at the MW-4D location (PSA sample).

Notes:
N = Total number of samples collected.
Range = Range of detected concentrations.
ND = Number of samples having no detections.
ppm = Parts per million equivalent to milligrams per kilogram (mg/kg).

As with BTEX, elevated concentrations of PAHs correlated with samples containing visible product and/or sheens. PAHs, however, are found throughout the environment and can be formed, for example, during forest fires and the combustion of coal, oil, gasoline (e.g., automobile exhaust), garbage, and other organic substances (ASTDR, 1995).

3.2.4.3 Soil Cyanide Analytical Results

The distribution of total cyanide detected in soil is summarized in the following table:

Geologic Unit	N	Range (ppm)	ND	Highest Cyanide Detections/Locations
Fill Unit	34	0.270 to 360	9	The highest concentrations of cyanide detected in the fill unit were from samples collected at monitoring well cluster MW-6. These samples include 280 ppm detected in a sample of the white ash-like material at 2 to 4 feet bgs and 360 ppm detected in a "tarry" soil sample (PSA sample) from the 12 to 14 feet bgs interval. The next highest cyanide detection was from a duplicate sample collected during the PSA at the MW-4D location at 12 to 14 feet bgs interval (85.60 ppm). Other elevated detections of total cyanide include 59.9 ppm in the white ash-like material in test pit TP-31, 50 ppm, 57.3 ppm, and 67 ppm in samples along the base of TP-31, 51.9 ppm from 0 to 6 feet bgs interval (composite, including white ash-like material) at TP-18A during the PSA, and 69.3 ppm at 8 feet bgs at TP-13 during the PSA.
Silt Unit	5	0.30 to 1.4	0	Low concentrations of total cyanide were detected in the silt unit. The highest concentration (1.4 ppm) was detected at the 10-14 feet bgs sample collected at the MW-1D location during the PSA. The second highest concentration (1.2 ppm) was detected at the MW-16 location at 14-16 feet bgs.
Sand-and-Gravel Unit	6	0.380 to 21.50	3	The highest concentrations of total cyanide detected in the sand-and-gravel unit were from samples collected during the PSA at the MW-6D location. These include the 38 to 40 feet bgs interval at 21.50 ppm and the 20 to 21.6 feet bgs interval at 18.9 ppm. The only other detection of cyanide in this unit was from the 50 to 52 feet bgs sample collected during the PSA at the MW-4D location (0.38 ppm).
Fine Sand-and-Silt Unit	6	0.120 to 0.370	3	Low concentrations of total cyanide were detected in the fine sand-and-silt unit. The highest concentration (0.370 ppm) was detected at the 46 to 48 feet bgs sample collected at the MW-6D location during the PSA. The second highest concentration (0.13 ppm) was detected during the PSA at the MW-1D location at 52 to 56 feet bgs.

Notes:
N = Total number of samples collected.
Range = Range of detected concentrations.
ND = Number of samples having no detections.
ppm = Parts per million equivalent to milligrams per kilogram (mg/kg).

Raw manufactured gas contained cyanide as a byproduct. While the purifiers were employed in the gas-manufacturing process primarily to remove hydrogen sulfide, their purifying media also removed cyanide. These media generally consisted of either lime or iron oxide (Thorpe, 1920). Purifier waste, therefore, can be a source of cyanide at former MGP sites. Samples containing the white ash-like material contained among the highest concentrations of cyanide. This data, and the colors of the material (white with blue staining) suggest that it may be lime purifier waste, as lime is typically white and the iron-cyanide complexes that commonly form in purifier waste are blue (Ghosh, et al., 1999).

The highest cyanide concentrations in the Phase II Area occurred in an area of the fill unit located roughly between the former purifier house near former Gas Holder No. 1 and the river (Figure 3). This area appears bounded to the west by the State Route 30 bridge and to the east by the MW-4 well cluster. Many of the samples collected from this area contained the suspected lime purifier waste.

3.3 Sediment Investigation Results

This section provides a discussion of results for the sediment investigation completed in the vicinity of the Riverlink Park along the north shore of the Mohawk River. The sediment investigation was conducted in accordance with the *IWP* between November 17 and 19, 1999, when the Mohawk River was at high level.

3.3.1 Sediment Characteristics

As discussed in Section 2.4, sediment sampling activities were conducted along a series of seven transects located upgradient, adjacent to, and downgradient of the Riverlink Park, each extending roughly perpendicular to the high river level shoreline (Figure 3). The following locations were proposed for sample collection at each transect:

- Sample location no. 1 approximately 25 feet south of the shoreline;
- Sample location no. 2 approximately 50 feet south of the shoreline;
- Sample location no. 3 approximately 75 feet south of the shoreline; and
- Sample location no. 4 approximately 100 feet south of the shoreline.

The following table summarizes observations made at each of these proposed sediment sampling locations.

Transect/Location	Distance from High Shoreline (ft.)	Mohawk River Depth (ft.)	Analytical Sample ID	PID (ppm)	Comments
1 - Approximately 500 feet upstream from North Chuctanunda Creek outfall.	25	4.2	SD-1(0-0.3)	0.0	Dark gray to brown fine to coarse SAND and GRAVEL.
	50	6.0	SD-2(0-0.3)	0.0	Dark gray to brown fine to coarse SAND and GRAVEL.
	75	8.0	No Recovery	NA	Rocky bottom.
	100	15.5	No Recovery	NA	Rocky bottom.
2 – Approximately 30 feet upstream from the State Route 30 bridge.	25	1.5	SD-3(0-0.6)	0.0	Gray to brown fine SAND, some medium to coarse sand.
	50	0.5	SD-4(0-0.4)	0.0	Gray to brown coarse SAND and GRAVEL.
	75	3.5	No Recovery	NA	Rocky bottom.
	100	8.0	No Recovery	NA	Rocky bottom.
3 – Approximately 110 feet east of the State Route 30 bridge.	25	8.0	SD-5(0-0.5)/ SD-5(0.5-1)	0.0 0.0	Dark gray to brown SILT for both samples.
	50	10.0	No Recovery	NA	Coarse gravel on top of rocky bottom.
	75	15.0	No Recovery	NA	Coarse gravel on top of rocky bottom.
	100	17.5	No Recovery	NA	Coarse gravel on top of rocky bottom.

Transect/Location	Distance from High Shoreline (ft.)	Mohawk River Depth (ft.)	Analytical Sample ID	PID (ppm)	Comments
4 - Approximately 115 feet west of the storm-sewer outfall, due south of former Gas Holder No. 2.	25	9.5	SD-6(0-0.5)/ SD-6(0.5-1)	32.5 / 58.0	(0-0.5) = Dark gray to brown fine SAND, some fine Gravel, petroleum odor and sheen; (0.5-1) = Dark brown to black SILT, some organic matter and fine to coarse sand, petroleum odor and sheen.
	50	13.5	SD-7(0-0.5)	58.0	Gray to brown fine to coarse SAND and GRAVEL, moderate petroleum odor and slight sheen.
	75	14.5	No Recovery	NA	Rocky bottom.
	100	15.5	No Recovery	NA	Coarse gravel on top of rock.
5 - At the west end of the terminal wall, near the storm sewer outfall.	25	14.0	SD-8(0-0.5)/ SD-8(0.5-1)	30.0/ 40.0	(0-0.5) = Gray to brown SILT and organic matter, some fine sand, strong petroleum odor and heavy sheen; (0.5-1) = Dark gray to brown SILT and fine SAND, some organic matter, strong petroleum odor and heavy sheen.
	50	14.0	SD-9(0-0.5)	75.0	Dark gray to brown fine to coarse SAND and GRAVEL, strong odor and heavy sheen.
	75	14.0	SD-10(0-0.5)	30.0	Gray to brown fine to coarse SAND and GRAVEL, slight petroleum odor and slight sheen.
	100	15.5	No Recovery	NA	Coarse gravel on top of rocky bottom.
6 - Approximately 30 feet downstream (east) of the east end of the terminal wall.	25	4.0	SD-11(0-0.5)/ SD-11(0.5-1)	0.0 / 0.0	Both samples were gray to brown fine to coarse SAND and Gravel.
	50	9.5	SD-12(0-0.5)/ SD-12(0.5-1)	0.0 / 0.0	Both samples were gray to brown fine to coarse SAND and GRAVEL, some silt and organic matter.
	75	14.0	No Recovery	NA	Rocky bottom.
	100	15.0	No Recovery	NA	Rocky bottom.
7 - Approximately 300 feet downstream of the east end of the terminal wall.	25	7.0	SD-13(0-0.5)/ SD-13(0.5-1)	0.0 / 0.0	Both samples were gray to brown fine to coarse SAND and GRAVEL, some silt.
	50	15.0	SD-14(0-0.5)/ SD-14(0.5-1)	0.0 / 0.0	(0-0.5) = Gray to brown fine SAND and SILT, some gravel and clay; (0.5-1) = dark gray clay.
	75	17.0	SD-15(0-0.5)	0.0	Gray to brown firm CLAY, some silt and fine sand and gravel.
	100	19.0	No Recovery	NA	Rocky bottom.

Note:
NA = Not applicable.

3.3.2 Sediment Analytical Results

This section provides a discussion of sediment results for analytical samples obtained at the locations described in the above table. The sediment results are summarized in this section according to three MGP indicator constituent classes: 1) total BTEX, 2) total PAHs, and 3) total cyanide. The results, by constituent class, are presented on Figure 9 and in Table 10. The laboratory data sheets are included in the DUSR provided in Appendix G. A detailed discussion of sediment analytical results with respect to a FWIA is presented in Section 5.

3.3.2.1 Sediment BTEX Analytical Results

BTEX compounds were detected in eight of the 24 sediment samples collected. Total detected BTEX concentrations ranged from 0.009 ppm at a downstream sediment sample (SD-15[0-0.5]) to 28.54 ppm at a sediment sample (SD-8[0-0.5]) collected adjacent to former Gas Holders No. 3. BTEX compounds were detected in each of the five sediment samples collected immediately adjacent to former Gas Holder No.2 and former Gas Holder No.3 (SD-6 through SD-10). BTEX compounds were not detected in any sediment samples west (upstream) of former Gas Holder No. 2 (SD-1 through SD-5), including background sediment samples.

3.3.2.2 Sediment PAH Analytical Results

PAH compounds were detected in each of the sediment samples collected, including the background samples collected at upstream sampling locations SD-1 and SD-2. Total detected PAH concentrations in sediment ranged from 0.24 ppm at a downstream sediment sample location (SD-14[0.5-1]) to 520 ppm at the sediment sample collected nearest to former Gas Holder No.2 (SD-6[0.5-1]). The highest PAH concentrations were detected in sediment samples collected at locations adjacent to former Gas Holders No. 1 and No. 2 (SD-6 through SD-9), with concentrations ranging from 25.1 ppm to 520 ppm. PAH concentrations were detected in background sediment samples SD-1(0-0.3) and SD-2(0-0.3) at 15.6 ppm and 8.35 ppm, respectively. PAHs, however, are found throughout the environment and can be formed, for example, during forest fires and the combustion of coal oil, gasoline (e.g., automobile exhaust), garbage, and other organic substances (ASTDR, 1995).

3.3.2.3 Sediment Cyanide Analytical Results

The data indicate that shallow sediment in the vicinity of the site is minimally affected by cyanide, because total cyanide was detected in only one of the 24 analytical sediment samples. Total cyanide was detected at a concentration of 1.0 ppm in sediment from a sample (SD-6[0.5-1]) collected nearest to former Gas Holder No. 2.

3.4 Groundwater Investigation Results

3.4.1 Hydrogeology

The following discussion of hydrogeology describes the groundwater flow system beneath the Phase II Area of the Riverlink Park, including probable effects of seasonal changes in the Mohawk River level imposed by the

NYSCC. The river level at the site is artificially raised and lowered by approximately nine feet each year. The high level is maintained between approximately May and November (summer season), with the low level occurring between December and April (winter season).

3.4.1.1 Groundwater Flow System

The groundwater flow system beneath the Phase II Area is interpreted to consist of five hydrostratigraphic units: bedrock, sand and gravel, fine sand, silt, and fill. The relationship of these units to one another is depicted on Figures 5, 6, and 7. As described below, the sand-and-gravel hydrostratigraphic unit collectively refers to the deposits identified as "sand and gravel" and "fine sand and silt" on the cross sections. To aid interpretation of groundwater flow conditions, including the effects of the seasonal changes in river level, maps and cross-sections depicting the water table and the potentiometric surface of deep overburden have been prepared for both high- and low-river conditions (Figures 10 through 15).

The five hydrostratigraphic units defined for the Phase II Area are discussed individually below.

Bedrock Unit

Bedrock beneath the Phase II Area consists of a moderately fractured, gray limestone with bedding that is nearly horizontal. The bedrock surface slopes steeply toward the Mohawk River. The slope appears to steepen dramatically near the river shoreline based on historical boring data collected during construction of the State Route 30 bridge (shown on Figure 3) and prior to reconstruction of the canal terminal wall.

In general, the hydraulic conductivity of the bedrock appears relatively low. Hydraulic conductivity values calculated from in-situ hydraulic conductivity tests performed in the six bedrock monitoring wells installed during the Phase II Area Investigation and the IRMI range from 6.5×10^{-4} centimeters per second (cm/s) at MW-4R to 1.2×10^{-6} cm/s at MW-6R, with a geometric mean of 2.3×10^{-5} cm/s (Table 5).

Groundwater in the bedrock is interpreted to chiefly be derived from offsite, upgradient sources. The water table occurs in the bedrock at the extreme northern portion of the Phase II Area (Figures 14 and 15); therefore, a small fraction of the water in the bedrock beneath the Phase II Area may be derived from recharge of precipitation falling in this limited area.

The data provided by this and previous investigations at the Phase II Area (BBL, 1999; Harza, 1999) are sufficient to reasonably characterize groundwater flow through the bedrock. Groundwater in the bedrock is interpreted to perennially discharge to the silt and sand-and-gravel units beneath the Phase II Area. As shown on Figures 14 and 15, flow is interpreted to be primarily lateral in the shallow bedrock in the northern portion of the Phase II Area. As the river is approached, the flow direction becomes increasingly upward. Review of the available hydraulic-head data obtained from monitoring-well clusters that include a bedrock well, and for which data are available (clusters MW-4 and MW-6; see Table 4), shows a consistent, relatively high upward vertical gradient from the bedrock to the overlying sand-and-gravel unit, during both high- and low-river conditions. This observation is consistent with historical data from former well cluster MW-10 (BBL, 1999).

Sand-and-Gravel Unit

The sand-and-gravel unit overlies the bedrock and is composed chiefly of stratified fine-to-coarse sand and gravel, fine-to-medium sand, and fine sand and silt. As shown on Figure 5, the top of the unit rises toward the west; as a result, the water table occurs in the western portion of the unit (roughly west of monitoring well cluster MW-4) when the river level is low, while in the east the water table always occurs above the top of the unit. Additionally, between monitoring well clusters MW-6 and MW-16, in the western portion of the Phase II Area, the unit pinches out toward the west, being replaced by a deposit of predominately fine sand. The sand-and-gravel unit also pinches out to the north, where it meets the northward-rising bedrock surface (Figures 14 and 15). The inferred areal limits of the sand-and-gravel unit are shown on Figures 12 and 13. Monitoring well MW-12 is also screened in sand and gravel; however, the sand and gravel intersected at this well is not interpreted to be part of the same sand-and-gravel unit described above. The stratigraphic location of this deposit and the hydraulic-head data obtained from well MW-12 indicate that there is little, if any, direct hydraulic communication between the sand and gravel at MW-12 and the larger sand-and-gravel unit at the Phase II Area.

The horizontal hydraulic conductivity of the unit (kh) is relatively high, ranging from 1.2 x 10^{-4} cm/s at former monitoring well MW-2D to greater than 3.0 x 10^{-2} cm/s at former monitoring well MW-3D, with a geometric mean of 4.22 x 10^{-3} cm/s (Table 5). The value obtained at MW-2D, however, is anomalous because it is about an order of magnitude or more lower than the values calculated for the remaining 11 wells screened in sand and gravel. An explanation for this anomaly is not apparent. The vertical hydraulic conductivity of the unit (k_v) is likely considerably less than the k_h due to the layered heterogeneity (stratification) of the unit. On a regional scale, it is not uncommon in such a setting for the ratio of k_h to k_v to be 100:1 or greater (Freeze and Cherry, 1979).

Groundwater in the sand-and-gravel unit appears to be derived primarily from three sources, upward or lateral discharge from the bedrock unit, discharge from the fine-sand unit (located to the west), and leakage from the overlying silt unit. These three sources are not expected to transmit large quantities of water to the sand-and-gravel unit based on the relatively low hydraulic conductivity of the silt and bedrock units, and the inferred groundwater flow characteristics of the fine-sand unit (discussed in the following subsection). As discussed below in Section 3.4.1.2, the Mohawk River is also not expected to provide a significant source of recharge to the sand-and-gravel unit.

The direction of groundwater flow in the sand-and-gravel unit is likely toward the Mohawk River throughout most of the year; however, available hydraulic-head data obtained from the monitoring wells screening this unit do not clearly demonstrate this. This is because the horizontal hydraulic gradient across this unit is slight. Figures 12 and 13 present hydraulic-head measurements obtained from wells screened near the base of the unit during high and low river conditions, respectively. All of the measurements within this unit, including that of the river level, vary at any one time of measurement by only about 0.3 feet and show no clear trend. This is attributed to several factors, including slight variations in vertical hydraulic gradients, inherent survey and measurement error, and/or minor fluctuations in the river level over the course of the several hours required to obtain the measurements. Using the data posted on these figures, the maximum horizontal hydraulic gradient is estimated to be approximately 0.003 ft/ft during the low-river condition and 0.0009 ft/ft during the high-river condition. The slight gradient across the sand-and-gravel unit, and between this unit and the river, is expected due to the unit's high hydraulic conductivity, relatively poor sources of recharge, and the apparent good degree of hydraulic communication between the unit and the river (discussed in more detail in Section 3.4.1.2).

Sand Unit

The sand unit was penetrated only at the MW-16 well-cluster location, but is considered separately from the sand-and-gravel unit based on its predominantly fine-grained nature and on the hydraulic-head data collected from the deep overburden well of the cluster. Unlike the heads measured in sand-and-gravel-unit wells, which are consistently within a few tenths of a foot of the river level, the heads measured in well MW-16D (Table 4) are consistently above the river level by an average of nearly 1.5 feet. This observation suggests that the degree of hydraulic communication between this unit and the sand-and-gravel unit (and the river) is not as good as between the sand-and-gravel unit and the river.

The unit is interpreted to be composed chiefly of fine sand, with occasional, discontinuous lenses of sand and gravel (Figure 5). Like the sand-and-gravel unit to the east, the sand unit pinches out to the north, against the steeply rising bedrock surface. Hydraulic-conductivity data for the unit are limited to the results of in-situ tests performed at wells MW-16S and MW-16D, which yielded values of 7.0 x 10^{-4} cm/s and 1.3 x 10^{-3} cm/s, respectively. Sources of water to the unit are interpreted to be leakage from the overlying silt and from the underlying bedrock.

Based on available hydraulic-head data for the MW-16 well cluster, a fraction of the groundwater in the unit likely moves east southeastward, toward the sand-and-gravel unit; the balance is expected to move southward and southwestward, toward the river and the North Chuctanunda Creek outfall (Figures 12 and 13).

Silt Unit

The silt hydrostratigraphic unit consists of the saturated portion of the silt unit described in Section 3.2.2.2. The unit is generally continuous across the Phase II Area, however, it appears that in the western portion of the Phase II Area, west of well cluster MW-4, a portion of the unit likely dewaters in response to the seasonal lowering of the river. This is because the unit thins from approximately 15 feet at the eastern portion of the Phase II Area to four feet or less at the west, and in the west the elevation of the bottom of the unit rises (Figure 6). The unit's thickness also decreases toward the north, to about 5 feet, before it pinches out against the steeply rising bedrock surface (Figure 15). Prior to site development, the silt surface likely represented the original land surface, except along the northern boundary of the site, where bedrock occurs at or near the surface. Development of the site resulted in the silt being covered with a layer of fill. In addition, some or all of the silt beneath former Gas Holders No. 1 and No. 2 appears to have been excavated to construct the holders. The influence of the holders on groundwater flow is discussed in Section 3.4.1.2.

The hydraulic conductivity of the unit is moderate. Three wells are screened entirely in the silt unit, MW-1S, MW-2S, and MW-7S. Hydraulic-conductivity tests performed in these wells yielded value for k_h ranging from 1.8 x 10^{-3} cm/s at MW-1S to 3.7 x 10^{-4} cm/s at MW-2S and MW-7S. The higher value for monitoring well MW-1S likely reflects the fact that the silt at that location was observed to contained a greater fraction of fine sand, including occasional thin seams. As noted in the sand-and-gravel unit discussion (above), the k_v of the silt unit is expected to be much lower.

Prior to site development, the top of the hydrostratigraphic unit was likely defined by the water table. Filling associated with development of the site, coupled with the presumed low k_v of the silt, has resulted in the water table occurring slightly above the silt unit across the majority of the Phase II Area, particularly during the summer season, when the elevation of the Mohawk River is artificially increased. Figures 10 and 11 present the elevation of the water table across the Phase II Area during high- and low-river conditions (November 18, 1999 and December 14, 1999).

Water in the silt unit is derived from several sources. The majority of water is likely derived from precipitation falling on the site. A small fraction of the water in the unit may be derived from discharge from the bedrock unit in the northern portion of the site.

The majority of groundwater in the silt unit is interpreted to flow laterally through the unit from north to south and discharge to the Mohawk River. This interpretation is based on the hydrogeologic conditions as illustrated on Figures 14 and 15, and the anticipated low k_v of the silt unit. The balance of the water in the unit discharges to the underlying sand-and-gravel unit.

Fill Unit

The fill hydrostratigraphic unit is comprised of the saturated portion of the fill material that blankets most of the site. During the summer season, when the river elevation is high, the unit is absent in areas where the fill material is unsaturated, predominantly at the northern third of the site, and west of monitoring well cluster MW-4. During the winter season, the limits of saturated fill decrease, resulting in an area of saturated fill bounded roughly by the limits of former Gas Holder No. 2 westward to about 50 feet west of monitoring well cluster MW-4. North of this gas holder, the fill is likely unsaturated during the winter season. The saturated thickness of the fill near the river during the summer season is generally 5 feet or less (Figure 5) and is expected to generally decrease with distance to the north. As shown on Figure 5, the saturated thickness along the river decreases during the winter, when the river level is low. The composition of the materials comprising the unit is variable, ranging from primarily slag and cinders at some areas to a mixture of reworked silt and fragments of miscellaneous materials (cinders, slag, wood, brick fragments, etc.) at others. In general, the material is poorly compacted.

The only monitoring well screened predominantly in the fill unit was former well MW-3S. The hydraulic-conductivity test performed at this location returned a k_h-value of 1.4×10^{-2} cm/s. The screens of two other monitoring wells, MW-4S and MW-15, straddle the fill and the underlying silt. The k_h-values of these wells (1.6×10^{-3} cm/s and 5.8×10^{-3} cm/s, respectively) represent a weighted average between hydraulic conductivity of the fill and silt and, therefore, are likely lower than the true k_h of the fill at those locations. The k_v of the fill unit is also expected to be relatively high due to the generally coarse, uncompacted, and unstratified nature of the material.

Water in the unit is derived predominantly from infiltration of precipitation. The majority of this water is expected to generally flow laterally toward, and discharge to, the Mohawk River, with the balance leaking into the silt unit.

3.4.1.2 Effects of Anthropogenic Features

Four major anthropogenic features exist in the Phase II Area that may influence groundwater flow: the Mohawk River, former Gas Holders No. 1 and No. 2, and the IRM sheet piling. The locations of these features are shown on Figure 3, and their potential effects on groundwater flow are discussed below.

Mohawk River

The most significant feature of the Mohawk River regarding hydraulic influence upon Phase II Area groundwater flow is the controlled, seasonal raising and lowering of the river water level. Pertinent information regarding these seasonal events is presented below, and is based on information provided by the NYSCC.

- The river level is raised each April by closing a series of dams so that the average high-water level is attained by May 1, when the river is opened to boat traffic. In the Amsterdam area, the high-water level is achieved within several weeks after closing the dam downstream from the site. This high level corresponds to an elevation of approximately 256 feet above the NYSCC datum.

- The river level is lowered each November. In the Amsterdam area, the NYSCC reports that the river lowering process takes approximately one week to complete.

- The net change in river level between the summer and winter seasons at the site is approximately nine feet.

Using the understanding of the Phase II Area groundwater flow system presented above and hydraulic-head data collected by pressure transducers installed in selected monitoring wells (refer to Section 2.5.2 for details), the following subsections discuss the effects of the seasonal changes in river levels upon the five hydrostratigraphic units in the Phase II Area.

Bedrock Unit

Seasonal changes in the river level do not appear to alter groundwater flow patterns in the bedrock unit significantly. As previously discussed, there is an upward vertical gradient from the bedrock unit to the sand-and-gravel unit year round. The predominant change in flow patterns between high- and low-river conditions is that the magnitude of the upward gradient increases, thus increasing the quantity of water discharging from the bedrock to the sand-and-gravel unit. The magnitude of the increase is expected to decrease with distance from the river. This is apparent on Figure 16, which is a hydrograph depicting, in part, hydraulic-head data collected at bedrock monitoring wells MW-4R, MW-6R, MW-13, and MW-14, and the river during lowering of the river water elevation. The difference between the surface elevation and the groundwater elevation in wells MW-4R and MW-6R, which are located near the river, is shown to increase in response to the river lowering (i.e., the vertical distance between the lines representing the river level and well water level increases). However, at wells MW-13 and MW-14, which are located further from the river, little response due to the river lowering is evident.

To estimate the magnitude of the increase in vertical gradients in the bedrock near the river, BBL compared calculated vertical gradients between the bedrock and overlying sand and gravel for high and low river conditions, using available data from the MW-4 well cluster. The comparison shows that the upward gradient nearly doubles between November 18, 1999 (high river condition) and January 10, 2000 (low river condition), from 0.25 ft/ft to 0.48 ft/ft.

Figure 16 also demonstrates that during the short intervals when the river level is lowered each year, the hydraulic head (pressure) in the bedrock unit responds rapidly to the change in river head (i.e., there is no discernable "lag time" between changes in the river level and similar changes in bedrock hydraulic head). A similar condition is expected during the brief period in the spring when the river level is raised, indicating that an upward gradient would be maintained from the bedrock to the sand-and-gravel unit.

Sand-and-Gravel Unit

Hydraulic head in the sand-and-gravel unit responds essentially instantaneously to changes in the river level, resulting in no significant reversal of the hydraulic gradient as the river level changes. This is demonstrated on Figure 16, which is a hydrograph showing, in part, the change in groundwater elevations in monitoring wells MW-1M, MW-1D, MW-4D, MW-5, MW-6M, MW-6D, MW-7M and MW-7D as the river was lowered in the fall of 1999. The figure shows that the elevations of the river and the water levels in the wells are essentially identical.

A small portion of the uppermost interval of the sand-and-gravel unit west of well cluster MW-4 dewaters when the river is lowered, and rewets when the river level is raised. This area is identified on Figure 5 as the area where the water table occurs in the sand-and-gravel unit during the low river condition. This phenomenon causes inferred shallow groundwater flow directions in the area (between well clusters MW-4 and MW-6) to shift from predominantly southward during the high-river condition (Figure 10) to southwestward (Figure 11) during the low-river condition. As a result, it is likely that there is some movement of water from the river to the sand-and-gravel unit in this limited area during the brief period when the river level is raised. Across the rest of the unit (east of the MW-6 well cluster), little, if any, actual discharge of water from the river to the sand-and-gravel unit is expected to occur when the river level is raised.

When the river level is lowered, the quantity of water discharging from the sand-and-gravel unit to the river is expected to temporarily increase. This temporary increase is due to the draining of the limited portion of the sand-and-gravel unit (described above), the increased upward hydraulic gradient from the bedrock unit, and the increased downward hydraulic gradient from the silt unit.

When the river level is raised, it is expected that the downward vertical hydraulic gradient between the sand-and-gravel unit and the overlying silt unit will reverse temporarily. This condition will likely last only until hydraulic heads in the overlying silt and fill units equilibrate in response to the rise in river level.

Sand Unit

The effects of the seasonal changes in river level in the sand hydrostratigraphic unit at the western end of the Phase II Area are less-well understood than the other units in the Phase II Area because only one well cluster is installed in the unit (MW-16), and hydraulic-head measurements from the cluster are only available for the low-river condition. The following can be inferred from the available data.

- The unit does dewater appreciably when the river is lowered. As shown on the hydrograph in Figure 16, the water level in monitoring well MW-16D lowers coincident with the lowering of the river; however, the water level in MW-16D does remain approximately 1.5 feet above the lowest level of the river and sand-and-gravel unit, indicating that groundwater is flowing from the sand unit to the river and sand-and-gravel unit.

- When the river-level is raised, the gradient between the sand unit and the sand-and-gravel unit likely decreases, potentially decreasing the quantity of groundwater that moves from the sand unit to the sand-and-gravel unit.

Silt Unit

The effect of seasonal changes in river level upon groundwater flow in the silt unit can be inferred by comparing Figures 14 and 15, which present the water table and, where appropriate, flow nets for high and low river conditions along various lines of section. The comparison shows that lowering of the river level 1) increases the downward vertical hydraulic gradient across the silt, and 2) causes portions of the silt to dewater, notably near the MW-7 well cluster and west of the MW-4 well cluster. Near the MW-7 cluster, the upper 2 to 3 feet of the unit dewater, while west of the MW-4 cluster, where the silt unit is much thinner and its bottom higher, all of the silt unit (on average, about a two-foot thickness) dewaters. The increased downward vertical gradient induced by the river lowering is expected to increase the quantity of water leaking from the silt unit into the sand-and-gravel unit. Additionally, because the water table falls into the sand and gravel unit between well clusters MW-4 and MW-6, thus creating a horizontal gradient from the silt and fill units toward the sand-and-gravel unit (as discussed under "*Sand-and-Gravel Unit,*" above), the quantity of groundwater contributed to the sand-and-gravel unit by the silt and fill units in this area likely increases during low-river conditions.

Review of the water-elevation data for water table monitoring wells on the hydrograph in Figure 16, indicates that the response of hydraulic head (in monitoring wells MW-1S, MW-7S, MW-15, and MW-16S) in much of the silt unit to changes in river level is less rapid than that of the bedrock and sand-and-gravel units. This is expected due to the silt unit's generally unconfined nature and lower hydraulic conductivity.

In the spring, when the river level is raised, the silt will rewet with water supplied by the river, upgradient groundwater, and recharge of precipitation, and possibly from the underlying sand and gravel. The latter is possible because the rapid response of the sand-and-gravel unit to river changes likely results in a temporary reversal of the direction of the vertical gradient in the silt unit.

Fill Unit

The fill unit is expected to respond to river-level changes in a similar manner as the silt unit, although the rate at which it drains is expected to be faster because the unit's bulk hydraulic conductivity is likely considerably greater than that of the silt unit. It is anticipated that the majority of the fill that is saturated during the summer season is unsaturated during the winter season, except in the area roughly between former Gas Holder No. 2 and the MW-4 well cluster. As shown on Figure 5, there is a depression in the silt surface in this area, and 2-3 feet of the fill remained saturated several weeks after the river was lowered. Data collected by the pressure transducer in well MW-4S, the screen of which straddles the fill/silt contact, support this observation (Figure 16) and suggest that the degree of hydraulic communication between the silt and fill at that location and the river is poor, as the water elevation in the well shows very little response to the lowering of the river. Because the texture of the fill at this location is relatively coarse, and the hydraulic conductivity measured at the well relatively high, the fact that the fill remains saturated suggests that the filled depression in the silt surface in this area is closed (i.e., there is no outlet to allow the fill to drain) and that the hydraulic conductivity of the silt in that area is relatively low.

Former Gas Holder No. 1

Available subsurface data near former Gas Holder No. 1, particularly those gathered from test pit TP-32 and test boring SB-13 (PSA boring), as well as water-level data collected from nearby monitoring wells, suggest that the effect of this feature on local groundwater flow patterns is negligible. Three important observations can be made from the logs of test pit TP-32 and boring SB-13, as listed below.

- The integrity of the holder wall at the location of test pit TP-32 is good, and the wall is lined with both metallic and non-metallic sheathing.

- Water was encountered outside the holder wall in TP-32, while none was present at similar depths inside the holder at this test pit. The elevation of the water outside the holder was approximately 262 feet above the NYSCC datum, using the grade elevation for the test pit (273.4 feet above the NYSCC datum) and the depth to water of 11.5 feet shown on the log for TP-32 (Appendix B). This elevation is consistent with the elevation of the water table in that area (Figure 10). The elevation of the bottom of the test pit inside the gas holder was approximately 258.4 feet above the NYSCC datum.

- The elevation of water in the holder during the drilling of SB-13 (in October 1998) was 257.1 feet above the NYSCC datum, which was about one foot higher than the elevation of the river as measured two weeks after the test boring was drilled. This observation indicates that the bottom 3.5 feet of gas holder contents were saturated at the time that the boring was drilled.

These observations provide insight into the effect of the gas holder on groundwater flow in the vicinity. The large difference in water levels inside and immediately outside the holder suggests that the holder walls are relatively intact, otherwise the levels would be more similar. If the holder walls are not leaking appreciably, then the holder bottom is not likely "water tight", otherwise, the level of water in the holder would be considerably higher due to recharge of precipitation (i.e., if the floor of the holder is not leaking, the holder would fill up over time as water was added to it through recharge from above.) The quantity of recharge, however, is likely small, as the majority of the holder appears to be located beneath the State Route 30 bridge and is somewhat shielded from precipitation. A possible reason for the lower water level inside the holder is apparent on Figure 14. This cross section shows that the holder is constructed through the silt unit and into the underlying sand-and-gravel unit. Recall that the potentiometric head in the sand-and-gravel unit is roughly the same as the river level, which is, in turn, typically several feet lower than the water table across most of the Phase II Area. Following this model, the observed 3.5 feet of holder contents that are saturated during the high-river condition are probably unsaturated during the low-river condition.

In summary, the net effect of the gas holder on groundwater flow is likely negligible. Shallow groundwater does not appear to leak into the holder in amounts worthy of consideration, rather, shallow flow is simply diverted around the relatively impermeable holder walls. This effect is shown on Figures 10 and 11 by the slight bend in the water-table contours near the holder. The bottom several feet of holder contents likely saturate and drain seasonally, in response to the changes in river level, and correspondingly, the water levels in the sand-and-gravel unit.

Former Gas Holder No. 2

Data collected at test pits, borings, and monitoring wells in or near former Gas Holder No. 2 (particularly test pit TP-33; boring SB-11; and monitoring wells MW-1S, MW-4S, and MW-7S), provide sufficient information to generally assess the effect of this former gas holder on groundwater flow in the vicinity. The collected data show that the effects of this holder on groundwater flow are considerably different than those caused by former Gas Holder No. 1.

Four important observations can be made from the collected data, as outlined below.

- At the time that test pit TP-33 was excavated, the elevation of water inside the holder was greater than outside the holder. Using the grade elevation of the eastern end of the test pit (269.1 feet above the NYSCC datum, from NMPC survey data) and the measured depth to water within test pit TP-33, the elevation of the water surface inside the holder is estimated to have been approximately 260 feet above the NYSCC datum, approximately 14 feet above the river surface at the time (low-river condition) and 4 to 8 feet above the water elevation measured in shallow wells located near, and downgradient of, the holder. This estimated water elevation inside the holder is approximately 0.5 to 1 feet above the planned invert (The Saratoga Associates [TSA], 1997) elevation of the storm sewer that connects catch basins CB-7 and CB-8. BBL staff observed two breaks in the holder wall in 1999 that appeared to have been made to facilitate installation of that storm sewer.

- The elevation of the holder bottom is approximately 255.5 feet above the NYSCC datum, based on the refusal depth at boring SB-11 (Harza, 1999), indicating that the bottom 4.5 feet of materials inside the holder were saturated at the time that test pit TP-33 was excavated (December 1999).

- The integrity of the holder wall at the location of test pit TP-33 was somewhat poor, as water was observed leaking through the wall into the west end of the pit, which was located outside the holder. No sheathing was observed to line the wall at this location. The integrity of a portion of the eastern end of the holder wall that was exposed during the IRM (BBL, 2000) was generally good. Only the outside edge of the wall was exposed during the IRM. No excavation was performed inside the holder at that time.

- The elevation of groundwater in monitoring well MW-1S, located between the holder and the river, is generally higher than the elevation in other shallow wells located at similar distances from the river shoreline.

These observations are manifested in the water-table maps (Figures 10 and 11) as a groundwater mound centered on the location of the former holder and extending southward toward the river. The fact that the mound extends southward from the holder suggests that water contained inside the former holder is leaking out and creating the mound in the vicinity. Given the location/invert elevations of catch basins CB-7 and CB-8, the similarity between the elevation of water inside the former holder (approximately 260 feet above NYSCC datum), and the planned invert elevations of these catch basins (259.0 and 259.6 feet above NYSCC datum, respectively [TSA, 1997]), modifications to the holder wall to construct the storm sewer that connects these catch basins may be a source of the leakage, coupled to some degree with potential leakage through the wall itself.

IRM Sheet Piling

As part of the IRM conducted, hot-rolled steel sheet piling was installed east of former Gas Holder No.2 (Figure 3). The purpose of the sheeting was to mitigate the potential for fluids contained in the fill near the east edge of former Gas Holder No. 2 to migrate into the IRM area. Given the low hydraulic conductivity of the sheet piling (on the order of 2^{-5} x 10^{-7} cm/s [Starr, not dated]) relative to those of the fill and silt units, it is likely that the piling is an effective barrier to fluid migration. Given the model for shallow groundwater flow near former Gas Holder No. 2 developed above, water may build up slightly on the western side of the sheeting before being directed southward, toward the river. These effects are shown on the water-table maps (Figures 10 and 11) as sharp bends in the contour lines near the sheeting. The base of the sheeting was installed into the upper 3 feet of the silt underlying the fill and the top of the wall extended to 2 to 3 feet below grade.

3.4.2 Groundwater Analytical Results

This section summarizes groundwater analytical results for samples collected from monitoring wells located in the Phase II Area. The samples from this investigation and the IRMI were analyzed for constituents associated with MGP byproducts (i.e., BTEX, PAHs, and cyanide), as well as NA parameters. Samples collected during the PSA were not analyzed for NA parameters. The NA-parameter analyses were performed to support a future evaluation of natural attenuation as a component of an overall remedy for the Phase II Area, if deemed relevant and appropriate. The NA-parameter data are presented in Appendix H of this report.

The discussion of groundwater quality in this section is divided into three subsections: shallow overburden groundwater quality, deep overburden groundwater quality, and bedrock groundwater quality. Table 11 and Figure 17 summarize BTEX, PAH, and cyanide results for samples analyzed during this investigation. Analytical results for samples collected during the IRMI and PSA are contained in Table 12, Appendix I, and on Figure 18. Table 11 also includes applicable NYSDEC Class GA groundwater standards and guidance values for the compounds analyzed.

3.4.2.1 Shallow Overburden Groundwater Analytical Results

The Phase II Area contains seven shallow overburden monitoring wells. The following table identifies these wells, the hydrostratigraphic units they screen, and the dates that they were sampled:

Well I.D.	Unit(s) Screened	Dates Sampled
MW-1S	Silt	Not Sampled
MW-4S	Fill/Silt	1/00, 6/00
MW-6S	Silt/Sand-and-Gravel	Not Sampled
MW-7S	Fill/Silt	5/99, 1/00, 6/00
MW-12	Fill/Silt*	5/99, 1/00, 6/00
MW-15	Fill	1/00, 6/00
MW-16S	Silt/Fine-Sand	1/00, 6/00

Note:
*This well's screened interval includes a lens of sand and gravel that is separate from the sand-and-gravel unit.

Wells MW-1S and MW-6S were not sampled because they contained NAPL at the time the sampling events were conducted. It is important to note that immediately upgradient of the former MGP, the water table exists in the bedrock; therefore, there is essentially no saturated shallow overburden that is upgradient of the Phase II Area, with the possible exception of well MW-15, which is located in the extreme northwestern corner of the Phase II Area.

Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)

BTEX were detected above NYSDEC Class GA groundwater standards in samples collected from two of the five shallow overburden monitoring wells sampled (MW-4S and MW-7S). BTEX were not detected in the remaining three shallow-overburden monitoring wells sampled (MW-12, MW-15, and MW-16S). One or more of the BTEX compounds may occur above the Class GA standards in groundwater from monitoring wells MW-1S and MW-6S, because these wells typically contain NAPL. The total concentration of BTEX has consistently been the greatest in samples collected from MW-7S; however, at both this well and MW-4S concentrations have declined. The decline has been greatest at well MW-7S, where BTEX totals have dropped 86% over the course of about a year, from 9,740 ppb in mid-May of 1999 to 1,321 ppb in early June 2000. The decline in concentrations of these volatile, rather mobile compounds is attributed to the IRM conducted in the summer of 1999, which removed affected soils from the area immediately north (upgradient) of the well (BBL, 2000).

The locations of the shallow overburden monitoring wells listed above, coupled with the relative concentrations of BTEX detected in groundwater samples collected from them, suggest that shallow groundwater containing concentrations of benzene, toluene, ethylbenzene, and/or xylenes in excess of their respective Class GA standards is generally confined to roughly the southern half of the Phase II Area, from the area's eastern boundary to the west end of former Gas Holder No. 1.

Polynuclear Aromatic Hydrocarbons (PAHs)

Shallow groundwater sampling results for PAHs show similar trends as those for BTEX. Only samples collected from wells MW-4S and MW-7S contained PAHs at concentrations exceeding the Class GA standard or guidance values, and the total concentrations of PAHs detected have decreased. As noted in the above discussion of BTEX, the groundwater monitored by wells MW-1S and MW-6S, which typically contain NAPL, may contain PAHs in excess of the applicable Class GA standard or guidance values. Benzo(a)pyrene was detected in the samples collected from both monitoring well MW-4S and MW-7S during this investigation exceeding the "non-detect" Class GA standard. Concentrations detected ranged from 19 ppb (qualified by the laboratory as an "estimated" concentration) at MW-4S to 1 ppb (also qualified as "estimated") at MW-7S (see

Table 11 for details). As shown in Table 11, a number of other PAHs were detected above their respective guidance values in samples from both wells each time that they were sampled. In samples collected from well MW-7S, the concentration of PAHs detected has decreased nearly 60% in the span of about a year, from 2,171 ppb in mid-May 1999 (prior to the IRM, see Table 12) to 914 ppb in early June 2000. Of the detected PAHs, naphthalene occurred in the highest concentrations, constituting greater than 80% of the mass of PAHs detected in each sample.

PAHs were also detected once, at concentrations below the applicable standard or guidance values, at well MW-12 the first time that it was sampled (May 1999); however, none were detected in the subsequent two groundwater sampling rounds.

The extent of groundwater in the shallow overburden that contains one or more PAHs in excess of the Class GA standard or guidance values appears similar to the area described above for BTEX.

Cyanide

Cyanide was detected at concentrations exceeding its NYSDEC Class GA groundwater standard (200 ppb) in the samples collected from only one well, MW-4S, and ranged from 2,750 ppb during the January 2000 sampling event, to 1,430 ppb in the June 2000 event. MW-4S is located downgradient of the former purifying house. Although the white ash-like (possibly calcium carbonate) material that is suspected to be a purifier waste was not identified in soil samples collected during drilling of the well, it is located in the general area where this material was often observed. In addition, where found, the white ash-like material was often observed to have blue staining, which is indicative of an iron-cyanide complex form. Studies have shown that greater than 98% of cyanide detected in groundwater at MGP sites is in a complex form with iron (Ghosh, et al., 1999). Metal-cyanide complexes, especially strong complexes with iron, are much less toxic than free cyanide (ASTDR, 1997).

3.4.2.2 Deep Overburden Groundwater Analytical Results

The Phase II area contains eight deep overburden monitoring wells. The following table identifies these wells, the hydrostratigraphic units they screen, and the dates that they were sampled:

Well I.D.	Unit(s) Screened	Dates Sampled
MW-1M	Silt/Sand-and-Gravel	5/99, 1/00, 6/00
MW-1D	Sand-and-Gravel	10/98, 5/99, 1/00, 6/00
MW-4D	Sand-and-Gravel	Not Sampled
MW-6M	Sand-and-Gravel	1/00, 6/00
MW-6D	Sand-and-Gravel	10/98, 5/99, 1/00, 6/00
MW-7M	Silt/Sand-and-Gravel	Not Sampled
MW-7D	Sand-and-Gravel	10/98, 5/99, 1/00, 6/00
MW-16D	Fine-Sand	1/00, 6/00

Wells MW-4D and MW-7M contained NAPL at the time of sampling and therefore were not sampled. Because the bedrock surface rises steeply to the north beneath the Phase II Area, there is no "deep overburden" upgradient of the Phase II Area.

Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)

BTEX were detected above their respective NYSDEC Class GA groundwater standards in samples collected from all of the deep overburden wells sampled during this investigation. It is probable that BTEX also occur at concentrations above their standards in the two wells that were not sampled because they contained NAPL (MW-4D and MW-7M). The total concentration of BTEX was greatest in the sample collected from MW-1M (22,280 ppb) and least in the sample collected from MW-16D (185 ppb).

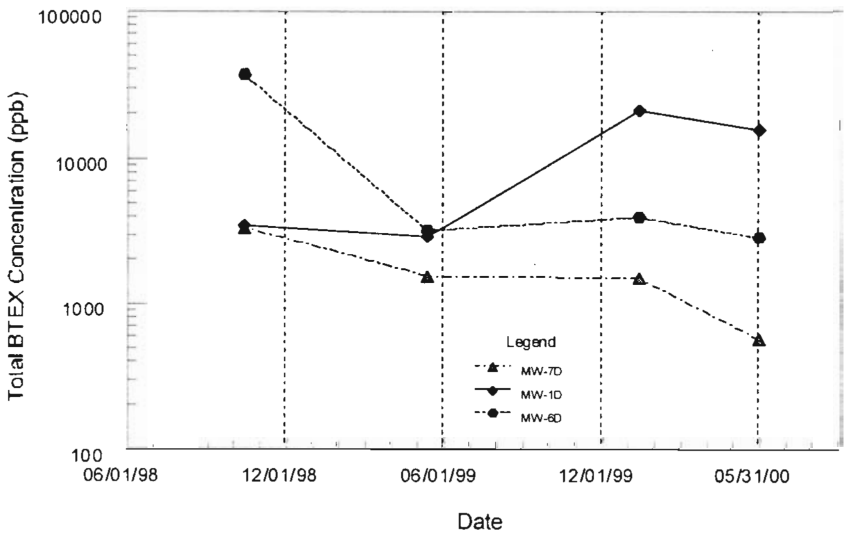
The presence of BTEX (and relatively low levels of PAHs, as discussed in the following subsection) at well MW-16D was unexpected because:

- Observations made during drilling and sampling of the well (no evidence of impacts from the former MGP were observed);
- Shallow groundwater monitored at other wells in the vicinity (i.e., at MW-15 and MW-16S) is unaffected by the MGP; and
- MW-16D is located upgradient of identified or suspected sources of MGP constituents.

These observations suggest that the source of these constituents may be unrelated to the former MGP.

Three of the wells sampled during this investigation (MW-1D, MW-6D, and MW-7D) were sampled twice previously, once during the PSA (October 1998) and once during the IRMI (May 1999). The following graph presents those results, as well as the results of the sampling conducted for this investigation.

Sum of BTEX Detected in Selected Deep Overburden
Ground-Water Monitoring Wells



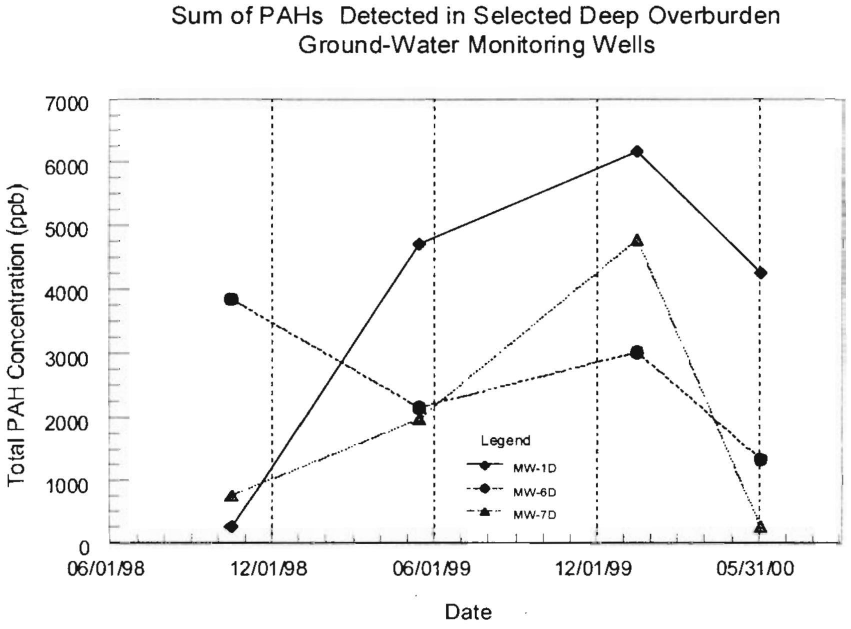
As shown by this graphic, BTEX concentrations have generally decreased markedly at wells MW-6D and MW-7D, and increased considerably at well MW-1D. Note that more than four data points (sampling events) are required to reliably identify trends in concentration data.

Based on the results discussed above, groundwater in the majority of the deep overburden beneath the Phase II Area likely contains concentrations of benzene, toluene, ethylbenzene and/or xylenes in excess of their respective Class GA standards.

Polynuclear Aromatic Hydrocarbons (PAHs)

PAHs were detected above their associated NYSDEC Class GA standard or guidance values in the samples collected from all six of the deep-overburden monitoring wells sampled. As noted in the above discussion of BTEX, the groundwater monitored by wells MW-4D and MW-7M, which typically contain NAPL, likely contains PAHs in excess of the applicable Class GA standard or guidance values as well. The sum of PAHs detected in the samples ranged from a high of 6,162 ppb at well MW-1D to 56 ppb at well MW-16D, both of which occurred during the January 2000 sampling event. Benzo(a)pyrene was detected, and thus exceeded its "non-detect" Class GA Standard, in all of the samples collected from well MW-6D, and in the most-recent sampling of well MW-1M. Other PAHs were also detected above their respective guidance values in samples from all six wells. Of the detected PAHs, naphthalene occurred in the highest concentrations, generally constituting about 60 to 80% of the total mass of PAHs detected in each sample.

PAH-concentration data for selected wells that have been sampled prior to this investigation are presented in the following graph:



The graphic shows that the concentration of PAHs in deep-overburden groundwater has dramatically increased and then decreased at the MW-1D and MW-7D well locations, while concentrations at well MW-6D appear to have generally decreased since its installation. As previously noted during the preceding BTEX discussion, more than four data points (sampling events) are required to reliably identify trends in concentration data.

The distribution of the PAHs in deep-overburden groundwater is similar to that described for BTEX (above).

Cyanide

Cyanide was detected at concentrations above its 200 ppb Class GA standard in samples collected from wells MW-1M (both sampling events) and MW-6M (January 2000 sampling event only). Cyanide concentrations in the remaining deep-overburden wells, including historical data for those wells sampled prior to this investigation, were below the Class GA standard.

Review of the cyanide data for deep-overburden wells (Table 13) suggests that cyanide concentrations decrease with depth, with the highest concentrations occurring in the "M"-series wells. These wells are screened across the contact between the silt unit and the underlying sand-and-gravel unit, while the "D"-series wells are deeper, being screened at the base of the sand-and-gravel unit. Because M-series wells do not exist at the MW-4 and MW-16 well clusters, and well MW-7M was not sampled due to the presence of NAPL in the well, the extent of deep overburden groundwater that contains cyanide in excess of the 200 ppb standard is less-well defined than the extent of BTEX and PAHs. The data do suggest, however, that the extent of groundwater containing cyanide above its standard is more limited than the extent of groundwater containing BTEX and PAHs above standards or guidance values. Additionally, as mentioned in Section 3.4.2.1, cyanide detected in groundwater at this site is believed to be in a complex (and stable) form with iron.

3.4.2.3 Bedrock Groundwater Analytical Results

Six bedrock monitoring wells were sampled during this investigation. The following table identifies these wells and the dates that they were sampled:

Well I.D.	Dates Sampled
MW-1R	1/00, 6/00
MW-4R	1/00, 6/00
MW-6R	1/00, 6/00
MW-11	1/00, 6/00
MW-13	1/00, 6/00
MW-14	1/00, 6/00

These wells are located in the Phase II Area, except well MW-11, which is in the Phase I Area (Figure 3).

The bedrock wells can be grouped into two categories. Wells MW-11, MW-13, and MW-14 are shallow wells located along the northern edge of the Phase II Area, where the water table occurs in, or within a few feet of, the bedrock. These well were intended to serve as upgradient monitoring wells; however, given the relationship between the northern site limit and the limits of the former MGP (Figure 3), none of these wells can be considered truly upgradient of all former MGP features. These wells do appear, however, to be upgradient of the most significant identified and potential sources of MGP byproducts (e.g., the former gasholders, purifiers, and former tar/water separator). Wells MW-1R, MW-4R, and MW-6R comprise the second category. These wells are located at the southern (downgradient) edge of the Phase II Area, where the depth to bedrock averages nearly 60 feet. These wells are generally screened 40 feet or more below the water table.

Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)

BTEX were not detected above their NYSDEC Class GA groundwater standards in any of the bedrock monitoring wells, except at well MW-13, where benzene was detected during both samplings (13 ppb and 40 ppb) and ethylbenzene was detected in the most-recent sampling (estimated by the laboratory at 5 ppb). The presence of these constituents in shallow groundwater at this location is not surprising. As shown on Figure 3, MW-13 is located within the footprint of the former MGP, near a bank of retorts. As mentioned in Section 3.4.1.1, the shallow groundwater at this location is expected to move southward and discharge into the silt unit.

Polynuclear Aromatic Hydrocarbons (PAHs)

PAHs were not detected at concentrations exceeding the standard or guidance values in samples collected from the bedrock monitoring wells, except at wells MW-6R and MW-13. The "non-detect" standard for benzo(a)pyrene was exceeded in the second sampling of well MW-6R (estimated at 1 ppb), and the 10 ppb guidance value for naphthalene was exceeded in the first sampling event at both MW-6R and MW-13 (18 ppb and 13 ppb, respectively).

Cyanide

Cyanide was not detected at concentrations exceeding the NYSDEC Class GA standard in samples collected from the bedrock monitoring wells.

3.5 Groundwater Flux and Constituent Mass Loading Estimates

The effect of Phase II Area groundwater upon Mohawk River water chemistry was evaluated by:

- Estimating the flux and drainage of groundwater from the Phase II Area to the Mohawk River;
- Estimating the rate that dissolved constituents are potentially discharged to the Mohawk River (loading); and
- Estimating the potential resultant river-water concentration of the constituents discharged.

The procedures used and calculations performed for this evaluation are discussed below.

3.5.1 Groundwater Flux Estimates

There are five primary sources of groundwater discharge to the Mohawk River in the Phase II Area: 1) continuous discharge from the sand-and-gravel unit; 2) continuous discharge from the sand unit; 3) continuous discharge from the silt unit; 4) continuous discharge from the fill unit; and 5) relatively instantaneous discharge from dewatering (draining) of portions of the sand-and-gravel, silt, and fill units when the river level is lowered at the end of the summer season. Because groundwater in the sand unit is generally unaffected by MGP-related constituents and the unit occurs cross-gradient and west of all known former MGP structures, the unit was not included in the flux calculations.

The flux of groundwater from the Phase II Area to the Mohawk River was evaluated by:

- Estimating the specific discharge (Q) of the sand-and-gravel, silt, and fill units in the Phase II Area; and
- Estimating the volume of water drained from the sand-and-gravel, silt, and fill units in the Phase II Area in response to the seasonal lowering of the river.

This methodology is similar to that used for evaluating groundwater flux from the Phase I Area of the site, as presented in the *IRMI Report*. The flux calculations for the Phase II Area are discussed below and summarized in Table 13.

3.5.1.1 Sand-and-Gravel Unit

The flux of groundwater from the sand-and-gravel unit to the river was estimated using the following form of Darcy's Law (Freeze and Cherry, 1979):

$$Q = KiA$$

where Q is the groundwater flux, K is the hydraulic conductivity of the unit, i is the horizontal hydraulic gradient, and A is the cross-sectional area through which groundwater is flowing.

Two values of groundwater flux through the sand-and-gravel unit were calculated based on different river levels: one value representing the flux when the river level is high (summer level), and the other representing the flux when the river level is low (winter level). This approach was taken because the hydraulic gradient (i) and the cross-sectional area (A) of the sand-and-gravel unit are different for these two conditions. Input parameters for calculating groundwater flux through the sand-and-gravel unit are given below.

Input Parameter	Value	Explanation
K	11.4 ft/d (4.0×10^{-3} cm/s)	Geometric mean determined from in situ hydraulic conductivity tests of wells screening the unit (Table 5).
i (high)	0.0015 ft/ft	Represents the gradient between well MW 7D and the Mohawk River during high-river condition. See Appendix J for details.
i (low)	0.0015 ft/ft	Represents the average gradient between well MW-1D and the Mohawk River, between well MW-6D and the Mohawk River, and between well MW-7D and the Mohawk River during low-river condition. See Appendix J for details.
A (high)	15,378 ft^2	Represents an estimate of the cross-sectional area of the sand-and-gravel unit along the edge of the Mohawk River during the high-river condition. See Appendix J for details.
A (low)	13,980 ft^2	Represents an estimate of the cross-sectional area of the sand-and-gravel unit along the edge of the Mohawk River during the low-river condition. See Appendix J for details.

Using the input parameters given above, the groundwater flux from the sand-and-gravel unit to the river is estimated to be approximately 1.4 gallons per minute (gpm) during the high-river condition and 1.3 gpm during the low-river condition (Table 13). These relatively low values are reasonable considering that the primary sources of water to the sand-and-gravel unit are discharge from the bedrock (which has a relatively low hydraulic conductivity) and leakage through the silt unit.

3.5.1.2 Silt Unit

Using the same approach described above, two values for groundwater flux through the silt unit were calculated: one representing the flux when the river level is high, and the other representing the flux when the river level is low. Input parameters for calculating groundwater flux from the silt unit to the river are given below.

Input Parameter	Value	Explanation
K	1.8 ft/d (6.2 x 10-4 cm/s)	Geometric mean determined from in-situ hydraulic conductivity tests of wells screening the unit (Table 5).
i (high)	0.007 ft/ft	Represents the average gradient between well S-1 and the edge of the Mohawk River during the high-river condition. See Appendix J for details.
i (low)	0.023 ft/ft	Represents the average gradient between well S-1 and the edge of the Mohawk River during the low-river condition. See Appendix J for details.
A (high)	5,359 ft^2	Represents an estimate of the cross-sectional area of the silt unit along the edge of the Mohawk River during the high-river condition. See Appendix J for details.
A (low)	3,924 ft^2	Represents an estimate of the cross-sectional area of the silt unit along the edge of the Mohawk River during the low-river condition. See Appendix J for details.

Given the input parameters above, the flux from the silt unit to the river is estimated to be approximately 0.4 gpm during the high-river condition and 0.8 gpm during the low-river condition (Table 13).

3.5.1.3 Fill Unit

In the same manner as the sand-and-gravel and silt units, two values were calculated for groundwater flux through the fill unit. Refer to Appendix J for a detailed explanation of the gradient calculations. Input parameters for calculating groundwater flux from the fill unit to the river are given below.

Input Parameter	Value	Explanation
K	14.2 ft/d (5.0×10^{-3} cm/s)	Geometric mean value determined from in-situ hydraulic conductivity tests of wells screening the unit (Table 5).
i (high)	0.038 ft/ft	Represents the average gradient between well MW-4S and the Mohawk River, and between well MW-1S and the Mohawk River during the high-river condition. See Appendix J for details.
i (low)	0.159 ft/ft	Represents the average gradient between well MW-4S and the Mohawk River (calculation based on distance during high-river condition), and between well MW-1S and the Mohawk River during the low-river condition. See Appendix J for details.
A (high)	903 ft^2	Represents an estimate of the cross-sectional area of the fill unit along the edge of the Mohawk River during the high-river condition. See Appendix J for details.
A (low)	450 ft^2	Represents an estimate of the cross-sectional area of the fill unit along the edge of the Mohawk River during the low-river condition. See Appendix J for details.

Based on the input parameters given above, the groundwater flux from the fill unit to the river is estimated to be approximately 2.5 gpm during high-river conditions and 5.3 gpm during low-river conditions (Table 13).

3.5.2 Drainage Estimates

The volume of water discharged to the river by dewatering of portions of the sand-and-gravel, silt, and fill units when the river level is lowered was estimated by assuming that two wedge-shaped volumes of material were dewatered, and calculating the volume of water that would drain from those volumes. Appendix J defines the wedge-shaped volumes, referred to as the eastern and western wedges, and contains the flux calculations for those volumes.

3.5.2.1 Eastern Wedge

Only portions of the silt and fill units contained in the eastern wedge dewater when the river level is lowered. To estimate the quantity of water that can drain from the eastern wedge two factors were considered:

- The volume that each unit comprises in the eastern wedge; and
- The specific yield (Sy) of each unit in the eastern wedge.

The specific yield is a storage factor that determines how much volume an unconfined aquifer will release per unit area per unit decline in hydraulic head (Freeze and Cherry, 1979). For the geologic units in the Phase II Area, the values for specific yield should range between 10% and 30% of the total volume of the unit that is draining; therefore, it was necessary to estimate the total volume of each unit contained in the eastern wedge. Different volumes and specific yields were calculated for the fill and silt units and were used to estimate a proportional specific yield for the eastern wedge using an approach described by Brassington (1988). The calculations for estimating specific yield are detailed in Appendix J.

A conservative specific yield value of 29% was estimated for the eastern wedge. The total volume of the eastern wedge that dewaters is estimated to be approximately 53,277 cubic feet (ft^3). Multiplying this volume by the estimated specific yield of the material comprising the wedge (0.29) yields 15,450 ft3, or approximately 116,000 gallons, which represents the volume of water that is estimated to drain from the eastern wedge during lowering of the river.

3.5.2.2 Western Wedge

The same approach for estimating drainage in the eastern wedge was applied to the western wedge for sand-and-gravel and silt unit during lowering of the river. For the western wedge, a conservative specific yield of approximately 25% was estimated. The volume of the western wedge was calculated to be approximately 160,628 ft^3 (Appendix J). Multiplying this volume by the estimated specific yield of the material comprising the wedge (0.25) yields 40,157 ft^3 or approximately 300,000 gallons, which represents the volume of water that is estimated to drain from the western wedge to the river during lowering of the river.

Summing the volumes of water estimated to drain from the eastern and western wedges yields an approximate total volume of water of 416,000 gallons expected to drain to the river during river lowering.

3.5.3 Constituent Mass-Loading Estimates

This section provides conservative estimates of the potential quantity of dissolved constituents discharging to the river. The estimates were calculated using the fluxes estimated above and the analytical results of the January 2000 groundwater sampling event.

Based on the understanding of groundwater flow described in Section 3.4.1, the time of year when the greatest quantity of dissolved constituents is expected to discharge to the river would be at the end of the boating season (at the time that the river level is lowered). During this period, horizontal hydraulic gradients towards the river are greatest, and groundwater drainage occurs in response to the river lowering. Mass loading was calculated on a per-day basis for this time period. The results of the calculations are presented in Table 14. Drainage of the sand-and-gravel, silt, and fill units is assumed to last approximately two weeks; therefore, the mass-loading values shown in Table 14 represent the mass of constituents discharged to the river each day of that two-week period. The daily loading rate for the remaining 351 days of the year will be considerably less. For this reason, the rates in Table 14 should not be used to calculate annual mass-loading values.

As shown in Table 14, the quantity of each dissolved constituent discharging to the river was determined by summing the quantities contributed by discharge and drainage from the sand-and-gravel unit, silt unit, and the fill unit when the river level is lowered. As an added measure of conservatism, for each constituent modeled, the concentration used for the mass-loading calculations was equal to the highest concentration detected in groundwater samples collected within the Phase II Area monitoring wells during the January 2000 sampling event, as shown below:

Discharge Source	Constituent Concentration Used
Sand-and-Gravel Unit	Highest concentration detected in samples collected from monitoring wells screening the unit (MW-1D, MW-1M, MW-6D, MW-6M, and MW-7D).
Silt Unit	Highest concentration detected in the sample collected from the monitoring well screening the unit (MW-7S).
Fill Unit	Highest concentration detected in the monitoring well screening the unit (MW-4S)*.

*The screen for well MW-4S extends into the silt unit. There are no wells that screen the fill unit exclusively.

The constituent loading was calculated for each of the VOCs analyzed (benzene, toluene, ethylbenzene, and xylenes), PAHs detected, and total cyanide. With this conservative approach, the concentration of each constituent in the water discharging from each unit is assumed to be uniform and is the greatest concentration measured in the sample(s) collected from that unit. In fact, most of the groundwater samples collected contained considerably lower concentrations, and many of the individual constituents were not detected in all of the samples.

3.5.4 Estimating Constituent Concentrations in River Water

The mass-loading values discussed above were used to estimate a resultant constituent concentration in the Mohawk River. Constituent concentrations were calculated using the following assumptions:

- River water does not already contain background concentrations of any site-related constituents prior to receiving groundwater from the site;
- Groundwater is instantaneously mixed with river water; and
- Constituent mass is not lost due to biodegradation, sorption, or volatilization.

Calculating constituent concentration in the river requires a value for the discharge (flow rate) of the river. Flow in rivers varies considerably from day to day and year to year in response to variations in climate and human-induced flow modifications. The resulting constituent concentration from discharge of groundwater to a river is highly dependent on the rate of flow in the river at the time of discharge, making selecting an appropriate river flow rate important. As an added measure of conservatism, the 7-day 10-year low-flow condition for the river was used. A 7-day 10-year low flow, $Q_{-,10}$, is defined as the lowest average flow over a consecutive period of seven days, occurring at an average of once in ten years (Singh and Stall, 1975). The $Q_{-,10}$ discharge of a given river or stream is typically much lower than its average flow rate. The $Q_{-,10}$ discharge value used in the calculations is 770 cubic feet per second. This value was obtained from the NYSDEC Water Resources Division (Dalton, personal communication with K. A. White, 1999). This, again, is a conservative approach as a $Q_{-,10}$ flow would not likely be encountered during release of waters from upstream dams, as occurs during the seasonal lowering of the river.

The estimated river-water concentration for each constituent is provided in Table 14, along with the appropriate New York State Ambient Water Quality Standards and Guidance Values (NYSDEC, 1998). Despite the various measures of conservatism built into the calculations, only one of the estimated concentrations exceeded a guidance value. The estimated concentration of benzo(a)pyrene in river water due to discharge associated with dissolved constituents in groundwater from the Phase II Area is estimated to be approximately 0.0015 ppb. This conservatively estimated value is 0.0003 ppb (0.3 parts per trillion) higher than the 0.0012 ppb guidance value (not standard value) for this constituent. Recall that this estimated concentration represents the concentration in river water during the two-week period when the river is lowered, when a small fraction of Phase II Area soils dewater.

The river-water concentration of benzo(a)pyrene, and all other MGP-related constituents, would be considerably less during the remaining 351 days of the year, when dewatering does not occur. To illustrate this, Table 14 also shows estimated river-water concentrations using the estimated average daily flux to the river, rather than the maximum daily flux. The table shows that, for the vast majority of the year, estimated river-water concentrations of MGP-related constituents would be several orders of magnitude lower, with the concentration of most constituents, including benzo(a)pyrene, being less than 0.1 part per trillion.

3.6 Surface-Water Investigation Results

As discussed in Section 2.6.1, surface-water samples were collected along the Mohawk River during two events, one in March 2000 (low river level), and the other in June 2000 (high river level). Samples were collected upstream, downstream, and adjacent to the Riverlink Park. Analytical results indicate that surface water is not adversely affected by the former MGP. Only one surface-water sample contained detectable concentrations of MGP-related constituents. These were toluene and xylene, each at estimated concentrations of 2 ppb, which are below appropriate NYSDEC ambient surface water-quality standards. This sample was collected during the first sampling event, approximately 10-feet from the "low" shoreline and immediately downgradient (south) of former Gas Holder No.2. Table 15 summarizes the surface-water analytical results.

3.7 Storm-Water Investigation Results

MGP-related constituents were not detected in storm-water samples collected from catch basin CB-9 or the storm-sewer outfall to the River. Given that the storm sewer invert elevation is below the water table in this area of the site, it is reasonable to assume that the storm sewer that passes through the Phase I and Phase II Areas does not collect affected groundwater. The potential for sewer bedding to act as a preferential pathway for groundwater (or NAPL) is discussed in Section 3.9.

3.8 NAPL Monitoring and Removal Program Results

The NAPL monitoring and removal program consists of the nine wells where measurable thicknesses of NAPL have been identified. Table 8 summarizes the NAPL type (LNAPL or DNAPL), average monthly apparent thickness, and the volume removed from each well in the program. Through August 2000, approximately 50 gallons of NAPL have been removed through the program, the majority of it (greater than 85%) consisting of DNAPL. DNAPL has been detected and removed from five wells: MW-1S, MW-1M, MW-4D, MW-8, and S-1. More than half of the DNAPL removed came from one well, MW-8 (approximately 25 gallons), which was decommissioned during the IRM and replaced by recovery well RW-3. RW-3 yielded a small amount of LNAPL shortly after it was installed (about 0.25 gallons), but since then little or no measurable thicknesses of

LNAPL or DNAPL have accumulated. Most of the balance of DNAPL collected came from well MW-1S (13 gallons). The quantity of DNAPL produced at each of the six wells appears to be declining. One well (S-1) has not produced any since May 2000.

LNAPL has been detected in seven wells (MW-1S, MW-1M, MW-4D, MW-6M, MW-7M, and RW-3); however, most of these (MW-1S, MW-1M, MW-4D, and MW-6M) have not produced a sufficient thickness to warrant removal and exhibit only sporadic occurrences. Most of the LNAPL collected (about 80%) came from one well, MW-7M; however, the volume produced by this well has steadily declined, and since June 2000, the thickness of accumulated LNAPL in this well was too small to warrant removal.

3.9 Riverbank Assessment Results

The riverbank assessment, which BBL conducted during the annual lowering of the Mohawk River (see Section 2.8), provided information on the actual process of lowering the river, and identified areas of the exposed bank that appeared affected by MGP byproducts. As described by personnel of the NYSCC, the process of lowering the Mohawk River consists of first, simultaneously removing the upper sections of dam (each lock dam has an upper and lower section) at each of the locks along the canal system, then, once the river level stabilizes, simultaneously removing the lower sections of dam at each lock. The process lasted approximately one week, and resulted in a net decrease in river level of about 10 feet.

The assessment identified two separate areas of the bank that appeared to be affected by different byproducts. The Eastern Riverbank extended from the western extent of the terminal wall to approximately 280 feet to the west (to roughly south of monitoring wells in cluster MW-4). The Western Riverbank extended to the west from this point to the Route 30 bridge. These areas are described in the following two subsections. As mentioned in Section 2.8, the Riverbank Assessment was conducted during December 2, 3, 6, and 15, 1999. Appendix E contains field notes taken during the assessment.

3.9.1 Eastern Riverbank

On each of the four separate dates that BBL conducted an assessment of the riverbank during the course of the Mohawk River lowering, oily-type sheens and NAPL were observed in soil, sediment, and surface water along the shoreline at the eastern portion of the Phase II Area, immediately downgradient (south) from former Gas Holders No. 1 and No. 2 (Figure 3). Generally, the most noticeable impacts were observed within a few hours immediately after the river level was lowered a significant amount (1 to 2 feet). However, the amount of sheen and mobile NAPL observed seemed to rapidly decrease once the river level stabilized. The material from which the sheen and NAPL was issuing was primarily composed of rip-rap at the higher river level and fine to coarse sand, gravel, and silty sediment at the lowest river level.

The storm sewer that passes through the Phase I and Phase II Areas discharges to the river along this section of riverbank (although the outfall is beneath several feet of water during the summer, when the river is at its high level). Field staff observed no preferential discharge of NAPL around the outfall (i.e., sheens in the river water around and beneath the outfall) as the river level decreased, or evidence of substantial, preferential discharge of groundwater. Due to the presence of rip-rap around the outfall; however, preferential discharge of groundwater from around the outfall (i.e., the sewer bedding) on a lesser scale may not have been noticeable during the survey.

The width of impacted shoreline appeared to increase as the level of the Mohawk River lowered (concurrent with the increased width of exposed river bottom). The following table summarizes the noticeable increase in impacted shoreline width corresponding with the drop in the river level for the Eastern Riverbank Area.

Date	Approximate River Level	Width of Shoreline Where Sheens and NAPL Were Observed
December 2, 1999	3 feet below summer level	55 feet
December 3, 1999	6.5 feet below summer level	64 feet
December 6, 1999	9 feet below summer level	77 feet
December 15, 1999	10 feet below summer level	177 feet

The most significant impacts were noticed on December 15, 1999, when the river was at its lowest level. At this time, a section of shoreline was exposed in front of (south of) the west end of the terminal wall immediately downgradient of former Gas Holder No. 3 (Figure 3). NAPL and sheen was observed along the shoreline extending from in front of the terminal wall to approximately 177 feet to the west, ending due south of the western extent of former Gas Holder No. 2.

3.9.2 Western Riverbank

A viscous coating of black tar was observed on rip-rap, soil, and sediment along the western portion of the riverbank extending from beneath the State Route 30 bridge to approximately 134 feet east. The coating of tar was more extensive beneath and immediately east of the bridge and became less extensive further to the east, where it was barely present.

At the time of the assessment, near the bridge, the tar was odorless, dense, hard, and seemed immobile; however, based on its existence and pliable appearance, it must have been mobile at some time in the past. In this area, the tar extended from about one- to two-feet below the top of the bank to the bottom of the bank, beneath the high river water level. The tar appeared to have been exuding from beneath and between the rip-rap that covered the bank in that area. Tar was observed at areas beneath the summer (high) level of the river, where it was covered with sediment from the Mohawk River.

4. Qualitative Human Health Evaluation

4.1 General

The qualitative human health evaluation presented in this section describes the potential for adverse human health effects associated with exposure to potential MGP-related constituents at the site and the adjacent Mohawk Riverlink bank. This evaluation uses information regarding current and foreseeable land use scenarios, and available data for the site, to evaluate the magnitude of potential exposure for human receptors. The human health evaluation is based on characterization of the environmental setting of the site and identification of constituents of interest. This section also includes the identification of potentially complete exposure pathways, and a characterization of the potential magnitude of the exposure. The results of the qualitative human health evaluation are then used, where appropriate, to develop RAOs for the Phase II Area.

4.2 Environmental Setting

The Riverlink Park is located along the northeastern bank of the Mohawk River in Amsterdam, New York (Figure 1). The site location was historically occupied by a MGP, and is being redeveloped into a public waterfront park. Land use surrounding the site is largely industrial/commercial. An active railroad and several warehouses exist to the north of the site, and there is a commercial business district beyond the railroad and warehouses. The Mohawk River is adjacent to and immediately south of the site. The northern bank of the Mohawk River is covered with rip-rap adjacent to the site. East and downstream of the site (in the Phase I Area), the riverbank is covered with a terminal wall. In addition, on the western portion of the site is the State Route 30 bridge and bridge abutments. East of the Phase I Area (i.e., downstream on the Mohawk River) is the former Mohawk Carpet Company warehouse and Longview Fibre Company.

The Riverlink Park is currently fenced, except for the southern edge bordering the Mohawk River. The fencing consists of an 8-foot high chain link fence with locked gates. Additionally, a chain link fence is present along the Phase I-Phase II line from the fence to the north to the top of the riverbank on the south. The Phase I Area of the site has been regraded and covered with approximately 2 feet of clean fill, except for areas of proposed structures or pavement, as discussed in the *IRM Report* (BBL, 2000). The only remaining vegetation on site is a thin strip of trees and shrubs adjacent to the Mohawk River in the Phase II Area. Current activities at the Park include environmental monitoring and sampling activities and construction of the Riverlink Plaza Area. Anglers and other people may gain access along the western portion of the site adjacent to the river, but the steep banks are likely to deter most people. Future activities are likely to be associated with the construction of the Riverlink Park and subsequent use by the public, and any additional environmental monitoring. Long-term future activities are likely associated with recreational activities at the Park, which will include (for example) an amphitheater, a playground, and a skating rink.

4.3 Constituents of Interest

As previously discussed, data defining the constituents of interest in the Phase II Area were collected as part of three investigations, including the PSA, IRMI, and Phase II Area Investigation. Based on a review of these data and evaluation of the history of the site, potential constituents of concern are BTEX compounds, PAHs, and cyanide.

4.4 Potential Exposure Points, Receptors, and Route of Exposure

An initial step in evaluating potential human exposure is the identification of complete exposure pathways. For an exposure pathway to be complete, the following three elements must exist: 1) the presence of constituents of potential interest in environmental media; 2) locations where human exposure to these media could occur; and 3) routes of exposure where constituents from these media could be taken up by the human body. As previously described, constituents of potential interest have been detected in soils, groundwater, and sediment. Potential human exposure to these media could occur via ingestion, dermal contact, and/or inhalation of particulates or volatile organics released to the air. Current potential receptors include on-site and near-site workers and trespassers. Future receptors may include the Park employees, general public visiting the Park, and environmental monitoring personnel.

Based on the existing data and site knowledge, the potentially complete human exposure pathways at the site are similar to those identified for the Phase I Area in the NYSDEC-approved IRM Work Plan (BBL, 1999c), with one addition, the potential exposure pathways for the Phase II Area also include potential exposure to sediment of the Mohawk River.

Potentially complete human exposure pathways for the Phase II Area are:

<u>Potential direct contact with soils</u> - Potential direct contact with MGP-affected soil could occur either by the general public or on-site workers. The potential for direct contact to the general public with MGP-affected soil may be mitigated by covering the site with either a layer of clean soil or a constructed structure/cover. These activities may take place as part of future remedial/construction activities. This approach is the same as that documented in the NYSDEC-approved IRM Work Plan for the Phase I Area (BBL, 1999c). Potential exposure of workers will be mitigated by using workers, as appropriate, that have the required Occupational Safety and Health Administration (OSHA) training, and by following appropriate health and safety procedures.

<u>Potential inhalation of vapor/gases/particulates</u> - Potential inhalation of volatilized or particulate emissions may occur either by the general public or on-site workers. For example, potential exposure may occur to fugitive dust generated during excavation and/or construction activities. Potential exposure via inhalation, however, may be effectively reduced by the following measures: 1) covering the site with either a layer of clean soil or a constructed structure/cover as part of future remedial activities; 2) using workers which have the required OSHA training; 3) following appropriate health and safety procedures and protocols, including air monitoring; 4) using (if and as necessary) dust, vapor, and odor controls while implementing future remedial activities; and 5) modifying, if necessary, the storm sewer catch basins at the site to mitigate potential vapor migration (as was done in the Phase I Area). Collectively, these measures will serve to effectively minimize the potential for exposure via inhalation.

<u>Potential direct-contact with Mohawk River sediments</u> - Potential direct-contact with Mohawk River sediments in the general vicinity of the site may occur by the general public or on-site workers. The riverbank in Phase I Area of the Park is covered by the terminal wall, minimizing access to the river sediments. Along the western portion of the Park (in the Phase II Area) and in the vicinity of the State Route 30 bridge, the river is not bulkheaded, but the steep bank is covered with large rip-rap. There are several factors that limit the potential for direct contact with sediment in this area. Mohawk River water levels are elevated during times of peak recreation (i.e., summer and early fall months), inundating sediments adjacent to the site under multiple feet of water. Sediment is only exposed when water levels in the Mohawk River are lowered during the months of November through April. During this time, exposure to sediment is unlikely because of the cold winter climate and general lack of recreational activities in this area at that time of year. Also, the Mohawk River in this area is turbid, and generally not appealing to most people for swimming.

Potential direct contact with groundwater - Groundwater is not a current or foreseeable potable source at the site, and thus exposure via ingestion is unlikely for all receptors. Additionally, a land-use restriction prohibiting use of groundwater as a drinking water source is anticipated to be placed on the site. However, there is a potential for direct contact with groundwater by on-site workers during construction activities. The potential for exposure to groundwater depends, however, on the depth to the groundwater table. Based on groundwater levels measured during the Phase II Area Investigation, the depth to groundwater in the Phase II Area is a minimum of approximately 5 to 10 feet bgs. Potential exposure of workers to groundwater will be mitigated by using workers (as necessary) which have the required OSHA training, and by following appropriate/required health and safety procedures and protocols. Potential future exposure to soils and to site groundwater would need to be controlled by a land-use restriction.

4.5 Summary

The PSA, IRMI, and Phase II Area Investigation identified BTEX, PAHs, and cyanide as constituents of interest in soil, sediment, and groundwater at the site. Potential exposure to these media may occur for on-site workers and the public. However, each of the potentially complete exposure pathways have, or could have, site-specific conditions, or mitigative measures can successfully reduce or mitigate the potential exposure. Specifically, soils of the site could be capped with a clean layer of soil or pavement, thereby mitigating the potential for exposure of the general public to constituents in soil. Direct contact of workers with soil will be mitigated by implementing appropriate health and safety practices. Exposure via drinking water to site groundwater is also unlikely, because groundwater is not a current or foreseeable potable source. Additionally, in accordance with the VCA, a land use restriction will likely be placed on the site to prohibit use of groundwater as a potable water source. The potential for direct contact with groundwater is also minimal because site groundwater is typically 5 to 10 feet bgs or greater, and direct contact with groundwater by workers will also be limited by following appropriate health and safety practices. Potential exposure to Mohawk River sediments in the general vicinity of the site is unlikely because of the terminal wall at the eastern end of the Park and the steep and rip-rap covered bank at the western end. Additionally, sediments are only exposed during times of low water levels, which is coincident with cold temperatures. Thus, seasonal conditions and the depth of water serve to minimize potential exposure to sediment.

5. Fish and Wildlife Impact Analysis

5.1 General

This section of the Phase II Area Investigation Report presents the Fish and Wildlife Impact Analysis (FWIA) for the Riverlink Park. The FWIA was performed in accordance with the NYSDEC (1994) guidance document *Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites* (FWIA). The FWIA procedures defined in the guidance follow a step-wise process. The steps included in this assessment (described in Section 2.10) are discussed below.

5.2 Step I - Site Description

Step IA of the FWIA process includes maps that describe the physical and ecological characteristics of the area. A map portraying the Riverlink Park is presented in Figure 2. The Park is located between Locks 10 and 11 along the north bank of the Mohawk River, just east of the State Route 30 bridge. The stretch of river between Locks 10 and 11 is 4.1 miles long, covers 378 acres, and has a mean width of 1,223 feet (McBride, 1985). The Mohawk River is approximately 160 miles long and qualifies as the second longest river in New York State. It is part of the New York State Erie Canal system and is a tributary to the Hudson River in the eastern part of the state. Approximately 84 miles of the river have been straightened and dredged for the purposes of navigation. The river was changed from a free flowing river to a series of seasonal and permanent impoundments with the addition of removable locks. Through the months of November to April, these locks are removed and the river again becomes free flowing. Extreme water level fluctuations in the canal section of the river, ranging from one to ten feet, occur due to the removal of dams each winter (McBride, 1985).

The lower Mohawk River is characterized as homothermous and moderately fertile (McBride, 1985). The pH levels of the Mohawk River are slightly alkaline, ranging from 7.6 to 8.8 (McBride, 1985). Dissolved oxygen levels range from 7.0 to 14.0 ppm throughout the water column (McBride, 1985). The New York State classification of the reach of the Mohawk River associated adjacent to the Park is Class C fresh surface waters, which are suitable for fish propagation and survival (6 NYCRR, Part 876).

There are three perennial streams present within the vicinity of the Park and include North Chuctanunda Creek, South Chuctanunda Creek and an unnamed tributary. All of these streams are tributaries to the Mohawk River, and none of these streams receive run-off from the site. The New York State classification of all three tributaries is Class C fresh surface waters, which are suitable for fish propagation and survival (6 NYCRR, Part 876).

5.3 Step IB - Description of Fish and Wildlife Resources

Step IB of the FWIA process involves the description of fish and wildlife resources in the vicinity of the Park. The description includes the characterization of vegetative covertypes of the area, wetland identification, an evaluation of fish and wildlife resources, the identification of threatened, endangered, and rare species, and observations of stressed vegetation or negative impacts on fish and wildlife. To conduct Step IB of the FWIA, topographic and wetland maps were reviewed to identify the general physical and ecological features of the Park and surrounding areas within a radius of 0.5 miles. In addition, a survey was performed on February 17, 2000 by BBL biologists to identify vegetative covertypes and associated fish and wildlife inhabitants within 0.5 miles of the Park. The survey also assisted in the evaluation of wildlife habitat value of the covertypes, and included an evaluation of the presence of stressed vegetation.

5.3.1 Covertype Mapping

Covertype mapping for the Park and surrounding area was performed by identifying the dominant vegetative species assemblages and classifying similar areas into ecological communities as defined by Reschke (1990). The covertype map is presented as Figure 19. The Park, in its partially developed condition, was classified as an urban vacant lot ecological community. Surrounding properties were predominately a residential/industrial covertype with intermixed successional old field and successional northern hardwoods covertypes. Ten different ecological communities were identified within a 0.5-mile radius of the site, consisting of an urban vacant lot, successional old field, maintained roadside/pathway, residential/industrial, mowed lawn with trees, successional northern hardwoods, junkyard, main channel stream, mid-reach stream, and floodplain forest. The identified covertypes are described in the following sections.

Urban Vacant Lot - The urban vacant lot covertype is characterized as an open site in a developed area that has been cleared either for construction or following the demolition of a building. Vegetation is usually sparse with large areas of exposed soil, accompanied by remaining rubble or other debris (Reschke, 1990). The Phase I Area of the Park has been recently excavated/backfilled for construction/remedial purposes, and is best characterized as an urban vacant lot (Figure 19). Large areas of exposed soil are present on the site, and the only remaining vegetation is a thin strip in the Phase II Area along the Mohawk River. Vegetation observed or expected to occur in the urban vacant lot covertype are listed in Table 16.

Successional Old Field - The successional old field covertype is described as a meadow dominated by forbs and grasses that occurs on sites that have been cleared or plowed and then abandoned (Reschke, 1990). This covertype is present on portions of the industrial properties west of the State Route 30 bridge and adjacent to the railroad tracks that run west to east, parallel to the study area (Figure 19). Vegetation observed or expected to occur within the successional old field covertype are listed in Table 17.

Maintained Roadside/Pathway - The maintained roadside/pathway covertype is characterized as a narrow strip of low-growing vegetation along a utility right-of-way corridor (Reschke, 1990). Two utility right-of-ways within the study area were classified as this covertype. The first area consists of a three-pillar-wide overhead electrical utility line right-of-way, which is located adjacent to the site on the north and parallel to the railroad tracks (Figure 19). A second utility right-of-way corridor exists across the river from the Park, bordering a wetland area found along the south shore of the Mohawk River (Figure 19). Vegetation observed or expected to occur in the maintained roadside/pathway covertype are listed in Table 18.

Residential/Industrial - The residential/industrial covertype generally consists of residential, commercial and industrial land uses. This covertype is characterized by houses, commercial and industrial buildings, roads, and parking lots with up to 50% vegetative cover (Reschke, 1990). The majority of the areas found within a 0.5 mile radius of the Park were classified as the residential/industrial covertype (Figure 19). Abandoned warehouses and Terleckey Tire Service are located adjacent to the Park on the north. Also north of the Park, across Route 5, are Amsterdam Community Cancer Program, Key Bank, and the parking area for the Riverlink Park. To the east of the Park, bordering the Mohawk River, are buildings of the former Mohawk Carpet Company warehouse and Longview Fibre Company. Bordering the Mohawk River on the south and to the west of the State Route 30 bridge are several abandoned warehouses, Santos Construction Company and the National Farmers Organization. Also on the south shore of the river, and to the east of the State Route 30 bridge, are several large above-ground petroleum storage tanks, which are part of a loading station for gasoline distribution trucks. Vegetation observed or expected to occur within the residential/industrial covertype are listed in Table 19.

Mowed Lawn with Trees - The mowed lawn with trees covertype generally consists of residential, recreational, or commercial land in which the ground cover is dominated by clipped grasses and forbs with at least 30% cover of trees (Reschke, 1990). This covertype is present approximately 0.4 miles north of the Park, within Green Hill Cemetery (Figure 19). Vegetation observed or expected to occur within the mowed lawn with trees covertype are listed in Table 20.

Successional Northern Hardwoods - The successional northern hardwoods covertype is one of the most common covertypes in New York State (Reschke, 1990) and generally consists of a mixture of maturing hardwood tree species. Dominant ground cover in this covertype may include a mixture of species such as those found in a successional old field community (Reschke, 1990). This covertype is located approximately 0.5 miles southwest of the Park along the south shore of the Mohawk River (Figure 19). Vegetation observed or expected to occur within the successional northern hardwoods covertype are listed in Table 21.

Floodplain Forest - The floodplain forest covertype generally consists of a hardwood forest that occurs on low terraces of river floodplains with a fluctuating flood regime (Reschke 1990). Vegetation observed or expected to occur in the floodplain forest covertype are listed in Table 22. The survey identified one wetland area within a 0.5 mile radius of the Park that is best described as a floodplain forest covertype. This wetland area encompasses two islands located in the middle of the Mohawk River and a portion of the southern shoreline, approximately one-third of a mile downstream of the Park (Figure 19).

Junkyard - The junkyard covertype generally consists of an area that has been cleared for disposal or storage of primarily inorganic refuse, including discarded automobiles, large appliances and mechanical parts (Reschke, 1990). This covertype is present on approximately one acre of land along the south shore of the Mohawk River, directly across the river from the Park (Figure 19).

Main Channel Stream - A main channel stream is a large stream aquatic community with no distinct riffle areas (Reschke 1990). Based on this description, the Mohawk River would be classified as a main channel stream. The Mohawk River borders the Park to the south, where it is approximately 1,000 feet wide (Figure 1). A concrete terminal wall exists along the river shore, bordering a portion of the Park on the south. There were no floating or emergent vegetation observed along the river shoreline at the time of the survey.

Mid-Reach Stream - The mid-reach stream covertype is described by Reschke (1990) as a streambed with a well-defined pattern of alternating pool, riffle, and run sections. There are three perennial streams, tributaries to the Mohawk River, within a 0.5 mile radius of the Park, all of which are classified as mid-reach streams (Figure 19). The first stream is North Chuctanunda Creek, which originates north of the Park and flows into a culvert, entering an outfall located on the north shore of the Mohawk River, west of the State Route 30 bridge. The second stream is South Chuctanunda Creek, which enters the south shore of the Mohawk River, west of the State Route 30 bridge, from a southwest direction. The third stream is an unnamed tributary, located to the east of the State Route 30 bridge, which bisects the wetland area before entering the Mohawk River along its south shore. None of these streams receive drainage from the Park.

5.3.2 Wetland Identification

The presence of regulated wetlands in the vicinity of the Riverlink Park was evaluated during the survey. In addition, the Park property was included on New York State Freshwater Wetlands Maps. Based on the New

York State Freshwater Wetlands Maps for the Amsterdam Quadrangle, six New York State regulated wetlands are mapped within a 2-mile radius of the Park (Figure 20). Of these six wetlands, three are Class II wetlands, two are Class I wetlands, and one is a Class III wetland (Parker, 2000). Characteristics indicative of each wetland classification can be found in the NYSDEC (1988) *Freshwater Wetlands Maps and Classification Regulations, 6 NYCRR Part 664*. Wetland A-12 is a Class II wetland located approximately 1.5 miles southeast of the site, along the northern shore of the Mohawk River. Wetland A-11 is a Class II wetland mapped along the southern shoreline of the Mohawk River, approximately one-third of a mile southeast of the Park. Both of these wetlands are located downstream of the Park. Wetland A-7 is a Class I wetland located approximately 2 miles northeast of the Park and is not hydraulically connected to the stretch of the Mohawk River associated with the Park. Wetland TH-14 is a Class I wetland located approximately 2 miles northwest of the site, upstream beyond Lock 11, along the northern shoreline of the Mohawk River. Wetland A-30 is a Class II wetland located northwest of the Park, 1.75 miles upstream beyond Lock 11, along the southern shoreline of the river. Wetland A-9 is a Class III wetland located approximately 1.5 miles northwest of the Park, along a tributary that enters the Mohawk River directly downstream of Lock 11 (Figure 20).

National Wetland Inventory (NWI) Maps that include the Park were also reviewed to evaluate the presence of wetlands in the vicinity of the site. However, no NWI wetland information was available for the Amsterdam Quadrangle.

5.3.3 Fish and Wildlife

In general, the wildlife inhabiting or using the terrestrial covertypes in the vicinity of the site are limited to common species typical of urban areas. During the survey, very few birds and mammals were observed in the vicinity of the Park, partially due to the winter season, but also as a result of the degree of development in the area. The fish and wildlife species potentially inhabiting each of the covertypes are listed in Tables 23 through 31.

5.3.4 Threatened, Endangered, or Rare Species

No threatened or endangered species were observed during the survey. In addition, information from the New York State Natural Heritage Program indicate no records of known occurrences of rare or state-listed animals or plants, significant natural communities, or other significant habitats, on or in the immediate vicinity of the Park. Similarly, information from the U.S. Fish and Wildlife Service indicates that except for occasional transient individuals, no federally-listed or proposed endangered or threatened species are known to exist in the project area. Copies of the correspondence from the New York State Natural Heritage Program and the U.S. Fish and Wildlife Service are included in Appendix K.

5.3.5 Observations of Stress

Excavation/backfilling on the Park has removed most of the native vegetation. However, during the survey, there were no observations of stressed vegetation or evidence of negative impacts on wildlife or natural covertypes in the areas surrounding the Park.

5.4 Step IC - Fish and Wildlife Resource Values

Step IC of the FWIA consists of an assessment of the general ability of the area within 0.5-miles of the site to support fish and wildlife resources and the value of fish and wildlife resources to humans. The qualitative evaluation of habitat value is based on field observations, research, and professional judgement.

Value of Habitat to Associated Fauna - The Park and vicinity consist of predominately residential/industrial land use interspersed with isolated areas of successional old field and successional northern hardwood forest. Although these small areas of natural covertypes provide some wildlife habitat, the predominantly residential/ industrial setting limits the use of these areas by significant or sensitive wildlife populations. Use of these areas is limited to wildlife species that have adapted to interaction with human disturbances. Therefore, the terrestrial covertypes in the vicinity of the Park are concluded to provide low habitat value for wildlife.

The Erie Canal, which joins the Mohawk River, facilitates the movement of fish between the Hudson River and the Great Lakes. According to the NYSDEC (McBride, 1985), the primary habitat of the stretch of river associated with the Park is classified as river canal. The fish communities found within the seasonal river canal impoundments are dominated by game species (e.g., bass and walleye) (McBride, 1985). According to 6 NYCRR Part 876, the waters of the river are suitable for fish propagation and survival. Therefore, the Mohawk River in the vicinity of the Park is concluded to provide moderate to high habitat value for fish. North and South Chuctanunda Creeks and one unnamed tributary are also present within the vicinity of the Park. Each of these streams facilitates the movement of fish between various watersheds and the Mohawk River. The fish communities present within mid-reach streams of this type can include many species (Reschke, 1990). According to 6 NYCRR Part 876, these waters are classified as suitable for fish propagation and survival. Therefore, these mid-reach streams are concluded to provide moderate habitat value for fish.

There is a New York State Freshwater Wetland (A-11) located approximately one-third mile downstream of the Park (Figure 20). This wetland is approximately 2 miles in length. The substantial size of this resource provides value as an important habitat resource for fauna.

Value of Resources to Humans - Based on its Class C designation, the area of the Mohawk River adjacent to the Park is suitable for primary and secondary contact recreation (McBride, 1985). According to 6 NYCRR Part 876, the best usage of these waters is for fishing. This stretch of river has been found to contain game fish, such as smallmouth bass and walleye (McBride, 1985). There are currently no fish consumption advisories on the stretch of river associated with the Park (NYSDOH, 1999). The Mohawk River is an important natural resource that provides the public with aesthetic enjoyment as well as recreational uses, such as fishing and wildlife watching. Located within the Park, there will be a waterfront promenade, which will further enable the public to use the river as a source of natural resource enjoyment in the future. Therefore, the value of the Mohawk River to the public is considered to be high. The best usage of the North and South Chuctanunda Creeks and the unnamed tributary present within the vicinity of the Park is fishing (6 NYCRR, Part 876). These tributaries to the Mohawk River facilitate the movement of fish between various watersheds and the Mohawk River by providing a transportation corridor. The streams are important natural resources that provide the public with aesthetic enjoyment as well. Therefore, the value of these tributaries to the public is considered to be high.

5.5 Step ID - Applicable Fish and Wildlife Regulatory Criteria

Step ID of the FWIA process is the identification of location-specific and chemical-specific laws, rules, regulations and criteria applicable to remediation of fish and wildlife resources. The applicable fish and wildlife criteria for the Phase II Area have been identified below:

- Environmental Conservation Law - Chapter 43-B of the Consolidated Laws:
    - Article 11, Fish and Wildlife: Statute 11-0503, Polluting Streams Prohibited, and Statute 11-0535, Endangered and Threatened Species;
    - Article 15, Water Resources: Title 5, Protection of Water; and
    - Article 24, Freshwater Wetlands.
- New York Codes, Rules and Regulations (6 NYCRR):
    - Part 608, Use and Protection of Waters;
    - Part 663, Freshwater Wetlands Permit Requirements;
    - Part 664, Freshwater Wetlands Maps and Classification;
    - Part 701, Classifications B Surface Waters and Groundwaters;
    - Part 702, Derivation and Use of Standards and Guidance Values;
    - Part 703, Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards; and
    - Part 800 ff., Classes and Standards of Quality and Purity Assigned to Fresh Surface and Tidal Salt Waters.
- Criteria and Guidelines:
    - NYSDEC, Division of Fish and Wildlife. November 1993. *Technical Guidance for Screening Contaminated Sediment*; and
    - NYSDEC. November 1991. *Division of Water Technical and Operational Guidance Series 1.1.1., Ambient Water Quality Standards and Guidance Values.*

5.6 Step IIA - Pathway Analysis

Step IIA of the FWIA process is the pathway analysis. The pathway analysis is performed to evaluate whether ecological receptors can be exposed to MGP-related constituents. As discussed in previous sections of this report, several constituents have been detected in site media. The constituents of interest have been identified as BTEX, PAHs, and cyanide. These constituents have been detected in soil, groundwater, and sediment. As such, this pathway analysis evaluates these media in terms of potential exposure pathways for ecological receptors.

As described in Step I, the terrestrial portion of the Park is a poor quality wildlife habitat due to the high degree of development and the predominance of residential/industrial land uses in surrounding areas. Sensitive or rare resources do not exist on the Park, and the identified inhabitants are adapted to residential/industrial areas. Soil excavation/backfilling on the Park altered its natural habitat and left very little vegetation, significantly reducing the possibilities of terrestrial receptors using the area for forage. Although exposures to MGP-related constituents in surface soil could occur for terrestrial receptors, the factors of poor habitat quality and urban receptors reduce the significance of the soil exposure pathway to wildlife. Similarly, the potential for ecological exposure to groundwater is expected to be minimal because the depth to groundwater is approximately 5 to 10 feet bgs, and groundwater seeps or springs were not observed in the Park, with the exception of possible temporary seeps associated with the canal lowering during a two-week period in the fall.

Complete exposure pathways to aquatic receptors exist and could occur through direct contact with MGP-related constituents in sediments and surface water. Benthic macroinvertebrates could be exposed to MGP-related constituents in river sediments. Fish could be exposed to MGP-related constituents if they partition from sediments to overlying surface water. The potential for food chain exposure for benthic invertebrates and fish is not expected to be significant because MGP-related constituents (BTEX, PAHs, and cyanide) do not readily bioaccumulate.

5.7 Step IIB - Criteria-Specific Analysis

Step IIB of the FWIA process is the criteria-specific analysis. The criteria-specific analysis is performed to evaluate the potential for impact to ecological resources. This evaluation is based on a comparison of detected concentrations against ecological-based screening values. As discussed in the pathway analysis, a complete exposure pathway exists for aquatic receptors in the Mohawk River and is related to direct contact with MGP-related constituents in sediments. Constituents detected in Mohawk River sediment include BTEX, PAHs, and cyanide.

The criteria used for the sediment sampled during the Phase II Area Investigation are from the NYSDEC (1999) *Technical Guidance for Screening Contaminated Sediments*. The NYSDEC (1999) sediment criteria for non-polar organic compounds (including PAHs) were developed based on water quality standards, guidance values, and criteria. For organic compounds, there are three ecological risk-based levels of protection for sediment in New York State: protection of aquatic life from acute toxicity; protection of aquatic life from chronic toxicity; and protection of wildlife from toxic effects of bioaccumulation. For PAHs and BTEX, the NYSDEC (1999) sediment criteria include values based on the protection of aquatic life from acute or chronic toxicity. Sediment criteria for the protection of wildlife from bioaccumulation of PAHs and BTEX are not available, as these compounds do not readily bioaccumulate. In addition to the NYSDEC criteria, sediment screening values from the Ontario Ministry of Environment (1993) were used. These values are used for individual PAHs when NYSDEC criteria are not available.

Comparison of sediment PAH concentrations to sediment criteria is presented in Table 10. PAHs were detected in each of the sediment samples, including the background sediment samples (SD-1 and SD-2). As shown in Table 10, several of the sediment samples exhibited concentrations of at least one PAH above the chronic and acute toxicity sediment criteria. The greatest acute and chronic sediment criteria exceedences are observed in samples collected in the vicinity and south of the former Gas Holder No. 2 and former Gas Holder No. 3 (Figure 9).

Comparison of sediment BTEX concentrations to sediment criteria is also presented in Table 10. BTEX compounds were detected in eight of the 24 sediment samples. In four of the samples, at least one of the BTEX compounds was detected at concentrations greater than the benthic aquatic life chronic toxicity value. In two of the samples [SD-6 (0-0.5') and SD-8 (0-0.5')], benzene concentrations also exceeded the benthic aquatic life acute toxicity value. Again, these samples were collected from adjacent to former Gas Holder No. 2 and former Gas Holder No. 3.

Cyanide was detected in only one of the 24 samples, with a concentration of 1.0 ppm detected in sediment sample SD-6 (0-0.5). Sediment criteria are not available for cyanide.

5.8 Conclusions

The FWIA for Riverlink Park was performed to characterize the ecological resources in the vicinity of the Park and to identify complete exposure pathways for these resources to site-related constituents. The results of the FWIA indicate that most of the Park is characterized as urban vacant lot, and no threatened, endangered, or rare species are known to occur in the immediate vicinity.

In terms of terrestrial exposure, BTEX, PAHs, and cyanide were detected in soils. However, the terrestrial covertypes in the vicinity of the Park were found to be of poor wildlife habitat quality as a result of the predominance of residential/industrial land uses and the high degree of disturbance to the natural habitats of the Park as a result of soil excavation. Therefore, no further evaluation of the terrestrial exposure pathway is recommended.

For aquatic exposure, BTEX, PAHs, and cyanide were detected in sediment samples collected from adjacent to and immediately downstream of the Park. The stretch of Mohawk River within the vicinity of the Park was found to be of moderate to high habitat quality for fish. Complete exposure pathways for ecological receptors involve direct contact with MGP-related constituents in river sediment. According to the criteria-specific analysis, several of the sediment samples collected from the Mohawk River in the vicinity of the Park exhibit BTEX and PAH concentrations greater than screening criteria. Therefore, the potential for adverse ecological effects from these constituents exist. A more detailed evaluation of effects on aquatic life may be warranted. The need for this further aquatic evaluation will be determined based on the results of additional sediment investigation work, as discussed in Section 7.5.

6. Cultural Resources Evaluation

This section summarizes the results of the Riverlink Park Phase 1A Cultural Resources Survey completed by Pratt & Pratt Archaeological Consultants, Inc (Pratt & Pratt) of Cazenovia, New York. The full Phase IA Report was distributed under separate cover.

The Phase I Cultural Resources Survey of the Riverlink Park indicated that the nearest National Historic Register property to the Park is the Amsterdam US Post Office building. This building is approximately 1,500 feet north of the Park and will not be affected by the project. In addition to the US Post Office, five other sites listed on the National Register are within a one-mile radius of the project area. None of these sites will be effected by activities at the Park.

Based on a literature review and interviews, pictographs were present at some time in the past on rocks nearby but outside of the Park area. Other recorded prehistoric/protohistoric occupation in the immediate vicinity of the Park area includes an Indian trail that cuts through the site. Evidence of this trail would likely have been destroyed during subsequent activities on the property. Additionally, two camps and traces of occupation are within the general vicinity but removed from the Park.

Thirty-nine historic sites are found within a one-mile radius of the Park. The Park area was previously the location of the Chuctanunda Gas and Light Company. Structures related to the MGP have been razed. What remains of the former MGP are some concrete pads and walls, and these are buried under as much as 20 feet of fill material. These remains would not meet the integrity criteria for nomination to the National Register of Historic Places.

Also formerly located within this Park area was the Mohawk River/Erie Canal terminal complex. The buildings comprising this complex included warehouse and storage buildings that were constructed after 1911 and before 1926. These buildings were razed in 1968. The area of the former terminal complex is also covered with fill materials, and much of the area has undergone significant disturbances associated with the recent construction of the new terminal wall. Other warehouse and storage buildings related to the New York Erie Canal exist elsewhere and could be more easily studied. If remains of the terminal complex structures do exist, they would be unlikely to meet the integrity criteria for nomination to the National Register.

A cabinet shop and railroad check and baggage area were also historically located adjacent to the Park area. Neither of these buildings remains. All of the remaining historic sites are well removed from the Park and will not be affected by activities at the site.

6.1 Recommendations

The location of the Riverlink Park has undergone considerable past disturbance. While subsurface manifestations of the Chuctanunda Gas and Light Company and possibly the New York State Canal Terminal exist within the Park area, these remains are buried. The structures were razed, and the resulting remains would not qualify for nomination to the National Register of Historic Places. Because of the amount of disturbance to the property, it is unlikely that intact cultural remains relating to either of these complexes or the reported Indian trail will be found. The location of the rock ledge on which pictographs were once present lies outside the Park area.

No further cultural resource evaluations of this site are recommended. Based upon the available information, Pratt & Pratt recommended a determination of "no effect" on cultural resources for the Riverlink Park construction in the City of Amsterdam.

7. Summary

7.1 General

Investigations conducted in the Phase II Area have further characterized the nature and extent of MGP-related materials in the Phase II Area soil and groundwater, and the surface water and sediment in the Mohawk River. These investigations also provided a basis for future evaluation of potential remedial options.

Using available site and regional information, BBL developed a comprehensive conceptual model of Phase II Area geology, groundwater flow, and groundwater/surface water interaction. When coupled with information about the former MGP structures in the Phase II Area and collected analytical data, this model reasonably explains the nature and extent of MGP materials in soil, groundwater, and surface water (Mohawk River) at and near the site.

The conceptual model coupled with the analytical and additional observational data have been used to develop a Qualitative Human Health Evaluation and a FWIA. These are summarized below as are the results of a Cultural Resources Stage IA Survey.

7.2 Hydrogeologic Conceptual Model

The geology beneath the Phase II Area can be described as a wedge of unconsolidated material resting on limestone bedrock. At the northern limits of the site, away from the Mohawk River, the bedrock exists at or within several feet of the surface. From north to south across the site, the unconsolidated material thickens due to the southward sloping bedrock surface, such that along the riverbank, the material is approximately 60 feet thick. This wedge of material consists of three roughly horizontal layers. The topmost layer consist of fill, the middle layer consists of silt, and the bottom layer consists of sand or a mixture of sand and gravel.

Groundwater beneath the Phase II Area is derived from infiltration of precipitation falling on the Phase II Area, and from groundwater discharging from the bedrock. This water, in turn, discharges to the Mohawk River. The stage of the river is controlled by dams such that it is approximately 10 feet higher in the summer than in the winter. During the summer, the water table generally occurs in the fill, while in the winter, the water table drops and generally occurs within the silt layer. The changes in river level do not alter groundwater flow conditions significantly; however, the changes do generate a few notable effects. When the level is dropped, there is a brief period (days or a few weeks) when a slug of groundwater discharges to the river, as some of the fill and silt dewater. For the reasons described in Section 3.4.1.2, when the river level is raised, only a small amount of river water moves from the river channel into the unconsolidated material beneath the Phase II Area.

BBL identified three man-made features in the Phase II Area that, due to their size and subsurface construction, might noticeably affect groundwater flow: Former Gas Holder No. 1, Former Gas Holder No. 2, and the IRM sheet piling. Former Gas Holder No. 1 was found to have little effect on groundwater flow in the vicinity of this former holder. It appears that the holder penetrates the upper portion of the underlying silt, has a reasonable degree of hydraulic communication with the underlying sand and gravel, and that its walls are relatively water tight. As a result, it appears relatively transparent to shallow groundwater flow. A small amount of water likely enters the holder through infiltration of precipitation falling within its limits; however, the amount is expected to be small, as much of the holder is shielded by the NYS Route 30 bridge. Water that enters the holder, however, is likely discharged to the underlying sand and gravel. Conversely, Former Gas Holder No. 2 does not penetrate the silt (therefore limiting the potential vertical movement of water below the holder) and is not shielded by the bridge (which would increase the amount of recharge compared to Former Gas Holder No. 1), as a result, groundwater is, at times, mounded inside the holder. Portions of the intact holder walls restrict, but do not prevent, leakage of water outside of the holder, resulting in mounding of groundwater between the holder and the river. The degree of mounding may be limited by two man-made breaches of the holder wall that were made to accommodate construction of a storm sewer. The sheet piling, which was installed as part of the IRM, mitigates movement of groundwater from the area of former Holder No. 2 to the east, toward the IRM area, directing it southward toward the river.

7.3 Nature and Extent of MGP Materials

Soils, groundwater, and river sediment in the Phase II Area have been affected by MGP materials, primarily coal tar and suspected purifier waste. The appearance and physical properties of the coal tar in the Phase II Area vary. In some cases, the tar consists of a brownish, oily, slightly viscous liquid, while others consists of a black, viscous, semi-solid to solid material. Both denser-than-water and lighter-than-water liquid coal tars (collectively referred to as NAPL) exist in the Phase II Area; however, the denser variety (DNAPL) is identified in monitoring wells more frequently. Constituents-of-interest contained in the NAPL are BTEX and PAHs. The suspected purifier waste consists of a white, ash-like material with occasional bluish mottles (likely an iron-cyanide complex) that is present in discrete areas of fill, particularly in the south-western portion of the former MGP plant area. This material may be lime, which, in addition to iron oxide, was commonly used to purify manufactured gas. The constituent-of-interest in the suspected purifier waste is cyanide.

Because they are liquids, and predominantly denser than water, NAPLs can be moderately mobile in the subsurface, particularly those that are less viscous. Sufficient data have been collected in the Phase II Area to develop a conceptual model for NAPL movement in the Phase II Area that reasonably explains the observed distribution of NAPL, and the areas of subsurface soil and groundwater that contain elevated concentrations of BTEX, PAHs, and cyanide. Primary sources of NAPL are inferred to be former Gas Holder Nos. 1 and 2, and the former tar/water separator. NAPLs have migrated downward and laterally from these features. Beneath these features, DNAPL appears to have migrated downward through most or all of the unconsolidated material along the southern portion of the Phase II Area; however, based on the results of the investigation activities, there is no evidence that NAPL has entered the bedrock. In addition to these features, geophysical and test-pit investigations indicate that underground piping exists beneath large portions of the former MGP facility. Piping uncovered in test pits was mostly undamaged and may contain accumulated NAPL. Additionally, other structures, such as the steel and brick-lined tank identified by Harza located between former Gas Holder Nos. 1 and 2, are present in the Phase II Area. As evidenced by the analytical results from soil from this structure, these structures and associated piping have the potential to act as another NAPL source to the subsurface. The NAPL appears to have also migrated laterally from the suspected sources, generally southward with the hydraulic gradient, predominantly along the base of the fill unit and the upper portion of the underlying silt unit, and also along the upper portion of the sand-and-gravel unit. Most of the lateral migration appears to have occurred at or below the seasonal high water table.

Unconsolidated materials through which NAPL has migrated contain residual NAPL trapped in their pore space. When found above the water table, these affected materials can act as a source of BTEX and PAHs to groundwater, as infiltrating precipitation slowly dissolves the NAPL and transports constituents of concern to the water table. Similarly, the NAPL beneath the water table also slowly dissolves, adding its constituents to the groundwater. This deeper NAPL is more problematic from the remediation standpoint than the shallow NAPL, as its migration pathways and resulting distribution are generally complex and unpredictable (Pankow and Cherry, 1996), and it will continue to affect groundwater quality until completely dissolved or removed. The suspected purifier waste does not appear to exist at the surface and is not mobile; however, these wastes have apparently caused localized cyanide exceedences in groundwater quality. As discussed in Section 3, cyanide detected in groundwater at MGP sites is nearly always in a complex form with iron.

The following subsections summarize the extent of media containing the highest concentrations of MGP-related constituents and the results of the riverbank assessment and NAPL monitoring/recovery program.

7.3.1 Subsurface Soil

Subsurface soils locally contain elevated levels of MGP-related constituents. Generally, soils observed to contain sheens or NAPL contained the greatest concentrations of BTEX and PAHs. These soils are found:

- Inside and in the vicinity of former Gas Holder No. 1 and in the vicinity of former Gas Holder No. 2. Additionally, Harza reported the presence of "free product" in the lowest-most portion (approximately 1 to 2 feet) above the inferred base of former Gas Holder No. 2.
- Beneath former Gas Holders No. 1 and 2, and the former tar/water separator, through the silt unit and into the underlying sand-and-gravel unit.
- Within the sand and gravel unit and south (downgradient) of former Gas Holders No. 1 and 2, the former tar/water separator, the structure/tank observed by Harza at TP-16, and the underground piping associated with the former MGP.
- Immediately east of former Gas Holder No. 1, in the fill unit. Generally, NAPL was not observed in the fill materials south (downgradient) of this holder.
- Between former Gas Holder No. 2 and the riverbank, in the fill unit and roughly the upper half of the silt unit.
- Near the riverbank, between the MW-4 and MW-6 well clusters, southeast of the former tar/water separator. These affected soils generally occurred near the base of the fill.

As indicated above, NAPLs and elevated BTEX and PAH concentrations are relatively widespread along the southern edge of the Phase II Area, within the fill materials, and into the underlying unconsolidated native materials.

Soils containing elevated levels of cyanide generally occur in the fill unit, and appear to be associated with the white ash-like material that is suspected to be purifier waste. These soils are generally limited to an area south of the former purifier house that was located near former Gas Holder No. 1, from below the State Route 30 bridge to the vicinity of the MW-4 well cluster.

7.3.2 Groundwater

Shallow groundwater from MW-4S, MW-7S, MW-1S, and MW-6S located near and downgradient of former Gas Holders No. 1 and 2, and the former tar/water separator contains concentrations of BTEX and selected PAHs above their respective Class GA standards or guidance values. Shallow groundwater to the west of former Gas Holder No. 1, at MW-16S appears unaffected by the former MGP operations. The only shallow groundwater monitoring well sampled that contained cyanide above the Class GA standard was monitoring well MW-4S.

Deeper overburden groundwater (generally monitored by the M- and D-series monitoring wells) also contains concentrations of BTEX, PAHs, and cyanide above Class GA standards. For BTEX and PAHs, the data indicate that the groundwater with constituents exceeding the standards and/or guidance values occurs throughout the southern half of the Phase II Area; however, the concentrations decline markedly toward the west, at well MW-16D. The source of BTEX and PAHs detected in monitoring well MW-16D may be unrelated to the former MGP. Deeper overburden groundwater containing cyanide above the Class GA standard appears limited to the upper portion of the sand-and-gravel unit south (downgradient) of former Gas Holder No. 1, and at the contact between the silt unit and the sand-and-gravel unit south (downgradient) of former Gas Holder No. 2.

In general, the quality of bedrock groundwater beneath the Phase II Area appears unaffected by the former MGP. Only a few samples from two monitoring wells contained any MGP-related constituents above Class GA standards or guidance values. Samples collected from shallow bedrock monitoring well MW-13, which is located in the footprint of the former MGP itself, contained concentrations of benzene above its Class GA standard. Also, the "non-detect" standard for benzo(a)pyrene was exceeded in the second sampling of well MW-6R (estimated at 1 ppb), and the 10 ppb guidance value for naphthalene was exceeded in the first sampling event at both MW-6R and MW-13 (18 ppb and 13 ppb, respectively). No cyanide was detected in bedrock groundwater.

7.3.3 River Sediment

Shallow river sediment (0.0 to 0.5 foot and 0.5 to 1.0 foot depth intervals) within the Phase II Area has been impacted by BTEX and/or PAHs. The sampled area containing the highest concentrations is located south of former Gas Holders No. 2 and 3, where levels of BTEX and PAHs exceed applicable screening criteria. Within this area, the concentrations of BTEX and PAHs were greatest near the shore; however, the samples furthest from the shore also contained constituents above the screening criteria. The highest PAH concentrations were detected immediately south of former Gas Holder No. 2, while the BTEX concentrations were highest south of former Gas Holder No. 3. BTEX were generally not detected in downstream sediment samples, and PAH levels in these sediment samples were lower than those near the former gasholders; however, the PAH concentrations of near-shore, downstream samples were higher than upstream (background) samples, and exceed screening criteria. Cyanide was only detected (at a concentration of 1 ppm) in one sediment sample. This near-shore sample was collected from directly south of former Gas Holder No. 2. The vertical distribution of MGP-related constituents in sediment has not been defined. The observed upward groundwater gradients and presence of NAPL in monitoring wells along the shoreline potentially suggests that NAPL may currently be migrating upward into the river sediments. This vertical migration would be in addition to the horizontal migration observed during the Riverbank Assessment. Shallow river sediments do not appear to be adversely affected by cyanide.

7.3.4 Surface Water

The Phase II Area analytical results indicate that surface water does not appear adversely affected by MGP-related constituents. Additionally, the calculated loading to the river of dissolved-phase constituents indicates that the ambient surface-water quality guidance value for one constituent (benzo(a)pyrene [1.5 parts per trillion]) would be exceeded (by 0.3 parts per trillion) for several days only if the seasonal lowering of the canal happened to coincide with a period of extremely low river flow. This scenario is highly conservative and unlikely.

7.3.5 Storm-Water

MGP-related constituents were not detected in storm-water samples collected from catch-basin CB-9, located in the Phase I Area, or the storm-sewer outfall to the River. Given that the storm sewer invert elevation is below the water table in this area of the site, it is reasonable to assume that the storm water conveyed across the eastern portion of the site does not appear to be measurably impacted by site-related constituents.

7.3.6 NAPL Monitoring and Removal Program

The nine wells where a measurable thickness of NAPL has been detected are routinely monitored for the presence of NAPL. This monitoring and the subsequent NAPL removal comprises the NAPL Monitoring and Removal Program. Over 50 gallons of NAPL have been removed since the program's inception in April 1999, about 85% of which was DNAPL. Most of the DNAPL was removed from one well, MW-8, which had to be decommissioned to facilitate the Riverlink Plaza Area IRM. A replacement well for MW-8 (RW-3) has yielded only a trace of DNAPL and a small quantity of LNAPL.

7.3.7 Mohawk Riverbank Assessment

As observed during the annual lowering of the Mohawk River, two areas of the riverbank along the Phase II Area appear to be affected by MGP-related materials. Brown NAPL was observed to actively seep from the riverbank along an area downgradient (south) of former Gas Holder No. 2 during brief periods of river lowering. In addition, sheens were observed to rise from river sediments a short distance from the shoreline in the area near the western end of the terminal wall when the sediments were disturbed, indicating the presence of impacted sediments near the shoreline in this area. Hardened tar was observed at the surface along the riverbank near the State Route 30 bridge. Field observations indicated that the source of the tar was likely from an area of the riverbank approximately one- to two-feet below the top of the bank. Given the hardened condition of this tar, the mobility of this material is not considered to be significant.

Bedding around the storm-sewer outfall does not appear to act as a preferential pathway for NAPL, or large volumes of groundwater to the river. Some preferential discharge of lesser amounts of groundwater through the bedding to the river cannot be ruled out.

7.4 Qualitative Human Health Evaluation

The Qualitative Human Health Evaluation considered BTEX, PAHs, and cyanide to be constituents of interest in soil, sediment, and groundwater at the site. Surface water was not adversely impacted by MGP-related constituents; therefore, there is no identified complete exposure pathway for surface water. Several potential human exposure pathways are present in soil, sediment, and groundwater. However, these potential exposure pathways are, or will be, mitigated by site-specific conditions or future mitigative measures combined with land use restrictions.

7.5 Fish and Wildlife Impact Analysis

A FWIA was performed to characterize the ecological resources at and in the vicinity of the Park, and to identify potentially complete exposure pathways for these resources to MGP-related constituents. The results of the FWIA indicate that most of the Park is characterized as urban vacant lot and provides limited habitat value for wildlife. No threatened, endangered, or rare species are known to occur at or near the area. The analysis recommended that no further evaluation of the terrestrial exposure pathway is necessary; however, the potential for adverse ecological effects from the presence of site-related BTEX and PAHs constituents in the sediment from the Mohawk River near the Park could not be ruled out. Additional evaluation of ecological effects may be appropriate following further assessment of the sediments in the Mohawk River near the site.

7.6 Cultural Resources Evaluation

A Phase IA Cultural Resource Survey was performed to evaluate the presence of potential cultural remains at, and in the vicinity of, the Park area, and to assess the potential impact that construction activities may have on cultural resources (if any) at the Park area. Because of the amount of disturbance the Park area has undergone, it is unlikely that intact cultural remains exist. No further cultural resource evaluations are recommended for the Park area. Based on the available information, a determination of "no effect" was recommended by the archaeological consultants on cultural resources for the Riverlink Park construction.

8. Conclusions and Recommendations

8.1 Conclusions

Based on the information summarized in this Investigation Report, the nature and extent of MGP-related constituents within the soil, groundwater, and surface water of the Phase II Area are generally well understood as are the on-land potential exposure routes to human and wildlife populations. A summary of the key findings is outlined below.

- Numerous potential sources of MGP-related materials are present within the site. Examples of potential sources include MGP-related materials in and around former MGP buildings and former utilities/structures including:
  - MGP-related buildings (e.g. former Gas Holders No. 1 and 2);
  - Subsurface utilities/structures (e.g., extensive plant piping and former structures, such as the tanks uncovered in TP- 16 and TP-19 and the soil around the former tar/water separator removed during the IRM); and
  - Areas of MGP-related wastes not directly associated with buildings and/or structures (e.g. areas where NAPL, purifier wastes, or elevated concentrations of MGP-related constituents were observed or detected in soil/groundwater but were not contained within a specific potential source building/structure).
- Dissolved-phase groundwater concentrations of MGP-related constituents, while causing exceedences of NYSDEC Class GA Standards and/or Guidance Values for groundwater quality criteria in groundwater within the unconsolidated materials below the Phase II Area of the Park, have been shown to not adversely impact the Mohawk River surface water quality near and downstream of the site.
- NAPL, both DNAPL and LNAPL, is present in the subsurface below the Phase II Area of the Park. In the area between the terminal wall to the east and the Route 30 bridge to the west along the north side of the river, NAPL is present (both as separate phase tar and sheen) to depths of up to approximately 50 feet below the water table throughout much of the vertical thickness of the saturated overburden. Additionally, NAPL has been observed to discharge to the river along the river bank west of the existing terminal wall during times of rapid lowering of the Mohawk River (e.g. during the annual lowering of the water in the Erie Canal) and hardened, immobile tar is present on the rip-rap just east of the Route 30 bridge.
- NAPL has not been observed in the competent bedrock underlying the area, nor has the bedrock groundwater quality been significantly impacted by the former MGP operations at the site. The observed lack of significant impact within the bedrock may be the result of strong vertically upward hydraulic gradients which have been observed between the underlying bedrock and saturated overburden along the north side of the river.
- The presence of NAPL in the deep overburden along the north bank of the Mohawk River, when combined with the potential for strong vertically upward hydraulic gradients into the river, suggest that there is a potential for vertical migration of NAPL up into the river sediments from the deep overburden at the site.

- Shallow sediment (0 to 1.0 foot) quality in the Mohawk River near to and just downstream from former Gas Holder No. 2 was shown to be adversely impacted by MGP-related constituents.

- Potential exposure of workers to site soils can be mitigated by implementing safe work rules (i.e., comply with OSHA work rules for contaminated sites). Potential exposure by casual contact to site soils by the general public can be mitigated by, for example, providing a cover over the Phase II Area of the Park or implementing some other appropriate mitigative measure.

- Groundwater from the site is not currently used as a source of drinking water. The potential future use of groundwater as a drinking water source will be prevented by the imposition of a land use restriction in accordance with the VCA. Direct contact with site groundwater by the general public is not likely because of the depth below the surface to groundwater and potential exposure to groundwater by site workers would be mitigated by implementing safe work rules.

- The site was found to be of poor wildlife habitat quality; therefore, no further evaluation of the terrestrial exposure pathway was warranted. The Mohawk River in the vicinity of the site was concluded to provide moderate habitat value for fish. Because the anticipated use of the area will be for a park, fishing by park visitors is likely. The potential impact on Human Health via this potential exposure pathway; however, is not considered to be complete because BTEX, PAHs, and cyanide do not significantly bioaccumulate in the edible portion of fin fish.

- Cultural remains do not likely exist in the Park area; therefore, construction activities at the Park will have "no effect" on cultural resources.

General Remediation Objectives were outlined in the *IWP* and reiterated in Section 1.5 - Investigation and Remediation Objectives. To address these objectives, and based on the information developed during this investigation (as documented in this report), specific Remedial Objectives for this site have been developed as follows:

- Eliminate, to the extent practicable, discharges of NAPL from the site to the Mohawk River; and

- Prevent exposure to the soil and groundwater by the general public/visitors to the Phase II portion of the Park once construction of the Park has been completed.

Because the nature and extent of potential impacts to the sediments from the site are not currently well defined, a specific Remedial Objective(s) for the Mohawk River sediments in the vicinity of the site cannot be defined at this time.

8.2 Recommendations

To address these identified data gaps and to meet the above-defined Remedial Objectives, the additional investigations activities outlined below will be required prior to development of a Remediation Work Plan for the site.

- To assess the distribution and potential mobility of NAPL below the river bottom, additional borings and/or piezometers/wells will be needed to assess the NAPL distribution and hydraulic gradients below the river adjacent to the site. As part of this program, additional sediment sampling will be required to evaluate the vertical and horizontal distribution of MGP-related constituents in the sediments of the Mohawk River in and around the area where exceedences of sediment quality criteria were observed during this investigation.

- The elimination, to the extent practicable, of NAPL migration to the river will require the development of additional geologic, hydrogeologic, and geotechnical data along the riverbank between the area of the terminal wall to the east and the Route 30 bridge to the west. These data will be used to further assess the distribution and mobility of the NAPL in this area, support the additional data to be generated from below the river, and provide a basis for design of a possible collection/interceptor system.

These identified data gaps need to be addressed prior to development of the Remediation Work Plan because the on-land remediation will, in part, be dependent on the scope of the investigation activities which may be required in the river. To facilitate the implementation of these activities, a Work Plan will be prepared for submission to the NYSDEC for review. Sediment sampling and drilling within/below the river can best be accomplished during the time when the water is at the high water levels; therefore, the Work Plan preparation/approval process will, ideally, be completed and the investigation activities initiated at the time the river level is raised to the high level in April 2001.

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Tables

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engineers & scientists

Tables

Table 1

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Sample Analysis Summary

Sample Location	Sample or Screen Interval (ft. bgs)	Date	Matrix	Sample Type	BTEX	PAHs	Total Cyanide	TOC	NA Parameters
MW-4R	38 - 40	11/2/99	SOIL	FS	X	X	X	X	
MW-13	2 - 4	11/9/99	SOIL	FS	X	X	X		
MW-13 (Dup)	2 - 4	11/9/99	SOIL	DUP	X	X	X		
MW-1S	2 - 4	11/10/99	SOIL	FS	X	X	X		
MW-6S	2 - 4	11/15/99	SOIL	FS	X	X	X		
MW-14	2 - 4	11/16/99	SOIL	FS	X	X	X		
SB-38	10 - 12	11/17/99	SOIL	FS	X	X	X		
MW-15	6 - 8	11/18/99	SOIL	FS	X	X	X		
MW-16D	14 - 16	11/22/99	SOIL	FS	X	X	X		
MW-16D	22 - 24	11/22/99	SOIL	FS	X	X	X	X	
MW-16D	44 - 46	11/23/99	SOIL	FS	X	X	X	X	
MW-16D (Dup)	44 - 46	11/23/99	SOIL	DUP				X	
MW-6R	52 - 54	12/3/99	SOIL	FS	X	X	X		
MW-6R	54 - 56	12/3/99	SOIL	FS	X	X	X		
SD-1	0 - 0.3	11/17/99	SED	FS	X	X	X	X	
SD-2	0 - 0.3	11/17/99	SED	FS	X	X	X	X	
SD-3	0 - 0.6	11/17/99	SED	FS	X	X	X	X	
SD-4	0 - 0.4	11/17/99	SED	FS	X	X	X	X	
SD-5	0 - 0.5	11/18/99	SED	FS	X	X	X	X	
SD-5	0.5 - 1	11/18/99	SED	FS	X	X	X	X	
SD-6	0 - 0.5	11/18/99	SED	FS	X	X	X	X	
SD-6	0.5 - 1	11/18/99	SED	FS	X	X	X	X	
SD-7	0 - 0.5	11/18/99	SED	FS	X	X	X	X	
SD-8	0 - 0.5	11/18/99	SED	FS	X	X	X	X	
SD-8	0.5 - 1	11/18/99	SED	FS	X	X	X	X	
SD-9	0 - 0.5	11/18/99	SED	FS	X	X	X	X	
SD-10	0 - 0.5	11/19/99	SED	FS	X	X	X	X	
SD-11	0 - 0.5	11/19/99	SED	FS	X	X	X	X	
SD-11 (Dup)	0 - 0.5	11/19/99	SED	DUP	X	X	X	X	
SD-11	0.5 - 1	11/19/99	SED	FS	X	X	X	X	
SD-12	0 - 0.5	11/19/99	SED	FS	X	X	X	X	
SD-12	0.5 - 1	11/19/99	SED	FS	X	X	X	X	
SD-13	0 - 0.5	11/19/99	SED	FS	X	X	X	X	
SD-13	0.5 - 1	11/19/99	SED	FS	X	X	X	X	
SD-13 (Dup)	0.5 - 1	11/19/99	SED	DUP	X	X	X	X	
SD-14	0 - 0.5	11/19/99	SED	FS	X	X	X	X	
SD-14	0.5 - 1	11/19/99	SED	FS	X	X	X	X	
SD-15	0 - 0.5	11/19/99	SED	FS	X	X	X	X	
TP-31-36-3	3	12/7/99	SOIL	FS	X	X	X		
TP-31-36-6	6	12/7/99	SOIL	FS	X	X	X		
TP-31-36-13	13	12/7/99	SOIL	FS	X	X	X		
TP-31-46-10	10	12/7/99	SOIL	FS	X	X	X		
TP-31-77-5	5	12/7/99	SOIL	FS	X	X	X		
TP-31-77-13	13	12/7/99	SOIL	FS	X	X	X		
TP-33-18-9	9	12/9/99	SOIL	FS	X	X	X		
TP-34-12-2	2	12/10/99	SOIL	FS	X	X	X		
TP-29-1-9	9	12/10/99	SOIL	FS	X	X	X		
TP-32-10-9	9	12/13/99	SOIL	FS	X	X	X		
TP-32-10-9 (Dup)	9	12/13/99	SOIL	DUP	X	X	X		
TP-32-18-14.5	14.5	12/14/99	SOIL	FS	X	X	X		
TP-35-10-13	13	12/14/99	SOIL	FS	X	X	X		

See Notes, Page 4.

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Sample Location	Sample or Screen Interval (ft. bgs)	Date	Matrix	Sample Type	BTEX	PAHs	Total Cyanide	TOC	NA Parameters
MW-1M	24.0 - 34.1	1/14/00	GW	FS	X	X	X		X
		5/30/00	GW	FS	X	X	X		X
MW-1D	46.2 - 56.2	1/14/00	GW	FS	X	X	X		X
		5/30/00	GW	FS	X	X	X		X
MW-1R	70.2 - 80.2	1/14/00	GW	FS	X	X	X		X
		5/30/00	GW	FS	X	X	X		X
MW-4S	12.5 - 22.1	1/17/00	GW	FS	X	X	X		X
		6/1/00	GW	FS	X	X	X		X
MW-4R	78.5 - 88.0	1/12/00	GW	FS	X	X	X		X
		6/2/00	GW	FS	X	X	X		X
MW-5	40.0 - 52.0	1/12/00	GW	FS	X	X	X		X
		6/5/00	GW	FS	X	X	X		X
MW-6D	37.6 - 47.6	1/13/00	GW	FS	X	X	X		X
		6/1/00	GW	FS	X	X	X		X
		6/1/00	GW	DUP	X	X	X		X
MW-6M	24.5 - 34.0	1/13/00	GW	FS	X	X	X		X
		6/1/00	GW	FS	X	X	X		X
MW-6R	63.5 - 73.0	1/13/00	GW	FS	X	X	X		X
		6/2/00	GW	FS	X	X	X		X
MW-7S	8.0 - 18.0	1/17/00	GW	FS	X	X	X		X
		6/5/00	GW	FS	X	X	X		X
MW-7D	41.5 - 51.5	1/17/00	GW	FS	X	X	X		X
		6/2/00	GW	FS	X	X	X		X
MW-11	12.0 - 22.0	1/12/00	GW	FS	X	X	X		X
		5/31/00	GW	FS	X	X	X		X
MW-12	10.0 - 20.4	1/11/00	GW	FS	X	X	X		X
		6/5/00	GW	FS	X	X	X		X
MW-13	13.0 - 22.8	1/11/00	GW	FS	X	X	X		X
		5/31/00	GW	FS	X	X	X		X
MW-14	12.1 - 21.9	1/12/00	GW	FS	X	X	X		X
		6/2/00	GW	FS	X	X	X		X
MW-15	10.5 - 20.0	1/10/00	GW	FS	X	X	X		X
		5/31/00	GW	FS	X	X	X		X
MW-16S	16.1 - 26.0	1/10/00	GW	FS	X	X	X		X
		5/31/00	GW	FS	X	X	X		X
MW-16D	40.0 - 49.1	1/11/00	GW	FS	X	X	X		X
		5/31/00	GW	FS	X	X	X		X
SW-1	*	3/21/00	SW	FS	X	X	X		
SW2-1	*	6/1/00	SW	FS	X	X	X		
SW-2	*	3/21/00	SW	FS	X	X	X		
SW2-2	*	6/1/00	SW	FS	X	X	X		
SW-3	*	3/21/00	SW	FS	X	X	X		
SW-3(Dup)	*	3/21/00	SW	DUP	X	X	X		
SW2-3	*	6/1/00	SW	FS	X	X	X		
SW-4	*	3/21/00	SW	FS	X	X	X		
SW2-4	*	6/1/00	SW	FS	X	X	X		
SW-5	*	3/21/00	SW	FS	X	X	X		
SW2-5	*	6/1/00	SW	FS	X	X	X		
SW-6	*	3/21/00	SW	FS	X	X	X		
SW2-6	*	6/1/00	SW	FS	X	X	X		
SW-7	*	3/21/00	SW	FS	X	X	X		
SW2-7	*	6/1/00	SW	FS	X	X	X		

See Notes, Page 4.

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Phase II Area Investigation

Sample Analysis Summary

Sample Location	Sample or Screen Interval (ft. bgs)	Date	Matrix	Sample Type	BTEX	PAHs	Total Cyanide	TOC	NA Parameters
SW-8	*	3/21/00	SW	FS	X	X	X		
SW2-8	*	6/1/00	SW	FS	X	X	X		
SW-9	*	3/22/00	SW	FS	X	X	X		
SW2-9	*	5/31/00	SW	FS	X	X	X		
SW2-9(Dup)	*	5/31/00	SW	DUP	X	X	X		
SW-10	*	3/22/00	SW	FS	X	X	X		
SW2-10	*	5/31/00	SW	FS	X	X	X		
SW-11	*	3/22/00	SW	FS	X	X	X		
SW2-11	*	5/31/00	SW	FS	X	X	X		
SW-12	*	3/22/00	SW	FS	X	X	X		
SW2-12	*	5/31/00	SW	FS	X	X	X		
SW-13	*	3/22/00	SW	FS	X	X	X		
SW2-13	*	5/31/00	SW	FS	X	X	X		
SW-14	*	3/22/00	SW	FS	X	X	X		
SW2-14	*	5/31/00	SW	FS	X	X	X		
CB-9	**	3/24/00	SW	FS	X	X	X		
30-inch Outfall	**	3/24/00	SW	FS	X	X	X		

See Notes, Page 4.

Table 1

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Sample Analysis Summary

Notes:

BTEX = benzene, toluene, ethylbenzene, xylene (total).
PAHs = The following polynuclear aromatic hydrocarbons: Naphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, and Benzo(g,h,i)perylene.
Cyanide = total cyanide.
TOC = Total Organic Carbon.
NA Parameters= the following Natural Attenuation parameters: permanent gases (dissolved oxygen, carbon dioxide, nitrogen, methane, and carbon monoxide), total and dissolved iron and manganese, nitrate, nitrite, ammonia, sulfate, sulfide, and alkalinity.
DUP = Duplicate Field Sample.
FS = Primary Field Sample.
GW = Ground-Water Sample.
SW = Surface-Water or Storm-Water Sample.
SED = Sediment Sample.
SOIL = Subsurface Soil Sample.
ft. bgs = feet below ground surface.
* = Surface water samples collected in the midpoint of the water column at each sampling location during low canal level.
** = Storm-water sample collected from the running water at each location.

Table 2

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Summary of Well Development

Well Location	Volume Removed (gallons)	Well Volumes Removed	Turbidity (NTU)	Comments and Observations
MW-1S	40	20	426	Light brown, strong odor, heavy sheen.
MW-1R	55	21	42	Clear, colorless, odorless.
MW-4S	35	18	226	Light gray, slight odor, no sheen.
MW-4R	130	10	22.6	Clear, colorless, odorless.
MW-6S	NA	NA	NA	Not developed due to insufficient water in the well and subsequent presence of DNAPL.
MW-6M	25	13	52	Clear, odor, sheen.
MW-6R	10	1.5	21	Well went, dry; clear, colorless, odorless.
MW-13	9	4	> 1000	Well went, dry; turbid, brown, odorless.
MW-14	4	2	68	Well went dry, light brown, clear, odorless.
MW-15	23	11	42	Clear, colorless, sewer odor.
MW-16S	20	13	103	Clear, colorless, odorless.
MW-16D	55	11	22	Clear, colorless, odorless.

Notes:

NTU = Nephelometric Turbidity Units at completion of development.

> = The turbidity was greater than the measuring capability of the turbidity meter.

NA = Not available.

Comments and observations represent the final purge water characteristics.

Table 3

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Well Construction Details

Location	Ground Surface Elevation	Depth to Top of Sandpack (ft. bgs)	Top of Sandpack Elevation	Depth to Top of Screen (ft. bgs)	Top of Screen Elevation	Depth to Bottom of Sandpack (ft. bgs)	Bottom of Sandpack Elevation (ft. bgs)	Depth to Bottom of Screen (ft. bgs)	Bottom of Screen Elevation	Depth to Screen Midpoint (ft. bgs)	Screen Midpoint Elevation	Depth to Bottom of Well (ft. bgs)	Bottom of Well Elevation
MW-1S	267.29	9.0	258.29	10.6	256.69	20.1	247.19	20.1	247.19	15.35	251.94	23.1	244.19
MW-1M	267.15	23.0	244.15	24.0	243.15	34.1	233.05	34.0	233.15	29.00	238.15	36.0	231.15
MW-1D	267.27	43.2	224.07	46.2	221.07	56.2	211.07	56.2	211.07	51.20	216.07	56.2	211.07
MW-1R	267.03	69.4	197.63	70.2	196.83	80.2	186.83	80.2	186.83	75.20	191.83	80.2	186.83
MW-2D	267.78	21.0	246.78	23.0	244.78	33.7	234.08	33.0	234.78	28.00	239.78	38.0	229.78
MW-2S	267.40	5.0	262.40	8.0	259.40	15.0	252.40	13.0	254.40	10.50	256.90	15.0	252.40
MW-3D	261.96	25.3	236.66	29.5	232.46	39.5	222.46	39.5	222.46	34.50	227.46	39.5	222.46
MW-3S	261.27	4.4	256.87	5.0	256.27	16.0	245.27	15.0	246.27	10.00	251.27	15.0	246.27
MW-4S	268.57	10.6	257.97	12.5	256.07	22.1	246.47	22.0	246.57	17.25	251.32	25.0	243.57
MW-4D	268.64	48.5	220.14	51.9	216.74	61.9	206.74	61.9	206.74	56.90	211.74	61.9	206.74
MW-4R	268.31	77.0	191.31	78.5	189.81	88.0	180.31	88.0	180.31	83.25	185.06	91.0	177.31
MW-5	262.45	37.0	225.45	40.0	222.45	52.0	210.45	50.0	212.45	45.00	217.45	52.0	210.45
MW-6S	270.00	12.5	257.50	14.5	255.50	24.0	246.00	24.0	246.00	19.25	250.75	27.0	243.00
MW-6M	270.20	23.0	247.20	24.5	245.70	34.0	236.20	34.0	236.20	29.25	240.95	37.0	233.20
MW-6D	269.98	33.6	236.38	37.6	232.38	47.6	222.38	47.6	222.38	42.60	227.38	47.6	222.38
MW-6R	269.80	63.0	206.80	63.5	206.30	73.0	196.80	73.0	196.80	68.25	201.55	76.0	193.80
MW-7S	266.02	7.0	259.02	8.0	258.02	18.0	248.02	18.0	248.02	13.00	253.02	18.0	248.02
MW-7M	266.08	20.0	246.08	22.0	244.08	32.3	233.78	32.0	234.08	27.00	239.08	36.0	230.08
MW-7D	265.63	38.2	227.43	41.5	224.13	51.5	214.13	51.5	214.13	46.50	219.13	51.5	214.13
MW-8	268.71	22.7	246.01	24.0	244.71	34.3	234.41	34.0	234.71	29.00	239.71	36.0	232.71
MW-9	271.83	13.0	258.83	14.1	257.73	24.6	247.23	24.1	247.73	19.10	252.73	26.1	245.73
MW-10	266.70	28.6	238.10	30.0	236.70	40.3	226.40	40.0	226.70	35.00	231.70	44.0	222.70
MW-10R	267.00	48.0	219.00	49.0	218.00	59.0	208.00	59.0	208.00	54.00	213.00	61.0	206.00
MW-11	274.97	10.5	264.47	12.0	262.97	22.0	252.97	22.0	252.97	17.00	257.97	22.0	252.97
MW-12	271.62	8.9	262.72	10.0	261.62	20.4	251.22	20.0	251.62	15.00	256.62	24.0	247.62
MW-13	274.50	12.0	262.50	13.0	261.50	22.8	251.70	22.5	252.00	17.75	256.75	22.8	251.70
MW-14	275.00	10.0	265.00	12.1	262.90	21.9	253.10	21.6	253.40	16.85	258.15	21.9	253.10
MW-15	274.60	8.5	266.10	10.5	264.10	20.0	254.60	20.0	254.60	15.25	259.35	23.0	251.60
MW-16S	273.40	14.1	259.30	16.1	257.30	26.0	247.40	25.6	247.80	20.85	252.55	26.0	247.40
MW-16D	273.50	37.0	236.50	40.0	233.50	49.1	224.40	49.1	224.40	44.55	228.95	52.1	221.40
RW-1	267.51	18.8	248.71	21.8	245.71	36.8	230.71	36.8	230.71	29.30	238.21	39.8	227.71
RW-2	262.97	19.1	243.87	21.7	241.27	36.7	226.27	36.7	226.27	29.20	233.77	39.7	223.27
RW-3	268.99	22.0	246.99	24.0	244.99	34.0	234.99	34.0	234.99	29.00	239.99	37.0	231.99
S-1	269.98	16.5	253.48	18.2	251.78	28.0	241.98	28.0	241.98	23.10	246.88	28.0	241.98
S-2	268.36	25.0	243.36	27.3	241.06	37.1	231.26	37.1	231.26	32.20	236.16	37.1	231.26
S-3	265.90	23.0	242.90	24.9	241.00	39.6	226.30	39.6	226.30	32.25	233.65	42.8	223.10

Notes:

All elevations in feet, referenced to the New York State Canal Corporation datum.

ft. bgs - feet below ground surface.

Monitoring wells MW-1S, MW-1R, MW-4S, MW-4R, MW-6S, MW-6M, MW-6R, MW-13, MW-14, MW-15, MW-16S, and MW-16D were installed during the Phase II Area Investigation. Monitoring wells MW-1D, MW-4D, MW-5, MW-6D, and MW-7D were installed by Harza Northeast during the Preliminary Site Assessment (February 1999). Monitoring wells MW-1M, MW-7S, MW-7M, MW-11, and MW-12 were installed by BBL during the Interim Remedial Measure Investigation (June 1999). Recovery wells RW-1, RW-2, and RW-3 and sentinel wells S-1, S-2, and S-3 were installed by BBL during the IRM for Phase I Area (March 1999).

Table 4

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Ground-Water and Surface-Water Elevations

Well ID	Reference Elevation	11/18/99		12/3/99		12/6/99		12/7/99		12/9/99		12/14/99		1/10/00		5/29/00	
		Depth to Water	Water Elevation	Depth to Water	Water Elevation	Depth to Water	Water Elevation	Depth to Water	Water Elevation	Depth to Water	Water Elevation	Depth to Water	Water Elevation	Depth to Water	Water Elevation	Depth to Water	Water Elevation
River	259.61	3.40	256.21	9.52	250.09	12.77	246.84	13.16	246.45	13.35	246.26	13.91	245.70	12.60	247.01	2.79	256.82
MW-1S	269.97	11.41*	258.56	11.72	258.25	12.47	257.50	12.55	257.42	12.80	257.17	13.67	256.30	12.45	257.52	12.25	257.72
MW-1M	269.40	13.17	256.23	19.30	250.10	22.43	246.97	21.78	247.62	23.01	246.39	23.60	245.80	22.25	247.15	12.78	256.62
MW-1D	269.96	13.76	256.20	19.88	250.08	23.04	246.92	22.36	247.60	23.61	246.35	24.18	245.78	22.84	247.12	13.37	256.59
MW-1R	269.61	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NM	NM	NM	NM
MW-4S	271.29	15.06	256.23	15.24	256.05	15.52	255.77	15.69	255.60	15.98	255.31	16.12	255.17	15.75	255.54	14.71	256.58
MW-4D	271.07	14.88	256.19	20.97	250.10	24.13	246.94	23.45	247.62	24.64	246.43	NM	NM	23.90	247.17	14.52	256.55
MW-4R	270.44	11.72	258.72	15.14	255.30	17.99	252.45	18.00	252.44	18.74	251.70	19.41	251.03	18.32	252.12	11.48	258.96
MW-5	265.02	8.82	256.20	14.76	250.26	18.06	246.96	17.44	247.58	18.64	246.38	19.23	245.79	17.88	247.14	8.34	256.68
MW-6S	273.06	16.79	256.27	20.90	252.16	25.11	247.95	25.29	247.77	26.55	246.51	27.08	245.98	25.82*	247.24	16.66*	256.40
MW-6M	272.93	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	27.10	245.83	25.73	247.20	16.40	256.53
MW-6D	272.44	16.26	256.18	22.32	250.12	25.51	246.93	25.07	247.37	26.12	246.32	26.65	245.79	25.30	247.14	15.96	256.48
MW-6R	272.58	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	21.55	251.03	20.20	252.38	13.71	258.87
MW-7S	268.81	12.48	256.33	14.78	254.03	16.02	252.79	15.94	252.87	16.11	252.70	16.65	252.16	15.99	252.82	12.08	256.73
MW-7M	268.79	12.51	256.28	18.68	250.11	21.94	246.85	21.18*	247.61	22.32*	246.47	23.24*	245.55	21.97*	246.82	12.19*	256.60
MW-7D	267.85	11.60	256.25	17.70	250.15	20.91	246.94	20.26	247.59	21.49	246.36	22.06	245.79	20.72	247.13	11.18	256.67
MW-11	276.80	16.71	260.09	15.99	260.81	16.48	260.32	16.65	260.15	16.76	260.04	17.05	259.75	16.14	260.66	15.11	261.69
MW-12	274.30	14.17	260.13	13.37	260.93	13.86	260.44	14.01	260.29	14.25	260.05	14.70	259.60	13.50	260.80	12.51	261.79
MW-13	277.67	12.28	265.39	11.72	265.95	11.86	265.81	11.88	265.79	11.90	265.77	12.05	265.62	11.59	266.08	11.69	265.98
MW-14	277.72	9.86	267.86	13.36	264.36	12.48	265.24	12.24	265.48	12.17	265.55	12.08	265.64	11.74	265.98	11.71	266.01
MW-15	277.18	NM	NM	12.45	264.73	12.58	264.60	12.57	264.61	12.63	264.55	12.52	264.66	12.61	264.57	13.50	263.68
MW-16S	275.83	NM	NM	19.71	256.12	20.46	255.37	20.47	255.36	20.54	255.29	20.36	255.47	20.09	255.74	18.17	257.66
MW-16D	276.00	NM	NM	25.05	250.95	27.59	248.41	27.37	248.63	28.09	247.91	28.50	247.50	27.48	248.52	19.29	256.71
RW-1	267.81	11.60	256.21	17.68	250.13	20.86	246.95	20.38	247.43	21.40	246.41	21.98	245.83	20.58	247.23	11.23	256.58
RW-2	263.27	NM	NM	14.15	249.12	17.34	245.93	16.67	246.60	17.95	245.32	17.95	245.32	16.16	247.11	6.67	256.60
RW-3	269.29	13.00	256.29	18.95	250.34	22.13	247.16	21.66	247.63	22.70	246.59	23.30	245.99	22.09	247.20	12.65	256.64
S-1	272.55	15.52	257.03	20.08	252.47	22.72	249.83	22.45	250.10	23.24	249.31	23.78	248.77	22.56	249.99	14.92	257.63
S-2	270.70	14.51	256.19	20.63	250.07	23.79	246.91	23.19	247.51	24.41	246.29	24.93	245.77	23.60	247.10	13.98	256.72
S-3	268.72	12.50	256.22	18.63	250.09	21.81	246.91	21.20	247.52	22.42	246.30	22.96	245.76	21.62	247.10	11.99	256.73

Notes:

All elevations are in feet, referenced to the New York State Canal Corporation Datum.

Depth to water in monitoring wells was measured from top of inner casing.

* Light Non-aqueous phase liquid (LNAPL) observed. Elevations shown are not corrected for the presence of LNAPL.

NI = Not yet installed.

NM = Not measured.

Table 5

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

In-Situ Hydraulic-Conductivity Test Results

Well ID	Hydraulic Conductivity cm/sec
Fill	
MW-3S*	1.35E-02
MW-4S	1.62E-03
MW-15	5.77E-03
Geometric Mean	5.01E-03
Silt	
MW-1S	1.77E-03
MW-2S*	3.68E-04
MW-7S*	3.69E-04
Geometric Mean	6.22E-04
Sand and Gravel	
MW-1D*	7.71E-03
MW-1M	5.95E-03
MW-2D*	1.24E-04
MW-3D*	3.03E-02
MW-5*	1.78E-03
MW-6D*	1.39E-02
MW-6M	6.70E-03
MW-7D*	1.17E-03
MW-9*	9.26E-03
MW-12*	3.82E-03
Geometric Mean	4.05E-03
Fine Sand	
MW-16S	7.04E-04
MW-16D	1.26E-03
Geometric Mean	9.42E-04
Limestone Bedrock	
MW-4R	6.48E-04
MW-6R	1.20E-06
MW-10R*	8.78E-05
MW-11*	1.48E-05
MW-13	7.58E-05
MW-14	1.67E-06
Geometric Mean	2.25E-05

Notes:

Hydraulic-conductivity values are based on analysis of rising head slug tests for monitoring wells MW-1D, MW-2S, MW-2D, MW-3S, MW-3D, MW-4R, MW-5, MW-6D, MW-6R, MW-7S, MW-9, MW-10R, MW-11, MW-12, MW-13, and MW-14 and specific capacity tests for MW-1S, MW-1M, MW-4S, MW-6M, MW-15, MW-16S, and MW-16D. The data from the rising head slug tests were converted to hydraulic conductivity values using the Bouwer and Rice analysis function in AQTESOLV^{TM}, a slug test analysis software package (Duffield and Rumbaugh 1995). Specific capacity data were evaluated using a method described by Walton (1962).

* Monitoring wells were hydraulic-conductivity tested during the Interim Remedial Measure Investigation (BBL, 1999). Monitoring wells MW-2S, MW-2D, MW-3S, MW-3D, MW-9, and MW-10R were abandoned during the Interim Remedial Measure conducted in the Riverlink Plaza Area of the site (BBL, 2000).

cm/sec = Centimeters per second

Table 6

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Ground-Water Quality Parameters

Sample Location	Date	pH (S.U.)	Temp. (°C)	Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)
MW-1M	1/14/00	7.18	13.8	1.29	-121.3	0.16	41.1
	5/30/00	6.85	12.8	1.35	-162.0	0.03	86.4
MW-1D	1/14/00	7.61	12.9	2.42	-153.4	0.17	48.7
	5/30/00	7.39	13.2	2.66	-179.0	0.11	18.5
MW-1R	1/14/00	7.73	9.7	0.65	-133.6	0.13	50.2
	5/30/00	7.20	12.8	0.602	-159.0	0.14	3.9
MW-4S	1/17/00	6.20	11.1	1.42	-79.1	0.12	14.2
	6/1/00	6.55	12.0	1.49	-177.0	0.00	2.0
MW-4R	1/12/00	7.94	10.8	1.24	-159.7	0.23	3.0
	6/2/00	7.75	11.8	1.10	-215.0	0.00	1.0
MW-5	1/12/00	7.29	12.8	1.15	-93.2	0.25	3.1
	6/5/00	7.15	12.0	1.25	-149.0	0.00	5.0
MW-6M	1/13/00	10.01	13.2	3.17	-158.3	0.10	53.2
	6/1/00	7.18	14.7	4.25	-170.0	0.02	4.0
MW-6D	1/13/00	7.12	12.2	3.86	-135.7	0.18	15.8
	6/1/00	6.98	12.9	5.50	-172.0	0.00	3.0
MW-6R	1/12/00	12.52*	9.8	3.26	-114.5	4.48	17.0
	6/1/00	11.56*	14.1	1.99	-191.0	0.20	7.0
MW-7S	1/17/00	6.91	12.9	1.10	-93.7	0.24	52.1
	6/5/00	6.75	12.2	0.93	-148.0	0.50	11.0
MW-7D	1/17/00	7.35	9.0	1.07	-126.8	0.21	43.2
	6/2/00	7.27	12.3	1.39	-175.0	0.00	4.0
MW-11	1/12/00	7.03	12.6	0.82	77.4	9.90	14.6
	5/31/00	6.89	11.2	1.02	65.0	8.75	14.5
MW-12	1/11/00	6.98	14.0	1.23	47.2	0.78	23.4
	6/5/00	6.83	11.4	1.32	62.0	0.00	7.0
MW-13	1/11/00	7.20	11.1	1.59	-21.5	1.43	22.6
	5/31/00	6.91	15.4	1.67	-66.0	1.07	17.0
MW-14	1/12/00	7.35	14.0	2.34	14.4	0.82	11.7
	6/1/00	7.07	15.9	5.85	13.0	1.98	5.0
MW-15	1/10/00	7.60	12.4	1.13	-252.8	0.36	8.1
	5/31/00	6.67	13.0	1.00	-158.0	0.00	1.0
MW-16S	1/10/00	7.14	13.8	1.25	-90.5	2.37	48.7
	5/31/00	6.82	11.4	1.67	-113.0	0.23	12.4
MW-16D	1/11/00	7.67	13.7	1.85	-189.3	0.15	4.8
	5/31/00	7.15	12.8	2.62	-173.0	0.00	7.8

Notes:

Field parameters recorded immediately after ground-water samples were collected.

pH recorded in Standard Units (S.U.).

Temperature recorded in degrees Celsius (°C).

Specific Conductivity recorded in milliSiemens per centimeter (mS/cm).

Oxidation/Reduction Potential (ORP) recorded in millivolts (mV).

Dissolved Oxygen (DO) recorded in milligrams per liter (mg/L).

Turbidity recorded in Nephelometric Turbidity Units (NTU).

Monitoring well MW-6R went dry prior to sampling.

*High pH readings may be attributed to the monitoring well construction. The sump at MW-6R was installed within a Portland cement grout.

Table 7

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Surface-Water Quality Parameters

Location	Date Collected	pH (S.U.)	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (deg. C)	ORP (mV)
SW-1	3/21/00	6.93	0.293	31.6	13.05	7.15	224
SW2-1	6/1/00	8.34	0.205	5.0	10.17	18.5	279
SW-2	3/21/00	8.24	0.279	6.0	13.82	5.56	224
SW2-2	6/1/00	8.18	0.200	5.0	10.34	18.4	284
SW-3	3/21/00	8.08	0.273	56.4	12.62	5.73	238
SW2-3	6/1/00	8.47	0.256	4.5	9.62	19.2	252
SW-4	3/21/00	7.98	0.263	38.2	12.94	5.33	240
SW2-4	6/1/00	8.55	0.241	3.5	9.86	18.8	277
SW-5	3/21/00	8.04	0.274	15.5	13.43	5.77	242
SW2-5	6/1/00	8.13	0.228	4.0	9.84	18.4	287
SW-6	3/21/00	7.93	0.264	10.4	13.24	5.38	252
SW2-6	6/1/00	8.08	0.220	4.0	9.92	18.3	294
SW-7	3/21/00	8.00	0.274	17.0	13.40	5.72	254
SW2-7	6/1/00	8.44	0.225	5.0	9.73	18.2	262
SW-8	3/21/00	7.92	0.261	14.1	13.10	5.32	251
SW2-8	6/1/00	7.76	0.213	4.0	10.10	18.0	299
SW-9	3/22/00	7.17	0.275	19.7	11.52	5.47	254
SW2-9	5/31/00	8.14	0.219	5.0	10.90	17.3	275
SW-10	3/22/00	7.64	0.265	30.9	12.90	5.58	288
SW2-10	5/31/00	7.78	0.216	6.0	10.98	17.3	297
SW-11	3/22/00	7.86	0.277	25.0	12.80	5.71	270
SW2-11	5/31/00	8.15	0.224	8.0	10.50	18.0	306
SW-12	3/22/00	7.85	0.267	20.9	12.78	5.75	254
SW2-12	5/31/00	8.21	0.218	12.5	11.33	17.1	283
SW-13	3/22/00	7.98	0.278	18.5	13.21	5.91	240
SW2-13	5/31/00	7.41	0.217	2.0	10.50	17.3	374
SW-14	3/22/00	7.99	0.263	33.7	13.43	5.83	237
SW2-14	5/31/00	7.85	0.213	6.8	11.01	16.8	286

Notes:

S.U. = Standard Units
mS/cm = milliSiemens per centimeter
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
deg. C = degrees Celsius
ORP = Oxidation Reduction Potential
mV = millivolts

Table 8

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

NAPL Monitoring and Removal Summary

Date	MW-1S		MW-1S		MW-1M		MW-1M	
	Average DNAPL Thickness (feet)	Approx. Vol. Removed (gal)	Average LNAPL Thickness (feet)	Approx. Vol. Removed (gal)	Average DNAPL Thickness (feet)	Approx. Vol. Removed (gal)	Average LNAPL Thickness (feet)	Approx. Vol. Removed (gal)
April 1999	NI	NI	NI	NI	NI	NI	NI	NI
May 1999	NI	NI	NI	NI	0.000	0.000	0.000	0.000
June 1999	NI	NI	NI	NI	0.000	0.000	0.000	0.000
July 1999	NI	NI	NI	NI	0.000	0.000	0.000	0.000
Aug. 1999	NI	NI	NI	NI	0.000	0.000	0.000	0.000
Sept. 1999	NI	NI	NI	NI	0.000	0.000	0.000	0.000
Oct. 1999	NI	NI	NI	NI	0.000	0.000	0.000	0.000
Nov. 1999	0.004	0.005	0.000	0.00	0.000	0.000	0.000	0.000
Dec. 1999	0.371	0.552	0.000	0.000	0.156	0.264	0.000	0.000
Jan. 2000	0.000	0.062	0.000	0.000	0.000	0.000	0.000	0.000
Feb. 2000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
March 2000	1.262	3.055	0.003	0.000	0.000	0.000	0.004	0.000
April 2000	2.658	6.190	0.009	0.000	0.000	0.000	0.003	0.000
May 2000	0.821	1.042	0.004	0.000	0.000	0.000	0.003	0.000
June 2000	1.363	1.420	0.003	0.000	0.520	0.504	0.007	0.000
July 2000	0.631	0.700	0.000	0.000	0.680	0.775	0.004	0.000
Aug. 2000	0.140	0.102	0.005	0.000	0.577	0.644	0.007	0.000
Sept. 2000	0.013	0.000	0.007	0.000	0.513	0.146	0.010	0.000
Oct. 2000	0.000	0.000	0.010	0.000	0.170	0.056	0.010	0.000
Nov. 2000	0.000	0.000	0.010	0.000	0.405	0.132	0.010	0.000
Dec. 2000	0.000	0.000	0.010	0.000	0.650	0.103	0.010	0.000
Jan. 2001	0.120	0.000	0.000	0.000	0.350	0.000	0.000	0.000
Feb. 2001	0.050	0.000	0.000	0.000	0.250	0.041	0.000	0.000
March 2001	2.125	0.663	0.005	0.000	0.000	0.000	0.005	0.000
April 2001	3.640	2.384	0.003	0.000	0.000	0.000	0.000	0.000
May 2001	0.370	0.098	0.000	0.000	0.195	0.052	0.000	0.000
June 2001	0.140	0.000	0.000	0.000	0.215	0.051	0.000	0.000
July 2001	0.170	0.056	0.000	0.000	0.050	0.000	0.000	0.000
Aug. 2001	0.950	0.311	0.000	0.000	0.200	0.000	0.000	0.000
Sept. 2001	1.200	0.195	0.000	0.000	0.340	0.056	0.000	0.000
Oct. 2001	0.795	0.260	0.000	0.000	0.000	0.000	0.000	0.000
11/2/01	0.300	0.049	0.000	0.000	0.110	0.000	0.000	0.000
11/14/01	0.040	0.000	0.000	0.000	0.290	0.048	0.000	0.000
	Total Volume Removed:	17.143	Total Volume Removed:	0.000	Total Volume Removed:	2.872	Total Volume Removed:	0.000

See Notes, Page 5.

Table 8

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

NAPL Monitoring and Removal Summary

Date	MW-4D		MW-4D		MW-6S		MW-6M	
	Average DNAPL Thickness (feet)	Approx. Vol. Removed (gal)	Average LNAPL Thickness (feet)	Approx. Vol. Removed (gal)	Average LNAPL Thickness (feet)	Approx. Vol. Removed (gal)	Average LNAPL Thickness (feet)	Approx. Vol. Removed (gal)
April 1999	3.400	NA	0.000	0.000	NI	NI	NI	NI
May 1999	0.878	1.200	0.000	0.000	NI	NI	NI	NI
June 1999	0.067	0.400	0.000	0.000	NI	NI	NI	NI
July 1999	0.059	0.450	0.000	0.000	NI	NI	NI	NI
Aug. 1999	0.103	0.200	0.000	0.000	NI	NI	NI	NI
Sept. 1999	0.103	0.121	0.000	0.000	NI	NI	NI	NI
Oct. 1999	0.390	0.345	0.000	0.000	NI	NI	NI	NI
Nov. 1999	0.000	0.125	0.000	0.000	0.003	0.000	NI	NI
Dec. 1999	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Jan. 2000	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.000
Feb. 2000	0.000	0.000	0.000	0.000	0.205	0.000	0.000	0.000
March 2000	0.085	0.200	0.001	0.000	0.218	0.475	0.000	0.000
April 2000	0.101	0.256	0.004	0.000	0.203	0.411	0.000	0.000
May 2000	0.050	0.053	0.001	0.000	0.124	0.145	0.000	0.000
June 2000	0.050	0.039	0.000	0.000	0.055	0.036	0.000	0.000
July 2000	0.044	0.016	0.000	0.000	0.049	0.019	0.000	0.000
Aug. 2000	0.060	0.033	0.002	0.000	0.050	0.020	0.003	0.000
Sept. 2000	0.077	0.016	0.000	0.000	0.173	0.080	0.003	0.000
Oct. 2000	0.095	0.023	0.000	0.000	0.140	0.031	0.000	0.000
Nov. 2000	0.100	0.031	0.005	0.000	0.200	0.044	0.005	0.000
Dec. 2000	0.200	0.033	0.000	0.000	0.590	0.097	0.310	0.051
Jan. 2001	0.170	0.000	0.000	0.000	0.230	0.000	0.050	0.000
Feb. 2001	0.160	0.000	0.000	0.000	0.760	0.124	0.020	0.000
March 2001	0.320	0.105	0.000	0.000	1.250	0.409	0.015	0.000
April 2001	0.105	0.000	0.000	0.000	1.015	0.666	0.005	0.000
May 2001	0.215	0.048	0.000	0.000	0.380	0.090	0.125	0.000
June 2001	0.185	0.000	0.000	0.000	0.475	0.156	0.165	0.000
July 2001	0.230	0.069	0.000	0.000	0.120	0.000	0.140	0.000
Aug. 2001	0.175	0.000	0.000	0.000	0.235	0.044	0.110	0.000
Sept. 2001	0.270	0.044	0.000	0.000	0.400	0.066	0.100	0.000
Oct. 2001	0.070	0.000	0.000	0.000	0.250	0.000	0.055	0.000
11/2/01	0.170	0.000	0.000	0.000	0.370	0.060	0.060	0.000
11/14/01	0.200	0.000	0.000	0.000	0.030	0.000	0.070	0.000
	Total Volume Removed:	3.807	Total Volume Removed:	0.000	Total Volume Removed:	2.973	Total Volume Removed:	0.051

See Notes, Page 5.

Table 8

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

NAPL Monitoring and Removal Summary

Date	MW-7M		MW-8		RW-3		S-1	
	Average LNAPL Thickness (feet)	Approx. Vol. Removed (gal)	Average DNAPL Thickness (feet)	Approx. Vol. Removed (gal)	Average DNAPL Thickness (feet)	Approx. Vol. Removed (gal)	Average DNAPL Thickness (feet)	Approx. Vol. Removed (gal)
April 1999	0.414	1.230	1.820	0.580	NI	NI	NI	NI
May 1999	0.057	0.280	2.066	4.750	NI	NI	NI	NI
June 1999	0.379	1.440	2.699	15.830	NI	NI	NI	NI
July 1999	0.169	0.650	2.166	3.740	NI	NI	NI	NI
Aug. 1999	0.190	0.390	*	*	NI	NI	NI	NI
Sept. 1999	0.023	0.020	*	*	NI	NI	NI	NI
Oct. 1999	0.003	0.005	*	*	NI	NI	0.000	0.000
Nov. 1999	0.003	0.007	*	*	0.000	0.000	0.033	0.090
Dec. 1999	0.210	0.379	*	*	0.000	0.000	0.206	0.477
Jan. 2000	0.358	0.256	*	*	0.000	0.000	0.000	0.090
Feb. 2000	0.100	0.000	*	*	0.000	0.000	0.000	0.000
March 2000	0.103	0.152	*	*	0.000	0.000	0.016	0.061
April 2000	0.058	0.042	*	*	0.038	0.048	0.001	0.000
May 2000	0.045	0.025	*	*	0.115	0.125	0.041	0.011
June 2000	0.027	0.000	*	*	0.032	0.000	0.010	0.000
July 2000	0.039	0.000	*	*	0.054	0.038	0.000	0.000
Aug. 2000	0.040	0.000	*	*	0.043	0.041	0.000	0.000
Sept. 2000	0.040	0.000	*	*	0.000	0.000	0.000	0.000
Oct. 2000	0.055	0.000	*	*	0.115	0.028	0.000	0.000
Nov. 2000	0.065	0.015	*	*	0.000	0.000	0.000	0.000
Dec. 2000	0.700	0.115	*	*	0.070	0.000	0.000	0.000
Jan. 2001	0.440	0.000	*	*	0.000	0.000	0.050	0.000
Feb. 2001	0.450	0.074	*	*	0.000	0.000	0.000	0.000
March 2001	1.170	0.384	*	*	0.255	0.043	0.000	0.000
April 2001	0.205	0.043	*	*	0.130	0.043	0.000	0.000
May 2001	0.335	0.072	*	*	0.220	0.000	0.000	0.000
June 2001	0.690	0.226	*	*	0.170	0.056	0.000	0.000
July 2001	0.770	0.252	*	*	0.215	0.000	0.000	0.000
Aug. 2001	0.285	0.066	*	*	0.105	0.000	0.000	0.000
Sept. 2001	0.290	0.048	*	*	0.260	0.085	0.000	0.000
Oct. 2001	0.300	0.054	*	*	0.145	0.000	0.000	0.000
11/2/01	0.460	0.075	*	*	0.220	0.000	0.000	0.000
11/14/01	0.520	0.085	*	*	0.200	0.000	0.000	0.000
	Total Volume Removed:	6.385	Total Volume Removed:	24.90	Total Volume Removed:	0.507	Total Volume Removed:	0.729

See Notes, Page 5.

Table 8

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

NAPL Monitoring and Removal Summary

Date	S-2	
	Average DNAPL Thickness (feet)	**Approx. Vol. Removed (gal)**
April 1999	NI	NI
May 1999	NI	NI
June 1999	NI	NI
July 1999	NI	NI
Aug. 1999	NI	NI
Sept. 1999	NI	NI
Oct. 1999	0.000	0.000
Nov. 1999	0.000	0.000
Dec. 1999	0.000	0.000
Jan. 2000	0.000	0.000
Feb. 2000	0.000	0.000
March 2000	0.000	0.000
April 2000	0.000	0.000
May 2000	0.000	0.000
June 2000	0.000	0.000
July 2000	0.000	0.000
Aug. 2000	0.000	0.000
Sept. 2000	0.000	0.000
Oct. 2000	0.000	0.000
Nov. 2000	0.000	0.000
Dec. 2000	0.000	0.000
Jan. 2001	0.000	0.000
Feb. 2001	0.000	0.000
March 2001	1.620	0.531
April 2001	0.645	0.422
May 2001	0.785	0.255
June 2001	0.900	0.249
July 2001	0.790	0.259
Aug. 2001	0.585	0.192
Sept. 2001	0.620	0.101
Oct. 2001	0.750	0.246
11/2/01	0.450	0.074
11/14/01	0.420	0.069
	Total Volume Removed:	2.398

See Notes, Page 5.

Table 8

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

NAPL Monitoring and Removal Summary

Notes:

NAPL thickness measurements were obtained with an oil/water interface probe.
NAPL was removed from monitoring wells using either a dedicated polyethylene bailer and polypropylene rope or a peristaltic pump and dedicated polyethylene tubing.
TIC = Top of the inner well casing.
NA = Not Available.
NM = Not Measured.
*Monitoring well MW-8 was abandonned on July 15, 1999 and replaced with Recovery well RW-3 on November 11, 1999.
NI = Monitoring well not yet installed.
Other monitoring wells that are monitored but have had no accumulations of NAPL include: MW-6D, MW-6R, MW-4R, MW-4S, MW-1D, RW-1, MW-7S, RW-2, S-3, S-2, and MW-12.
Monthly NAPL thicknesses based on the average thickness for the month. Thickness has typically been monitored 2 to 4 times per month, depending on the observed rate of accumulation in the wells.
RW-3 and S-1 also have occasional LNAPL detections in trace amounts (0.01 foot).

Table 9

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Soil Analytical Results

Sample ID	MW-1S	MW-4R	MW-6R	MW-6R	MW-6S	MW-13	MW-13 (DUP)	MW-14	MW-15	MW-16D
Field Sample ID	MW-1S(2-4')	MW-4R(38-40')	MW-6R(52-54)	MW-6R(54-56)	MW-6S(2-4')	MW-13(2-4')	DUP-1	MW-14(2-4')	MW-15(6-8')	MW-16D(14-16)
Sample Depth (ft)	(2-4')	(38-40')	(52-54')	(54-56')	(2-4')	(2-4')	(2-4')	(2-4')	(6-8')	(14-16')
Date Collected	11/9/99	11/2/99	12/3/99	12/3/99	11/15/99	11/9/99	11/9/99	11/16/99	11/18/99	11/22/99
BTEX (mg/Kg)										
Benzene	0.0020 J	0.076	160 D	30 JD	0.0080 U	0.0060 UJ	R	0.0010 J	0.0060 UJ	0.0080 UJ
Toluene	0.028 J	0.054	360 D	6.9	0.0080	R	R	0.0050 J	0.0090 J	0.0080 U
Ethylbenzene	0.0060 UJ	0.065	310 D	0.78 U	0.0080 U	R	R	0.0060 U	0.0060 UJ	0.0080 U
Xylene (total)	0.0060 UJ	0.14	350 D	0.78 U	0.0080 U	R	R	0.0060 U	0.0060 UJ	0.0080 U
Total BTEX	0.030	0.335	1,180	36.9	0.008	ND	ND	0.006	0.009	ND
PAHs (mg/Kg)										
Naphthalene	0.44 JD	2.1 B	2,500 D	0.33 J	0.51 U	0.10 J	0.047 J	0.73 JD	0.39 U	0.37 J
2-Methylnaphthalene	0.25 JD	0.72	1,000 D	0.17 J	0.51 U	0.074 J	0.38 U	0.40 JD	0.39 U	0.10 J
Acenaphthylene	0.25 JD	0.44	660 D	0.41 U	0.43 J	0.25 J	0.38 U	0.16 JD	0.39 U	0.26 J
Acenaphthene	0.37 JD	0.33 J	53	0.055 J	0.51 U	0.40 U	0.38 U	1.0 JD	0.39 U	0.16 J
Fluorene	0.39 JD	0.53	210	0.042 J	0.51 U	0.12 J	0.38 U	0.84 JD	0.39 U	0.25 J
Phenanthrene	3.8 D	1.6	730 D	0.18 J	0.51 U	1.5	0.15 J	9.4 D	0.11 J	2.2
Anthracene	1.0 D	0.50	240	0.056 J	0.51 U	0.36 J	0.38 U	2.0 D	0.39 U	0.63
Fluoranthene	3.5 D	0.92	200	0.058 J	0.11 J	2.2	0.27 J	6.5 D	0.26 J	2.9
Pyrene	5.6 D	1.0	300 JD	0.097 J	0.32 J	3.1	0.40	11 D	0.29 J	5.1 D
Benzo(a)anthracene	2.5 D	0.43	130	0.41 U	0.51 U	1.3	0.22 J	4.2 D	0.17 J	2.2 J
Chrysene	2.2 D	0.32 J	130	0.41 U	0.51 U	1.2	0.24 J	4.1 D	0.15 J	1.5 J
Benzo(b)fluoranthene	3.3 D	0.35 J	49 J	0.41 U	0.51 U	1.5	0.35 J	4.0 D	0.17 J	2.0 J
Benzo(k)fluoranthene	1.0 D	0.20 J	28 J	0.41 U	0.97	0.55	0.18 J	1.8 D	0.082 J	0.60 J
Benzo(a)pyrene	2.4 D	0.34 J	78 J	0.41 U	0.99	1.2	0.26 J	3.5 D	0.15 J	1.5 J
Indeno(1,2,3-cd)pyrene	1.2 D	0.085 J	16 J	0.41 U	1.5	0.43	0.11 J	2.2 D	0.075 J	1.0 J
Dibenzo(a,h)anthracene	0.78 U	0.39 U	38 UJ	0.41 U	0.51 U	0.40 U	0.38 U	1.5 U	0.39 U	0.50 UJ
Benzo(g,h,i)perylene	1.3 D	0.090 J	26 J	0.41 U	3.7	0.47	0.12 J	2.8 D	0.074 J	1.2 J
Total PAHs	29.5	9.955	6,350	0.988	8.02	14.354	2.347	54.63	1.531	21.97
Dibenzofuran	0.28 J	0.35 J	32 J	0.41 U	0.51 U	0.085 J	0.38 U	0.51	0.39 U	0.15 J
CYANIDE (mg/Kg)										
Cyanide, Total	4.9	0.53 U	0.49 U	0.53 U	280	0.60 U	0.51 U	0.65	0.59 U	1.2
TOC (mg/Kg)										
Total Organic Carbon	NA	25,500	NA	NA	NA	NA	NA	NA	NA	NA

See Notes on Page 4.

Table 9

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Soil Analytical Results

Sample ID	**MW-16D**	**MW-16D**	**MW-16D (DUP)**	**SB-38**	**TP-29**	**TP-31**	**TP-31**	**TP-31**	**TP-31**	**TP-31**	**TP-31**
Field Sample ID	**MW-16D(22-24)**	**MW-16D(44-46)**	**DUP-2**	**SB-38(10-12')**	**TP-29-1-9**	**TP-31-36-3**	**TP-31-36-6**	**TP-31-36-13**	**TP-31-46-10**	**TP-31-77-5**	**TP-31-77-13**
Sample Depth (ft)	**(22-24')**	**(44-46')**	**(44-46')**	**(10-12')**	**(9')**	**(3')**	**(6')**	**(13')**	**(10')**	**(5')**	**(13')**
Date Collected	**11/22/99**	**11/23/99**	**11/22/99**	**11/17/99**	**12/10/99**	**12/7/99**	**12/7/99**	**12/7/99**	**12/7/99**	**12/7/99**	**12/7/99**
BTEX (mg/Kg)											
Benzene	0.0060 UJ	0.0020 J	NA	0.0050 U	0.0010 J	0.0030 J	0.0030 J	2.4	34 J	0.002 J	5.0
Toluene	0.0060 U	0.026 J	NA	0.0020 J	0.0030 J	0.040	0.033	0.31 J	11 J	0.021	3.5 U
Ethylbenzene	0.0060 U	0.0060 UJ	NA	0.0050 U	0.0020 J	0.0050 U	0.0080 U	15	23 J	0.0060 U	0.96 J
Xylene (total)	0.0060 U	0.0010 J	NA	0.0050 U	0.0030 J	0.0050 U	0.0080 U	17	160 J	0.0060 U	14
Total BTEX	ND	0.029	NA	0.002	0.009	0.043	0.036	34.71	228	0.023	19.96
PAHs (mg/Kg)											
Naphthalene	0.41 U	0.39 U	NA	0.36 U	29	3.6 U	0.51 U	44 J	2,000	8.1 U	2,200
2-Methylnaphthalene	0.41 U	0.39 U	NA	0.36 U	11	3.6 U	0.51 U	45 U	410 J	8.1 U	1,300
Acenaphthylene	0.41 U	0.39 U	NA	0.36 U	6.7	2.0 J	0.51 U	20 J	180 J	1.1 J	620
Acenaphthene	0.41 U	0.39 U	NA	0.36 U	9.4	3.6 U	0.51 U	54	110 J	8.1 U	290 J
Fluorene	0.41 U	0.39 U	NA	0.36 U	23	3.6 U	0.51 U	33 J	230 J	8.1 U	1,500
Phenanthrene	0.41 U	0.049 J	NA	0.36 U	270 JD	5.8	0.073 J	97	820	15	4,500 D
Anthracene	0.41 U	0.39 U	NA	0.36 U	55 EJ	2.2 J	0.51 U	34 J	250 J	3.4 J	1,600
Fluoranthene	0.41 U	0.39 U	NA	0.36 U	540 D	38 D	0.24 J	73	560	25	2,900
Pyrene	0.41 U	0.39 U	NA	0.36 U	550 D	42 D	0.26 J	75	430 J	24	2,400
Benzo(a)anthracene	0.41 U	0.39 U	NA	0.36 U	260 JD	23	0.21 J	32 J	220 J	18	1,100
Chrysene	0.41 U	0.39 U	NA	0.36 U	230 JD	22	0.25 J	28 J	160 J	15	900
Benzo(b)fluoranthene	0.41 U	0.39 U	NA	0.36 U	280 JD	34 D	0.62	27 J	180 J	24	840
Benzo(k)fluoranthene	0.41 U	0.39 U	NA	0.36 U	100 JD	13	0.32 J	12 J	54 J	10	390 J
Benzo(a)pyrene	0.41 U	0.39 U	NA	0.36 U	190 JD	21	0.30 J	27 J	160 J	21	830
Indeno(1,2,3-cd)pyrene	0.41 U	0.39 U	NA	0.36 U	100 JD	16	0.66	12 J	77 J	12	300 J
Dibenzo(a,h)anthracene	0.41 U	0.39 U	NA	0.36 U	4.2 UJ	3.6 U	0.51 U	45 U	500 U	8.1 U	470 U
Benzo(g,h,i)perylene	0.41 U	0.39 U	NA	0.36 U	100 JD	18	1.1	13 J	79 J	12	320 J
Total PAHs	ND	0.049	NA	ND	2,754.1	237	4.033	581	5,920	180.5	21,990
Dibenzofuran	0.41 U	0.39 U	NA	0.36 U	34 E	3.6 U	0.51 U	6.7 J	190 J	8.1 U	1,200
CYANIDE (mg/Kg)											
Cyanide, Total	0.61 U	0.55 U	NA	0.47 U	0.48 U	4.5	59.9	57.3	67.1	3.0	50.0
TOC (mg/Kg)											
Total Organic Carbon	7,990 J	3,370 J	3,930 J	NA	NA	NA	NA	NA	NA	NA	NA

See Notes on Page 4.

Table 9

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
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Soil Analytical Results

Sample ID **Field Sample ID** **Sample Depth (ft)** **Date Collected**	**TP-32** **TP-32-10-9** **(9')** **12/13/99**	**TP-32 (DUP)** **TP-DUP1** **(9')** **12/13/99**	**TP-32** **TP-32-18-14.5** **(14.5')** **12/14/99**	**TP-33** **TP-33-18-9** **(9')** **12/9/99**	**TP-34** **TP-34-12-2** **(2')** **12/10/99**	**TP-35** **TP-35-10-13** **(13')** **12/14/99**
BTEX (mg/Kg)						
Benzene	1.9 J	3.0 J	29 J	0.054	26	0.75 U
Toluene	8.3 U	7.9 U	20 J	0.14	17	0.75 U
Ethylbenzene	74	130	260	0.17	1.4 J	0.84
Xylene (total)	100	190	1,700	0.36	30	0.61 J
Total BTEX	175.9	323	2,009	0.724	74.4	1.45
PAHs (mg/Kg)						
Naphthalene	360 D	240	2,000	1.7	21,000 D	4.0 U
2-Methylnaphthalene	120 D	94	1,200	1.6	3,700 JD	4.0 U
Acenaphthylene	10 JD	11 J	110 J	0.61	6,400 JD	7.2
Acenaphthene	63 JD	43	310 J	0.10 J	740	29
Fluorene	28 JD	23 J	180 J	0.32 J	3,400 JD	17
Phenanthrene	89 D	64	540	0.92	18,000 D	62 D
Anthracene	26 JD	20 J	170 J	0.27 J	5,000 JD	24
Fluoranthene	20 JD	17 J	140 J	0.43	12,000 D	16
Pyrene	34 JD	26 J	210 J	0.61	8,700 JD	31
Benzo(a)anthracene	15 JD	12 J	97 J	0.29 J	4,200 JD	9.3
Chrysene	14 JD	11 J	85 J	0.31 J	3,500 JD	8.7
Benzo(b)fluoranthene	4.0 EJ	6.3 J	42 J	0.29 J	4,000 JD	3.2 J
Benzo(k)fluoranthene	1.0 J	41 U	400 U	0.11 J	1,800 JD	1.3 J
Benzo(a)pyrene	9.4 JD	7.5 J	61 J	0.24 J	3,700 JD	4.3
Indeno(1,2,3-cd)pyrene	1.5 J	41 U	400 U	0.11 J	1,600 JD	0.97 J
Dibenzo(a,h)anthracene	0.44 UJ	41 U	400 U	0.43 U	10,000 U	4.0 U
Benzo(g,h,i)perylene	2.2 J	41 U	400 U	0.13 J	1,700 JD	1.7 J
Total PAHs	797.1	574.8	5,145	8.04	99,440	215.67
Dibenzofuran	0.44 U	41 U	400 U	0.43 U	2,900 E	3.4 J
CYANIDE (mg/Kg)						
Cyanide, Total	0.57 U	0.63	0.99	0.55 U	0.47 U	6.8
TOC (mg/Kg)						
Total Organic Carbon	NA	NA	NA	NA	NA	NA

See Notes on Page 4.

Table 9

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Soil Analytical Results

Notes:
BTEX - Benzene, Toluene, Ethylbenzene, and Xylene.
PAHs - Polynuclear Aromatic Hydrocarbons.
SVOCs - Semivolatile Organic Compounds.
TOC - Total Organic Carbon.
Results are reported in milligrams per kilogram (mg/Kg) .
DUP = Field Duplicate.
NA = Not available.
U = Compound was analyzed for but not detected.
B = The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
J = Estimated value below the laboratory quantitation limit.
E = Identifies compounds whose concentrations exceeded the calibration range of the GC/MS instrument for that specific analysis.
DL = Dilution.
D = Concentration is based on a diluted sample analysis.
RE = Sample re-extracted.
ND = All associated compounds were analyzed for but non were detected.

Table 10

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Comparison of Sediment Analytical Results to Screening Criteria Levels

Sample ID	**Benthic Aquatic Life Toxicity Criteria (1,2)**		**SD-1**	**SD-2**	**SD-3**	**SD-4**	**SD-5**	**SD-5**	**SD-6**	**SD-6**	**SD-7**	**SD-8**	**SD-8**	**SD-9**	**SD-10**
Date Collected			**11/17/99**	**11/17/99**	**11/17/99**	**11/17/99**	**11/18/99**	**11/18/99**	**11/18/99**	**11/18/99**	**11/18/99**	**11/18/99**	**11/18/99**	**11/18/99**	**11/19/99**
Sample Depth (ft.)	**Chronic (ug/g OC)**	**Acute (ug/g OC)**	**(0 - 0.3')**	**(0 - 0.3')**	**(0 - 0.6')**	**(0 - 0.4')**	**(0 - 0.5')**	**(0.5 - 1')**	**(0 - 0.5')**	**(0.5 - 1')**	**(0 - 0.5')**	**(0 - 0.5')**	**(0.5 - 1')**	**(0 - 0.5')**	**(0 - 0.5')**
BTEX (mg/Kg)															
Benzene	28	103	0.0060 UJ	0.0060 U	0.0060 U	0.0060 U	0.0070 UJ	0.0070 UJ	0.030 J	0.52 J	0.024	**0.94 JD**	0.40 J	0.10	0.011
Toluene	49	235	0.0060 UJ	0.0060 U	0.0060 U	0.0060 U	0.0070 U	0.0070 U	0.15 J	0.12	0.0080	**7.1 D**	**2.1**	0.53	0.0020 J
Ethylbenzene	24	212	0.0060 UJ	0.0060 U	0.0060 U	0.0060 U	0.0070 U	0.0070 U	0.13 J	**6.4 D**	0.093	**7.5 D**	**4.0**	**0.77**	0.029
Xylene (total)	92	833	0.0060 UJ	0.0060 U	0.0060 U	0.0060 U	0.0070 U	0.0070 U	0.33 J	2.2	0.40 D	**13 D**	**6.8**	2.2	0.023
Total BTEX	--	--	ND	ND	ND	ND	ND	ND	0.64	9.24	0.525	28.54	13.3	3.6	0.065
PAHs (mg/Kg)															
Naphthalene	30	258	0.11 JB	0.40 U	0.42 U	0.38 U	0.49 U	0.44 U	**2.2 B**	**140 DB**	**18 DB**	**12 DB**	**13 DB**	**5.7 DB**	**1.2 B**
2-Methylnaphthalene	34	304	0.42 U	0.078 J	0.42 U	0.38 U	0.49 U	0.44 U	**2.4**	**59 D**	**11 D**	**10 D**	**14 D**	**5.0 D**	**0.43**
Acenaphthylene	0.044 (a)	0.64 (a)	**0.064 J**	0.40 U	0.42 U	0.38 U	**0.096 J**	**0.059 J**	**1.5**	**5.4 J**	**2.4 JD**	**2.6**	**2.9 D**	**1.5**	**0.10 J**
Acenaphthene	140	0.50 (a)	0.10 J	0.17 J	0.42 U	0.38 U	0.097 J	0.076 J	**0.77**	**43**	**13 D**	**1.0**	**3.5 D**	0.38 J	0.25 J
Fluorene	8	73	**0.13 J**	**0.20 J**	0.043 J	0.38 U	0.12 J	**0.10 J**	**0.84**	**22**	**9.0 D**	**1.6**	**3.2 D**	**0.83**	**0.099 J**
Phenanthrene	120	950 (b)	**2.2**	**1.4**	0.53	**0.31 J**	1.3	1.2	3.0	**88 D**	**31 D**	**5.8 D**	**7.6 D**	2.6	0.34 J
Anthracene	107	986	0.46	0.40	0.098 J	0.049 J	0.24 J	0.29 J	1.5	**24**	**13 D**	1.6	1.8 JD	0.76	0.087 J
Fluoranthene	1020	5100 (a)	2.3	1,2	0.54	0.35 J	1.4	1.2	3.8	**33**	24 D	2.2	4.9 D	1.3	0.26 J
Pyrene	961	8775	3.3 D	1.6	1.1	0.68	2.5 J	2.0	7.7 D	**42**	28 D	4.8 D	6.6 JD	2.7	0.48
Benzo(a)anthracene	12	94	**1.5**	**0.67**	**0.30 J**	**0.20 J**	**0.78 J**	**0.74**	**3.3 J**	**16**	**12 D**	**1.6 J**	**2.2 JD**	**0.78**	**0.17 J**
Chrysene	0.34 (c)	460 (b)	**1.3**	**0.59**	**0.36 J**	0.23 J	**0.85 J**	**0.67**	**3.0 J**	**14**	**11 D**	**1.8 J**	**2.5 JD**	**0.86**	0.17 J
Benzo(b)fluoranthene	--	--	1.4	0.63	0.36 J	0.21 J	0.94	0.82	2.6	11 J	11 JD	1.6	2.4 JD	0.75	0.18 J
Benzo(k)fluoranthene	0.24 (c)	1340 (b)	**0.55**	**0.34 J**	0.15 J	0.12 J	**0.38 J**	**0.39 J**	**1.3**	**3.4 J**	**5.7 JD**	**0.42 J**	**1.2 JD**	**0.39 J**	0.087 J
Benzo(a)pyrene	0.37 (c)	1440 (b)	**1.0**	**0.53**	0.27 J	0.16 J	**0.75**	**0.71**	**2.4**	**10 J**	**10 JD**	**1.3**	**2.1 JD**	**0.68**	0.14 J
Indeno(1,2,3-cd)pyrene	0.20 (c)	320 (b)	**0.64**	**0.25 J**	0.16 J	0.12 J	**0.56**	**0.44**	**1.5**	**4.6 J**	**5.0 JD**	**0.98**	**1.1 JD**	**0.40 J**	0.078 J
Dibenzo(a,h)anthracene	0.06 (c)	130 (b)	0.42 U	0.40 U	0.42 U	0.38 U	0.49 U	0.44 U	0.48 U	5.8 UJ	0.39 UJ	0.59 U	2.3 UJ	0.47 U	0.39 U
Benzo(g,h,i)perylene	0.17 (c)	320 (b)	**0.70**	**0.29 J**	**0.22 J**	0.14 J	**0.61**	**0.52**	**1.6**	**4.8 J**	**5.5 JD**	**1.2**	**1.4 JD**	**0.49**	0.079 J
Total PAHs	4 (a)	45 (a)	**15.6**	**8.35**	**4.13**	2.57	**10.6**	**9.22**	**39.4**	**520**	**209**	**50.5**	**70.4**	**25.1**	**4.15**
CYANIDE (mg/Kg)															
Cyanide, Total	--	--	0.60 U	0.52 U	0.57 U	0.53 U	0.70 U	0.66 U	0.68 U	1.0	0.50 U	0.87 U	0.87 U	0.70 U	0.54 U
TOC (%)															
% TOC	--	--	0.6	0.7	0.7	0.2	2.8	1.0	3.8	2.8	4.5	3.3	3.3	2.4	1.0

See Notes on Page 3.

Table 10

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Comparison of Sediment Analytical Results to Screening Criteria Levels

Sample ID **Date Collected** **Sample Depth (ft.)**	**Benthic Aquatic Life Toxicity Criteria (1,2)**		**SD-11** **11/19/99** **(0 - 0.5')**	**SD-11 (Dup)** **11/19/99** **(0 - 0.5')**	**SD-11** **11/19/99** **(0.5 - 1')**	**SD-12** **11/19/99** **(0 - 0.5')**	**SD-12** **11/19/99** **(0.5 - 1')**	**SD-13** **11/19/99** **(0 - 0.5')**	**SD-13** **11/19/99** **(0.5 - 1')**	**SD-13 (Dup)** **11/19/99** **(0.5 - 1')**	**SD-14** **11/19/99** **(0 - 0.5')**	**SD-14** **11/19/99** **(0.5 - 1')**	**SD-15** **11/19/99** **(0 - 0.5')**
	Chronic (ug/g OC)	**Acute (ug/g OC)**											
BTEX (mg/Kg)													
Benzene	28	103	0.0060 UJ	0.0060 U	0.0070 U	0.0070 UJ	0.0060 UJ	0.0070 UJ	0.0070 U	0.0060 U	0.0070 UJ	0.0060 UJ	0.0060 UJ
Toluene	49	235	0.0060 U	0.0060 U	0.0070 U	0.0070 UJ	0.0060 UJ	0.0070 U	0.0070 U	0.0060 U	0.0070 U	0.0060 UJ	0.0040 J
Ethylbenzene	24	212	0.0060 U	0.0060 U	0.0070 U	0.0070 UJ	0.0060 UJ	0.0070 U	0.0070 U	0.0060 U	0.0070 U	0.0060 UJ	0.0060 UJ
Xylene (total)	92	833	0.0060 U	0.0060 U	0.0070 U	0.0070 UJ	0.0060 UJ	0.0070 U	0.0070 U	0.0060 U	0.0070 U	0.0060 UJ	0.0060 UJ
Total BTEX	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.009
PAHs (mg/Kg)													
Naphthalene	30	258	**0.38 JB**	0.54 B	0.45 JB	0.45 U	0.43 B	0.32 JB	0.60 B	0.29 JB	0.46 U	0.42 U	0.43 U
2-Methylnaphthalene	34	304	0.18 J	0.25 J	0.24 J	0.056 J	0.14 J	0.34 J	0.48	0.21 J	0.46 U	0.42 U	0.43 U
Acenaphthylene	0.044 (a)	0.64 (a)	**0.86**	**0.97**	**1.6**	**0.44 J**	**0.40 J**	**1.9**	**2.1**	**0.52**	**0.048 J**	0.42 U	0.43 U
Acenaphthene	140	0.50 (a)	0.45	**0.57**	**1.7**	0.29 J	**2.4**	0.44 U	**1.4**	0.25 J	0.047 J	0.42 U	0.11 J
Fluorene	8	73	**0.56**	**0.66**	**2.2**	**0.24 J**	**1.2**	**0.47**	**0.88**	0.41 U	0.46 U	0.42 U	0.060 J
Phenanthrene	120	950 (b)	**4.7 D**	**4.8 D**	**9.9 D**	**2.3 J**	5.3 D	0.38 J	2.4	0.90	0.24 J	0.067 J	0.19 J
Anthracene	107	986	**1.5 J**	1.5	3.5 J	0.80 J	1.2	0.42 J	2.4	0.88	0.088 J	0.42 U	0.058 J
Fluoranthene	1020	5100 (a)	**10 D**	7.4 JD	17 D	6.4 D	6.5 D	2.0 J	2.5 J	1.7 J	0.34 J	0.089 J	0.29 J
Pyrene	961	8775	**9.1 D**	10 D	15 D	6.8 D	7.0 D	3.4	6.7 D	2.4	0.61	0.082 J	0.27 J
Benzo(a)anthracene	12	94	**5.9 D**	**5.3 D**	**9.2 D**	**3.6 J**	**2.9 J**	**1.5**	**2.9 D**	**1.0**	**0.29 J**	0.42 U	0.18 J
Chrysene	0.34 (c)	460 (b)	**5.2 D**	**4.4 D**	**8.0 D**	**3.1 J**	**2.7 J**	**2.3**	**3.3 D**	**1.2**	0.32 J	0.42 U	0.16 J
Benzo(b)fluoranthene	--	--	6.4 D	5.0 JD	9.0 D	2.9	2.4	2.1 J	2.2 J	0.94 J	0.32 J	0.42 UJ	0.18 J
Benzo(k)fluoranthene	0.24 (c)	1340 (b)	**2.4**	**2.0 J**	**2.8**	**1.0**	**0.89**	**1.0 J**	**0.98**	**0.27 J**	0.14 J	0.42 U	0.43 U
Benzo(a)pyrene	0.37 (c)	1440 (b)	**4.9 D**	**4.3 D**	**7.1 D**	**2.7**	**2.2**	**2.4 J**	**2.8**	**0.92**	0.29 J	0.42 U	0.12 J
Indeno(1,2,3-cd)pyrene	0.20 (c)	320 (b)	**2.7**	**2.5 J**	**3.2**	**1.7**	**1.5**	**1.1 J**	**1.2**	**0.46**	0.17 J	0.42 U	0.054 J
Dibenzo(a,h)anthracene	0.06 (c)	130 (b)	0.43 U	**0.26 J**	**1.2**	0.45 U	0.42 U	0.44 UJ	0.44 U	0.41 U	0.46 U	0.42 U	0.43 U
Benzo(g,h,i)perylene	0.17 (c)	320 (b)	**3.0**	**2.8 J**	**3.5**	**1.9**	**1.7**	**1.4 J**	**1.6**	**0.54**	**0.24 J**	0.42 U	0.058 J
Total PAHs	4 (a)	45 (a)	**58.2**	**53.3**	**95.6**	**34.2**	**38.9**	**21.0**	**34.4**	**12.5**	3.14	0.24	1.73
CYANIDE (mg/Kg)													
Cyanide, Total	--	--	0.63 U	0.61 U	0.66 U	0.60 U	0.56 U	0.57 U	0.60 U	0.53 U	0.66 U	0.57 U	0.58 U
TOC (%)													
% TOC	--	--	0.9	1.9	6.5	1.6	6.1	2.8	6.7	3.1	1.8	1.1	6.3

See Notes on Page 3.

Table 10

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Comparison of Sediment Analytical Results to Screening Criteria Levels

Notes:

(1) Sediment criteria are from NYSDEC (1999) *Technical Guidance for Screening Contaminated Sediments*. Units are in ug/g OC and are adjusted for TOC concentr
If NYSDEC criteria are not available, additional values are used as described below.
- (a) Effects Range-Low (ERL) and Effects Range-Median (ERM) values, respectively from Long et al. (1995), as reported in NYSDEC (1999). Units are in mg/kg and are not adjusted for TOC concentration.
- (b) Ontario Ministry of Environment (OME, 1993) Severe Effect Levels. Units are in ug/g OC and are adjusted for TOC concentration.
- (c) Ontario Ministry of Environment (OME, 1993) Lowest Effect Levels. Units are in mg/kg and are not adjusted for TOC concentration.

(2) Criteria which are presented in ug/g OC (organic carbon) are adjusted for each sample based on sample-specific TOC concentrations. For example, for fluorene (c of 8 ug/g OC; acute value of 73 ug/g OC) and sample SD-1 (TOC of 0.6%, or 6 g OC/Kg), the criteria are adjusted as follows:

chronic:	(8 ug/g OC) * (6 g OC/Kg) = 48 ug/Kg, or 0.048 mg/Kg
acute:	(73 ug/g OC) * (6 g OC/Kg) = 438 ug/Kg, or 0.438 mg/Kg

The fluorene concentration detected in sample SD-1 was 0.13 mg/Kg. This concentration exceeds the sample-specific chronic value, but not the sample-specific acute value.

BTEX - Benzene, Toluene, Ethylbenzene, and Xylene.
PAHs - Polynuclear Aromatic Hydrocarbons.
SVOCs - Semivolatile Organic Compounds.
TOC - Total Organic Carbon.
Results are reported in milligrams per kilogram (mg/Kg) .
DUP = Field duplicate.
NA = Not available.
U = Compound was analyzed for but not detected. Value shown is the detection limit.
B = The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
J = Estimated value below the laboratory quantitation limit.
D = Concentration is based on a diluted sample analysis.
Detected concentration exceeds the Benthic Aquatic Life Chronic Toxicity Criteria.
Detected concentration exceeds the Benthic Aquatic Life Acute Toxicity Criteria.
ND = All associated compounds were analyzed for but none were detected.

Table 11

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Ground-Water Analytical Results

Sample ID	NYSDEC GA Standards and Guidance Values	MW-1D		MW-1M		MW-1R		MW-4R		MW-4S	
Date Collected		1/14/00	5/30/00	1/14/00	5/30/00	1/14/00	5/30/00	1/12/00	6/2/00	1/17/00	6/1/00
BTEX (ug/L)											
Benzene	1	15,000 D	12,000 DJ	10,000 D	8,600 J	5 U	5 UJ	5 U	5 UJ	440 D	390 J
Toluene	5	94	500 UJ	980	1,400 J	5 U	5 UJ	5 U	5 UJ	92	67 J
Ethylbenzene	5	3,700 D	2,300 DJ	4,300 D	3,700 J	5 U	5 UJ	5 U	5 UJ	49	31 J
Xylene (total)	5d	2,600	1,300 DJ	7,000 D	5,900 J	5 U	5 UJ	5 U	5 UJ	240	160 J
Total BTEX		21,394	15,600	22,280	19,600	ND	ND	ND	ND	821	648
PAHs (ug/L)											
Naphthalene	10 G	5,400 D	3,000 D	4,700 D	3,100 D	4 J	10 U	10 U	10 U	4,800 D	2,600 DJ
2-Methylnaphthalene	NA	530	240 DJ	1,100 D	510 D	10 U	10 U	10 U	10 U	180	79 DJ
Acenaphthylene	NA	32 J	10 J	110	78 J	2 J	1 J	10 U	10 U	240	110 JD
Acenaphthene	20 G	140	80 JD	79 J	36 J	10 U	10 U	10 U	10 U	130	58
Fluorene	50 G	30 J	12 J	47 J	24 J	10 U	10 U	10 U	10 U	180	74
Phenanthrene	50 G	30 J	8 J	64 J	35 J	10 U	10 U	10 U	10 U	230	63 J
Anthracene	50 G	100 U	2 J	18 J	9 J	10 U	10 UJ	10 U	10 U	54 J	9 J
Fluoranthene	50 G	100 U	10 UJ	100 U	4 J	10 U	10 U	10 U	10 U	66 J	6 J
Pyrene	50 G	100 U	10 U	11 J	6 J	10 U	10 U	10 U	10 U	48 J	4 J
Benzo(a)anthracene	0.002 G	100 U	10 U	100 U	2 J	10 U	10 U	10 U	10 U	19 J	10 UJ
Chrysene	0.002 G	100 U	10 U	100 U	2 J	10 U	10 U	10 U	10 U	17 J	10 UJ
Benzo(b)fluoranthene	0.002 G	100 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U	17 J	10 U
Benzo(k)fluoranthene	0.002 G	100 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U
Benzo(a)pyrene	ND	100 U	10 U	100 U	1 J	10 U	10 U	10 U	10 U	19 J	10 U
Indeno(1,2,3-cd)pyrene	0.002 G	100 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U
Dibenzo(a,h)anthracene	NA	100 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U
Benzo(g,h,i)perylene	NA	100 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U
Total PAHs		6,162	4,252	6,129	3,807	6	1	ND	ND	6,000	3,003
CYANIDE (ug/L)											
Cyanide, Total	200	34.6	37.6 *	326	293 *	10 U	10 U*	10 U	10 U*	2,750	1,430 *

See Notes, Page 5.

Table 11

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Ground-Water Analytical Results

Sample ID	NYSDEC GA Standards and Guidance Values	MW-5		MW-6D	MW-6D (DUP)	MW-6D	MW-6D (DUP)	MW-6M		MW-6R	
Date Collected		**1/12/00**	**6/5/00**	**1/13/00**	**1/13/00**	**6/1/00**	**6/1/00**	**1/13/00**	**6/1/00**	**1/13/00**	**6/2/00**
BTEX (ug/L)											
Benzene	1	5 U	5 UJ	960	900	920 J	930 J	100	120 J	5 U	5 UJ
Toluene	5	5 U	5 UJ	330	330	230 J	240 J	94	66 J	1 J	5 UJ
Ethylbenzene	5	5 U	5 UJ	1,200	1,200	900 J	910 J	1,600	1,200 J	5 U	5 UJ
Xylene (total)	5d	5 U	5 UJ	1,400	1,400	820 J	780 J	2,200	1,600 J	2 J	5 UJ
Total BTEX		ND	ND	3,860	3,830	2,870	2,860	3,994	2,986	3	ND
PAHs (ug/L)											
Naphthalene	10 G	10 U	10 U	2,000 D	1,900 D	980 D	1,100 DJ	2,700 D	2,000 DJ	18	2 J
2-Methylnaphthalene	NA	10 U	10 U	340 JD	360 JD	95 DJ	95 DJ	360 JD	280 DJ	9 J	1 J
Acenaphthylene	NA	10 U	10 U	57	60	21 J	22 J	20	9 J	4 J	2 J
Acenaphthene	20 G	10 U	10 U	230 JD	240 JD	120 JD	120 JD	110 EJ	81 EJ	3 J	1 J
Fluorene	50 G	10 U	10 U	66	67	37 J	38 J	37	20 J	2 J	10 UJ
Phenanthrene	50 G	10 U	10 U	180 JD	160 JD	51 J	51 J	44	27 J	4 J	4 J
Anthracene	50 G	10 U	10 U	37	38	11 J	10 J	12	7 J	10 U	10 UJ
Fluoranthene	50 G	10 U	10 U	26	28	5 J	4 J	3 J	1 J	10 U	2 J
Pyrene	50 G	10 U	10 U	40	44	6 J	6 J	3 J	2 J	1 J	4 J
Benzo(a)anthracene	0.002 G	10 U	10 U	15	16	2 J	1 J	10 U	10 U	10 U	2 J
Chrysene	0.002 G	10 U	10 U	14	15	2 J	1 J	10 U	10 U	10 U	2 J
Benzo(b)fluoranthene	0.002 G	10 U	10 U	8 J	10	10 U	10 U	10 U	10 U	10 U	1 J
Benzo(k)fluoranthene	0.002 G	10 U	10 U	3 J	4 J	10 U	10 U	10 U	10 U	10 U	10 UJ
Benzo(a)pyrene	ND	10 U	10 U	10	12	1 J	10 U	10 U	10 U	10 U	2 J
Indeno(1,2,3-cd)pyrene	0.002 G	10 U	10 U	2 J	2 J	10 U	10 U	10 U	10 U	10 U	10 UJ
Dibenzo(a,h)anthracene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ
Benzo(g,h,i)perylene	NA	10 U	10 U	2 J	2 J	10 U	10 U	10 U	10 U	10 U	1 J
Total PAHs		ND	ND	3,010	2,958	1,331	1,448	3,289	2,427	41	24
CYANIDE (ug/L)											
Cyanide, Total	200	10 U	10 U*	115	118	93.8 *	93.0 *	219	150 *	10 U	10 U*

See Notes, Page 5.

Table 11

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Ground-Water Analytical Results

Sample ID	NYSDEC GA Standards and Guidance Values	MW-7D		MW-7S		MW-11		MW-12		MW-13		MW-14	
Date Collected		1/17/00	6/2/00	1/18/00	6/5/00	1/12/00	5/31/00	1/11/00	6/5/00	1/11/00	5/31/00	1/12/00	6/2/00
BTEX (ug/L)													
Benzene	1	740 D	250 J	420	130 J	5 U	5 UJ	5 U	5 UJ	13	40 J	5 U	5 UJ
Toluene	5	4 J	10 UJ	61	11 J	5 U	5 UJ	5 U	5 UJ	5 U	2 J	5 U	5 UJ
Ethylbenzene	5	460	230 J	1,100 D	290 J	5 U	5 UJ	5 U	5 UJ	3 J	5 J	5 U	5 UJ
Xylene (total)	5d	290	88 J	2,800 D	890 J	5 U	5 UJ	5 U	5 UJ	2 J	3 J	5 U	5 UJ
Total BTEX		1,494	568	4,381	1,321	ND	ND	ND	ND	18	50	ND	ND
PAHs (ug/L)													
Naphthalene	10 G	4,000 D	150 D	1,700 D	830 D	10 U	10 U	10 U	10 U	10	1 J	10 U	10 U
2-Methylnaphthalene	NA	660 JD	48 D	340 EJ	38	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	NA	11	5 JD	29 J	9 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthene	20 G	65	32 JD	62 J	20 J	10 U	10 U	10 U	10 U	6 J	4 J	10 U	10 U
Fluorene	50 G	19	10 JD	26 J	6 J	10 U	10 U	10 U	10 U	1 J	10 U	10 U	10 U
Phenanthrene	50 G	19	8 JD	22 J	4 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	50 G	3 J	48 U	6 J	10 UJ	10 U	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U
Fluoranthene	50 G	10 U	48 U	4 J	2 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	50 G	10 U	48 U	4 J	2 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ
Benzo(a)anthracene	0.002 G	10 U	48 U	1 J	1 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ
Chrysene	0.002 G	10 U	48 U	1 J	1 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ
Benzo(b)fluoranthene	0.002 G	10 U	48 U	1 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	0.002 G	10 U	48 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	ND	10 U	48 U	1 J	1 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002 G	10 U	48 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	NA	10 U	48 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	NA	10 U	48 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total PAHs		4,777	253	1,987	914	ND	ND	ND	ND	17	5	ND	ND
CYANIDE (ug/L)													
Cyanide, Total	200	10 U	10 U*	120	93.1 *	56.9	33.8 *	12.9	12.6 *	10 U	10 U*	11.4	14.6 *

See Notes, Page 5.

Table 11

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Ground-Water Analytical Results

Sample ID	NYSDEC GA Standards and Guidance Values	MW-15		MW-16D		MW-16S	
Date Collected		1/10/00	5/31/00	1/11/00	5/31/00	1/10/00	5/31/00
BTEX (ug/L)							
Benzene	1	5 U	5 UJ	29	36 J	5 U	5 UJ
Toluene	5	5 U	5 UJ	21	1 J	5 U	5 UJ
Ethylbenzene	5	5 U	5 UJ	79	120 J	5 U	5 UJ
Xylene (total)	5d	5 U	5 UJ	56	50 J	5 U	5 UJ
Total BTEX		ND	ND	185	207	ND	ND
PAHs (ug/L)							
Naphthalene	10 G	10 U	10 U	39	94 D	10 U	10 U
2-Methylnaphthalene	NA	10 U	10 U	1 J	19 U	10 U	10 U
Acenaphthylene	NA	10 U	10 U	2 J	5 JD	10 U	10 U
Acenaphthene	20 G	10 U	10 U	10	18 JD	10 U	10 U
Fluorene	50 G	10 U	10 U	3 J	5 JD	10 U	10 U
Phenanthrene	50 G	10 U	10 U	1 J	2 JD	10 U	10 U
Anthracene	50 G	10 U	10 U	10 U	19 U	10 U	10 UJ
Fluoranthene	50 G	10 U	10 U	10 U	19 U	10 U	10 U
Pyrene	50 G	10 U	10 U	10 U	19 U	10 U	10 U
Benzo(a)anthracene	0.002 G	10 U	10 U	10 U	19 U	10 U	10 U
Chrysene	0.002 G	10 U	10 U	10 U	19 U	10 U	10 U
Benzo(b)fluoranthene	0.002 G	10 U	10 U	10 U	19 U	10 U	10 U
Benzo(k)fluoranthene	0.002 G	10 U	10 U	10 U	19 U	10 U	10 U
Benzo(a)pyrene	ND	10 U	10 U	10 U	19 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002 G	10 U	10 U	10 U	19 U	10 U	10 U
Dibenzo(a,h)anthracene	NA	10 U	10 U	10 U	19 U	10 U	10 U
Benzo(g,h,i)perylene	NA	10 U	10 U	10 U	19 U	10 U	10 U
Total PAHs		ND	ND	56	124	ND	ND
CYANIDE (ug/L)							
Cyanide, Total	200	10 U	10 U*	10 U	10 U*	10 U	34.6 *

See Notes, Page 5.

Table 11

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Ground-Water Analytical Results

Notes:

BTEX - Benzene, Toluene, Ethylbenzene, and Xylene.
PAHs - Polynuclear Aromatic Hydrocarbons.
Concentrations are reported in micrograms per liter (ug/L).
Shaded values exceed NYSDEC Standard.
* = Duplicate analysis not within control limits.
U = Compound was analyzed for but not detected.
J = Estimated value below the quantitation limit.
D = Concentration is based on a diluted sample analysis.
E = The compound was quantified above the calibration range.
d = Value listed applies to each isomer individually.
G = Guidance Value.
NYSDEC GA standard values as reported in NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) Memorandum (TOGS), Ambient Water Quality Standards and Guidance Values, dated June 1998.
ND = All associated compounds were analyzed for but none were detected, for Benzo(a)pyrene, ND = a non-detectable concentration by the method specified in TOGS 1.1.1.
NA = Not Available.

Table 12

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

IRMI Ground-Water Analytical Results

Sample ID	**NYSDEC GA**	**MW-1D**	**MW-2S**	**MW-2D**	**MW-3S**	**MW-3D**	**MW-5**	**MW-6**	**MW-7S**	**MW-7D**	**MW-9**	**MW-10**	**MW-10 (DUP #1)**	**MW-10R**	**MW-11**	**MW-12**
Date Collected	**CRITERIA**	**5/13/99**	**5/11/99**	**5/11/99**	**5/11/99**	**5/11/99**	**5/11/99**	**5/13/99**	**5/12/99**	**5/12/99**	**5/11/99**	**5/13/99**	**5/13/99**	**5/12/99**	**5/12/99**	**5/13/99**
BTEX (ug/L)																
Benzene	1	1,700	5 U	130	5 U	410	5 U	790	2,400 D	1,100 D	5 U	1,000	990	5 U	5 U	5 U
Toluene	5	43 J	5 U	75 J	5 U	50 U	5 U	720	140	15	5 U	730	840	1 J	5 U	5 U
Ethylbenzene	5	260	7	1,600	5 U	230	5 U	320	2,200 D	120	5 U	2,600 D	2,400 D	9	5 U	5 U
Xylene (Total)	5d	940	52	2,700	5 U	170	5 U	1,400	5,000 D	310	6	4,600	4,100	14	5 U	5 U
Total BTEX		2,943	59	4,505	ND	810	ND	3,230	9,740	1,545	6	8,930	8,330	24	ND	ND
PAHs (ug/L)																
Naphthalene	10 G	4,500 D	10	2,800 D	10 U	1,200 D	10 U	1,500 D	1,800 D	1,700 D	9 J	3,900 D	4,500 D	10 U	10 U	10 U
2-Methylnaphthalene	NA	310 DJ	10 U	140	10 U	39	10 U	200 JD	270 D	140	2 J	660 D	840 D	10 U	10 U	29
Acenaphthylene	NA	10	33	100	10 U	6 J	10 U	65	9 J	8 J	18	51	59	10 U	10 U	14
Acenaphthene	20 G	100	9 J	14	6 J	46	10 U	140	51	75	6 J	66	79	10 U	10 U	4 J
Fluorene	50 G	21	14	22	10 U	10	10 U	75	24	24	14	41	53	10 U	10 U	12
Phenanthrene	50 G	14	8 J	15	10 U	4 J	10 U	84	14	12	5 J	26	38	10 U	10 U	10
Anthracene	50 G	4 J	3 J	3 J	10 U	10 U	10 U	22	2 J	2 J	5 J	6 J	10	10 U	10 U	4 J
Fluoranthene	50 G	10 U	2 J	10 U	10 U	10 U	10 U	12	1 J	10 U	1 J	1 J	3 J	10 U	10 U	2 J
Pyrene	50 G	2 J	3 J	10 U	10 U	10 U	10 U	20	10 U	10 U	3 J	2 J	5 J	10 U	10 U	3 J
Benzo(a)anthracene	0.002 G	10 U	10 U	10 U	10 U	10 U	10 U	6 J	10 U	10 U	10 U	10 U	2 J	10 U	10 U	10 U
Chrysene	0.002 G	10 U	10 U	10 U	10 U	10 U	10 U	6 J	10 U	10 U	10 U	10 U	2 J	10 U	10 U	10 U
Benzo(b)fluoranthene	0.002 G	10 U	10 U	10 U	10 U	10 U	10 U	2 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	0.002 G	10 U	10 U	10 U	10 U	10 U	10 U	3 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	ND	10 U	10 U	10 U	10 U	10 U	10 U	4 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	0.002 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total PAHs		4,961	82	3,094	6	1,305	ND	2,139	2,171	1,961	63	4,753	5,591	ND	ND	78
SVOCs (ug/L)																
Dibenzofuran	NA	4 J	2 J	2 J	10 U	2 J	10 U	8 J	5 J	6 J	1 J	4 J	5 J	10 U	10 U	1 J
CYANIDES (ug/L)																
Cyanide, Amenable	NA	25.9	128	55.4	33.1	31.5	NA	76.9	28.1	30.4	17.8	36.4	32.6	NA	NA	NA
Cyanide, Total	200	25.9	141	55.4	33.1	46.9	10 U	104	28.1	30.4	17.8	36.4	32.6	10 U	10 U	10 U

Notes:

BTEX - Benzene, Toluene, Ethylbenzene, and Xylene.
PAHs - Polynuclear Aromatic Hydrocarbons.
SVOCs - Semivolatile Organic Compounds.
Concentrations are reported in micrograms per liter (µg/L).
NA = Not Available
U = Compound was analyzed for but not detected.
J = Estimated value below the quantitation limit.
E = Identifies compounds whose concentrations exceeded the calibration range of the GC/MS instrument for that specific analysis.
DL = Dilution
D = Concentration is based on a diluted sample analysis.
d = Value listed applies to each isomer individually.
G = Guidance Value
ND = All associated compounds were analyzed for but none were detected, for Benzo(a)pyrene, ND = a non-detectable concentration by the method specified in TOGS 1.1.1.
NYSDEC GA criteria values as reported in NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) Memorandum, Ambient Water Quality Standards and Guidance Values, dated June 1998.

Table 13

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP
Phase II Area Investigation

Estimation of Ground-Water Flux to the Mohawk River/Erie Canal

Input Parameters

Unit	Hydraulic Conductivity (K) (ft/day)	Hydraulic Gradient (*i*) (*high*)	Hydraulic Gradient (*i*) (*low*)	Cross-Sectional Area (high) (ft^2)	Cross-Sectional Area (low) (ft^2)
Fill	14.2	0.038	0.159	903	450
Silt	1.8	0.007	0.023	5359	3924
Sand-and-Gravel	11.5	0.0015	0.0015	15378	13980

Calculated Ground-Water Flux to the Mohawk River/Erie Canal

Fill (low)		Fill (high)		Fill Drainage[1]		Silt (low)		Silt (high)		Gravel (low)		Gravel (high)	
(ft^3/day)	gpm	(ft^3/day)	gpm	(ft^3/day)	gpm	(ft^3/day)	gpm	(ft^3/day)	gpm	(ft^3/day)	gpm	(ft^3/day)	gpm
1016	5.27	487	2.53	3972	20.61	162	0.84	68	0.35	240	1.25	264	1.37

Average Daily Flux		Maximum Daily Flux[2]	
(ft^3/day)	gpm	(ft^3/day)	gpm
1222	6.3	5390	28.0

Notes:

[1] Hydraulic conductivity values based on geometric mean of in-situ hydraulic conductivity tests performed on monitoring wells screened in the particular unit.

[2] Represents the contribution of ground water to the Mohawk River due to draining of portions of the sand-and-gravel, silt, and fill units in response to the lowering of the river level at the end of the summer season. Rates shown are for the 14-day period over which the drainage is assumed to occur. Refer to Appendices for an explanation of how the volume of water used to calculate this rate was estimated.

[3] Represents the average flux of ground water to the Mohawk River during the 14-day period when there is an additional contribution of ground water to the river due to drainage of portions of the sand and gavel, silt, and fill (see note 1).

Assumptions:

Steady-state ground-water flow occurs.
Change in river level from high (summer) to low (winter) condition is instantaneous.
Drainage occurs once per year over a period of 14 days.

Table 14

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP
Phase II Area Investigation

Estimation of Mass Loading and Resulting Surface-Water Constituent Concentrations
"Worst Case" -- During Dewatering of Site Soils at Winter River Lowering

Constituent[1]	Concentration[2] (ppb)			Mass Loading[3] (lbs/day)			Estimated River[4]		Water Quality Standard[5] (ppb)	Water Quality Guidance[6] (ppb)
	Fill	Silt	Gravel	Fill	Silt	Gravel	Total	Conc.(ppb)		
Benzene	440	420	15000	0.1372	0.0043	0.2249	0.3663	0.0881	10	210
Toluene	92	61	980	0.0287	0.0006	0.0147	0.0440	0.0106	6000	100
Ethylbenzene	49	1100	4300	0.0153	0.0112	0.0645	0.0909	0.0219	NS	17
Xylene (Total)	240	2800	7000	0.0748	0.0284	0.1050	0.2082	0.0501	NS	65
Naphthalene	4800	1700	5400	1.4964	0.0173	0.0810	1.5946	0.3835	NS	13
2-Methylnaphthalene	180	340	1100	0.0561	0.0035	0.0165	0.0761	0.0183	NS	4.7
Acenaphthylene	240	29	110	0.0748	0.0003	0.0016	0.0768	0.0185	NS	NG
Acenaphthene	130	62	230	0.0405	0.0006	0.0034	0.0446	0.0107	NS	5.3
Fluorene	180	26	66	0.0561	0.0003	0.0010	0.0574	0.0138	NS	0.54
Phenanthrene	230	22	180	0.0717	0.0002	0.0027	0.0746	0.0179	NS	5
Anthracene	54	6	37	0.0168	0.0001	0.0006	0.0175	0.0042	NS	3.8
Fluoranthene	66	4	26	0.0206	0.0000	0.0004	0.0210	0.0051	NS	NG
Pyrene	48	4	40	0.0150	0.0000	0.0006	0.0156	0.0038	NS	4.6
Benzo(a)anthracene	19	1	15	0.0059	0.0000	0.0002	0.0062	0.0015	NS	0.03
Chrysene	17	1	14	0.0053	0.0000	0.0002	0.0055	0.0013	NS	NG
Benzo(b)fluoranthene	17	1	8	0.0053	0.0000	0.0001	0.0054	0.0013	NS	NG
Benzo(k)fluoranthene	0	0	3	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	NG
Benzo(a)pyrene	19	1	10	0.0059	0.0000	0.0001	0.0061	0.0015	NS	0.0012
Indeno(1,2,3-cd)pyrene	0	0	2	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	NG
Benzo(g,h,i)perylene	0	0	2	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	NG
Cyanide, Total	2750	120	326	0.8573	0.0012	0.0049	0.8634	0.2077	9000	NG

"Typical Case" -- During the Majority of the Year

Constituent[1]	Concentration[2] (ppb)			Mass Loading[3] (lbs/day)			Estimated River		Water Quality Standard[4] (ppb)	Water Quality Guidance[5] (ppb)
	Fill	Silt	Gravel	Fill	Silt	Gravel	Total	Conc.(ppb)		
Benzene	440	420	15000	0.0004	0.0000	0.0013	0.0017	0.0004	10	210
Toluene	92	61	980	0.0001	0.0000	0.0001	0.0002	< 0.0001	6000	100
Ethylbenzene	49	1100	4300	0.0000	0.0000	0.0004	0.0005	0.0001	NS	17
Xylene (Total)	240	2800	7000	0.0002	0.0001	0.0006	0.0009	0.0002	NS	65
Naphthalene	4800	1700	5400	0.0041	0.0001	0.0005	0.0046	0.0011	NS	13
2-Methylnaphthalene	180	340	1100	0.0002	0.0000	0.0001	0.0003	0.0001	NS	4.7
Acenaphthylene	240	29	110	0.0002	0.0000	0.0000	0.0002	0.0001	NS	NG
Acenaphthene	130	62	230	0.0001	0.0000	0.0000	0.0001	< 0.0001	NS	5.3
Fluorene	180	26	66	0.0002	0.0000	0.0000	0.0002	< 0.0001	NS	0.54
Phenanthrene	230	22	180	0.0002	0.0000	0.0000	0.0002	0.0001	NS	5
Anthracene	54	6	37	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	3.8
Fluoranthene	66	4	26	0.0001	0.0000	0.0000	0.0001	< 0.0001	NS	NG
Pyrene	48	4	40	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	4.6
Benzo(a)anthracene	19	1	15	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	0.03
Chrysene	17	1	14	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	NG
Benzo(b)fluoranthene	17	1	8	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	NG
Benzo(k)fluoranthene	0	0	3	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	NG
Benzo(a)pyrene	19	1	10	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	0.0012
Indeno(1,2,3-cd)pyrene	0	0	2	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	NG
Benzo(g,h,i)perylene	0	0	2	0.0000	0.0000	0.0000	0.0000	< 0.0001	NS	NG
Cyanide, Total	2750	120	326	0.0023	0.0000	0.0000	0.0024	0.0006	9000	NG

Notes:

[1] Includes only those constituents that were detected in site monitoring wells during the January 2000 sampling event.

[2] Represents the maximum concentration detected during the January 2000 ground-water sampling event in site monitoring wells screened in that geologic unit.

[3] Calculated based on the Maximum Daily Flux presented in Table 13, and a 7-day, 10-year low flow ($Q_{7,10}$) for the Mohawk River of 770 cubic feet per second.

[4] Estimated River Total represents the total mass of constituent in the River associated with transport of dissolved constituents from the modeled area.

[5] For Class C rivers and streams. Source: 6 NYCRR Part 703.5

[6] For Class C rivers and streams. Source: Division of Water Technical Operational Guidance Series (1.1.1), Memorandum New York State Ambient Water Quality Standards and Guidance Values and Ground Water Effluent Limitations, 1998. Represents the most stringent of the listed guidance values.

ppb = parts per billion.

lbs/day = pounds per day.

NS = There is no ambient water quality standard for this constituent.

NG = There are no ambient water quality guidance values for this constituent.

Shading indicates concentration in excess of guidance value.

Assumptions:

No loss of constituents due to biodegradation, sorption, or volatilization.

The hydraulic conductivities of the sand-and-gravel, silt, and fill units are the same as that of the fill unit.

Table 15

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP
Phase II Area Investigation

Surface-Water Analytical Results

Sample ID	NYSDEC Class C Standards and Guidance Values	SW-1	SW2-1	SW-2	SW2-2	SW-3	SW-3 (DUP)	SW2-3	SW-4	SW2-4
Date Collected		3/21/00	6/1/00	3/21/00	6/1/00	3/21/00	3/21/00	6/1/00	3/21/00	6/1/00
BTEX (ug/L)										
Benzene	10	5 U	5 UJ	5 U	5 UJ	5 U	5 U	5 UJ	5 U	5 UJ
Toluene	100 G	5 U	5 UJ	5 U	5 UJ	5 U	5 U	5 UJ	5 U	5 UJ
Ethylbenzene	17 G	5 U	5 UJ	5 U	5 UJ	5 U	5 U	5 UJ	5 U	5 UJ
Xylene (total)	65 G	5 U	5 UJ	5 U	5 UJ	5 U	5 U	5 UJ	5 U	5 UJ
Total BTEX		ND	ND	ND	ND	ND	ND	ND	ND	ND
PAHs (ug/L)										
Naphthalene	13 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	4.7 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthene	5.3 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	0.54 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	5.0 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	3.8 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	4.6 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)anthracene	0.03 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	0.0012 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	NA	10 U	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 UJ
Dibenzo(a,h)anthracene	NA	10 U	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 UJ
Benzo(g,h,i)perylene	NA	10 U	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 UJ
Total PAHs		ND	ND	ND	ND	ND	ND	ND	ND	ND
CYANIDE (ug/L)										
Cyanide, Total	5.2	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

See Notes, Page 5.

Table 15

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP
Phase II Area Investigation

Surface-Water Analytical Results

Sample ID Date Collected	NYSDEC Class C Standards and Guidance Values	SW-5 3/21/00	SW2-5 6/1/00	SW-6 3/21/00	SW2-6 6/1/00	SW-7 3/21/00	SW2-7 6/1/00	SW-8 3/21/00	SW2-8 6/1/00
BTEX (ug/L)									
Benzene	10	5 U	5 UJ	5 U	5 UJ	5 U	5 UJ	5 U	5 UJ
Toluene	100 G	5 U	5 UJ	5 U	5 UJ	5 U	5 UJ	2 J	5 UJ
Ethylbenzene	17 G	5 U	5 UJ	5 U	5 UJ	5 U	5 UJ	5 U	5 UJ
Xylene (total)	65 G	5 U	5 UJ	5 U	5 UJ	5 U	5 UJ	2 J	5 UJ
Total BTEX		ND	ND	ND	ND	ND	ND	4	ND
PAHs (ug/L)									
Naphthalene	13 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	4.7 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthene	5.3 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	0.54 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	5.0 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	3.8 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	4.6 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)anthracene	0.03 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	0.0012 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	NA	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
Dibenzo(a,h)anthracene	NA	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
Benzo(g,h,i)perylene	NA	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
Total PAHs		ND	ND	ND	ND	ND	ND	ND	ND
CYANIDE (ug/L)									
Cyanide, Total	5.2	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

See Notes, Page 5.

Table 15

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP
Phase II Area Investigation

Surface-Water Analytical Results

Sample ID	NYSDEC Class C Standards and Guidance Values	SW-9	SW2-9	SW2-9 (Dup)	SW-10	SW2-10	SW-11	SW2-11	SW-12	SW2-12
Date Collected		3/22/00	5/31/00	5/31/00	3/22/00	5/31/00	3/22/00	5/31/00	3/22/00	5/31/00
BTEX (ug/L)										
Benzene	10	5 U	5 UJ	5 UJ	5 U	5 UJ	5 U	5 UJ	5 U	5 UJ
Toluene	100 G	5 U	5 UJ	5 UJ	5 U	5 UJ	5 U	5 UJ	5 U	5 UJ
Ethylbenzene	17 G	5 U	5 UJ	5 UJ	5 U	5 UJ	5 U	5 UJ	5 U	5 UJ
Xylene (total)	65 G	5 U	5 UJ	5 UJ	5 U	5 UJ	5 U	5 UJ	5 U	5 UJ
Total BTEX		ND	ND	ND	ND	ND	ND	ND	ND	ND
PAHs (ug/L)										
Naphthalene	13 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	4.7 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthene	5.3 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	0.54 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	5.0 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	3.8 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	4.6 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)anthracene	0.03 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	0.0012 G	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	NA	10 U	10 UJ	10 UJ	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
Dibenzo(a,h)anthracene	NA	10 U	10 UJ	10 UJ	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
Benzo(g,h,i)perylene	NA	10 U	10 UJ	10 UJ	10 U	10 UJ	10 U	10 UJ	10 U	10 UJ
Total PAHs		ND	ND	ND	ND	ND	ND	ND	ND	ND
CYANIDE (ug/L)										
Cyanide, Total	5.2	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

See Notes, Page 5.

Table 15

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP
Phase II Area Investigation

Surface-Water Analytical Results

Sample ID	NYSDEC Class C Standards and Guidance Values	SW-13	SW2-13	SW-14	SW2-14	CB-9	30-inch Outfall
Date Collected		3/22/00	5/31/00	3/22/00	5/31/00	3/24/00	3/24/00
BTEX (ug/L)							
Benzene	10	5 U	5 UJ	5 U	5 UJ	5 U	5 U
Toluene	100 G	5 U	5 UJ	5 U	5 UJ	5 U	5 U
Ethylbenzene	17 G	5 U	5 UJ	5 U	5 UJ	5 U	5 U
Xylene (total)	65 G	5 U	5 UJ	5 U	5 UJ	5 U	5 U
Total BTEX		ND	ND	ND	ND	ND	ND
PAHs (ug/L)							
Naphthalene	13 G	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	4.7 G	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	NA	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthene	5.3 G	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	0.54 G	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	5.0 G	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	3.8 G	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	4.6 G	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)anthracene	0.03 G	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	NA	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	NA	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	0.0012 G	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	NA	10 U	10 UJ	10 U	10 UJ	10 U	10 U
Dibenzo(a,h)anthracene	NA	10 U	10 UJ	10 U	10 UJ	10 U	10 U
Benzo(g,h,i)perylene	NA	10 U	10 UJ	10 U	10 UJ	10 U	10 U
Total PAHs		ND	ND	ND	ND	ND	ND
CYANIDE (ug/L)							
Cyanide, Total	5.2	10 U	10 U	10 U	10 U	10 U	10 U

See Notes, Page 5.

Table 15

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP
Phase II Area Investigation

Surface-Water Analytical Results

Notes:

BTEX - Benzene, Toluene, Ethylbenzene, and Xylene.
PAHs - Polynuclear Aromatic Hydrocarbons.
Concentrations are reported in micrograms per liter (ug/L).
Shaded values exceed NYSDEC Standard.
BDL = Below Detection Limits.
U = Compound was analyzed for but not detected.
J = Estimated value below the quantitation limit.
G = Guidance Value.
NA = Not Available.
NYSDEC GA standard values as reported in NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) Memorandum, Ambient Water Quality Standards and Guidance Values, dated June 1998 for Class C waters.
ND = All associated compounds were analyzed for but none were detected.

Table 16

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Vegetative Species Observed or Typical of the Urban Vacant Lot Covertype

Common Name	Scientific Name
Herbaceous Vegetation	
Grasses	*Poa* spp.
Timothy	*Phleum pratense*
Goldenrod	*Solidago* spp.
Common mullein	*Verbascum thapsus*
Wild carrot	*Daucus corota*
Ragweed	*Ambrosia artemisiifolia*

Table 17

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Vegetative Species Observed or Typical of the Successional Old Field Covertype

Common Name	**Scientific Name**
Herbaceous Vegetation	
Grasses	*Poa* spp.
Timothy	*Phleum pratense*
Sedges	*Carex* spp.
Buttercup	*Ranunculus* spp.
Dandelion	*Taraxacum offininale*
Aster	*Aster* spp.
Yellow rocket	*Barbarea vulgaris*
Goldenrod	*Solidago* spp.
Common mullein	*Verbascum thapsus*
Hawkweed	*Hieracium* spp.
Common milkweed	*Asclepias syriaca*
Evening primrose	*Oenothera biennis*
Wild carrot	*Daucus corota*
Ragweed	*Ambrosia artemisiifolia*
Shrubs and Trees	
Silky dogwood	*Cornus amomum*
Gray dogwood	*Cornus foemina* ssp. *racemosa*
Staghorn sumac	*Rhus typhina*
Raspberries	*Rubus* spp.
Northern arrowwood	*Viburnum recognitum*

Table 18

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Vegetative Species Observed or Typical of the Maintained Roadside/Pathway Covertype

Common Name	**Scientific Name**
Herbaceous Vegetation	
Grasses	*Poa* spp.
Goldenrod	*Solidago* spp.
Giant reed grass	*Phragmites communis*
Timothy	*Phleum pratense*
Sedges	*Carex* spp.
Ragweed	*Ambrosia artemisiifolia*

Table 19

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Vegetative Species Observed or Typical of the Residential/Industrial Covertype

Common Name	**Scientific Name**
Herbaceous Vegetation	
Grasses	*Poa* spp.
Timothy	*Phleum pratense*
Reed grass	*Phragmites communis*
Goldenrod	*Solidago* spp.
Common mullein	*Verbascum thapsus*
Wild carrot	*Daucus corota*
Ragweed	*Ambrosia artemisiifolia*
Shrubs and Trees	
Sugar maple	*Acer saccharum*
Red maple	*Acer rubrum*
Blue spruce	*Picea pungens*
Norway spruce	*Picea abies*
Scotch pine	*Pinus sylvestris*
White pine	*Pinus strobus*

Table 20

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Vegetative Species Observed or Typical of the Mowed Lawn with Trees Covertype

Common Name	Scientific Name
Herbaceous Vegetation	
Grasses	*Poa* spp.
Shrubs and Trees	
Sugar maple	*Acer saccharum*
Red maple	*Acer rubrum*
Blue spruce	*Picea pungens*
Norway spruce	*Picea abies*
Scotch pine	*Pinus sylvestris*
White pine	*Pinus strobus*

Table 21

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Vegetative Species Observed or Typical of the Successional Northern Hardwoods Covertype

Common Name	Scientific Name
Herbaceous Vegetation	
Grasses	*Poa* spp.
Timothy	*Phleum pratense*
Goldenrod	*Solidago* spp.
Common mullein	*Verbascum thapsus*
Wild carrot	*Daucus corota*
Buttercup	*Ranunculus* spp.
Dandelion	*Taraxacum offininale*
Aster	*Aster* spp.
Ragweed	*Ambrosia artemisiifolia*
Shrubs and Trees	
Eastern cottonwood	*Populus deltoides*
American elm	*Ulmus americana*
White ash	*Fraxinus americana*
Quaking aspen	*Populus tremuloides*
Yellow birch	*Betula alleghaniensis*
Box elder	*Acer negundo*
Hawthorn	*Crataegus* spp.
Black cherry	*Prunus serotina*

Table 22

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Vegetative Species Observed or Typical of the Floodplain Forest Covertype

Common Name	Scientific Name
Herbaceous Vegetation	
Giant reed grass	*Phragmites communis*
Sedges	*Carex* spp.
Reed canary grass	*Phalaris arundinacea*
Rice cutgrass	*Leersia oryzoides*
Grasses	*Poa* spp.
Shrubs and Trees	
Red-osier dogwood	*Cornus sericia*
Silky dogwood	*Cornus amomum*
Willow	*Salix* spp.
White ash	*Fraxinus americana*
Eastern cottonwood	*Populus deltoides*
Silver maple	*Acer saccharinum*
Red maple	*Acer rubrum*

Table 23

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Wildlife Species Observed or Typical of the Urban Vacant Lot Covertype

Common Name	Scientific Name
Mammals	
Eastern cottontail	*Sylvilagus floridanus*
Whitetail deer	*Odocoileus virginianus*
Woodchuck	*Marmota monax*
Birds	
American crow	*Corvus brachyrhynchos*
Mourning dove	*Zenaida macroura*
Rock dove	*Columba livia*
American robin	*Turdus migratorius*
House sparrow	*Passer domesticus*
Herptiles	
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Northern brown snake	*Storeria dekayi dekayi*

Table 24

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Wildlife Species Observed or Typical of the Successional Old Field Covertype

Common Name	Scientific Name
Mammals	
Meadow vole	*Microtus pennsylvanicus*
Deer mouse	*Peromyscus maniculatus*
Shrews	*Sorex* spp., *Blarina* spp.
Raccoon	*Procyon lotor*
Whitetail deer	*Odocoileus virginianus*
Woodchuck	*Marmota monax*
Coyote	*Canis latrans*
Red fox	*Vulpes vulpes*
Eastern cottontail	*Sylvilagus floridanus*
Weasel	*Mustela* spp.
Birds	
Red-tailed hawk	*Buteo jamaicensis*
Cardinal	*Cardinalis cardinalis*
Flicker	*Colaptes auratus*
Great horned owl	*Bubo virginianus*
Bluejay	*Cyanocitta cristata*
Catbird	*Dumetella carolinensis*
American kestrel	*Falco sparverius*
Goldfinch	*Carduelis tristis*
Chickadee	*Parus atricapillus*
Pheasant	*Phasianus colchicus*
American robin	*Turdus migratorius*
Mourning dove	*Zenaida macroura*
Field sparrow	*Spizella pusilla*
Herptiles	
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Leopard frog	*Rana pipiens*
American toad	*Bufo americanus*

Table 25

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Wildlife Species Observed or Typical of the Maintained Roadside/Pathway Covertype

Common Name	Scientific Name
Mammals	
Raccoon	*Procyon lotor*
Whitetail deer	*Odocoileus virginianus*
Weasel	*Mustela* spp.
Eastern cottontail	*Sylvilagus floridanus*
Shrews	*Sorex* spp., *Blarina* spp.
Meadow vole	*Microtus pennsylvanicus*
Deer mouse	*Peromyscus maniculatus*
Birds	
Red-winged blackbird	*Agelaius phoeniceus*
American crow	*Corvus brachyrhynchos*
American robin	*Turdus migratorius*
Cardinal	*Cardinalis cardinalis*
Herptiles	
Leopard frog	*Rana pipiens*

Table 26

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Wildlife Species Observed or Typical of the Residential/Industrial Covertype

Common Name	Scientific Name
Mammals	
House mouse	*Mus musculus*
Eastern cottontail	*Sylvilagus floridanus*
Whitetail deer	*Odocoileus virginianus*
Eastern gray squirrel	*Sciurus carolinensis*
Chipmunk	*Tamias striatus*
Shrews	*Sorex* spp., *Blarina* spp.
Woodchuck	*Marmota monax*
Birds	
American crow	*Corvus brachyrhynchos*
Mourning dove	*Zenaida macroura*
Rock dove	*Columba livia*
American robin	*Turdus migratorius*
House sparrow	*Passer domesticus*
House finch	*Carpodacus mexicanus*
Herptiles	
American toad	*Bufo americanus*
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Northern brown snake	*Storeria dekayi dekayi*

Table 27

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Wildlife Species Observed or Typical of the Mowed Lawn with Trees Covertype

Common Name	**Scientific Name**
Mammals	
Eastern cottontail	*Sylvilagus floridanus*
Eastern gray squirrel	*Sciurus carolinensis*
Chipmunk	*Tamias striatus*
Whitetail deer	*Odocoileus virginianus*
Woodchuck	*Marmota monax*
Birds	
American crow	*Corvus brachyrhynchos*
Field sparrow	*Spizella pusilla*
American robin	*Turdus migratorius*
House sparrow	*Passer domesticus*
Herptiles	
Eastern garter snake	*Thamnophis sirtalis sirtalis*
American toad	*Bufo americanus*

Table 28

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Wildlife Species Observed or Typical of the Successional Northern Hardwoods Covertype

Common Name	Scientific Name
Mammals	
Meadow vole	*Microtus pennsylvanicus*
Deer mouse	*Peromyscus maniculatus*
Woodland jumping mouse	*Napaeozapus insignis*
Shrews	*Sorex* spp., *Blarina* spp.
Raccoon	*Procyon lotor*
Woodchuck	*Marmota monax*
Chipmunk	*Tamias striatus*
Eastern gray squirrel	*Sciurus carolinensis*
Whitetail deer	*Odocoileus virginianus*
Coyote	*Canis latrans*
Red fox	*Vulpes vulpes*
Eastern cottontail	*Sylvilagus floridanus*
Weasel	*Mustela* spp.
Birds	
Red-tailed hawk	*Buteo jamaicensis*
Cardinal	*Cardinalis cardinalis*
Common "yellow-shafted" flicker	*Colaptes auratus*
Wild turkey	*Meleagris gallopavo*
Great horned owl	*Bubo virginianus*
Bluejay	*Cyanocitta cristata*
Catbird	*Dumetella carolinensis*
Warblers	*Dendroica* spp., *Vermivora* spp.
White-breasted nuthatch	*Sitta carolinensis*
Chickadee	*Parus atricapillus*
Red-eyed vireo	*Vireo olivaceus*
American crow	*Corvus brachyrhynchos*
Pheasant	*Phasianus colchicus*
American robin	*Turdus migratorius*
Mourning dove	*Zenaida macroura*
Herptiles	
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Leopard frog	*Rana pipiens*
Redback salamander	*Plethodon cinereus*
Northern slimy salamander	*Plethodon glutinosus*
Red-spotted newt (eft stage)	*Notophthalmus viridescens viridescens*
American toad	*Bufo americanus*

Table 29

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Wildlife Species Observed or Typical of the Floodplain Forest Covertype

Common Name	Scientific Name
Mammals	
Eastern cottontail	*Sylvilagus floridanus*
Shrews	*Sorex* spp., *Blarina* spp.
Whitetail deer	*Odocoileus virginianus*
Eastern gray squirrel	*Sciurus carolinensis*
Chipmunk	*Tamias striatus*
Red fox	*Vulpes vulpes*
Raccoon	*Procyon lotor*
Mink	*Mustela vison*
Muskrat	*Ondatra zibethica*
Weasel	*Mustela* spp.
Birds	
Red-winged blackbird	*Agelaius phoeniceus*
Cardinal	*Cardinalis cardinalis*
Chipping sparrow	*Spizella pusilla*
Wild turkey	*Meleagris gallopavo*
Pheasant	*Phasianus colchicus*
Brown thrasher	*Toxostoma rufum*
Catbird	*Dumetella carolinensis*
Herptiles	
Leopard frog	*Rana pipiens*
Redback salamander	*Plethodon cinereus*
Northern slimy salamander	*Plethodon glutinosus*

Table 30

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Fish Species of the Mohawk River in the Vicinity of the Site

Common Name	Scientific Name
American eel	*Anguilla rostrata*
Black crappie	*Pomoxis nigromaculatus*
Blueback herring	*Alosa aestivalis*
Bluegill	*Lepomis macrochirus*
Brown bullhead	*Ictalurus nebulosus*
Chain pickerel	*Esox niger*
Common carp	*Cyprinus carpio*
Common shiner	*Notropis cornutus*
Fallfish	*Semotilus corporalis*
Golden shiner	*Notemigonus crysoleucas*
Largemouth bass	*Micropterus salmoides*
Log perch	*Percina caprodes*
Northern hog sucker	*Hypentelium nigricans*
Rock bass	*Ambloplites rupestris*
Rosyface shiner	*Notropis rubellus*
Shorthead redhorse	*Moxostoma macrolepidotum*
Smallmouth bass	*Micropterus dolomieui*
Spotfin shiner	*Notropis spilopterus*
Spottail shiner	*Notropis hudsonius*
Trout perch	*Percopsis omiscomaycus*
Walleye	*Stizostedion vitreum*
White bass	*Morone chrysops*
White perch	*Morone americana*
White sucker	*Catostomus commersoni*
Yellow perch	*Perca flavescens*

Source: McBride, Norman D. 1985. Distribution and Relative Abundance of Fish in the Lower Mohawk River. New York State Department of Environmental Conservation.

Table 31

Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Fish Species Typical of the
Midreach Stream Covertype

Common Name	Scientific Name
Creek chub	*Semotilus atromaculatus*
Pumpkinseed	*Lepomis gibbosus*
Common shiner	*Notropis cornutus*
Trout perch	*Percopsis omiscomaycus*
Rosyface shiner	*Notropis rubellus*
Tessellated darter	*Etheostoma olmstedi*
Greenside darter	*Etheostoma blennioides*
Longnose darter	*Rhinichthys cataractae*
Slimy sculpin	*Cottus cognatus*
Mottled sculpin	*Cottus bairdi*
Stonecat	*Noturus flavus*
Bluntnose minnow	*Pimephales notatus*
Northern hog sucker	*Hypentelium nigricans*
Smallmouth bass	*Micropterus dolomieui*

Figures

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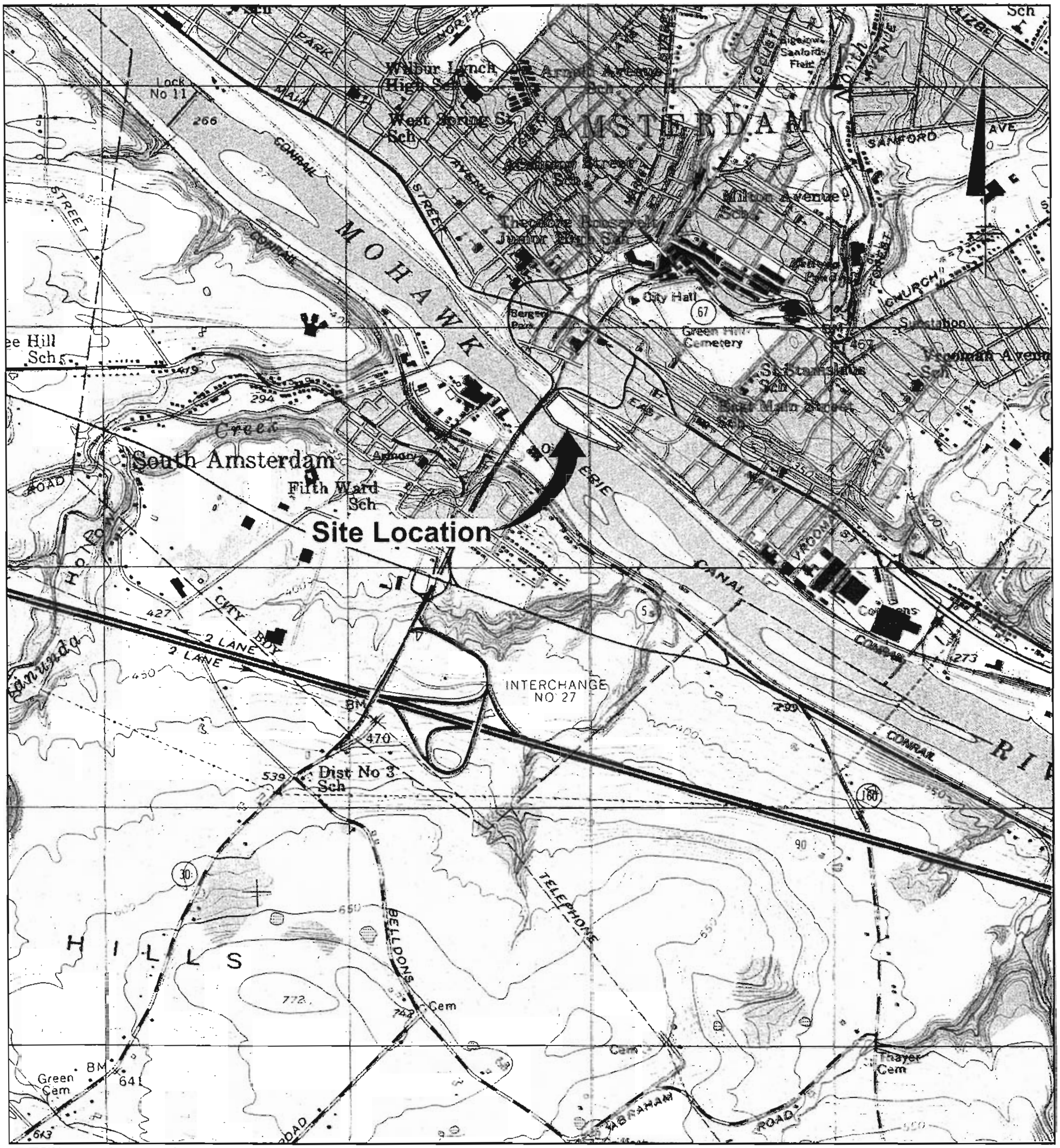
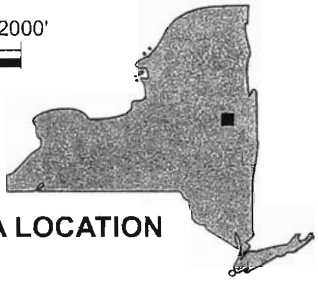
Figures



REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., AMSTERDAM, NY, 1954, PHOTOREVISED 1980.

2000'　0　2000'

Approximate Scale: 1" = 2000'



AREA LOCATION

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP

SITE LOCATION MAP

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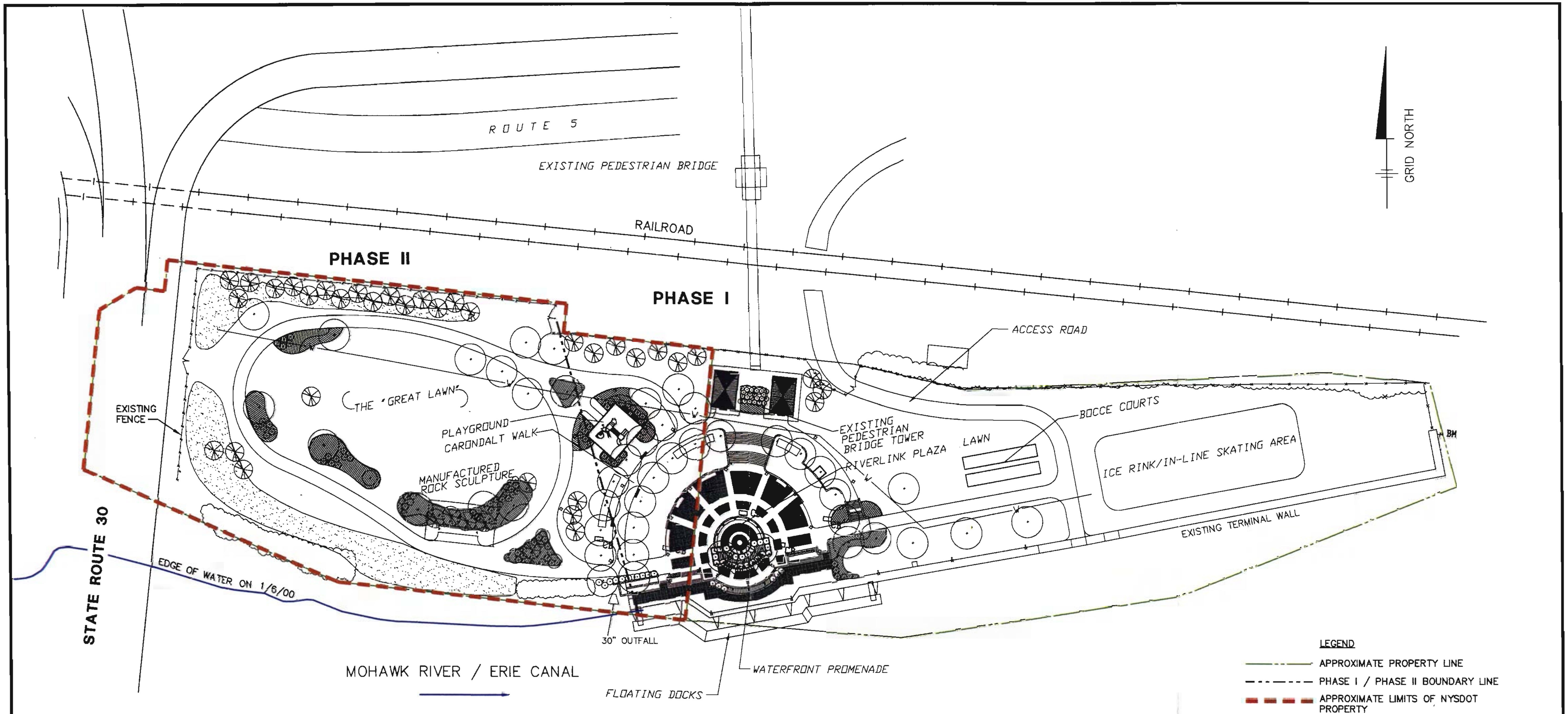
FIGURE
1

01/00 SYR-D54-LBR
36497030/36497n01.cdr



LEGEND

- APPROXIMATE PROPERTY LINE
- PHASE I / PHASE II BOUNDARY LINE
- APPROXIMATE LIMITS OF NYSDOT PROPERTY

NOTES:

1. BASE MAP PRODUCED FROM SURVEY DATA COMPILED BY NIAGARA MOHAWK POWER CORPORATION (NMPC) SURVEYORS.
2. APPROXIMATE PROPERTY BOUNDARIES ARE FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES.
3. PROPOSED PARK FEATURES ADDED FROM A MAP BY THE SARATOGA ASSOCIATES DATED 12/1/97 AND ENTITLED: RIVERLINK PARK AND ROOFTOP ACCESS.

0 80' 160'

GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

PROPOSED AMSTERDAM RIVERLINK PARK FEATURES

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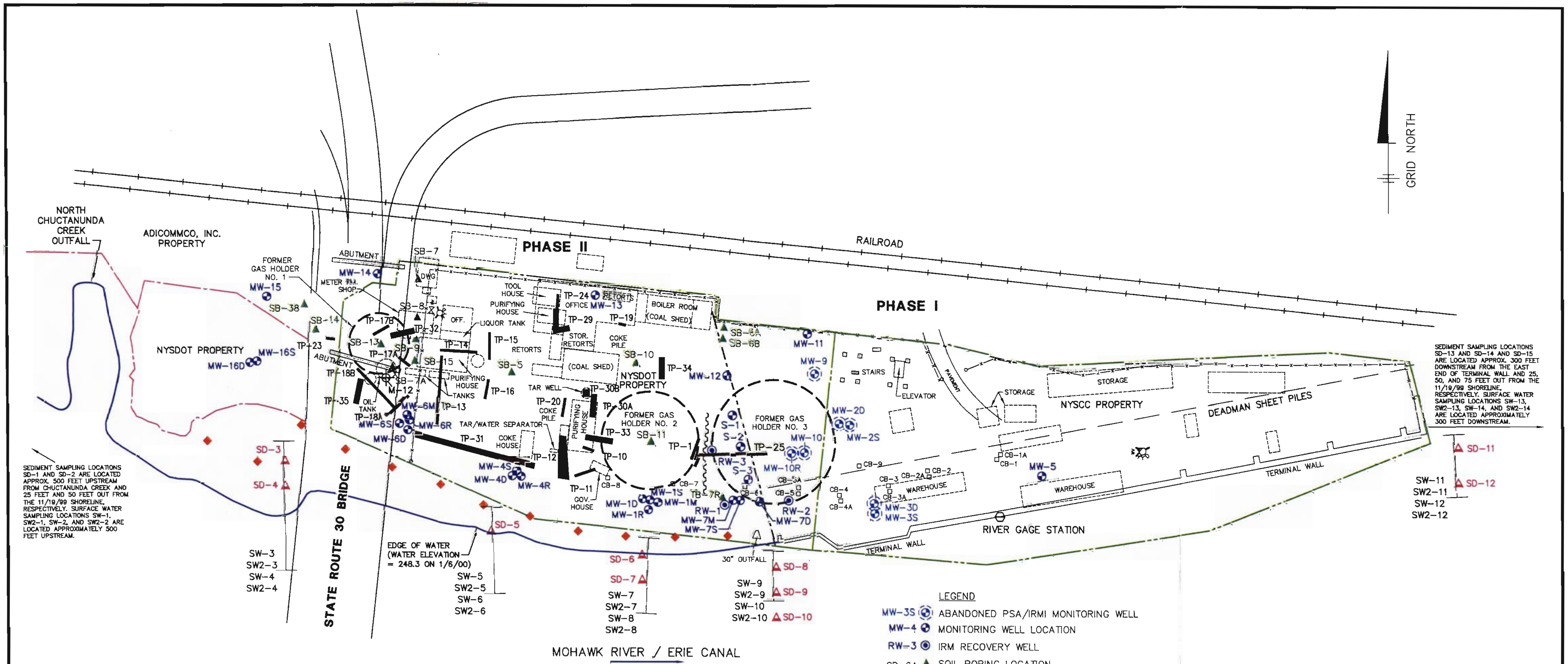
FIGURE
2

X: (NONE)
L: ON=*, OFF= REF*
P: STD-PCP/BL
12/3/01 SYR-54-MAD JMS RCA
36497060/36497B11.DWG



SEDIMENT SAMPLING LOCATIONS SD-1 AND SD-2 ARE LOCATED APPROX. 500 FEET UPSTREAM FROM CHUCTANUNDA CREEK AND 25 FEET AND 50 FEET OUT FROM THE 11/19/99 SHORELINE, RESPECTIVELY. SURFACE WATER SAMPLING LOCATIONS SW-1, SW2-1, SW-2, AND SW2-2 ARE LOCATED APPROXIMATELY 500 FEET UPSTREAM.

SEDIMENT SAMPLING LOCATIONS SD-13 AND SD-14 AND SD-15 ARE LOCATED APPROX. 300 FEET DOWNSTREAM FROM THE EAST END OF TERMINAL WALL AND 25, 50, AND 75 FEET OUT FROM THE 11/19/99 SHORELINE, RESPECTIVELY. SURFACE WATER SAMPLING LOCATIONS SW-13, SW2-13, SW-14, AND SW2-14 ARE LOCATED APPROXIMATELY 300 FEET DOWNSTREAM.

LEGEND

MW-3S	ABANDONED PSA/IRMI MONITORING WELL
MW-4	MONITORING WELL LOCATION
RW-3	IRM RECOVERY WELL
SB-6A ▲	SOIL BORING LOCATION
TP-21 ▬	TEST PIT LOCATION
◆	RIVERBANK ASSESSMENT POINT
SD-15 △	SEDIMENT SAMPLE LOCATION
SW-3	SURFACE WATER SAMPLING TRANSECT (SEE NOTE 10)
M-12	NYSDOT GEOTECHNICAL BORING LOCATION
CB-1 □	CATCH BASIN LOCATION
—x—x—	FENCE
~~	IRM STEEL SHEET PILING
▨	CONCRETE ABUTMENT
— - - —	PHASE I / PHASE II BOUNDARY LINE
——	APPROXIMATE RIVERLINK PARK PROPERTY LINE (SEE NOTES)
——	APPROXIMATE PROPERTY LINES FOR PROPERTIES WEST OF THE RIVERLINK PARK (SEE NOTES)
☐	HISTORICAL STRUCTURE

NOTES:

1. BASE MAP PRODUCED, IN PART, FROM SURVEY DATA COMPILED BY NIAGARA MOHAWK POWER CORPORATION (NMPC) SURVEYORS.
2. DATUM IS NEW YORK STATE CANAL CORPORATION DATUM FOR SECTION 3, LOCK E-11. THIS DATUM IS 1.00 FEET HIGHER THAN NGVD OF 1929. (NYSCC, MAY 1998)
3. ALL LOCATIONS ARE APPROXIMATE.
4. APPROXIMATE PROPERTY BOUNDARIES OF THE GREATER AMSTERDAM RIVERLINK PARK SITE ARE FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES. APPROXIMATE PROPERTY BOUNDARIES OF THE NYSDOT AND ADICOMMCO INC. PROPERTIES WEST OF THE STATE ROUTE 30 BRIDGE ARE EXTRAPOLATED FROM MONTGOMERY COUNTY REAL PROPERTY TAX MAP NO. 055.43, JANUARY 1999.
5. SOIL BORINGS SB-6A/B THROUGH SB-15, TEST PITS TP-1 THROUGH TP-24 AND MONITORING WELLS MW-1D, MW-2S/D, MW-3D, MW-4D, MW-5D, MW-6D, AND MW-7D COMPLETED BY HARZA DURING THE PRELIMINARY SITE ASSESSMENT (PSA), FEBRUARY 1999. ALL OTHER SOIL BORINGS, TEST PITS AND MONITORING WELLS WERE INSTALLED BY BBL DURING THE INTERIM REMEDIAL MEASURE INVESTIGATION (IRMI), JUNE 1999 AND THE PHASE II AREA INVESTIGATION. FOR CLARITY, THE LOCATIONS OF PSA AND IRMI BORINGS AND TEST PITS ARE NOT SHOWN FOR THE PHASE I AREA. ADDITIONALLY, TEST PITS LOCATED IN THE PHASE II AREA (EXCEPT FOR TP-25) WHICH WERE EXCAVATED DURING THE IRM, ARE NOT INCLUDED.
6. NYSDOT = NEW YORK STATE DEPARTMENT OF TRANPORTATION, NYSCC = NEW YORK STATE CANAL CORPORATION.
7. HISTORICAL FEATURES ADDED FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES. ALL HISTORICAL FEATURES SHOWN WITH LIGHT DASHED LINE, EXCEPT FOR THE THREE HOLDERS WHERE A HEAVY DASHED LINE IS USED.
8. LOCATION OF FORMER GAS HOLDER NO.1 BASED ON FIELD OBSERVATIONS DURING THE INSTALLATION OF TEST PIT TP-17A DURING THE PSA AND TP-32 DURING THE PHASE II AREA INVESTIGATION.
9. FORMER GAS HOLDER NO.3 AND THE FORMER TAR/WATER SEPARATOR WERE REMOVED DURING AN INTERIM REMEDIAL MEASURE COMPLETED BY BBL (BBL, 2000).
10. FOUR SURFACE-WATER SAMPLES WERE COLLECTED ALONG EACH TRANSECT, TWO DURING THE HIGH (SUMMER) RIVER-LEVEL SAMPLING EVENT AND TWO DURING THE LOW (WINTER) RIVER-LEVEL SAMPLING EVENT. THE PREFIX "SW2" INDICATES SAMPLES COLLECTED DURING THE SUMMER SAMPLING EVENT. DURING EACH EVENT ONE SAMPLE WAS COLLECTED 10 FEET FROM THE SHORE LINE AND THE OTHER SAMPLE WAS COLLECTED 50 FEET FROM THE SHORELINE. SAMPLES WITH THE HIGHER NUMERICAL I.D. ALONG EACH TRANSECT WERE COLLECTED FURTHER (50') FROM SHORE.
11. IRMI MONITORING WELL MW-8 WAS ABANDONED DURING THE IRM AND REPLACED WITH RECOVERY WELL RW-3. THE LOCATION OF MW-8 IS NOT SHOWN ON THIS FIGURE.

L: ON= *, OFF= REF*
P: STD-PCP/BL
12/3/01 SYR-54-MAD PGL RCA
36497060/36497B04.DWG

0 100' 200'
GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

SITE MAP

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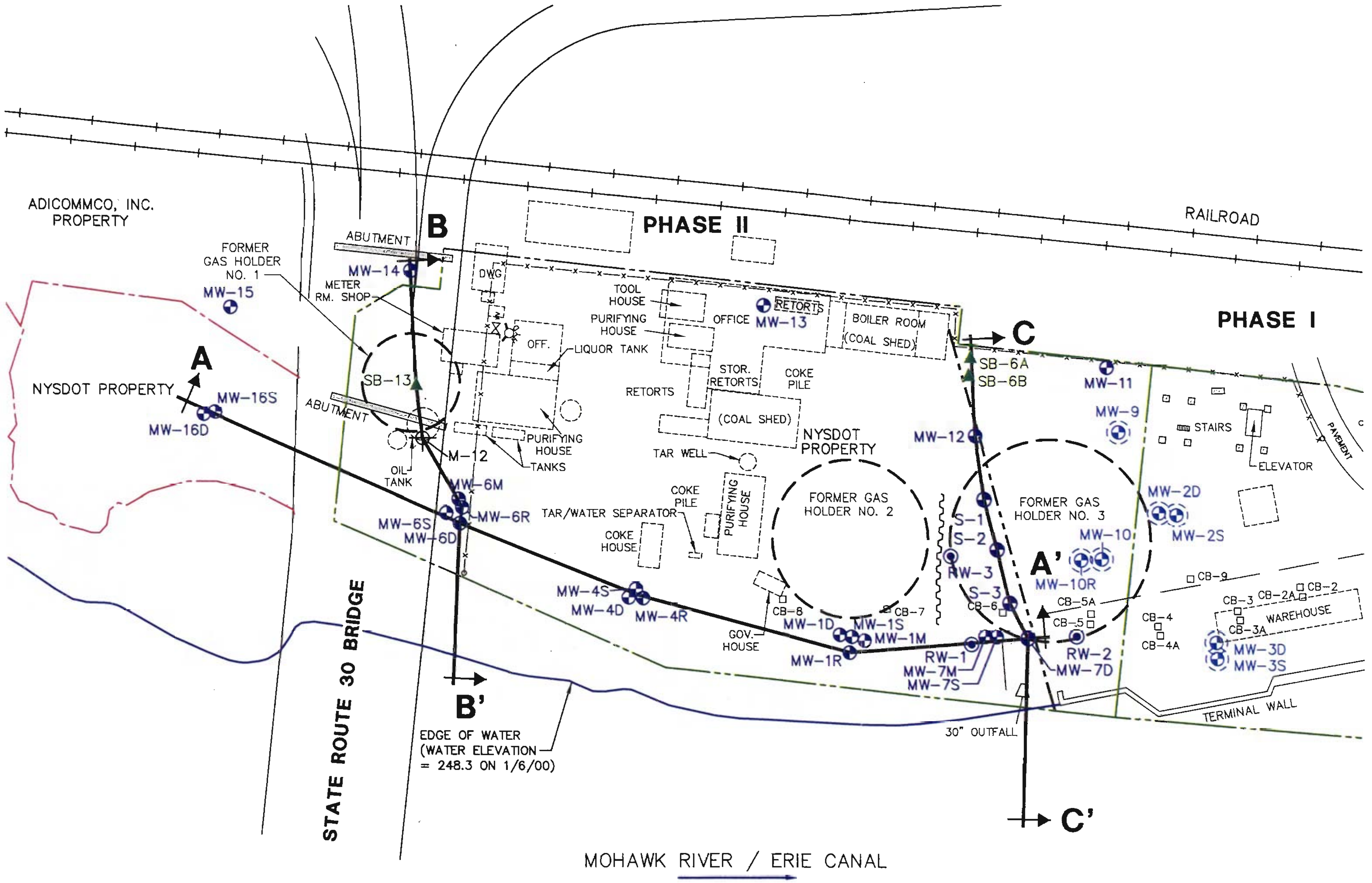
FIGURE
3



GRID NORTH

LEGEND

MW-3S ABANDONED PSA/IRMI MONITORING WELL
MW-4 MONITORING WELL LOCATION
RW-3 IRM RECOVERY WELL
M-12 NYSDOT GEOTECHNICAL BORING LOCATION
CB-1 ☐ CATCH BASIN LOCATION
FENCE
IRM STEEL SHEET PILING
CONCRETE ABUTMENT
PHASE I / PHASE II BOUNDARY LINE
APPROXIMATE RIVERLINK PARK PROPERTY LINE (SEE NOTES)
APPROXIMATE PROPERTY LINE WEST OF THE RIVERLINK PARK (SEE NOTES)
HISTORICAL STRUCTURE

NOTES:

1. BASE MAP PRODUCED, IN PART, FROM SURVEY DATA COMPILED BY NIAGARA MOHAWK POWER CORPORATION (NMPC) SURVEYORS.
2. DATUM IS NEW YORK STATE CANAL CORPORATION DATUM FOR SECTION 3, LOCK E-11. THIS DATUM IS 1.00 FEET HIGHER THAN NGVD OF 1929. (NYSCC, MAY 1998)
3. ALL LOCATIONS ARE APPROXIMATE.
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6. NYSDOT = NEW YORK STATE DEPARTMENT OF TRANPORTATION, NYSCC = NEW YORK STATE CANAL CORPORATION.
7. HISTORICAL FEATURES ADDED FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES. ALL HISTORICAL FEATURES SHOWN WITH LIGHT DASHED LINE, EXCEPT FOR THE THREE HOLDERS WHERE A HEAVY DASHED LINE IS USED.
8. LOCATION OF FORMER GAS HOLDER NO.1 BASED ON FIELD OBSERVATIONS DURING THE INSTALLATION OF TEST PIT TP-17A DURING THE PSA AND TP-32 DURING THE PHASE II AREA INVESTIGATION.
9. FORMER GAS HOLDER NO.3 AND THE FORMER TAR/WATER SEPARATOR WERE REMOVED DURING AN INTERIM REMEDIAL MEASURE COMPLETED BY BBL (BBL, 2000).
10. IRMI MONITORING WELL MW-8 WAS ABANDONED DURING THE IRM AND REPLACED WITH RECOVERY WELL RW-3. THE LOCATION OF MW-8 IS NOT SHOWN ON THIS FIGURE.

0 80' 160'

GRAPHIC SCALE

L: ON= *, OFF= REF*
P: STD-PCP/BL
12/3/01 SYR-54-MAD PGL RCA
36497060/36497B12.DWG

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

GEOLOGIC CROSS SECTION LOCATION MAP

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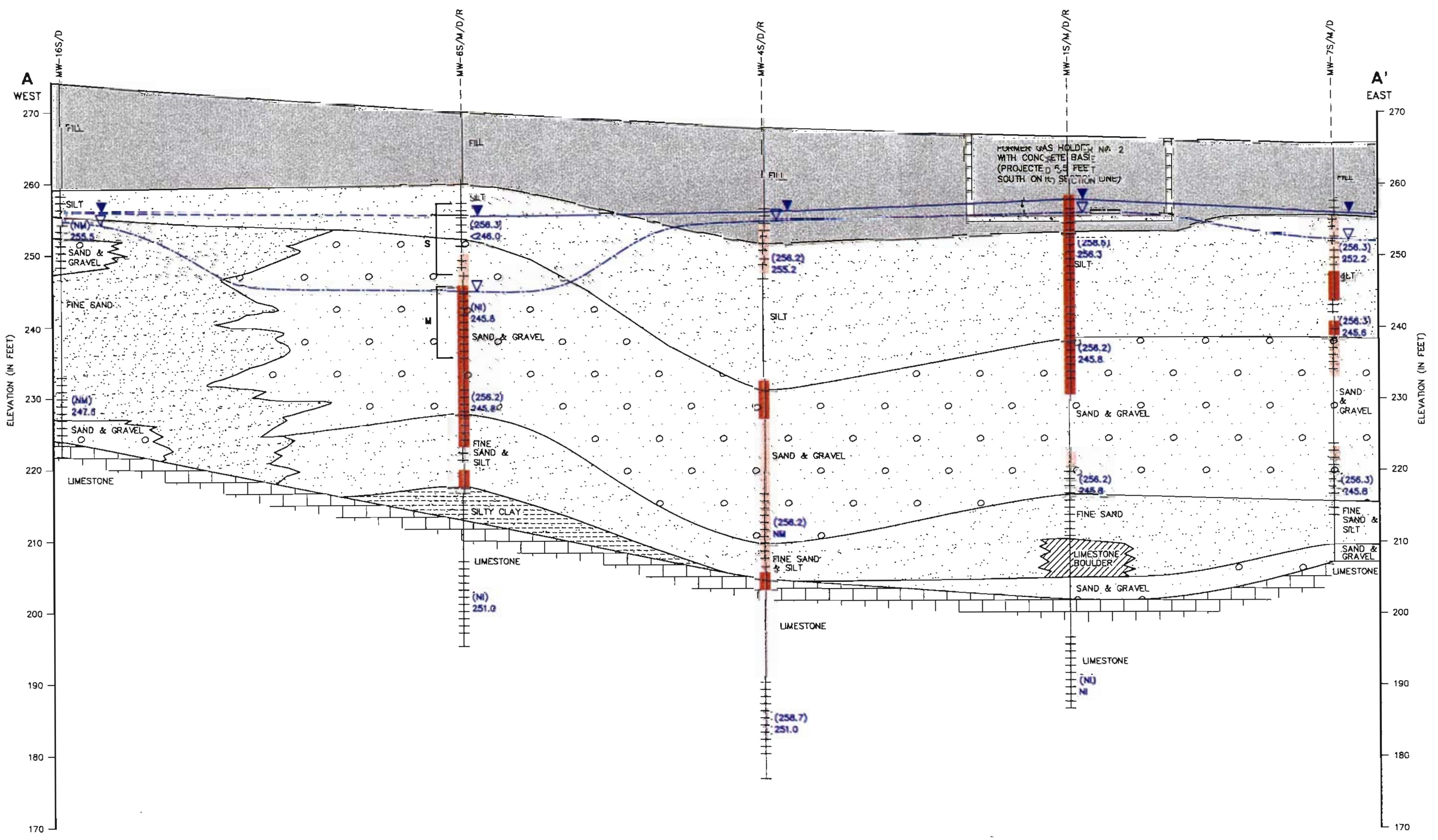
FIGURE
4



LEGEND

MW-16S/D ← WELL/SOIL BORING NUMBER

GROUND SURFACE

SCREENED INTERVAL

BOTTOM OF BORING

CONTACT BETWEEN GEOLOGIC UNITS

▼ WATER TABLE (11/18/99)

▽ WATER TABLE (12/14/99)

(256.33) WATER LEVEL ELEVATION (11/18/99)

252.16 WATER LEVEL ELEVATION (12/14/99)

NM NOT MEASURED

NI NOT INSTALLED ON DATE OF MEASUREMENT

□ SHEEN

■ NAPL

NOTES:

1. LOCATIONS FROM BASE MAP PRODUCED FROM SURVEY DATA COMPILED BY NIAGARA MOHAWK POWER CORPORATION SURVEYORS.
2. DATUM IS NEW YORK STATE CANAL CORPORATION DATUM FOR SECTION 3, LOCK E-11. THIS DATUM IS 1.00 FT. HIGHER THAN NGVD 1929.
3. CONTACTS ARE APPROXIMATE AND ARE INFERRED BETWEEN BORINGS. SUBSURFACE CONDITIONS HAVE BEEN GENERALIZED.
4. MOHAWK RIVER/ERIE CANAL WATER SURFACE ON 11/18/99: 256.2 FT. AND ON 12/14/99: 245.7 FT.
5. ALL GEOLOGIC CONTACTS BETWEEN BORING/MONITORING LOCATIONS INFERRED.

VERTICAL EXAGGERATION = 3X

0 20' 40'

VERTICAL GRAPHIC SCALE

0 60' 120'

HORIZONTAL GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

GEOLOGIC CROSS-SECTION A-A'

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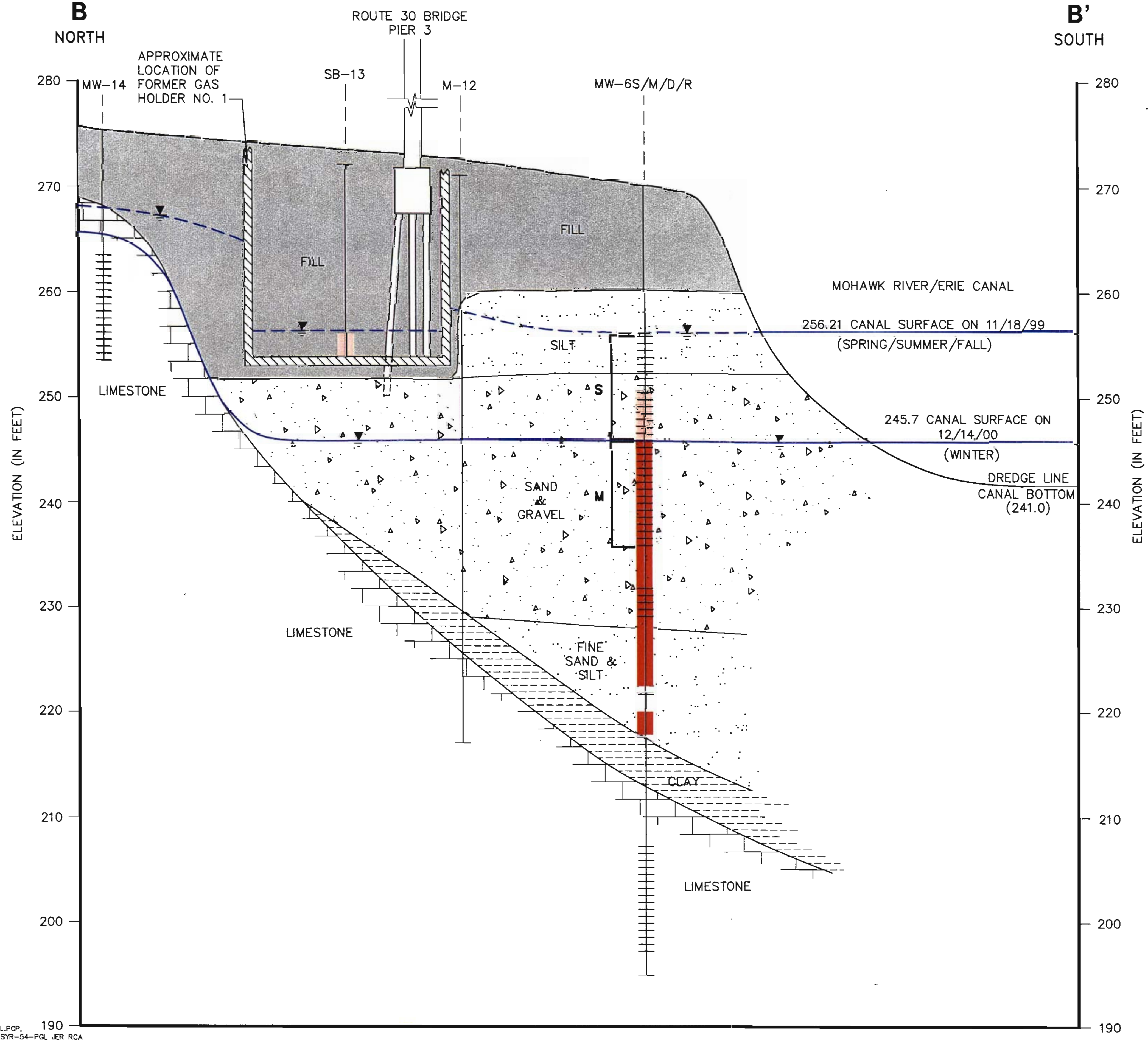
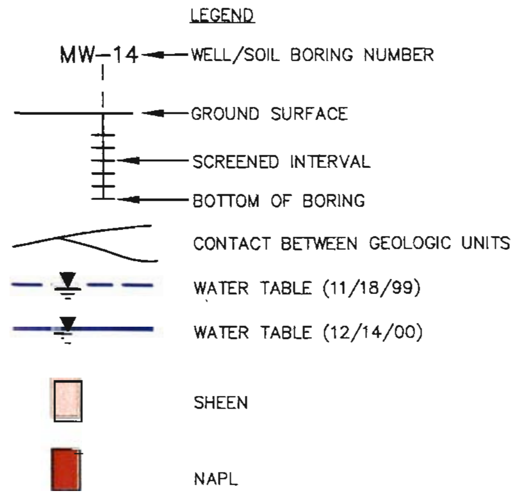
FIGURE
5

L: ON=*, OFF=REF*
P: PAGESET/PLT-BL (PLTHALF.CTB)
12/3/01 SYR-54-PGL JER RCA
36620030/36620V01.DWG





NOTES:

1. LOCATIONS FROM BASE MAP PRODUCED FROM SURVEY DATA COMPILED BY NIAGARA MOHAWK POWER CORPORATION SURVEYORS.
2. DATUM IS NEW YORK STATE CANAL CORPORATION DATUM FOR SECTION 3, LOCK E-11. THIS DATUM IS 1.00 FT. HIGHER THAN NGVD OF 1929.
3. CONTACTS ARE APPROXIMATE AND ARE INFERRED BETWEEN SUBSURFACE EXPLORATION LOCATIONS. SUBSURFACE CONDITIONS HAVE BEEN GENERALIZED.
4. THE ELEVATION OF THE CANAL DREDGE LINE IS BASED ON : NEW YORK STATE CANAL CORPORATION (NYSCC) 1998." ALBANY DIVISION PLANS FOR REPAIR OF THE CANAL TERMINAL WALL AT AMSTERDAM-STRIN 30014A ON THE ERIE CANAL IN MONTGOMERY COUNTY." TAA 97-64C, JULY 13, 1998.
5. GEOTECHNICAL BORING M-12 FROM: AMSTERDAM NORTH-SOUTH ARTERIAL, MOHAWK RIVER TO GROVE STREET, MONTGOMERY COUNTY, SHEET NO. 89, STATE OF NEW YORK, (UNKNOWN DATE).
6. DESIGN OF ROUTE 30 BRIDGE, PIER 3, FROM: AMSTERDAM NORTH-SOUTH ARTERIAL, MOHAWK RIVER TO GROVE STREET, MONTGOMERY COUNTY, SHEET NO. 105, DRAWING NO. 17 OF 113, STATE OF NEW YORK, (UNKNOWN DATE). PILING LENGTHS VARY FROM 14.5 FEET TO 36 FEET LONG. INDIVIDUAL PILE LENGTHS ARE UNKNOWN.
7. BOTTOM OF FORMER GAS HOLDER NO. 1 BASED ON A BORING LOG FOR SOIL BORING SB-13 INCLUDED IN THE PRELIMINARY SITE ASSESSMENT (HARZA, 1999). BBL DOES NOT HAVE INFORMATION REGARDING THE CONSTRUCTION OF GAS HOLDER NO. 1. FOR SIMPLICITY THE BOTTOM OF THIS GAS HOLDER IS ASSUMED TO BE FLAT.

VERTICAL EXAGGERATION = 3X

0 10' 20'

VERTICAL GRAPHIC SCALE

0 30' 60'

HORIZONTAL GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP
PHASE II AREA INVESTIGATION

GEOLOGIC CROSS-SECTION B-B'

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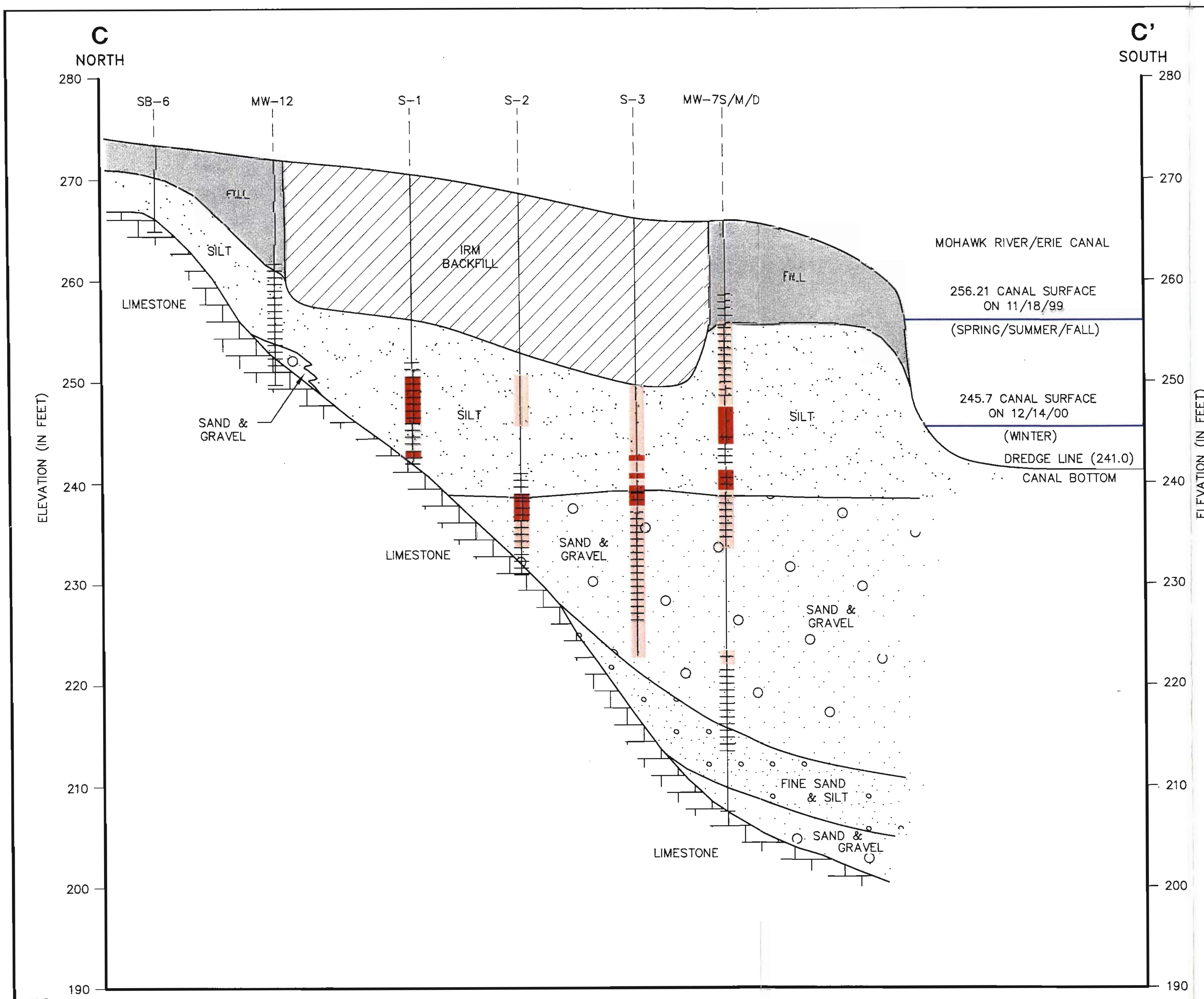
FIGURE
6

P: STD BLPCP,
12/3/01 SYR-54-PGL JER RCA
36497060/36497V02.DWG



X: NONE
L: ON=*, OFF=REF*
P: STD/BL.PCP
12/3/01 SYR-54-PGL JER RCA
36497060/36497V05.DWG

LEGEND

MW-14 ← WELL/SOIL BORING NUMBER
← GROUND SURFACE
← SCREENED INTERVAL
← BOTTOM OF BORING
CONTACT BETWEEN GEOLOGIC UNITS
▨ APPROXIMATE LIMITS OF IRM BACKFILL
▯ SHEEN
🟥 NAPL

NOTES:

1. LOCATIONS FROM BASE MAP PRODUCED FROM SURVEY DATA COMPILED BY NIAGARA MOHAWK POWER CORPORATION SURVEYORS.
2. DATUM IS NEW YORK STATE CANAL CORPORATION DATUM FOR SECTION 3, LOCK E-11. THIS DATUM IS 1.00 FT. HIGHER THAN NGVD OF 1929.
3. CONTACTS ARE APPROXIMATE AND ARE INFERRED BETWEEN BORINGS. SUBSURFACE CONDITIONS HAVE BEEN GENERALIZED.
4. THE ELEVATION OF THE CANAL DREDGE LINE IS BASED ON: NEW YORK STATE CANAL CORPORATION (NYSCC) 1998. "ALBANY DIVISION PLANS FOR REPAIR OF THE CANAL TERMINAL WALL AT AMSTERDAM-STRIN 30014A ON THE ERIE CANAL IN MONTGOMERY COUNTY." TAA 97-64C, JULY 13, 1998.
5. ALL GEOLOGIC CONTACTS BETWEEN BORING/MONITORING LOCATIONS INFERRED.

VERTICAL EXAGGERATION = 3X

0 10' 20'
VERTICAL GRAPHIC SCALE

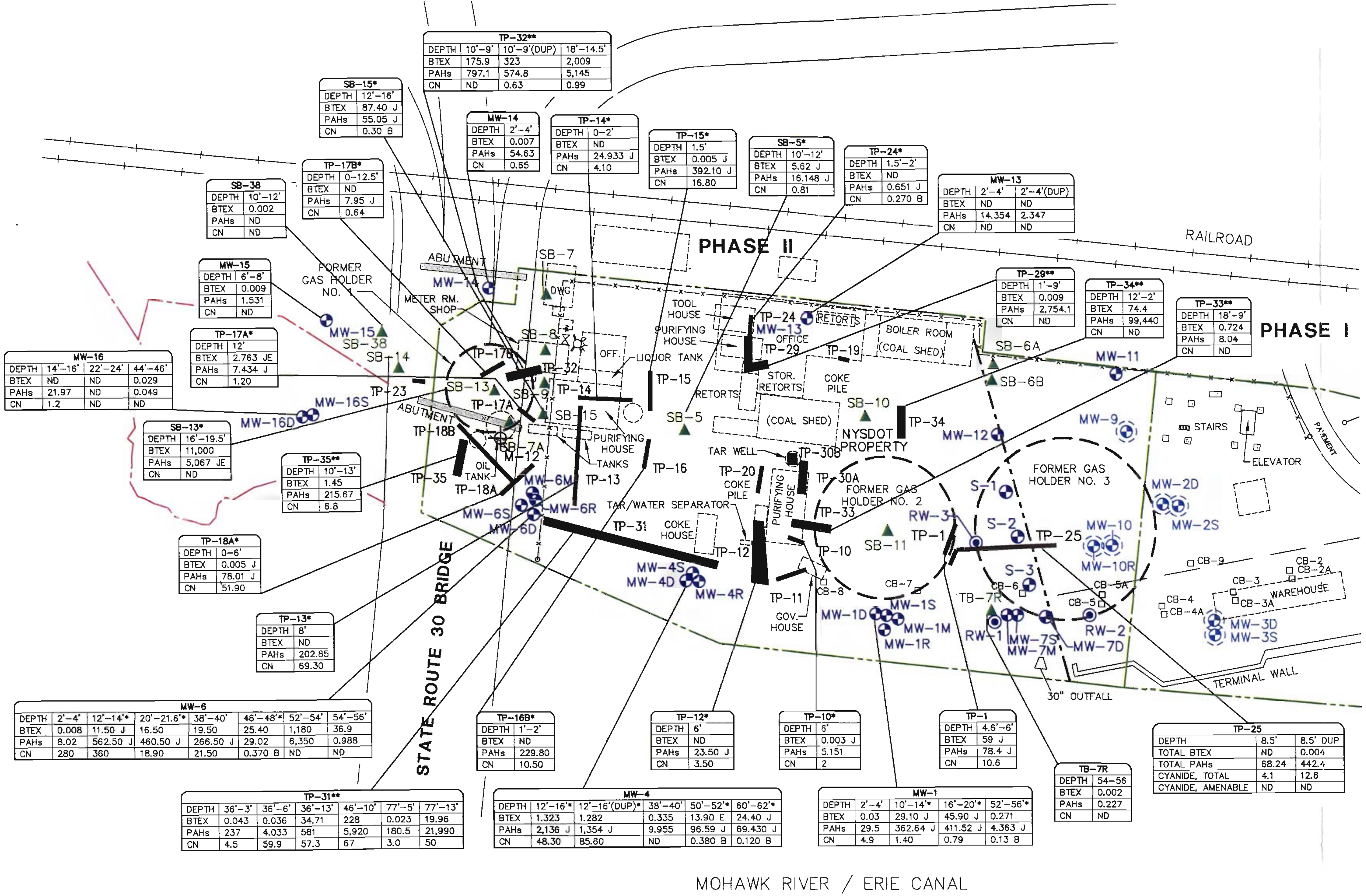
0 30' 60'
HORIZONTAL GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP
PHASE II AREA INVESTIGATION

GEOLOGIC CROSS-SECTION C-C'

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
7



TP-32**

DEPTH	10'-9'	10'-9'(DUP)	18'-14.5'
BTEX	175.9	323	2,009
PAHs	797.1	574.8	5,145
CN	ND	0.63	0.99

SB-15*

DEPTH	12'-16'
BTEX	87.40 J
PAHs	55.05 J
CN	0.30 B

MW-14

DEPTH	2'-4'
BTEX	0.007
PAHs	54.63
CN	0.65

TP-14*

DEPTH	0-2'
BTEX	ND
PAHs	24.933 J
CN	4.10

TP-15*

DEPTH	1.5'
BTEX	0.005 J
PAHs	392.10 J
CN	16.80

SB-5*

DEPTH	10'-12'
BTEX	5.62 J
PAHs	16.148 J
CN	0.81

TP-24*

DEPTH	1.5'-2'
BTEX	ND
PAHs	0.651 J
CN	0.270 B

MW-13

DEPTH	2'-4'	2'-4'(DUP)
BTEX	ND	ND
PAHs	14.354	2.347
CN	ND	ND

TP-17B*

DEPTH	0-12.5'
BTEX	ND
PAHs	7.95 J
CN	0.64

SB-38

DEPTH	10'-12'
BTEX	0.002
PAHs	ND
CN	ND

MW-15

DEPTH	6'-8'
BTEX	0.009
PAHs	1.531
CN	ND

TP-17A*

DEPTH	12'
BTEX	2.763 JE
PAHs	7.434 J
CN	1.20

MW-16

DEPTH	14'-16'	22'-24'	44'-46'
BTEX	ND	ND	0.029
PAHs	21.97	ND	0.049
CN	1.2	ND	ND

SB-13*

DEPTH	16'-19.5'
BTEX	11,000
PAHs	5,067 JE
CN	ND

TP-35**

DEPTH	10'-13'
BTEX	1.45
PAHs	215.67
CN	6.8

TP-18A*

DEPTH	0-6'
BTEX	0.005 J
PAHs	78.01 J
CN	51.90

TP-13*

DEPTH	8'
BTEX	ND
PAHs	202.85
CN	69.30

TP-29**

DEPTH	1'-9'
BTEX	0.009
PAHs	2,754.1
CN	ND

TP-34**

DEPTH	12'-2'
BTEX	74.4
PAHs	99,440
CN	ND

TP-33**

DEPTH	18'-9'
BTEX	0.724
PAHs	8.04
CN	ND

MW-6

DEPTH	2'-4'	12'-14'*	20'-21.6'*	38'-40'	46'-48'*	52'-54'	54'-56'
BTEX	0.008	11.50 J	16.50	19.50	25.40	1,180	36.9
PAHs	8.02	562.50 J	460.50 J	266.50 J	29.02	6,350	0.988
CN	280	360	18.90	21.50	0.370 B	ND	ND

TP-31**

DEPTH	36'-3'	36'-6'	36'-13'	46'-10'	77'-5'	77'-13'
BTEX	0.043	0.036	34.71	228	0.023	19.96
PAHs	237	4.033	581	5,920	180.5	21,990
CN	4.5	59.9	57.3	67	3.0	50

TP-16B*

DEPTH	1'-2'
BTEX	ND
PAHs	229.80
CN	10.50

TP-12*

DEPTH	6'
BTEX	ND
PAHs	23.50 J
CN	3.50

TP-10*

DEPTH	6'
BTEX	0.003 J
PAHs	5.151
CN	2

TP-1

DEPTH	4.6'-6'
BTEX	59 J
PAHs	78.4 J
CN	10.6

MW-4

DEPTH	12'-16'*	12'-16'(DUP)*	38'-40'	50'-52'*	60'-62'*
BTEX	1.323	1.282	0.335	13.90 E	24.40 J
PAHs	2,136 J	1,354 J	9.955	96.59 J	69.430 J
CN	48.30	85.60	ND	0.380 B	0.120 B

MW-1

DEPTH	2'-4'	10'-14'*	16'-20'*	52'-56'*
BTEX	0.03	29.10 J	45.90 J	0.271
PAHs	29.5	362.64 J	411.52 J	4.363 J
CN	4.9	1.40	0.79	0.13 B

TB-7R

DEPTH	54-56
BTEX	0.002
PAHs	0.227
CN	ND

TP-25

DEPTH	8.5'	8.5' DUP
TOTAL BTEX	ND	0.004
TOTAL PAHs	68.24	442.4
CYANIDE, TOTAL	4.1	12.6
CYANIDE, AMENABLE	ND	ND

GRID NORTH

LEGEND:

MW-3S ◎ ABANDONED PSA/IRMI MONITORING WELL
MW-4 ⊕ MONITORING WELL LOCATION
RW-3 ◉ IRM RECOVERY WELL
SB-6A ▲ SOIL BORING LOCATION
TP-21 ▬ TEST PIT LOCATION
CB-1 □ CATCH BASIN LOCATION
—x—x—x— FENCE
▨ CONCRETE ABUTMENT
— - - — PHASE I / PHASE II BOUNDARY LINE
—-·-— APPROXIMATE RIVERLINK PARK PROPERTY LINE (SEE NOTES)
—-·-— APPROXIMATE PROPERTY LINES FOR PROPERTIES WEST OF THE RIVERLINK PARK (SEE NOTES)
┆ ┆ HISTORICAL STRUCTURE

TP-21

DEPTH	4'	SAMPLE DEPTH OR INTERVAL
BTEX	16.47 JE	BENZENE, TOLUENE, ETHYLBENZENE, XYLENE
PAHs	347.10 J	POLYNUCLEAR AROMATIC HYDROCARBONS
CN	3.50	TOTAL CYANIDE

ALL CONCENTRATIONS IN mg/kg (ppm).

ND = ALL ASSOCIATED COMPOUNDS WERE ANALYZED FOR, BUT NONE WERE DETECTED.

B = REPORTED VALUE WAS LESS THAN THE CONTRACT REQUIRED DETECTION LIMIT (CRDL) BUT GREATER OR EQUAL TO THE INSTRUMENT DETECTION LIMIT (IDL).

J = ESTIMATED BELOW DETECTION LIMIT

E = CONCENTRATION EXCEEDS CALIBRATION RANGE

0 80' 160'

GRAPHIC SCALE

NOTES:

1. BASE MAP PRODUCED, IN PART, FROM SURVEY DATA COMPILED BY NIAGARA MOHAWK POWER CORPORATION (NMPC) SURVEYORS.
2. DATUM IS NEW YORK STATE CANAL CORPORATION DATUM FOR SECTION 3, LOCK E-11. THIS DATUM IS 1.00 FEET HIGHER THAN NGVD OF 1929. (NYSCC, MAY 1998)
3. ALL LOCATIONS ARE APPROXIMATE.
4. APPROXIMATE PROPERTY BOUNDARIES OF THE GREATER AMSTERDAM RIVERLINK PARK SITE ARE FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES. APPROXIMATE PROPERTY BOUNDARIES OF THE NYSDOT AND ADICOMMCO INC. PROPERTIES WEST OF THE STATE ROUTE 30 BRIDGE ARE EXTRAPOLATED FROM MONTGOMERY COUNTY REAL PROPERTY TAX MAP NO. 055.43, JANUARY 1999.
5. SOIL BORINGS SB-6A/B THROUGH SB-15, TEST PITS TP-1 THROUGH TP-24 AND MONITORING WELLS MW-1D, MW-2S/D, MW-3D, MW-4D, MW-5D, MW-6D, AND MW-7D COMPLETED BY HARZA DURING THE PRELIMINARY SITE ASSESSMENT (PSA), FEBRUARY 1999. ALL OTHER SOIL BORINGS, TEST PITS AND MONITORING WELLS WERE INSTALLED BY BBL DURING THE INTERIM REMEDIAL MEASURE INVESTIGATION (IRMI), JUNE 1999 AND THE PHASE II AREA INVESTIGATION. FOR CLARITY, THE LOCATIONS OF PSA AND IRMI BORINGS AND TEST PITS ARE NOT SHOWN FOR THE PHASE I AREA. ADDITIONALLY, TEST PITS LOCATED IN THE PHASE II AREA (EXCEPT FOR TP-25) WHICH WERE EXCAVATED DURING THE IRM, ARE NOT INCLUDED.
6. NYSDOT = NEW YORK STATE DEPARTMENT OF TRANPORTATION, NYSCC = NEW YORK STATE CANAL CORPORATION.
7. HISTORICAL FEATURES ADDED FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES. ALL HISTORICAL FEATURES SHOWN WITH LIGHT DASHED LINE, EXCEPT FOR THE THREE HOLDERS WHERE A HEAVY DASHED LINE IS USED.
8. * SOIL SAMPLE RESULTS FROM PSA (HARZA, FEBRUARY, 1999).
9. ** DEPTH INTERVAL SHOWN FOR THESE TEST PITS REPRESENTS THE HORIZONTAL DISTANCE ALONG THE TEST PIT AND CORRESPONDING DEPTH AT WHICH SAMPLE WAS COLLECTED. SAMPLE LOCATIONS ARE DETAILED ON THE TEST PIT CROSS SECTIONS CONTAINED IN APPENDIX B.
10. LOCATION OF FORMER GAS HOLDER NO.1 BASED ON FIELD OBSERVATIONS DURING THE INSTALLATION OF TEST PIT TP-17A DURING THE PSA AND TP-32 DURING THE PHASE II AREA INVESTIGATION.
11. FORMER GAS HOLDER NO.3 AND THE FORMER TAR/WATER SEPARATOR WERE REMOVED DURING AN INTERIM REMEDIAL MEASURE COMPLETED BY BBL (BBL, 2000).
12. IRMI MONITORING WELL MW-8 WAS ABANDONED DURING THE IRM AND REPLACED WITH RECOVERY WELL RW-3. THE LOCATION OF MW-8 IS NOT SHOWN ON THIS FIGURE.

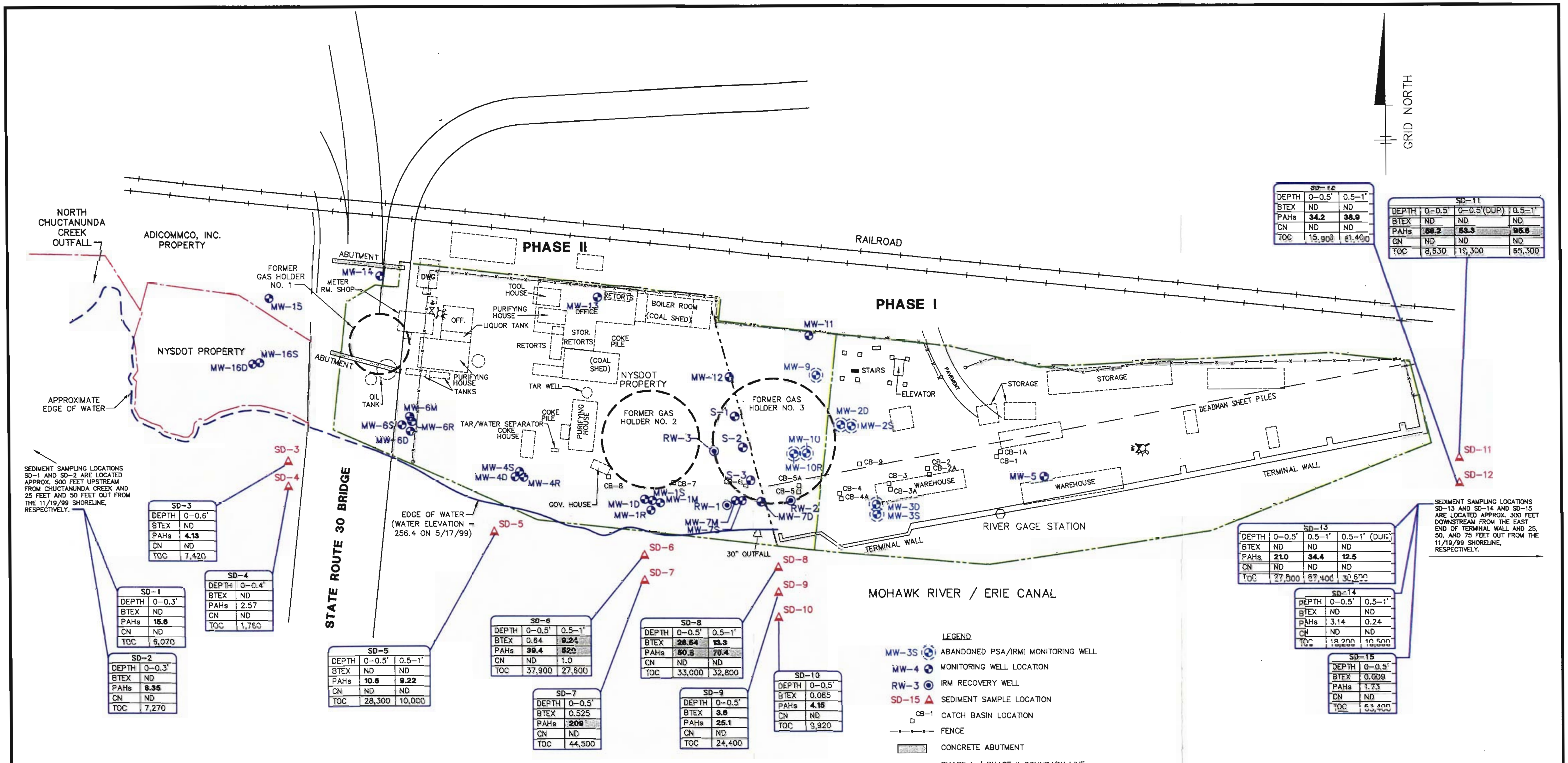
X: (NONE)
L: ON= *, OFF= *REF*
P: STD-PCP/BL
12/3/01 SYR-54-MAD PGL RCA
36497060/36497B09.DWG

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

SUMMARY OF SOIL ANALYTICAL RESULTS

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
8



SEDIMENT SAMPLING LOCATIONS SD-1 AND SD-2 ARE LOCATED APPROX. 500 FEET UPSTREAM FROM CHUCTANUNDA CREEK AND 25 FEET AND 50 FEET OUT FROM THE 11/19/99 SHORELINE, RESPECTIVELY.

SD-3

DEPTH	0-0.6'
BTEX	ND
PAHs	**4.13**
CN	ND
TOC	7,420

SD-4

DEPTH	0-0.4'
BTEX	ND
PAHs	2.57
CN	ND
TOC	1,760

SD-1

DEPTH	0-0.3'
BTEX	ND
PAHs	**15.6**
CN	ND
TOC	6,070

SD-2

DEPTH	0-0.3'
BTEX	ND
PAHs	**8.35**
CN	ND
TOC	7,270

SD-5

DEPTH	0-0.5'	0.5-1'
BTEX	ND	ND
PAHs	**10.6**	**9.22**
CN	ND	ND
TOC	28,300	10,000

SD-6

DEPTH	0-0.5'	0.5-1'
BTEX	0.64	**9.24**
PAHs	**39.4**	**520**
CN	ND	1.0
TOC	37,900	27,600

SD-7

DEPTH	0-0.5'
BTEX	0.525
PAHs	**209**
CN	ND
TOC	44,500

SD-8

DEPTH	0-0.5'	0.5-1'
BTEX	**28.54**	**13.3**
PAHs	**50.5**	**70.4**
CN	ND	ND
TOC	33,000	32,800

SD-9

DEPTH	0-0.5'
BTEX	**3.6**
PAHs	**25.1**
CN	ND
TOC	24,400

SD-10

DEPTH	0-0.5'
BTEX	0.065
PAHs	**4.15**
CN	ND
TOC	9,920

SD-12

DEPTH	0-0.5'	0.5-1'
BTEX	ND	ND
PAHs	**34.2**	**38.9**
CN	ND	ND
TOC	15,900	61,400

SD-11

DEPTH	0-0.5'	0-0.5'(DUP)	0.5-1'
BTEX	ND	ND	ND
PAHs	**58.2**	**53.3**	**95.6**
CN	ND	ND	ND
TOC	8,630	19,300	65,300

SEDIMENT SAMPLING LOCATIONS SD-13 AND SD-14 AND SD-15 ARE LOCATED APPROX. 300 FEET DOWNSTREAM FROM THE EAST END OF TERMINAL WALL AND 25, 50, AND 75 FEET OUT FROM THE 11/19/99 SHORELINE, RESPECTIVELY.

SD-13

DEPTH	0-0.5'	0.5-1'	0.5-1' (DUP)
BTEX	ND	ND	ND
PAHs	**21.0**	**34.4**	**12.5**
CN	ND	ND	ND
TOC	27,500	67,400	30,600

SD-14

DEPTH	0-0.5'	0.5-1'
BTEX	ND	ND
PAHs	3.14	0.24
CN	ND	ND
TOC	18,200	10,500

SD-15

DEPTH	0-0.5'
BTEX	0.009
PAHs	1.73
CN	ND
TOC	63,400

NOTES:

1. BASE MAP PRODUCED, IN PART, FROM SURVEY DATA COMPILED BY NIAGARA MOHAWK POWER CORPORATION (NMPC) SURVEYORS.
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3. ALL LOCATIONS ARE APPROXIMATE.
4. APPROXIMATE PROPERTY BOUNDARIES OF THE GREATER AMSTERDAM RIVERLINK PARK SITE ARE FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES. APPROXIMATE PROPERTY BOUNDARIES OF THE NYSDOT AND ADICOMMCO INC. PROPERTIES WEST OF THE STATE ROUTE 30 BRIDGE ARE EXTRAPOLATED FROM MONTGOMERY COUNTY REAL PROPERTY TAX MAP NO. 055.43, JANUARY 1999.
5. HISTORICAL FEATURES ADDED FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES.
6. SHADED/BOLDED VALUES FOR PAHs INDICATES ONE OR MORE INDIVIDUAL PAHs EXCEEDED CRITERION FOR THE RESPECTIVE PAH, OR THAT THE TOTAL PAH CONCENTRATIONS EXCEED THE CRITERION FOR TOTAL PAHs. THERE IS NO CRITERION FOR "TOTAL BTEX", HOWEVER THERE ARE CRITERIA FOR INDIVIDUAL BTEX COMPOUNDS; THEREFORE SHADED/BOLDED VALUES FOR BTEX INDICATE THAT THE CONCENTRATION(S) OF AT LEAST ONE OF THE BTEX COMPOUNDS EXCEEDED ITS CRITERION.

LEGEND

MW-3S ◎	ABANDONED PSA/IRMI MONITORING WELL
MW-4 ●	MONITORING WELL LOCATION
RW-3 ◉	IRM RECOVERY WELL
SD-15 ▲	SEDIMENT SAMPLE LOCATION
CB-1 □	CATCH BASIN LOCATION
—x—x—x—	FENCE
▨	CONCRETE ABUTMENT
— - - —	PHASE I / PHASE II BOUNDARY LINE
🟩	APPROXIMATE RIVERLINK PARK PROPERTY LINE (SEE NOTES)
🟥	APPROXIMATE PROPERTY LINES FOR PROPERTIES WEST OF THE RIVERLINK PARK (SEE NOTES)
⬚	HISTORICAL STRUCTURE
39.4	BOLD LETTERING = CONCENTRATION EXCEEDS BENTHIC AQUATIC LIFE CHRONIC TOXICITY VALUE (SEE NOTE 6)
520	BOLD LETTERING AND GRAY SHADING = CONCENTRATION EXCEEDS BENTHIC AQUATIC LIFE ACUTE TOXICITY CRITERIA (SEE NOTE 6).

SD-15

DEPTH	0-0.5'	SAMPLE DEPTH OR INTERVAL
BTEX	0.009	BENZENE, TOLUENE, ETHYLBENZENE AND XYLENE
PAHs	1.73	TOTAL POLYNUCLEAR AROMATIC HYDROCARBONS
CN	ND	TOTAL CYANIDE
TOC	63,400	TOTAL ORGANIC CARBON

RESULTS ARE REPORTED IN mg/kg (ppm).
DUP = FIELD DUPLICATE.
ND = ALL ASSOCIATED COMPOUNDS WERE ANALYZED FOR BUT NOT DETECTED.

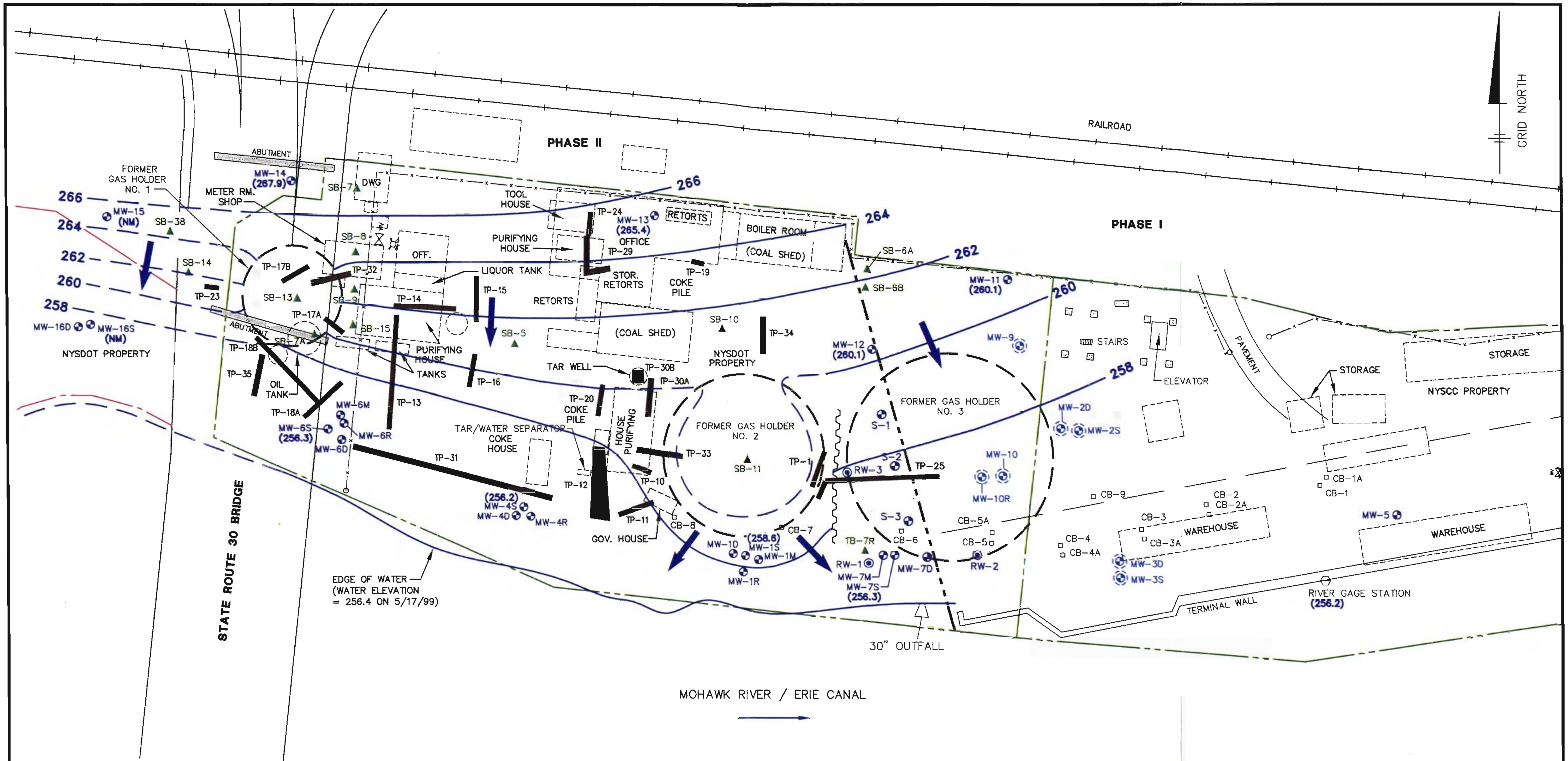
X: (NONE)
L: ON= *, OFF= REF*
P: STD-PCP/BL
12/3/01 SYR-54-MAD PGL RCA
36497060/36497C01.DWG

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

SUMMARY OF SEDIMENT ANALYTICAL RESULTS

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
9



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6. NYSDOT = NEW YORK STATE DEPARTMENT OF TRANPORTATION, NYSCC = NEW YORK STATE CANAL CORPORATION.
7. FOR CLARITY, THE LOCATIONS OF PSA AND IRMI BORINGS AND TEST PITS ARE NOT SHOWN FOR THE PHASE I AREA.
8. HISTORICAL FEATURES ADDED FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES.

LEGEND

MW-3S ◎	ABANDONED PSA/IRMI MONITORING WELL
MW-4 ⊕	MONITORING WELL LOCATION
RW-3 ◉	IRM RECOVERY WELL
SB-6A ▲	SOIL BORING LOCATION
TP-21 ▬	TEST PIT LOCATION
□ CB-1	CATCH BASIN LOCATION
—x—x—	FENCE
▨	CONCRETE ABUTMENT
— · —	PHASE I / PHASE II BOUNDARY LINE
— · —	APPROXIMATE RIVERLINK PARK PROPERTY LINE (SEE NOTES)
— · —	APPROXIMATE PROPERTY LINES FOR PROPERTIES WEST OF THE RIVERLINK PARK (SEE NOTES)
⬚	HISTORICAL STRUCTURE
∿∿∿	IRM STEEL SHEET PILING
(256.2)	GROUND-WATER ELEVATION (REFERENCED TO CANAL DATUM)
(NM)	NOT MEASURED
260 —	GROUND-WATER ELEVATION CONTOUR, DASHED WHERE INFERRED (REFERENCED TO CANAL DATUM)
➡	INFERRED DIRECTION OF GROUND-WATER FLOW

0 60' 120'

GRAPHIC SCALE

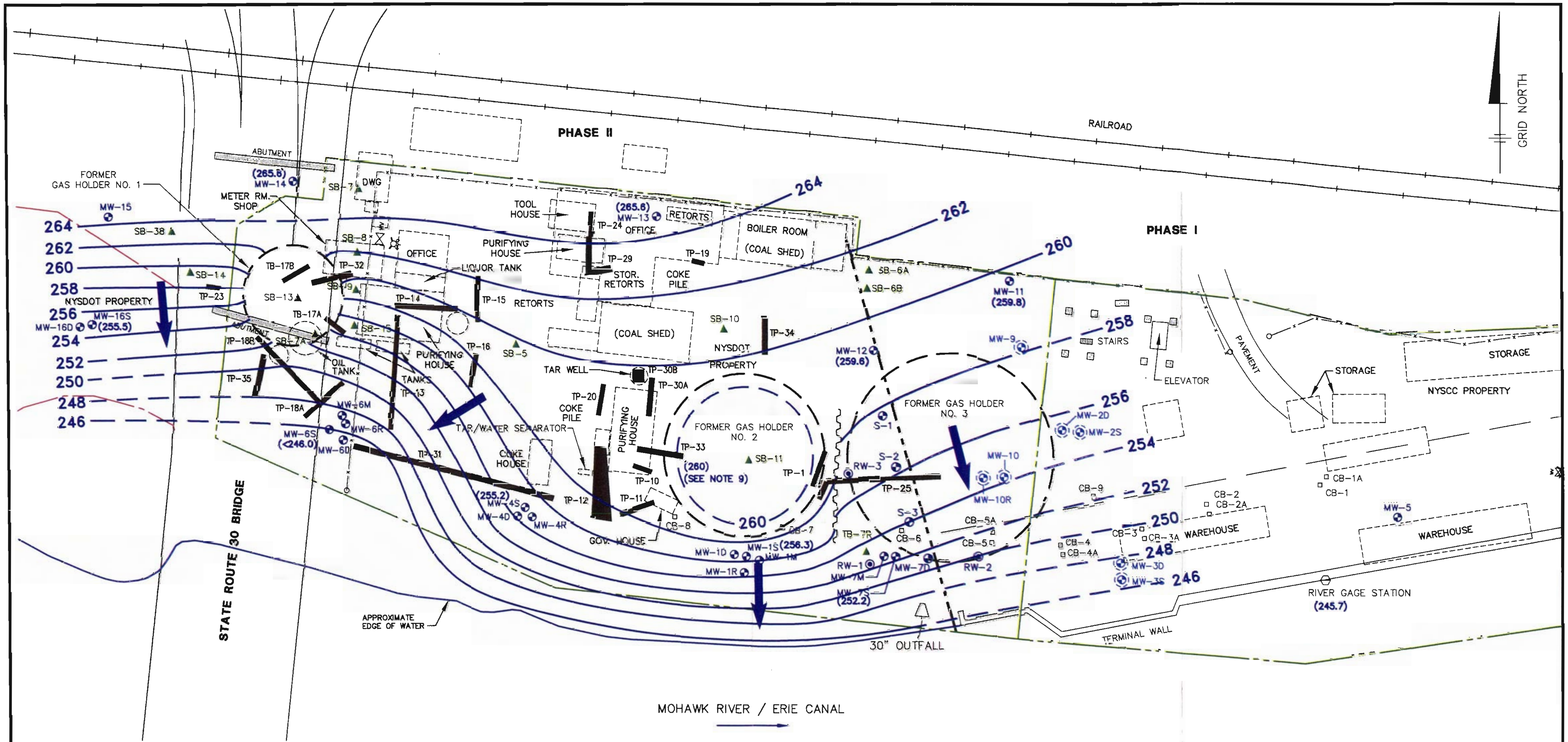
NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

WATER TABLE ELEVATION CONTOURS PRIOR TO CANAL LOWERING-11/18/99

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
10

L: ON=*, OFF= REF*
P: STD-PCP/BL
12/3/01 SYR-54-MAD PGL RCA
36497060/36497B15.DWG



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5. SOIL BORINGS SB-6A/B THROUGH SB-15, TEST PITS TP-1 THROUGH TP-24 AND MONITORING WELLS MW-1D, MW-2S/D, MW-3D, MW-4, MW-5, MW-6, AND MW-7D COMPLETED BY HARZA DURING THE PRELIMINARY SITE ASSESSMENT (PSA), FEBURARY 1999. ALL OTHER SOIL BORINGS, TEST PITS AND MONITORING WELLS WERE INSTALLED BY BBL DURING THE INTERIM REMEDIAL MEASURE INVESTIGATION (IRMI), JUNE 1999 AND THE PHASE II AREA INVESTIGATION.
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8. HISTORICAL FEATURES ADDED FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES. ALL HISTORICAL FEATURES SHOWN WITH LIGHT DASHED LINE, EXCEPT FOR THE THREE HOLDERS WHERE A HEAVY DASHED LINE IS USED.
9. INFERRED ELEVATION BASED ON DEPTH TO WATER OBSERVED IN TEST PIT TP-33 ON 12/2/99.

LEGEND

MW-3S ◎ ABANDONED PSA/IRMI MONITORING WELL
MW-4 ● MONITORING WELL LOCATION
RW-3 ◉ IRM RECOVERY WELL
SB-6A ▲ SOIL BORING LOCATION
TP-21 ▬ TEST PIT LOCATION
□ CB-1 CATCH BASIN LOCATION
—x—x— FENCE
▨ CONCRETE ABUTMENT
〰 IRM STEEL SHEET PILING
—··— PHASE I / PHASE II BOUNDARY LINE
—·— APPROXIMATE RIVERLINK PARK PROPERTY LINE (SEE NOTES)
—·— APPROXIMATE PROPERTY LINES FOR PROPERTIES WEST OF THE RIVERLINK PARK (SEE NOTES)
▭ HISTORICAL STRUCTURE
260 —— GROUND-WATER ELEVATION CONTOUR, DASHED WHERE INFERRED (REFERENCE TO CANAL DATUM)
➡ INFERRED DIRECTION OF GROUND-WATER FLOW

0 60' 120'
GRAPHIC SCALE

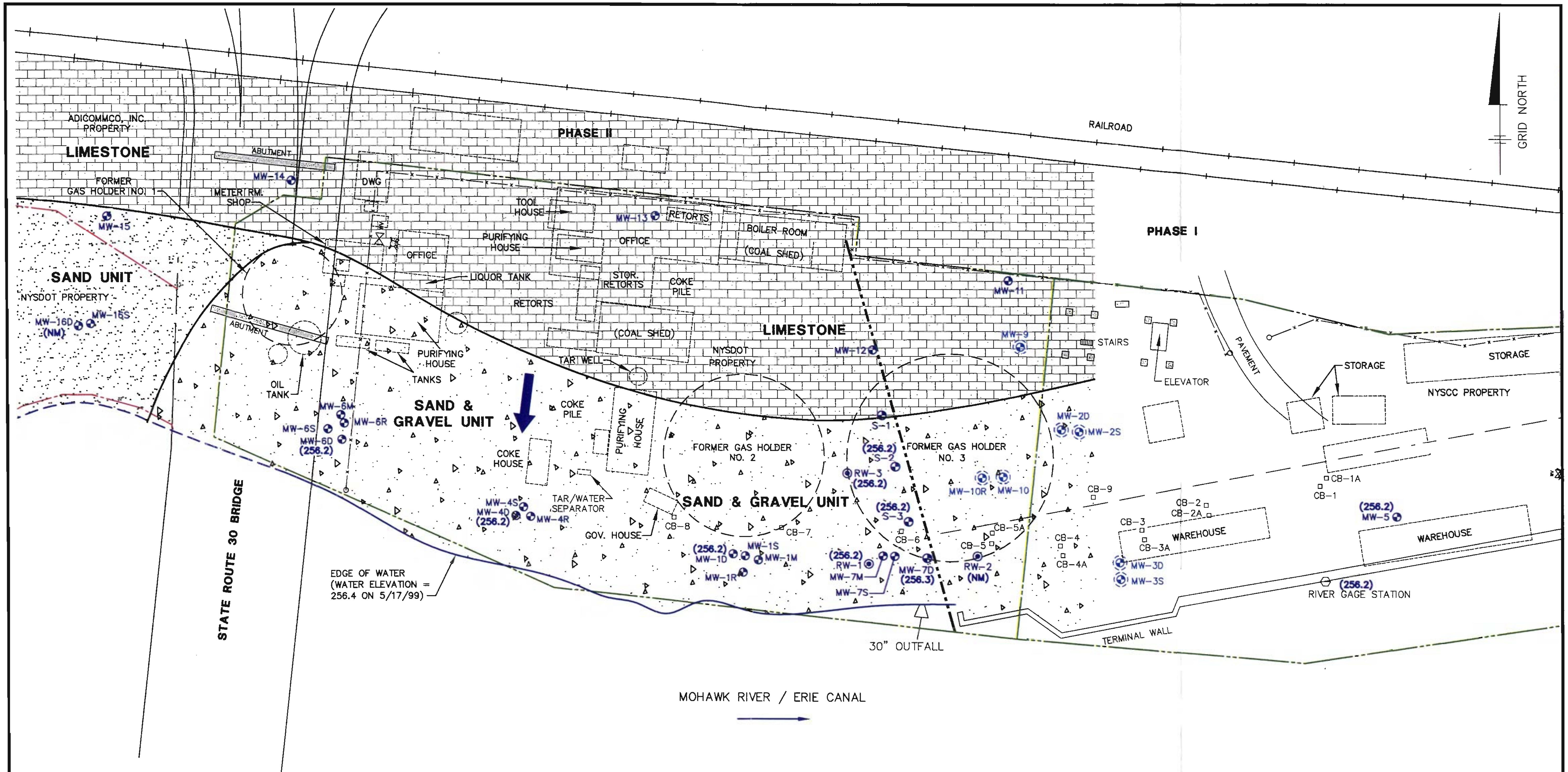
NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

WATER TABLE
ELEVATION CONTOURS AFTER
CANAL LOWERING, 12/14/99

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
11

L: ON= *, OFF= REF*
P: STD-PCP/BL
12/3/01 SYR-54-MAD PGL RCA
36497060/36497B14.DWG



NOTES:

1. BASE MAP PRODUCED, IN PART, FROM SURVEY DATA COMPILED BY NIAGARA MOHAWK POWER CORPORATION (NMPC) SURVEYORS.
2. DATUM IS NEW YORK STATE CANAL CORPORATION DATUM FOR SECTION 3, LOCK E-11. THIS DATUM IS 1.00 FEET HIGHER THAN NGVD OF 1929. (NYSCC, MAY 1998)
3. ALL LOCATIONS ARE APPROXIMATE.
4. APPROXIMATE PROPERTY BOUNDARIES OF THE GREATER AMSTERDAM RIVERLINK PARK SITE ARE FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES. APPROXIMATE PROPERTY BOUNDARIES OF THE NYSDOT AND ADICOMMCO INC. PROPERTIES WEST OF THE STATE ROUTE 30 BRIDGE ARE EXTRAPOLATED FROM MONTGOMERY COUNTY REAL PROPERTY TAX MAP NO. 055.43, JANUARY 1999.
5. SOIL BORINGS SB-6A/B THROUGH SB-15, TEST PITS TP-1 THROUGH TP-24 AND MONITORING WELLS MW-1D, MW-2S/D, MW-3D, MW-4, MW-5, MW-6, AND MW-7D COMPLETED BY HARZA DURING THE PRELIMINARY SITE ASSESSMENT (PSA), FEBURARY 1999. ALL OTHER SOIL BORINGS, TEST PITS AND MONITORING WELLS WERE INSTALLED BY BBL DURING THE INTERIM REMEDIAL MEASURE INVESTIGATION (IRMI), JUNE 1999 AND THE PHASE II AREA INVESTIGATION.
6. NYSDOT = NEW YORK STATE DEPARTMENT OF TRANPORTATION, NYSCC = NEW YORK STATE CANAL CORPORATION.
7. HISTORICAL FEATURES ADDED FROM A MAP BY HARZA DATED 12/2/98 AND ENTITLED: SITE MAP WITH HISTORICAL STRUCTURES. ALL HISTORICAL FEATURES SHOWN WITH LIGHT DASHED LINE, EXCEPT FOR THE THREE HOLDERS WHERE A HEAVY DASHED LINE IS USED.

LEGEND

MW-3S ◎	ABANDONED PSA/IRMI MONITORING WELL
MW-4 ●	MONITORING WELL LOCATION
S-1 ●	IRM SENTINEL WELL
RW-1 ◉	IRM RECOVERY WELL
□ CB-1	CATCH BASIN LOCATION
—x—x—	FENCE
▨	CONCRETE ABUTMENT
—·—·—	PHASE I / PHASE II BOUNDARY LINE
—·—·—	APPROXIMATE RIVERLINK PARK PROPERTY LINE (SEE NOTES)
—·—·—	APPROXIMATE PROPERTY LINES FOR PROPERTIES WEST OF THE RIVERLINK PARK (SEE NOTES)
☐	HISTORICAL STRUCTURE
(256.2)	DEEP OVERBURDEN POTENTIOMETRIC SURFACE ELEVATION
(NM)	NOT MEASURED
⬅	INFERRED DIRECTION OF GROUNDWATER FLOW

0 60' 120'

GRAPHIC SCALE

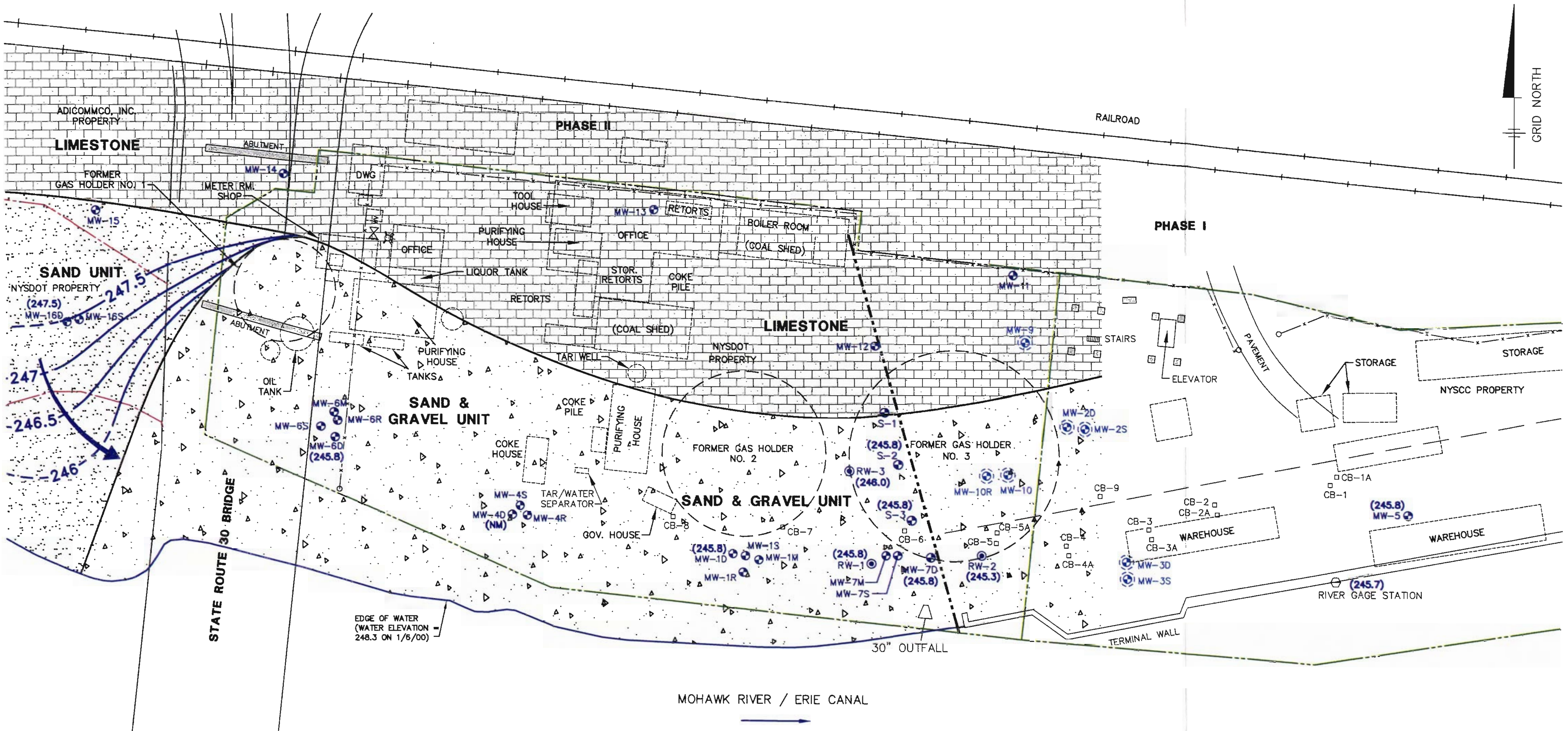
L: ON=*, OFF=REF*
P: STD-PCP/BL
12/3/01 SYR-54-MAD PGL RCA
36497060/36497B17.DWG

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

DEEP OVERBURDEN POTENTIOMETRIC SURFACE ELEVATIONS PRIOR TO CANAL LOWERING - 11/18/99

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
12



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L: ON= *, OFF= REF*
P: STD-PCP/BL
12/3/01 SYR-54-MAD PGL RCA
36497060/36497B22.DWG

LEGEND

MW-3S ABANDONED PSA/IRMI MONITORING WELL
MW-4 MONITORING WELL LOCATION
S-1 IRM SENTINEL WELL
RW-1 IRM RECOVERY WELL
CB-1 CATCH BASIN LOCATION
FENCE
CONCRETE ABUTMENT
PHASE I / PHASE II BOUNDARY LINE
APPROXIMATE RIVERLINK PARK PROPERTY LINE (SEE NOTES)
APPROXIMATE PROPERTY LINE WEST OF THE RIVERLINK PARK (SEE NOTES)
HISTORICAL STRUCTURE

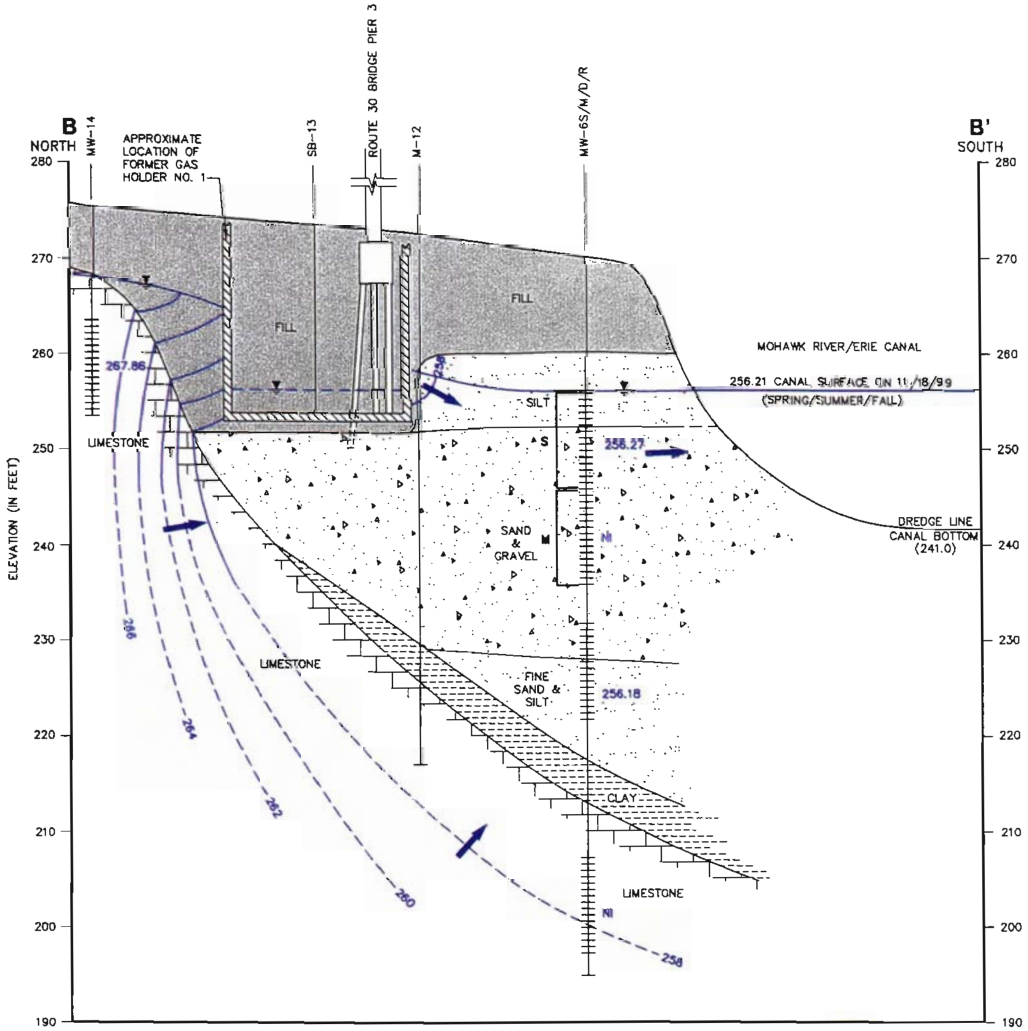
0 60' 120'
GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

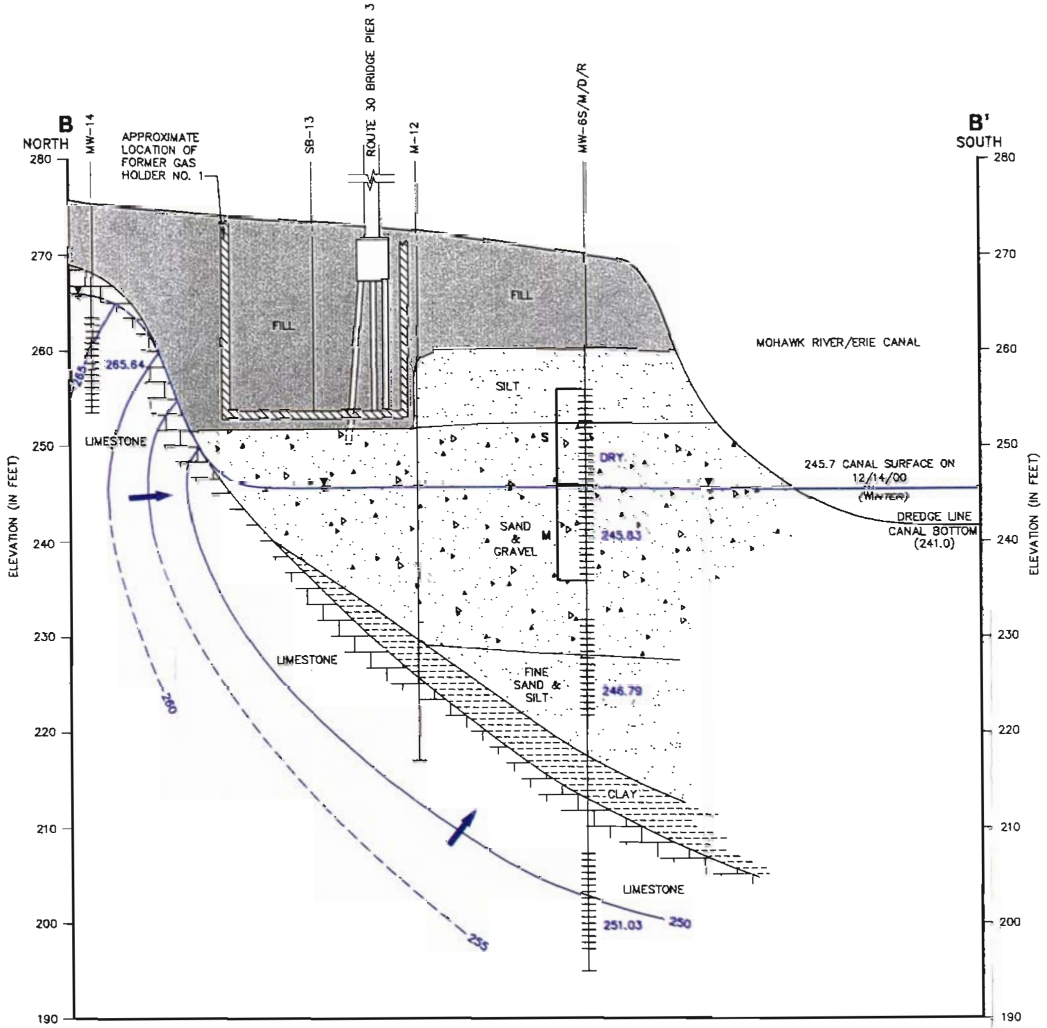
DEEP OVERBURDEN POTENTIOMETRIC SURFACE CONTOURS AFTER CANAL LOWERING - 12/14/99

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
13



EQUIPOTENTIAL CONTOURS
NOVEMBER 18, 1999



EQUIPOTENTIAL CONTOURS
DECEMBER 14, 1999

LEGEND

MW-14 — WELL/SOIL BORING NUMBER
— GROUND SURFACE
— SCREENED INTERVAL
— BOTTOM OF BORING
CONTACT BETWEEN GEOLOGIC UNITS
WATER TABLE
260 — EQUIPOTENTIAL LINE, DASHED WHERE INFERRED (REFERENCE TO CANAL DATUM)
➡ INFERRED DIRECTION OF GROUND-WATER FLOW
NI NOT INSTALLED AT TIME OF WATER-LEVEL MEASUREMENTS

NOTES:

1. LOCATIONS FROM BASE MAP PRODUCED FROM SURVEY DATA COMPILED BY NIAGARA MOHAWK POWER CORPORATION SURVEYORS.
2. DATUM IS NEW YORK STATE CANAL CORPORATION DATUM FOR SECTION 3, LOCK E-11. THIS DATUM IS 1.00 FT. HIGHER THAN NGVD OF 1929.
3. CONTACTS ARE APPROXIMATE AND ARE INFERRED BETWEEN SUBSURFACE EXPLORATION LOCATIONS. SUBSURFACE CONDITIONS HAVE BEEN GENERALIZED.
4. THE ELEVATION OF THE CANAL DREDGE LINE IS BASED ON : NEW YORK STATE CANAL CORPORATION (NYSCC) 1998." ALBANY DIVISION PLANS FOR REPAIR OF THE CANAL TERMINAL WALL AT AMSTERDAM-STRIN 30014A ON THE ERIE CANAL IN MONTGOMERY COUNTY." TAA 97-64C, JULY 13, 1998.
5. GEOTECHNICAL BORING M-12 FROM: AMSTERDAM NORTH-SOUTH ARTERIAL, MOHAWK RIVER TO GROVE STREET, MONTGOMERY COUNTY, SHEET NO. 89, STATE OF NEW YORK.
6. DESIGN OF ROUTE 30 BRIDGE, PIER 3, FROM: AMSTERDAM NORTH-SOUTH ARTERIAL, MOHAWK RIVER TO GROVE STREET, MONTGOMERY COUNTY, SHEET NO. 105, DRAWING NO. 17 OF 113, STATE OF NEW YORK. PILING LENGTHS VARY FROM 14.5 FEET TO 36 FEET LONG. INDIVIDUAL PILE LENGTHS ARE UNKNOWN.
7. BOTTOM OF FORMER GAS HOLDER NO. 1 BASED ON A BORING LOG FOR SOIL BORING SB-13 INCLUDED IN THE PRELIMINARY SITE ASSESSMENT (HARZA, 1999).

VERTICAL EXAGGERATION = 3X

0 20' 40'

VERTICAL GRAPHIC SCALE

0 60' 120'

HORIZONTAL GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP
PHASE II AREA INVESTIGATION

GEOLOGIC CROSS-SECTION B-B'
EQUIPOTENTIAL CONTOURS

BBL®
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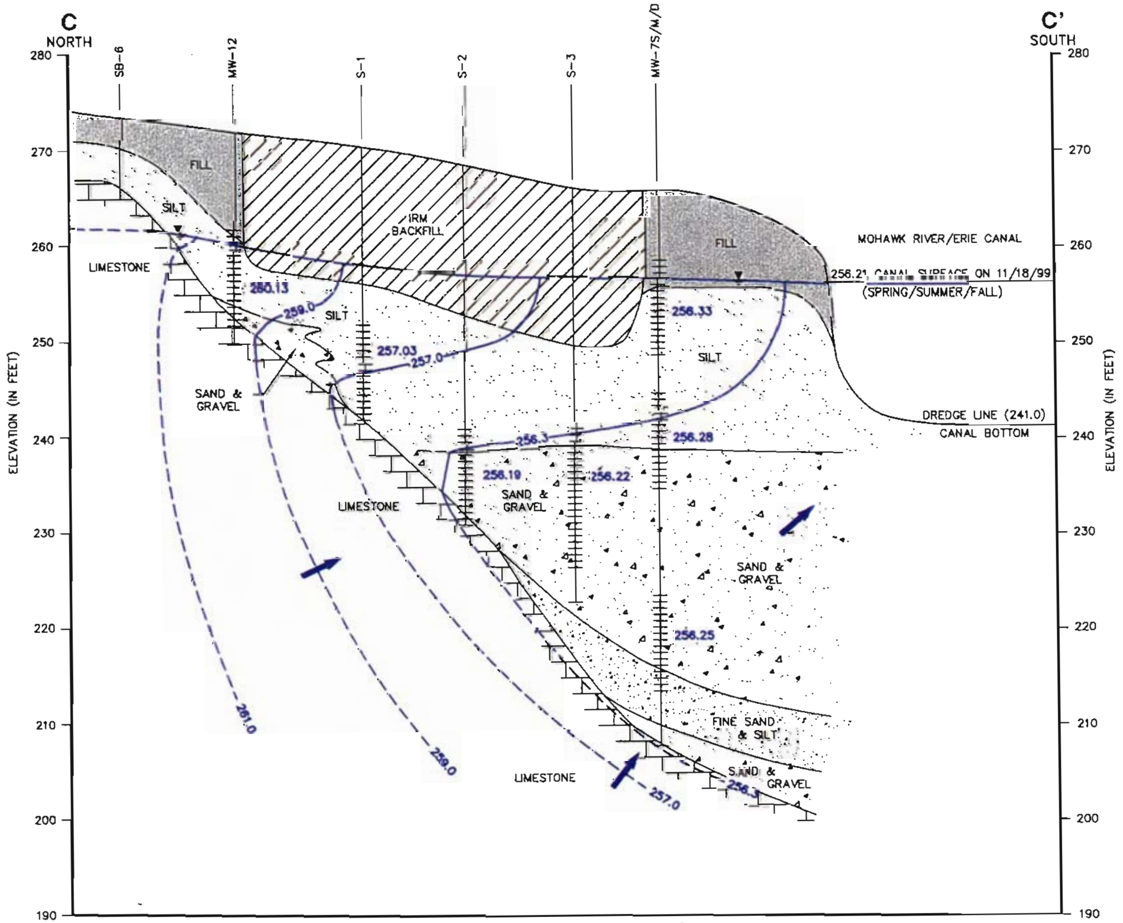
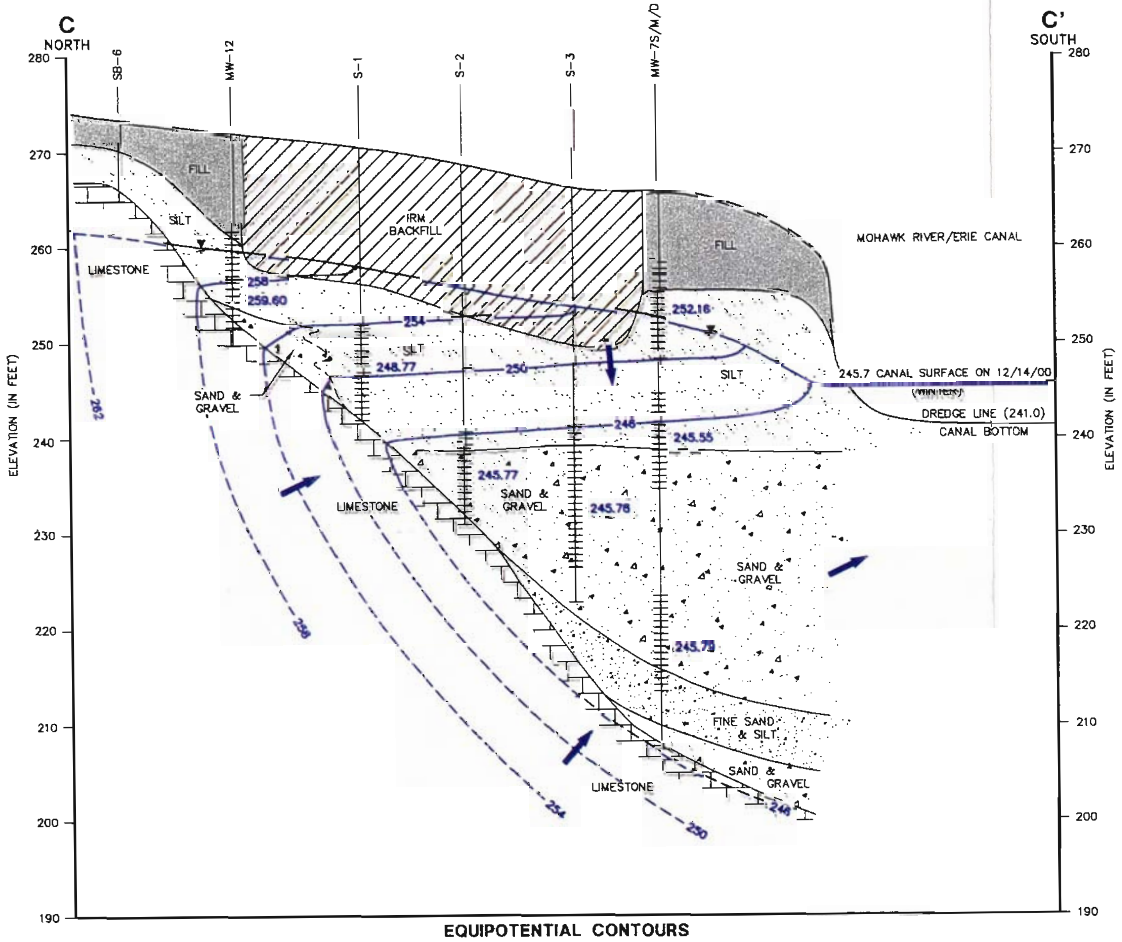
engineers & scientists

FIGURE
14

L: ON=* OFF=REF*
P: PAGESET/PLT-BL (PLTHALF.CTB)
12/3/01 SYR-54-PCL JER RCA
36620030/36620V02.DWG



EQUIPOTENTIAL CONTOURS
NOVEMBER 18, 1999



EQUIPOTENTIAL CONTOURS
DECEMBER 14, 1999

LEGEND

MW-14 ← WELL/SOIL BORING NUMBER
← GROUND SURFACE
← SCREENED INTERVAL
← BOTTOM OF BORING
CONTACT BETWEEN GEOLOGIC UNITS
▨ APPROXIMATE LIMITS OF IRM BACKFILL
▼ WATER TABLE
259.0 —— EQUIPOTENTIAL LINE, DASHED WHERE INFERRED (REFERENCE TO CANAL DATUM)
➡ INFERRED DIRECTION OF GROUND-WATER FLOW

NOTES:

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2. DATUM IS NEW YORK STATE CANAL CORPORATION DATUM FOR SECTION 3, LOCK E-11. THIS DATUM IS 1.00 FT. HIGHER THAN NGVD OF 1929.
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0 20' 40'

VERTICAL GRAPHIC SCALE

0 60' 120'

HORIZONTAL GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP
PHASE II AREA INVESTIGATION

GEOLOGIC CROSS-SECTION C-C'
EQUIPOTENTIAL CONTOURS

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engineers & scientists

FIGURE
15

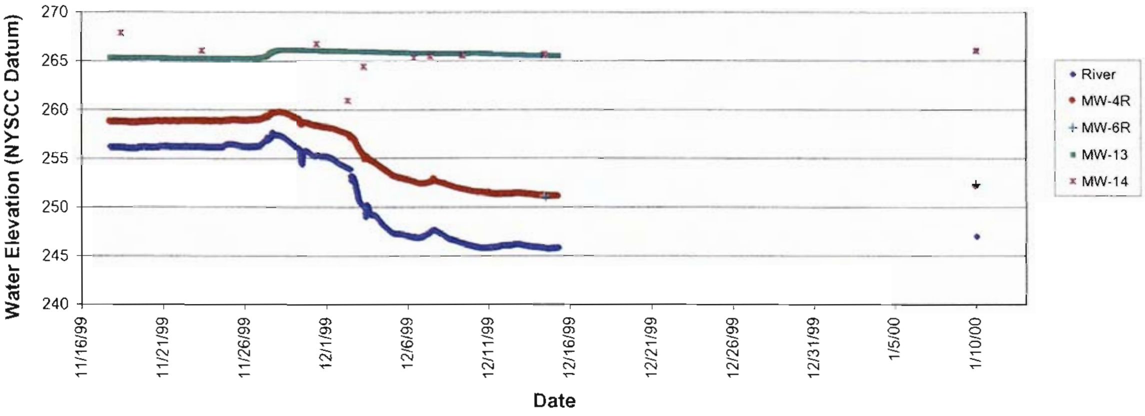
L: ON = * OFF= *REF*
P: PAGESET/PLT-BL (PLTHALF.CTB)
12/3/01 SYR-54-PGL RCA
36620030/36620V03.DWG

Figure 16

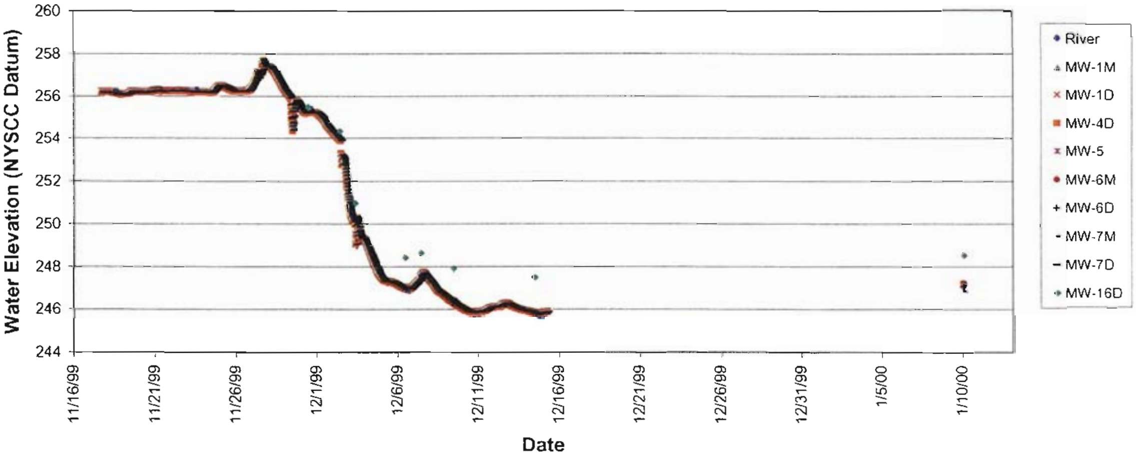
Niagara Mohawk Power Corporation
Amsterdam (Front Street) Former MGP Site
Phase II Area Investigation

Hydrographs

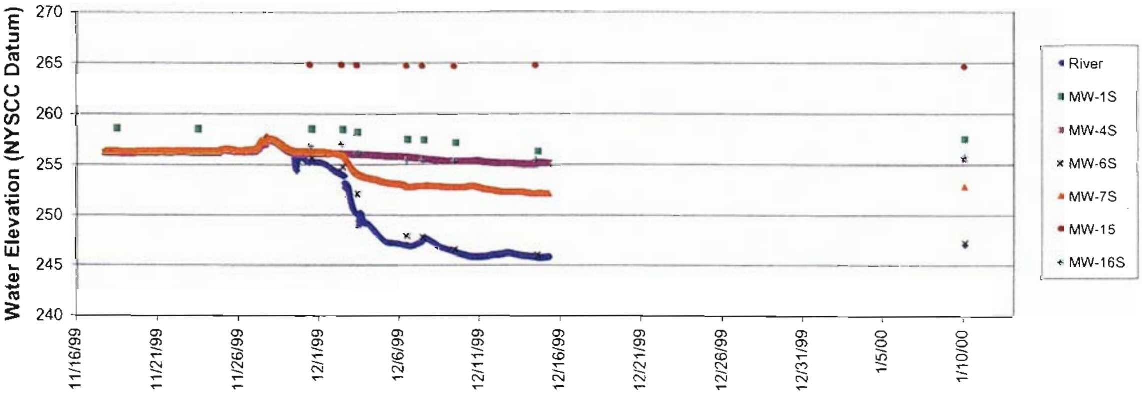
Bedrock Monitoring Wells



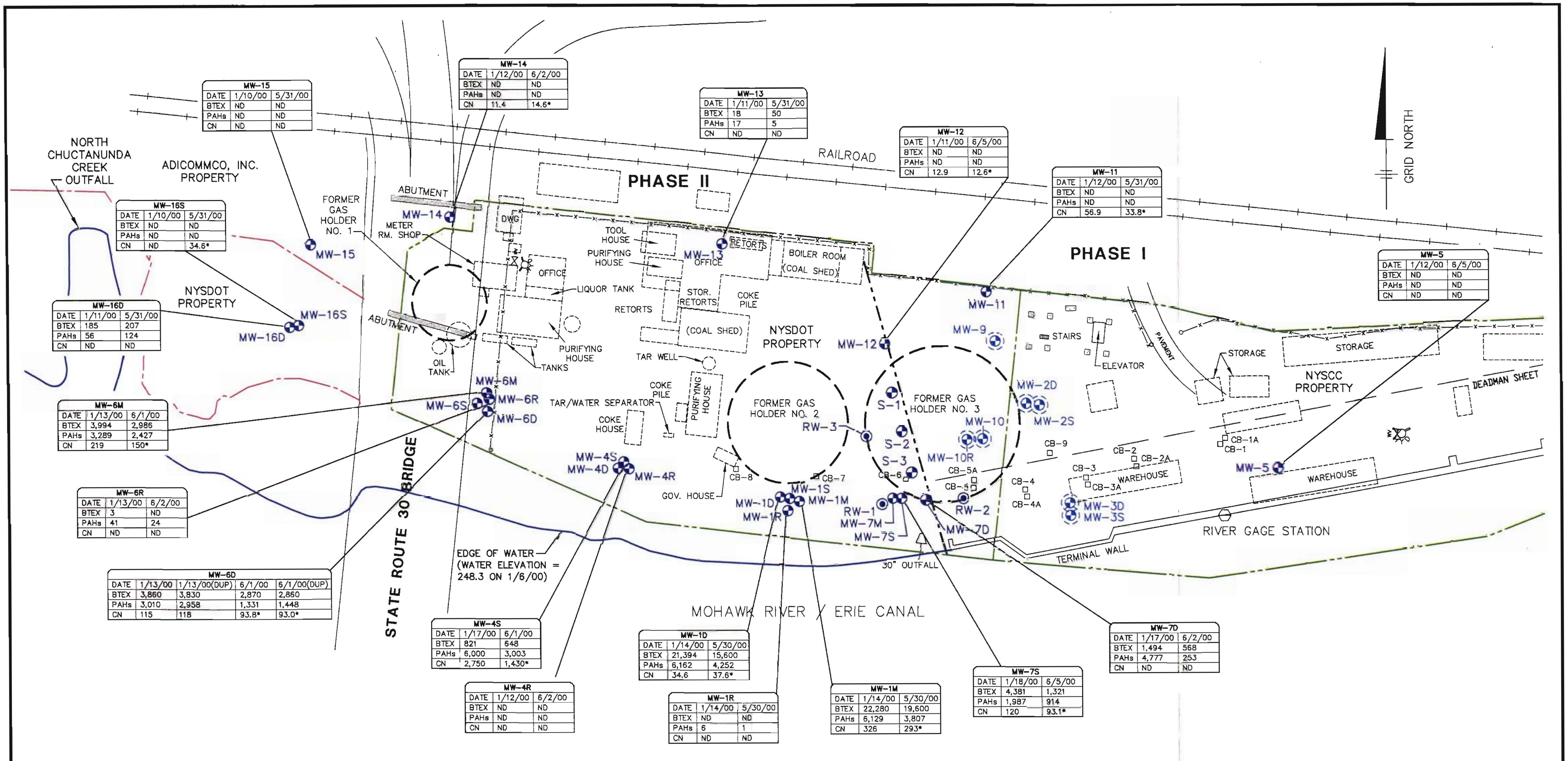
Monitoring Wells Screened in the Deep Overburden



Water Table Monitoring Wells



masterwl.xls



MW-15

DATE	1/10/00	5/31/00
BTEX	ND	ND
PAHs	ND	ND
CN	ND	ND

MW-16S

DATE	1/10/00	5/31/00
BTEX	ND	ND
PAHs	ND	ND
CN	ND	34.6*

MW-16D

DATE	1/11/00	5/31/00
BTEX	185	207
PAHs	56	124
CN	ND	ND

MW-6M

DATE	1/13/00	6/1/00
BTEX	3,994	2,986
PAHs	3,289	2,427
CN	219	150*

MW-6R

DATE	1/13/00	6/2/00
BTEX	3	ND
PAHs	41	24
CN	ND	ND

MW-6D

DATE	1/13/00	1/13/00(DUP)	6/1/00	6/1/00(DUP)
BTEX	3,860	3,830	2,870	2,860
PAHs	3,010	2,958	1,331	1,448
CN	115	118	93.8*	93.0*

MW-14

DATE	1/12/00	6/2/00
BTEX	ND	ND
PAHs	ND	ND
CN	11.4	14.6*

MW-13

DATE	1/11/00	5/31/00
BTEX	18	50
PAHs	17	5
CN	ND	ND

MW-12

DATE	1/11/00	6/5/00
BTEX	ND	ND
PAHs	ND	ND
CN	12.9	12.6*

MW-11

DATE	1/12/00	5/31/00
BTEX	ND	ND
PAHs	ND	ND
CN	56.9	33.8*

MW-5

DATE	1/12/00	6/5/00
BTEX	ND	ND
PAHs	ND	ND
CN	ND	ND

MW-4S

DATE	1/17/00	6/1/00
BTEX	821	648
PAHs	6,000	3,003
CN	2,750	1,430*

MW-4R

DATE	1/12/00	6/2/00
BTEX	ND	ND
PAHs	ND	ND
CN	ND	ND

MW-1D

DATE	1/14/00	5/30/00
BTEX	21,394	15,600
PAHs	6,162	4,252
CN	34.6	37.6*

MW-1R

DATE	1/14/00	5/30/00
BTEX	ND	ND
PAHs	6	1
CN	ND	ND

MW-1M

DATE	1/14/00	5/30/00
BTEX	22,280	19,600
PAHs	6,129	3,807
CN	326	293*

MW-7S

DATE	1/18/00	6/5/00
BTEX	4,381	1,321
PAHs	1,987	914
CN	120	93.1*

MW-7D

DATE	1/17/00	6/2/00
BTEX	1,494	568
PAHs	4,777	253
CN	ND	ND

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5. MONITORING WELLS MW-1D, MW-2S/D, MW-3D, MW-4D, MW-5D, MW-6D, AND MW-7D COMPLETED BY HARZA DURING THE PRELIMINARY SITE ASSESSMENT (PSA), FEBRUARY 1999. ALL OTHER MONITORING WELLS WERE INSTALLED BY BBL DURING THE INTERIM REMEDIAL MEASURE INVESTIGATION (IRMI), JUNE 1999 AND THE PHASE II AREA INVESTIGATION.
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8. GROUND WATER FROM MONITORING WELLS MW-1S, MW-4D, MW-6S, AND MW-7M NOT SAMPLED DUE TO THE PRESENCE OF A MEASURABLE THICKNESS OF NAPL IN THE WELL AT THE TIME OF SAMPLING.

X: (NONE)
L: ON= *, OFF= *REF*
P: STD-PCP/BL
12/3/01 SYR-54-MAD PGL RCA
36497060/36497B23.DWG

LEGEND:

MW-3S ◎	ABANDONED PSA/IRMI MONITORING WELL
MW-4 ●	MONITORING WELL LOCATION
RW-3 ◉	IRM RECOVERY WELL
CB-1 □	CATCH BASIN LOCATION
—x—x—	FENCE
▨	CONCRETE ABUTMENT
— · —	PHASE I / PHASE II BOUNDARY LINE
— - —	APPROXIMATE RIVERLINK PARK PROPERTY LINE (SEE NOTES)
— - —	APPROXIMATE PROPERTY LINES FOR PROPERTIES WEST OF THE RIVERLINK PARK (SEE NOTES)
⬚	HISTORICAL STRUCTURE

MW-6M

DATE	1/13/00	SAMPLE DATE
BTEX	3,994	BENZENE, TOLUENE, ETHYLBENZENE, XYLENE
PAHs	3,289	POLYNUCLEAR AROMATIC HYDROCARBONS
CN	219	TOTAL CYANIDE

ALL CONCENTRATIONS IN UG/L (ppb).

ND = ALL ASSOCIATED COMPOUNDS WERE ANALYZED FOR, BUT NONE WERE DETECTED.

* DUPLICATE ANALYSIS NOT WITHIN CONTROL LIMITS

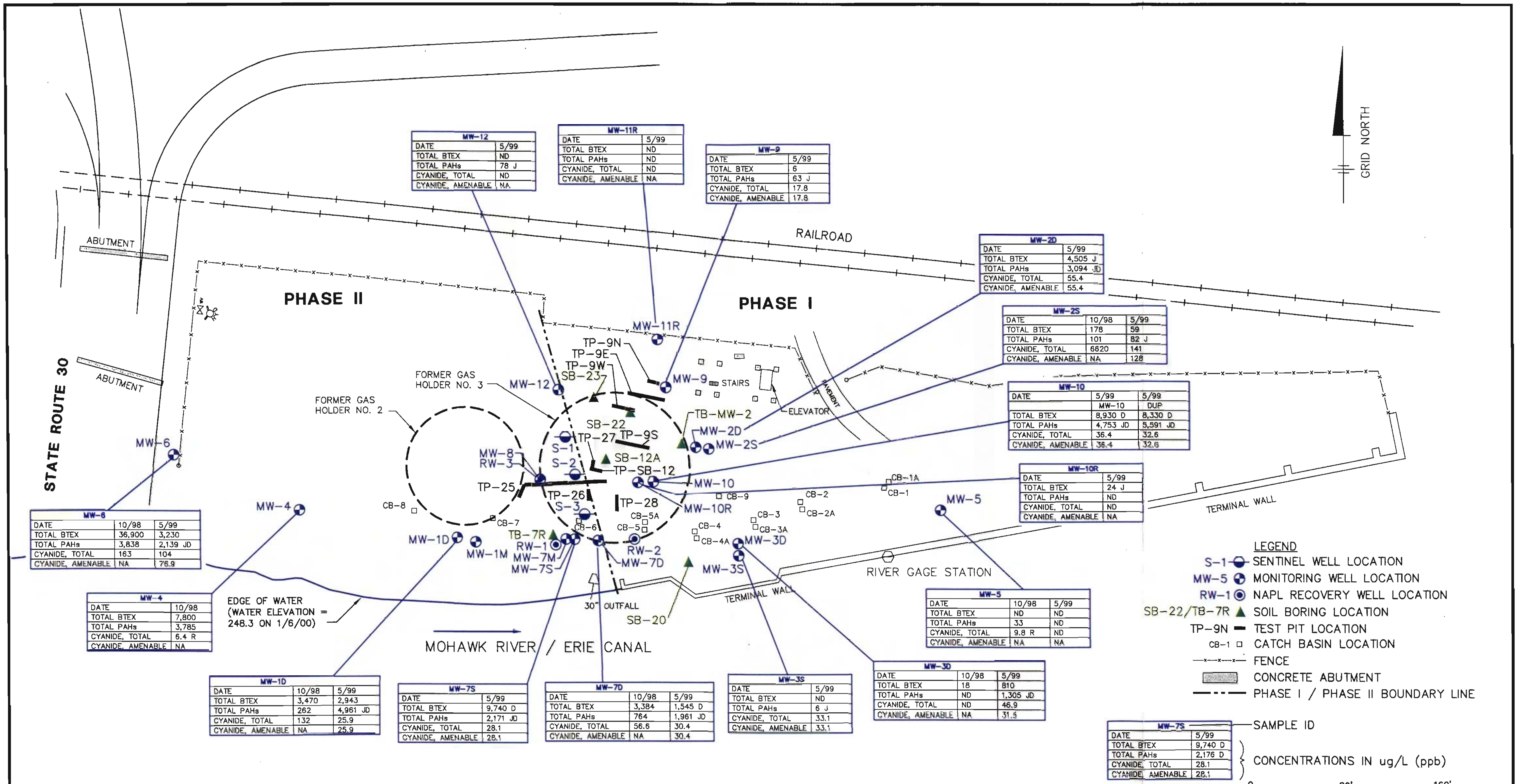
0 80' 160'
GRAPHIC SCALE

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS-
JANUARY AND MAY/JUNE 2000

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
17



MW-6

DATE	10/98	5/99
TOTAL BTEX	36,900	3,230
TOTAL PAHs	3,838	2,139 JD
CYANIDE, TOTAL	163	104
CYANIDE, AMENABLE	NA	76.9

MW-4

DATE	10/98
TOTAL BTEX	7,800
TOTAL PAHs	3,785
CYANIDE, TOTAL	6.4 R
CYANIDE, AMENABLE	NA

MW-1D

DATE	10/98	5/99
TOTAL BTEX	3,470	2,943
TOTAL PAHs	262	4,961 JD
CYANIDE, TOTAL	132	25.9
CYANIDE, AMENABLE	NA	25.9

MW-7S

DATE	5/99
TOTAL BTEX	9,740 D
TOTAL PAHs	2,171 JD
CYANIDE, TOTAL	28.1
CYANIDE, AMENABLE	28.1

MW-7D

DATE	10/98	5/99
TOTAL BTEX	3,384	1,545 D
TOTAL PAHs	764	1,961 JD
CYANIDE, TOTAL	56.6	30.4
CYANIDE, AMENABLE	NA	30.4

MW-3S

DATE	5/99
TOTAL BTEX	ND
TOTAL PAHs	6 J
CYANIDE, TOTAL	33.1
CYANIDE, AMENABLE	33.1

MW-3D

DATE	10/98	5/99
TOTAL BTEX	18	810
TOTAL PAHs	ND	1,305 JD
CYANIDE, TOTAL	ND	46.9
CYANIDE, AMENABLE	NA	31.5

MW-5

DATE	10/98	5/99
TOTAL BTEX	ND	ND
TOTAL PAHs	33	ND
CYANIDE, TOTAL	9.8 R	ND
CYANIDE, AMENABLE	NA	NA

MW-12

DATE	5/99
TOTAL BTEX	ND
TOTAL PAHs	78 J
CYANIDE, TOTAL	ND
CYANIDE, AMENABLE	NA

MW-11R

DATE	5/99
TOTAL BTEX	ND
TOTAL PAHs	ND
CYANIDE, TOTAL	ND
CYANIDE, AMENABLE	NA

MW-9

DATE	5/99
TOTAL BTEX	6
TOTAL PAHs	63 J
CYANIDE, TOTAL	17.8
CYANIDE, AMENABLE	17.8

MW-2D

DATE	5/99
TOTAL BTEX	4,505 J
TOTAL PAHs	3,094 JD
CYANIDE, TOTAL	55.4
CYANIDE, AMENABLE	55.4

MW-2S

DATE	10/98	5/99
TOTAL BTEX	178	59
TOTAL PAHs	101	82 J
CYANIDE, TOTAL	6620	141
CYANIDE, AMENABLE	NA	128

MW-10

DATE	5/99	5/99
	MW-10	DUP
TOTAL BTEX	8,930 D	8,330 D
TOTAL PAHs	4,753 JD	5,591 JD
CYANIDE, TOTAL	36.4	32.6
CYANIDE, AMENABLE	36.4	32.6

MW-10R

DATE	5/99
TOTAL BTEX	24 J
TOTAL PAHs	ND
CYANIDE, TOTAL	ND
CYANIDE, AMENABLE	NA

MW-7S

DATE	5/99
TOTAL BTEX	9,740 D
TOTAL PAHs	2,176 D
CYANIDE, TOTAL	28.1
CYANIDE, AMENABLE	28.1

NOTES:

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2. DATUM IS NEW YORK STATE CANAL CORPORATION DATUM FOR SECTION 3, LOCK E-11. THIS DATUM IS 1.00 FEET HIGHER THAN NGVD OF 1929.
3. LOCATIONS OF FORMER GAS HOLDERS ARE APPROXIMATE.
4. NA = NOT ANALYZED.
5. ND = NOT DETECTED.
6. D = CONCENTRATION BASED ON DILUTED SAMPLE ANALYSIS FOR ONE OR MORE ANALYTES.
7. R = RESULT IN QUESTION BECAUSE ANALYTE DETECTED IN RINSE BANK.
8. AMENABLE CYANIDE ANALYZED ONLY IF TOTAL CYANIDE WAS DETECTED.
9. GROUND-WATER SAMPLES COLLECTED DURING 10/98 WERE PART OF THE PRELIMINARY SITE ASSESSMENT (PSA), THOSE COLLECTED DURING 5/99 WERE PART OF THE INTERIM REMEDIAL MEASURE INVESTIGATION (IRMI).
10. J = ESTIMATED VALUE BELOW THE LABORATORY QUANTITATION LIMIT.
11. MONITORING WELLS MW-2S, MW-2D, MW-3S, MW-3D, MW-8, MW-9, MW-10, MW-10R WERE DECOMMISSIONED AS PART OF THE IRM ACTIVITIES.
12. MONITORING WELLS, SOIL BORINGS, AND TEST PITS SHOWN ON THIS FIGURE ARE ASSOCIATED WITH THE PSA AND IRMI ACTIVITIES. SOIL BORING LOCATIONS SB-24 THROUGH SB-37 WERE INSTALLED AFTER THE IRMI AND BEFORE THE IRM, AND THESE LOCATIONS ARE SHOWN ON A FIGURE PROVIDED AS ATTACHMENT 4 TO THIS FINAL ENGINEERING REPORT.

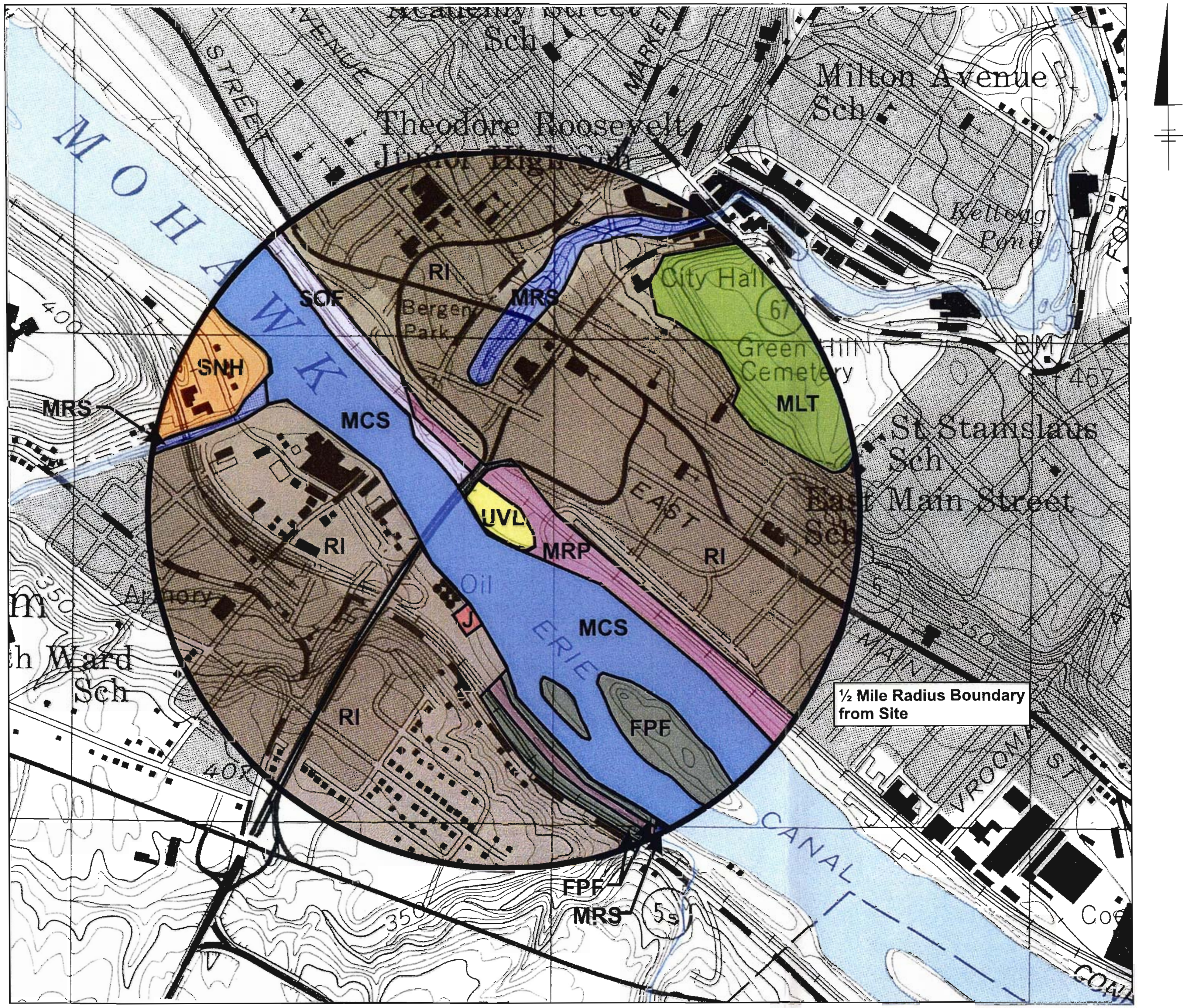
L: ON=*, OFF=REF
P: STD-PCP/BL
12/3/01 SYR-54-MAD PGL RCA
36497060/36497C03.DWG

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

SUMMARY OF PSA AND IRMI GROUND-WATER ANALYTICAL RESULTS

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
18



REFERENCE: Basemap Source: USGS 7.5 Min. Quad., Amsterdam, New York, 1954, Photorevised 1980.

LEGEND:

🟨	UVL	Urban Vacant Lot
⬜	SOF	Successional Old Field
🟪	MRP	Maintained Roadside/Pathway
⬜	RI	Residential/Industrial
🟩	MLT	Mowed Lawn with Trees
🟧	SNH	Successional Northern Hardwoods
⬜	FPF	Floodplain Forest
🟥	J	Junkyard
🟦	MCS	Main Channel Stream
🟦	MRS	Mid-reach Stream

Approximate scale: 1:24,000

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

COVERTYPE MAP

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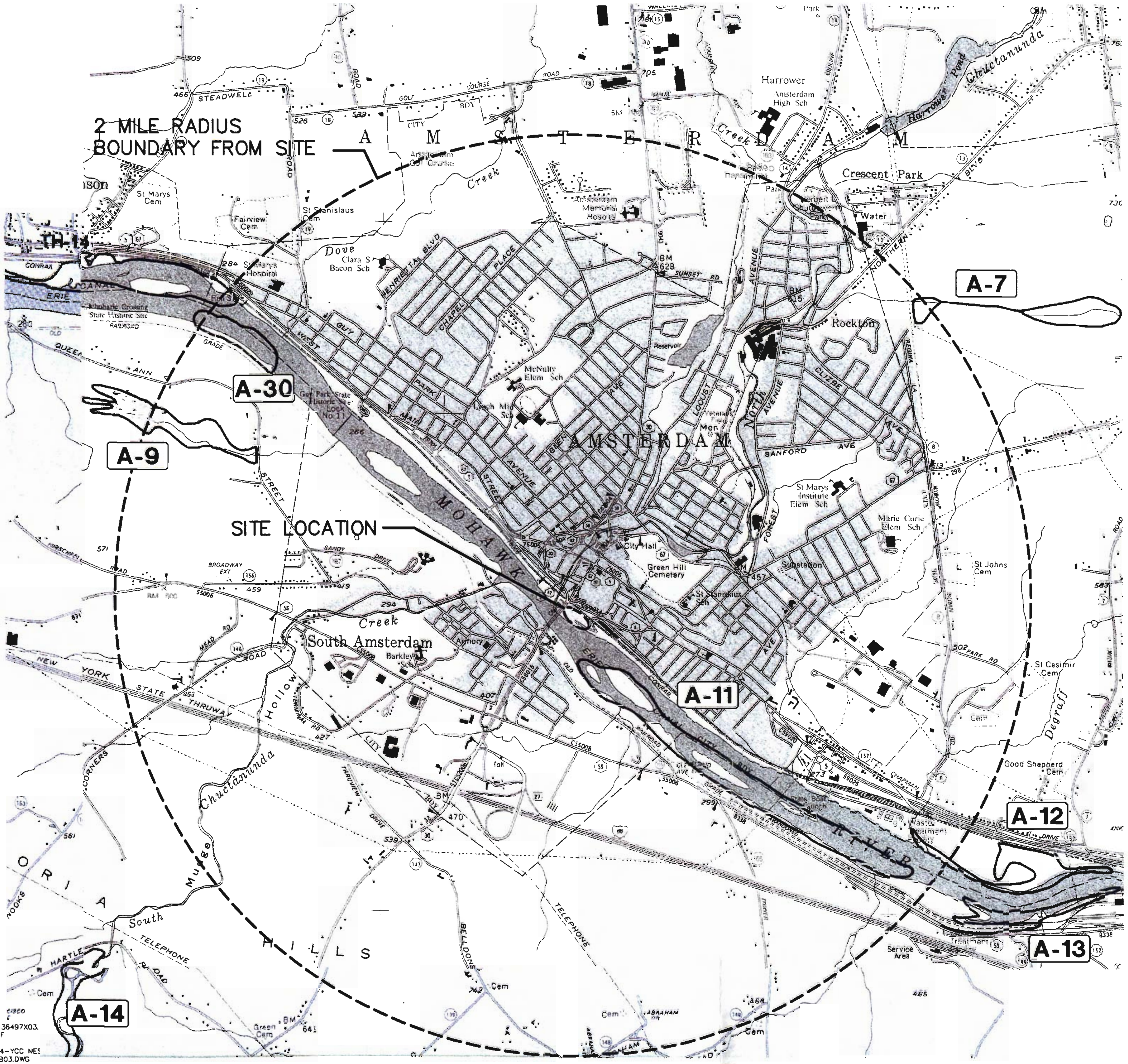
engineers & scientists

FIGURE
19

02/00 SYR D54-LBR
36497060/36497n02.CDR



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L: ON=•, OFF=REF
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10/30/00 SYR-54-YCC NES
36497065/36497B03.DWG

LEGEND:

APPROXIMATE WETLAND BOUNDARY

A-12 WETLAND IDENTIFICATION CODE

NOTE:

1. BASE MAP INFORMATION TAKEN FROM NEW YORK STATE FRESHWATER WETLANDS MAP OF MONTGOMERY COUNTY, MAP 9 OF 16 DATED 11/4/92 AT A SCALE OF 1:24000.

NIAGARA MOHAWK POWER CORPORATION
AMSTERDAM (FRONT STREET) FORMER MGP SITE
PHASE II AREA INVESTIGATION

NEW YORK STATE FRESHWATER WETLANDS MAP

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FIGURE
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