REPORT

Preliminary Site Assessment Groundwater Investigation Report

Volume I of II

Harper Substation
Niagara Falls, New York

Niagara Mohawk
A **National Grid** Company

April 2004

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BLASLAND, BOUCK & LEE, INC.
engineers & scientists

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1. Introduction

1.1 General

This document summarizes the work activities performed and the results obtained for the groundwater investigation conducted as part of the Preliminary Site Assessment (PSA) of the Niagara Mohawk, a National Grid Company (Niagara Mohawk) Harper Substation located in Niagara Falls, New York. Niagara Mohawk voluntarily implemented the PSA to evaluate potential environmental concerns associated with electrical transmission and distribution operations at the substation. The PSA was conducted under an existing multi-site Order on Consent (Index D0-001-9612, as amended May 1997) between Niagara Mohawk and the New York State Department of Environmental Conservation (NYSDEC). In addition to the groundwater investigation, the PSA for the Harper Substation also included soil and subsurface structure investigation activities. The work activities performed and the results obtained for the PSA soil and subsurface structure investigations are summarized in the NYSDEC-approved PSA Soil/Subsurface Structure Investigation Report and Interim Remedial Measures Plan (BBL, December 2000).

The PSA groundwater investigation was conducted by Blasland, Bouck & Lee, Inc. (BBL) and included three separate phases of field activities, including an initial phase during July/August 1999, a second phase during April/May 2000, and a third phase during August/September 2000. An onsite geologist from the NYSDEC provided periodic observation during each phase of the field investigation activities.

The PSA groundwater investigation activities were conducted in accordance with the following NYSDEC-approved documents:

- The PSA Work Plan (BBL, November 1998) and supporting documents, including the Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP);
- A May 21, 1999 letter from Niagara Mohawk to the NYSDEC that responded to NYSDEC comments on the PSA Work Plan and supporting documents;
- A February 7, 2000 letter from Niagara Mohawk to the NYSDEC that summarized the results for the initial PSA groundwater investigation activities conducted during July/August 1999 and presented recommendations for additional groundwater investigation activities;
- A March 30, 2000 letter from Niagara Mohawk to the NYSDEC that responded to NYSDEC comments on the additional groundwater investigation activities proposed in Niagara Mohawk's February 7, 2000 letter; and
- A July 18, 2000 letter from Niagara Mohawk to the NYSDEC that summarized the results for the second round of groundwater investigation activities conducted during April/May 2000 and presented recommendations for the third round of groundwater investigation activities.

This report also presents a discussion of the hydrogeologic conditions at and in the vicinity of the site based on the results of the PSA groundwater investigation and the results of various studies that were previously conducted by the United States Environmental Protection Agency (USEPA), the United States Geological Survey (USGS), and the NYSDEC.

The organization of this document is outlined below, followed by a discussion of relevant background information.

1.2 Report Organization

The PSA Groundwater Investigation Report is organized into the following sections:

Section	Purpose
Section 1 – Introduction	Provides a brief overview of the PSA groundwater investigation activities, site background information, and the objectives and scope of the groundwater investigation.
Section 2 – PSA Groundwater Investigation Activities	Describes the work activities performed for the PSA groundwater investigation.
Section 3 – PSA Groundwater Investigation Results	Presents the PSA groundwater investigation results.
Section 4 – References	Provides references used to prepare this report.

A summary of relevant background information relating to the Harper Substation is presented below, followed by the PSA groundwater investigation objectives.

1.3 Background Information

This section presents relevant background information for the Niagara Mohawk Harper Substation including the following:

- the location and physical setting for the site;
- a detailed facility description and site history;
- a description of topography and drainage in the vicinity of the site;
- the geologic and hydrogeologic settings of the site;
- a detailed discussion of groundwater flow patterns in the vicinity of the site and physical changes in the vicinity of the site that have impacted the groundwater flow patterns; and
- results obtained for previous hydrogeologic investigation activities conducted at and in the immediate vicinity of the Harper Substation as part of an offsite investigation for an Occidental Chemical Corporation (Occidental) facility located south of the Harper Substation.

1.3.1 Location and Physical Setting

The Harper Substation is located on Royal Avenue (between 47th Street and Hyde Park Boulevard) in the City of Niagara Falls, Niagara County, New York. A site location map is shown on Figure 1. The substation is located on a 25-acre rectangular parcel that is surrounded by industrial facilities to the north, south, and east.

The main access road to the substation extends from Royal Avenue, which borders the substation property to the north. The following industrial facilities and features are located in the vicinity of the Harper Substation:

- A large paper products manufacturing facility (Nitec Paper Corporation) is located directly across Royal Avenue to the north of the substation property;
- An inactive industrial facility (the former Frontier Chemical-Royal Avenue Plant) borders the substation property to the northeast;
- A large industrial facility (Praxair, the former Union Carbide Industrial Gases) is located immediately east and southeast of the substation;
- Another former Union Carbide facility (the current American Vanadium Corporation plant) is located to the east of the Praxair facility;
- A railroad siding borders the substation to the south (the railroad tracks extend from the Praxair facility east of the substation);
- Buffalo Avenue (NYS Route 383) is located on the opposite side of the railroad siding approximately 1,000 feet south of substation;
- A large industrial facility (Occidental Chemical, formerly Hooker Chemical) is located across Buffalo Avenue, to the south and southeast of the substation;
- A grass field borders the substation to the west. The field serves as the right of way for two large subsurface aqueducts that convey water from intakes located at the Niagara River (approximately 0.5 miles south of the substation) to the New York Power Authority (NYPA) Niagara Power Project forebay canal (located approximately 3.5 miles northwest of the substation). The subsurface aqueducts consist of twin 46-foot wide by 66-foot deep concrete-lined tunnels which are each capable of conveying up to 375,000 gallons of water per second. The volume of water diverted to the aqueducts is regulated under an international treaty with Canada; and
- Residential properties are located along the west side of 38th Street (across the NYPA right-of-way) approximately 1,000-feet west of the substation.

Based on a review of the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites for Region 9, the following NYSDEC-listed inactive hazardous waste disposal sites are located within a ½-mile radius of the Harper Substation:

Site/Owner	Location	NYSDEC Listing Classification
DuPont Plant Site E.I. DuPont deNemours & Company	½ mile southwest of the Harper Substation	Class 4
Frontier Chemical – Royal Avenue Trans Niagara Associates	Borders the Harper Substation to the northeast.	Class 2
Hooker Main Plant Occidental Chemical Corporation	½ mile south/southeast of the Harper Substation	Class 2
Hooker Plant "S" Area Occidental Chemical Corporation	½ mile southeast of the Harper Substation	Class 2
Olin Chemical – Disposal Well	½ mile southwest of the Harper Substation	Class 4

Site/Owner	Location	NYSDEC Listing Classification
Olin Chemicals Group		
Olin Corporation – Industrial Welding	½ mile west of the Harper Substation	Class 2
Olin Corporation Parking Lot Olin Chemicals Group	½ mile southwest of the Harper Substation	Class 3
Solvent Chemical - Corigan Sanorian	½ mile southwest of the Harper Substation	Class 2

Note: NYSDEC Listing Classifications are as follows:

- Class 2 – Indicates that the site is a significant threat to the public health and environment and action is required.
- Class 3 – Indicates that the site does not present a significant threat to public health or the environment.
- Class 4 – Indicates that the site has been properly closed and requires continued management.

The location of each above-listed inactive hazardous waste disposal site is shown on Figure 2. NYSDEC Inactive Hazardous Waste Disposal Reports for each of the above-listed sites are included in Appendix A.

In addition to being included on the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites, the Hooker Plant "S" Area site is also included on the National Priorities List (NPL) established under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Hooker Plant "S" Area is the only NPL site located within a one-mile radius of the Harper Substation.

1.3.2 Facility Description and Site History

A site map of the Harper Substation property is presented as Figure 3. The substation was originally constructed in the early 1920s by the Niagara Falls Power Corporation (a predecessor to Niagara Mohawk, a National Grid Company). As indicated on Figure 3, primary site features present at the Harper Substation Property include the following:

- An outdoor 25-cycle electrical substation and switching structure located near the center of the fenced substation area. The 25-cycle electrical substation and switching structure consist of a bank of three large 25-cycle transformers (Bank 7) which each contain approximately 3,000 to 3,500 gallons of mineral oil. Transformer Bank 7 is currently energized. The 25-cycle substation formerly included an additional bank of three large 25-cycle transformers (Bank 11, which was located north of Bank 7). The Bank 11 transformers were removed from the substation during the fall of 2000. The concrete pad that formerly supported the transformers remains in-place. Several concrete foundations that formerly supported additional electrical equipment items (including synchronous condensers and condenser switches) remain northeast of the pad for former Bank 11;

- A 60-cycle electrical substation and switching structure located in the western portion of the fenced substation area. The 60-cycle electrical substation (installed during the 1940s) includes two large 115-kilovolt (kV), three-phase transformers which each contain approximately 5,500-gallons of mineral oil. The substation also includes several smaller pieces of electrical equipment. A small substation control building is located along the east side of the 60-cycle substation and switching structure;

- A concrete block storage building located along the eastern fence line of the substation. The storage building is not currently in use and contains miscellaneous materials and surplus equipment. An underground gasoline storage tank was previously located directly south of the storage building. The tank was removed as part of an interim remedial measure (IRM) that is described in the *Interim Remedial Measures Summary Report* (BBL, February 2004); and

- Three abandoned concrete-lined structures that formerly served as cooling ponds for water-filled electrical equipment at the substation are located to the northwest of the storage building. The cooling ponds were filled during the late 1970s/early 1980s with miscellaneous construction and demolition debris.

In addition to the electrical equipment that is in-service at the substation, several spare substation electrical equipment items are currently stored for potential future reuse in the area north of the 25-cycle electrical substation. Treated wood utility poles are also stored on concrete and steel storage racks in the southern portion of the substation property.

A former building associated with substation operations known as the "Echota Building" was demolished between March and July 2000. The Echota Building was a multi-story brick structure that housed various circuit breakers, electrical equipment, and support facilities (including a control room, a pump room, a crane and repair building, and a room labeled "Niagara Junction Rotary Building"). A former two-story brick structure referred to as the "Terminal Building" was also demolished under the same contract as the Echota Building. The Terminal Building formerly contained electrical equipment (i.e., circuit breakers and switching equipment) associated with onsite electrical operations. The former locations of the Echota Building and the Terminal Building are shown on Figure 3.

According to Niagara Mohawk records, polychlorinated biphenyl- (PCB-) containing oil was historically used at the substation. Niagara Mohawk records indicate that electrical equipment in service at the substation as of 1991 contained approximately 15 gallons of PCB oil (oil containing PCBs at concentrations greater than 500 parts per million [ppm]) and approximately 15,500 gallons of PCB-contaminated oil (oil containing PCBs at concentrations between 50 and 499 ppm). Two pieces of electrical equipment in the 60-cycle substation are currently labeled as PCB-contaminated.

Niagara Mohawk substation drawings indicate that two horizontally mounted, aboveground oil storage tanks (with capacities of approximately 6,100 and 7,300 gallons) were previously located south of the storage building. The oil storage tanks were installed in the late 1920s and were removed in 1990. The concrete tank saddles remain and subsurface piping formerly associated with the storage tanks was cut and capped at the ground surface (subsurface piping associated with the tanks appears to remain in place). In addition, a Niagara Mohawk substation drawing indicates that three aboveground oil storage tanks were formerly located immediately west of the Crane and Repair Room of the former Echota Building. Niagara Mohawk substation drawings indicate that these tanks were associated with a system of underground oil supply and return piping utilized in servicing equipment. The concrete foundations that formerly supported the tanks west of the Echota Building remain in-place.

Niagara Mohawk site drawings indicate that a relatively complex system of underground utilities extends throughout the substation property, including underground conduits, electrical manholes and subways for equipment control cables, subsurface power feeds from the substation to various industrial facilities in the vicinity of the property, municipal sanitary sewers, and water supply piping. Several former or active industrial process pipelines (which convey material between industrial facilities in the vicinity of the property) also extend along the southern and eastern boundaries of the substation property. The locations of identified subsurface structures and utilities in the immediate vicinity of the substation are shown on Figure 3.

During the early 1990s, Occidental installed 11 groundwater monitoring wells at and in the immediate vicinity of the Harper Substation property as part of an environmental investigation (the "Off-Site Investigation") of their facility. Nine of the monitoring wells were installed at three monitoring well clusters (OW-652, OW-654, and OW-657) located on the Harper Substation property. Bedrock monitoring well cluster OW-651 (which

consists of two groundwater monitoring wells) was installed directly west of the Harper Substation property (on the NYPA right-of-way). The locations of the onsite and offsite well clusters are shown on Figure 3.

1.3.3 Topography and Drainage

Topographic mapping of the area in the vicinity of the Harper Substation indicates that the site is fairly level with surface elevations ranging between approximately 572 and 574 feet above mean sea level (AMSL). Stormwater runoff is currently conveyed offsite via overland flow. Prior to the Fall of 2000, stormwater runoff collected by onsite catch basins, drainage from selected onsite electrical subways and electrical manholes, and possibly groundwater infiltration was conveyed through a combination of private and city sewers beneath the substation (shown on Figure 3) to the Falls Street Tunnel (a 6-foot by 7-foot unlined trunk sewer that extends in an east-west direction beneath Royal Avenue). The Falls Street Tunnel begins at 56th Street (which is approximately 3,400 feet east of the substation) and continues approximately 3.5 miles westward to the Niagara River Gorge. In an additional effort to reduce the amount of dry-weather flow conveyed to the Falls Street Tunnels, the City of Niagara Falls blocked off subsurface drainage from the site during the fall of 2000.

Additional drainage features in the vicinity of the site include a 6-foot diameter concrete sewer (the Southside Interceptor), which extends parallel to the Falls Street Tunnel and a 4.5-foot diameter sanitary sewer (the Iroquois Street Sanitary Sewer), which is located east of the Harper Substation. The locations of municipal sewers in the vicinity of the substation are shown on Figure 3.

1.3.4 Geologic Setting

Soil in the vicinity of the substation has been reworked by industrial development. The United States Department of Agriculture (USDA) Soil Conservation Service (SCS) document entitled, "Soil Survey Maps of Niagara County, New York (USDA, 1972)," indicates that soil in the vicinity of the substation has not been mapped due to the extensive development in the Niagara Falls area.

Based on the soil investigation activities completed as part of the PSA, the majority of the substation is covered with fill material (i.e., crushed stone, sand, and gravel) that extends up to approximately 3 feet below ground surface (bgs). Soil encountered beneath the fill material consists primarily of till and glaciolacustrine deposits (mainly brown sand and silt overlying a reddish-brown clay and silt) that extend to bedrock at depths of approximately 14 to 22 feet bgs. Bedrock encountered beneath the overburden consists of Lockport Dolomite. The upper 10 to 25 feet of the Lockport Dolomite is a moderately permeable zone that contains relatively abundant bedding planes and interconnected vertical openings that have been enlarged over time by chemical dissolution (Miller and Kappel, 1987). The horizontal bedding planes in the vicinity of the Harper Substation slope gently downward (approximately 0.5%) from the north to the south, generally parallel to the natural layering of the bedrock. The bedrock surface beneath the Harper Substation slopes gently (approximately 1%) towards the south/southeast.

1.3.5 Hydrogeologic Setting

During the PSA, groundwater was encountered in both the overburden and bedrock beneath the site, at depths ranging from approximately 11 to 17 feet bgs. The water table generally occurs in the native overburden in the south/southeast portion of the site, where the depth to bedrock is greater. Groundwater may occur in fill in the vicinity of a 12-inch diameter City sewer that runs east-west across the substation. In the north/northwestern

portion of the site, the water table generally occurs in bedrock. Movement of water through the bedrock occurs primarily through bedding planes, vertical openings, and solution cavities. The upper 25 feet of the bedrock has a greater potential for movement of groundwater than deeper parts because it has more interconnected horizontal and vertical openings that have been widened by solutioning (Miller and Kappel, 1987). Most of the groundwater in the overburden and bedrock in the surrounding area is from infiltration of rainfall and snowmelt.

Groundwater in the vicinity of the Harper Substation is not used for drinking water. However, groundwater is withdrawn from several industrial facilities in the area (including the Occidental Chemical Corporation Main Plant, the DuPont Plant, and the Olin Chemical Corporation Plant) as part of on-going groundwater remedial activities. Based on regional groundwater potentiometric surface maps developed by Yager and Kappel (1997), the withdrawal of groundwater at these facilities does not appear to influence groundwater flow patterns in the immediate vicinity of the Harper Substation.

1.3.6 Groundwater Flow Patterns

Groundwater flow patterns in the vicinity of the Harper Substation have changed over time as a result of the construction of the Falls Street Tunnel in the early 1920s, construction of the NYPA Niagara Power Project in the early 1960s, and repairs to the Falls Street Tunnel in 1989. Groundwater flow patterns may have also changed as a result of work conducted by the City of Niagara Falls during 2000/2001 to reduce the amount of groundwater infiltration to the Falls Street Tunnel. Limited information is available regarding groundwater flow conditions in the Niagara Falls area prior to the 1960s. Therefore, interpretation of groundwater flow patterns in the vicinity of the substation prior to the 1960s is based primarily on assumptions regarding groundwater flow. Extensive information regarding groundwater flow patterns in the Niagara Falls area following the construction of the Niagara Power Project has been gathered by the United States Geological Survey (USGS), the NYSDEC, and industrial property owners in the area. The information was gathered to determine the effect of the power project on groundwater flow in the Lockport Dolomite and to further evaluate the migration of chemical constituents from several industrial facilities.

A summary of groundwater flow patterns in the vicinity of the Harper Substation prior to the 1920s, from the 1920s to the 1960s, from the 1960s to 1989, and post-1989 (prepared based on review of USGS and NYSDEC information) is presented below. The summary is presented to provide an understanding of current and former pathways for migration of chemical constituents in regional groundwater. This summary primarily focuses on groundwater in overburden and the upper 25 feet of bedrock. Much of the information presented in this summary was obtained from the report entitled, "*Effect of Niagara Power Plant Project on Groundwater Flow in the Upper Part of the Lockport Dolomite, Niagara Falls, New York*", Todd S. Miller and William N. Kappel (1987).

Pre-1920s Flow Patterns

Prior to the early 1920s (before construction of the Falls Street Tunnel), groundwater flow in the vicinity of the substation likely followed the south-southwest slope of the land surface and the southwest dip of the major bedding planes toward the Niagara River (Miller and Kappel, 1987).

1920s to 1960s Flow Patterns

Groundwater flow patterns in the vicinity of the Harper Substation reportedly changed in the early 1920s due to the construction of the Falls Street Tunnel. The unlined tunnel was constructed entirely within the upper portion of the Lockport Dolomite, sloping approximately 20 feet per mile from 56th Street (where the tunnel begins) to

the Niagara River Gorge. From approximately 4,000 feet west of the substation (at 27th Street) continuing to 56th Street, the tunnel is located within the relatively permeable upper 15 to 20 feet of the Lockport Dolomite. Invert elevations for this stretch of tunnel range from 549 feet AMSL at 56th Street to 533 feet AMSL at 27th Street. By comparison, the surface water level of the Niagara River south of the Falls Street Tunnel is typically around 560 feet AMSL. West of 27th Street, the tunnel is below the relatively permeable portion of the dolomite.

The section of tunnel east of 27th Street has historically been a significant infiltration point for groundwater in the area. East of 27th Street, the Falls Street Tunnel likely altered groundwater movement by creating a groundwater depression as water drained into the tunnel from the upper 25 feet of bedrock and possibly from the Niagara River (Miller and Kappel, 1987). Groundwater likely flowed into the eastern section of the Falls Street Tunnel (east of 27th Street) from the areas north and south of the tunnel. Historically, minimal groundwater infiltration has entered the Falls Street Tunnel west of 27th Street (Miller and Kappel, 1987). The volume of groundwater infiltration into the tunnel during this period is unknown. Based on mapping of inferred groundwater flow directions between the 1920s and 1960s (as developed by Miller and Kappel, 1987), groundwater in the vicinity of the Harper Substation flowed northward. Consequently, the Harper Substation was hydraulically downgradient from the Occidental Chemical Corporation main plant during this timeframe.

1960s to 1989 Flow Patterns

Groundwater flow patterns in the vicinity of the Harper Substation reportedly changed following the construction of the aqueducts that convey water from the Niagara River to the NYPA Niagara Power Project. Construction of the project began in 1958 and was completed in 1961. Twin 46-foot wide by 66-foot deep concrete-lined tunnels which are each capable of conveying up to 375,000 gallons of water per second were constructed immediately west of the substation. The tunnels were constructed in two separate parallel bedrock trenches that are between approximately 100 to 160 feet deep. The top of the aqueducts are typically more than 40 feet below the ground surface. A drainage system was integrated into the aqueduct construction. The drainage system consists of a series of vertical drains along the aqueduct sides and horizontal drains beneath each aqueduct (spanning the width and length of the aqueducts). The drains are open to the bedrock around the aqueducts, but are not directly open to the river or the forebay canal. A grout curtain surrounding the NYPA intakes was constructed as a measure to prevent a direct hydraulic connection between the river and the drainage system. However, river water has apparently managed to enter the drains (Yager and Kappel, 1997).

Two pumping stations were constructed as part of the Niagara Power Project. One pumping station is located just west of the Harper Substation (where the subsurface aqueducts pass under the Falls Street Tunnel), and the other is located adjacent to the forebay canal. The pumping stations have direct contact to water in both aqueducts and the drainage system surrounding the aqueducts (which are in hydraulic connection with the surrounding bedrock). The pumping stations were designed to pump water from the surrounding bedrock to reduce the hydrostatic pressure on the aqueduct walls when dewatering of the aqueducts is required. Each pumping station is also equipped with a balancing weir, which limits the groundwater in the drainage system surrounding the aqueducts. The balancing weir at the pumping station west of the Harper Substation limits the groundwater level in the drains so that it does not exceed 560 feet AMSL. When the water level in the drainage system exceeds the elevation of the balancing weir, water from the drains flows through the weir to a set of sumps. From the sumps, the water drains to the aqueducts which, in turn, discharge to the forebay canal. Since the drains surrounding the aqueducts are in hydraulic connection with the surrounding bedrock, the groundwater level near the aqueducts is indirectly effected by the balancing weirs.

During the construction of the NYPA aqueducts, an approximately 400-foot section of the Falls Street Tunnel was reconstructed using reinforced concrete pipe (to span the crossing over the aqueducts). Over time, the seals

around the pipe connections deteriorated, allowing groundwater to enter the pipe at a rate of approximately 6 million gallons per day by the early 1980s (Miller and Kappel, 1987) and 9.1 million gallons per day by the late 1980s (Yager and Kappel, 1997). This created a groundwater depression in the immediate vicinity of the intersection of the Falls Street Tunnel and the NYPA aqueducts. As a result, according to Miller and Kappel (1987), groundwater in the area (most likely including flow from the Occidental Chemical Corporation main plant and potentially the S-Area) was drawn toward this depression. The general groundwater flow direction in the vicinity of the Harper Substation during 1985 was toward the northwest (as shown on Figure 4).

Post-1989 Flow Patterns

The 400-foot long concrete pipe that conveys the Falls Street Tunnel over the NYPA aqueducts was pressure-grouted during 1989 in an effort to reduce the groundwater infiltration into the Falls Street Tunnel. As a result of the grouting activities, groundwater levels in the area rose approximately 4.9 feet (Yager and Kappel, 1997). Although the grouting efforts reduced infiltration into the concrete pipe, an increase in groundwater infiltration was noticed in the fractured bedrock walls of the Falls Street Tunnel immediately east and west of the grouted pipe. The combined groundwater infiltration into the tunnel immediately east and west of the grouted pipe totaled approximately 7.5 million gallons per day, with approximately 90% of the infiltration occurring west of the pipe (Yager and Kappel, 1997). Yager and Kappel (1997) indicate that groundwater flow near the Harper Substation shifted following the grouting activities from northwest (i.e., toward the pumping station at Royal Avenue, as shown on Figure 4) to northeast (i.e., toward the unsealed portion of the Falls Street Tunnel, as shown on Figure 5). It should be noted that the northeasterly groundwater flow direction that Yager and Kappel identified for the vicinity of the Harper Substation following the grouting activities is consistent with the flow direction identified by the PSA groundwater investigation activities (described in Section 2).

1.3.7 Occidental Off-Site Investigation

Although groundwater flow patterns in the vicinity of the Harper Substation have changed over time (as discussed above), the Occidental Chemical Corporation main plant facility has historically been hydraulically upgradient from the Harper Substation. This subsection focuses on relevant results from Occidental's Off-Site Investigation conducted during the early 1990s. Relevant results for the Off-Site Investigation were obtained from Occidental's Off-Site Investigation Program Phase I and II Reports (dated August 1992 and November 1993, respectively). Niagara Mohawk obtained sections of the reports from the NYSDEC in response to a Freedom of Information Law (FOIL) request.

As previously mentioned, nine groundwater monitoring wells (three monitoring well clusters containing three wells each) were installed on the Harper Substation property as part of Occidental's Off-Site Investigation. The locations of the well clusters (OW-652, OW-654, and OW-657) are shown on Figure 3. In addition, bedrock monitoring well cluster OW-651 (which consists of two groundwater monitoring wells) was installed directly west of the Harper Substation property (on the NYPA right-of-way) as part of the Off-Site investigation as shown on Figure 3. The wells within each cluster were installed to different depths in order to assess the groundwater quality within various characteristic bedrock layers as summarized in Table 1. Subsurface conditions encountered during the installation of Occidental's offsite monitoring well clusters at and in the vicinity of the Harper Substation (including clusters OW-651, OW-652, OW-654, and OW-657) and details for each well completion are summarized on the monitoring well completion logs presented in Appendix B.

Groundwater samples were collected from one or more wells at each monitoring well cluster during an initial phase of the Off-Site Investigation in December 1991 and a second phase in February/March 1992. Each groundwater sample was analyzed for specific list of volatile organic compounds (VOCs) and semi-volatile

organic compounds (SVOCs) associated with the Occidental site. Based on available information, none of the groundwater samples appear to have been analyzed for PCBs. Based on the analytical results, 29 different VOCs and SVOCs were detected in the groundwater samples at concentrations exceeding the ambient groundwater quality standards presented in the NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) document entitled, "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations" (TOGS 1.1.1, June 1998). Concentrations of several chemical constituents detected in the groundwater samples exceeded the groundwater quality standards presented in TOGS 1.1.1 by two to three orders of magnitude (including benzene, trichloroethene, 1,2,4-trichlorobenzene, 1,2,3,4-tetrachlorobenzene, 1,2,4,5-tetrachlorobenzene, alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane, gamma-hexachlorocyclo-hexane, and delta-hexachlorocyclohexane).

During the initial phase of the Off-Site Investigation, NAPL (presumably LNAPL) was observed in monitoring well OW-654D at a depth of approximately 26 feet bgs (elevation of approximately 544 feet). The depth of LNAPL was consistent with the approximate invert elevation of the Iroquois Street Sanitary Sewer to the east. A sample of the LNAPL was collected for analysis of specific VOCs and SVOCs. The results obtained for the LNAPL sample indicated the presence of VOCs/SVOCs at concentrations that were 15 to 20 percent in the sample (including C56 hexachlorocyclopentadiene, trichlorobenzene, and tetrachlorobenzene). LNAPL was not encountered at monitoring well OW-654D during the second phase of the Off-Site Investigation. In addition, LNAPL was not encountered at the well during the PSA activities conducted by BBL. However, NAPL (apparently DNAPL) was encountered at monitoring well OW-654D during the second phase of the Off-Site Investigation at a depth of approximately 57 bgs (elevation of approximately 513 feet). Occidental concluded that the NAPL encountered at OW-654D was not attributed to their operations, citing the southward slope of the bedding planes, the presence of NAPL in three monitoring wells located to the north of OW-654D, and the absence of NAPL at sampling locations closer to their facility as evidence.

1.4 PSA Groundwater Investigation Objectives

The PSA groundwater investigation was conducted to achieve the following objectives:

- Characterize the geologic and hydrogeologic conditions beneath the Harper Substation;
- Evaluate the influence of fluctuating water levels in the Niagara Power Project forebay canal (transmitted via drains surrounding the two NYPA subsurface aqueducts) on groundwater flow beneath the substation;
- Evaluate horizontal groundwater flow direction and hydraulic gradients beneath the substation;
- Determine the presence and extent of chemical constituents in the uppermost groundwater zone at the site;
- Determine whether chemical constituents may be migrating onsite or offsite in groundwater flow;

Based on the initial results obtained for the PSA groundwater investigation (as summarized in Niagara Mohawk's February 7, 2000 letter to the NYSDEC), the following additional PSA groundwater investigation objectives were formulated:

- Evaluate potential sources of LNAPL encountered in monitoring well MW-3; and
- Provide data to evaluate requirements for interim or long-term remedial measures to address the presence of chemical constituents in groundwater at the site.

A description of the PSA groundwater investigation field activities is presented below, followed by a summary of the PSA groundwater investigation results.

2. PSA Groundwater Investigation Activities

2.1 General

This section presents a description of the field activities performed as part of the PSA groundwater investigation to meet the objectives set forth in Section 1.4. Work activities performed in connection with the PSA groundwater investigation included the following:

- Installing three bedrock monitoring wells (MW-1, MW-3, and MW-5) and two overburden monitoring wells (MW-2 and MW-4) during the initial PSA groundwater investigation activities;
- Installing four overburden/bedrock interface monitoring wells (MW-3S and MW-6 through MW-8) during the third phase of the PSA groundwater investigation activities;
- Developing each new monitoring well, except for monitoring well MW-3 (to avoid potentially redistributing the LNAPL encountered on the groundwater surface in the well);
- Performing in-situ hydraulic conductivity tests at each new monitoring well;
- Obtaining static water level measurements at each new and existing monitoring well (including the monitoring wells installed on/adjacent to the property as part of Occidental's Off-Site Investigation);
- Obtaining continuous water level measurements at selected new monitoring wells;
- Probing each new and existing monitoring well for the presence of LNAPL or DNAPL;
- Collecting three separate rounds of groundwater samples from monitoring wells MW-1, MW-2, MW-4, and MW-5 and one complete round of groundwater samples from the overburden/bedrock interface monitoring wells;
- Collecting an LNAPL sample from monitoring well MW-3 during each groundwater sampling event; and
- Completing 12 Geoprobe® soil borings and collecting subsurface soil samples from five of the borings for laboratory analysis.

The PSA groundwater investigation activities are described below.

2.2 Groundwater Monitoring Well Installation

Three new bedrock groundwater monitoring wells (monitoring wells MW-1, MW-3, and MW-5) and two new overburden groundwater monitoring wells (monitoring wells MW-2 and MW-4) were installed at the substation during July 1999 as part of the initial phase of the PSA groundwater investigation. The new overburden and bedrock monitoring wells were installed to provide a preliminary evaluation of groundwater quality and evaluate the direction of groundwater flow beneath the substation. Groundwater samples were collected from the monitoring wells installed as part of the initial phase of the PSA groundwater investigation during August 1999

and April 2000. Based on the groundwater sampling results, additional overburden/bedrock interface monitoring wells (MW-3S and MW-6 through MW-8) were installed at the substation during August 2000 to further evaluate groundwater flow conditions and provide additional groundwater analytical data to confirm the results of the initial groundwater investigation activities.

Monitoring wells MW-1 through MW-5 were installed by Maxim Technologies, Inc. (Maxim). Monitoring wells MW-3S and MW-6 through MW-8 were installed by Parratt-Wolff, Inc. (Parratt-Wolff). The monitoring well locations are shown on Figure 3. Prior to installing the monitoring wells, soil borings were completed at each well location using hollow-stem auger drilling methods. The augers were advanced through the overburden to a depth of approximately 6 to 18 inches into bedrock. The top of bedrock was encountered at depths ranging from approximately 12 to 22 feet below the ground surface. Drilling was performed using a truck-mounted CME-75 drill rig equipped with 6¼-inch inside diameter hollow-stem augers. Overburden soil at each monitoring well location was continuously sampled at 2-foot depth intervals using a 2-foot long, 2-inch outside diameter, split-spoon sampling device. Each soil sample recovered from the borings was visually characterized for color, grain size, and moisture content. A photoionization detector (PID) was used to measure the relative concentration of VOC vapors in each soil sample collected from the borings completed at the overburden/bedrock interface wells during August 2000. Due to an instrument error, PID measurements were not obtained during the installation of the overburden and bedrock monitoring wells installed during July 1999. Soil cuttings generated by the soil boring activities were placed in 55-gallon drums for disposal by Niagara Mohawk in accordance with applicable rules and regulations.

Once the top of bedrock was encountered during the installation of monitoring wells MW-1 through MW-5, the water level in the augers was checked using an electronic water level indicator. If a sufficient amount of water was present above the top of the bedrock surface within the borehole (at least approximately 5 feet), then an overburden monitoring well was installed. If an insufficient amount of water was encountered above the bedrock surface within the borehole, then a bedrock monitoring well was installed. At the locations selected for installation of a bedrock monitoring well (monitoring wells MW-1, MW-3, and MW-5), a rock socket was installed by advancing the hollow stem augers (or a roller bit) into the bedrock and setting 4-inch diameter steel casing in place to the bottom of the socket. A cement/bentonite grout was tremied around the casing to the ground surface. After the grout had adequately set, the borehole was advanced using HQ coring techniques to a depth of approximately 5 feet below the groundwater level within the Lockport formation.

NAPL was encountered in a rock core recovered from a depth of approximately 18 to 24 bgs at the location of monitoring well MW-3. Following installation of MW-3, approximately 2.5 inches of LNAPL was identified on the surface of groundwater, which was encountered at approximately 11.5 feet bgs (which is equivalent to approximately 12.5 feet above the top of the well screen).

Following drilling/coring, 2-inch diameter Schedule 40 polyvinyl chloride (PVC) monitoring wells were installed in the soil borings/core holes. Monitoring wells MW-1, MW-2, MW-4, and MW-5 were installed using 9 feet of 2-inch diameter PVC well screen positioned to straddle the water table. Monitoring well MW-3 was installed using 5 feet of 2-inch diameter well screen positioned to straddle the surface of NAPL encountered within the corehole. Monitoring wells MW-1 through MW-5 were each constructed using a one-foot long sump (to recover DNAPL, if encountered). The well screens installed in each monitoring well had a 0.010-inch slot size.

Based on the subsurface conditions encountered during the initial PSA groundwater investigation activities, Niagara Mohawk anticipated that groundwater would be encountered approximately 1 to 2 feet below the bedrock surface at monitoring well locations MW-3S and MW-6 through MW-8. Therefore, Niagara Mohawk elected to construct monitoring wells MW-3S and MW-6 through MW-8 as overburden/bedrock interface

Well ID	Total Volume of Water Removed		Turbidity (NTUs)		Final Conductivity (mS/cm)	Final pH (S.U.)
	Gallons	Well Volumes	Initial	Final		
MW-8	15	12.8	514	198	0.96	7.5

Notes:
1. NTUs = Nephelometric turbidity units.
2. mS/cm = millisiemens per centimeter.
3. S.U. = standard units.
4. > 999 = indicates that the turbidity of the groundwater was greater than the instrument detection range.

After removing a minimum of three well volumes from each well, the pH and conductivity of the water in each well stabilized. Additional development was conducted at each well in an effort to achieve the turbidity level goal of 50 nephelometric turbidity units (NTUs). However, it was not possible to achieve the turbidity level goal using reasonable means during development. Nonetheless, the 50 NTU turbidity level goal was achieved during low-flow sampling at each well with the exception of MW-4 during the April 2000 sampling event and MW-2 and MW-7 during the September 2000 sampling event, as indicated on the groundwater sampling logs included as Attachment F.

2.3 Hydraulic Conductivity Testing

In-situ rising head hydraulic conductivity tests (slug tests) were performed approximately 2 to 4 weeks following the installation and development of each new monitoring well to evaluate the hydraulic conductivity of the geologic formation surrounding the well screens. Static water levels were obtained from each well prior to testing. The slug tests entailed creating an "instantaneous" water level (head) change in the well and then monitoring the recovery in water levels over time. Following the initial head change, the water levels were measured and recorded with respect to time using the following equipment:

- Pressure transducers and dataloggers at monitoring wells MW-1 through MW-5 (on August 19, 1999); and
- Continuous water level monitors (Trolls) at monitoring wells MW-3S and MW-6 through MW-8 (on September 4, 2000).

Based on the recorded water level measurements, the Bouwer and Rice Method (1976) was used to calculate the hydraulic conductivity of the material surrounding the screened interval of each well. The calculated in-situ hydraulic conductivity (K) values are as follows:

Well Location	Material Tested	Hydraulic Conductivity (cm/sec)
MW-1	Bedrock	9.39×10^{-2}
MW-2	Overburden	3.49×10^{-4}
MW-3	Bedrock	1.18×10^{-1}
MW-3S	Bedrock	1.12×10^{-1}
MW-4	Overburden	9.38×10^{-4}
MW-5	Bedrock	1.01×10^{-2}

Well Location	Material Tested	Hydraulic Conductivity (cm/sec)
MW-6*	Overburden/Bedrock	1.61×10^{-2}
MW-7	Bedrock	2.18×10^{-3}
MW-8	Bedrock	1.05×10^{-2}

Notes:
1. cm/sec = centimeter per second.
2. * = During the K test, approximately 7 feet of water was present in the well, 6 feet were in bedrock and 1 foot was in clay. Since the clay layer yields relatively much less water than the upper fractured bedrock, the K value obtained from this well is indicative of bedrock.

Data from the in-situ hydraulic conductivity tests performed on the wells indicates the following hydraulic conductivity ranges for the overburden and bedrock:

- Overburden: 3.49×10^{-4} cm/sec (MW-2) to 9.38×10^{-4} cm/sec (MW-4); and
- Bedrock: 2.18×10^{-3} cm/sec (MW-7) to 1.18×10^{-1} cm/sec (MW-3).

The geometric mean hydraulic conductivities calculated for the overburden and bedrock are summarized below:

- Overburden: 5.72×10^{-4} cm/sec; and
- Bedrock: 2.40×10^{-2} cm/sec.

The geometric mean hydraulic conductivity for bedrock (2.40×10^{-2} cm/sec) is comparable to the hydraulic conductivity estimated by Yager and Kappel, 1997 (4×10^{-2} cm/sec). The water level measurements, computational documentation, and comparison graphs for the rising head hydraulic conductivity tests are provided in Appendix E.

2.4 Fluid Level Measurement

As indicated above, the PSA included three groundwater sampling events. Prior to each sampling event, BBL used an oil-water interface probe to measure the groundwater depth and determine whether LNAPL or DNAPL were present in monitoring wells MW-1 through MW-5. In addition, prior to the third sampling event (September 2000), BBL also used the probe to measure the groundwater depth and determine whether LNAPL or DNAPL were present in the overburden/bedrock interface monitoring wells (MW-3S and MW-6 through MW-8) and well clusters OW-651, OW-652, OW-654, and OW-657 (at each well within the clusters).

Approximately 2 to 4 inches of LNAPL was present in monitoring well MW-3 during each round of fluid-level measurements. In addition, trace amounts of LNAPL were present in monitoring wells OW-651C, OW-652C, and OW-657C during the September 2000 fluid level measurements. Evidence of the LNAPL consisted of an oil film that was observed on the oil-water interface probe as the probe was withdrawn from the well. LNAPL was not encountered in any other monitoring wells (besides MW-3, OW-651C, OW-652C, and OW-657C) during the PSA. DNAPL was not encountered in any of the monitoring wells checked during the PSA.

Groundwater and LNAPL elevations were calculated by subtracting the depth to groundwater and LNAPL measured in the field from the surveyed top-of-casing elevations obtained by Niagara Mohawk's surveyors. The depths and elevations of the groundwater/LNAPL encountered in the wells are summarized in Table 1. As indicated in Table 1, the depth to groundwater/LNAPL beneath the substation ranged from approximately 11 to

17 feet bgs. A groundwater potentiometric surface map for water-level measurements obtained on September 5, 2000 (using the water level data obtained from each Niagara Mohawk monitoring well and Occidental bedrock wells OW-654D and OW-657D) is included as Figure 7. Due to uncertainty in the depth of the screened intervals for Occidental monitoring well clusters OW-651 and OW-652 (BBL was unsure which wells were shallow bedrock wells), water-level data obtained for these wells was not used to develop the September 5, 2000 groundwater potentiometric surface map. The water-level-measurement results obtained for all three PSA sampling events indicate that groundwater beneath the substation flows toward the northeast, which is consistent with the findings of Yager and Kappel (1997).

2.5 Continuous Groundwater Level Measurement

Continuous groundwater level measurements were obtained during the initial phase of the PSA groundwater investigation to evaluate whether daily water level fluctuations in the Niagara Power Project forebay canal produce groundwater elevation fluctuations at the substation. After determining that the groundwater levels at the substation are influenced by the water level fluctuations in the forebay canal, additional continuous water level measurements were obtained during the second phase of the PSA to evaluate possible changes in the groundwater flow direction in the vicinity of the substation that may be associated with changing water levels in the forebay canal and to identify possible water level fluctuation influences on the distribution of LNAPL encountered in monitoring well MW-3. Descriptions of the groundwater level measurement activities performed during the initial and second phases of the PSA groundwater investigation are presented below.

Initial Continuous Groundwater-Level Measurement

The initial continuous water-level measurements were obtained at the request of the NYSDEC, as outlined in an April 2, 1999 letter to Niagara Mohawk that provided NYSDEC comments on the PSA Work Plan (BBL, November 1998). As part of the initial continuous water level measurement activities, pressure transducers were installed in monitoring wells MW-4 and MW-5 to measure the change in water levels every five minutes, starting at approximately 6:00 PM on Friday, August 20, 1999 and continuing until approximately 12:00 noon on Monday, August 23, 1999. The water-level changes measured by the pressure transducers were recorded using two dataloggers.

Additional Continuous Groundwater Level Measurement

Additional continuous water level measurements were obtained pursuant to a recommendation presented in Niagara Mohawk's February 7, 2000 letter to the NYSDEC. As part of the additional continuous water level measurement activities, pressure transducers were installed in monitoring wells MW-1 through MW-5 to measure the change in water levels over a one week period beginning on April 26, 2000 and ending on May 3, 2000. Water levels were initially recorded by the Trolls at a frequency of several times per minute. The frequency of the water level measurements was gradually reduced until a final measurement frequency of one reading per 20 minutes was reached approximately 4 to 5 hours into the measurement period. Due to a battery failure in the pressure transducer installed at monitoring well MW-1, continuous water level data were not obtained for monitoring well MW-1.

2.6 LNAPL Sampling

As mentioned above, approximately 2 to 4 inches of LNAPL was encountered in monitoring well MW-3 during each phase of the PSA groundwater investigation. The LNAPL was characterized as a brown/cream-colored

fluid that exhibited a strong odor. BBL collected samples of the LNAPL from monitoring well MW-3 during each phase of the PSA groundwater investigation (on July 21, 1999, April 24, 2000, and September 7, 2000). Each LNAPL sample was collected using a dedicated bailer, transferred into appropriate sample containers, and submitted for laboratory analysis for PCBs, VOCs, and SVOCs. Analytical methods used for the laboratory analysis of the LNAPL samples are listed in the table below.

Parameter	Analytical Method
PCBs	USEPA SW-846 Method 8082
VOCs	USEPA SW-846 Method 8260
SVOCs	USEPA SW-846 Method 8270

The specific VOCs and SVOCs that were analyzed included the compound lists established for the above-referenced methods by the USEPA (and selected VOCs on the supplemental compound list established for Method 8260 by the USEPA). Laboratory analysis of the LNAPL samples for PCBs and SVOCs was performed by Galson Laboratories, Inc. (Galson) of East Syracuse, New York. Galson subcontracted with O'Brien & Gere Laboratories, Inc. (OBG) of Syracuse, New York to analyze the LNAPL sample collected during the initial phase of the PSA groundwater investigation for VOCs. Galson subcontracted with Columbia Analytical Services, Inc. (Columbia) for the VOC analysis of the LNAPL samples collected during the second and third phases of the PSA groundwater investigation.

2.7 Groundwater Sampling

Prior to each of the three sampling events, BBL used low-flow pumping techniques (i.e., a peristaltic pump with dedicated disposable tubing) to purge the monitoring wells. Field parameters (including pH, conductivity, dissolved oxygen, temperature, and turbidity) were measured approximately every 5 minutes during purging. These are presented on the groundwater sampling logs included in Appendix F. Final field parameter measurements (at the time of sampling) are summarized below.

Monitoring Well ID	pH (S.U.)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	Turbidity (NTU)
August 20 and 23, 1999					
MW-1	7.7	0.33	2.3	13.8	3.4
MW-2	8.0	0.60	9.9	15.5	13.1
MW-4	7.6	0.41	1.8	15.8	36.8
MW-5	9.3	0.33	0.8	11.9	5.1
April 24-25, 2000					
MW-1	7.7	0.34	3.0	9.9	6.8
MW-2	7.5	0.69	*	11.7	35.7
MW-4	7.6	0.93	0.79	12.0	892.3
MW-5	10.2	0.70	1.1	11.9	11.9
September 5-7, 2000					
MW-1	7.3	0.39	1.3	13.9	32.0
MW-2	7.2	0.94	5.0	15.1	639.0

Monitoring Well ID	pH (S.U.)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	Turbidity (NTU)
MW-3S	7.3	0.34	1.6	14.7	33.2
MW-4	7.1	0.48	6.9	14.2	47.2
MW-5	7.4	0.37	1.4	11.9	26.5
MW-6	7.5	0.44	0.4	13.9	14.8
MW-7	7.5	0.96	1.6	14.0	223.0
MW-8	7.5	0.45	1.5	14.1	15.1

Notes:

1. Field parameter measurements were obtained prior to sampling on the dates indicated.
2. S.U. = Standard units.
3. mS/cm = millisiemens per centimeter.
4. mg/L = milligrams per liter.
5. NTU = nephelometric turbidity units.
6. * = The reading for monitoring well MW-2 purge water indicated >12.9 mg/L for DO.
7. The values presented above for MW-4 (August 20 and 23, 2000) and MW-2 and MW-7 (September 5-7, 2000) were measured immediately before pumping the well dry during purging before sampling. The wells were allowed to recover for 1 to 2 hours prior to sampling. Visually, the groundwater samples collected following well recovery were relatively clear (i.e., relatively low turbidity) in comparison with the groundwater during well purging. However, an insufficient volume of water was obtained to perform additional field parameter measurements.

After field parameter measurements stabilized during the well purging, groundwater samples were collected from each well using low-flow sampling techniques. Groundwater samples were collected via a peristaltic pump with dedicated tubing (with the exception of samples collected for VOC analysis). Groundwater samples submitted for laboratory analysis for VOCs were collected using dedicated polyethylene bailers. The groundwater samples collected from each well were submitted to Galson for laboratory analysis for PCBs, VOCs, SVOCs, and TAL inorganic constituents. Galson subcontracted with OBG Laboratories to analyze the August 1999 groundwater samples for cyanide. Analytical methods used for the laboratory analysis of the groundwater samples are listed in the table below.

Parameter	Analytical Method
PCBs	USEPA SW-846 Method 8082
VOCs	USEPA SW-846 Method 8260
SVOCs	USEPA SW-846 Method 8270
TAL Inorganic Constituents	USEPA SW-846 Method 6010 (except for mercury which was analyzed using Method 7470, and cyanide which was analyzed using Method 9010)

The specific VOCs and SVOCs that were analyzed included the compound lists established for the above-referenced methods by the USEPA (and selected VOCs on the supplemental compound list established for Method 8260 by the USEPA).

Based on an error in the SVOC analysis of the April 2000 groundwater samples collected from monitoring wells MW-4 and MW-5 (i.e., internal quality control standards were not achieved by Galson), BBL remobilized to the site and collected additional groundwater SVOC samples from MW-4 and MW-5 on May 18, 2000.

Quality assurance/quality control (QA/QC) samples, including one blind duplicate sample, one matrix spike sample, one matrix spike duplicate sample, and one trip blank sample were collected in support of each PSA groundwater sampling event as required by the NYSDEC-approved PSA Work Plan (BBL, November 1998). The blind duplicate samples consist of the following:

- Sample DUP-2, which was collected from monitoring well MW-5 during the August 1999 sampling event;
- Samples FD042500 and FD051800, which were collected from monitoring well MW-5 during the April/May 2000 sampling event; and
- Sample FD090500, which was collected from monitoring well MW-6 during the September 2000 sampling event.

An analytical sample summary listing the samples collected and analyses performed is included as Table 2. The analytical results obtained from laboratory analysis of the PSA groundwater samples are discussed in Section 3.

2.8 Geoporobe® Soil Boring and Sampling

Soil investigation activities were conducted during August 2000 to evaluate potential sources for the LNAPL encountered in monitoring well MW-3. BBL's subcontractor, Parratt-Wolff, used a truck-mounted Geoprobe® sampling rig to complete soil borings at 12 locations in the vicinity of monitoring well MW-3 and the 60-cycle transformers (locations GP-01 through GP-12, as shown on Figure 3). The soil borings were completed to the top of shale bedrock, which was encountered at depths of approximately 12.0 to 15.5 feet bgs. The soil borings were distributed as follows:

- Eight soil borings were completed between monitoring well MW-3 and the northern-most 60-cycle transformer (soil borings GP-01 through GP-08);
- Three soil borings were completed between the two 60-cycle transformers (soil borings GP-09 through GP-11); and
- One soil boring was completed southwest of the southern-most 60-cycle transformer (soil boring GP-12).

Prior to initiating the soil boring activities, crushed stone and vegetation were cleared from the ground surface at the drilling locations. Soil samples were recovered continuously to the top of bedrock at each location using a 4-foot long macro core sampler. Each soil sample was characterized for the presence of visible staining and/or obvious odors. A portion of the soil sample recovered from each sampling interval was placed in a glass jar for headspace screening using a PID. Visible oil staining and obvious odors were not encountered in any of the recovered soil samples. No organic vapors were detected for headspace screening of the soil samples recovered from the borings. Subsurface conditions encountered at each soil boring location are summarized on the soil boring logs included as Appendix G.

Soil samples collected from five of the soil borings [samples GP-01 (13-15'), GP-03 (10-12'), GP-08 (12.5-14.5'), GP-09 (13-15'), and GP-12 (13.5-15.5')] were submitted to Galson for laboratory analysis for PCBs, VOCs, SVOCs, and inorganic constituents using the analytical methods presented in the table below.

Parameter	Analytical Method
PCBs	USEPA SW-846 Method 8082
VOCs	USEPA SW-846 Method 8260
SVOCs	USEPA SW-846 Method 8270
TAL Inorganic Constituents	USEPA SW-846 Method 6010 (with the exception of mercury by Method 7470/7471 and cyanide by Method 9010)

The specific VOCs and SVOCs that were analyzed for the soil samples included the compound lists established for the above-referenced methods by the USEPA and selected VOCs on the supplemental compound list established for Method 8260 by the USEPA. The samples submitted for laboratory analysis were selected to provide a distribution of data in the vicinity of the 60-cycle transformers and monitoring well MW-3. QA/QC samples, including one blind duplicate sample, one matrix spike sample, and one matrix spike duplicate sample were collected in support of the additional soil investigation activities as required by the NYSDEC-approved PSA Work Plan (BBL, November 1998). The blind duplicate sample (sample FD082400) was collected from the 12.5 to 14.5 foot depth interval of soil boring GP-08.

3. PSA Groundwater Investigation Results

3.1 General

This section presents the results of the PSA groundwater investigation, including analytical results obtained for the laboratory analysis of the LNAPL samples, groundwater samples, and additional soil samples.

3.2 Groundwater Level Fluctuations

As presented in Section 1, Miller and Kappel (1987) previously determined that water level fluctuations in the Niagara Power Project forebay canal were influenced by the water levels in the drains surrounding the two NYPA subsurface aqueducts. The water level fluctuations had been observed as far south as the Falls Street Tunnel. Until the PSA, no information had been obtained regarding the groundwater level fluctuations south of the Falls Street Tunnel in the vicinity of the Harper Substation. Continuous water level measurements were obtained during the initial phase of the PSA groundwater investigation (August 1999) to evaluate whether daily water level fluctuations in the Niagara Power Project forebay canal cause groundwater elevation fluctuations at the substation. The continuous water level measurements obtained for the PSA groundwater investigation are discussed below.

Continuous Water Level Measurement Results - August 1999

Continuous water level measurements were obtained from monitoring wells MW-4 and MW-5 during the initial PSA groundwater investigation activities. The measurement period began at 6:00 PM on Friday, August 20, 1999 and continued until approximately 12:00 noon on Monday, August 23, 1999. The depths to groundwater obtained from the continuous water level measurement activities at monitoring wells MW-4 and MW-5 were converted to groundwater elevations (referenced to the NAVD of 1988). A graph showing the calculated groundwater elevation changes during the initial continuous water level monitoring period is presented in Appendix H. The continuous water level measurement results indicate the following:

- The water level fluctuations in monitoring wells MW-4 and MW-5 are in phase with one another (i.e., the rising and falling water levels in both wells occur at approximately the same time) and appear to roughly coincide with the daily water level fluctuations in the NYPA forebay canal. The lowest water levels in the monitoring wells were observed around 6:00 AM (i.e. when the water in the forebay canal is typically near the lowest level). The water levels in the wells rose continuously from around 6:00 AM to approximately 6:00 PM. The water level in the forebay canal typically rises during approximately the same period from the combined effect of diverting water from the Niagara River through the aqueducts and releasing water from the Lewiston Reservoir (which allows the NYPA to maximize hydroelectric power generation during periods of maximum demand). The water levels in monitoring wells MW-4 and MW-5 declined from approximately 6:00 PM to around 6:00 AM, when the next cycle of water level fluctuations began. During roughly the same period (i.e., from the evening until the morning), water diverted from the Niagara River through the aqueducts is pumped to re-supply the Lewiston Reservoir;

- Although monitoring well MW-5 is located approximately 200 feet further from the aqueducts than monitoring well MW-4, the magnitude of the water level fluctuation measured at monitoring well MW-5 was greater than the fluctuation measured at monitoring well MW-4 (i.e., an approximately 2.3 foot fluctuation was measured at monitoring well MW-5, while an approximately 1.9 foot fluctuation was

measured at monitoring well MW-4). As indicated in Section 2, monitoring well MW-4 was screened entirely within the overburden, while monitoring well MW-5 was screened entirely within bedrock (the Lockport Dolomite formation which also surrounds the drains for the NYPA subsurface aqueducts). Hydraulic conductivity test results indicate that the conductivity of the bedrock at monitoring well MW-5 is an order of magnitude greater than the conductivity of the overburden at monitoring well MW-4. The larger water level fluctuation at monitoring well MW-5 may be due to the higher hydraulic conductivity of the bedrock surrounding the well screen (as compared to the overburden surrounding the well screen at monitoring well MW-4);

- The water level fluctuation at monitoring well MW-4 lagged approximately two hours behind the water level fluctuation at monitoring well MW-5. The time difference between the wells in responding to changes in the water level fluctuation of the NYPA forebay canal may also be due to the differences between the hydraulic conductivity of the bedrock and overburden;

- The average water level during the continuous water level monitoring period at monitoring well MW-4 (approximately 557.3 feet) was approximately 2.2 feet higher than the average water level during the same period at monitoring well MW-5 (approximately 555.1 feet); and

- The graph of the water level fluctuations for monitoring well MW-5 (included as Appendix H) shows several oscillations (ranging in magnitude from approximately 0.1 to 0.3 feet) when the groundwater elevation fell below 554.4 feet. Similar oscillations were not observed in the graph of water level fluctuations for monitoring well MW-4. The cause of the oscillations was not determined.

The results of the initial continuous water level monitoring indicate that the groundwater levels at the Harper Substation are influenced by the fluctuations in the NYPA forebay canal. However, an additional evaluation was deemed necessary to assess the potential impact of the water level fluctuations on groundwater flow direction(s) in the vicinity of the site.

Additional Continuous Water Level Measurement Results - April/May 2000

Additional continuous water level measurements were obtained from monitoring wells MW-2 through MW-5 during the second phase of the PSA groundwater investigation activities over a one week period beginning on April 26, 2000 and ending on May 3, 2000. The depths to groundwater for the additional continuous water level measurement activities were converted to groundwater elevations (referenced to the NAVD of 1988). A graph showing the calculated groundwater elevation changes during the additional continuous water level monitoring period is presented in Appendix H. The additional continuous water level measurement results indicate the following:

- The water-level fluctuations within monitoring wells MW-2 through MW-5 are in phase with one another (i.e., the rising and falling water levels in each well occur at approximately the same time) and appear to roughly coincide with the daily water level fluctuations in the NYPA forebay canal. Water levels within the monitoring wells generally increased during the period between the early morning hours (12:00 AM to 4:00 AM, when water levels in the monitoring wells are generally the lowest) and the early evening hours (5:00 PM to 9:00 PM, when water levels in the monitoring wells are generally the highest). The average period between the highest and lowest water levels was approximately 7 to 9 hours and between the lowest and highest water levels was approximately 15 to 17 hours;

- Monitoring well MW-3 appears to be the first to respond to changes in water level fluctuations in the NYPA forebay canal. A slight lag (approximately 0.5 to 1 hour) in water level response was noticed between

monitoring wells MW-4/MW-5 as compared to monitoring well MW-3. A fairly consistent lag in water level response of approximately 2 to 2.5 hours was observed in monitoring well MW-2 as compared to monitoring well MW-3. The water level response lag in the monitoring wells may be due to the hydraulic conductivities of the geologic formations surrounding the well screens and a poorer hydraulic communication between the wells and the drains surrounding the NYPA subsurface aqueducts;

- During the one-week continuous water level measurement period, the groundwater elevations in monitoring wells MW-2 and MW-3 were consistently higher than the groundwater elevations in monitoring wells MW-4 and MW-5. In addition, at most times the groundwater elevation in monitoring well MW-2 was greater than the groundwater elevation in monitoring well MW-3. The influence of monitoring wells MW-2 and MW-3 appears to create a trough effect in the groundwater flow. The overall groundwater flow direction in the vicinity of monitoring wells MW-2 through MW-5 appears to be toward the northeast. Based on several potentiometric surface contour maps, which were prepared for different times of the day during the water level fluctuation cycle, the apparent centerline of the groundwater flow in the trough shifted slightly with time (5 to 10 degrees around an average center line) but the overall flow direction was consistently towards the northeast. Based on the northeasterly groundwater flow direction at the site, no monitoring wells were located downgradient from monitoring well MW-3 (where LNAPL was observed) and no monitoring wells were located downgradient from monitoring wells MW-1, MW-4, and MW-5 (where PCBs were detected in the groundwater samples, as discussed below). In addition, no monitoring wells were located downgradient from potential sources of the LNAPL and PCBs encountered at the site (i.e., the 25- and 60-cycle transformers and underground gasoline storage tank). Based on the groundwater flow direction at the site, additional monitoring wells were installed downgradient of potential source areas as part of the third phase of the PSA groundwater investigation during August 2000;

- The average daily water level fluctuations in the onsite groundwater monitoring wells (i.e., the average difference between the highest and lowest water elevation in each well) ranged from 1.26 feet in monitoring well MW-5 to 1.60 feet in monitoring well MW-2. As previously indicated, monitoring well MW-2 is an overburden monitoring well located south of the former Echota Building and is the furthest monitoring wells from the NYPA aqueducts. The magnitude of the fluctuations in each individual monitoring well may be dependent on a number of factors, including the hydraulic conductivity of the geologic formation surrounding the well screens, the hydraulic connection between the well and the drains surrounding the NYPA subsurface aqueducts, and the influence of other subsurface drainage structures in the vicinity of the site (i.e., the Falls Street Tunnel, city and private subsurface sewer lines, etc.);

- The average groundwater elevations in monitoring wells MW-2 through MW-5 during the April 26, 2000 through May 4, 2000 monitoring period are summarized below.

Well ID	Average Groundwater Elevation (ft)
MW-2	556.48
MW-3	555.88
MW-4	555.39
MW-5	554.93

- The graphs of the continuous water level measurements for each of the monitoring wells (Appendix H) shows several water level oscillations (ranging in magnitude from <0.1 to 0.5 feet). Similar oscillations

were observed in monitoring well MW-5 during the initial continuous water level measurements. The cause of the water level oscillations was not determined as part of the PSA groundwater investigation;

- Between approximately 7:00 PM and 11:00 PM when the water levels in the monitoring wells are declining, the difference in the water elevation between monitoring wells MW-4 and MW-5 becomes very small (i.e., a very small hydraulic gradient). However, the majority of the time, a positive hydraulic gradient exists from monitoring well MW-4 to MW-5 (i.e., toward the northeast); and

- The greatest difference in groundwater elevations between the monitoring wells (i.e., steepest gradients) generally occurs around the time of the maximum and minimum groundwater elevations (i.e., 5:00 PM to 9:00 PM and 12:00 AM to 4:00 AM).

A series of groundwater potentiometric surface maps developed for the overall average water levels during the monitoring period and the average water levels over the monitoring period at midnight, 6:00 AM, noon, and 6:00 PM are included as Figures 8A, 8B, 8C, 8D, and 8E, respectively.

In addition to the hydrogeologic influences from the Niagara Power Project, the following subsurface utilities at and in the vicinity of the Harper Substation property have also been identified as influences on groundwater flow at the substation:

- The 12-inch diameter city sewer crossing the middle of the Harper Substation from east to west (between the former Echota Building and the former cooling ponds) may have intercepted groundwater flow in the immediate vicinity of the sewer pipe. During the PSA, field personnel observed a steady flow through the sewer within a manhole southwest of the storage building (manhole S-2). The observations were made during dry-weather conditions, and there were no known discharges to the sewer from neighboring industrial facilities. Field personnel also noted that the invert of the 12-inch diameter city sewer was approximately 15.5 feet bgs at manhole S-2 (which appears to be just above bedrock based on subsurface conditions encountered during the installation of nearby monitoring wells MW-5, MW-6, and MW-7). The groundwater depth at the closest monitoring well to manhole S-2 (monitoring well MW-6, located approximately 60 feet southwest of manhole S-2) was measured at approximately 15 feet bgs. Based on the relatively flat ground surface in the vicinity of monitoring well MW-6 and manhole S-2, the city sewer invert depth coincides with the top of the groundwater table. As further evidence that the city sewer may have intercepted local groundwater in the area, the groundwater elevation at monitoring well MW-5 (located adjacent to the city sewer, approximately 150 feet west of monitoring MW-6) appeared slightly lower than expected based on groundwater elevations obtained for the other onsite monitoring wells. Based on the relatively low hydraulic conductivity of the overburden material at the site (discussed in Section 2.3), the hydraulic influence of the city sewer was most likely confined to the overburden in the immediate vicinity of the sewer. As mentioned above, the City of Niagara Falls attempted to block flow from the sewers beneath the Harper Substation after the PSA was completed (via a mechanical plug and a bulkhead). The volume of groundwater flow through the city sewer may have been reduced by the blockage; and

- The 4.5 foot diameter Iroquois Street sanitary sewer located east of the Harper Substation may intercept groundwater flow within the overburden/bedrock east of the substation. The Iroquois Street sanitary sewer extends to the north from Buffalo Avenue to the Southside Interceptor Tunnel. The Iroquois Street sanitary sewer was constructed within overburden for a distance extending approximately 500 feet west of Buffalo Avenue. The remaining section of sewer appears to have been constructed in the upper portion of the Lockport Dolomite, which as previously mentioned, contains abundant bedding planes and interconnected vertical openings which have been enlarged over time by chemical dissolution. Directly east of the Harper Substation, the Iroquois Street sanitary sewer invert elevation is approximately 544 to 546 feet AMSL

fluid that exhibited a strong odor. BBL collected samples of the LNAPL from monitoring well MW-3 during each phase of the PSA groundwater investigation (on July 21, 1999, April 24, 2000, and September 7, 2000). Each LNAPL sample was collected using a dedicated bailer, transferred into appropriate sample containers, and submitted for laboratory analysis for PCBs, VOCs, and SVOCs. Analytical methods used for the laboratory analysis of the LNAPL samples are listed in the table below.

Parameter	Analytical Method
PCBs	USEPA SW-846 Method 8082
VOCs	USEPA SW-846 Method 8260
SVOCs	USEPA SW-846 Method 8270

The specific VOCs and SVOCs that were analyzed included the compound lists established for the above-referenced methods by the USEPA (and selected VOCs on the supplemental compound list established for Method 8260 by the USEPA). Laboratory analysis of the LNAPL samples for PCBs and SVOCs was performed by Galson Laboratories, Inc. (Galson) of East Syracuse, New York. Galson subcontracted with O'Brien & Gere Laboratories, Inc. (OBG) of Syracuse, New York to analyze the LNAPL sample collected during the initial phase of the PSA groundwater investigation for VOCs. Galson subcontracted with Columbia Analytical Services, Inc. (Columbia) for the VOC analysis of the LNAPL samples collected during the second and third phases of the PSA groundwater investigation.

2.7 Groundwater Sampling

Prior to each of the three sampling events, BBL used low-flow pumping techniques (i.e., a peristaltic pump with dedicated disposable tubing) to purge the monitoring wells. Field parameters (including pH, conductivity, dissolved oxygen, temperature, and turbidity) were measured approximately every 5 minutes during purging. These are presented on the groundwater sampling logs included in Appendix F. Final field parameter measurements (at the time of sampling) are summarized below.

Monitoring Well ID	pH (S.U.)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Temperature (°C)	Turbidity (NTU)
August 20 and 23, 1999					
MW-1	7.7	0.33	2.3	13.8	3.4
MW-2	8.0	0.60	9.9	15.5	13.1
MW-4	7.6	0.41	1.8	15.8	36.8
MW-5	9.3	0.33	0.8	11.9	5.1
April 24-25, 2000					
MW-1	7.7	0.34	3.0	9.9	6.8
MW-2	7.5	0.69	*	11.7	35.7
MW-4	7.6	0.93	0.79	12.0	892.3
MW-5	10.2	0.70	1.1	11.9	11.9
September 5-7, 2000					
MW-1	7.3	0.39	1.3	13.9	32.0
MW-2	7.2	0.94	5.0	15.1	639.0

(approximately 24 to 26 feet bgs). By comparison, groundwater was encountered at depths ranging from approximately 12 to 21 feet bgs in monitoring well clusters OW-652 and OW-654, which are both located adjacent to the Iroquois Street sanitary sewer.

3.3 LNAPL Analytical Results

BBL collected three separate samples of the LNAPL encountered in monitoring well MW-3 during the PSA (on July 21, 1999, April 24, 2000, and September 7, 2000). Each LNAPL sample was submitted for laboratory analysis for PCBs, VOCs, and SVOCs. The analytical results obtained from the laboratory analysis of the LNAPL samples are presented in Table 3 and summarized below:

- PCBs were detected in the July 1999, April 2000, and September 2000 LNAPL samples at concentrations of 37 ppm, 48 ppm, and 35 ppm, respectively. Aroclor 1254 was the only Aroclor detected in the July 1999 and April 2000 LNAPL samples. Aroclors 1242 and 1254 were detected in the September 2000 LNAPL sample;

- 11 VOCs (including methylene chloride, n-propylbenzene, isopropylbenzene, p-isopropyltoluene, 1,3,5-trimethylbenzene, n-butylbenzene, ethylbenzene, 1,2,4-trimethylbenzene, sec-butylbenzene, tert-butylbenzene, and xylenes) were detected in the LNAPL samples at concentrations exceeding laboratory detection limits. The concentration of ethylbenzene detected in the April 2000 LNAPL sample (an estimated 2.6 ppm) was the lowest concentration of any individual VOC constituent detected in the LNAPL samples. The concentration of n-butylbenzene detected in the September 2000 LNAPL sample (360 ppm) was the highest concentration of any individual VOC constituent detected in the LNAPL samples. Total VOC tentatively identified compounds (TICs) were detected in the July 1999 and April 2000 LNAPL samples at estimated concentrations of 32,880 ppm and 36,400 ppm, respectively. The September 2000 LNAPL sample was not analyzed for VOC TICs; and

- 1,2,4-Trichlorobenzene was detected in each LNAPL sample at concentrations ranging from 370 ppm (in the September 2000 sample) to 530 ppm (in the April 2000 sample). Three additional SVOCs, including fluorene, phenanthrene, and bis(2-ethylhexyl)phthalate, were also detected in the July 1999 LNAPL sample at estimated concentrations of 22 ppm, 59 ppm, and 42 ppm, respectively. No other SVOCs were detected in any of the LNAPL samples. Total SVOC TICs were identified in the July 1999 and April 2000 LNAPL samples at estimated concentrations of 30,880 ppm and 15,110 ppm, respectively. The September 2000 LNAPL sample was not analyzed for SVOC TICs.

Niagara Mohawk received information from NYPA relating to the discovery of NAPL during an investigation to assess the impact of the Niagara Power Project on groundwater flow in the vicinity of the twin aqueducts. Investigation activities were conducted by URS Corporation (URS) and consisted of installing 17 groundwater monitoring wells within NYPA's right-of-way between the Niagara River and the Niagara Power Project. URS encountered NAPL at a depth of approximately 20 feet bgs in a soil boring completed approximately 400 feet south of Royal Avenue immediately west of the Harper Substation property. URS collected a sample of the NAPL and submitted the sample to Severn Trent Laboratories (STL) of Amherst, New York for laboratory analysis for PCBs, VOCs, SVOCs, pesticides, metals, RCRA hazardous characteristics, and miscellaneous analyses. The analytical results obtained for the laboratory analysis of the NAPL sample collected by URS are summarized below:

- PCBs were collected at a concentration of 4.1 ppm. Aroclor 1254 was the only Aroclor detected in the sample;

- Nine VOCs (consisting of 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, xylenes, ethylbenzene, isopropyl benzene, methylcyclohexane, and toluene) were detected at concentrations exceeding laboratory detection limits. Concentrations of detected individual VOC compounds ranged from an estimated concentration of 2.2 ppm toluene to 57 ppm 1,2,4-trichlorobenzene;

- 1,1-biphenyl was detected at an estimated concentration of 32 ppm. No other SVOCs were detected at concentrations exceeding laboratory detection limits;

- Pesticides alpha-BHC, beta-BHC, and delta-BHC were detected at concentrations of 1.1, 0.64 (estimated), and 0.62 ppm (estimated). No other pesticides were detected at concentrations exceeding laboratory detection limits;

- Miscellaneous parameters that were detected in the NAPL samples included Fuel Oil #2 at an estimated concentrations of 140,000 ppm, mineral spirits at an estimated concentration of 41,000 ppm, and motor oil at a concentration of 60,000 ppm; and

- Flashpoint for the material was 109.7 °F.

The source of the NAPL identified on the NYPA right-of-way to the west of the Harper Substation property has not been determined.

3.4 Groundwater Analytical Results

As previously mentioned, groundwater samples were collected from monitoring wells MW-1, MW-2, MW-4, and MW-5 during each of the three separate sampling events. In addition, groundwater samples were collected from monitoring wells MW-3S, MW-6, MW-7, and MW-8 during the third sampling event. Groundwater samples were not collected from monitoring well MW-3 during any of the sampling events due to the presence of LNAPL on the water surface in the well. Each of the groundwater samples was submitted for laboratory analysis for PCBs, VOCs, SVOCs, and TAL inorganic constituents.

Analytical results obtained for the laboratory analysis of the groundwater samples collected during the PSA groundwater sampling events are summarized below. The discussion includes a comparison of the analytical results with New York State Class GA groundwater standards and guidance values presented in the NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) document entitled, "*Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*," (TOGS 1.1.1).

3.4.1 Groundwater Analytical Results for PCBs

Analytical results obtained for the laboratory analysis of the PSA groundwater samples for PCBs are presented in Table 4 and shown on Figure 9. A summary of the PCB analytical results obtained for the laboratory analysis of the groundwater samples collected during each phase of the PSA is presented below.

- *August 1999:* PCBs were not detected in any of the groundwater samples collected during August 1999 at concentrations exceeding laboratory detection limits (0.48 parts per billion [ppb] for samples MW-1, MW-4, and MW-5 and 0.50 ppb for sample MW-2).

- *April 2000:* The groundwater samples collected during April 2000 were analyzed for PCBs using a lower analytical detection limit than the August 1999 groundwater samples in order to allow for comparison with the PCB groundwater quality standard presented in TOGS 1.1.1. PCBs were detected in three of the four groundwater samples collected during April 2000, including sample MW-1 (0.13 ppb), sample MW-4 (0.22 ppb), and sample MW-5 (0.08 ppb). PCBs were also detected in the blind duplicate sample collected from monitoring well MW-5 at a concentration of 0.09 ppb. The PCB concentrations detected in samples MW-1 and MW-4 exceed the 0.09 ppb PCB groundwater quality standard presented in TOGS 1.1.1.

- *September 2000:* Similar to the April 2000 sampling event, the groundwater samples collected during September 2000 were analyzed using a lower analytical detection limit than the samples collected during August 1999. PCBs were detected in the groundwater sample collected from monitoring well MW-1 during September 2000 at a concentration of 0.19 ppm, which exceeds the 0.09 ppb PCB groundwater quality standard presented in TOGS 1.1.1. PCBs were not detected in any of the other groundwater samples collected during September 2000 at concentrations exceeding the laboratory detection limit of 0.05 ppb.

The only Aroclor detected in the PSA groundwater samples was Aroclor 1248. Based on the relatively low solubility of PCBs in water, the detected PCBs may be associated with suspended particulates in the groundwater samples.

3.4.2 Groundwater Analytical Results for VOCs

Analytical results obtained from the laboratory analysis of the PSA groundwater samples for VOCs are listed in Table 5 and shown on Figure 10. VOCs were detected at concentrations exceeding the groundwater quality standards and/or guidance values presented in TOGS 1.1.1 in each groundwater sample collected for the PSA, except monitoring wells MW-2 and MW-4 during the April 2000 sampling event, and monitoring wells MW-3S and MW-8 during the September 2000 sampling event. The following general observations were noted based on review of the VOC groundwater analytical results:

- The concentrations of VOCs detected in the groundwater samples collected from monitoring wells MW-1 and MW-5 during each phase of the PSA were generally consistent;

- The concentrations of VOCs detected in the groundwater samples collected from monitoring wells MW-2 and MW-4 during the April 2000 sampling event were generally much lower than the concentrations of VOCs detected in the groundwater samples collected from the same wells during the August 1999 and September 2000 sampling event. In addition, the concentrations of VOCs detected in the groundwater samples collected from monitoring wells MW-2 and MW-4 during the September 2000 sampling event were somewhat lower than the concentrations of VOCs detected in the groundwater samples collected from the same wells during the August 1999 sampling event; and

- A larger number of VOCs (and higher concentrations of VOCs) were detected in the groundwater samples collected from monitoring well MW-2 during the August 1999 and September 2000 sampling events than in any of the other PSA groundwater samples. As previously mentioned, monitoring well MW-2 is hydraulically upgradient from potential source areas within the substation.

A summary of VOC analytical results obtained from the laboratory analysis of the groundwater samples collected at each monitoring well location is presented below.

Monitoring Well ID	VOCs Detected at Concentrations Exceeding TOGS 1.1.1
MW-1	cis-1,2-dichloroethene (39 to 46 ppb) and trichloroethene (10 to 14 ppb) were detected in the groundwater samples collected during August 1999, April 2000, and September 2000.
MW-2	Vinyl chloride, cis-1,2-dichloroethene, benzene, chlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and 1,2-dichlorobenzene were detected in the groundwater samples collected during August 1999 and September 2000.
MW-3S	None detected.
MW-4	Cis-1,2-dichloroethene (15 to 22 ppb) and trichloroethene (13 to 22 ppb) were detected in the groundwater samples collected during August 1999 and September 2000.
MW-5	Vinyl chloride (4 to 10 ppb), cis-1,2-dichloroethene (12 to 20 ppb), and trichloroethene (6 to 8 ppb) were detected in the groundwater samples collected during August 1999 and September 2000.
MW-6	Vinyl chloride (40 ppb), cis-1,2-dichloroethene (150 ppb), benzene (4 ppb), 1,2-dichlorobenzene (5 ppb), 1,3-dichlorobenzene (5 ppb), and 1,4-dichlorobenzene (6 ppb) were detected in the groundwater sample collected during September 2000.
MW-7	Vinyl chloride (55 ppb), cis-1,2-dichloroethene (34 ppb), benzene (100 ppb), chlorobenzene (21 ppb), 1,3-dichlorobenzene (5 ppb), and 1,4-dichlorobenzene (4 ppb) were detected in the groundwater sample collected during September 2000.
MW-8	None detected.

The potential sources of VOCs detected in groundwater samples collected from the site are discussed on Section 4.

3.4.3 Groundwater Analytical Results for SVOCs

Analytical results obtained from the laboratory analysis of the PSA groundwater samples for SVOCs are listed in Table 5 and shown on Figure 10. SVOCs were detected at concentrations exceeding the groundwater quality standards and/or guidance values presented in TOGS 1.1.1 in the groundwater samples collected from monitoring well MW-2 during each PSA, and from monitoring wells MW-6 and MW-7 during the September 2000 sampling event.

A summary of SVOC analytical results obtained from the laboratory analysis of the groundwater samples collected during each phase of the PSA is presented below, organized by monitoring well location.

Monitoring Well ID	SVOCs Detected at Concentrations Exceeding TOGS 1.1.1
MW-1	None detected
MW-2	1,4-dichlorobenzene and 1,2-dichlorobenzene were detected in the groundwater samples collected during August 1999 and September 2000. In addition, 1,3-dichlorobenzene was detected in the groundwater sample collected during August 1999 and bis(2-ethylhexyl) phthalate was detected in the sample collected during April 2000.
MW-3S	None detected.
MW-4	None detected.
MW-5	None detected
MW-6	1,4-dichlorbenzene was detected in the groundwater sample (and the field duplicate) collected during September 2000.
MW-7	1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1-4 dichlorobenzene were each detected in the groundwater sample collected during September 2000.
MW-8	None detected.

The potential sources of SVOCs detected in groundwater samples collected from the site are discussed in Section 4.

3.4.4 Groundwater Analytical Results for TAL Inorganic Constituents

Analytical results obtained from the laboratory analysis of the PSA groundwater samples for TAL inorganic constituents are listed in Table 6 and shown on Figure 11. Excluding three typical mineral constituents (iron, magnesium, and sodium), antimony and lead are the only TAL inorganic constituents detected in the PSA groundwater samples at concentrations exceeding the NYSDEC groundwater quality standards and guidance values presented in TOGS 1.1.1. A summary of the PSA groundwater analytical results for antimony and lead is presented below, organized by well location.

Monitoring Well ID	Antimony and Lead Detected at Concentrations Exceeding TOGS 1.1.1
MW-1	Antimony was detected at an estimated concentration of 4.1 ppb in the groundwater sample collected during April 2000.
MW-2	Antimony was detected at an estimated concentration of 4.4 ppb in the groundwater sample collected during April 2000. Lead was detected at concentrations of 132 and 241 ppb in the groundwater samples collected during April 2000 and September 2000, respectively.
MW-3S	None detected.
MW-4	Lead was detected at a concentration of 62.6 ppb in the groundwater sample collected during August 1999.
MW-5	Antimony was detected at an estimated concentration of 4.9 ppb in the duplicate sample collected during August 1999.
MW-6	None detected.
MW-7	Lead was detected at a concentration of 77.9 ppb in the groundwater sample collected during September 2000.
MW-8	None detected.

The concentrations of antimony and lead detected in the groundwater samples may be representative of typical background concentrations in the industrialized area surrounding the substation. Based on the detected concentration of inorganics and the solubility of these constituents in water, the detected concentrations of these constituents may be associated with suspended particulates within the aqueous sample.

3.5 Supplemental Soil Analytical Results

Analytical results obtained for the laboratory analysis of the subsurface soil samples collected as part of the additional soil investigation activities during August 2000 are summarized below, including a comparison of analytical results with the recommended soil cleanup objectives presented in the NYSDEC document entitled "Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels", HWR 94-4046 (TAGM 4046):

- PCBs were not detected in any of the subsurface soil samples collected as part of the additional soil investigation activities at concentrations exceeding laboratory detection limits (which ranged from 0.018 ppm to 0.022 ppm). Analytical results obtained for the laboratory analysis of the additional soil samples for PCBs are presented in Table 7.

- Four VOCs (acetone, benzene, methylene chloride, and toluene) were detected in the subsurface soil samples collected as part of the additional soil investigation activities. The concentration of toluene

detected in sample GP-03 (10-12') [0.028 ppm] was the highest concentration of any individual VOC detected in the additional soil samples. The VOC concentrations detected in the additional soil samples do not exceed the NYSDEC-recommended soil cleanup objectives presented in TAGM 4046. Analytical results obtained for the laboratory analysis of the additional soil samples for VOCs are listed in Table 8.

- With the exception of sample GP-03 (10-12'), bis(2-ethylhexyl)phthalate was detected in each subsurface soil sample collected as part of the additional soil investigation activities at concentrations exceeding laboratory detection limits. The concentrations of bis(2-ethylhexyl)phthalate detected in the additional soil samples ranged from an estimated 0.046 ppm in sample GP-12 (13.5-15.5') to 0.77 ppm in sample GP-01 (13-15'), which is less than the 50 ppm NYSDEC-recommended soil cleanup objective presented in TAGM 4046. Bis(2-ethylhexyl)phthalate is a common laboratory artifact (associated with polyethylene and plastic) that may have been inadvertently introduced during laboratory handling and/or analysis of the soil samples. No other SVOCs besides bis(2-ethylhexyl)phthalate were detected in any of the additional soil samples. Analytical results obtained from the laboratory analysis of the additional soil samples for SVOCs are listed in Table 8.

- Several TAL inorganic constituents were detected in each of the additional soil samples at concentrations exceeding the NYSDEC-recommended soil cleanup objectives presented in TAGM 4046. However, the detected concentrations of inorganic constituents may be consistent with typical background concentrations in the industrialized area surrounding the substation. As established under TAGM 4046, site background concentrations may be used as appropriate cleanup criteria for all inorganic constituents except mercury (which was not detected in any of the additional soil samples at concentrations exceeding laboratory detection limits). Analytical results obtained for the laboratory analysis of the additional soil samples for TAL inorganic constituents are listed in Table 9.

3.6 Summary

Based on the PSA groundwater investigation results and the results for previous hydrogeologic studies conducted in the vicinity of the Harper Substation property, groundwater quality and flow conditions in the immediate vicinity of the property have been extensively characterized. The PSA groundwater investigation results indicate that groundwater flow in the vicinity of the substation property is generally towards the northeast and that flow conditions are influenced by the NYPA subsurface aqueducts and by other subsurface utilities and conduits in the vicinity of the site. PCBs, and specific VOCs, SVOCs, and inorganic constituents were identified in shallow overburden and bedrock groundwater beneath the substation property at concentrations that exceeded New York State groundwater quality standards and/or guidance values. However, the highest concentrations of many of the constituents (particularly VOCs) were identified in groundwater samples collected at locations that were upgradient of potential source areas at the site. In addition, the identified concentrations of PCBs, SVOCs, and inorganic constituents were generally consistent with expected background concentrations in the groundwater and may have been primarily associated with the presence of suspended particulates in the samples. Based on the regional setting of the substation (within ½ mile of nine New York State inactive hazardous waste sites) and the lack of any documented potable use of groundwater in the immediate vicinity of the substation, Niagara Mohawk does not propose to implement further investigation or remedial activities to address dissolved constituents in ground water in the vicinity of the site.

The PSA groundwater investigation also identified LNAPL at monitoring well MW-3. The source of the LNAPL was not identified by the PSA results. However, based on supplemental soil borings and the conditions observed at other monitoring wells installed at the substation as part of the PSA, the extent of LNAPL appears to be isolated to shallow bedrock in the immediate vicinity of MW-3. Based on the PSA groundwater investigation

results, Niagara Mohawk does not propose to implement further efforts to investigate or remediate the LNAPL encountered at MW-3 at this time. NAPL has been identified on the NYPA right-of-way located to the west of the Harper Substation property. Based on the PSA groundwater investigation results, there is no information to suggest that the NAPL identified on the NYPA right-of-way is associated with the Harper Substation property. Niagara Mohawk will continue to review the results of on-going investigative efforts that are being implemented by NYPA to evaluate the NAPL identified on the right-of-way. Niagara Mohawk will evaluate requirements for further action if the results of the on-going investigative efforts suggest that the NAPL on the NYPA right-of-way may be associated with the Harper Substation property.

As documented in the Interim Remedial Measures Summary Report (BBL. February 2003), Niagara Mohawk has addressed identified environmental concerns associated with soil and subsurface structures at the Harper Substation property that could potentially act as sources for on-going impacts to groundwater beneath the property. Based on the existing environmental conditions at the property following completion of the IRM activities and the results of the PSA groundwater investigation as summarized in this document, Niagara Mohawk does not propose to implement further actions to evaluate or address environmental concerns associated with the Harper Substation property.

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Tables

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Table 1

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Monitoring Well Construction Elevations and Fluid Levels

Monitoring Well	Ground Surface Elevation (feet)	Top of Inner Well Casing Elevation (feet)	Depths (in feet below ground surface)			Elevation of Screened/Open Core Interval (feet)	Fluid Levels											
							Depth from casing to: (feet)						Elevation of: (feet AMSL)					
							LNAPL			Water			LNAPL			Water		
			Well Depth	Bedrock Depth	Screened Interval Depth		8/19/1999	4/24/2000	9/5/2000	8/19/1999	4/24/2000	9/5/2000	8/19/1999	4/24/2000	9/5/2000	8/19/1999	4/24/2000	9/5/2000
Niagara Mohawk Monitoring Wells																		
MW-1	569.7	569.15	26.0	15.5	16.0 - 25.0	544.7 - 553.7	--	--	--	16.79	17.01	15.97	--	--	--	552.36	552.14	553.18
MW-2	571.0	570.75	22.0	22.0	12.0 - 21.0	550.0 - 559.0	--	--	--	13.92	14.33	13.52	--	--	--	556.83	556.42	557.23
MW-3	568.1	570.61	30.0	12.0	24.0 - 29.0	539.1 - 544.1	14.02	14.64	14.02	14.36	14.8	14.21	556.59	555.97	556.59	556.25	555.81	556.40
MW-3S	567.8	567.56	20.0	12.0	10.0 - 20.0	547.8 - 557.8	--	--	--	--	--	11.35	--	--	--	--	--	556.21
MW-4	569.4	568.92	16.0	16.0	6.0 - 15.0	554.4 - 563.4	--	--	--	11.50	13.65	11.34	--	--	--	557.42	555.27	557.58
MW-5	572.3	571.96	30.0	19.0	20.0 - 29.0	543.3 - 552.3	--	--	--	16.60	17.17	16.11	--	--	--	555.36	554.79	555.85
MW-6	570.5	570.10	23.0	18.0	13.0 - 23.0	547.5 - 557.5	--	--	--	--	--	14.92	--	--	--	--	--	555.18
MW-7	569.8	569.62	23.8	17.8	13.8 - 23.8	546.0 - 556.0	--	--	--	--	--	16.97	--	--	--	--	--	552.65
MW-8	570.2	570.02	23.0	14.8	13.0 - 23.0	547.2 - 557.2	--	--	--	--	--	15.04	--	--	--	--	--	554.98
Occidental Monitoring Wells																		
OW-651C	568.8	568.54	91.3*	15.0	61.0 - 91.3	477.5 - 507.8	--	--	Trace	--	--	11.11	--	--	--	--	--	557.43
OW-651D	568.8	568.46	61.0	14.7	15.5 - 61.0	507.8 - 553.3	--	--	--	--	--	10.37	--	--	--	--	--	558.09
OW-652B	570.7	570.34	111.1**	14.4	NA	NA	--	--	--	--	--	12.33	--	--	--	--	--	558.01
OW-652C	570.5	570.14	90.0**	14.4	NA	NA	--	--	Trace	--	--	12.58	--	--	--	--	--	557.56
OW-652D	570.2	569.92	17.1**	14.4	17.5 - 60.5	509.7 - 552.7	--	--	--	--	--	16.23	--	--	--	--	--	553.69
OW-654B	569.8	569.41	125.5	13.5	91.0 - 125.5	444.3 - 478.8	--	--	--	--	--	12.28	--	--	--	--	--	557.13
OW-654C	570.4	570.06	88.5	13.0	60.6 - 88.5	481.9 - 509.8	--	--	--	--	--	12.89	--	--	--	--	--	557.17
OW-654D	570.3	570.04	59.5	13.7	14.3 - 59.6	510.7 - 556.0	--	--	--	--	--	20.85	--	--	--	--	--	549.19
OW-657B	570.4	570.15	130.5	15.0	97.1 - 130.5	439.9 - 473.3	--	--	--	--	--	12.72	--	--	--	--	--	557.43
OW-657C	570.8	570.45	95.1	16.0	67.1 - 95.1	475.7 - 503.7	--	--	Trace	--	--	11.99	--	--	--	--	--	558.46
OW-657D	572.0	571.55	64.5	17.9	18.5 - 64.5	507.5 - 553.5	--	--	--	--	--	15.11	--	--	--	--	--	556.44

Notes:

1. Monitoring well MW-3 was completed as a stick-up well, and the remaining monitoring wells were completed as flush-mount wells.
2. Ground surface elevation and inner well casing elevations were surveyed by Niagara Mohawk during September 1999 and September 2000.
3. Monitoring well depths for the Niagara Mohawk and Occidental monitoring wells are based on measurements at the time of the well completions and are consistent with depths measured by BBL during April 2000 and September 2000, except as indicated below:
   * = The depth of this well was measured by BBL during September 2000 as 55.2 feet; and
   ** = The depths of these wells at completion were not available (the reported well depths were measured by BBL during September 2000).
4. Monitoring wells MW-1 through MW-8 were constructed with PVC well screens (0.010-inch screen slot size).
5. Monitoring wells OW-651 through OW-657 were constructed as open core hole wells.
6. Trace amounts of LNAPL were reported at monitoring wells OW-651C, OW-652C, and OW-657C, based on the presence of a noticeable oil film on the oil/water interface probe used to obtain the water level measurements.
7. AMSL = above mean sea level.

Table 4

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Groundwater Analytical Results for Total PCBs (ppb)

Sample ID	Total PCB Concentration		
	Aug-99	Apr-00	Sep-00
MW-1	<0.48	0.13	0.19
MW-2	<0.50	< 0.05	<0.05
MW-3S	NA	NA	<0.05
MW-4	<0.48	0.22	<0.05
MW-5	<0.48	0.08	<0.05
DUP (MW-5)	<0.48	0.09	NA
MW-6	NA	NA	<0.05
DUP (MW-6)	NA	NA	<0.05
MW-7	NA	NA	<0.05
MW-8	NA	NA	<0.05

Notes:

1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) during the months indicated.
2. Samples analyzed by Galson Laboratories, Inc. (Galson) using USEPA SW-846 Method 8082 as referenced in NYSDEC 1995 ASP.
3. Concentrations reported in parts per billion (ppb) or micrograms per kilogram (µg/kg).
4. Sample designations indicate the following:
   - MW = Monitoring well (groundwater sample); and
   - DUP = Blind duplicate sample.
5. The duplicate samples collected during the July 1999 and April 2000 groundwater monitoring events were collected from monitoring well MW-5 and were designated as follows:
   - DUP-2 for August 1999; and
   - FD042500 for April 2000.
6. The duplicate sample collected during the September 2000 groundwater monitoring event was collected from monitoring well MW-6 and was designated as FD090500.
7. < = No individual Aroclors were detected at concentrations exceeding the presented value.
8. Shaded values indicate that PCBs were detected at a concentration exceeding the 0.09 ppb Class GA groundwater standard presented in the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) document entitled "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations", dated June 1998, as revised April 2000.
9. Analytical results have not been validated.

Table 5

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Groundwater Analytical Results for Detected VOCs and SVOCs (ppb)

Compound	NYSDEC Groundwater Standard/Guidance Value	MW-1			MW-2			MW-3S	MW-4		
		Aug-99	Apr-00	Sep-00	Aug-99	Apr-00	Sep-00	Sep-00	Aug-99	Apr/May-00	Sep-00
VOCs											
Vinyl Chloride	2	< 1	< 1	<1	95	< 2	75	<1	< 1	< 1	<1
1,1-Dichloroethene	5	< 1	< 1	<1	3	< 2	2	<1	< 1	< 1	<1
Acetone	50*	< 5	< 5	<5	10	< 10	<5	<5	<5	< 5	6
Methylene Chloride	5	<2	<2	<2	<2	<4	<2	<2	<2	<2	<2
Carbon Disulfide	NA	<1	<1	<1	<1	<2	1 B	<1	<1	<1	<1
cis-1,2-Dichloroethene	5	39	46	43	300 D	3	130	4	22	4	15
trans-1,2-Dichloroethene	5	< 1	< 1	1	2	< 2	<1	<1	1	< 1	<1
2-Butanone	50*	<2	<2	<2	<2	<4	<2	<2	<2	<2	11
Chloroform	7	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1
Benzene	1	< 1	< 1	<1	18	< 2	11	<1	< 1	< 1	<1
Trichloroethene	5	13	10	14	1	< 2	<1	5	22	3	13
Toluene	5	< 1	< 1	<1	2	< 2	<1	<1	< 1	< 1	<1
Tetrachloroethene	5	3	3	4	< 1	< 2	<1	2	3	< 1	2
Chlorobenzene	5	< 1	< 1	<1	28	< 2	8	<1	< 1	< 1	<1
Xylenes (Total)	5	< 2	< 2	<2	1 J	< 4	<2	<2	<2	< 2	<2
1,2,4-Trimethylbenzene	5	<1	<1	<1	<1	<2	<1	2	<1	<1	<1
1,3-Dichlorobenzene	3	< 1	< 1	<1	28	< 2	9	<1	< 1	< 1	<1
1,4-Dichlorobenzene	3	< 1	< 1	<1	35	< 2	10	<1	< 1	< 1	<1
1,2-Dichlorobenzene	3	< 1	< 1	<1	30	< 2	10	<1	< 1	< 1	<1
Total VOC TICs	NA	ND	ND	ND	43 J	ND	22 J	ND	ND	ND	ND
SVOCs											
1,3-Dichlorobenzene	3	< 10	< 10	<10	10	< 10	3 J	<10	< 10	< 10	<10
1,4-Dichlorobenzene	3	< 10	< 10	<10	12	< 10	4 J	<10	< 10	< 10	<10
1,2-Dichlorobenzene	3	< 10	< 10	<10	14	< 10	4 J	<10	< 10	< 10	<10
1,2,4-Trichlorobenzene	5	< 10	< 10	<10	3 J	< 10	1 J	<10	< 10	< 10	<10
Di-n-butylphthalate	50	< 10	< 10	<10	< 10	< 10	<10	<10	< 10	< 10	<10
bis(2-Ethylhexyl)phthalate	5	< 10	1 JB	4 JB	< 10	12 B	1 J	<10	1 J	1 J	<10
Total SVOC TICs	NA	8 J	25 JB	6 JB	48 J	20 J	45 JB	59 J	ND	3 J	30 JB

- see notes on page 3

Table 5

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Groundwater Analytical Results for Detected VOCs and SVOCs (ppb)

Compound	NYSDEC Groundwater Standard/Guidance Value	MW-5			DUP (MW-5)		MW-6	DUP (MW-6)	MW-7	MW-8
		Aug-99	Apr/May-00	Sep-00	Aug-99	Apr/May-00	Sep-00	Sep-00	Sep-00	Sep-00
VOCs										
Vinyl Chloride	2	10	2	4	11	< 1	40	40	55	<1
1,1-Dichloroethene	5	< 1	< 1	<1	< 1	< 1	<1	<1	<1	<1
Acetone	50*	< 5	< 5	<5	< 5	< 5	<5	<5	<5	<5
Methylene Chloride	5	<2	<2	<2	<2	<2	1 J	1 J	<2	<2
Carbon Disulfide	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	5	20	18	12	20	17	150	160	34	5
trans-1,2-Dichloroethene	5	< 1	< 1	<1	< 1	< 1	<1	<1	<1	<1
2-Butanone	50*	<2	<2	11	<2	<2	<2	<2	<2	<2
Chloroform	7	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	1	< 1	< 1	<1	< 1	< 1	4	4	100	<1
Trichloroethene	5	8	5	6	8	5	3	4	<1	4
Toluene	5	< 1	< 1	<1	< 1	< 1	<1	<1	1	<1
Tetrachloroethene	5	2	1	2	2	1	<1	<1	<1	<1
Chlorobenzene	5	< 1	< 1	<1	1	< 1	4	4	21	<1
Xylenes (Total)	5	< 2	< 2	<2	< 2	< 2	<2	<2	<2	<2
1,2,4-Trimethylbenzene	5	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	3	< 1	< 1	<1	< 1	< 1	5	4	5	<1
1,4-Dichlorobenzene	3	< 1	< 1	<1	< 1	< 1	6	6	4	<1
1,2-Dichlorobenzene	3	< 1	< 1	<1	< 1	< 1	5	5	2	<1
Total VOC TICs	NA	ND	ND	ND	ND	ND	36 J	35 J	22 J	ND
SVOCs										
1,3-Dichlorobenzene	3	< 10	< 10	<10	< 10	< 10	3 J	3 J	8 J	<10
1,4-Dichlorobenzene	3	< 10	1 J	<10	< 10	1 J	4 J	4 J	7 J	<10
1,2-Dichlorobenzene	3	< 10	< 10	<10	< 10	< 10	3 J	3 J	4 J	<10
1,2,4-Trichlorobenzene	5	< 10	< 10	<10	< 10	< 10	1 J	1 J	<10	<10
Di-n-butylphthalate	50	< 10	< 10	<10	< 10	< 10	<10	<10	<10	<10
bis(2-Ethylhexyl)phthalate	5	< 10	< 10	<10	< 10	< 10	<10	<10	<10	<10
Total SVOC TICs	NA	55 J	32 J	21 JB	21 J	29 J	37 JB	35 JB	58 JB	18 JB

- see notes on page 3

Table 5

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Groundwater Analytical Results for Detected VOCs and SVOCs (ppb)

Notes:

1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) during the months indicated.
2. Samples analyzed by Galson Laboratories, Inc. (Galson) of East Syracuse, New York for VOCs using USEPA SW-846 Method 8260 and for SVOCs using USEPA SW-846 Method 8270.
3. Concentrations reported in parts per billion (ppb) or micrograms per kilogram (µg/kg).
4. Sample designations indicate the following:
   MW = Monitoring well (Groundwater sample); and
   DUP = Duplicate sample.
5. The duplicate samples collected during the groundwater monitoring events were collected from monitoring wells MW-5 and MW-6 were designated as follows:
   - DUP-2 for VOC and SVOC samples collected August 1999 from MW-5;
   - FD042500 for VOC sample collected April 2000 from MW-5;
   - FD051800 for SVOC sample collected May 2000 from MW-5; and
   - FD090500 for VOC and SVOC samples collected September 2000 from MW-6.
6. < = Compound was not detected at a concentration exceeding the listed value.
7. D = Concentration based on a diluted sample analysis.
8. J = Indicates an estimated concentration.
9. Compound was detected in the sample and in the associated sample blank.
10. Groundwater Standards/Guidance Values for Class GA water presented in the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) document entitled "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations," dated June 1998, as revised April 2000.
11. Shaded values indicate that the constituent was detected at a concentration exceeding the NYSDEC Class GA Standard/Guidance Value presented in TOGS 1.1.1.
12. TIC = Tentatively identified compounds.
13. ND = Indicates no TICs detected.
14. * = Indicates an NYSDEC ambient water quality guidance value.
15. Analytical results have not been validated.

Table 6

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Groundwater Analytical Results for TAL Inorganic Constituents (ppb)

Constituent	NYSDEC Groundwater Standards/Guidance Values	MW-1			MW-2			MW-3S	MW-4		
		Aug-99	Apr-00	Sep-00	Aug-99	Apr-00	Sep-00	Sep-00	Aug-99	Apr-00	Sep-00
Aluminum	NA	31.9 B	< 43.0	<78.0	138	5,730	12,300	80.7 B	29,400	3,920	6,890
Antimony	3	< 4.0	4.1 B	<5.0	< 4.0	4.4 B	<5.0	<5.0	< 4.0	< 4.0	<5.0
Arsenic	25	< 4.0	< 4.0	<4.0	< 4.0	4.4 B	5.4 B	<4.0	5.5 B	< 4.0	<4.0
Barium	1,000	27.2 B	27.2 B	26.9 B	19.7 B	77.3 B	148 B	58.4 B	253	53.9 B	70.2 B
Beryllium	3*	< 2.0	< 1.0	<1.0	< 2.0	< 1.0	<1.0	<1.0	2.3 B	< 1.0	<1.0
Cadmium	5	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	<2.0	<2.0	< 1.0	< 1.0	<2.0
Calcium	NA	55,500	58,000	53,700	53,700	187,000	251,000	44,100	264,000	129,000	105,000
Chromium	50	< 2.0	< 2.0	<3.0	10.5	10.2	22.9	<3.0	40.4	5.2 B	10.5
Cobalt	NA	< 1.0	< 1.0	<2.0	< 1.0	5.1 B	7.3 B	<2.0	21.7 B	3.2 B	3.7 B
Copper	200	< 2.0	4.8 B	<3.0	< 2.0	15.2 B	28.7	<3.0	47.6	8.5 B	10.4 B
Iron	300	< 20.0	52.7 B	<28.0	202	7,700	18,600	109	48,500	4,930	9,570
Lead	25	3.6	3.8	3.8	3.2	132	241	<2.0	62.6	8.5	24.3
Magnesium	35,000*	10,100	9,930	9,390	35,300	98,100	121,000	9,730	94,200	59,100	40,500
Manganese	300	< 2.0	1.9 B	<2.0	17.2	404	713	<2.0	1,490	178	304
Mercury	0.7	< 0.10	< 0.10	<0.10	< 0.10	< 0.10	<0.10	<0.10	< 0.10	< 0.10	<0.10
Nickel	100	< 3.0	6.0 B	<3.0	< 3.0	10.4 B	16.1 B	24.4 B	48.2	4.6 B	8.4 B
Potassium	NA	1,930 B	1,830 B	1,780 B	4,700 B	3,910	5,790	1,700	10,100	2,260 B	3,730 B
Selenium	10	< 4.0	< 4.0	<4.0	< 4.0	< 4.0	<4.0	<4.0	< 4.0	6.8	<4.0
Silver	50	< 2.0	< 2.0	<2.0	< 2.0	< 2.0	<2.0	<2.0	< 2.0	< 2.0	<2.0
Sodium	20,000	10,900	16,000	11,300	31,900	72,600	45,500	10,400	12,400	11,800	12,700
Thallium	0.5*	< 4.0	< 4.0	<6.0	<4.0	< 4.0	<6.0	<6.0	< 4.0	< 4.0	<6.0
Vanadium	NA	< 2.0	< 2.0	<2.0	< 2.0	10.8 B	23.7 B	<2.0	56.6	6.9 B	12.6 B
Zinc	2,000*	199	361	237	5.0 B	176.0	311	15.4 B	322	38.1	62.4
Cyanide	200	< 10	< 10	<10.0	< 10	< 10	<10.0	<10.0	< 10	< 10	<10.0

- see notes on Page 3

Table 6

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Groundwater Analytical Results for TAL Inorganic Constituents (ppb)

Constituent	NYSDEC Groundwater Standards/Guidance Values	MW-5			DUP (MW-5)		MW-6	DUP (MW-6)	MW-7	MW-8
		Aug-99	Apr-00	Sep-00	Aug-99	Apr-00	Sep-00	Sep-00	Sep-00	Sep-00
Aluminum	NA	57.4 B	48.0 B	<78.0	66.1 B	50.2 B	503	282	19,900	<78.0
Antimony	3	< 4.0	< 4.0	<5.0	4.9 B	< 4.0	<5.0	<5.0	<5.0	<5.0
Arsenic	25	< 4.0	< 4.0	<4.0	< 4.0	< 4.0	<4.0	<4.0	6.4 B	<4.0
Barium	1,000	34.2 B	29.0 B	26.0 B	34.0 B	29.2 B	30.9 B	29.4 B	173 B	37.2 B
Beryllium	3*	< 2.0	< 1.0	<1.0	< 2.0	< 1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	5	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	<2.0	<2.0	<2.0	<2.0
Calcium	NA	61,800	65,600	52,400	62,300	65,900	60,800	62,200	464,000	62,600
Chromium	50	< 2.0	< 2.0	<3.0	< 2.0	< 2.0	<3.0	<3.0	42.2	<3.0
Cobalt	NA	< 1.0	< 1.0	<2.0	< 1.0	< 1.0	<2.0	<2.0	12.2 B	<2.0
Copper	200	< 2.0	4.7 B	<3.0	< 2.0	< 2.0	<3.0	<3.0	31.4	<3.0
Iron	300	< 20.0	< 35.0	<28.0	< 20.0	< 35.0	528	261	29,100	44.1 B
Lead	25	< 2.0	< 2.0	<2.0	< 2.0	< 2.0	3.6	<2.0	77.9	<2.0
Magnesium	35,000*	8,640	10,100	8,800	9,060	10,100	13,700	13,300	172,000	12,500
Manganese	300	< 2.0	6.3 B	<2.0	< 2.0	6.6 B	20.9	18.9	1,360	5.5 B
Mercury	0.7	< 0.10	< 0.10	<0.10	< 0.10	< 0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	< 3.0	< 3.0	<3.0	< 3.0	< 3.0	<3.0	<3.0	27.6 B	<3.0
Potassium	NA	2,240 B	1,960 B	1,760	2,620 B	1,970 B	1,950	1,780 B	7,760	1,760 B
Selenium	10	< 4.0	< 4.0	<4.0	< 4.0	< 4.0	<4.0	<4.0	<4.0	<4.0
Silver	50	< 2.0	< 2.0	<2.0	< 2.0	< 2.0	<2.0	<2.0	<2.0	<2.0
Sodium	20,000	10,200	15,700	11,100	10,400	15,700	13,500	13,900	19,000	13,800
Thallium	0.5*	< 4.0	< 4.0	<6.0	< 4.0	< 4.0	<6.0	<6.0	<6.0	<6.0
Vanadium	NA	< 2.0	< 2.0	<2.0	< 2.0	< 2.0	<2.0	<2.0	37.1 B	<2.0
Zinc	2,000*	32.9	80.5	59.6	33.8	81.8	8.1 B	8.4 B	321	56.8
Cyanide	200	< 10	< 10	<10.0	< 10	< 10	<10.0	<10.0	<10.0	<10.0

-see notes on page 3

Table 6

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Groundwater Analytical Results for TAL Inorganic Constituents (ppb)

Notes:

1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) during the months indicated.
2. TAL = Target Analyte List.
3. Samples analyzed by Galson Laboratories, Inc. of East Syracuse, New York using USEPA SW-846 Method 6010 with the following exceptions:
   - Mercury was analyzed using Method 7470/7471; and
   - Cyanide was analyzed using Method 335.2 - O'Brien & Gere Laboratories, Inc. performed the analysis for the August 1999 ground-water samples for cyanide during August 1999.
4. Concentrations reported in parts per billion (ppb) or micrograms per kilogram (ug/kg).
5. Sample designations indicate the following:
   MW = Monitoring well (Groundwater sample); and
   DUP = Duplicate sample.
6. The duplicate samples collected during the groundwater monitoring events were designated as follows:
   - DUP-2 for August 1999 sample from MW-5;
   - FD042500 for April 2000 sample from MW-5; and
   - FD090500 for September 2000 sample from MW-6.
7. < = Constituent was not detected at a concentration exceeding the laboratory detection limit.
8. B = Indicates a value which is greater than or equal to the instrument detection limit, but less than the contract required detection limit.
9. Ground-Water Standards/Guidance Values presented in the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) document entitled "Ambient Water Quality Standards and Guidance Values and Ground-Water Effluent Limitations", dated June 1998, as revised April 2000.
10. NA = Not available.
11. * = Indicates a NYSDEC ambient water quality guidance value.
12. Analytical results have not been validated.

Table 7

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Subsurface Soil Analytical Results for Total PCBs (ppm)

Sample ID	Sample Depth	Total PCB Concentration
GP-01	(13-15')	<0.018
GP-03	(10-12')	<0.022
GP-08	(12.5-14.5')	<0.020
FD082400 (GP-08)	(12.5-14.5')	<0.019
GP-09	(13-15')	<0.019
GP-12	(13.5-15.5')	<0.019

Notes:

1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) during August 2000.
2. Samples analyzed by Galson Laboratories, Inc. (Galson) of East Syracuse, New York using USEPA SW-846 Method 8082 as referenced in NYSDEC 1995 ASP.
3. Concentrations reported in parts per million (ppm) or milligrams per kilogram (mg/kg).
4. Sample designations indicate the following:
   GP = Subsurface soil sample from a Geoprobe soil boring; and
   FD = Blind field duplicate sample.
5. < = No individual Aroclors were detected at concentrations exceeding the presented values.
6. Analytical results have not been validated.

Table 8

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Subsurface Soil Analytical Results for Detected VOCs and SVOCs (ppm)

Compound	NYSDEC-Recommended Soil Cleanup Objectives	GP-01 (13-15')	GP-03 (10-12')	GP-08 (12.5-14.5')	FD082400 <GP-08> (12.5-14.5')	GP-09 (13-15')	GP-12 (13.5-15.5')
VOCs							
Acetone	0.2	<0.011	<0.013	<0.012	0.008 J	<0.012	<0.011
Methylene Chloride	0.1	0.002 J	0.003 J	0.004 J	0.002 J	<0.012	0.002 J
Benzene	0.06	<0.011	0.004 J	0.002 J	<0.012	<0.012	0.001 J
Toluene	1.5	<0.011	0.028	0.009 J	0.002 J	<0.012	0.006 J
Total VOC TICs	NA	0.076 J	0.41 J	0.38 J	0.10 J	0.017 J	0.48 J
SVOCs							
Bis(2-ethylhexyl)phthalate	50	0.77	<0.43	0.71	2.5	0.74	0.046 J
Total SVOC TICs	NA	1.9 JB	1.7 JB	1.5 JB	1.4 JB	2.1 JB	2.2 JB

Notes:

1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) during August 2000.
2. Samples analyzed by Galson Laboratories, Inc. (Galson) of East Syracuse, New York for VOCs using USEPA SW-846 Method 8260 and for SVOCs using USEPA SW-846 Method 8270.
3. Concentrations reported in parts per million (ppm) or milligrams per kilogram (mg/kg).
4. Sample designations indicate the following:
   GP = Subsurface soil sample from a Geoprobe soil boring; and
   FD = Blind field duplicate sample.
5. < = Compound was not detected at a concentration exceeding the presented value.
6. J = Indicates an estimated value.
7. B = Compound was detected in the sample and in the associated sample blank.
8. NYSDEC-recommended soil cleanup objectives from the NYSDEC document entitled, "Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels," HWR-94-4046 (TAGM 4046), dated January 24, 1994, as revised by a December 20, 2000 internal NYSDEC memorandum.
9. TIC = Tentatively identified compounds.
10. NA = Not applicable.
11. Analytical results have not been validated.

Table 9

Niagara Mohawk, a National Grid Company
Harper Substation
Niagara Falls, New York

Subsurface Soil Analytical Results for TAL Inorganic Constituents (ppm)

Constituent	NYSDEC-Recommended Soil Cleanup Objective	GP-01 (13-15')	GP-03 (10-12')	GP-08 (12.5-14.5')	FD082400 <GP-08> (12.5-14.5')	GP-09 (13-15')	GP-12 (13.5-15.5')
Aluminum	SB	13,400	15,000	15,200	8,000	8,060	6,870
Antimony	SB	1.1 B	1.7 B	1.3 B	0.80 B	0.71 B	0.78 B
Arsenic	7.5 or SB	12.3	4.1	3.1	2.0	3.8	2.8
Barium	300 or SB	105	118	137	71.9	63	94.9
Beryllium	0.16 or SB	0.83	0.89	0.85	0.50 B	0.54 B	0.45 B
Cadmium	1.0 or SB	0.29 B	<0.26	0.26 B	<0.23	<0.24	0.23 B
Calcium	SB	41,800	52,300	54,000	68,300	70,700	62,800
Chromium	10 or SB	29.0	22.0	21.6	12.0	12.8	10.8
Cobalt	30 or SB	10.7	12.4	11.7	7.2	7.5	6.9
Copper	25 or SB	19.6	20.2	21.3	14.9	18.2	22.7
Iron	2,000 or SB	26,900	27,100	25,600	15,300	16,300	14,800
Lead	SB	7.7	8.5	8.5	9.7	9.4	7.2
Magnesium	SB	12,700	11,500	11,200	22,500	13,800	15,900
Manganese	SB	526	652	540	541	416	614
Mercury	0.1	<0.056	<0.066	<0.062	<0.058	<0.060	<0.058
Nickel	13 or SB	25.9	28.4	26.6	15.1	16.7	13.5
Potassium	SB	2,640	3,190	3,470	2,020	1,110	1,700
Selenium	2.0 or SB	0.53 B	<0.53	<0.50	<0.46	<0.48	0.50 B
Silver	SB	<0.22	<0.26	<0.25	<0.23	<0.24	<0.23
Sodium	SB	103 B	94.2 B	97.6 B	142 B	63.2 B	108 B
Thallium	SB	1.7	<0.79	1.3	0.77 B	<0.72	1.2
Vanadium	150 or SB	28.9	30.2	30.2	17.7	18.1	15.9
Zinc	20 or SB	71.7	66.2	56.3	61.0	49.8	59.0
Cyanide	***	<0.54	<0.64	<0.58	<0.57	<0.57	<0.56

Notes:

1. Samples collected by Blasland, Bouck & Lee, Inc. (BBL) during August 2000.
2. TAL = Target Analyte List.
3. Samples analyzed by Galson Laboratories, Inc. of East Syracuse, New York using USEPA SW-846 Method 6010 with the following exceptions:
   - Mercury was analyzed using Method 7470/7471; and
   - Cyanide was analyzed using Method 335.2.
4. Concentrations reported in parts per million (ppm) or milligrams per kilogram (mg/kg).
5. Sample designations indicate the following:
   GP = Subsurface soil sample from a Geoprobe soil boring; and
   FD = Blind field duplicate sample.
6. < = Constituent was not detected at a concentration exceeding the laboratory detection limit.
7. B = Indicates a value which is greater than or equal to the instrument detection limit, but less than the contract required detection limit.
8. NYSDEC-recommended soil cleanup objectives from the NYSDEC document entitled, "Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels," HWR-94-4046 (TAGM 4046), dated January 24, 1994, as revised by a June 20, 2000 internal NYSDEC memorandum.
9. SB = site background.
10. *** = Site-specific form(s) of cyanide shall be considered when establishing soil cleanup objective.
11. Analytical results have not been validated.

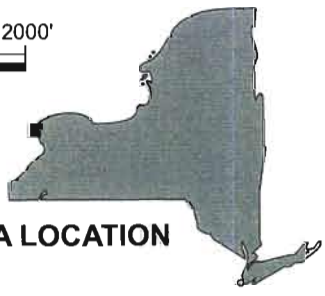
Figures

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

REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., NIAGARA FALLS, NY-ONT. 1980.

2000' 0 2000'

Approximate Scale: 1" = 2000'



AREA LOCATION

NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK

SITE LOCATION MAP

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

FIGURE 1

06/00 SYR-D54-DJH
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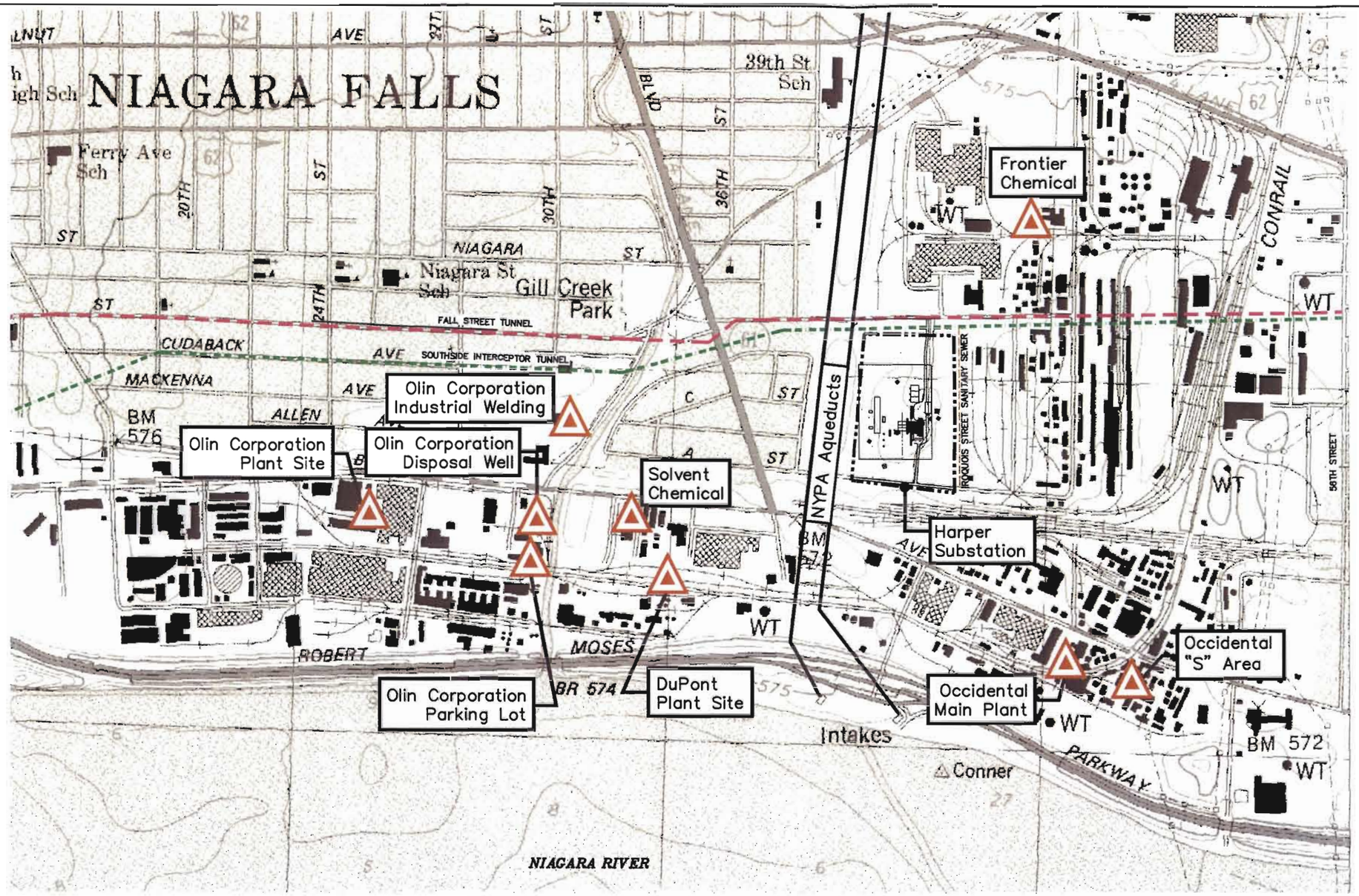

LEGEND:

- INACTIVE HAZARDOUS WASTE DISPOSAL SITE LOCATION
- RAILROAD
- FALLS STREET TUNNEL
- SOUTHSIDE INTERCEPTOR TUNNEL

0 1000' 2000'

GRAPHIC SCALE

NOTES:

1. BASE MAP WAS SCANNED FROM UNITED STATES GEOLOGICAL SURVEY MAP ENTITLED NIAGARA FALLS QUADRANGLE, REVISED 1980.
2. LOCATIONS OF FALLS STREET TUNNEL, SOUTHSIDE INTERCEPTOR TUNNEL, AND IROQUOIS STREET SANITARY SEWER ARE BASED ON A MAP OF THE COMBINED SEWER SYSTEM FOR THE CITY OF NIAGARA FALLS OBTAINED FROM THE NIAGARA FALLS CITY ENGINEER ON AUGUST 6, 1998.
3. LOCATIONS OF ADJACENT INACTIVE HAZARDOUS WASTE DISPOSAL SITES ARE BASED ON SITE LOCATION MAPS INCLUDED IN THE NYSDEC INACTIVE HAZARDOUS WASTE SITE REGISTRY, UPDATED APRIL 2000.

NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

ADJACENT INACTIVE HAZARDOUS WASTE DISPOSAL SITES

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

FIGURE 2

IMAGE: L43079A1
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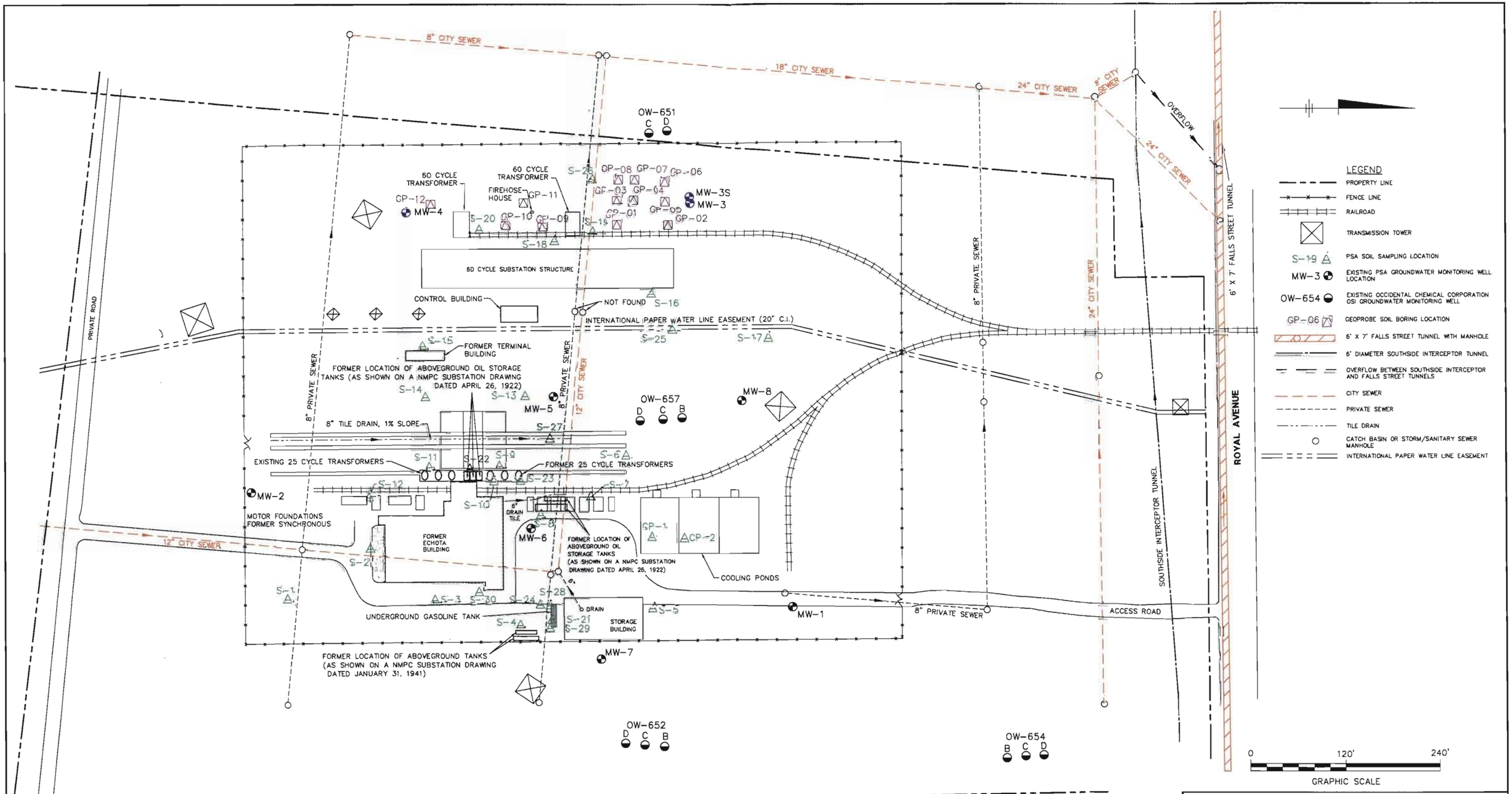

NOTES:

1. BASE MAP WAS DIGITIZED FROM NIAGARA MOHAWK POWER COMPANY MAP DATED 12/8/41. ADDITIONAL SITE AND DRAINAGE FEATURES WERE ADDED FROM A CITY OF NIAGARA FALLS COMBINATION SEWER PLAN AND VARIOUS OTHER NIAGARA MOHAWK SITE PLANS.
2. SOIL SAMPLING LOCATIONS AND MONITORING WELL LOCATIONS ARE FROM NIAGARA MOHAWK POWER CORPORATION SURVEY DRAWING #D-61367-W, DATED SEPT. 9, 1999, LATEST REVISION DATED SEPTEMBER 12, 2000 (EXCEPT FOR SAMPLING LOCATION S-27, WHICH IS APPROXIMATE).
3. SITE AND DRAINAGE FEATURE LOCATIONS ARE APPROXIMATE.
4. OTHER UNDERGROUND UTILITIES AND STRUCTURES MAY EXIST, THE LOCATION OF WHICH ARE UNKNOWN.
5. LOCATION OF UNDERGROUND GASOLINE STORAGE TANK BASED ON FIELD OBSERVATION/MEASUREMENT.

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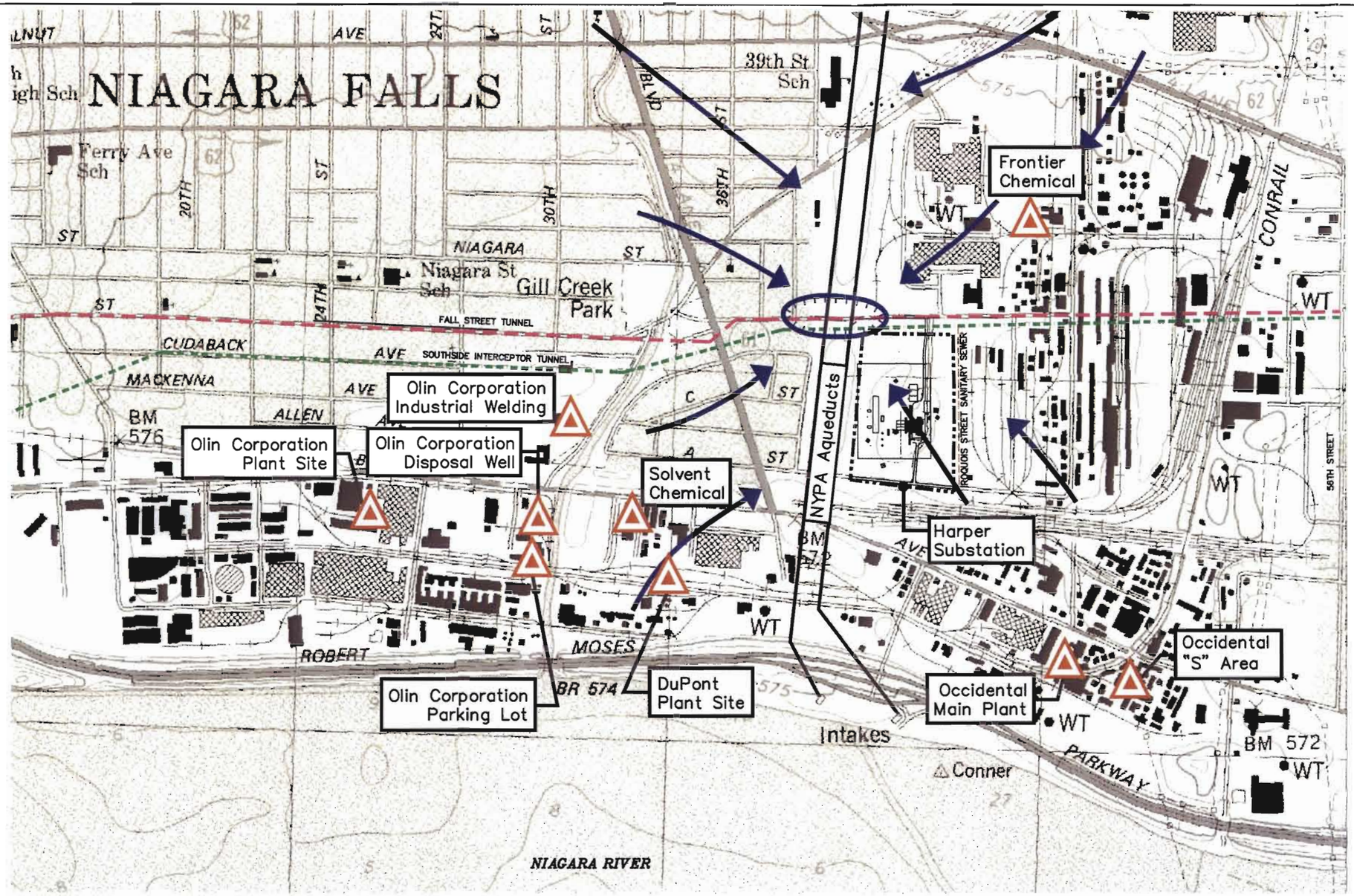
36540002/36540B02.DWG

NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

SITE PLAN

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

FIGURE 3



LEGEND:

- INACTIVE HAZARDOUS WASTE DISPOSAL SITE LOCATION
- RAILROAD
- FALLS STREET TUNNEL
- SOUTHSIDE INTERCEPTOR TUNNEL
- GROUNDWATER DEPRESSION
- APPROXIMATE GROUNDWATER FLOW DIRECTION

0 1000' 2000'

GRAPHIC SCALE

NOTES:

1. BASE MAP WAS SCANNED FROM UNITED STATES GEOLOGICAL SURVEY MAP ENTITLED NIAGARA FALLS QUADRANGLE, REVISED 1980.
2. LOCATIONS OF FALLS STREET TUNNEL, SOUTHSIDE INTERCEPTOR TUNNEL, AND IROQUOIS STREET SANITARY SEWER ARE BASED ON A MAP OF THE COMBINED SEWER SYSTEM FOR THE CITY OF NIAGARA FALLS OBTAINED FROM THE NIAGARA FALLS CITY ENGINEER ON AUGUST 6, 1998.
3. LOCATIONS OF ADJACENT INACTIVE HAZARDOUS WASTE DISPOSAL SITES ARE BASED ON SITE LOCATION MAPS INCLUDED IN THE NYSDEC INACTIVE HAZARDOUS WASTE SITE REGISTRY, UPDATED APRIL 2000.
4. APPROXIMATE GROUNDWATER FLOW DIRECTION WAS INTERPRETED FROM A STUDY CONDUCTED BY MILLER AND KAPPEL, 1987.

NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

REGIONAL GROUNDWATER FLOW DIRECTIONS DURING 1985

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

FIGURE 4

IMAGE: L43079A1
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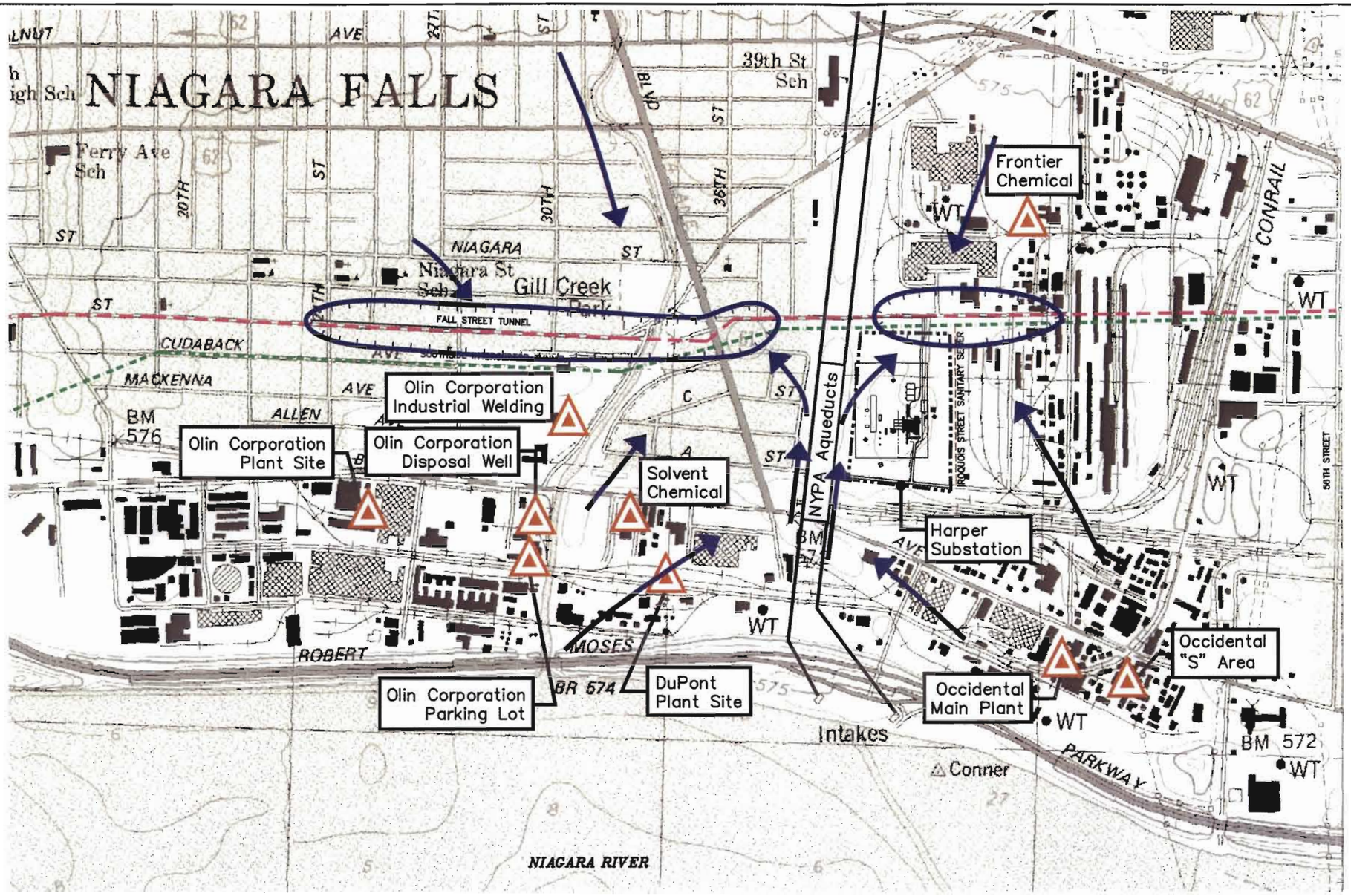

LEGEND:

- INACTIVE HAZARDOUS WASTE DISPOSAL SITE LOCATION
- RAILROAD
- FALLS STREET TUNNEL
- SOUTHSIDE INTERCEPTOR TUNNEL
- GROUNDWATER DEPRESSION
- APPROXIMATE GROUNDWATER FLOW DIRECTION

0 1000' 2000'

GRAPHIC SCALE

NOTES:

1. BASE MAP WAS SCANNED FROM UNITED STATES GEOLOGICAL SURVEY MAP ENTITLED NIAGARA FALLS QUADRANGLE, REVISED 1980.
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3. LOCATIONS OF ADJACENT INACTIVE HAZARDOUS WASTE DISPOSAL SITES ARE BASED ON SITE LOCATION MAPS INCLUDED IN THE NYSDEC INACTIVE HAZARDOUS WASTE SITE REGISTRY, UPDATED APRIL 2000.
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NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

REGIONAL GROUNDWATER FLOW DIRECTIONS DURING 1990

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

FIGURE 5

IMAGE:L43079A1
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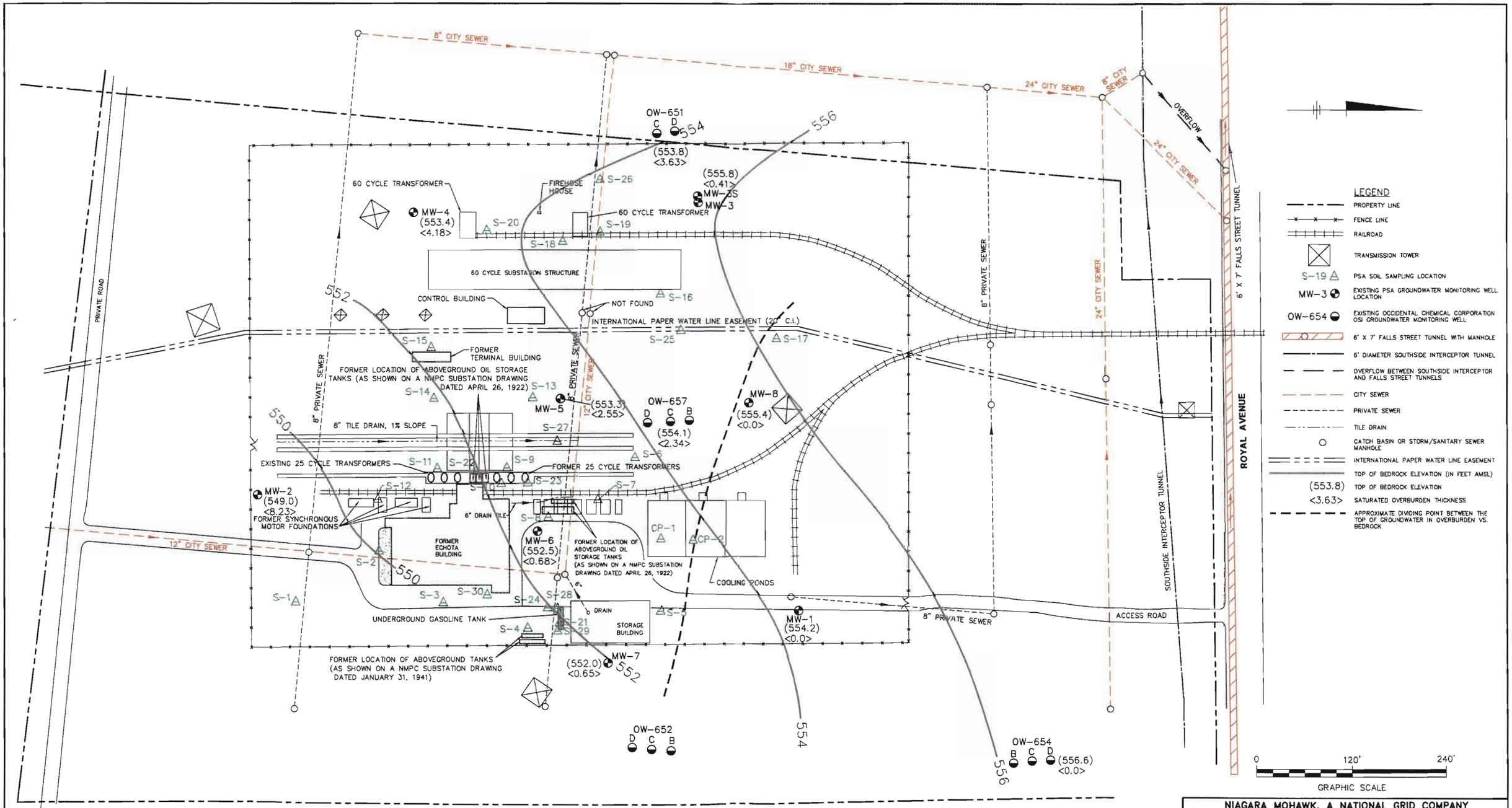

NOTES:

1. BASE MAP WAS DIGITIZED FROM NIAGARA MOHAWK POWER COMPANY MAP DATED 12/8/41. ADDITIONAL SITE AND DRAINAGE FEATURES WERE ADDED FROM A CITY OF NIAGARA FALLS COMBINATION SEWER PLAN AND VARIOUS OTHER NIAGARA MOHAWK SITE PLANS.
2. SOIL SAMPLING LOCATIONS AND MONITORING WELL LOCATIONS ARE FROM NIAGARA MOHAWK POWER CORPORATION SURVEY DRAWING #D-61367-W, DATED SEPT. 9, 1999, LATEST REVISION DATED SEPTEMBER 12, 2000 (EXCEPT FOR SAMPLING LOCATION S-27, WHICH IS APPROXIMATE).
3. SITE AND DRAINAGE FEATURE LOCATIONS ARE APPROXIMATE.
4. OTHER UNDERGROUND UTILITIES AND STRUCTURES MAY EXIST, THE LOCATION OF WHICH ARE UNKNOWN.
5. LOCATION OF UNDERGROUND GASOLINE STORAGE TANK BASED ON FIELD OBSERVATION/MEASUREMENT.
6. BEDROCK SURFACE ELEVATIONS OBTAINED FROM MONITORING WELL COMPLETION LOGS PREPARED FOR EACH OF THE ON-SITE MONITORING WELLS.

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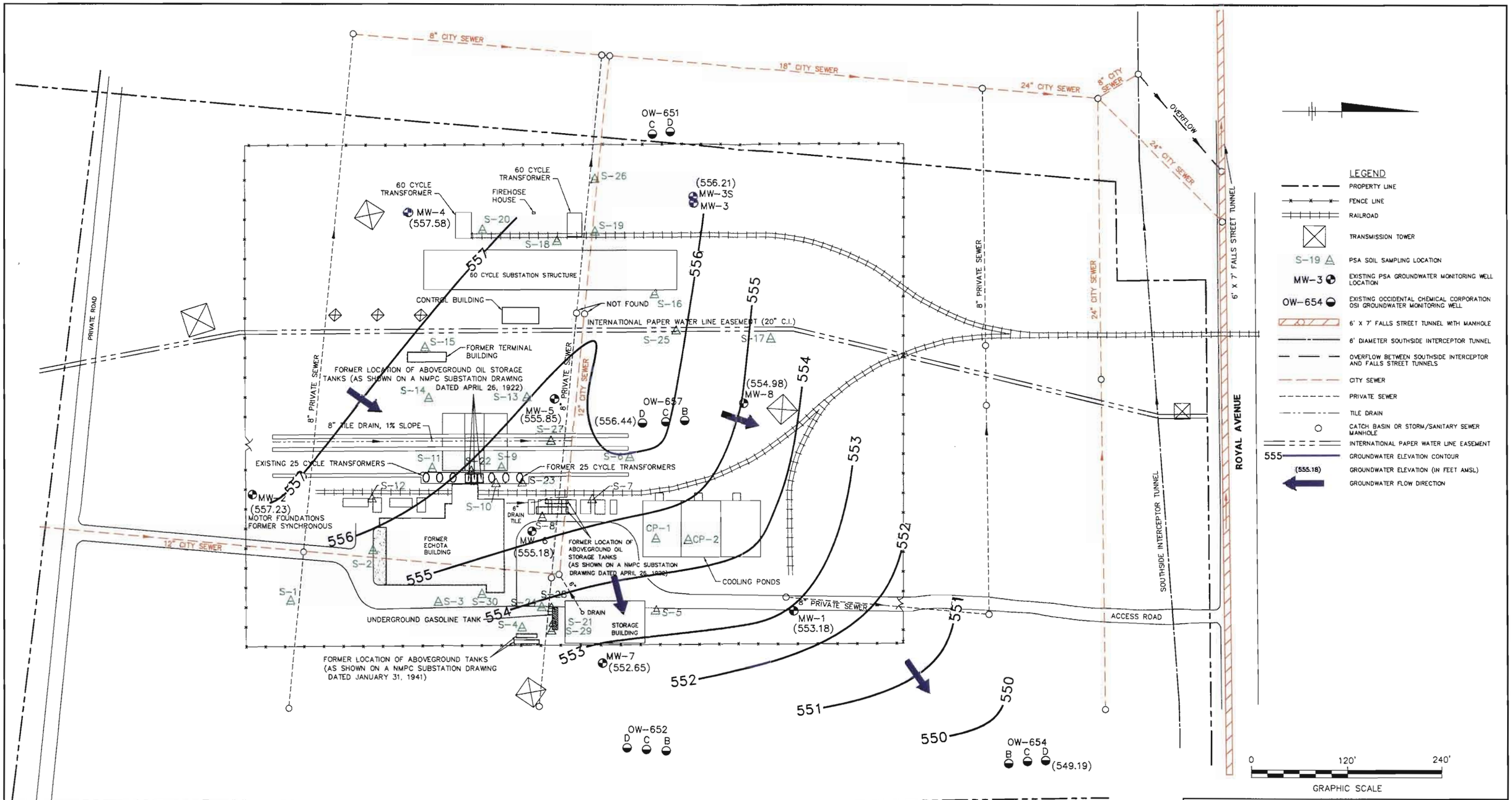
NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

BEDROCK SURFACE CONTOUR MAP

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

FIGURE 6



NOTES:

1. BASE MAP WAS DIGITIZED FROM NIAGARA MOHAWK POWER COMPANY MAP DATED 12/8/41. ADDITIONAL SITE AND DRAINAGE FEATURES WERE ADDED FROM A CITY OF NIAGARA FALLS COMBINATION SEWER PLAN AND VARIOUS OTHER NIAGARA MOHAWK SITE PLANS.
2. SOIL SAMPLING LOCATIONS AND MONITORING WELL LOCATIONS ARE FROM NIAGARA MOHAWK POWER CORPORATION SURVEY DRAWING #D-61367-W, DATED SEPT. 9, 1999, LATEST REVISION DATED SEPTEMBER 12, 2000 (EXCEPT FOR SAMPLING LOCATION S-27, WHICH IS APPROXIMATE).
3. SITE AND DRAINAGE FEATURE LOCATIONS ARE APPROXIMATE.
4. OTHER UNDERGROUND UTILITIES AND STRUCTURES MAY EXIST, THE LOCATION OF WHICH ARE UNKNOWN.
5. LOCATION OF UNDERGROUND GASOLINE STORAGE TANK BASED ON FIELD OBSERVATION/MEASUREMENT.
6. GROUNDWATER ELEVATIONS BASED ON FIELD MEASUREMENTS OBTAINED ON SEPTEMBER 5, 2000.

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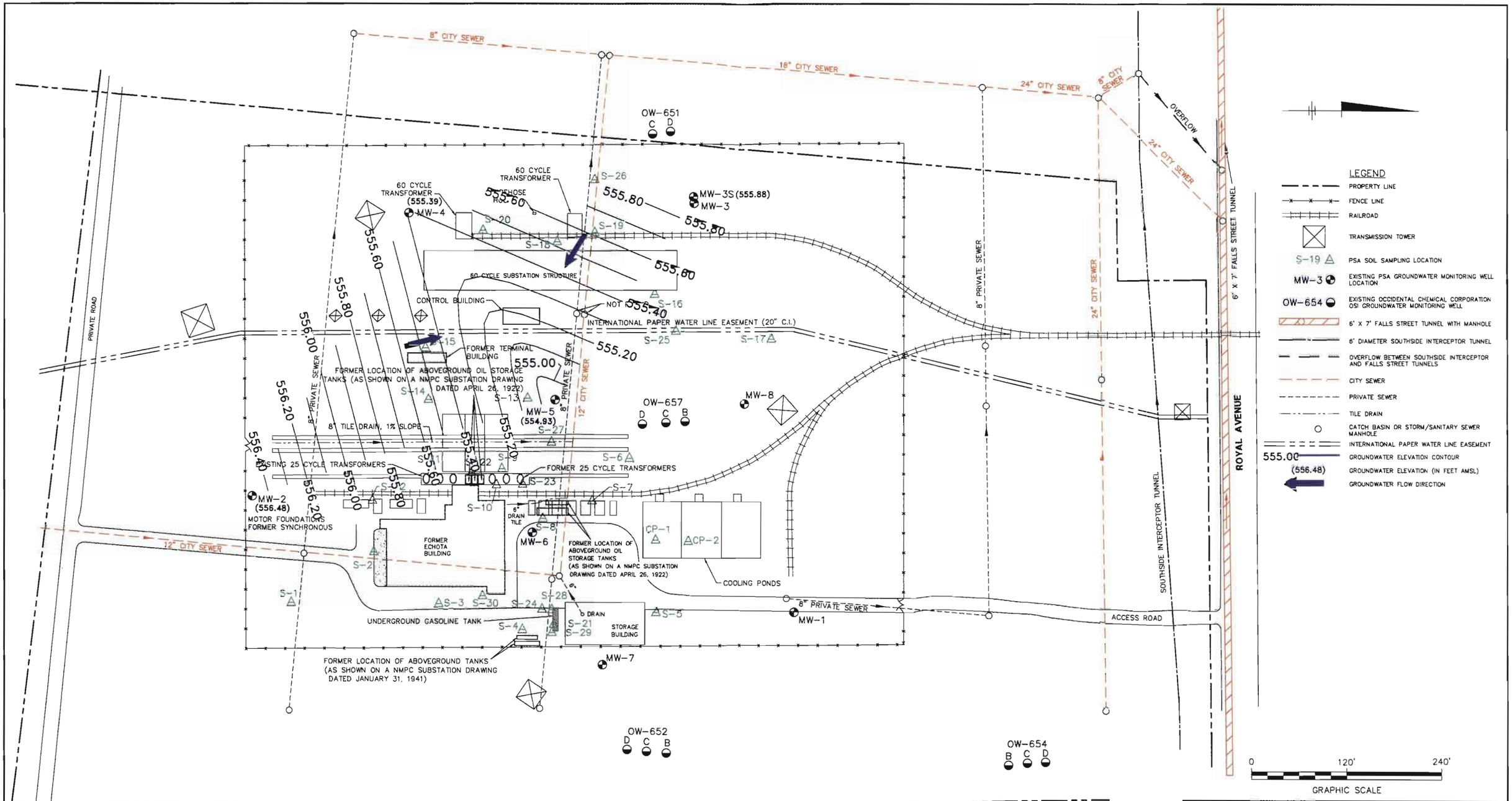
NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

POTENTIOMETRIC SURFACE MAP (SEPTEMBER 5, 2000)

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

FIGURE 7



NOTES:

1. BASE MAP WAS DIGITIZED FROM NIAGARA MOHAWK POWER COMPANY MAP DATED 12/8/41. ADDITIONAL SITE AND DRAINAGE FEATURES WERE ADDED FROM A CITY OF NIAGARA FALLS COMBINATION SEWER PLAN AND VARIOUS OTHER NIAGARA MOHAWK SITE PLANS.
2. SOIL SAMPLING LOCATIONS AND MONITORING WELL LOCATIONS ARE FROM NIAGARA MOHAWK POWER CORPORATION SURVEY DRAWING #D-61367-W, DATED SEPT. 9, 1999, LATEST REVISION DATED SEPTEMBER 12, 2000 (EXCEPT FOR SAMPLING LOCATION S-27, WHICH IS APPROXIMATE).
3. SITE AND DRAINAGE FEATURE LOCATIONS ARE APPROXIMATE.
4. OTHER UNDERGROUND UTILITIES AND STRUCTURES MAY EXIST, THE LOCATION OF WHICH ARE UNKNOWN.
5. LOCATION OF UNDERGROUND GASOLINE STORAGE TANK BASED ON FIELD OBSERVATION/MEASUREMENT.
6. GROUNDWATER ELEVATIONS BASED ON WATER LEVEL MEASUREMENTS OBTAINED BETWEEN APRIL 26 AND MAY 4, 2000.

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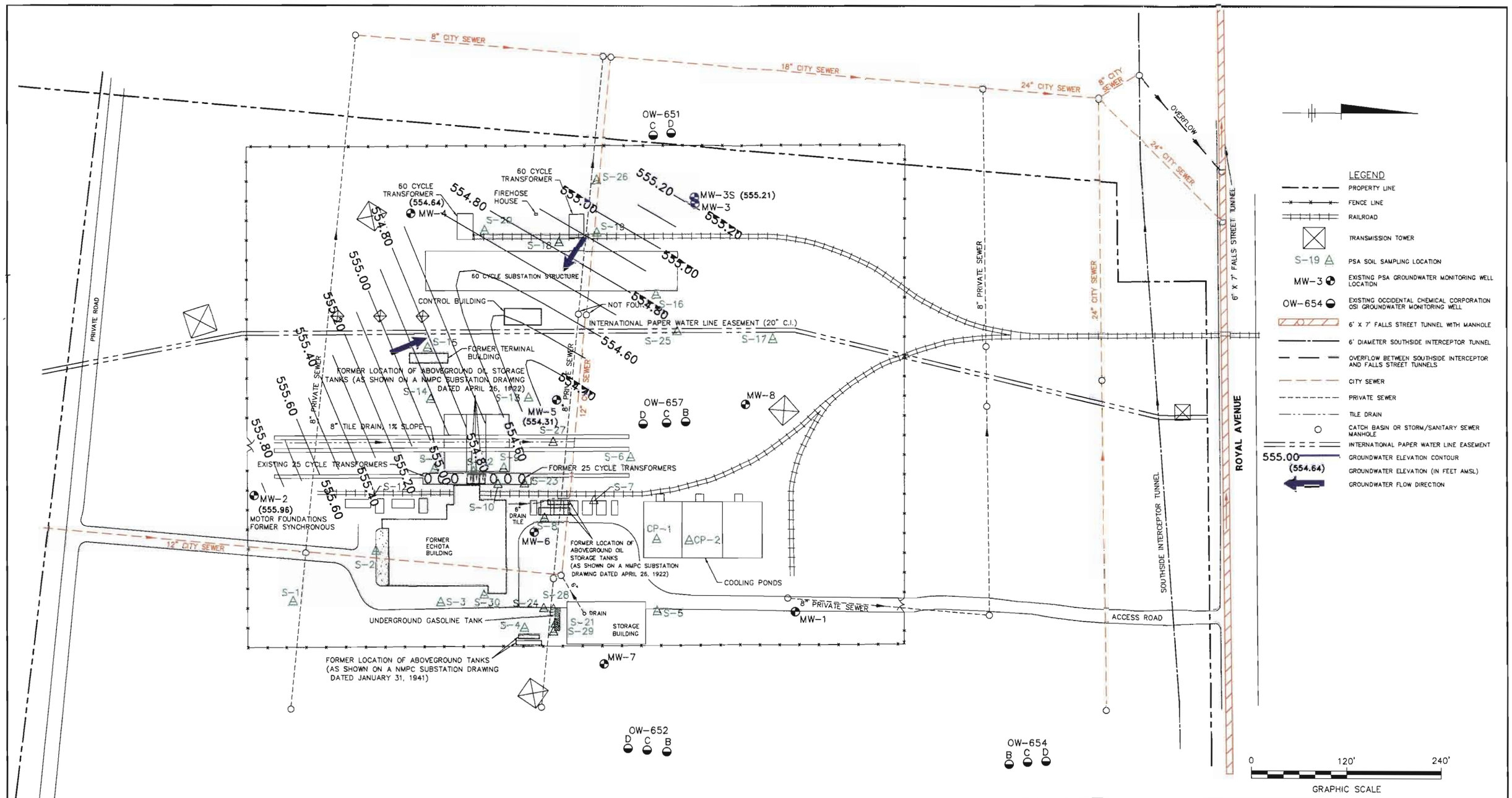
NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

POTENTIOMETRIC SURFACE MAP OVERALL AVERAGE WATER LEVELS FOR APRIL 26-MAY 4, 2000

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

FIGURE 8A



NOTES:

1. BASE MAP WAS DIGITIZED FROM NIAGARA MOHAWK POWER COMPANY MAP DATED 12/8/41. ADDITIONAL SITE AND DRAINAGE FEATURES WERE ADDED FROM A CITY OF NIAGARA FALLS COMBINATION SEWER PLAN AND VARIOUS OTHER NIAGARA MOHAWK SITE PLANS.
2. SOIL SAMPLING LOCATIONS AND MONITORING WELL LOCATIONS ARE FROM NIAGARA MOHAWK POWER CORPORATION SURVEY DRAWING #D-61367-W, DATED SEPT. 9, 1999, LATEST REVISION DATED SEPTEMBER 12, 2000 (EXCEPT FOR SAMPLING LOCATION S-27, WHICH IS APPROXIMATE).
3. SITE AND DRAINAGE FEATURE LOCATIONS ARE APPROXIMATE.
4. OTHER UNDERGROUND UTILITIES AND STRUCTURES MAY EXIST, THE LOCATION OF WHICH ARE UNKNOWN.
5. LOCATION OF UNDERGROUND GASOLINE STORAGE TANK BASED ON FIELD OBSERVATION/MEASUREMENT.
6. GROUNDWATER ELEVATIONS BASED ON WATER LEVEL MEASUREMENTS OBTAINED BETWEEN APRIL 26 AND MAY 4, 2000.

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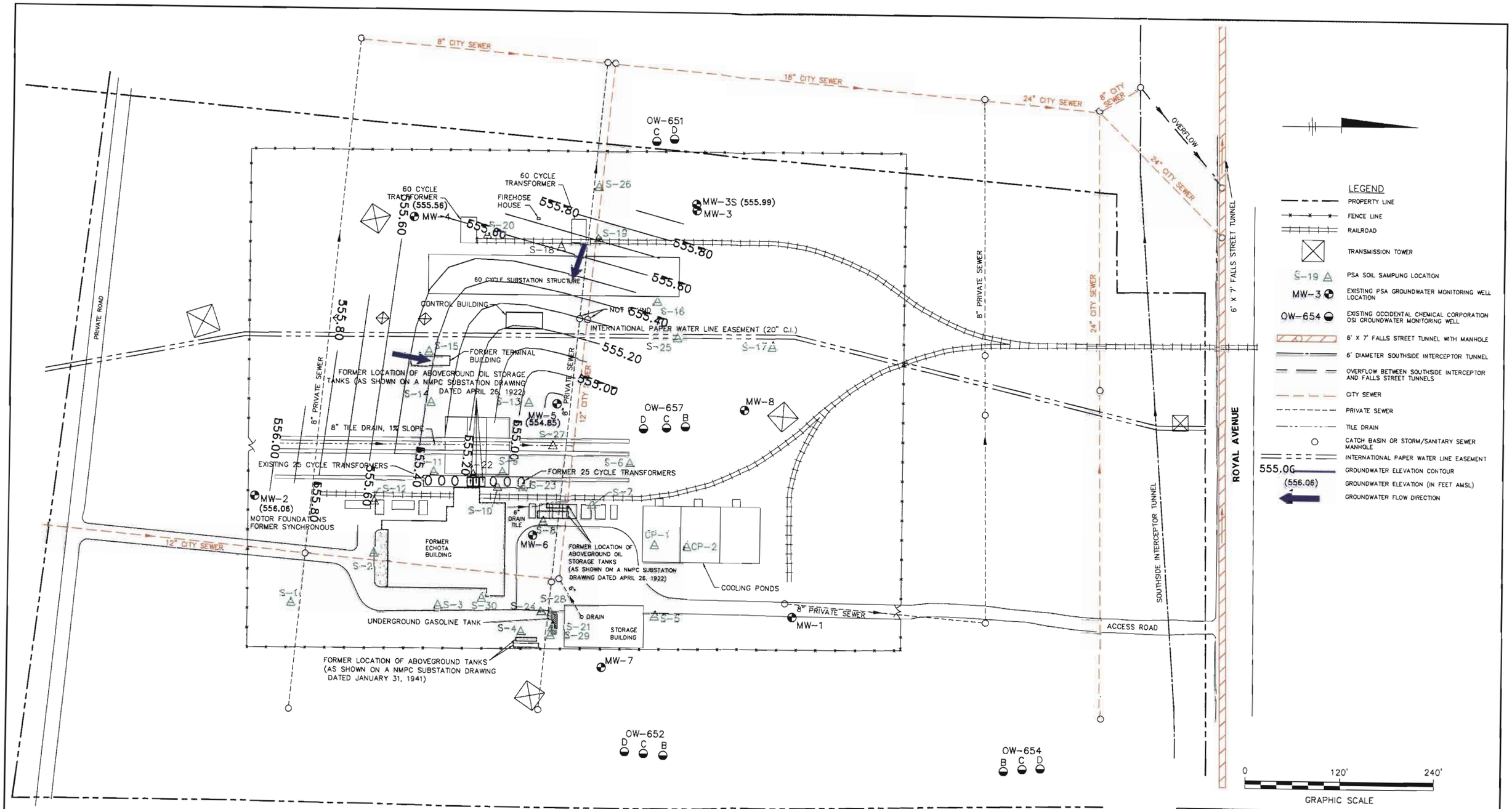
36540002/36540WD4.DWG

NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

POTENTIOMETRIC SURFACE MAP AVERAGE MIDNIGHT WATER LEVELS FOR APRIL 26-MAY 4, 2000

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

FIGURE 8B



NOTES:

1. BASE MAP WAS DIGITIZED FROM NIAGARA MOHAWK POWER COMPANY MAP DATED 12/8/41. ADDITIONAL SITE AND DRAINAGE FEATURES WERE ADDED FROM A CITY OF NIAGARA FALLS COMBINATION SEWER PLAN AND VARIOUS OTHER NIAGARA MOHAWK SITE PLANS.
2. SOIL SAMPLING LOCATIONS AND MONITORING WELL LOCATIONS ARE FROM NIAGARA MOHAWK POWER CORPORATION SURVEY DRAWING #D-61367-W, DATED SEPT. 9, 1999, LATEST REVISION DATED SEPTEMBER 12, 2000 (EXCEPT FOR SAMPLING LOCATION S-27, WHICH IS APPROXIMATE).
3. SITE AND DRAINAGE FEATURE LOCATIONS ARE APPROXIMATE.
4. OTHER UNDERGROUND UTILITIES AND STRUCTURES MAY EXIST, THE LOCATION OF WHICH ARE UNKNOWN.
5. LOCATION OF UNDERGROUND GASOLINE STORAGE TANK BASED ON FIELD OBSERVATION/MEASUREMENT.
6. GROUNDWATER ELEVATIONS BASED ON WATER LEVEL MEASUREMENTS OBTAINED BETWEEN APRIL 26 AND MAY 4, 2000.

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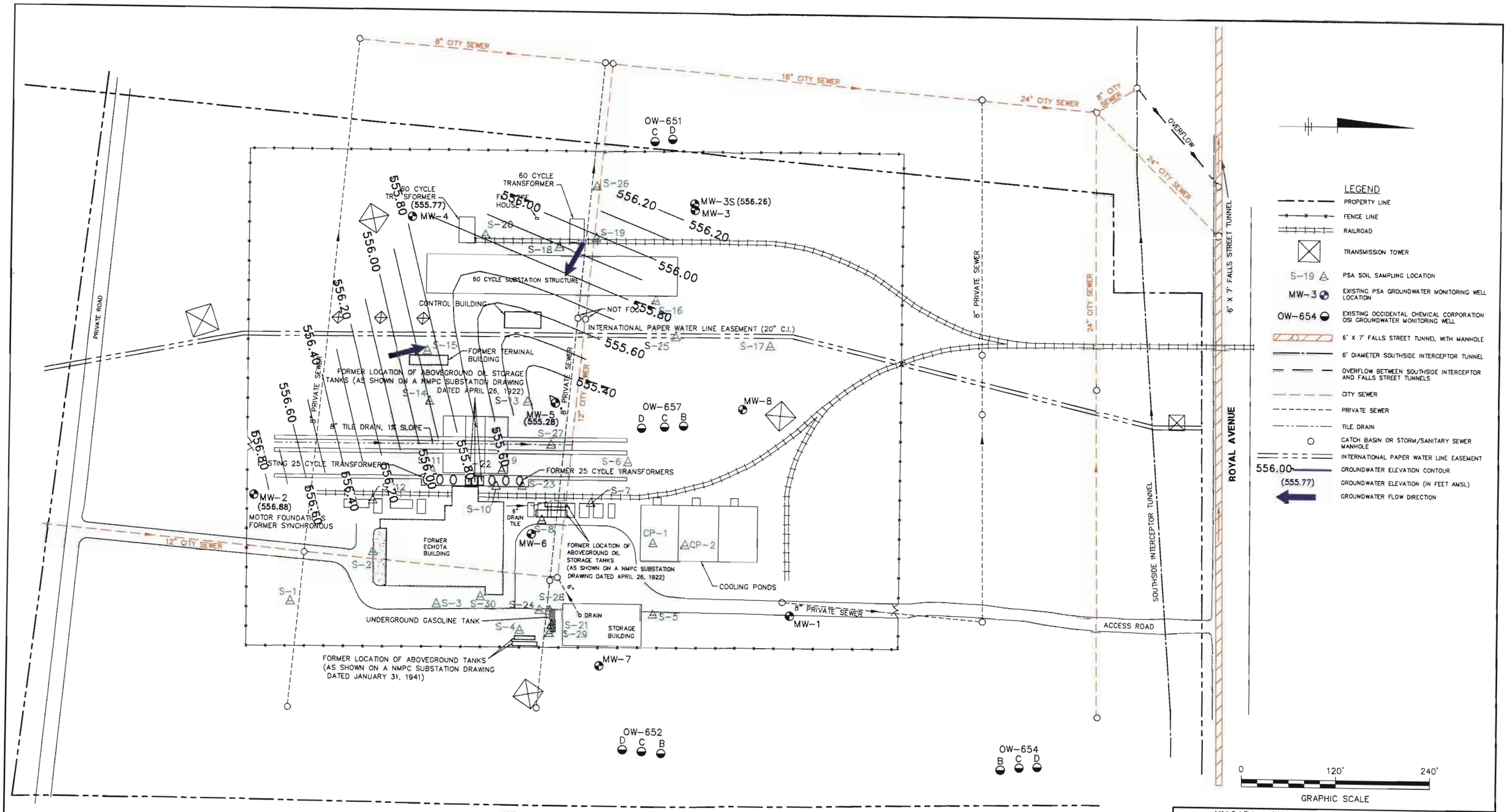
NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

POTENTIOMETRIC SURFACE MAP AVERAGE 6:00 WATER LEVELS FOR APRIL 26-MAY 4, 2000

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

FIGURE 8C



NOTES:

1. BASE MAP WAS DIGITIZED FROM NIAGARA MOHAWK POWER COMPANY MAP DATED 12/8/41. ADDITIONAL SITE AND DRAINAGE FEATURES WERE ADDED FROM A CITY OF NIAGARA FALLS COMBINATION SEWER PLAN AND VARIOUS OTHER NIAGARA MOHAWK SITE PLANS.
2. SOIL SAMPLING LOCATIONS AND MONITORING WELL LOCATIONS ARE FROM NIAGARA MOHAWK POWER CORPORATION SURVEY DRAWING #D-61367-W, DATED SEPT. 9, 1999, LATEST REVISION DATED SEPTEMBER 12, 2000 (EXCEPT FOR SAMPLING LOCATION S-27, WHICH IS APPROXIMATE).
3. SITE AND DRAINAGE FEATURE LOCATIONS ARE APPROXIMATE.
4. OTHER UNDERGROUND UTILITIES AND STRUCTURES MAY EXIST, THE LOCATION OF WHICH ARE UNKNOWN.
5. LOCATION OF UNDERGROUND GASOLINE STORAGE TANK BASED ON FIELD OBSERVATION/MEASUREMENT.
6. GROUNDWATER ELEVATIONS BASED ON WATER LEVEL MEASUREMENTS OBTAINED BETWEEN APRIL 26 AND MAY 4, 2000.

X: 36503X02.DWG
L: ON=*,OFF=*REF*
P: STD-PCP/DL OR B01.PCP
3/16/04 SYR-85-RCB PGL NJR
36640002/36640W06.DWG

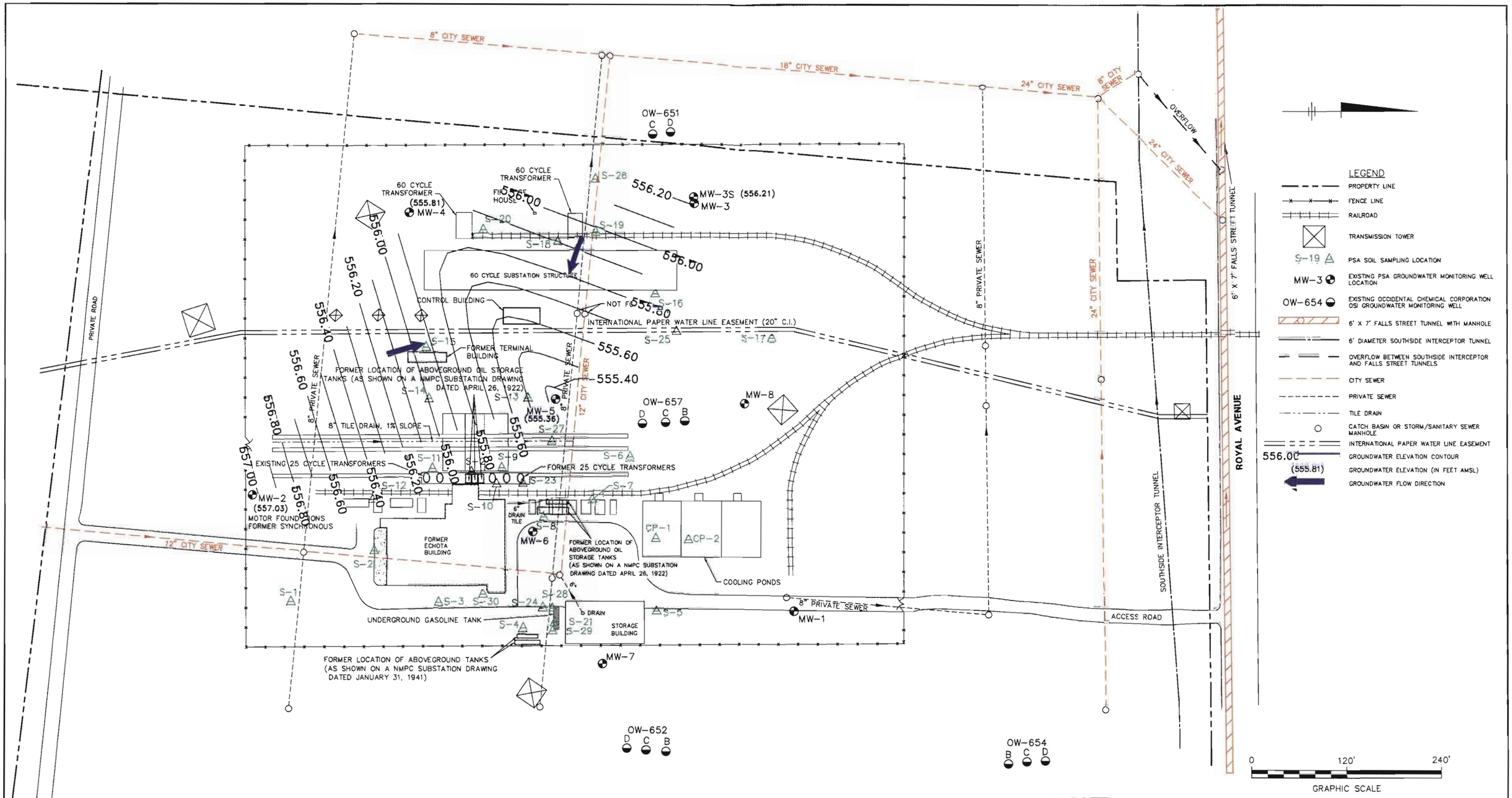
NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK

PRELIMINARY SITE ASSESSMENT

POTENTIOMETRIC SURFACE MAP AVERAGE NOON WATER LEVELS FOR APRIL 26-MAY 4, 2000

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

FIGURE 8D



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6. GROUNDWATER ELEVATIONS BASED ON WATER LEVEL MEASUREMENTS OBTAINED BETWEEN APRIL 26 AND MAY 4, 2000.

X: 36605X02.DWG
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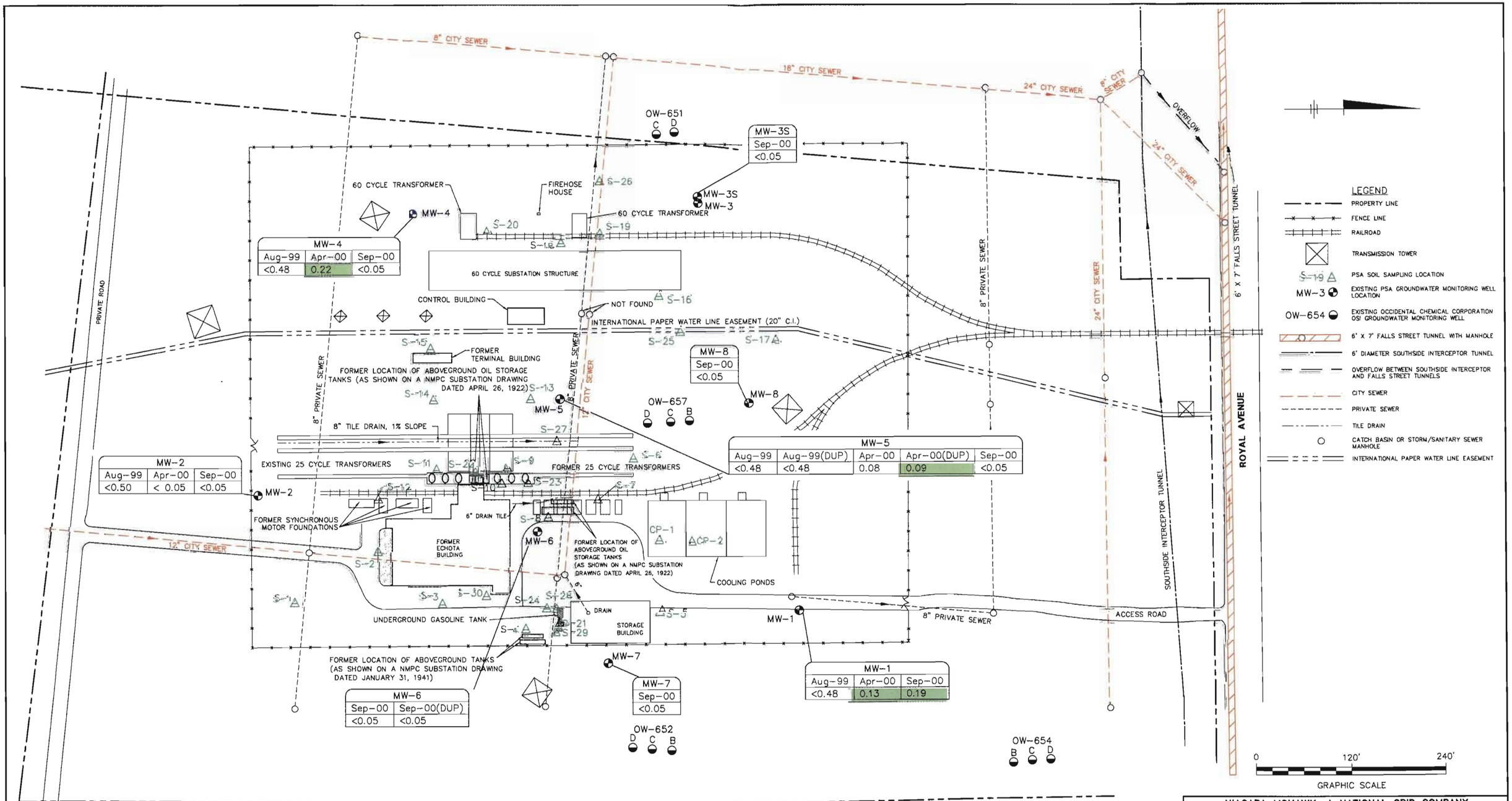
P: STD-PCP/DL OR B01.PCP
3/16/04 SYR-85-RCB PGL NJR
36640002/36640W07.DWG

NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

POTENTIOMETRIC SURFACE MAP AVERAGE 18:00 WATER LEVELS FOR APRIL 26-MAY 4, 2000

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

FIGURE 8E



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3. SITE AND DRAINAGE FEATURE LOCATIONS ARE APPROXIMATE.
4. OTHER UNDERGROUND UTILITIES AND STRUCTURES MAY EXIST, THE LOCATION OF WHICH ARE UNKNOWN.
5. LOCATION OF UNDERGROUND GASOLINE STORAGE TANK BASED ON FIELD OBSERVATION/MEASUREMENT.
6. ALL GROUNDWATER SAMPLE CONCENTRATIONS ARE PRESENTED IN PARTS PER BILLION (ppb).
7. PCBs = POLYCHLORINATED BIPHENYLS.
8. < = COMPOUND WAS NOT DETECTED AT A CONCENTRATION EXCEEDING THE LISTED VALUE.
9. DUP = DUPLICATE SAMPLE.
10. SHADED VALUES INDICATE THAT THE CONSTITUENT WAS DETECTED AT A CONCENTRATION EQUAL TO OR EXCEEDING THE 0.09 ppb CLASS GA STANDARD/GUIDANCE VALUE FOR PCBs PRESENTED IN THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) DIVISION OF WATER TECHNICAL AND OPERATION GUIDANCE SERIES (TOGS 1.1.1) DOCUMENT ENTITLED "AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES AND GROUNDWATER EFFLUENT LIMITATIONS," DATED JUNE 1998.

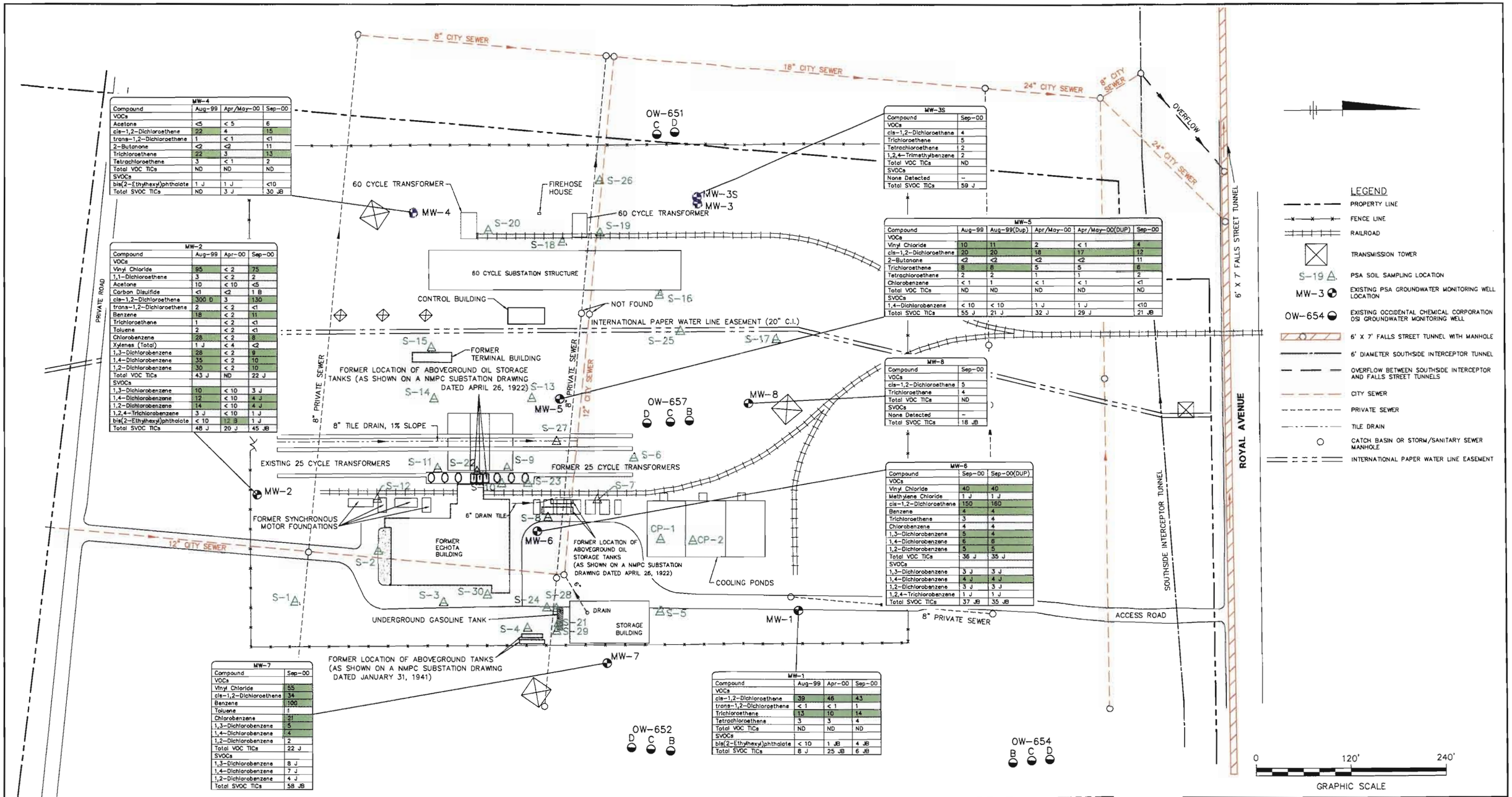
X: 36605X02.DWG
L: ON=*,OFF=REF
P: STD-PCP/DL OR B01.PCP
3/16/04 SYR-BS-RCB PGL NJR
36640002/36640C03.DWG

NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

GROUNDWATER ANALYTICAL RESULTS FOR TOTAL PCBs (ppb)

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

FIGURE 9



MW-4

Compound	Aug-99	Apr/May-00	Sep-00
VOCs			
Acetone	<5	< 5	6
cis-1,2-Dichloroethene	22	4	15
trans-1,2-Dichloroethene	1	< 1	<1
2-Butanone	<2	<2	11
Trichloroethene	22	3	13
Tetrachloroethene	3	< 1	2
Total VOC TICs	ND	ND	ND
SVOCs			
bis(2-Ethylhexyl)phthalate	1 J	1 J	<10
Total SVOC TICs	ND	3 J	30 JB

MW-2

Compound	Aug-99	Apr-00	Sep-00
VOCs			
Vinyl Chloride	95	< 2	75
1,1-Dichloroethene	3	< 2	2
Acetone	10	< 10	<5
Carbon Disulfide	<1	<2	1 B
cis-1,2-Dichloroethene	300 D	3	130
trans-1,2-Dichloroethene	2	< 2	<1
Benzene	18	< 2	11
Trichloroethene	1	< 2	<1
Toluene	2	< 2	<1
Chlorobenzene	28	< 2	8
Xylenes (Total)	1 J	< 4	<2
1,3-Dichlorobenzene	28	< 2	9
1,4-Dichlorobenzene	35	< 2	10
1,2-Dichlorobenzene	30	< 2	10
Total VOC TICs	43 J	ND	22 J
SVOCs			
1,3-Dichlorobenzene	10	< 10	3 J
1,4-Dichlorobenzene	12	< 10	4 J
1,2-Dichlorobenzene	14	< 10	4 J
1,2,4-Trichlorobenzene	3 J	< 10	1 J
bis(2-Ethylhexyl)phthalate	< 10	12 B	1 J
Total SVOC TICs	48 J	20 J	45 JB

MW-3S

Compound	Sep-00
VOCs	
cis-1,2-Dichloroethene	4
Trichloroethene	5
Tetrachloroethene	2
1,2,4-Trimethylbenzene	2
Total VOC TICs	ND
SVOCs	
None Detected	--
Total SVOC TICs	59 J

MW-5

Compound	Aug-99	Aug-99(Dup)	Apr/May-00	Apr/May-00(DUP)	Sep-00
VOCs					
Vinyl Chloride	10	11	2	< 1	4
cis-1,2-Dichloroethene	20	20	18	17	12
2-Butanone	<2	<2	<2	<2	11
Trichloroethene	8	8	5	5	6
Tetrachloroethene	2	2	1	1	2
Chlorobenzene	< 1	1	< 1	< 1	<1
Total VOC TICs	ND	ND	ND	ND	ND
SVOCs					
1,4-Dichlorobenzene	< 10	< 10	1 J	1 J	<10
Total SVOC TICs	55 J	21 J	32 J	29 J	21 JB

MW-8

Compound	Sep-00
VOCs	
cis-1,2-Dichloroethene	5
Trichloroethene	4
Total VOC TICs	ND
SVOCs	
None Detected	--
Total SVOC TICs	18 JB

MW-6

Compound	Sep-00	Sep-00(DUP)
VOCs		
Vinyl Chloride	40	40
Methylene Chloride	1 J	1 J
cis-1,2-Dichloroethene	150	160
Benzene	4	4
Trichloroethene	3	4
Chlorobenzene	4	4
1,3-Dichlorobenzene	5	4
1,4-Dichlorobenzene	6	6
1,2-Dichlorobenzene	5	5
Total VOC TICs	36 J	35 J
SVOCs		
1,3-Dichlorobenzene	3 J	3 J
1,4-Dichlorobenzene	4 J	4 J
1,2-Dichlorobenzene	3 J	3 J
1,2,4-Trichlorobenzene	1 J	1 J
Total SVOC TICs	37 JB	35 JB

MW-7

Compound	Sep-00
VOCs	
Vinyl Chloride	55
cis-1,2-Dichloroethene	34
Benzene	100
Toluene	1
Chlorobenzene	21
1,3-Dichlorobenzene	5
1,4-Dichlorobenzene	4
1,2-Dichlorobenzene	2
Total VOC TICs	22 J
SVOCs	
1,3-Dichlorobenzene	8 J
1,4-Dichlorobenzene	7 J
1,2-Dichlorobenzene	4 J
Total SVOC TICs	58 JB

MW-1

Compound	Aug-99	Apr-00	Sep-00
VOCs			
cis-1,2-Dichloroethene	39	46	43
trans-1,2-Dichloroethene	< 1	< 1	1
Trichloroethene	13	10	14
Tetrachloroethene	3	3	4
Total VOC TICs	ND	ND	ND
SVOCs			
bis(2-Ethylhexyl)phthalate	< 10	1 JB	4 JB
Total SVOC TICs	8 J	25 JB	6 JB

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5. LOCATION OF UNDERGROUND GASOLINE STORAGE TANK BASED ON FIELD OBSERVATION/MEASUREMENT.
6. ALL GROUNDWATER SAMPLE CONCENTRATIONS ARE PRESENTED IN PARTS PER BILLION (ppb).
7. VOCs = VOLATILE ORGANIC COMPOUNDS.
8. SVOCs = SEMIVOLATILE ORGANIC COMPOUNDS.
9. TICs = TENTATIVELY IDENTIFIED COMPOUNDS.
10. DUP = DUPLICATE SAMPLE.
11. J = INDICATES AN ESTIMATED VALUE.
12. B = ANALYTE IDENTIFIED IN THE SAMPLE AS WELL AS THE ASSOCIATED BLANK.
13. ND = NONE DETECTED.
14. SHADED VALUES INDICATE THAT THE CONSTITUENT WAS DETECTED AT A CONCENTRATION EXCEEDING CLASS GA STANDARD/GUIDANCE VALUE PRESENTED IN THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) DIVISION OF WATER TECHNICAL AND OPERATION GUIDANCE SERIES (TOGS 1.1.1) DOCUMENT ENTITLED "AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES AND GROUNDWATER EFFLUENT LIMITATIONS, " DATED JUNE 1998.

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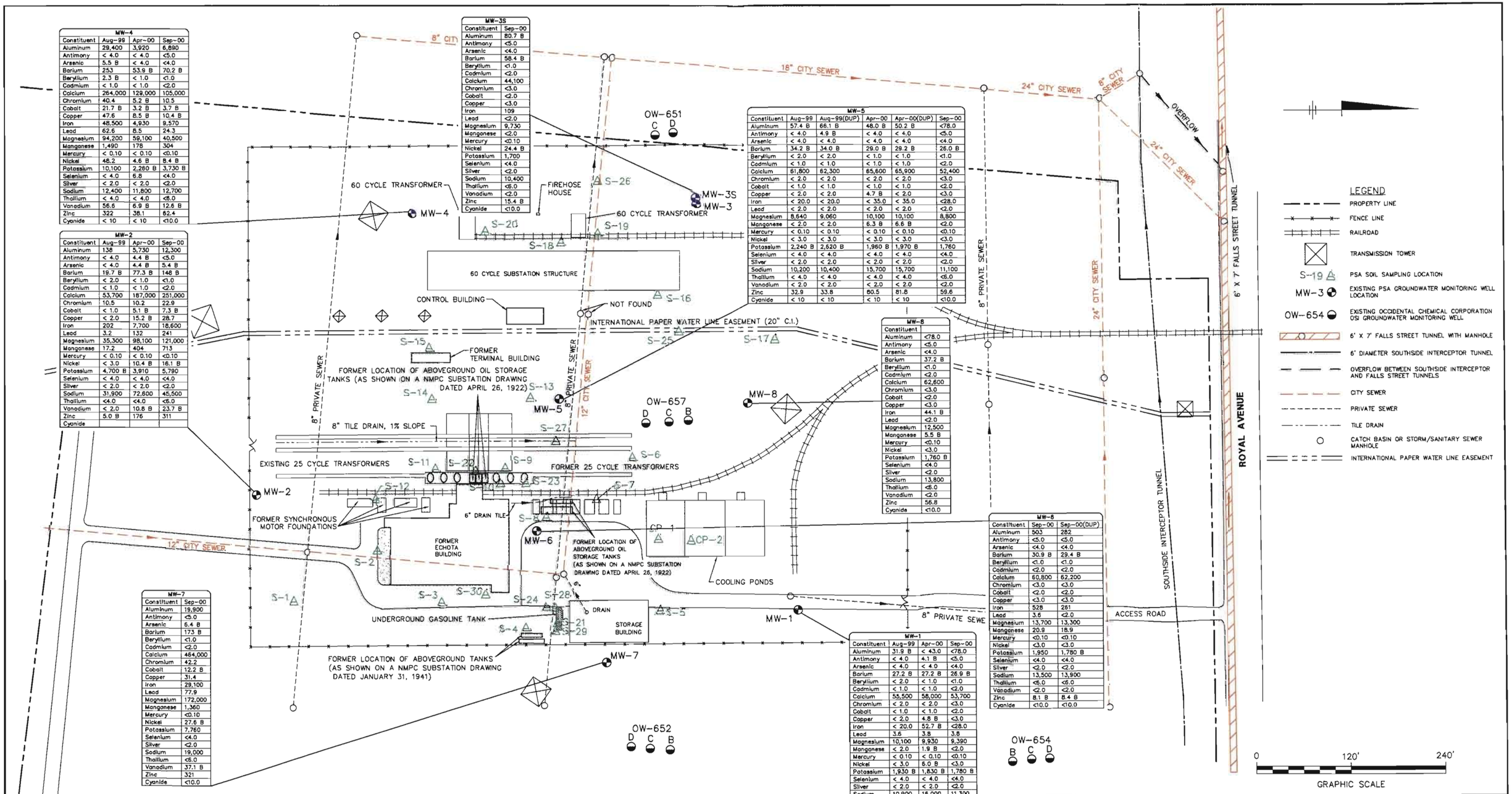
36640002/36640C02.DWG

NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK
PRELIMINARY SITE ASSESSMENT

GROUNDWATER ANALYTICAL RESULTS FOR DETECTED VOCs & SVOCs (ppb)

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

FIGURE 10



MW-4			
Constituent	Aug-99	Apr-00	Sep-00
Aluminum	29,400	3,920	6,880
Antimony	< 4.0	< 4.0	<5.0
Arsenic	5.5 B	< 4.0	<4.0
Barium	253	53.9 B	70.2 B
Beryllium	2.3 B	< 1.0	<1.0
Cadmium	< 1.0	< 1.0	<2.0
Calcium	264,000	129,000	105,000
Chromium	40.4	5.2 B	10.5
Cobalt	21.7 B	3.2 B	3.7 B
Copper	47.6	8.5 B	10.4 B
Iron	48,500	4,930	9,570
Lead	62.6	8.5	24.3
Magnesium	94,200	58,100	40,500
Manganese	1,490	178	304
Mercury	< 0.10	< 0.10	<0.10
Nickel	48.2	4.6 B	8.4 B
Potassium	10,100	2,260 B	3,730 B
Selenium	< 4.0	6.8	<4.0
Silver	< 2.0	< 2.0	<2.0
Sodium	12,400	11,800	12,700
Thallium	< 4.0	< 4.0	<6.0
Vanadium	56.6	6.9 B	12.6 B
Zinc	322	38.1	82.4
Cyanide	< 10	< 10	<10.0

MW-2			
Constituent	Aug-99	Apr-00	Sep-00
Aluminum	138	5,730	12,300
Antimony	< 4.0	4.4 B	<5.0
Arsenic	< 4.0	4.4 B	5.4 B
Barium	19.7 B	77.3 B	148 B
Beryllium	< 2.0	< 1.0	<1.0
Cadmium	< 1.0	< 1.0	<2.0
Calcium	53,700	187,000	251,000
Chromium	10.5	10.2	22.9
Cobalt	< 1.0	5.1 B	7.3 B
Copper	< 2.0	15.2 B	28.7
Iron	202	7,700	18,600
Lead	3.2	132	241
Magnesium	35,300	98,100	121,000
Manganese	17.2	404	713
Mercury	< 0.10	< 0.10	<0.10
Nickel	< 3.0	10.4 B	16.1 B
Potassium	4,700 B	3,910	5,790
Selenium	< 4.0	< 4.0	<4.0
Silver	< 2.0	< 2.0	<2.0
Sodium	31,900	72,600	45,500
Thallium	<4.0	<4.0	<6.0
Vanadium	< 2.0	10.8 B	23.7 B
Zinc	5.0 B	176	311
Cyanide			

MW-3S	
Constituent	Sep-00
Aluminum	80.7 B
Antimony	<5.0
Arsenic	<4.0
Barium	58.4 B
Beryllium	<1.0
Cadmium	<2.0
Calcium	44,100
Chromium	<3.0
Cobalt	<2.0
Copper	<3.0
Iron	109
Lead	<2.0
Magnesium	9,730
Manganese	<2.0
Mercury	<0.10
Nickel	24.4 B
Potassium	1,700
Selenium	<4.0
Silver	<2.0
Sodium	10,400
Thallium	<6.0
Vanadium	<2.0
Zinc	15.4 B
Cyanide	<10.0

MW-5					
Constituent	Aug-99	Aug-99(DUP)	Apr-00	Apr-00(DUP)	Sep-00
Aluminum	57.4 B	66.1 B	48.0 B	50.2 B	<78.0
Antimony	< 4.0	< 4.0	< 4.0	< 4.0	<5.0
Arsenic	< 4.0	< 4.0	< 4.0	< 4.0	<4.0
Barium	34.2 B	34.0 B	29.0 B	29.2 B	26.0 B
Beryllium	< 2.0	< 2.0	< 1.0	< 1.0	<1.0
Cadmium	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
Calcium	61,800	62,300	65,600	65,900	52,400
Chromium	< 2.0	< 2.0	< 2.0	< 2.0	<3.0
Cobalt	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
Copper	< 2.0	< 2.0	4.7 B	< 2.0	<3.0
Iron	< 20.0	< 20.0	< 35.0	< 35.0	<28.0
Lead	< 2.0	< 2.0	< 2.0	< 2.0	<2.0
Magnesium	8,640	9,060	10,100	10,100	8,800
Manganese	< 2.0	< 2.0	6.3 B	6.6 B	<2.0
Mercury	< 0.10	< 0.10	< 0.10	< 0.10	<0.10
Nickel	< 3.0	< 3.0	< 3.0	< 3.0	<3.0
Potassium	2,240 B	2,620 B	1,960 B	1,970 B	1,760
Selenium	< 4.0	< 4.0	< 4.0	< 4.0	<4.0
Silver	< 2.0	< 2.0	< 2.0	< 2.0	<2.0
Sodium	10,200	10,400	15,700	15,700	11,100
Thallium	< 4.0	< 4.0	< 4.0	< 4.0	<6.0
Vanadium	< 2.0	< 2.0	< 2.0	< 2.0	<2.0
Zinc	32.9	33.8	80.5	81.8	59.6
Cyanide	< 10	< 10	< 10	< 10	<10.0

MW-8	
Constituent	
Aluminum	<78.0
Antimony	<5.0
Arsenic	<4.0
Barium	37.2 B
Beryllium	<1.0
Cadmium	<2.0
Calcium	62,600
Chromium	<3.0
Cobalt	<2.0
Copper	<3.0
Iron	44.1 B
Lead	<2.0
Magnesium	12,500
Manganese	5.5 B
Mercury	<0.10
Nickel	<3.0
Potassium	1,760 B
Selenium	<4.0
Silver	<2.0
Sodium	13,800
Thallium	<6.0
Vanadium	<2.0
Zinc	56.8
Cyanide	<10.0

MW-8		
Constituent	Sep-00	Sep-00(DUP)
Aluminum	503	282
Antimony	<5.0	<5.0
Arsenic	<4.0	<4.0
Barium	30.9 B	29.4 B
Beryllium	<1.0	<1.0
Cadmium	<2.0	<2.0
Calcium	60,800	62,200
Chromium	<3.0	<3.0
Cobalt	<2.0	<2.0
Copper	<3.0	<3.0
Iron	528	261
Lead	3.6	<2.0
Magnesium	13,700	13,300
Manganese	20.9	18.9
Mercury	<0.10	<0.10
Nickel	<3.0	<3.0
Potassium	1,950	1,780 B
Selenium	<4.0	<4.0
Silver	<2.0	<2.0
Sodium	13,500	13,900
Thallium	<6.0	<6.0
Vanadium	<2.0	<2.0
Zinc	8.1 B	8.4 B
Cyanide	<10.0	<10.0

MW-7	
Constituent	Sep-00
Aluminum	19,900
Antimony	<5.0
Arsenic	6.4 B
Barium	173 B
Beryllium	<1.0
Cadmium	<2.0
Calcium	464,000
Chromium	42.2
Cobalt	12.2 B
Copper	31.4
Iron	29,100
Lead	77.9
Magnesium	172,000
Manganese	1,360
Mercury	<0.10
Nickel	27.6 B
Potassium	7,760
Selenium	<4.0
Silver	<2.0
Sodium	19,000
Thallium	<6.0
Vanadium	37.1 B
Zinc	321
Cyanide	<10.0

MW-1			
Constituent	Aug-99	Apr-00	Sep-00
Aluminum	31.9 B	< 43.0	<78.0
Antimony	< 4.0	4.1 B	<5.0
Arsenic	< 4.0	< 4.0	<4.0
Barium	27.2 B	27.2 B	26.9 B
Beryllium	< 2.0	< 1.0	<1.0
Cadmium	< 1.0	< 1.0	<2.0
Calcium	55,500	58,000	53,700
Chromium	< 2.0	< 2.0	<3.0
Cobalt	< 1.0	< 1.0	<2.0
Copper	< 2.0	4.8 B	<3.0
Iron	< 20.0	52.7 B	<28.0
Lead	3.6	3.8	3.8
Magnesium	10,100	9,930	9,390
Manganese	< 2.0	1.9 B	<2.0
Mercury	< 0.10	< 0.10	<0.10
Nickel	< 3.0	5.0 B	<3.0
Potassium	1,930 B	1,830 B	1,780 B
Selenium	< 4.0	< 4.0	<4.0
Silver	< 2.0	< 2.0	<2.0
Sodium	10,900	16,000	11,300
Thallium	< 4.0	< 4.0	<6.0
Vanadium	< 2.0	< 2.0	<2.0
Zinc	199	361	237
Cyanide	< 10	< 10	<10.0

NOTES:

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5. LOCATION OF UNDERGROUND GASOLINE STORAGE TANK BASED ON FIELD OBSERVATION /MEASUREMENT.
6. TAL = TARGET ANALYTE LIST.
7. ALL CONCENTRATIONS ARE PRESENTED IN PARTS PER BILLION (ppb).
8. < = COMPOUND WAS NOT DETECTED AT A CONCENTRATION EXCEEDING THE LISTED VALUE.
9. MW = MONITORING WELL (GROUNDWATER SAMPLE).
10. B = CONCENTRATION REPORTED WAS LESS THAN THE CONTRACT REQUIRED DETECTION LIMIT, BUT GREATER THAN OR EQUAL TO THE INSTRUMENT DETECTION LIMIT.
11. DUP = DUPLICATE SAMPLE.

X: 36605X02.DWG
L: ON=*,OFF=REF
P: STD-PCP/D2BL
3/16/04 SYR-85-JER RCB NJR
36640002/36640C01.DWG

NIAGARA MOHAWK, A NATIONAL GRID COMPANY
HARPER SUBSTATION
NIAGARA FALLS, NEW YORK

PRELIMINARY SITE ASSESSMENT

GROUNDWATER ANALYTICAL RESULTS FOR TAL INORGANIC CONSTITUENTS (ppb)

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

FIGURE 11

Appendices

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Appendix A

Inactive Hazardous Waste Disposal Reports

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation
Inactive Hazardous Waste Disposal Report April 1, 2000

Site Name: DuPont Plant Site **Site Code:** 932013
Class Code: 4 **Region:** 9 **County:** Niagara **EPA Id:**
Address: Buffalo Avenue **City:** Niagara Falls **Zip:** 14302
Latitude: 43 4' 50" **Longitude:** 79 1' 21"
Site Type: Dump **Estimated Size:** 52 Acres

Site Owner / Operator Information:
Current Owner(s) Name: E.I. DuPont de Nemours & Company
Current Owner(s) Address: P.O.B. 787 Buffalo Ave. Niagara Falls NY 14302
Owner(s) during disposal: Niagara Electro Chemical Co./DuPont
Operator(s) during disposal: E.I. DuPont deNemours & Company
Stated Operator(s) Address: Buffalo Ave. Niagara Falls NY 14302
Hazardous Waste Disposal Period: From 1898 To present

Site Description:
DuPont's Niagara Plant borders the Robert Moses Parkway on the south and Buffalo Avenue on the North. Gill Creek transects the plant, dividing it in two approximately equal parts. Over half of the site is built on filled land.
In 1982, the U.S.G.S. installed 6 wells south of the plant along the Robert Moses Parkway as part of the Niagara River Toxics Investigation. Samples from these wells have confirmed the presence of chlorinated organics in the groundwater. Subsequently DuPont has undertaken a series of plant-wide investigations. These studies have verified that contaminants were present on the plant site and that they have migrated deep into bedrock. Based on these findings, DuPont has implemented a remediation plan to control the migration of contaminants from the plant site. The plan consists of groundwater collection in the overburden and shallow bedrock zones with treatment of collected water. Also, the Olin Production Well that is now operated by DuPont collects groundwater from the deep bedrock zones. The groundwater from the overburden and shallow bedrock is pumped and treated before discharging to the Niagara Falls Waste Water Treatment Plant (WWTP). Gill Creek, which was heavily contaminated with DuPont and Olin plant site chemicals, was partially remediated in 1982. The remaining creek remediation was completed in 1992 under a Consent Order. The groundwater is sampled, and the systems evaluated on a regular basis. Monitoring reports are provided for DEC review. Long term operation and maintenance (O&M) activities are in place to monitor the performance of the groundwater remedial system and the Gill Creek remediation. Through 1999 third quarter, the recovery system and the Olin deep well have removed about 84,000 lbs. of organic compounds from the groundwater. Additional investigations are underway on the East Plant bedrock to assess the impact of the groundwater recovery system and the old production well on deep bedrock groundwater zones, east of Gill Creek.

Confirmed Hazardous Waste Disposal:
metal cyanide sludges, hexachloroethane, 1,2,4,-trichlorobenzene, benzene, chloroform, trans-1, 2-dichloroethylene, methylene chloride, 1,1,2,2-tetrachloroethane, trichloroethylene, tetrachloroethylene, toluene, vinyl chloride, trichlorofluoromethane, BHC

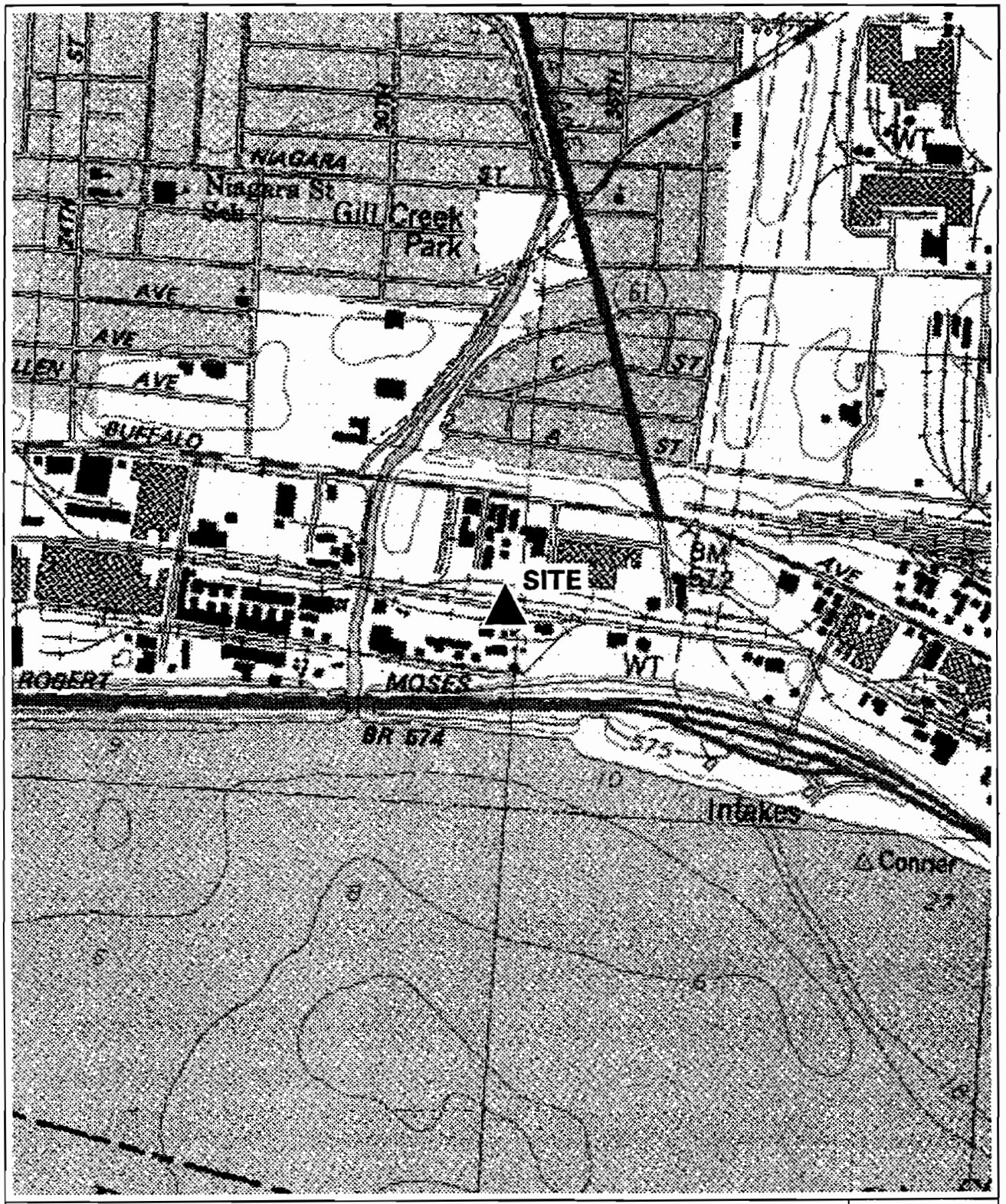
Quantity:
unknown

Analytical Data Available for: Air Groundwater Surface Water Soil Sediment
Applicable Standards Exceeded in: Groundwater
Geotechnical Information:
Soil/Rock Type: Fill over till over bedrock.
Depth to Groundwater: Range: 5 to 10 feet.

Legal Action: Type: State Consent Order Status: Order Signed
Remedial Action: Complete Nature of action: GW collect-treatment, creek sediment removal.

Assessment of Environmental Problems:
Groundwater on the plant site is contaminated with organics and inorganics. Off-site migration has occurred. Direction of groundwater movement in the overburden and bedrock has been defined. Remedial program has been implemented.

Assessment of Health Problems:
Although groundwater is contaminated, exposure by contact or ingestion is unlikely as there are no drinking water wells in the vicinity and public water serves the area. The entire site is fenced, limiting public access to the site. The remedial program includes overburden and bedrock groundwater collection and treatment. As part of the remedy, DuPont removed contaminated sediments in Gill Creek from Adams Avenue up to and including the mouth of Gill Creek.



Site Location Map

932013 DuPont Plant Site

Map source: USGS 1:24,000-scale topographic quadrangles

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Scale 1:12,000

April 1, 2000

County: Niagara

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation

Inactive Hazardous Waste Disposal Report **April 1, 2000**

Site Name: Frontier Chemical - Royal Avenue **Site Code:** 932110
Class Code: 2 **Region:** 9 **County:** Niagara **EPA Id:**
Address: 4626 Royal Avenue **City:** Niagara Falls **Zip:** 14303
Latitude: 43 5' 22" **Longitude:** 79 0' 35"
Site Type: Structure Lagoon **Estimated Size:** 9 Acres

Site Owner / Operator Information:
Current Owner(s) Name: Trans Niagara Associates
Current Owner(s) Address: 2730 Transit Road West Seneca NY 14224
Owner(s) during disposal: Multi-Owner During Use
Operator(s) during disposal:
Stated Operator(s) Address:
Hazardous Waste Disposal Period: From 1906 To 1992

Site Description:
he site dates back to 1906 when it was owned and operated by the International Minerals and Chemical Company as a caustic chlorine nercury cell) production plant. Sludge ponds associated with this operation were utilized for liquid sludge disposal from caustic soda production. Although these ponds have been removed, they may have contributed to the contamination of the site. Between 1974 and 1992, Frontier Chemical operated a RCRA facility at the site at which a wide variety of listed and characteristic hazardous wastes were stored and eated. Inadequate operation and maintenance at the facility, including uncontrolled releases of hazardous wastes, led the Department to sue a Summary Abatement Order in December of 1992. When the facility failed to comply with the Order, the Department requested the USEPA to conduct an emergency response action at the site. This action was completed in early 1995. As part of the action, drums and tanks containing hazardous waste solvents were removed and properly disposed off-site. The RCRA permit issued for the facility was evoked by the Department on April 6, 1994. Hydrogeological Investigations at the site have identified significant organic contamination in n-site soils, and over burden and bedrock groundwater. The area of maximum overburden contamination, as evidenced by the presence of non-aqueous chlorinated organics, centers around the former hazardous waste sludge settler, transfer operations, and chemical storage tanks that were used to store solvents. NAPL has been detected in bedrock monitoring wells located at the property line immediately djacent to, and at the same elevation as, the unlined Falls Street tunnel. Dry weather flow, and nearly all wet weather flow, through the nnel is treated. Groundwater elevation data confirm that groundwater flow across the site is toward the tunnel. The NYSDEC has completed a limited PRP search. Negotiations with the PRP for completing a Remedial Investigation and Feasibility Study are underway.

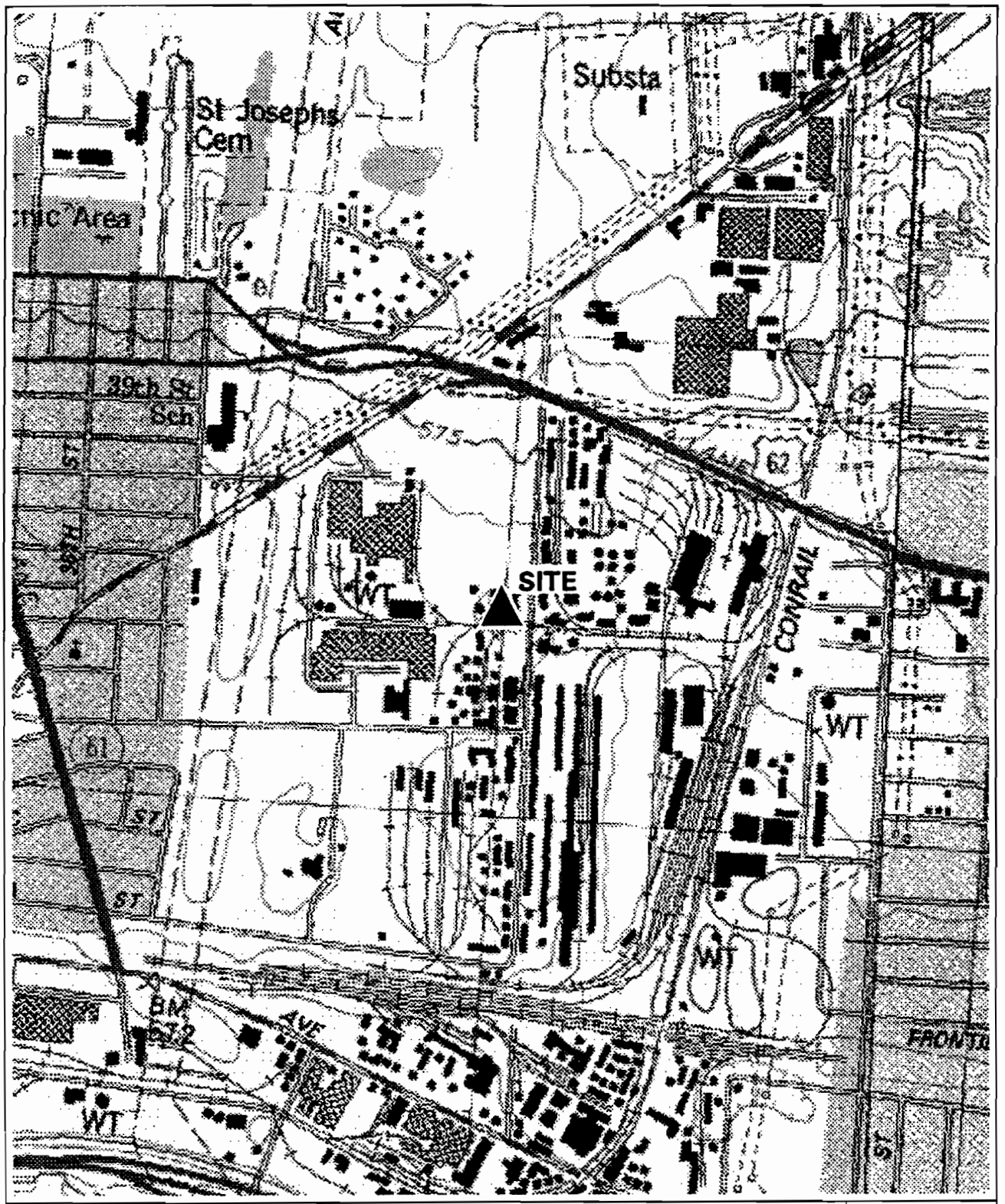
onfirmed Hazardous Waste Disposal:	**Quantity:**
solvent chemicals (chlorobenzenes, trichloro & tetrachloroethene, benzoyl chloride)	unknown

Analytical Data Available for: Groundwater Soil
Applicable Standards Exceeded in: Groundwater
Geotechnical Information:
Soil/Rock Type: Fill over glacio-lacustrine deposits over till.
Depth to Groundwater: Range: 15 to 20 feet.

Legal Action: Type: State Consent Order -RI/FS Status: Negotiations in Progress
Remedial Action: Complete Nature of action: Removal of drummed and tanked hazardous wastes.

ssessment of Environmental Problems:
High concentrations of organic contaminants exist in soil and groundwater. Non-aqueous phase liquids (NAPL) have been found in both the overburden and bedrock groundwater. NAPL has also been detected immediately adjacent to the unlined Falls Street Tunnel. NAPL will ontinue to act as a source of groundwater contamination.

ssessment of Health Problems:
he most concentrated contamination is located well below the ground surface where public contact with wastes is unlikely. The site is enced and secured which minimizes the potential for public exposures to on-site contamination. The surrounding area of the site is mostly industrial. The nearest residence is approximately one mile west of the site and is supplied with public water. There are no private wells in ne immediate area so exposures via drinking water are not expected.



Site Location Map

932110 Frontier Chemical - Royal Avenue

Map source: USGS 1:24,000-scale topographic quadrangles

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April 1, 2000

County: Niagara

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation

Inactive Hazardous Waste Disposal Report — **April 1, 2000**

Site Name: Hooker Main Plant — **Site Code:** 932019
Class Code: 2 — **Region:** 9 — **County:** Niagara — **EPA Id:**
Address: Buffalo Avenue — **City:** Niagara Falls — **Zip:** 14303
Latitude: 43 4' 41" — **Longitude:** 79 0' 32"
Site Type: Landfill — **Estimated Size:** 113 Acres

Site Owner / Operator Information:
Current Owner(s) Name: Occidential Chemical Corp.
Current Owner(s) Address: 360 Rainbow Blvd., PO Box 344 — Niagara Falls — NY 14302
Owner(s) during disposal: Hooker Chemicals and Plastics Corp.
Operator(s) during disposal: Hooker Chemicals and Plastics Corp.
Stated Operator(s) Address: Buffalo Ave. — Niagara Falls — NY 14302
Hazardous Waste Disposal Period: From 1930 To 1975

Site Description:
his is an operating chemical manufacturing plant. Historic landfilling of hazardous organic materials reportedly was limited to three areas:)","F", and "N". Additionally, three dewatering areas handled inorganic sludges. Several spill areas were reported, with additional organic spill areas suspected. The geology, hydrogeology, and chemistry in the overburden and upper shallow bedrock have previously been recorded by the owner with approximately 180 wells and boreholes installed from 1979 through 1982. Essentially, the entire plant site is eported to be contaminated in varying degrees.

stipulation and order requiring additional investigation, Supplemental Data Collection Program (SDCP) was executed in September 1988. All SDCP field work and chemical analyses are now complete and the Final SDCP Report has been approved. The remedial program was incorporated into the OCC RCRA Part 373 Permit system with additional on-site investigations and an off-site groundwater investigation onducted pursuant to the OCC Permit. The bedrock groundwater remediation, consisting of nineteen extraction wells and an on-site eatment facility, is operational. The overburden groundwater collection system has been installed along the south and southwest boundaries of the plant and is operational. A barrier wall has been constructed along the southern plant boundary adjacent to the Niagara River to prevent overburden groundwater from entering the river. The RCRA Final Corrective Measures Study was submitted in November 998, and the RCRA Statement of Basis for Final Corrective Measures was issued in December 1999. ICMs already completed at the site ollectively comprise the final corrective measures. An extensive long-term operation, maintenance and monitoring program is underway.

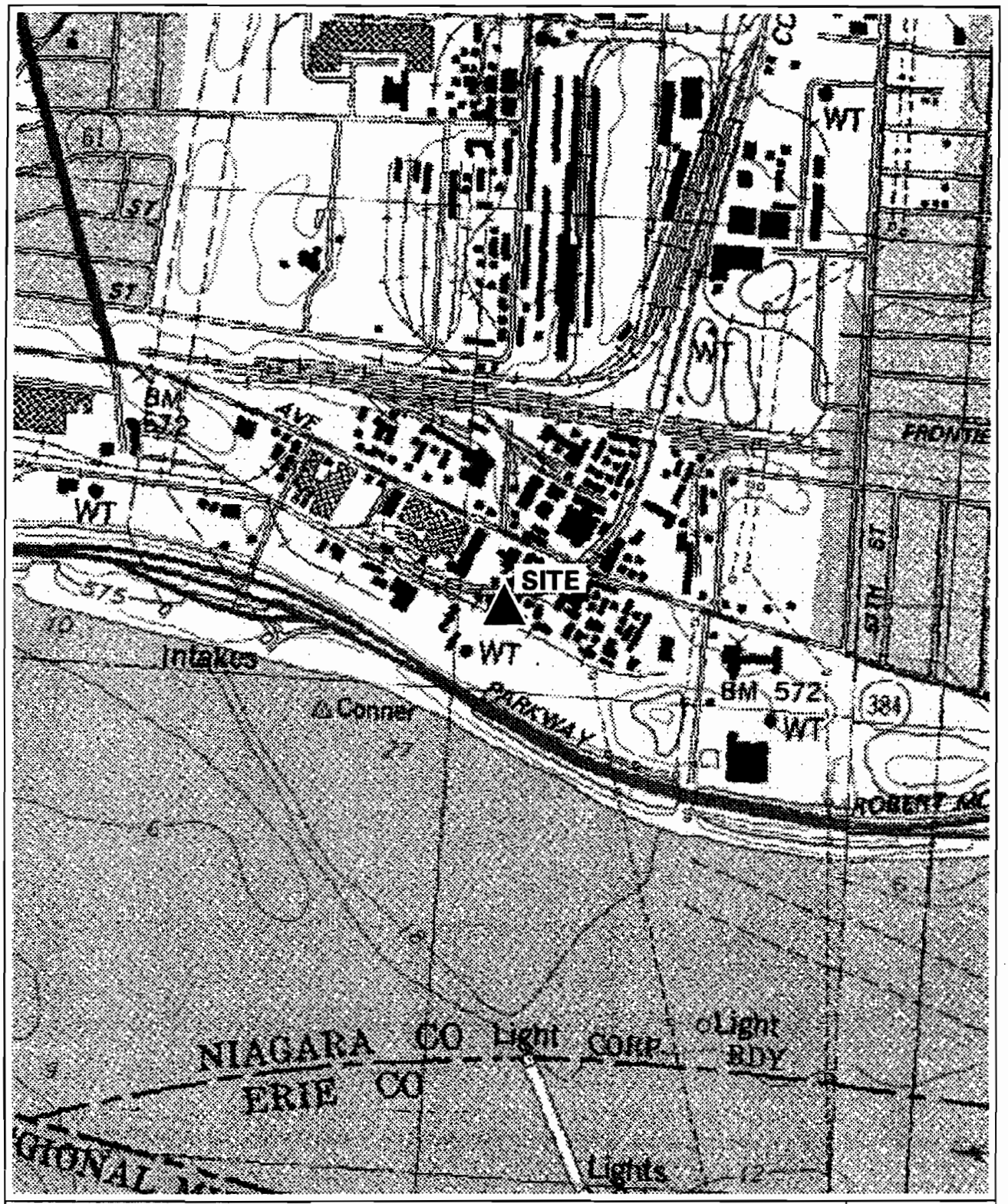
onfirmed Hazardous Waste Disposal:	**Quantity:**
primarily organics with some inorganics	6,000 tons

Analytical Data Available for: Groundwater Soil
Applicable Standards Exceeded in: Groundwater
Geotechnical Information:
Soil/Rock Type: Fine-coarse sand, silt-rich clay over bedrock.
Depth to Groundwater: Range: 1 to 20 feet.

Legal Action: Type: State Stipulation — Status: Order Signed
Remedial Action: Complete — Nature of action: Corrective meas. implementation

ssessment of Environmental Problems:
Remedial action at the site is complete. Contaminated groundwater is intercepted and collected by a series of extraction wells and collection trenches, and treated at an on-site facility. A barrier was installed between the site and the Niagara River to minimize overburden roundwater contamination from impacting the river. Contaminated soils remain but direct contact is prevented by soil or asphalt covers. eed restrictions have been instituted to prohibit future incompatible site uses. Long-term O&M has been implemented to monitor remedy effectiveness.

ssessment of Health Problems:
he potential for public contact with contaminated surface soils is small as the site is fenced and access is restricted. Air emissions are monitored throughout all site investigations in order to limit exposures on- and off-site. Non-aqueous phase liquids have been found along underground utilities during emergency repairs and therefore represent a potential exposure route during utility repair. Exposures via drinking vater are not expected because there are no known drinking water wells in the immediate area and potable water is supplied by the City of iagara Falls.



Site Location Map

932019 Hooker Main Plant

Map source: USGS 1:24,000-scale topographic quadrangles

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Scale 1:12,000

April 1, 2000

County: Niagara

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation
Inactive Hazardous Waste Disposal Report **April 1, 2000**

Site Name: Hooker Plant - "S" Area **Site Code:** 932019A
Class Code: 2 Region: 9 County: Niagara EPA Id: NYD980651087
Address: Buffalo Avenue City: Niagara Falls Zip: 14303
Latitude: 43 4' 41" Longitude: 79 0' 26"
Site Type: Landfill Estimated Size: 8 Acres

Site Owner / Operator Information:
Current Owner(s) Name: Occidental Chemical Corp.
Current Owner(s) Address: 360 Rainbow Blvd. Niagara Falls, NY 14302
Owner(s) during disposal: Hooker Chemicals and Plastics Corp.
Operator(s) during disposal: Occidental Chemical Corp.
Stated Operator(s) Address: 360 Rainbow Blvd. Niagara Falls NY 14302
Hazardous Waste Disposal Period: From 1947 To 1975

Site Description:
The S-Area Landfill is a now closed disposal area in the southwest corner of the Occidental Chemical Company's (OCC) Niagara Falls Manufacturing Plant. In 1978, organic chemicals from S-Area were found at the adjacent Niagara Falls Drinking Water Plant. Thousands of tons of Dense Non-Aqueous Phase Liquids (DNAPLS) were disposed in the landfill and were found permeating the network of buried utilities around the landfill and bedrock beneath the site. Lawsuits filed by the State and Federal governments resulted in Court ordered agreements 1985 and 1991) requiring OCC to investigate and remediate the site. OCC also agreed to fund the replacement of the City's Water Treatment Plant. The old Water Plant was demolished and the now vacant area incorporated into the S-Area remedial systems. Construction of S-Area remedial systems is nearing completion. Major utility relocations, and construction of DNAPL separators and liquid storage tanks were completed in 1992. In 1993, the onsite groundwater treatment facility was completed and initial treatment operations began. A hydraulic barrier wall surrounding S-Area and groundwater DNAPL extraction systems in the overburden and bedrock were completed and brought on-line in 1995. Most of the Drain Collection System (DCS) inside the barrier wall was also completed in 1995. The remaining Barrier Wall section was completed in 1998 after the old Water Plant was demolished. During startup it was found that the DCS did not function well and had to be replaced. replacement of the DCS is almost completed. Once the DCS is done, a landfill cap will be constructed.

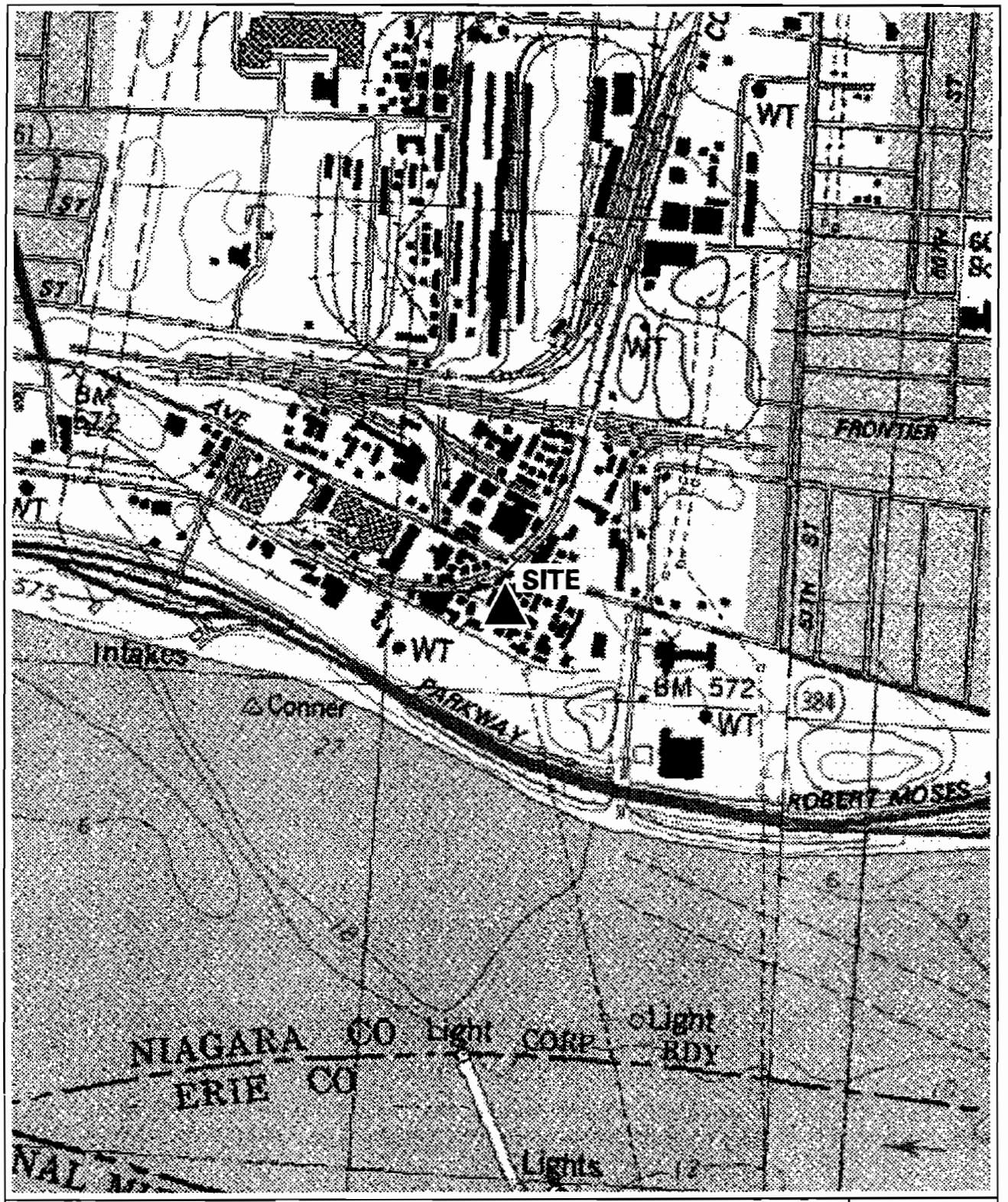
Confirmed Hazardous Waste Disposal: **Quantity:**
CaF2 (lagoons), organic phosphates, acid
chlorides, phenol tars, thionyl chloride,
TCP, benzoyl chloride,
DDS/MCT, metal chlorides, thiodan,
sulfides, C-56, benzyl chlorides
chlorobenzenes (mono,di,tri,tetra,hexa)

Analytical Data Available for: Groundwater Soil
Applicable Standards Exceeded in: Groundwater
Geotechnical Information:
Soil/Rock Type: Sand and silt-rich clay.
Depth to Groundwater: Range: 5 to 10 feet.

Legal Action: Type: State Settlement Federal Settlement Status: Order Signed
Remedial Action: In Progress. Nature of action: Containment, and collection of DNAPL & GW

Assessment of Environmental Problems:
Migration of chemicals from the site has impacted the Niagara Falls Water Treatment Plant. The City of Niagara Falls and OCC have completed plans for a relocation of the City WTP. The new WTP is currently on line and operational. The old WTP was demolished and the old intake tunnel will be grouted in 2000..

Assessment of Health Problems:
Since 1979, when monitoring began, none of the S-Area site-specific compounds appeared in the finished drinking water at the former adjacent drinking water treatment plant (DWTP) at concentrations above 1-microgram per liter nor have the NYS drinking water standards for organic chemicals been exceeded. Public contact with contaminated soil is not expected as the site is fenced, the landfill is capped, and off-site contamination is below ground level. The potential exists for contact with S-Area chemicals in the bedding of underground utilities when routine or emergency repairs are performed. The negotiated remedy of capping, physical/hydraulic containment, use of pump and treat technologies, and the relocation of the DWTP will significantly reduce the potential for exposures.



Site Location Map

932019A Hooker Plant - "S" Area

Map source: USGS 1:24,000-scale topographic quadrangles

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Scale 1:12,000

April 1, 2000

County: Niagara

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation

Inactive Hazardous Waste Disposal Report **April 1, 2000**

Site Name: Olin Corporation - Disposal Well **Site Code:** 932037
Class Code: 4 **Region:** 9 **County:** Niagara **EPA Id:** NYD980507339
Address: Buffalo Avenue **City:** Niagara Falls **Zip:**
Latitude: 43 4' 56" **Longitude:** 79 1' 36"
Site Type: **Estimated Size:** Acres

Site Owner / Operator Information:
Current Owner(s) Name: Olin Chemicals Group
Current Owner(s) Address: Buffalo Avenue Niagara Falls NY 14303
Owner(s) during disposal: Olin Chemicals Group
Operator(s) during disposal:
Stated Operator(s) Address:
Hazardous Waste Disposal Period: From 1963 To 1977

Site Description:
An abandoned water supply well about 125 feet deep was used to dispose of approximately 130,000 tons of end liquor (60-65% water, 30% sulfuric acid, 5-10% sodium chlorite). The wastes were discharged into the well by gravity flow. The well has been capped and covered. A Phase I Investigation has been completed. A plant wide RCRA Facility Investigation (RFI) was accepted by the Division of Hazardous Substances Regulation (DEC) and a Corrective Measures Study (CMS) has been approved. Implementation of the Remedial Program began 1997 and is comprised of a groundwater pump and treat system.

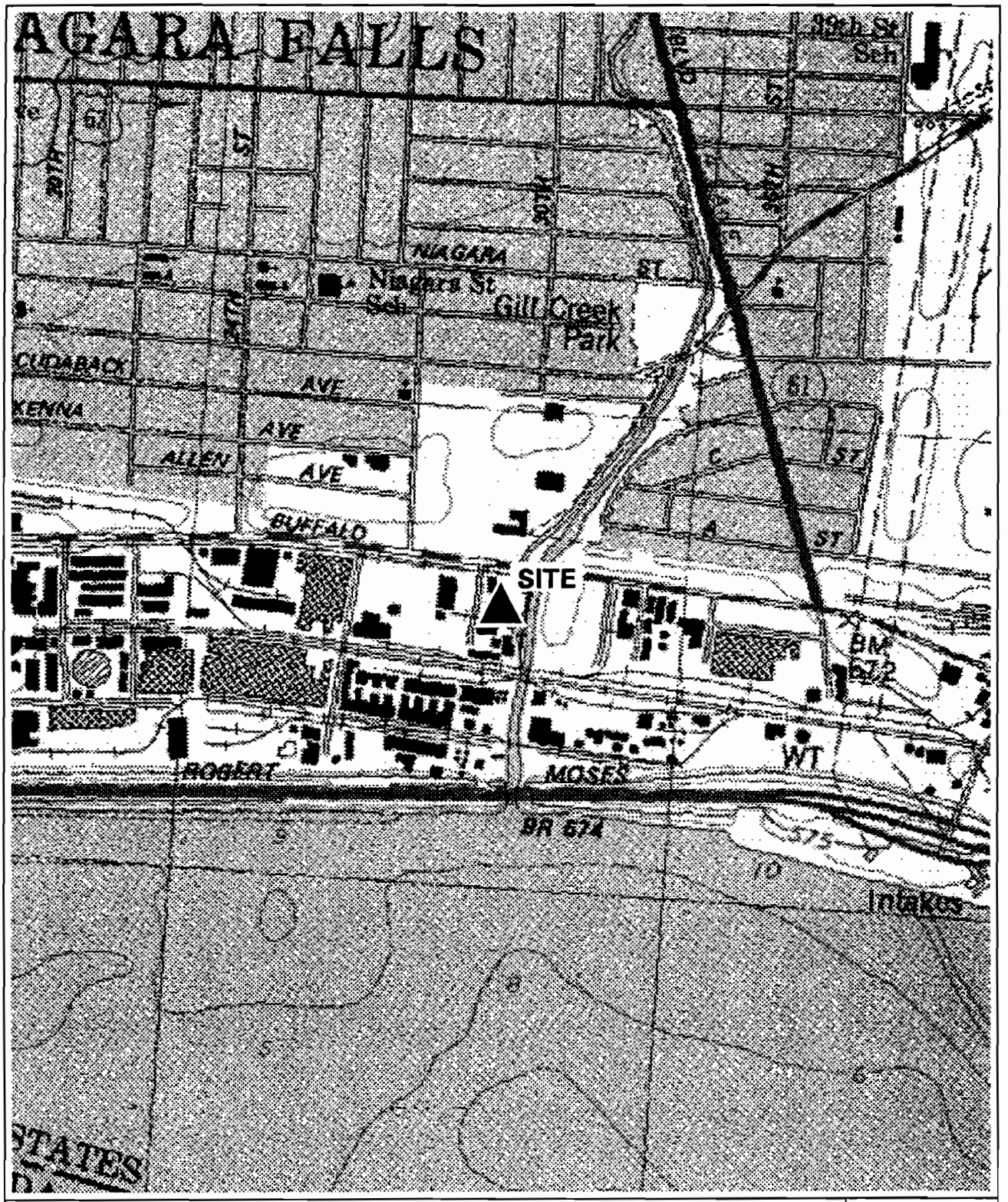
Confirmed Hazardous Waste Disposal:	**Quantity:**
End Liquor (60-65% water, 30% sulfuric acid, 5-10% sodium chlorite)	unknown

Analytical Data Available for:
Applicable Standards Exceeded in:
Geotechnical Information:
Soil/Rock Type: **Depth to Groundwater:** **Range: 10 to 15 feet.**

Legal Action: Type: **Status:**
Remedial Action: Complete **Nature of action:** Plantwide Remedial Program

Assessment of Environmental Problems:
Remediation is complete. Operation and Maintenance (O&M) is underway.

Assessment of Health Problems:
Public access to plant property is restricted. Direct contact with wastes is not expected since they were deposited into a 40 foot deep well which was ultimately capped and covered with fill. Exposures via drinking water are not expected because nearby residents and businesses are served by public water and there are no known private wells in the immediate area.



Site Location Map

932037 Olin Corporation - Disposal Well

Map source: USGS 1:24,000-scale topographic quadrangles

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Scale 1:12,000

April 1, 2000

County: Niagara

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation

Inactive Hazardous Waste Disposal Report **April 1, 2000**

Site Name: Olin Corporation-Industrial Welding **Site Code:** 932050
Class Code: 2 Region: 9 County: Niagara EPA Id: NYD980507412
Address: Packard Road near 30th Street City: Niagara Falls Zip: 14303
Latitude: 43 5' 4" Longitude: 79 1' 33"
Site Type: Dump Estimated Size: 10 Acres

Site Owner / Operator Information:
Current Owner(s) Name: *** Multiple Site Owners ***
Current Owner(s) Address:
Owner(s) during disposal: Olin Corporation
Operator(s) during disposal: Olin Corp.
Stated Operator(s) Address: PO Box 748 Niagara Falls NY
Hazardous Waste Disposal Period: From 1946 To 1956

Site Description:
The site is a low lying area that has been backfilled with brine sludge, miscellaneous industrial scrap, building rubble from a demolished BHC building, fly-ash and possibly waste transformer oil. The site includes the former American Legion Post Property which was purchased by Olin in 1999. Company buildings formerly on the site have been demolished and only the foundations remain. A Consent Order for field investigation was negotiated with Olin Corp. The drilling of monitoring wells and boreholes under the workplan were completed in October of 1988. A supplementary RI workplan was prepared and the field work for this program was completed in 1991. The review of the report indicated the need for additional soil investigation to determine the limits of the contaminated area. The revised RI Report together with the Feasibility Study Report was submitted in July 1993. Additional revision in the Feasibility Study Report were made in December 1993. The Remedial Investigation Report indicated that soil and groundwater at the site are contaminated with elevated levels of mercury, BHCs (hexachlorocyclohexane) and PAHs (polynuclear aromatic hydrocarbons). Gill Creek sediments were also found to be contaminated with low levels of the same contaminants. The Record of Decision (ROD) was signed in November 1994. The selected remedy included waste containment with a leachate collection system, excavation of off-site contaminated soil and Gill Creek sediments and its consolidation under the cap of the containment area, and long term operation and maintenance. Gill Creek sediments were removed and placed under the containment area. A Consent Order for the Remedial Design / remedial Action (RD/RA) was signed in February 1997. An explanation of significant differences (ESD) was issued in October 1999 in order to extend the containment and leachate collection system in the former American Legion Property, The RD for the main site was finalized in mid 1999. The RA started in August 1999 and was completed in December 1999.

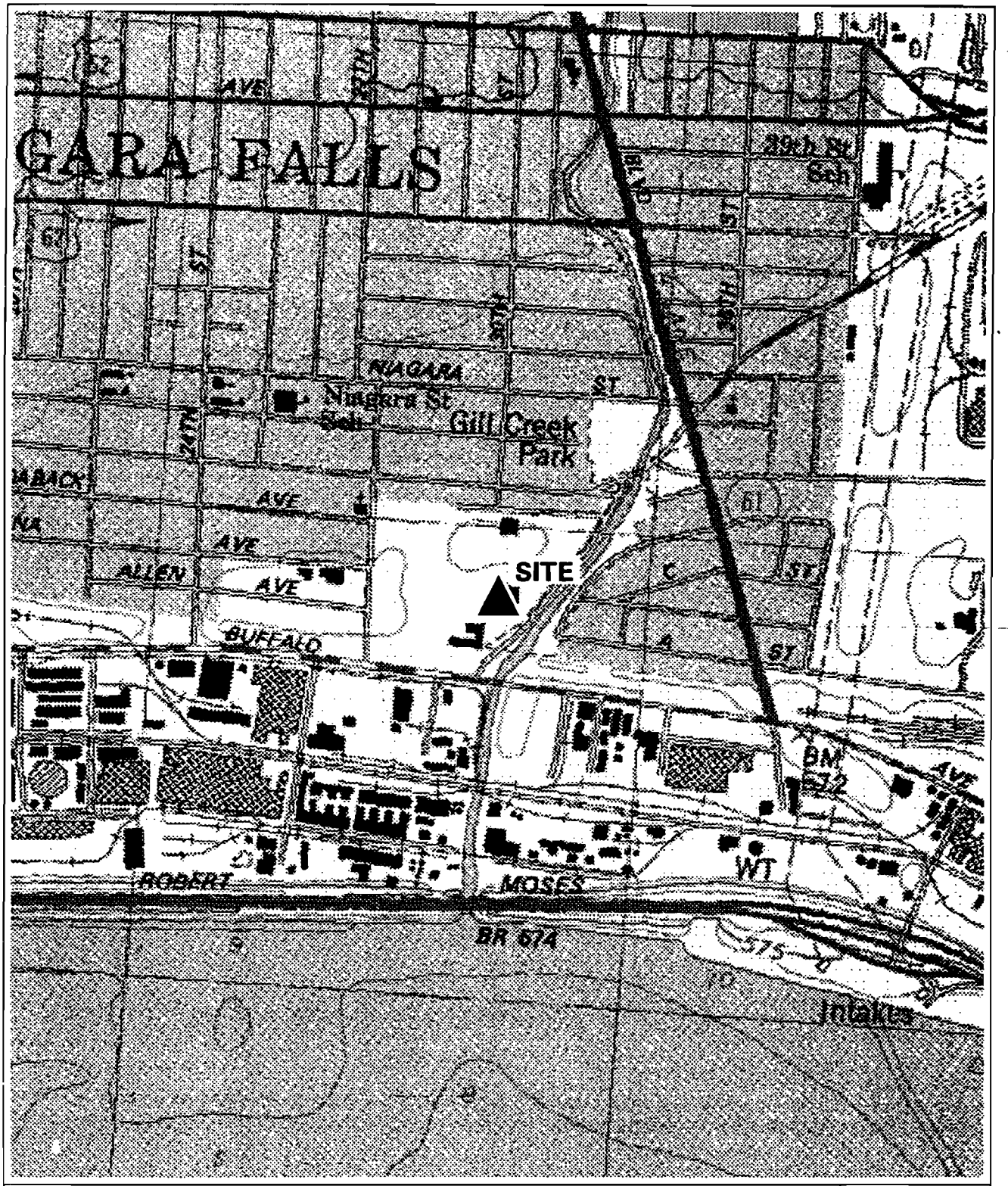
Confirmed Hazardous Waste Disposal:	Quantity:
Brine sludge (w/mercury) miscellaneous Industrial scrap, building rubble from demolished BHC building, flyash and concrete, possibly waste transformer oil containing PCB's	18,300 yds

Analytical Data Available for: Soil
Applicable Standards Exceeded in:
Geotechnical Information:
Soil/Rock Type: Fill and waste over clay-rich silt and clay.
Depth to Groundwater: Range: 1 to 5 feet.

Legal Action: Type: State Consent Order Status: Negotiations in Progress
Remedial Action: In Progress Complete Nature of action: Remedial Action

Assessment of Environmental Problems:
Removal of the contaminated sediments from the bed of Gill Creek has addressed the environmental problems at the creek. The other problems included the presence of the contaminated soil and groundwater at the site. The implementation of the selected remedy and the long-term O&M has addressed these problems.

Assessment of Health Problems:
Access to the site is restricted by fencing. Site-related contamination on the former American Legion property has been paved over to prevent public exposures and deed restrictions will minimize the potential for contaminants to be brought to the surface. The results of surface soil samples collected from nearby residences showed the presence of contaminants at levels that do not pose a public health concern. All residents in the area are supplied with public water so exposures via drinking water are not expected. The remedy includes consolidating and containing contaminated off-site soil, Gill Creek sediment, and on-site wastes, thereby minimizing potential future public exposures.



Site Location Map

932050 Olin Corporation-Industrial Welding

Map source: USGS 1:24,000-scale topographic quadrangles

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Scale 1:12,000

April 1, 2000

County: Niagara

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation

Inactive Hazardous Waste Disposal Report **April 1, 2000**

Site Name: Olin Corporation Parking Lot **Site Code:** 932051A
Class Code: 3 Region: 9 County: Niagara EPA Id:
Address: Buffalo Avenue City: Niagara Falls Zip: 14302
Latitude: 43 4' 52" Longitude: 79 1' 37"
Site Type: Dump Estimated Size: Acres

Site Owner / Operator Information:
Current Owner(s) Name: Olin Chemicals Group
Current Owner(s) Address: Buffalo Avenue Niagara Falls NY 14302
Owner(s) during disposal: Olin Chemicals Group
Operator(s) during disposal: Olin Chemicals Corp.
Stated Operator(s) Address: PO Box 748 Niagara Falls NY
Hazardous Waste Disposal Period: From 1947 To 1960

Site Description:
This site is located north of Buffalo Avenue, across from the Olin Plant site. It was used for the disposal of coal, ash and brine sludge. The sh and sludge were landspread to fill in low areas of the parking lot. The parking lot has since been paved.
The site was sampled by the U.S.G.S. in 1982 as part of the Niagara River Toxics Investigation. Mercury and organic parameters were detected in the samples. This site, together with the Plant Site (932051B) have completed a RCRA Section #3013 investigation under EPA uspices with DEC input. The Interim Report was submitted in January 1992. The Preliminary Corrective Measure Study (CMS) was ubmitted in November 1993 with submittal of the Final RCRA Facility Investigation (RFI) in August 1994. The RFI was accepted by the Division of Hazardous Substance Regulation (DHSR) in November 1994. The CMS was approved in 1995.
Implementation of the Remedial Program began in late 1997. The system implemented under the Remedial Program consists of 5 roundwater extraction wells designed to capture contaminants at the eastern end of the plant site. These wells will compliment the plant roduction wells, which capture much of the groundwater contamination.

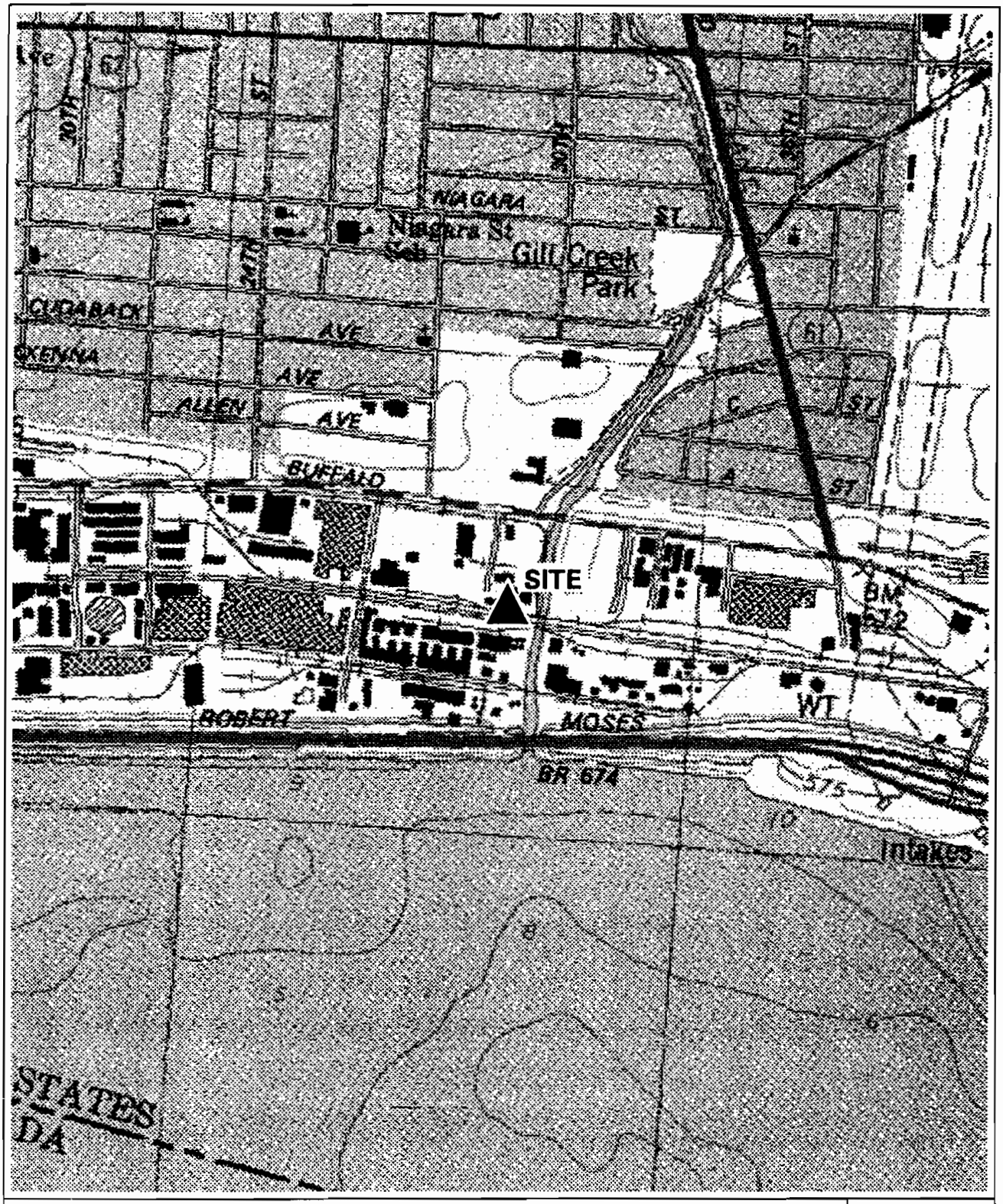
onfirmed Hazardous Waste Disposal:	Quantity:
oiler flyash & bottom ash	unknown
Mercury cell brine sludges	30 Cubic yards
austic bottoms from anhydrous	unknown
odium Hydroxide (NaOH)	

Analytical Data Available for: Soil
Applicable Standards Exceeded in:
Geotechnical Information: Depth to
Soil/Rock Type: Sand-rich loam. Groundwater:

Legal Action: Type: Status:
Remedial Action: In Design Nature of action: Corrective Action Measures

ssessment of Environmental Problems:
Although mercury and organic chemicals were detected in soil samples, it appears that they are currently immobile due to the absence of overburden water. Infiltration is limited due to paving on parking lot.

Assessment of Health Problems:
he waste materials are covered by a paved parking lot, precluding direct contact exposures, unless the wastes are brought to the surface hrough digging. Exposures via drinking water are not expected because all area residents and businesses are served with public water.



Site Location Map

932051A Olin Corporation Parking Lot

Map source: USGS 1:24,000-scale topographic quadrangles

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Scale 1:12,000

April 1, 2000

County: Niagara

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation

Inactive Hazardous Waste Disposal Report **April 1, 2000**

Site Name: Solvent Chemical **Site Code:** 932096
Class Code: 2 **Region:** 9 **County:** Niagara **EPA Id:** NYD000349449
Address: 3163 Buffalo Avenue **City:** Niagara Falls **Zip:** 14303
Latitude: 43 4' 55" **Longitude:** 79 1' 27"
Site Type: Dump **Estimated Size:** 5.7 Acres

Site Owner / Operator Information:
Current Owner(s) Name: Corigan Sanorian
Current Owner(s) Address: 3909 Witmer Rd. Niagara Falls NY
Owner(s) during disposal: Solvent Chemical Co./ICC Industries
Operator(s) during disposal: Solvent Chemical Co. ICC Industries
Stated Operator(s) Address: 720 Fifth Avenue New York NY 10019
Hazardous Waste Disposal Period: From 1972 To 1978

Site Description:
This plant site has been the site of chemical manufacture since the early 1940's. There are no known disposal areas on the site, however, a hydrogeologic investigation of the site revealed significant contamination of the overburden groundwater. The contaminants present are characteristic of the chemical operations conducted during the 1972-78 time frame. The Phase I and Phase II Investigations have been completed. This site was referred to the Attorney General's office. Negotiations with the principal parties, who owned or utilized the site from 1941 to present, brought about a Consent Order and work plan for a Remedial Investigation (RI). The monitoring well and borehole installation program was started in December of 1989. A report on this investigation was received in November 1990. Additional soil samples were collected in 1991 to identify the process wastes. DEC conducted additional sampling of soil and groundwater in August of 1992 to identify contaminants that may be the result of the early plant operations. Under the State Superfund Program a Supplemental Remedial Investigation and Feasibility Study (RI/FS) of this site began in the fall of 1993. The supplemental RI and the FS reports have been completed under the State Superfund program. A Record of Decision (ROD) was issued in December 1996. The ROD requires building demolition with C&D material consolidated into a soil cover system; an overburden groundwater collection system; a bedrock groundwater hydraulic control system; proper treatment of contaminated groundwater collected; operation and maintenance of the systems, and a requirement to enhance or modify the bedrock groundwater system if it does not demonstrate a significant reduction in bedrock groundwater contaminant loadings. Agreements have been reached with the PRPs to implement the remedy presented in the ROD. Building demolition and several pre-design assessments were completed in 1998. Cover and groundwater collection system construction is underway.

Confirmed Hazardous Waste Disposal:
Zinc, lead, Benzene Mono and Di and Trichlorobenzenes.

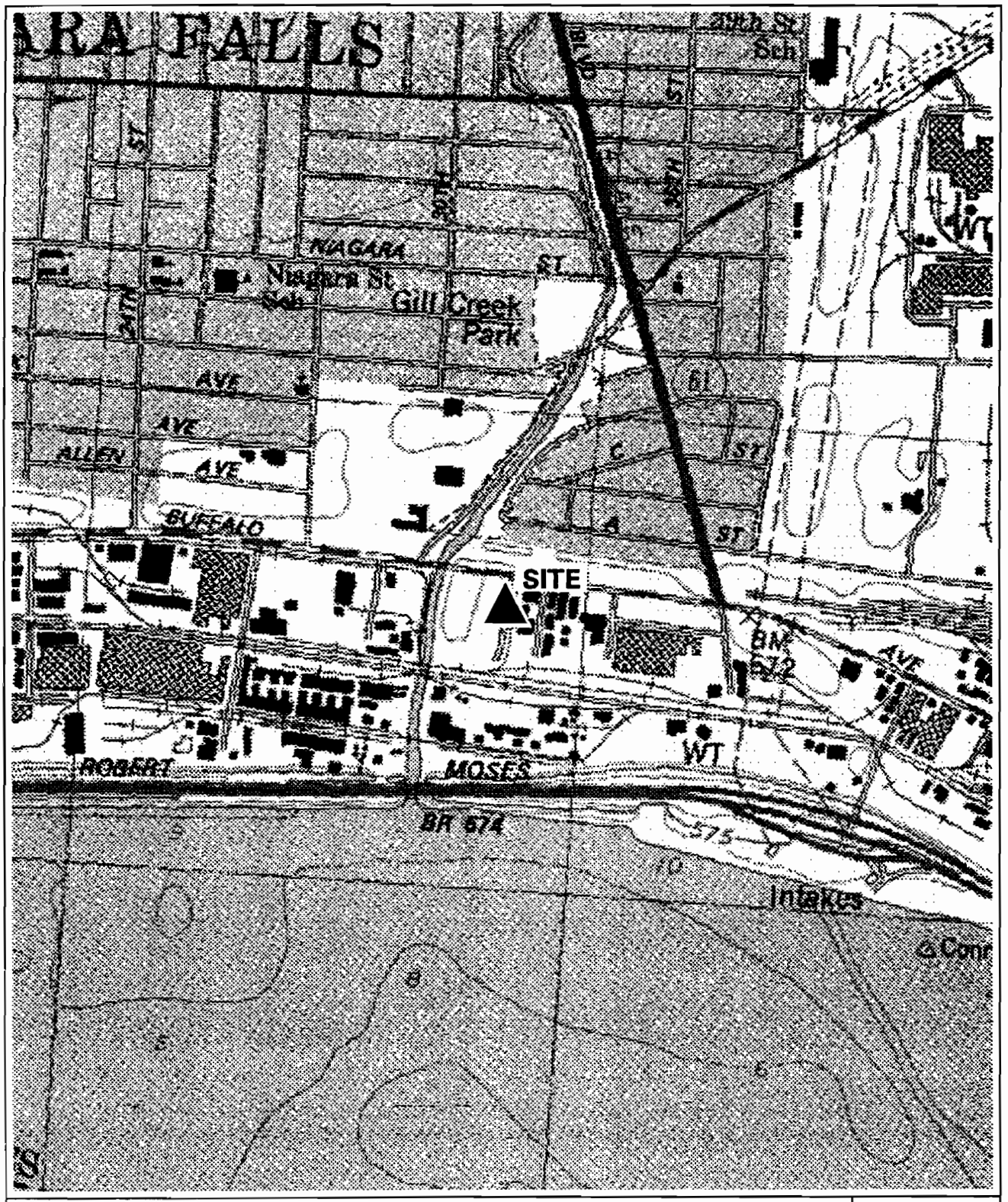
Quantity:
unknown

Analytical Data Available for: Groundwater Soil
Applicable Standards Exceeded in: Groundwater
Geotechnical Information:
Soil/Rock Type: Silt and clay with coarse to fine sand.
Depth to Groundwater: Range: 1 to 5 feet.

Legal Action: Type: State Court Order Status: Order Signed
Remedial Action: In Progress Nature of action: RD/RA for full site remedy

Assessment of Environmental Problems:
The overburden and bedrock groundwater are seriously contaminated with ammonium compounds, zinc, lead, and chlorinated benzenes. The potential for contamination by other chemicals exists. Chemicals may be moving off site in sewer lines, bedding material and through bedrock groundwater flow.

Assessment of Health Problems:
The site is fenced, but trespassing has been reported. Trespassers may be exposed to contaminated surface soil and surface water on-site. Drinking water is provided to the area; therefore, exposures via drinking contaminated groundwater are not expected. In the past, contaminant transport via surface water may have lead to bioaccumulation of site-related contaminants in sportfish. However, a NYS DOH Fish Advisory is in effect for the Niagara River (upper and lower) and Lake Ontario. The remedy, when implemented, will minimize the potential for public exposures to site-related contamination.



Site Location Map

932096 Solvent Chemical

Map source: USGS 1:24,000-scale topographic quadrangles

N

0 250 500 750 1000

FEET

Scale 1:12,000

April 1, 2000

County: Niagara

Appendix B

Occidental Monitoring Well Completion Logs

BBL®
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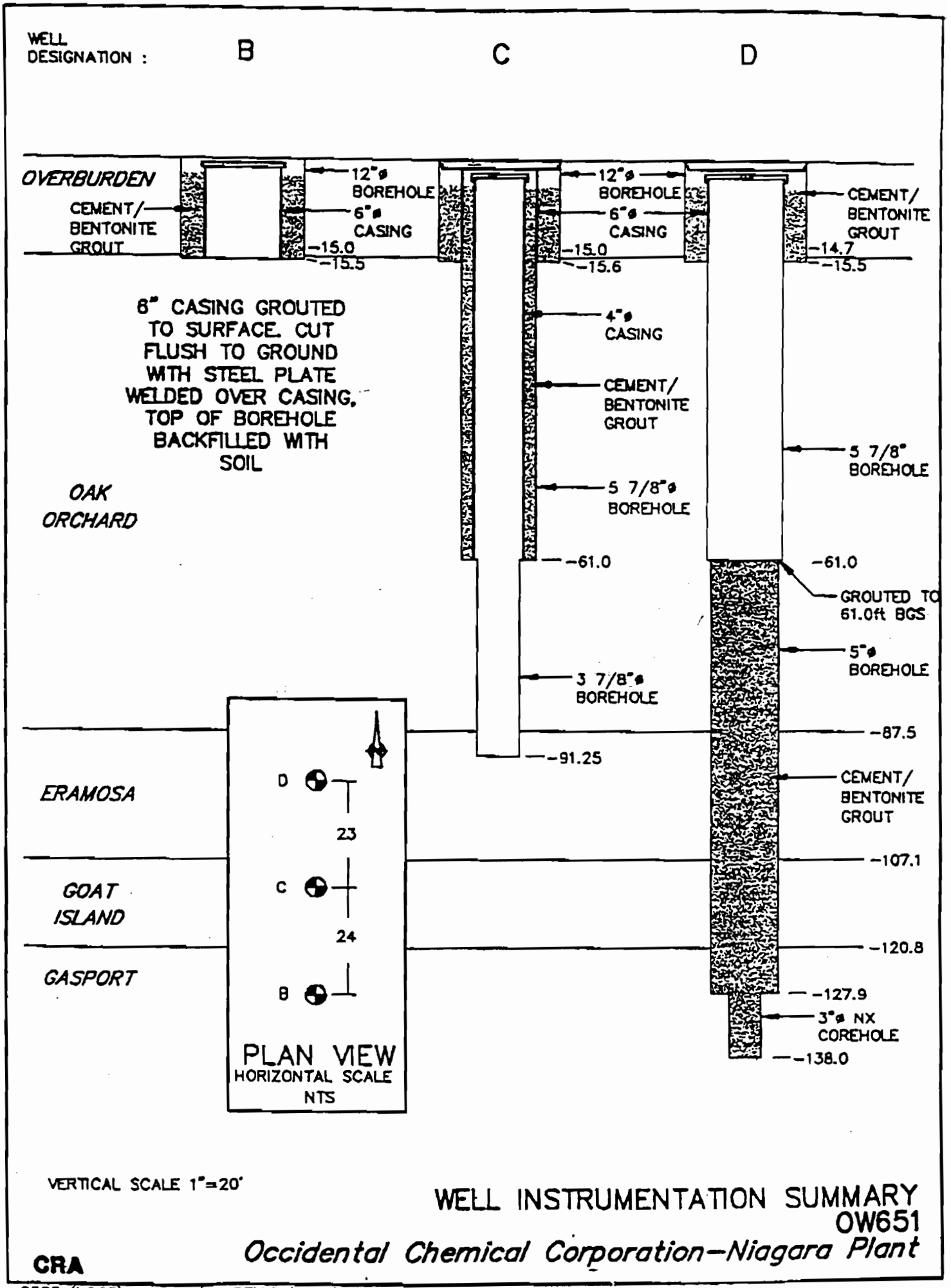


WELL INSTRUMENTATION SUMMARY
OW651
Occidental Chemical Corporation–Niagara Plant

CRA

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(L283)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: NIAGARA PLANT

HOLE DESIGNATION: OW651D (Page 1 of 6)
DATE COMPLETED: JULY 29, 1991
DRILLING METHOD: 12" OD HSA
CRA SUPERVISOR: A.P. KISIEL

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
	REFERENCE POINT (Top of Riser)	568.49				
	GROUND SURFACE	568.7				
	Brown and gray SILT, some sand, trace gravel and roots, dry, FILL	568.3	ROAD BOX	1SS		80
2.5	Brown and gray SAND, some fine to coarse angular gravel, dry	566.7				
	Brown, red brown and gray SILT and CLAY, some fine to coarse gravel, some sand, dry	564.7		2SS		110
5.0	Brown, gray and green CLAY, some silt, some fine gravel, some sand, moist			3SS		17
	Same, except mottled red brown, brown, gray, green and black, trace fine to medium subrounded gravel, trace sand and roots		12"ø BOREHOLE			
7.5	Same, except some silt, trace fine to coarse subangular to subrounded gravel, trace to little sand, trace roots			4SS		9
				5SS		14
10.0	Mottled red brown, brown, gray, green and black SILT and CLAY, little sand, trace fine to coarse gravel, trace red brown laminated clay mass, moist	558.7	CEMENT/ BENTONITE GROUT			
				6SS		11
12.5			6"ø BLACK IRON PIPE			
				7SS		8
	Gray fine to coarse angular GRAVEL, wet	554.7				
15.0	BEDROCK – augered to 15.5 ft BGS and set casing to 15.3 ft BGS	554.0		8SS		>100
	END OF OVERBURDEN HOLE @ 15.5 FT. BGS	552.3				
17.5			3"ø NX COREHOLE			
20.0						
22.5						
25.0						
27.5						
30.0						
32.5						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯ WATER FOUND ▽ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L284)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: NIAGARA PLANT

HOLE DESIGNATION: OW651 (Page 2 of 6)
DATE COMPLETED: OCTOBER 10, 1991
DRILLING METHOD: NX
CRA SUPERVISOR: A.P. KISIEL

DEPTH ft BGS	DESCRIPTION OF STRATA	ELEVATION ft. AMSL	MONITOR INSTALLATION	BIENDTRERORCVKAL	RUNNUMBER	CORE RECOVERY %	ROD %	WATER RETURN %
12.5	Overburden		12"ø BOREHOLE; 6"ø BLACK IRON PIPE; CEMENT/ BENTONITE GROUT					
15.0	DOLOSTONE(Oak Orchard Formation): bituminous, light gray, very thin to thinly bedded, fine grained, saccharoidal, highly fractured, moderately weathered, carbonaceous partings, solution pitting, vuggy – slightly weathered, trace small gypsum filled vugs, trace carbonaceous partings, trace solution pitting (14.8 to 18.6 ft BGS) – moderately weathered, moderately fractured, some gypsum lined fractures, small to medium gypsum filled vugs, trace sphalerite, some coral (18.6 to 28.1 ft BGS) – numerous moderately weathered fractures, some gypsum lined (20.4 to 21.4 ft BGS) – moderately weathered, some coral, trace gypsum filled vugs and gypsum lined fractures, some solution pitting (23.0 to 24.7 ft BGS) – sphalerite crystal in small vug (@ 24.6 ft BGS) – weathered fracture (@ 24.7 ft BGS) – sphalerite crystals (@ 28.8 ft BGS) – slightly weathered, some solution pitting, trace coral, trace sphalerite, carbonaceous partings (26.8 to 28.1 ft BGS) – moderate to highly weathered, thinly bedded, some fractures, trace small to medium gypsum filled vugs and gypsum lined fractures, trace sphalerite, trace carbonaceous partings, trace coral (28.1 38.1 ft BGS) – highly weathered zone with some coral, little solution pitting, trace sphalerite 28.7 to 29.6 ft BGS) – medium to highly weathered void (2" ø) lined with carbonaceous material (@ 28.8 ft BGS) – weathered fracture (33.5 to 33.6 ft BGS) – medium gypsum filled vug (@ 33.7 ft BGS) – medium gypsum filled vug and gypsum lined fracture (@ 36.6 ft BGS) – few moderately weathered fractures (37.8 to 38.1 ft BGS)	553.9	3"ø NX COREHOLE		1	92	82	50
17.5								
20.0								
22.5					2	106	92	50
25.0								
27.5								
30.0								
32.5					3	92	89	0
35.0								
37.5								
40.0					4	88	76	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L284)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: NIAGARA PLANT

HOLE DESIGNATION: OW651D (Page 3 of 6)
DATE COMPLETED: OCTOBER 10, 1991
DRILLING METHOD: NX
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIOTURBATED ZONE	RUN NUMBER	CORE RECOVERY	ROD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
42.5	– slightly to moderately weathered, some medium gypsum filled vugs, trace coral, trace solution pitting, trace carbonaceous partings and gypsum lined fractures (38.8 to 44.9 ft BGS)				4	88	76	0
45.0	– vertical and inclined fractures (42.5 to 43.2 ft BGS)							
	– moderately weathered fracture, trace sphalerite (@ 42.9 ft BGS)							
47.5	– gypsum filled vug (@ 44.0 and 44.7 ft BGS)		3" ø NX COREHOLE					
	– slightly to moderately weathered, some medium sized gypsum filled vugs, trace medium gypsum masses, trace coral, little sphalerite, fine grained, trace stylolites (44.9 to 53.9 ft BGS)				5	101	98	0
50.0	– weathered fracture (@ 46.7 ft BGS)							
	– gypsum filled vug, trace sphalerite (@ 48.5 ft BGS)							
52.5	– weathered fracture (@ 49.0 ft BGS)							
	– gypsum mass, trace sphalerite (@ 49.9 ft BGS)							
55.0	– numerous weathered fracture (50.6 to to 51.3 ft BGS)							
	– coral (51.7 to 52.4 ft BGS)							
	– stylolite (@ 52.4 ft BGS)							
57.5	– bioturbated zone (52.4 to 52.6 ft BGS)							
	– very few fractures, trace solution pitting, large gypsum mass, large stylolite, slight weathering, inclined bedding				6	102	102	0
60.0	– large stylolite (@ 57.5 ft BGS)							
	– large gypsum mass (58.1 to 58.6 ft BGS)							
	– moderately weathered fracture (@ 58.6 ft BGS)							
62.5	– small stylolite (@ 61.0 ft BGS)							
	– inclined bedding (45ø from horizontal @ 61.0 to 63.3 ft BGS)							
	– stylolite (@ 63.7 ft BGS)							
65.0	– few fractures, slightly weathered, little gypsum, trace solution pitting (63.9 to 73.9 ft BGS)							
67.5					7	101	91	0
70.0								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(LZB4)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: NIAGARA PLANT

HOLE DESIGNATION: OW651D (Page 4 of 6)
DATE COMPLETED: OCTOBER 10, 1991
DRILLING METHOD: NX
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RNUUNMBER	CRECOVERY	RQD	WRAETTEURRN
ft BGS		ft. AMSL				%	%	%
	– gypsum lined fracture (● 70.7 ft BGS)							
72.5	– highly fractured zone, moderately weathered (71.1 to 71.4 ft BGS) – gypsum mass (72.0 to 72.2 ft BGS) – carbonaceous partings, moderatly fractured (73.0 to 73.9 ft BGS)				7	101	91	0
75.0	– fine grained, trace coral, sphalerite, trace calcite crystals, stylolites, slightly weathered (73.9 to 83.9 ft BGS) – coral (● 76.0 ft BGS)							
77.5	– sphalerite crystal (● 76.2 ft BGS)		3"ø NX COREHOLE					
80.0	– stylolite (● 79.2, 80.0 and 81.4 ft BGS)				8	97	95	0
82.5								
85.0	– small gypsum filled vug (● 83.3 ft BGS) – fine grained, dark to light gray, some small to medium gypsum filled vugs, slighlty weathered, trace carbonaceous partings (83.9 to 93.9 ft BGS) – small calcite filled vug (● 85.3, 86.0 and 86.5 ft BGS)							
87.5	ARGILLACEAOUS DOLOSTONE(Eramosa Formation): bituminous, saccharoidal, light to medium gray, thin to medium bedded, fine to medium grained, some shaly partings, trace carbonaceous partings, trace small chert nodules, trace stylolites, gypsum filled vugs, veinlets and partings	481.2			9	99	88	
90.0								
92.5	– medium gypsum filled vug (● 92.7 ft BGS) – trace small chert nodules (92.7 to 93.9 ft BGS)							
95.0	– medium gypsum filled vug (● 93.2 ft BGS) – fine to medium grained, some shaly banding, shaly partings, slightly weathered, trace small chert nodules, one medium gypsum mass, trace gypsum lined fractures, trace stylolites (93.9 to 103.9 ft BGS)							
97.5	– slightly weathered shaly partings (98.0 to 98.4 ft BGS)				10	101	93	0
100.0								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WF – WATER FOUND ▼ – STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L284)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
HOLE DESIGNATION: OW651D (Page 5 of 6)
PROJECT NO.: 2583
DATE COMPLETED: OCTOBER 10, 1991
CLIENT: OXYCHEM – NIAGARA PLANT
DRILLING METHOD: NX
LOCATION: NIAGARA PLANT
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RUNNUMBER	CORE RECOVERY	RQD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
	– medium gypsum filled vug (● 100.7 ft BGS)							
102.5	– medium gypsum mass (● 102.0 ft BGS)				10	101	93	0
	– large stylolite (● 103.6 ft BGS)							
105.0	– fine to medium grained, some large chert nodules, trace stylolites (103.9 to 108.8 ft BGS)							
	– chert (● 104.2 ft BGS)				11	104	100	0
107.5	DOLOSTONE(Goat Island Formation): bituminous, light to dark gray, thin to medium bedded, fine to medium grained, some chert	461.6	3"ø NX COREHOLE					
110.0	– medium chert nodule (● 107.2ft BGS)							
	– chert (● 108.0 ft BGS)							
112.5	– light gray, some massive chert nodules, trace shaly partings, trace stylolites, slightly weathered (108.8 to 118.8 ft BGS)				12	99	98	0
115.0								
117.5								
120.0	– light gray to dark gray, some chert, trace gypsum masses, fine to medium bedded, fine to medium grained, slightly to moderately weathered (118.8 to 127.9 ft BGS)	447.9						
122.5	DOLOMITIC LIMESTONE(Gasport Formation): dark to light gray, trace medium gypsum masses and gypsum filled veinlets, trace shaly partings, crinoidal fragments				13	87	77	0
125.0	– numerous moderately weathered fracture, darker gray (● 119.5 to 123.8ft BGS)							
	– medium gypsum filled vug (● 121.5 ft BGS)							
127.5	– medium gypsum mass (● 122.7 ft BGS)							
	– lighter gray, finely bedded, fine to medium grained, trace crinoidal fragments, slightly weathered (127.9 to 138.0 ft BGS)							
130.0					14	100	79	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L284)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: NIAGARA PLANT

HOLE DESIGNATION: OW651D (Page 6 of 6)
DATE COMPLETED: OCTOBER 10, 1991
DRILLING METHOD: NX
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RNUUNMBER	CRECOVERY	RQD	WRETURN
ft BGS		ft. AMSL				%	%	%
132.5			3"ø NX COREHOLE		14	100	79	0
135.0								
137.5								
	END OF HOLE @ 138 FT. BGS	430.7						
140.0								
142.5								
145.0								
147.5								
150.0								
152.5								
155.0								
157.5								
160.0								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ⧗ STATIC WATER LEVEL NM – NOT MEASURED

15

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(L286)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: WEST OF UNION CARBIDE PLANT

HOLE DESIGNATION: OW652D (Page 1 of 3)
DATE COMPLETED: AUGUST 26, 1991
DRILLING METHOD: 12" OD HSA
CRA SUPERVISOR: A.P. KISIEL

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE
	REFERENCE POINT (Top of Riser)	569.93				
	GROUND SURFACE	570.2				
	Brown SILT, little clay, trace sand, moist, FILL	569.7	ROAD BOX			
2.5	Blue, green and gray SLAG, some gravel and sand, dry	568.4		1SS		16
	Mottled brown and rust brown SILT, some clay, moist	568.2		2SS		7
5.0	Mottled brown and gray fine SAND, some silt, trace fine gravel, trace clay, moist to wet, NATIVE		6"ø BLACK IRON PIPE	3SS		8
	Same, with trace fine subangular gravel, trace shells, moist to wet	564.4	4"ø BLACK IRON PIPE	4SS		19
7.5	Red brown SILT, some clay, moist			5SS		5
	Same, except laminating, increased clay content, moist to wet	562.2				
10.0	Laminated red brown and gray CLAY, some silt, trace fine sand lenses, moist		12"ø BOREHOLE	6SS		1
	Same, except red brown and brown, trace coarse gravel, trace sand, moist to wet	559.6				
12.5	Red brown SAND, little to some fine to coarse gravel, little silt, trace to little clay, wet, TILL			7SS		6
		556.7	CEMENT/ BENTONITE GROUT			
15.0	Red brown SILT, some sand, little fine to coarse gravel, trace clay, moist to wet	555.8		8SS		>50
	Same, with increased gravel content, moist		6"ø BOREHOLE			
	NON COMPETENT BEDROCK – auger to 14.6 ft BGS and set 6"ø casing, advanced roller					
17.5	bit to 17.5 ft BGS and set 4"ø casing	552.7				
	END OF OVERBURDEN HOLE @ 17.5 FT. BGS					
20.0			3"ø NX COREHOLE			
22.5						
25.0						
27.5						
30.0						
32.5						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (○) WATER FOUND ▽ - STATIC WATER LEVEL ▼

12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L286)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
HOLE DESIGNATION: OW652 (Page 2 of 3)
PROJECT NO.: 2583
DATE COMPLETED: SEPTEMBER 16, 1991
CLIENT: OXYCHEM – NIAGARA PLANT
DRILLING METHOD: NX
LOCATION: WEST OF UNION CARBIDE PLANT
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRREORCVKAL	RNUUNMBER	CROERCOVERY	RQD	WRATTEURRN
ft BGS		ft. AMSL				%	%	%
	Overburden		6"ø BLACK IRON PIPE; 4"ø BLACK IRON PIPE; 12"ø BOREHOLE; CEMENT/ BENTONITE GROUT; 6"ø BOREHOLE; 3"ø NX COREHOLE					
12.5								
15.0	DOLOSTONE(Oak Orchard Formation): bituminous, light to dark gray, very thin to medium bedded, fine to medium grained, saccharoidal, carbonaceous partings and trace stylolites	555.8						
17.5	– light gray, fine grained, stylolites, few weathered fractures, calcite deposits in fractures (14.4 to 20.0 ft BGS)				1	67	17	17
20.0	– light to medium gray, medium grained, abundant vugs and weathered fractures, calcite deposits in fractures (20.0 to 22.1 ft BGS)				2	90	0	17
22.5	– light to medium gray, medium grained, some stylolites, occasional vugs (22.1 to 33.0 ft BGS)				3	83	19	0
25.0								
27.5	– light gray, fine grained, some stylolites, deformed bedding planes (26.4 to 27.6 ft BGS)				4	100	80	0
30.0								
32.5					5	98	98	0
35.0	– large calcite filled vug (@ 33.6 ft BGS) – large calcite filled vug (@ 34.7 ft BGS) – weathered fracture (@ 35.4 ft BGS)							
37.5	– vertical fracture (@ 36.7 ft BGS) – highly fractured zone, calcite deposits in fractures (37.1 to 38.2 ft BGS)				6	87	64	0
40.0								
	– highly fractured zone, some calcite deposits in fractures, bands of pitted rock, few stylolites (40.6 to 47.5 ft BGS)				7	89	55	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

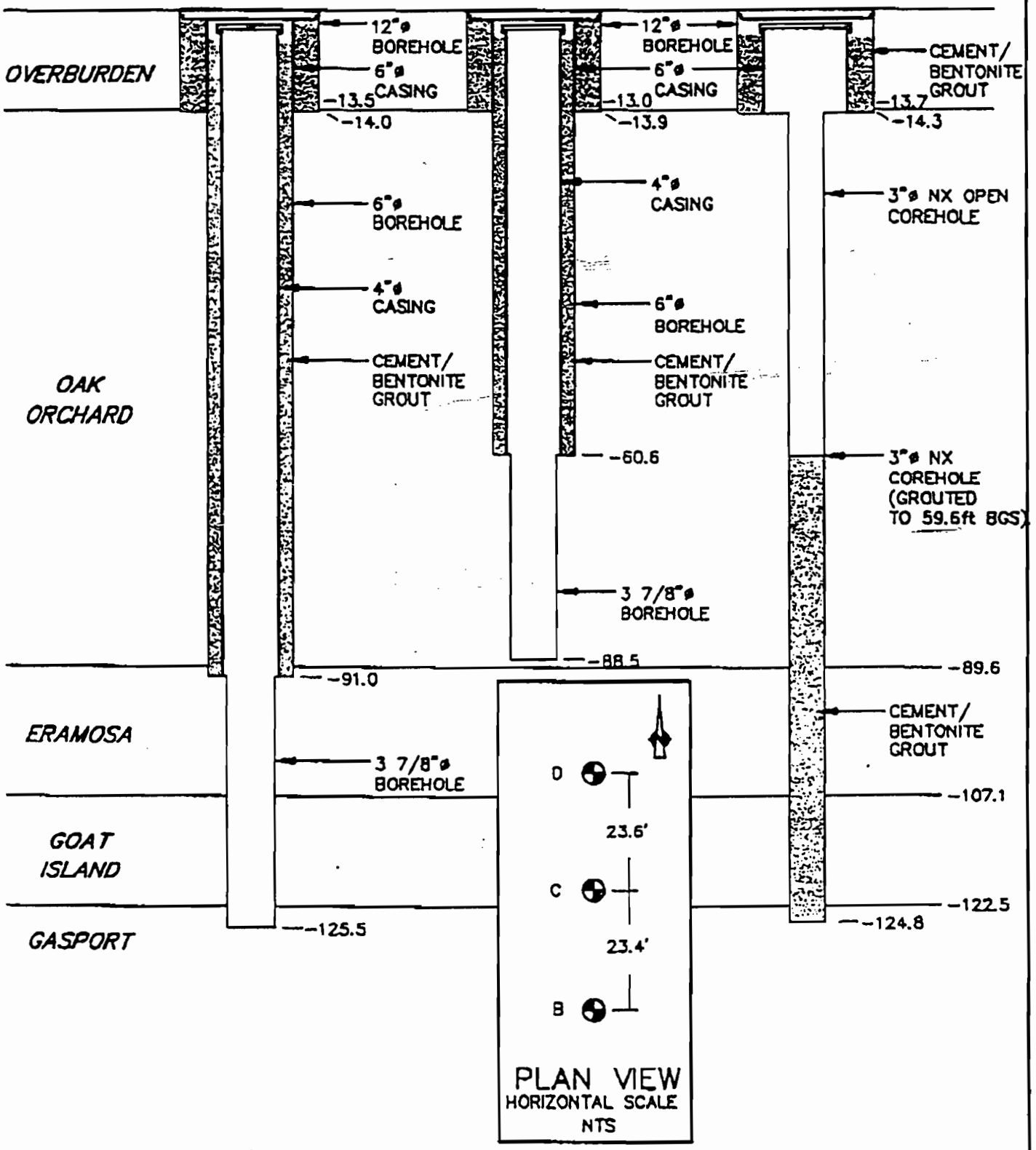
(L286)

PROJECT NAME: SOCP – OFF SITE INVESTIGATION
HOLE DESIGNATION: OW652 (Page 3 of 3)
PROJECT NO.: 2583
DATE COMPLETED: SEPTEMBER 16, 1991
CLIENT: OXYCHEM – NIAGARA PLANT
DRILLING METHOD: NX
LOCATION: WEST OF UNION CARBIDE PLANT
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRREOORCVKAL	RNUUNMBER	CRORECOVERY	RQD	WRAETTEURRN
ft BGS		ft. AMSL				%	%	%
42.5	– calcite filled vug (@ 40.9 ft BGS)		3"ø NX COREHOLE					
45.0					7	89	55	0
47.5								
50.0	– highly fractured, highly weathered fractures, abundant vugs, calcite deposits in fractures, few stylolites (49.9 to 51.2 ft BGS)							
52.5					8	92	74	0
55.0	– highly fractured zone, weathered fractures, little calcite deposits in fractures, occasional vug and stylolite (55.5 to 60.5 ft BGS)							
57.5					9	62	20	0
60.0	END OF HOLE @ 60.5 FT. BGS	509.7						
62.5								
65.0								
67.5								
70.0								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED



WELL INSTRUMENTATION SUMMARY
OW654
Occidental Chemical Corporation--Niagara Plant

CRA

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(L287)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: WEST OF UNION CARBIDE

HOLE DESIGNATION: OW654 (Page 1 of 5)
DATE COMPLETED: AUGUST 23, 1991
DRILLING METHOD: 12" OD HSA
CRA SUPERVISOR: A.P. KISIEL

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE N VALUE
	REFERENCE POINT (Top of Riser)	570.04				
	GROUND SURFACE	570.3				
	Gray brown SILT, some fine to medium gravel, some fine sand, trace clay, vegetation, dry, FILL	569.7 / 569.4	ROAD BOX	1SS		>50
2.5	Black, gray, and blue CINDERS, little ash and slag, dry	568.3 / 568.0		2SS		13
	Auger through SLAG to 2.0 ft BGS	567.1				
5.0	Black CINDERS, little ash and slag, moist			3SS		7
	Green and gray CLAY, some silt, little fine sand, trace vegetation, moist, NATIVE	564.3	12"ø BOREHOLE			
7.5	Green to gray SILT, little fine sand, trace vegetation, moist			4SS		17
	Same, except mottled gray and brown, little clay, trace vegetation, shell fragments, moist to wet			5SS		13
10.0	Same, except some clay, trace fine sand, moist	561.1	CEMENT/ BENTONITE GROUT			
	Red brown CLAY, some silt, trace fine sand, trace very fine gravel, moist			6SS		29
12.5	Red brown SILT, some clay, little fine sand, trace fine to medium gravel, moist to wet, NATIVE		6"ø BLACK IRON PIPE	7SS		20
	Same, except grading to brown, some fine sand, little fine gravel, trace clay, moist to wet	556.6 / 556.0				
15.0	Same, except gray brown, some fine gravel, moist					
17.5	BEDROCK – augered to 14.3 ft BGS and set casing					
	END OF OVERBURDEN HOLE @ 14.3 FT. BGS					
20.0						
22.5						
25.0						
27.5			3"ø NX COREHOLE			
30.0						
32.5						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ◯ WATER FOUND ▽ STATIC WATER LEVEL ⧗

20

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L288)

PROJECT NAME: SDCP - OFF SITE INVESTIGATION
HOLE DESIGNATION: OW654 (Page 2 of 5)
PROJECT NO.: 2583
DATE COMPLETED: AUGUST 27, 1991
CLIENT: OXYCHEM - NIAGARA PLANT
DRILLING METHOD: NX
LOCATION: WEST OF UNION CARBIDE
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RNUUNMBER	CRORECOVERY	ROD	WRAETTURRN
ft BGS		ft. AMSL				%	%	%
	Overburden		12"ø BOREHOLE; 6"ø BLACK IRON PIPE; CEMENT/ BENTONITE GROUT					
12.5	DOLOSTONE(Oak Orchard Formation): bituminous, light to dark gray, fine to medium grained, very thin to medium bedded, slightly to heavily weathered, saccharoidal, some gypsum, some coral, trace stylolites, trace sphalerite, solution pitting, vuggy	556.3						
15.0	- slightly to heavily weathered, some solution pitting, moderately fractured, several gypsum lined fractures, trace coral, trace stylolites (14.0 to 24.0 ft BGS)		3"ø NX COREHOLE					
17.5	- moderately weathered fracture (@ 15.4 and 15.8 ft BGS)							
	- stylolite (@ 15.9 ft BGS)				1	93	75	
20.0	- gypsum lined fracture (@ 16.7, 17.2, 19.5 and 19.8 ft BGS)							
	- stylolite (@ 22.0 ft BGS)							
22.5	- finer grained, several medium vugs, bedding is slightly inclined (20° from horizontal), slight chemical odor (22.0 to 24.0 ft BGS							
	- fine to medium grained, numerous slightly to moderately weathered fractures, trace coral, solution pitting, gypsum, sphalerite, coral (24.0 to 34.0 ft BGS)							
25.0	- small vertical fracture, slightly weathered (24.8 to 25.0 ft BGS)							
27.5	- slight iron staining (25.4 to 25.6 ft BGS)							
	- moderately weathered zone with solution pitting, trace gypsum filled vugs, some coral (25.9 to 27.0 ft BGS)				2	83	22	
30.0	- large sphalerite mass (@ 26.4 ft BGS)							
	- medium gypsum filled vug (@ 26.6 ft BGS)							
	- coral (26.8 to 27.0 ft BGS)							
	- two 1/2" vertical fractures (@ 27.5 ft BGS)							
32.5	- small gypsum filled vug (@ 27.9 ft BGS)							
	- moderately weathered zone (30.0 to 34.0 ft BGS)							
	- coral (30.1 to 30.2 ft BGS)							
35.0	- large stylolite (@ 30.9 ft BGS)							
	- coral (@ 31.1 ft BGS)							
	- medium gypsum filled vug (@ 33.8 ft BGS)							
	- slightly to moderately weathered, fine to medium grained, trace stylolites and carbonaceous partings, trace gypsum (34.0 to 44.0 ft BGS)							
37.5	- moderately weathered (34.0 to 34.3 ft BGS)							
	-slightly weathered (34.3 to 44.0 ft BGS)				3	99	99	
40.0	- small gypsum filled vug, carbonaceous partings (34.9 ft BGS)							
	- stylolite (@ 37.5, 38.3, 38.8 and 40.6 ft BGS)							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L288)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
HOLE DESIGNATION: OW654 (Page 3 of 5)
PROJECT NO.: 2583
DATE COMPLETED: AUGUST 27, 1991
CLIENT: OXYCHEM – NIAGARA PLANT
DRILLING METHOD: NX
LOCATION: WEST OF UNION CARBIDE
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRREORCVKAL	RUNNUMBER	CORE RECOVERY	ROD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
42.5	– gypsum lined fracture (@ 40.8 ft BGS) – medium gypsum filled vug (@ 41.0 ft BGS) – stylolite (41.5 ft BGS) – carbonaceous parting (@ 41.6, 42.5 and 44.0 ft BGS) – medium grained, moderately weathered, trace gypsum, small vugs, trace coral, (44.0 to 49.5 ft BGS)							
45.0	– moderately weathered, solution pitting, several weathered fractures (44.7 to 46.5 ft BGS)							
47.5	– coral (@ 44.8 and 45.6 ft BGS) – small gypsum filled vug and veinlets (@ 45.9 ft BGS)		3"ø NX COREHOLE		4	98	95	
50.0	– several small vugs with calcite crystals (@ 46.3 ft BGS)							
52.5	– several small vugs with calcite crystals, trace coral (@ 47.3 ft BGS) – coral (47.7 to 47.9 ft BGS) – numerous slightly weathered fractures, trace stylolites, some carbonaceous partings, medium to fine grained (49.5 to 53.5 ft BGS)				5	100	68	
55.0	– numerous fractures, carbonaceous partings (49.5 to 51.4 ft BGS) – bedding inclined about 40° from horizontal (49.9 to 51.1ft BGS)				6	85	76	
57.5	– vertical fractures (50.5 to 51.0 ft BGS) – stylolite (@ 53.5 ft BGS) – medium to fine grained, slightly to moderately weathered, trace gypsum, sphalerite (53.5 to 59.0 ft BGS)							
60.0	– several medium sized gypsum filled vugs and veinlets, some solution pitting, moderately weathered (53.6 to 54.4 ft BGS) – slightly weathered (54.4 to 59.0 ft BGS)							
62.5	– trace sphalerite, small gypsum filled vug (@ 56.3 ft BGS)							
65.0	– slightly to moderately weathered, stylolites, trace gypsum, some vugs and solution pitting, trace carbonaceous partings (59.0 to 69.0 ft BGS)				7	100	100	
67.5	– small gypsum filled vug, carbonaceous partings (@ 60.4 ft BGS) – stylolite (@ 61.9 and 63.8 ft BGS) – heavily weathered and eroded, trace gypsum (64.0 to 64.8 ft BGS)							
70.0	– moderately weathered, solution pitting, numerous small vugs; some gypsum filled, several gypsum filled veinlets (64.8 to 69.0 ft BGS) – stylolite (@ 67.0 ft BGS) – carbonaceous parting (67.8 ft BGS)				8	90	67	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM = NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L288)

PROJECT NAME: SDCP - OFF SITE INVESTIGATION
HOLE DESIGNATION: OW654 (Page 4 of 5)
PROJECT NO.: 2583
DATE COMPLETED: AUGUST 27, 1991
CLIENT: OXYCHEM - NIAGARA PLANT
DRILLING METHOD: NX
LOCATION: WEST OF UNION CARBIDE
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RNUUNMBER	CRORECOVERY	ROD	WRAETTURN
ft BGS						%	%	%
	- fine to medium grained, moderately to slightly weathered, trace gypsum (69.0 to 79.0 ft BGS)							
72.5	- medium gypsum filled vug and veinlet (@ 72.4 ft BGS)							
	- shale parting (@ 72.5 ft BGS)							
	- slightly weathered (72.5 to 79.0 ft BGS)				8	90	67	
75.0	- small calcite crystal filled vug (@ 74.4 and 75.2 ft BGS)							
77.5			3"ø NX COREHOLE					
	- slightly weathered, trace gypsum, sphalerite, stylolites, carbonaceous partings (79.0 to 89.0 ft BGS)							
80.0	- medium gypsum filled vug (@ 81.8 ft BGS)							
82.5	- stylolite (@ 82.3, 83.0 and 86.0 ft BGS)							
					9	96	96	
85.0								
	- medium gypsum and calcite filled vug (@ 86.4 ft BGS)							
87.5	- small gypsum filled vug (@ 86.7 ft BGS)							
	- carbonaceous parting (@ 87.1 ft BGS)							
	- sphalerite (@ 87.2 ft BGS)							
	- carbonaceous parting (@ 88.3 and 88.4 ft BGS)							
90.0	ARGILLACEOUS DOLOSTONE(Eramosa Formation), bituminous, light to medium gray, thin to medium bedded, fine to medium grained, some carbonaceous partings, shaly partings, shale banding, trace gypsum and sphalerite, trace stylolites	480.7						
92.5	- numerous moderately weathered fractures (90.5 to 90.8 ft BGS)				10	92	80	
95.0	- gypsum lined parting (@ 91.4 ft BGS)							
	- slightly weathered, fine grained, little gypsum, trace sphalerite (98.0 to 100.3 ft BGS)							
97.5								
					11	100	43	
100.0								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM - NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

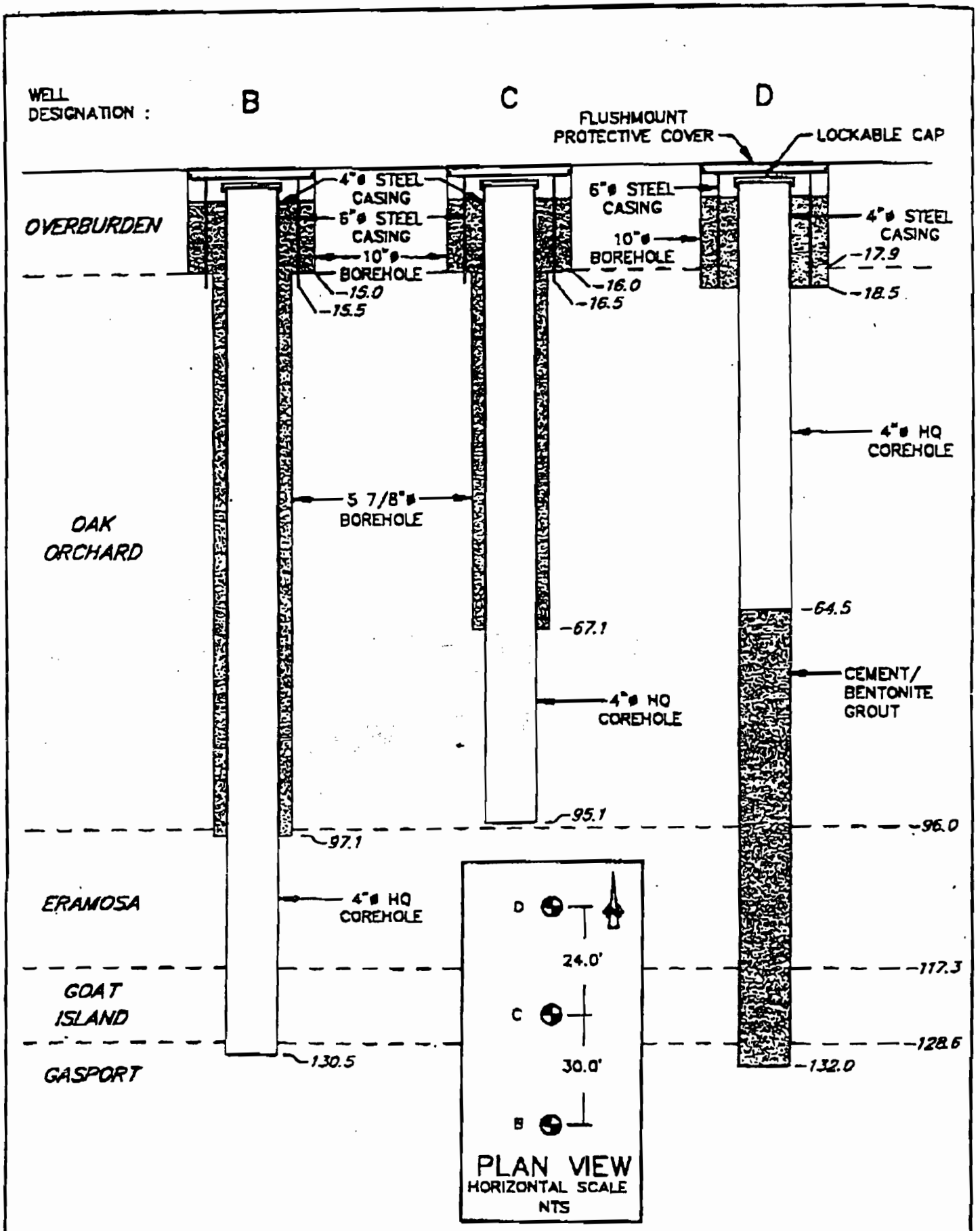
(L288)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
HOLE DESIGNATION: OW654 (Page 5 of 5)
PROJECT NO.: 2583
DATE COMPLETED: AUGUST 27, 1991
CLIENT: OXYCHEM – NIAGARA PLANT
DRILLING METHOD: NX
LOCATION: WEST OF UNION CARBIDE
CRA SUPERVISOR: A.P. KISIEL

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RUNNUMBER	CORE RECOVERY	RQD	WRATTEURRN
ft BGS		ft. AMSL				%	%	%
102.5	– fine grained, slightly weathered, trace gypsum, trace small chert nodules (100.3 to 110.3 ft BGS) – gypsum filled veinlet (@ 101.2 ft BGS) – shaly parting (@ 102.1 and 102.2 ft BGS) – small gypsum filled vug, trace sphalerite (@ 102.5 ft BGS) – medium gypsum filled vug (@ 103.0 ft BGS) – small chert nodule (@ 103.6 and 105.5 ft BGS)							
105.0					12	100		
107.5	DOLOSTONE(Goat Island Formation): bituminous, medium to dark gray, thin to medium bedded, fine to medium grained, some chert, trace shaly partings, trace stylolites, slightly weathered, some gypsum	463.2	3"ø NX COREHOLE					
110.0	– fine to medium grained, slightly weathered, some chert, trace stylolites (110.3 to 120.3 ft BGS)							
112.5								
115.0	– numerous weathered fractures (114.5 to 120.3 ft BGS)				13		41	
117.5								
120.0	– numerous weathered fractures, trace crinoids (120.3 to 124.3 ft BGS)							
122.5	DOLOMITIC LIMESTONE(Gasport Formation): bituminous, medium to dark gray, very thin to medium bedded, fine to medium grained, trace crinoidal fragments	447.8			14	70	20	
125.0	END OF HOLE @ 124.8 FT. BGS	445.5						
127.5								
130.0								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ⧗ STATIC WATER LEVEL – NM – NOT MEASURED



WELL CLUSTER OW657
SDCP - OFF SITE INVESTIGATION
Occidental Chemical Corporation-Niagara Plant

CRA

2583 (87) OCT 29/93(W) REV.0 (LD26)

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

(L306)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: NIAGARA MOHAWK HARPER STATION

HOLE DESIGNATION: OW657D (Page 1 of 5)
DATE COMPLETED: APRIL 9, 1993
DRILLING METHOD: 6 1/4" ID HSA
CRA SUPERVISOR: K. LYNCH

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE VALUE
	REFERENCE POINT (Top of Riser)	571.59				
	GROUND SURFACE	572.1				
	Dark brown SAND, some gravel and slag, moist, FILL		ROAD BOX	1SS		34
2.5		569.6		2SS		49
	Black fine CINDERS, some sand, moist – beige sewer pipe fragments					
5.0		567.5		3SS		12
	Gray brown and black SILT, some sand, little clay in layers, moist, NATIVE		10" ø BOREHOLE			
7.5		565.0		4SS		15
	Brown gray SAND, little silt, moist to wet					
	Same, except gray, moist	563.5		5SS		9
	Red brown SILT, little sand and clay, hard, dry		CEMENT/ BENTONITE GROUT			
10.0		562.1		6SS		11
	Red brown CLAY, little silt, hard, dry					
	Same, except gray, soft	560.1	6" ø BLACK IRON PIPE	7SS		9
12.5						
	Gray medium grained SAND, little fine sand and silt, trace gravel and clay, soft, moist to wet	558.4				
	Red brown CLAY, little silt and sand, moist to wet			8SS		24
15.0		557.1				
	Red brown SILT, some fine round gravel, little sand, trace clay, hard, dry to moist, TILL			9SS		56
	Same, except dry to moist					
17.5		554.1				
	BEDROCK – augered to 18.5 ft BGS	553.6				
	END OF OVERBURDEN HOLE @ 18.5 FT. BGS		4" ø HQ COREHOLE			
20.0						
22.5						
25.0						
27.5						
30.0						
32.5						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (○) WATER FOUND ▽ STATIC WATER LEVEL ▼

(BEDROCK)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: NIAGARA MOHAWK HARPER STATION

HOLE DESIGNATION: OW657D (Page 2 of 5)
DATE COMPLETED: APRIL 8, 1993
DRILLING METHOD: HQ
CRA SUPERVISOR: K. LYNCH

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERDORCVKAL	RUNNUMBER	CORE RECOVERY	RQD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
	Overburden		10"ø BOREHOLE; 6"ø BLACK IRON PIPE; CEMENT/ BENTONITE GROUT					
17.5		553.6						
20.0	DOLOSTONE(Oak Orchard Formation): bituminous, light to medium grey, fine to medium grained, thin to medium bedded, saccharoidal, carbonaceous partings, some gypsum lined partings, highly fractured and weathered zone		4"ø HQ COREHOLE		1	77	46.0	100
22.5	– heavily weathered, numerous weathered fractures, solution pitting, gypsum lined fractures (18.5 to 23.7 ft BGS)							
25.0								50
27.5	– heavily weathered, solution pitting (26.1 to 27.1 ft BGS) – vertical fracture, slightly weathered (26.1 to 27.9 ft BGS) – rubble (26.5 to 26.8 ft BGS) – heavily weathered (29.1 to 32.0 ft BGS) – rubble (29.1 to 30.0 ft BGS)				2	88	52.0	
30.0	– lost all water circulation (@ 29.5 ft BGS)							0
32.5								
35.0	– trace coral (@ 33.5 ft BGS) – solution pitting, several very small vugs (33.9 to 35.3 ft BGS) – trace coral (34.2 to 34.7 ft BGS)							
37.5	– gypsum filled veinlet (@ 36.5 ft BGS) – medium sized gypsum filled vug (@ 37.6 ft BGS) – trace coral, solution pitting, trace gypsum (38.0 to 38.8 ft BGS)				3	108	85.0	0
40.0	– moderately weathered gypsum mass (@ 38.0 ft BGS) – medium sized moderately weathered open vug (@ 39.2 ft BGS) – heavily weathered, rubble (39.4 to 40.5 ft BGS)							
42.5	– slightly to moderately weathered gypsum lined parting (@ 40.9 ft BGS) – moderately weathered zone (41.2 to 41.6 ft BGS)							
45.0	– gypsum lined parting (@ 43.7 ft BGS) – rubble, moderately weathered (43.8 to 44.4 ft BGS)				4	100	64.0	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▽ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

(L307)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: NIAGARA MOHAWK HARPER STATION

HOLE DESIGNATION: OW657D (Page 3 of 5)
DATE COMPLETED: APRIL 8, 1993
DRILLING METHOD: HQ
CRA SUPERVISOR: K. LYNCH

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RUNNUMBER	CORE RECOVERY	ROD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
47.5	– gypsum lined parting (@ 44.9 ft BGS) – gypsum filled veinlets (45.0 to 45.2 ft BGS) – rubble, slightly to moderately weathered (45.9 to 47.5 ft BGS) – gypsum filled vug (@ 47.8 ft BGS)				4	100	64.0	0
50.0	– moderately weathered fracture (@ 48.2, 49.8 and 49.9 ft BGS) – rubble, moderately weathered, trace gypsum and coral (50.7 to 51.5 ft BGS)		4"ø HQ COREHOLE					
52.5	– moderately weathered fracture (@ 53.1 ft BGS)							
55.0	– rubble, slightly weathered (55.0 to 55.4 ft BGS)				5	103	88.0	0
57.5								
60.0	– coraliferous zone, solution pitting, slightly weathered (59.8 to 61.8 ft BGS)							
62.5								
65.0	– coraliferous zone, solution pitting, slightly weathered, trace stylolites and gypsum (64.8 to 67.0 ft BGS)							
67.5	– numerous weathered fractures (67.2 to 68.2 ft BGS)				6	100	89.0	0
70.0	– coral, mottled dark circular masses in dolomitic matrix (69.6 to 70.8 ft BGS)		CEMENT/ BENTONITE GROUT					
72.5	– solution pitting, slightly weathered, coral, trace gypsum (72.3 to 80.0 ft BGS)							
75.0					7	100	88.0	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

(L307)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: NIAGARA MOHAWK HARPER STATION

HOLE DESIGNATION: OW657D (Page 4 of 5)
DATE COMPLETED: APRIL 8, 1993
DRILLING METHOD: HQ
CRA SUPERVISOR: K. LYNCH

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIENDTRERORCVKAL	RUNNUMBER	CORE RECOVERY	ROD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
77.5	– moderately weathered fracture (@ 76.4 ft BGS)				7	100	88.0	0
80.0	– fine grained, very thinly bedded (80.0 to 82.4 ft BGS) – several shaly partings, shaly banding (80.8 to 81.7 ft BGS)		4"ø HQ COREHOLE					
82.5								
85.0	– medium sized gypsum mass (84.2 to 84.3 ft BGS)				8	100	97.0	0
87.5	– medium sized gypsum mass (@ 85.8, 91.2 and 91.8 ft BGS)							
90.0			CEMENT/ BENTONITE GROUT					
92.5	– slightly to moderately weathered vertical fracture (93.0 to 94.5 ft BGS)							
95.0	– medium sized calcite lined and gypsum filled vug (@ 95.4 ft BGS)	476.1						
97.5	ARGILLACEOUS DOLOSTONE(Eramosa Formation): bituminous, light to medium gray, thin to medium bedded, fine grained, trace chert nodules, weathered fractures – several moderately weathered fractures (97.4 to 98.0 ft BGS)				9	99	90.0	0
100.0	– medium sized gypsum filled vug (@ 99.3 ft BGS)							
102.5	– shaly partings (103.5 to 104.5 ft BGS)							
105.0					10	102	94.0	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE: REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▽ STATIC WATER LEVEL NM – NOT MEASURED

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

(L307)

PROJECT NAME: SDCP – OFF SITE INVESTIGATION
PROJECT NO.: 2583
CLIENT: OXYCHEM – NIAGARA PLANT
LOCATION: NIAGARA MOHAWK HARPER STATION

HOLE DESIGNATION: OW657D (Page 5 of 5)
DATE COMPLETED: APRIL 9, 1993
DRILLING METHOD: HQ
CRA SUPERVISOR: K. LYNCH

DEPTH	DESCRIPTION OF STRATA	ELEVATION	MONITOR INSTALLATION	BIOSTRATIGRAPHICAL	RUN NUMBER	CORE RECOVERY	RQD	WATER RETURN
ft BGS		ft. AMSL				%	%	%
	– shaly partings (106.1 to 106.5 ft BGS)							
107.5	– slightly weathered gypsum lined parting (● 108.4 ft BGS) – medium sized gypsum mass (108.5 to 108.7 ft BGS) – slightly weathered gypsum lined parting (● 109.0 ft BGS) – gypsum filled veinlet (● 110.2 ft BGS) – slightly weathered gypsum lined parting (● 110.5 ft BGS) – slightly weathered carbonaceous parting (● 111.3 ft BGS)				10	102	94.0	0
110.0			4"ø HQ COREHOLE					
112.5								
115.0								
	DOLOSTONE(Goat Island Formation): bituminous, medium to dark gray, thin to medium bedded, fine to medium grained, cherty, trace stylolites	456.1			11	99	99.0	0
117.5								
120.0	– small gypsum filled vug (● 121.5 ft BGS)		CEMENT/ BENTONITE GROUT					
122.5	– slightly weathered shaly partings (123.8 to 123.9 ft BGS)							
125.0								
127.5	– slightly weathered shaly partings (● 127.3 ft BGS)				12	100	94.0	0
	DOLOSTONE LIMESTONE(Gasport Formation): bituminous, medium to dark gray, very thin to medium bedded, fine to medium grained, shaly partings, trace stylolites	443.5						
130.0	– detrital layer, crinoid fragments, gypsum (128.6 to 128.8 ft BGS) – slightly weathered fracture (128.7 to 128.8 ft BGS) – moderately weathered fracture (130.3 to 130.5 ft BGS)	440.1						
132.5								
135.0	END OF HOLE ● 132 FT. BGS							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

▽ WATER FOUND ▼ STATIC WATER LEVEL NM – NOT MEASURED

Appendix C

Niagara Mohawk Monitoring Well Completion Logs

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

Date Start/Finish: 7-19-99 / 7-20-99 **Drilling Company:** Maxim Technologies **Driller's Name:** Mike Guziec **Drilling Method:** Hollow Stem Auger **Bit Size:** in. **Auger Size:** 6.25" ID in. **Rig Type:** CME-75 **Spoon Size:** 2" in.	**Northing:** 20631.9450 **Easting:** 20323.2650 **Well Casing:** 569.15 feet **Corehole Depth:** 26.0 ft. **Borehole Depth:** 16.0 ft. **Ground Surface:** 569.69 feet **Geologist:** Michael R. Arlauckas	**Well No: MW-1** **Client:** Harper Substation **Location:** Niagara Mohawk Power Corporation Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation 569.69 ft.										**GROUND SURFACE**	Flush mount casing installed with locking well cap
		(S-1)	HSA	16 28 11 17	39	0.6	NA			Dark brown SILT, some very fine Sand and rock fragments, dry.	Concrete pad from ground surface to 1.5' bgs.
		(S-2)	HSA	9 7 8 9	15	1.9	NA			Dark brown very fine SAND and SILT, tan mottling, dry.	2-inch diameter SCH 40 PVC riser from 0.1' to 16.0' bgs
5	565	(S-3)	HSA	4 4 6 7	10	2.0	NA			Brown very fine SAND, little Silt, tan mottling, moist.	4-inch diameter steel casing from 0.0' to 15.0' bgs.
		(S-4)	HSA	8 11 14 16	25	2.0	NA			Reddish brown CLAY, tan mottling, dry to moist.	Cement/bentonite grout from 1.5' to 12.5' bgs.
	560	(S-5)	HSA	13 12 8 7	20	0.0	NA			No recovery.	
10		(S-6)	HSA	2 4 16 14	20	1.3	NA			Reddish brown SILT, trace subangular fine Gravel, damp.	Cement/bentonite grout from 0.0' to 15.0' bgs.
		(S-7)	HSA	12 14 17 19	31	1.5	NA			Becoming moist.	Hydrated bentonite seal from 12.5' to 15.5' bgs
15	555	(S-8)	HSA	9 35	NA	NA	NA			Broken rock fragments.	

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Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Client:
Harper Substation

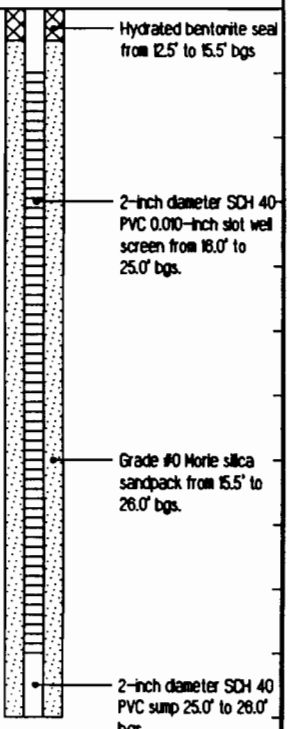
Location:
Niagara Mohawk Power Corporation
Niagara Falls, New York

Well No: MW-1

Total Depth = 16.0 ft.

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description
		(S-8)	HSA		NA	NA	NA			Broken rock fragments.
		Run 1	RB	NA	NA	5.12	NA			Lockport Dolostone RQD % = 87.63% Horizontal fractures @ 15.5'and 15.7' bgs Horizontal fracture @ 17.32' bgs Horizontal fracture @ 19.78' bgs Horizontal fracture @ 20.53' bgs
20	550									
		Run 2	RB	NA	NA	4.98	NA			RQD % = 82.20% Horizontal fracture @ 21.50' bgs Horizontal fracture @ 23.1' bgs Horizontal fracture @ 24.75' bgs Horizontal fractures @ 25.61', 25.73', and 26.0' bgs
25	545									
										End of boring at 26.0' bgs.
30	540									
35	535									

Well Construction



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Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Date Start/Finish: 7-20-99 / 7-20-99
Drilling Company: Maxim Technologies
Driller's Name: Mike Guziec
Drilling Method: Hollow Stem Auger
Bit Size: in.
Auger Size: 6.25" ID in.
Rig Type: CME-75
Spoon Size: 2" in.

Northing: 20233.5450
Easting: 19743.5290
Well Casing: 570.75 feet
Corehole Depth: ft.
Borehole Depth: 22.0 ft.
Ground Surface: 571.02 feet

Geologist: Michael R. Arlauckas

Well No: MW-2

Client:
Niagara Substation

Location:
Niagara Mohawk Power Corporation
Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description
gs elevation 571.02 ft.										GROUND SURFACE
	570	(S-1)	HSA	10 17 16 15	33	2.0	NA			Brown very fine SAND and SILT, trace fine Gravel, trace organic material, dry.
		(S-2)	HSA	9 11 9 10	20	1.8	NA			Brown SILT, little very fine Sand, trace Clay, tan mottling, dry.
5		(S-3)	HSA	6 7 9 8	16	1.5	NA			Brown to tan Silty CLAY, moist.
	565	(S-4)	HSA	10 10 7 11	17	1.8	NA			Brown very fine SAND, little Silt, tan mottling, moist.
		(S-5)	HSA	8 9 20 21	29	2.0	NA			
10										
	560	(S-6)	HSA	7 6 5 4	11	2.0	NA			Reddish brown Silty CLAY, moist.
		(S-7)	HSA	6 5 4 4	9	2.0	NA			Reddish brown CLAY, trace Silt, moist.
15		(S-8)	HSA	1 1	2	2.0	NA			

Well Construction:
- Flush mount casing installed with locking well cap.
- Concrete pad from ground surface to 1.5' bgs.
- 2-inch diameter SCH 40 PVC riser from 0.1' to 12.0' bgs.
- Cement/bentonite grout from 1.5' to 8.0' bgs
- Hydrated bentonite seal from 8.0' to 10.0' bgs.
- Grade #0 Morie silica sandpack from 10.0' to 22.0' bgs
- 2-inch diameter SCH 40 PVC 0.010-inch slot well screen 12.0' to 21.0' bgs.

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Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Client:
Niagara Substation

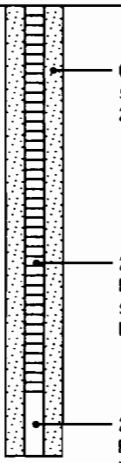
Location:
Niagara Mohawk Power Corporation
Niagara Falls, New York

Well No: MW-2

Total Depth = 22.0 ft.

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description
		(S-9)	HSA	1 1	2	2.0	NA			Reddish brown CLAY, trace Silt, moist.
	555	(S-10)	HSA	1 2 4 47	6	1.8	NA			Reddish borwn very fine SAND and SILT, trace very fine Gravel (subangular), moist.
		(S-11)	HSA	10 20 41 48	61	1.2	NA			Brown to gray very fine SAND, trace rock fragments, moist.
20	550	(S-12)	HSA	31 52 50/ 0.1	NA	0.8	NA			Split-spoon refusal at 21.5' bgs. Auger refusal at 22.0' bgs. End of boring at 22.0' bgs.
25	545									
30	540									
35										

Well Construction



- Grade #0 Morie silica sandpack from 10.0' to 22.0' bgs
- 2-inch diameter SCH 40-PVC 0.010-inch slot well screen 12.0' to 21.0' bgs.
- 2-in diameter Sch. 40 PVC sump 21.0' to 22.0' bgs

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Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Date Start/Finish: 7-19-99 / 7-20-99
Drilling Company: Maxim Technologies
Driller's Name: Mike Guziec
Drilling Method: Hollow Stem Auger
Bit Size: in.
Auger Size: 6.25" ID in.
Rig Type: CME-75
Spoon Size: 2" in.

Northing: 20105.0860
Easting: 20403.8480
Well Casing: 570.61 feet
Corehole Depth: 30.0 ft.
Borehole Depth: 16.0 ft.
Ground Surface: 568.09 feet

Geologist: Michael R. Arlauckas

Well No: MW-3

Client:
Harper Substation

Location:
Niagara Mohawk Power Corporation
Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation 568.09 ft.										GROUND SURFACE	Stick-up protective casing installed with locking well cap
		(S-1)	HSA	3 7 9 9	16	0.4	NA			Dark brown very fine SAND and SILT, trace rootlets, organics, dry.	Concrete pad from ground surface to 1.5' bgs.
	565	(S-2)	HSA	3 8 7 13	15	1.3	NA			Dark very fine to fine SAND, little Silt, gray mottling, dry.	2-inch diameter SCH 40 PVC riser from 2.0' ags to 24.0' bgs
5		(S-3)	HSA	9 3 15 11	18	2.0	NA			Black very fine SAND, trace Silt, dry. Brown very fine SAND, trace Silt, dry. Reddish brown SILT, trace Clay, moist.	
		(S-4)	HSA	9 12 13 11	25	1.0	NA			Reddish brown CLAY, trace Silt, moist.	Cement/bentonite grout from 1.5 to 14.0' bgs.
	560	(S-5)	HSA	3 7 8 12	15	0.6	NA				4-inch diameter steel casing from 2.5' ags to 14.0' bgs.
10		(S-6)	HSA	4 5 6 8	11	1.4	NA			Reddish brown fine to very fine SAND, trace Silt, trace fine subangular fine gravel.	
	555	(S-7)	HSA	50/.1	-	0.0	NA			No recovery.	Cement/bentonite grout from 1.5' to 22.0' bgs.
15		Run 1	RB		NA	-	NA			Lockport Dolostone Horizontal fractures @ 14.23', 14.50', and 14.82' bgs	

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Remarks:
bgs=below ground surface, HSA=Hollow Stem Auger. NA = Not Applicable.

Saturated Zones

Date / Time	Elevation	Depth

Client:
Harper Substation

Location:
Niagara Mohawk Power Corporation
Niagara Falls, New York

Well No: MW-3

Total Depth = 16.0 ft.

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
		Run 1	RB	NA	NA	-	NA			RQD % = 2.47% Horizontal fractures @ 15.11', 15.62', and 15.92' bgs Horizontal fractures @ 16.23', 16.41', 16.69', and 16.95' bgs Horizontal fractures @ 17.21', 17.51', 17.75', and 17.80' bgs	Cement/bentonite grout from 1.5' to 22.0' bgs. 2-inch diameter SCH 40 PVC riser from 2.0' ags to 24.0' bgs
20	550	Run 2	RB	NA	NA	-	NA			RQD % = 77.66% Horizontal fractures @ 18.34' and 18.88' bgs Horizontal fractures @ 19.21', 19.64', 19.91' bgs Horizontal fractures @ 20.51' bgs Horizontal fractures @ 22.32' and 22.51' bgs Horizontal fractures @ 23.17' and 23.79' bgs	Hydrated bentonite seal 20.0' to 22.0' bgs
25	545	Run 3	RB	NA	NA	-	NA			RQD % = 96.83% Horizontal fracture @ 24.73' bgs Horizontal fractures at 25.32' and 25.86' bgs Horizontal fracture @ 27.91' bgs Horizontal fractures @ 29.81' and 30.0' bgs	2-inch diameter SCH 40 PVC 0.010-inch slot well screen from 24.0' to 29.0' bgs. Grade #0 Morie silica sandpack 22.0' to 30.0' bgs 2-inch diameter SCH 40 PVC sump 29.0' to 30.0' bgs
30	540									End of boring at 30.0' bgs	
35	535										

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Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Date Start/Finish: 8-23-00 / 8-23-00
Drilling Company: Parratt Wolff
Driller's Name: Mark Eaves
Drilling Method: Hollow Stem Auger
Bit Size: in.
Auger Size: 6.25" ID in.
Rig Type: CME-75
Spoon Size: 2" in.

Northing: 20098.05
Easting: 20406.80
Well Casing: 567.56 feet
Corehole Depth: 20.0 ft.
Borehole Depth: 20.0 ft.
Ground Surface: 567.83 feet

Geologist: Michael R. Arlauckas

Well No: MW-3S

Client:
Niagara Mohawk Power Corporation

Location:
Harper Substation
Niagara Falls, New York

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation 567.83 ft.										Flush mount casing installed with locking well cap.
									GROUND SURFACE	
	(S-1)	HSA	2 4 6 7	10	0.6	0.0			Dark brown vf SAND and SILT, trace rootlets and organics, dry.	Concrete pad from ground surface to 1.5' bgs.
565	(S-2)	HSA	8 6 8 8	14	1.1	0.0			Brown vf to f SAND, little Silt, tan and gray mottling, dry.	2-inch diameter SCH 40 PVC riser from 0.1 to 10.0' bgs
5	(S-3)	HSA	3 7 8 10	15	0.8	0.0			Reddish brown SILTY CLAY, tan mottling, dry.	Cement/bentonite grout from 1.5 to 6.0' bgs.
	(S-4)	HSA	10 9 10 10	19	1.0	0.0			same as above, tan mottling.	Hydrated bentonite seal 6.0' to 8.0' bgs
560	(S-5)	HSA	2 3 4 8	7	0.7	0.0			Reddish brown, CLAY, trace Silt, moist.	Grade #0 Morie silica sandpack 8.0' to 20.0' bgs
10	(S-6)	HSA	3 4 7 50/.4	11	1.3	0.0			Reddish brown vf to f SAND, trace Silt, trace subangular fine Gravel.	
555	Run 1	RB	NA	NA					Run #1 (12.0' - 17.0'). Lockport Dolostone	2-inch diameter SCH 40 PVC 0.010-inch slot well screen from 10.0' to 20.0' bgs.
15										

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Remarks:
bgs=below ground surface, HSA=Hollow Stem Auger. NA = Not Applicable.

Saturated Zones

Date / Time	Elevation	Depth

Client:
Niagara Mohawk Power Corporation

Location:
Harper Substation
Niagara Falls, New York

Well No: MW-3S

Total Depth = 20.0 ft.

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
		Run 1	RB	NA	NA					Run #1 (12.0' - 17.0').	2-inch diameter SCH 40 PVC 0.010-inch slot well screen from 10.0' to 20.0' bgs.
	550	Run 2	RB	NA	NA					Run #2 (17.0' - 20.0') Lockport Dolostone	Grade #0 Morie silica sandpack 8.0' to 20.0' bgs
20										End of boring at 20.0' bgs	
	545										
25											
	540										
30											
	535										
35											

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Remarks:

Saturated Zones

Date / Time	Elevation	Depth
		▼
		▼
		▽

Date Start/Finish: 7-19-99 / 7-19-99
Drilling Company: Maxim Technologies
Driller's Name: Mike Guziec
Drilling Method: Hollow Stem Auger
Bit Size: in.
Auger Size: 6.25" ID in.
Rig Type: CME-75
Spoon Size: 2" in.

Northing: 19980.2370
Easting: 20069.2780
Well Casing: 568.92 feet
Corehole Depth: ft.
Borehole Depth: 18.0 ft.
Ground Surface: 569.37 feet

Geologist: Michael R. Arlauckas

Well No: MW-4

Client:
Niagara Substation

Location:
Niagara Mohawk Power Corporation
Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation 569.37 ft.										GROUND SURFACE	Flush mount casing installed with locking well cap
		(S-1)	HSA	NA	NA	NA	NA			Augered to 2.0' bgs.	Concrete pad from ground surface to 1.0' bgs.
		(S-2)	HSA	8 4 7 7	11	1.0	NA			Brown very fine to fine SAND, moist.	Cement/bentonite grout from 1.0' to 2.0' bgs
	565										hydrated bentonite seal from 2.0' to 4.0' bgs
5		(S-3)	HSA	4 6 9 9	15	1.6	NA			Brown very fine SAND, trace Silt.	2-inch diameter SCH 40 PVC riser from 0.1' to 6.0' bgs
		(S-4)	HSA	6 7 8 8	15	2.0	NA			Tan to yellow gray very fine SAND, trace black Silt, streaking, moist.	
										Reddish brown CLAY, trace Silt, moist.	
		(S-5)	HSA	4 5 5 5	10	2.0	NA			Reddish brown CLAY, moist.	
	560										
10		(S-6)	HSA	2 1 2 2	3	2.0	NA				2-in diameter Sch. 40 PVC 0.010-inch slot well screen screen 6.0' to 15.0' bgs.
		(S-7)	HSA	5 4 5 20	9	2.0	NA				Grade #0 Morie silica sandpack 4.0' to 18.0' bgs
	555									Trace fine Gravel (subangular) present.	
15		(S-8)	HSA	15 20	NA	1.0	NA				

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Remarks:
bgs=below ground surface, HSA=Hollow Stem Auger. NA = Not Applicable.

Saturated Zones

Date / Time	Elevation	Depth

Client:
Niagara Substation

Location:
Niagara Mohawk Power Corporation
Niagara Falls, New York

Well No: MW-4

Total Depth = 18.0 ft.

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
		(S-8)	HSA	50/ 0.1	NA	1.0	NA			Split-spoon refusal at 15.0' bgs. Auger refusal at 16.0' bgs. End of boring at 16.0' bgs.	2-inch diameter SCH 40 PVC sump 15.0' to 16.0' bgs
20	550										
25	545										
30	540										
35	535										

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Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Date Start/Finish: 7-19-99 / 7-20-99
Drilling Company: Maxim Technologies
Driller's Name: Mike Guziec
Drilling Method: Hollow Stem Auger
Bit Size: in.
Auger Size: 6.25" ID in.
Rig Type: CME-75
Spoon Size: 2" in.

Northing: 20269.3020
Easting: 20146.4300
Well Casing: 571.96 feet
Corehole Depth: 30.0 ft.
Borehole Depth: 19.0 ft.
Ground Surface: 572.28 feet

Geologist: Michael R. Arlauckas

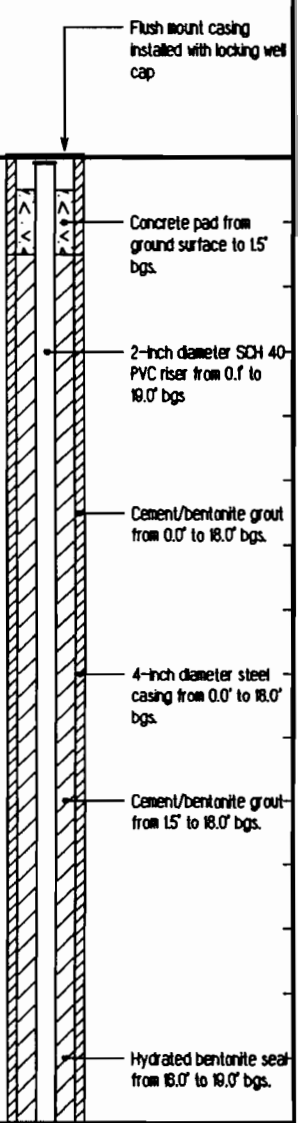
Well No: MW-5

Client:
Harper Substation

Location:
Niagara Mohawk Power Corporation
Niagara Falls, New York

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description
gs elevation 572.28 ft.									**GROUND SURFACE**
	(S-1)	HSA	7 19 15 12	34	1.0	NA			Black very fine SAND, dry, Dark brown very fine SAND and SILT, tan mottling, dry.
570	(S-2)	HSA	10 25 29 17	51	1.0	NA			Black CINDERS, Ash, and Slag, dry.
5	(S-3)	HSA	7 10 9 9	19	1.3	NA			Dark gray SILT, little Clay, tan mottling, dry.
565	(S-4)	HSA	11 5 7 8	12	2.0	NA			Dark gray SILT and very fine SAND, tan mottling, moist.
	(S-5)	HSA	5 4 6 6	10	1.8	NA			Tan to brown SILT, some Clay, mottling, dry.
10	(S-6)	HSA	9 12 10 12	22	1.7	NA			Gray CLAY, moist.
560	(S-7)	HSA	9 15 13 7	28	1.6	NA			Brown SILT, trace Clay, tan mottling, dry.
15	(S-8)	HSA	2 4	21	0.6	NA			Some fine subrounded Gravel present, becomes moist.

Well Construction



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Remarks:
bgs=below ground surface, HSA=Hollow Stem Auger. NA = Not Applicable.

Saturated Zones

Date / Time	Elevation	Depth

Client:
Harper Substation

Location:
Niagara Mohawk Power Corporation
Niagara Falls, New York

Well No: MW-5

Total Depth = 19.0 ft.

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description
		(S-8)	HSA	17 11	21	0.6	NA			Some fine subrounded Gravel present, becomes moist.
		(S-9)	HSA	19 50/ 0.4	NA	0.8	NA			Weathered rock fragments present.
	555	(S-10)	HSA		NA	0.5	NA			
20		Run 1	RB	NA	NA	4.89	NA			RQD % = 94.80% Horizontal fracture @ 19.81' bgs Horizontal fractures @ 21.11', 21.34', and 21.79' bgs Horizontal fracture @ 22.91' bgs Horizontal fracture @ 23.42' and 23.97' bgs Horizontal fracture at 24.0' bgs
	550									
25		Run 2	RB	NA	NA	6.0	NA			RQD % = 74.83% Horizontal fractures @ 25.21', 25.34', and 25.79' bgs Horizontal fracture @ 26.76' bgs Horizontal fractures @ 28.71' and 28.88' bgs Horizontal fracture @ 30.0' bgs End of boring at 30.0' bgs.
	545									
30										
	540									
35										

Well Construction

- Cement/bentonite grout from 1.5' to 16.0' bgs.
- Cement/bentonite grout from 0.0' to 18.0' bgs.
- Hydrated bentonite seal from 16.0' to 19.0' bgs.
- 2-inch diameter SCH 40 PVC 0.010-inch slot well screen 20.0' to 29.0' bgs.
- Grade #0 Morie silica sandpack 19.0' to 30.0' bgs.
- 2-inch diameter SCH 40 PVC sump 29.0' to 30.0' bgs.

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Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Date Start/Finish: 8-22-00 / 8-22-00
Drilling Company: Parratt Wolff
Driller's Name: Mark Eaves
Drilling Method: Hollow Stem Auger
Bit Size: in.
Auger Size: 6.25" ID in.
Rig Type: CME-75
Spoon Size: 2" in.

Northing: 20412.10
Easting: 20055.50
Well Casing: 570.10 feet
Corehole Depth: 23.0 ft.
Borehole Depth: 23.0 ft.
Ground Surface: 570.46 feet

Geologist: Michael R. Arlauckas

Well No: MW-6

Client:
Niagara Mohawk Power Corporation

Location:
Harper Substation
Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
	gs elevation 570.46 ft.										Flush mount casing installed with locking well cap
										GROUND SURFACE	
	570	(S-1)	HSA	27 60 43 20	103	0.5	0.0			Gray Crushed Stone, Glass, Brick, Concrete, ashapit, dry.	Concrete pad from ground surface to 1.5' bgs.
		(S-2)	HSA	11 16 15 12	31	0.0	0.0			No recovery.	2-inch diameter SCH 40 PVC riser from 0.1 to 13.0' bgs
5	565	(S-3)	HSA	3 3 5 8	8	0.0	0.0				Cement/bentonite grout from 1.5' to 9.0' bgs.
		(S-4)	HSA	6 6 10 11	16	0.8	0.0			Reddish brown vf SAND and SILT, gray/tan mottling, dry.	
		(S-5)	HSA	9 12 10 9	22	0.6	0.0			same as above, dry.	
10	560	(S-6)	HSA	2 2 2 2	4	1.5	0.0			Gray CLAY, some Silt, soft, moist.	Hydrated bentonite seal from 9.0' to 11.0' bgs
		(S-7)	HSA	2 2 2 2	4	1.8	0.0			Gray to reddish brown CLAY, little Silt, very soft, moist.	Grade #0 Morie silica sandpack from 11.0' to 23.0' bgs.
15		(S-8)	HSA	6 14	22	1.5	0.0			Reddish brown CLAY, trace vf SAND and SILT, very soft, moist.	2-inch diameter SCH 40 PVC 0.010-inch slot well screen from 13.0' to 23.0' bgs.

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engineers & scientists

Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Client:
Niagara Mohawk Power Corporation

Location:
Harper Substation
Niagara Falls, New York

Well No: MW-6

Total Depth = 23.0 ft.

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
	555	(S-8)	HSA	8 10	22	1.5	0.0			Reddish brown CLAY, trace vf SAND and SILT, very soft, moist.	2-inch diameter SCH 40 PVC 0.010-inch slot well screen from 13.0' to 23.0' bgs.
		(S-9)	HSA	6 50/.5	-	0.4	0.0			same, except Rock fragments in tip of spoon.	
20	550	Run 1	RB	NA	NA		0.0			Run #1 (18.0'-23.0') Lockport Dolostone	Grade #0 Morie silica sandpack from 11.0' to 23.0' bgs.
25	545									End of boring at 23.0' bgs.	
30	540										
35											

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engineers & scientists

Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Date Start/Finish: 8-22-00 / 8-22-00
Drilling Company: Parratt Wolff
Driller's Name: Mark Eaves
Drilling Method: Hollow Stem Auger
Bit Size: in.
Auger Size: 6.25" ID in.
Rig Type: CME-75
Spoon Size: 2" in.

Northing: 20600.73
Easting: 20073.03
Well Casing: 569.62 feet
Corehole Depth: 23.8 ft.
Borehole Depth: 23.8 ft.
Ground Surface: 569.84 feet

Geologist: Michael R. Arlauckas

Well No: MW-7

Client:
Niagara Mohawk Power Corporation

Location:
Harper Substation
Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation 569.84 ft.										**GROUND SURFACE**	Flush mount casing installed with locking well cap
		(S-1)	HSA	6 10 5 9	15	0.5	0.0			Dark gray Rock fragments, Slag,, Concrete fragments, FILL, dry.	Concrete pad from ground surface to 1.5' bgs.
		(S-2)	HSA	5 6 8 9	14	1.1	0.0			Reddish brown vf SAND and SILT, trace Clay, tan mottling, moist.	
5	565	(S-3)	HSA	1 2 2 2	4	1.5	0.0			same as above, moist.	2-inch diameter SCH 40 PVC riser from 0.1' to 13.8' bgs
		(S-4)	HSA	2 5 7 14	12	1.8	0.0			same as above.	Cement/bentonite grout from 1.5' to 9.8' bgs.
		(S-5)	HSA	5 7 9 7	16	1.5	0.0			Reddish brown CLAY, tan mottling, dry. same as above, except @ 9.1' - 9.15' vf SAND seam, wet.	
10	560	(S-6)	HSA	1 1 1 1	2	1.1	0.0			Reddish brown CLAY, very soft, wet.	Hydrated bentonite seal from 9.8' to 11.8' bgs
		(S-7)	HSA	WOH 1 1 1	2	2.0	0.0			same as above.	Grade #0 Morie silica sandpack from 11.8' to 23.8' bgs.
15	555	(S-8)	HSA	10 12	32	1.8	0.0			Dark gray SILT and CLAY, little vf subangular gravel, moist to wet.	2-inch diameter SCH 40 PVC 0.010-inch slot well screen from 13.8' to 23.8' bgs

BBL
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engineers & scientists

Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Client:
Niagara Mohawk Power Corporation

Location:
Harper Substation
Niagara Falls, New York

Well No: MW-7

Total Depth = 23.8 ft.

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
		(S-8)	HSA		32	1.8	0.0			Dark gray SILT and CLAY, little vf subangular gravel, moist to wet.	
		(S-9)	HSA	20 30 50/.3	-	1.3	0.0			same as above, except Rock fragments in tip of spoon.	2-inch diameter SCH 40-PVC 0.010-inch slot well screen from 13.8' to 23.8' bgs.
20	550	Run 1	RB	NA	NA		0.0			Run #1 (17.8'-22.8') Lockport Dolostone	Grade #0 Morie silica sandpack from 11.8' to 23.8' bgs.
		Run 2	RB	NA	NA		0.0			Run #2 (22.8'-23.8') Lockport Dolostone	
25	545									End of boring at 23.8' bgs.	
30	540										
35	535										

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Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Date Start/Finish: 8-21-00 / 8-21-00
Drilling Company: Parratt Wolff
Driller's Name: Mark Eaves
Drilling Method: Hollow Stem Auger
Bit Size: in.
Auger Size: 6.25" ID in.
Rig Type: CME-75
Spoon Size: 2" in.

Northing: 20364.22
Easting: 20366.48
Well Casing: 570.02 feet
Corehole Depth: 23.0 ft.
Borehole Depth: 23.0 ft.
Ground Surface: 570.24 feet

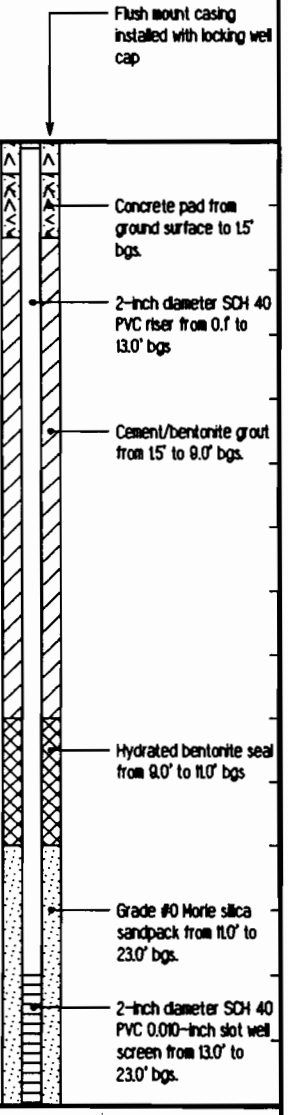
Geologist: Michael R. Arlauckas

Well No: MW-8

Client:
Niagara Mohawk Power Corporation

Location:
Harper Substation
Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description
gs elevation 570.24 ft.										
	570									**GROUND SURFACE**
		(S-1)	HSA	10 15 10 12	25	L.8	0.0			0.0' - 0.8' Brown to tan vf. SAND, little Silt, trace rootlets, organics.
										0.8 - 2.0' Brown, black and tan vf SAND and SILT, trace Clay, dry, (black particles as Cinders).
		(S-2)	HSA	7 7 10 12	17	L.5	0.0			Brown vf SAND, little Silt, dry.
5	565	(S-3)	HSA	2 2 4 3	6	L.2	0.0			same as above, except trace subrounded vf gravel, dry.
		(S-4)	HSA	4 6 8 9	14	L.8	0.0			Tan to brown vf SAND, little Silt, tan mottling, dry.
		(S-5)	HSA	3 5 9 11	14	L.1	0.0			same as above, dry.
10	560	(S-6)	HSA	3 3 3 9	6	0.9	0.0			same as above damp.
		(S-7)	HSA	3 7 9 12	16	L.1	0.0			Dark gray vf SAND and SILT, trace subangular vf Gravel, (rock fragments), moist.
15		(S-8)	HSA	50/.4	-	0.2	0.0			Gray broken rock fragments.



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Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Client:
Niagara Mohawk Power Corporation

Location:
Harper Substation
Niagara Falls, New York

Well No: MW-8

Total Depth = 23.0 ft.

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
	555	Run 1	RB	NA	NA		0.0			Run #1 (14.8'-19.8') Lockport Dolostone	2-inch diameter SCH 40-PVC 0.010-inch slot well screen from 13.0' to 23.0' bgs.
20	550	Run 2	RB	NA	NA		0.0			Run #2 (19.8'-23.0') Lockport Dolostone	Grade #0 Morie silica sandpack from 11.0' to 23.0' bgs.
										End of boring at 23.0' bgs.	
25	545										
30	540										
35											

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Remarks:

Saturated Zones

Date / Time	Elevation	Depth

Appendix D

Monitoring Well Evaluation Forms

BBL®
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engineers, scientists, economists

NMPC - Harper Substation, Niagara Falls, New York — Well Survey
Site — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather: @ 75°F OVERCAST

Well I.D. OW-651D (NORTHERN WELL)
Date: 9/8/09
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	59.42		
Water Table Depth	(feet)	11.15		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type:	(Flushmount)			Stick-up
Well Locked:	Yes			(No)
Measuring Point Marked:	(Yes)			No
Well Diameter:	1"	2"	4"	(Other) 6"
Protective Casing:	1"	2"	4"	Other:

Conversion Factors				
gallons per feet	1" ID	2" ID	4" ID	6" ID
of water column:	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well OW-651
Lock present NO
Lock functional N/A
Did you replace the lock NO
Surface seal present YES - GOOD
Surface seal complete - YES
Protective casing in good shape N/A
Protective casing material type N/A
Physical condition of visible well casing GOOD
Well casing material STEEL

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:

EASY - DRIVE ON/IN

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)

EDGE OF GRASS FIELD, ALONG FENCELINE.

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:

* MOST NORTHERLY WELL OF THE CLUSTER *
- NEW SURFACE SEAL
Δ TOP OF WELL CASING & GROUND SURFACE = 0.35'
NO AL LNAPL OR DNAPL PRESENT.

NMPC - Harper Substation, Niagara Falls, New York — Well Survey
Site — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather: 075°F OVERCAST

Well I.D. OW-651C (SOUTHERN WELL)
Date: 9/18/08
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	55.15		
Water Table Depth	(feet)	10.42		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type:		(Flushmount)		Stick-up
Well Locked:		Yes		(No)
Measuring Point Marked:		~~Yes~~		No
Well Diameter:	1"	2"	(4")	Other:
Protective Casing:	1"	2"	4"	Other:

Conversion Factors				
gallons per feet of water column	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well OW 651
Lock present NO
Lock functional N/A
Did you replace the lock NO
Surface seal present YES — GOOD
Surface seal complete SLIGHTLY CRACKED
Protective casing in good shape N/A
Protective casing material type N/A
Physical condition of visible well casing GOOD
Well casing material STEEL

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:
EASY - DRIVE IN/ON

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)
EDGE OF GRASS FIELD, ALONG FENCE LINE.

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:
- DOUBLE CASED WELL
- WELL LEFT OPEN NO INNER CAP
- 3/4 BLACK POLY TUBING STICKING OUT OF WELL
- LNAPL PRESENT
- NO DNAPL PRESENT
- TOP OF INNER CASING & GROUND SURFACE = 0.35'

NMPC - Harper Substation, Niagara Falls, New York — Well Survey
Site — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather: ~75°F OVERCAST

Well I.D. OW 652-B
Date: 9/8/00
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	111.06		
Water Table Depth	(feet)	12.35		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type:		(Flushmount)		Stick-up
Well Locked:		Yes		(No)
Measuring Point Marked:		(Yes)		No
Well Diameter:	1"	2"	(4")	Other:
Protective Casing:	1"	2"	4"	Other:

Conversion Factors				
gallons per feet	1" ID	2" ID	4" ID	6" ID
of water column:	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well 652-B
Lock present NO
Lock functional N/A
Did you replace the lock NO
Surface seal present FAIR -
Surface seal complete CRACKING
Protective casing in good shape N/A
Protective casing material type N/A
Physical condition of visible well casing FAIR
Well casing material STEEL

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:
BABY - DRIVE IN

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)
EDGE OF FIELD / LOT

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:

- NO LNAPL OR DNAPL PRESENT
- NO SAND DRAIN
- SOFT BOTTOM
- Δ TOP OF WELL CASING & GROUND SURFACE .35'

NMPC - Harper Substation, Niagara Falls, New York — Site
Well Survey — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather: @ 75°F OVERCAST

Well I.D. OW 652-C
Date: 9/8/00
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	90.03		
Water Table Depth	(feet)	12.59		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type: (Flushmount) Stick-up
Well Locked: Yes (No)
Measuring Point Marked: (Yes) No
Well Diameter: 1" 2" (4") Other:
Protective Casing: 1" 2" 4" Other:

Conversion Factors				
gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well 652-C

Lock present NO
Lock functional N/A
Did you replace the lock NO
Surface seal present FAIR/OKAY
Surface seal complete MINOR CRACKING
Protective casing in good shape N/A
Protective casing material type N/A
Physical condition of visible well casing GOOD
Well casing material STEEL

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:
EASY - DRIVE IN

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)
GRASS AT VACANT LOT

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:
- TRACE PRESENTS OF LNAPL
- NO DNAPL
- SOFT BOTTOM
- 3/4" BLACK POLY TUBING IN WELL
- NO SAND DRAIN
- Δ TOP OF WELL CASING & GROUND ELEVATION = 0.33'

NMPC - Harper Substation, Niagara Falls, New York — Well Survey
Site — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather: @ 75°F OVERCAST

Well I.D. OW 652-D
Date: 9/8/00
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	17.12		
Water Table Depth	(feet)	16.25		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type: (Flushmount) Stick-up
Well Locked: Yes (No)
Measuring Point Marked: (Yes) No
Well Diameter: 1" 2" (4") Other:
Protective Casing: 1" 2" 4" Other:

Conversion Factors				
gallons per feet	1" ID	2" ID	4" ID	6" ID
of water column:	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well 652-D

Lock present NO

Lock functional N/A

Did you replace the lock NO

Surface seal present FAIR

Surface seal complete CRACKING

Protective casing in good shape N/A

Protective casing material type N/A

Physical condition of visible well casing FAIR

Well casing material STEEL

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:

EASY - DRIVE IN

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)

EDGE OF VACANT LOT

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:

- NO LNAPL OR DNAPL PRESENT
- NO SAMPLING
- SOFT BOTTOM
- 3/4" BLACK POLY TUBING IN WELL
- WATER IN CURB BOX

NMPC - Harper Substation, Niagara Falls, New York — Well Survey
Site — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather: @ 75°F OVERCAST

Well I.D. OW 65A-B
Date:
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	12.0		
Water Table Depth	(feet)	12.32		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type: (Flushmount) Stick-up
Well Locked: Yes (No)
Measuring Point Marked: (Yes) No
Well Diameter: 1" 2" (4") Other:
Protective Casing: 1" 2" 4" Other:

Conversion Factors				
gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well 65A-B

Lock present NO

Lock functional N/A

Did you replace the lock NO

Surface seal present YES

Surface seal complete CRACKED / ROUGH

Protective casing in good shape N/A

Protective casing material type N/A

Physical condition of visible well casing GOOD

Well casing material STEEL

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:

EASY DRIVE IN

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)

EDGE OF VACANT LOT

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:

- SOFT BOTTOM
- 3/4 BLACK POLY TUBING IN WELL
- NO SANDBLAST
- NO LNAPL OR DNAPL PRESENT
- TOP OF WELL CASING / GROUNDSURFACE = 0.38'

NMPC - Harper Substation, Niagara Falls, New York — Well Survey
Site — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather: @ 75°F OVERCAST

Well I.D. OW 652-C
Date: 9/8/~~05~~
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	89.0		
Water Table Depth	(feet)	12.95		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type:	Flushmount			Stick-up
Well Locked:	Yes			No
Measuring Point Marked:	~~Yes~~			No
Well Diameter:	1"	2"	4"	Other:
Protective Casing:	1"	2"	4"	Other: 6"

Conversion Factors				
gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well 652-C
Lock present NO
Lock functional N/A
Did you replace the lock NO
Surface seal present POOR
Surface seal complete CRACKED/HEAVED
Protective casing in good shape N/A
Protective casing material type N/A
Physical condition of visible well casing GOOD
Well casing material STEEL

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:
EASY - DRIVE IN

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)
EDGE OF VACANT LOT

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:
* DOUBLED CASED WELL
- 3/4 BLACK POLY TUBING IN WELL
- NO SAND DRAIN
- NO LNAPL OR DNAPL PRESENT
- Δ TOP OF WELL CASING & GROUNDSURFACE = 0.41'

NMPC - Harper Substation, Niagara Falls, New York — Well Survey
Site — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather: @75°F OVERCAST

Well I.D. OW 654 D
Date: 9/8/06
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	54.80		
Water Table Depth	(feet)	20.88		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type:	(Flushmount)			Stick-up
Well Locked:	Yes			(No)
Measuring Point Marked:	(Yes)			No
Well Diameter:	1"	2"	4"	Other: 6"
Protective Casing:	1"	2"	4"	Other:

Conversion Factors				
gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well OW 654 D

Lock present NO

Lock functional N/A

Did you replace the lock NO

Surface seal present POOR

Surface seal complete CRACKED

Protective casing in good shape N/A

Protective casing material type N/A

Physical condition of visible well casing GOOD

Well casing material STEEL

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:

GRAY - DRIVE IN

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)

GRASS OR VACANT LOT

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:

- NO LOCK OR CAP PRESENT
- NO SAND DRUM
- 3/4" BLACK POLY TUBING LEFT IN WELL
- Δ TOP OF WELL CASING & GROUND SURFACE = 0.34'

NMPC - Harper Substation, Niagara Falls, New York — Well Survey
Site — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather: @ 75°F OVERCAST

Well I.D. OW - 657 B
Date: 9/8/00
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	13.48		
Water Table Depth	(feet)	12.74		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type:	~~Flushmount~~			Stick-up
Well Locked:	Yes			~~No~~
Measuring Point Marked:	~~Yes~~			No
Well Diameter:	1"	2"	~~4"~~	Other:
Protective Casing:	1"	2"	4"	Other:

Conversion Factors				
gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well OW - 657

Lock present NO

Lock functional N/A

Did you replace the lock NO

Surface seal present YES

Surface seal complete FAIR - CRACKED

Protective casing in good shape N/A

Protective casing material type N/A

Physical condition of visible well casing GOOD

Well casing material STEEL

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:
GRASS - DRIVE IN/ON

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)
CORNER OF NMPC PROPERTY

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:
- DOUBLE CASING WELL
- NO SAND DRAIN
- 3/4 POLY BLACK TUBING IN WELL
- NO LNAPL or DNAPL

NMPC - Harper Substation, Niagara Falls, New York — **Well Survey**
Site — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather: @ 75°F OVERCAST

Well I.D. OW - 657 - C
Date: 9/8/00
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	96.41		
Water Table Depth	(feet)	12.02		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type: (Flushmount) Stick-up
Well Locked: Yes (No)
Measuring Point Marked: (Yes) No
Well Diameter: 1" 2" (4") Other:
Protective Casing: 1" 2" 4" Other:

Conversion Factors				
gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well 657-C
Lock present NO
Lock functional N/A
Did you replace the lock NO
Surface seal present YES
Surface seal complete POOR - CRACKED
Protective casing in good shape N/A
Protective casing material type N/A
Physical condition of visible well casing GOOD
Well casing material
STEEL

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:
EASY ACCESS ON/IN

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)
CORNER OF NMPC PROPERTY

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:
- DOUBLE CASED WELL
- NO SAND DRAIN
- TRACE LNAPL
- NO DNAPL
- SOFT BOTTOM
- 3/4 BLACK POLY TUBING IN WELL.
- Δ TOP OF WELL CASING & GROUND SURFACE = 0.33'

NMPC - Harper Substation, Niagara Falls, New York — Well Survey
Site — Event

MONITORING WELL EVALUATION FORM

Personnel: Michael R. Arlauckas
Job Number: 36605
Weather:

Well I.D. MW - 657 D
Date: 9/8/08
Time In: Time Out:

WELL INFORMATION

Ground Elevation	(ft. AMSL)	
Inner Casing Elevation	(ft. AMSL)	
Outer Casing Elevation	(ft. AMSL)	

		TIC	TOC	BGS
Well Depth	(feet)	56.75		
Water Table Depth	(feet)	15.12		

Length of Water Column	(feet)	
Volume of Water in Well	(feet)	

check where appropiate

Well Type: (Flushmount) Stick-up
Well Locked: Yes ~~No~~
Measuring Point Marked: (Yes) No
Well Diameter: 1" 2" 4" (Other: 6'
Protective Casing: 1" 2" 4" Other:

Conversion Factors				
gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.50
1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.				

FIELD INVESTIGATION

Well visible YES
Well I.D. visible YES
Well location match site map NO
Well I.D. as it appears on protective casing or well 657 D

Lock present NO

Lock functional N/A

Did you replace the lock NO

Surface seal present YES

Surface seal complete FAIR - CRACKED

Protective casing in good shape N/A

Protective casing material type N/A

Physical condition of visible well casing GOOD

Well casing material SCH 5

DRILLING INFORMATION

Bit Type	Hole Diameter (in.)	End Depth (ft.)	Fluid Type

FILTER PACK AND ANNULAR SPACE SEALS

Description	Top (ft.)	Bottom (ft.)

HISTORICAL INFORMATION

Date installed
Field rep
Contractor
Rig type
Formation screened

DESCRIBE ACCESS TO WELL:

EASY - DRIVE ON/IN

DESCRIBE WELL LOCATION (for example location in a field, on a landfill, on pavement, in stone, etc.)

CORNER OF NMPC PROPERTY

IDENTIFY ANY NEARBY POTENTIAL SOURCE OF CONTAMINATION, IF PRESENT.

REMARKS:

- 3/4 BLACK POLY TUBING LEFT IN WELL
- NO SAMPLE OBTAIN
- NO LNAPL OR DNAPL
- Δ TOP OF WELL CASING AND GROUNDSURFACE = 0.53'

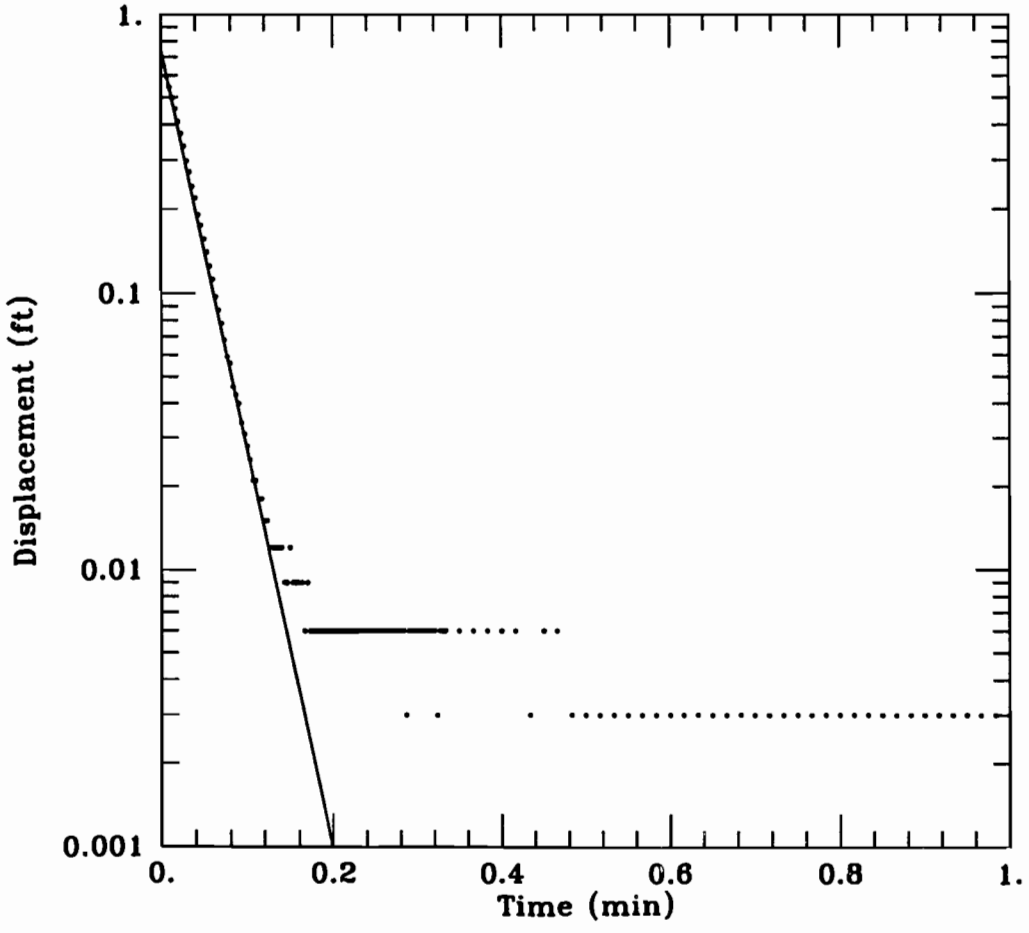
Appendix E

Hydraulic Conductivity Test Results

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

Client: **Niagara Mohawk P.C.**	Company: **Blasland, Bouck, and Lee, Inc.**
Location: **Harper Substation**	Project: **36487**

MW-1 – Rising Head Slug Test



DATA SET:
MW-1.PAR
11/30/99

AQUIFER MODEL:
Confined
SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/19/99

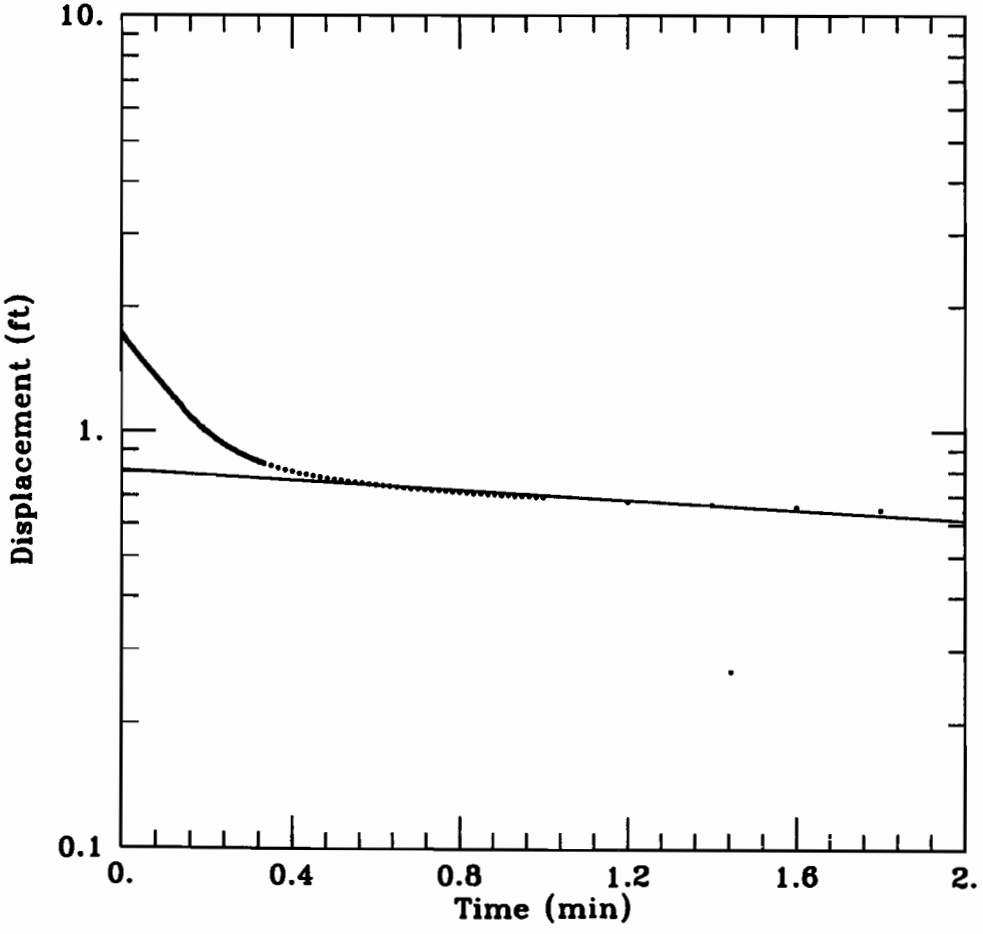
TEST DATA:
H0 = 0.71 ft
rc = 0.08333 ft
rw = 0.35 ft
L = 9.21 ft
b = 9.21 ft
H = 9.21 ft

PARAMETER ESTIMATES:
K = 0.1846 ft/min
y0 = 0.75 ft

AQTESOLV

Client: **Niagara Mohawk P.C.**	Company: **Blasland, Bouck, and Lee, Inc.**
Location: **Harper Substation**	Project: **36487**

MW-2 – Rising Head Slug Test



DATA SET:
MW-2.PAR
11/30/99

AQUIFER MODEL:
Unconfined
SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/19/99

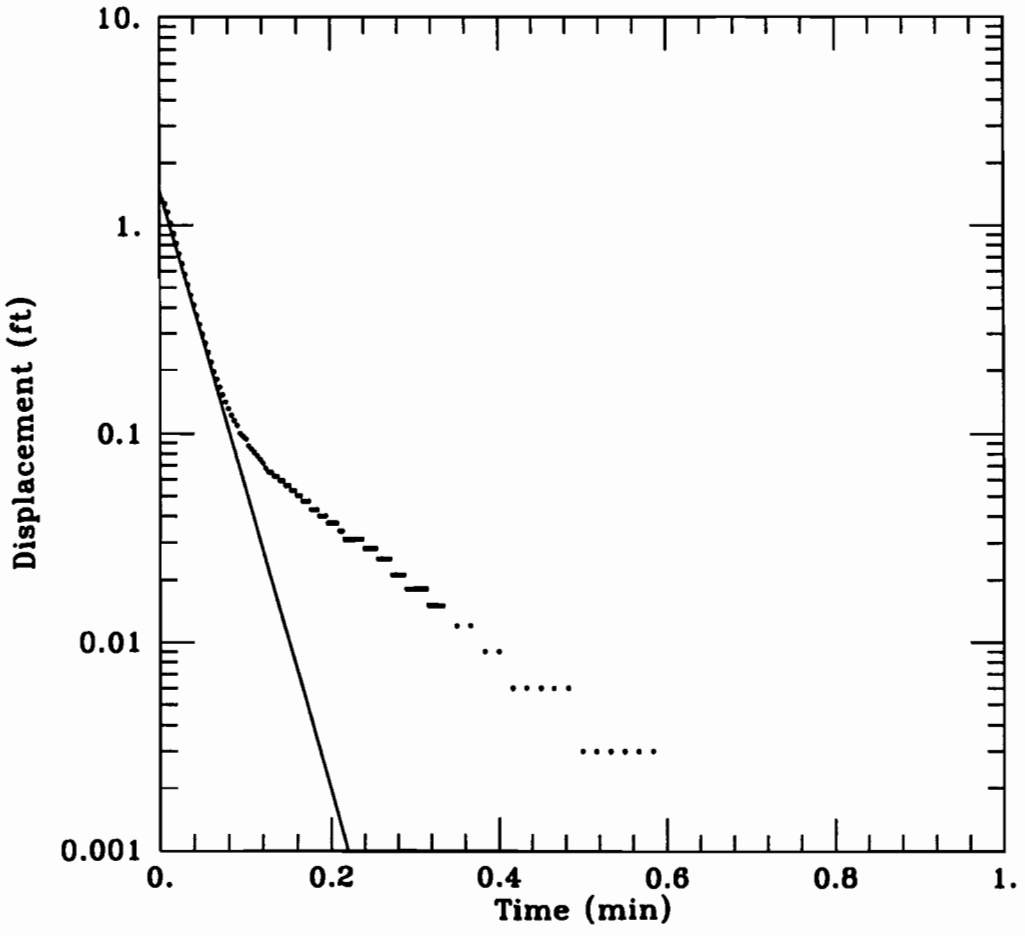
TEST DATA:
H0 = 1.714 ft
rc = 0.08333 ft
rw = 0.35 ft
L = 8.8 ft
b = 13. ft
H = 8.8 ft

PARAMETER ESTIMATES:
K = 0.0006863 ft/min
y0 = 0.8061 ft

AQTESOLV

Client: **Niagara Mohawk P.C.**	Company: **Blasland, Bouck, and Lee, Inc.**
Location: **Harper Substation**	Project: **36487**

MW-3 – Rising Head Slug Test



DATA SET:
MW-3.PAR
11/30/99

AQUIFER MODEL:
Confined
SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/19/99

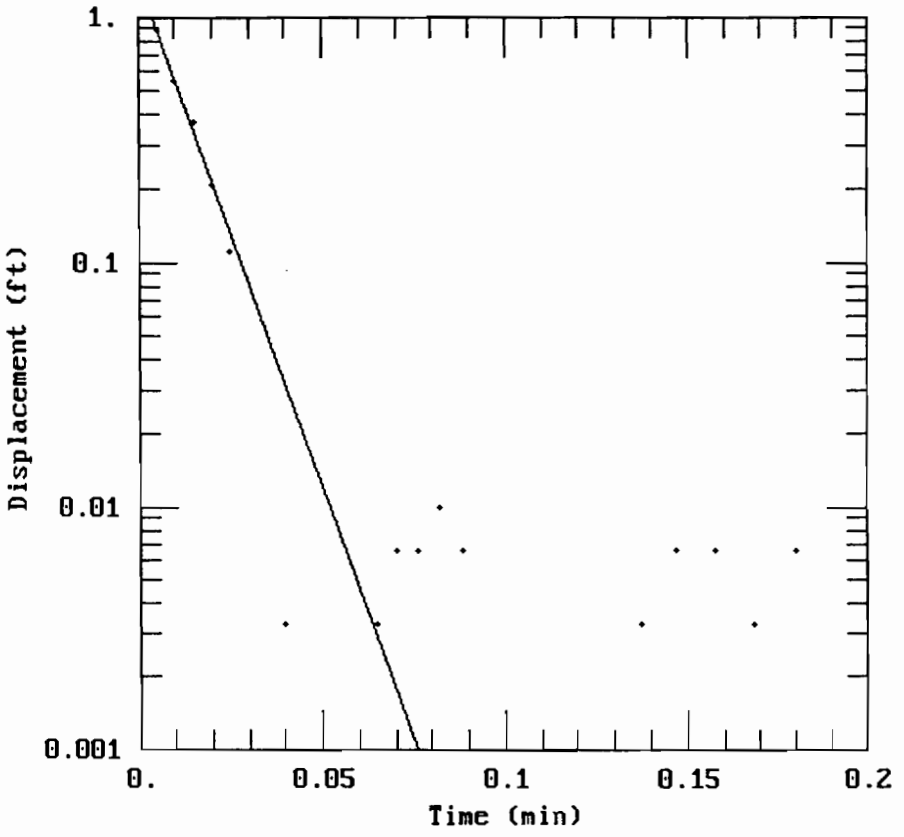
TEST DATA:
H0 = 1.325 ft
rc = 0.08333 ft
rw = 0.35 ft
L = 8. ft
b = 14.36 ft
H = 14.36 ft

PARAMETER ESTIMATES:
K = 0.2315 ft/min
y0 = 1.486 ft

AQTESOLV

CLIENT: Niagara Mohawk P. C.	COMPANY: Blasland, Bouck & Lee, Inc.
LOCATION: Harper Substation	PROJECT: 36605

MW-3S Rising Head Slug Test



DATA SET:
MW-3S.TXT
11/22/00

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

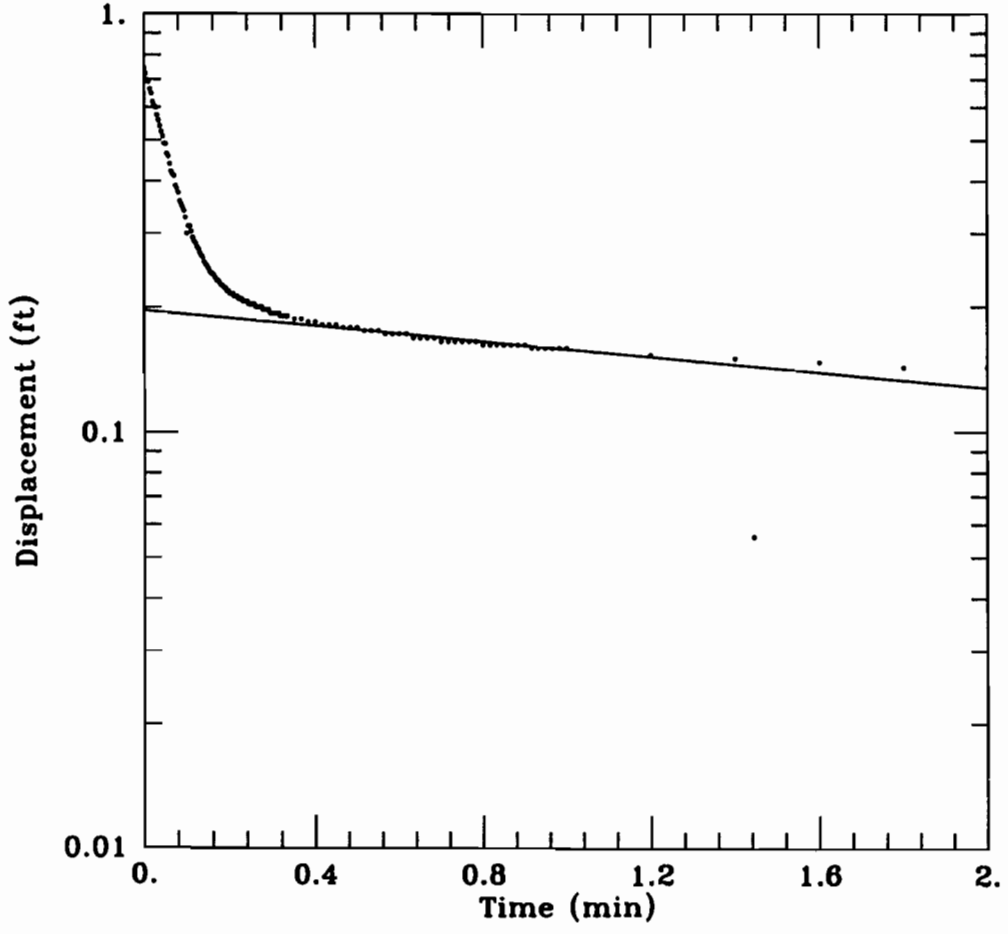
TEST DATA:
H0= 1.286 ft
r_c= 0.0833 ft
r_w= 0.1615 ft
L = 8.25 ft
b = 8.25 ft
H = 8.25 ft

PARAMETER ESTIMATES:
K = 0.2208 ft/min
y0 = 1.433 ft

AQTESOL

Client: **Niagara Mohawk P.C.**	Company: **Blasland, Bouck, and Lee, Inc.**
Location: **Harper Substation**	Project: **36487**

MW-4 – Rising Head Slug Test



DATA SET:
MW-4.PAR
11/30/99

AQUIFER MODEL:
Unconfined
SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/19/99

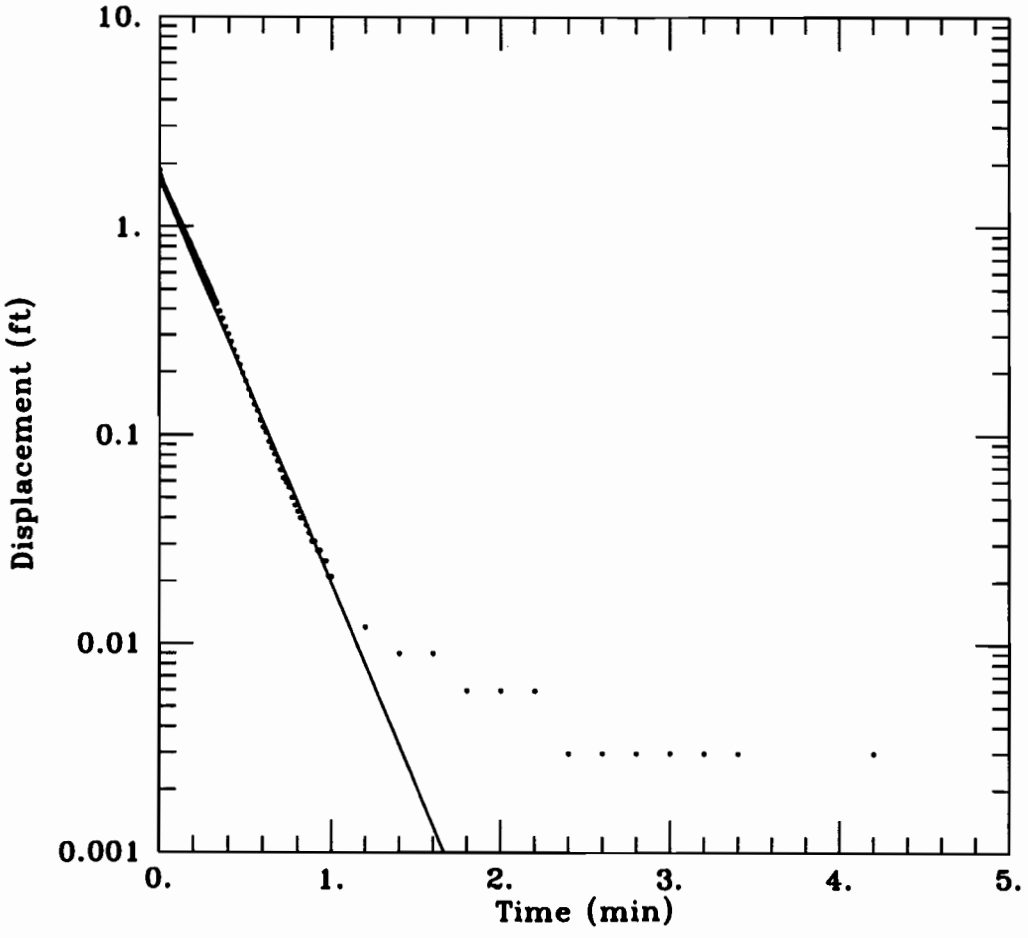
TEST DATA:
H0 = 0.741 ft
rc = 0.08333 ft
rw = 0.35 ft
L = 4.5 ft
b = 4.5 ft
H = 4.5 ft

PARAMETER ESTIMATES:
K = 0.001847 ft/min
y0 = 0.1961 ft

AQTESOLV

Client: **Niagara Mohawk P.C.**	Company: **Blasland, Bouck, and Lee, Inc.**
Location: **Harper Substation**	Project: **36487**

MW-5 – Rising Head Slug Test



DATA SET:
MW-5.PAR
11/30/99

AQUIFER MODEL:
Confined
SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/19/99

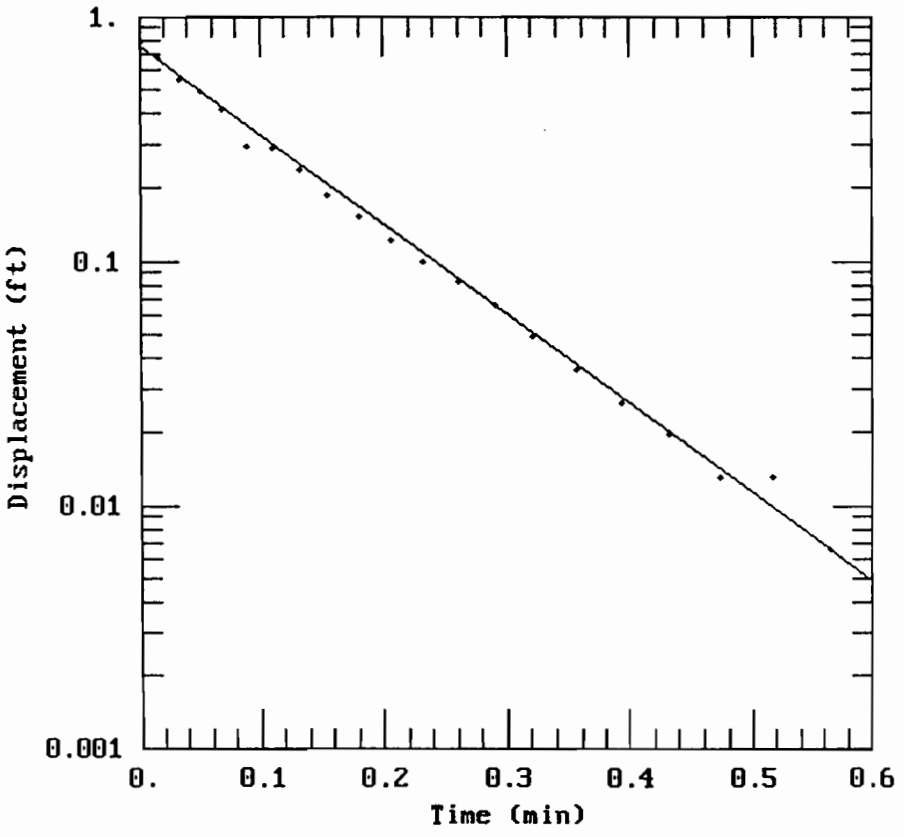
TEST DATA:
H0 = 1.852 ft
rc = 0.08333 ft
rw = 0.35 ft
L = 13. ft
b = 13.4 ft
H = 13.4 ft

PARAMETER ESTIMATES:
K = 0.01979 ft/min
y0 = 1.685 ft

AQTESOLV

CLIENT: Niagara Mohawk P. C.	COMPANY: Blasland, Bouck & Lee, Inc.
LOCATION: Harper Substation	PROJECT: 36605

MW-8 Rising Head Slug Test



DATA SET:
MW-8.TXT
11/22/00

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATA:
H0= 0.7743 ft
r_c= 0.0833 ft
r_w= 0.1615 ft
L = 7.57 ft
b = 7.57 ft
H = 7.57 ft

PARAMETER ESTIMATES:
K = 0.02068 ft/min
y0 = 0.7573 ft

AQTESOLV

SLUG TEST METHOD FOR UNCONFINED AQUIFERS

REFERENCE: Bouwer, H. and R. C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol. 12, no. 3, pp. 423-428.

SOLUTION:

$$\ln s_o - \ln s_t = \frac{2 K L t}{r_c^2 \ln(r_e/r_w)}$$

where:

s_o = initial drawdown in well due to instantaneous removal of water from well [L]

s_t = drawdown in well at time t [L]

L = length of well screen [L]

r_c = radius of well casing [L]

$\ln(r_e/r_w)$ = empirical "shape factor" determined from tables provided in Bouwer and Rice (1976)

r_e = equivalent radius over which head loss occurs [L]

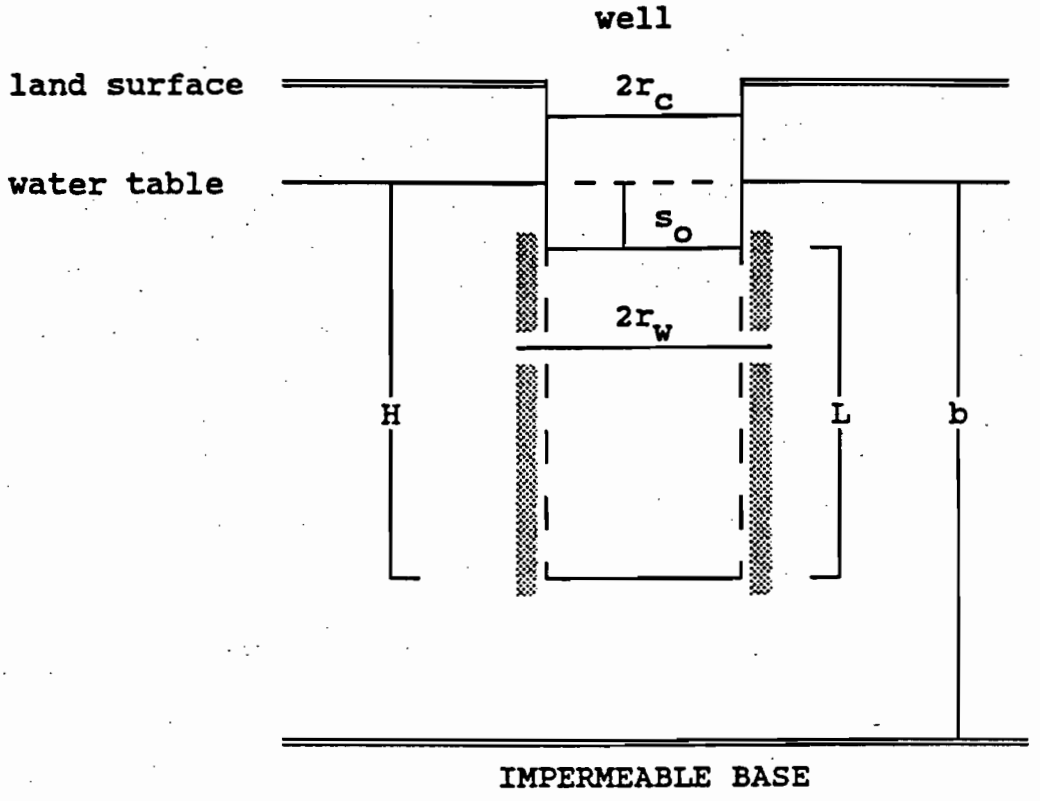
r_w = radius of well (including gravel pack) [L]

H = static height of water in well [L]

b = saturated thickness of aquifer

SLUG TEST METHOD FOR UNCONFINED AQUIFERS
(continued)

DEFINITION OF TERMS:



Appendix F

Groundwater Sampling Logs

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

Nimo Harper

Site | Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: JCS / WPH
Job Number: 36467
Weather: p. cloudy, slight breeze, 75°F

Well ID. MW-1
Date: 8/23/99
Time In: 0840 Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)	25.48		
Water Table Depth	(feet)	16.81		

check where appropriate

Well Type: Flushmount ☒ Stick-Up ☐
Well Locked: Yes ☐ No ☒
Measuring Point Marked: Yes ☒ No ☐
Well Diameter: 1" ☐ 2" ☒ Other:

WELL WATER INFORMATION

Length of Water Column:	(feet)	8.67
Volume of Water in Well:	(gal)	1.43
Pumping Rate of Pump:	(mL/min)	~100
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		
Total Volume Removed:	(gal)	4.5

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.041	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

Unit Stability

pH	DO	Cond	ORP
± 0.1	± 10%	± 3.0%	± 10 mV

SAMPLING INFORMATION

Analyses:
PCB ☐
VOC ☐
SVOC ☐
TAL Inorganics ☐
☐
☐

Sample ID: MW-1
Sample Time: 0940
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID:
Total Bottles: 6

EVACUATION INFORMATION

Evacuation Method: Bailer ☐ Peristaltic ☒ Grudfos ☐ Other Pump ☐
Tubing Used: Teflon ☐ Polyethylene ☒
Sampling Method: Bailer ☒ Peristaltic ☐ Grudfos ☐ Other Pump ☐
Did well go dry? Yes ☐ No ☒ Water Quality Meter Type: YSI

Time / Parameter	1 0902 Initial	2 0905	3 0910	4 0915	5 0920	6 0923	7 0926	8 0929	9 0932
Volume Purged (gal)	—	<0.25	0.25	0.50	1.0	1.5	2.0	2.5	3.0
Depth to Water (ft. TIC)	—	16.81	16.81	16.81	16.81	16.81	16.81	16.81	16.81
Temperature (°C)	—	14.19	13.71	13.94	13.70	13.61	13.61	13.65	13.70
pH	—	7.90	7.88	7.80	7.77	7.76	7.76	7.75	7.76
Conductance (mS/cm)	~~0.345~~	0.345	0.240	0.338	0.337	0.336	0.336	0.335	0.335
Dissolved Oxygen mg/L)	—	2.52	2.26	2.36	2.32	2.30	2.29	2.27	2.28
Turbidity (NTU)	—	6.22	3.26	3.92	2.20	3.75	2.41	3.97	3.68
ORP (mV)	—	—	—	—	—	—	—	—	—

Time / Parameter	10 0935	11 0938	12 0940
Volume Purged (gal)	3.5	4.0	4.5
Depth to Water (ft. TIC)	16.81	16.81	16.81
Temperature (°C)	13.75	13.77	13.81
pH	7.75	7.74	7.74
Conductance (mS/cm)	0.334	0.334	0.334
Dissolved Oxygen mg/L)	2.27	2.26	2.28
Turbidity (NTU)	3.62	4.01	3.44
ORP (mV)	—	—	—

MISCELLANEOUS OBSERVATIONS/PROBLEMS

initial purge clear

SAMPLE DESTINATION

Laboratory: Galson
Shipped Via: Federal Express ☐ Other: Courier ☒
Sample was ☒ shipped day of sampling ☐ sent on
Chain of Custody Signed By: JCS

NMPC - Harper Substation, Buffalo, New York — Low Flow Sampling Program

Site — Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Aaron D. Richardson
Well ID. MW-1
Job Number: 36487
Date: APRIL 25th 20000
Weather: 65°F SUNNY
Time In: Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)	25.48'		
Water Table Depth	(feet)	17.01'		

check where appropriate

Well Type: Flushmount ☒ Stick-Up ☐
Well Locked: Yes ☒ No ☐
Measuring Point Marked: Yes ☒ No ☐
Well Diameter: 1" ☐ 2" ☒ Other:

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 100mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		
Total Volume Removed:	(gal)	@ 9.25gal

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
TCL VOCs (2 - 40 mL vials) ☒
TCL SVOCs ☒
TAL Metals (6 metals) ☒
CYANIDE ☒
LEAD ☒
Sample ID: MW-1
Sample Time: 1100
MS/MSD: Yes ☒ No ☐
Duplicate: Yes ☐ No ☒
Duplicate ID:
Total Bottles: 18

EVACUATION INFORMATION

Purging Method: Bailer ☐ Waterra ☐ Whale ☐ Other Pump ☒ ISCO
Tubing Used: Dedicated ☑ Deconned ☐
Sampling Method: Bailer ☑ Waterra ☐ Whale ☐ Other Pump ☐ ISCO

Did well go dry? Yes ☐ No ☒ Water Quality Meter Type: YSI - 6100

Time / Parameter	1 1025 Initial	2 1030	3 1035	4 1040	5 1045	6 1050	7 1055	8 1100	9
Volume Purged (gal)									
Depth to Water (ft. TIC)	17.01	17.25	17.25	17.25	17.25	17.25	17.25	17.25	
Temperature (°C)	10.11	9.97	9.95	9.93	9.92	9.91	9.90	9.90	
pH	7.89	7.82	7.79	7.73	7.73	7.73	7.74	7.72	
Conductance (mS/cm)	0.342	0.341	0.339	0.339	0.339	0.339	0.339	0.340	
ORP (mV)	—	—	—	—	—	—	—	—	
DO (mg/L)	3.21	3.05	2.97	2.98	2.96	2.95	2.95	2.95	
Turbidity (NTU)	11.1	9.7	6.8	6.9	7.1	8.2	6.9	6.8	

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (SVOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010/7000 - Tagel Analyte Inorganics (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide

SAMPLE DESTINATION

Laboratory: Galson Laboratories — Sample was ☐ shipped day of sampling — Chain of Custody Signed By:
Shipped Via: ☐ Federal Express ☐ Other: Blasland, Bouck and Lee ☐ sent on

NMPC - Harper Substation, Niagara Falls, New York — Site
Low Flow Sampling Program — Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Anthony J. Browne
Well ID. MW-1
Job Number: 36605
Date: 9/7/00
Weather: @70°F Partly cloudy
Time In: Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)			
Water Table Depth	(feet)	15.97		

check where appropriate

Well Type:	Flushmount	☒	Stick-Up	☐
Well Locked:	Yes	☒	No	☐
Measuring Point Marked:	Yes	☒	No	☐
Well Diameter:	1"	☐	2" ☒	Other:

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 250 mL/min
Pumping Rate of Pump:	(GPM)	-
Minutes of Pumping:		45 min
Total Volume Removed:	(gal)	~30 gal

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
- TCL VOCs (2 - 40 mL vials) ☒
- TCL SVOCs ☒
- TAL Metals (6 metals) ☒
- PCBs ☒
- TOTAL CN ☒

Sample ID: MW-1
Sample Time: 1525
MS/MSD: Yes ☒ No ☐
Duplicate: Yes ☐ No ☒
Duplicate ID:
Total Bottles:

EVACUATION INFORMATION

Purging Method:	Bailer ☐	Waterra ☐	Whale ☐	Other Pump ☒	Peristaltic	
Tubing Used:	Dedicated ☐	Deconned ☐				
Sampling Method:	Bailer ☐	Waterra ☐	Whale ☐	Other Pump ☒	Peristaltic	

Did well go dry? Yes ☐ No ☒ Water Quality Meter Type: Horiba U22

Time / Parameter	1 1430 initial	2 1435	3 1440	4 1445	5 1450	6 1455	7 1500	8 1505	9 1510
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	16.1	14.2	14.3	14.2	14.1	13.9	13.9	13.9	13.9
pH	7.75	7.45	7.31	7.25	7.25	7.27	7.28	7.28	7.28
Conductance (mS/cm)	0.398	0.395	0.393	0.393	0.393	0.393	0.393	0.393	0.393
ORP (mV)	+48	+44	+49	+52	+53	+54	+54	+54	+53
DO (mg/L)	2.80	1.41	1.35	1.30	1.30	1.28	1.28	1.28	1.29
Turbidity (NTU)	36.7	33.8	32.9	32.0	32.2	32.2	32.1	32.3	32.0

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Sem-Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010 - Target Analyte List Metals (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide (Total Cn-)

SAMPLE DESTINATION

Laboratory: Galson Laboratories
Sample was ☐ shipped day of sampling ☐ sent on
Chain of Custody Signed By:
Shipped Via: ☒ Federal Express ☐ Other:

NJMo Harper

Site | Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: JCS / WPH
Job Number: 36487
Weather: cloudy, moderate breeze 70°F

Well ID: MW-2
Date: 8/20/99
Time In: 1120 Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)	20.72		
Water Table Depth	(feet)	13.12		

check where appropriate

Well Type: Flushmount [X] Stick-Up [ ]
Well Locked: Yes [ ] No [X]
Measuring Point Marked: Yes [X] No [ ]
Well Diameter: 1" [ ] 2" [X] Other:

WELL WATER INFORMATION

Length of Water Column:	(feet)	7.6
Volume of Water in Well:	(gal)	1.13
Pumping Rate of Pump:	(mL/min)	200
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		
Total Volume Removed:	(gal)	4.75

Conversion Factors

gallons per feet of water column:	1.5" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

Unit Stability

pH	DO	Cond	ORP
± 0.1	± 10%	± 3.0%	± 10 mV

SAMPLING INFORMATION

Analyses:
PCB [ ]
VOC [ ]
SVOC [ ]
TAL Inorganics [ ]
[ ]
[ ]
Sample ID: MW-2
Sample Time: 1335
MS/MSD: Yes [ ] No [X]
Duplicate: Yes [ ] No [X]
Duplicate ID:
Total Bottles: 6

EVACUATION INFORMATION

Evacuation Method: Bailer [ ] Peristaltic [X] Grudfos [ ] Other Pump [ ]
Tubing Used: Teflon [ ] Polyethylene [X]
Sampling Method: Bailer [X] Peristaltic [ ] Grudfos [ ] Other Pump [ ]
Did well go dry? Yes [X] No [X]
Water Quality Meter Type: YSI

Time / Parameter	1 1153 Initial	2 1159	3 1210	4 1220	5 1230	6 1240	7 1250	8 1305	9 1312
Volume Purged (gal)	1.5	2.0	2.5	2.7	3.0	3.4	4.0	4.25	4.50
Depth to Water (ft. TIC)	15.75	15.75	15.76	15.77	15.77	15.77	15.77	15.77	15.77
Temperature (°C)	14.81	14.82	15.07	15.37	15.22	15.54	15.71	15.59	15.52
pH	7.75	7.74	7.87	7.87	7.89	7.92	7.93	7.96	7.97
Conductance (mS/cm)	0.895	0.882	0.799	0.755	0.701	0.673	0.637	0.615	0.603
Dissolved Oxygen mg/L)	7.49	7.31	9.12	9.25	9.27	9.56	9.65	9.81	9.87
Turbidity (NTU)	Taken as final reading								
ORP (mV)	—	—	—	—	—	—	—	—	—

Time / Parameter	10 1321	11	12
Volume Purged (gal)	4.75		
Depth to Water (ft. TIC)	15.77		
Temperature (°C)	15.52		
pH	7.98		
Conductance (mS/cm)	0.602		
Dissolved Oxygen mg/L)	9.91		
Turbidity (NTU)	13.1		
ORP (mV)	—		

MISCELLANEOUS OBSERVATIONS/PROBLEMS

Initial Purge brown & turbid
YSI fell over @ 1300
PID: 0.0 ppm

SAMPLE DESTINATION

Laboratory: Groton
Shipped Via: Federal Express [ ] Other: Car [X]
Sample was shipped day of sampling [ ] sent on 8/21/99 [X]
Chain of Custody Signed By: JCS

NMPC - Harper Substation, Buffalo, New York — Site

Low Flow Sampling Program — Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Aaron D. Richardson
Job Number: 36487
Weather: C 55°F SUNNY

Well ID. MW-2
Date: APRIL 24TH 2008
Time In: Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)	20.72		
Water Table Depth	(feet)	14.33		

check where appropriate

Well Type: Flushmount [X] Stick-Up [ ]
Well Locked: Yes [X] No [ ]
Measuring Point Marked: Yes [X] No [ ]
Well Diameter: 1" [ ] 2" [X] Other

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 150 mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		
Total Volume Removed:	(gal)	5.0

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
TCL VOCs (2 - 40 mL vials) [X]
TCL SVOCs [X]
TAL Metals (6 metals) [X]
CYANIDE [X]
LEAD [X]
Sample ID: MW-2
Sample Time: 1445
MS/MSD: Yes [ ] No [ ]
Duplicate: Yes [ ] No [ ]
Duplicate ID:
Total Bottles: 6

EVACUATION INFORMATION

Purging Method: Bailer [X] Waterra [ ] Whale [ ] Other Pump [X] ISCO
Tubing Used: Dedicated [X] Deconned [ ]
Sampling Method: Bailer [X] Waterra [ ] Whale [ ] Other Pump [X] ISCO

Did well go dry? Yes [ ] No [X] Water Quality Meter Type: YSI-6100

Time / Parameter	1 1405 initial	2 1410	3 1415	4 1420	5 1425	6 1430	7 1435	8 1440	9
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	11.93	11.73	11.71	11.71	11.71	11.71	11.71	11.71	
pH	7.57	7.52	7.49	7.41	7.42	7.41	7.42	7.49	
Conductance (mS/cm)	0.799	0.789	0.768	0.691	0.689	0.687	0.688	0.689	
ORP (mV)	—	—	—	—	—	—	—	—	
DO (mg/L)									
Turbidity (NTU)	1325.9	987.3	576.9	121.3	56.1	43.2	41.9	35.7	

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (SVOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010/7000 - Taget Analyte Inorganics (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide

* CHANGED FLOW THRU CELL @ 1415 — UNIT WAS DIRTY

* D.O. PROBE WAS READING GREATER THAN 12.9 mg/L

SAMPLE DESTINATION

Laboratory: Galson Laboratories — Sample was [ ] shipped day of sampling — Chain of Custody Signed By:
Shipped Via: [ ] Federal Express [ ] Other: Blasland, Bouck and Lee [ ] sent on

NMPC - Harper Substation, Niagara Falls, New York — *Site*

Low Flow Sampling Program — *Event*

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Anthony J. Browne
Job Number: 36605
Weather: @ 80°F CLEAR

Well ID. MW-2
Date: 9/6/00
Time In: 0805 **Time Out:**

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)			
Water Table Depth	(feet)	3.52'		

check where appropriate

Well Type: Flushmount [X] Stick-Up [ ]
Well Locked: Yes [X] No [ ]
Measuring Point Marked: Yes [X] No [ ]
Well Diameter: 1" [ ] 2" [X] Other: ____

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 200 mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		45 min
Total Volume Removed:	(gal)	@ 2.37 gal

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
TCL VOCs (2 - 40 mL vials) [X]
TCL SVOCs [X]
TAL Metals (6 metals) [X]
PCBs [X]
TOTAL CN- [X]
Sample ID: MW-2
Sample Time: 1045
MS/MSD: Yes [ ] No [X]
Duplicate: Yes [ ] No [X]
Duplicate ID:
Total Bottles:

EVACUATION INFORMATION

Purging Method: Bailer [ ] Waterra [ ] Whale [ ] Other Pump [X] PERISTALTIC
Tubing Used: Dedicated [ ] Deconned [ ]
Sampling Method: Bailer [X] Waterra [ ] Whale [ ] Other Pump [X] PERISTALTIC

Did well go dry? Yes [ ] No [X] Water Quality Meter Type: HORIBA U22

Time / Parameter	1 0830 Initial	2 0835	3 0840	4 0845	5 0850	6 0855	7 0900	8 0905	9 0910
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	14.8	13.4	13.5	13.8	14.1	14.5	14.6	14.9	15.1
pH	7.30	6.97	6.82	6.85	6.90	6.99	7.08	7.14	7.16
Conductance (mS/cm)	1.10	1.12	1.13	1.17	1.16	1.09	1.03	0.98	0.94
ORP (mV)	279	273	273	272	260	194	149	125	102
DO (mg/L)	+ 6.84	+ 5.66	+ 4.57	+ 3.65	+ 3.82	+ 4.50	+ 4.80	+ 4.98	4.96
Turbidity (NTU)	33.9	32.9	999.0	999.0	999.0	999.0	997.0	668.0	639.0

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Sem-Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010 - Target Analyte List Metals (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide (Total Cn-)

* SHUT PUMP OFF @ 0915 - WILL ALLOW THE WELL TO SIT FOR 1 HOUR PRIOR TO SAMPLING.

SAMPLE DESTINATION

Laboratory: Galson Laboratories
Shipped Via: [X] Federal Express [ ] Other: _____
Sample was [ ] shipped day of sampling [ ] sent on _____
Chain of Custody Signed By: _____

NMPC - Harper Substation, Niagara Falls, New York — *Site*

Low Flow Sampling Program — *Event*

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Anthony J. Browne
Well ID. MW-35
Job Number: 36605
Date: 9/7/05
Weather: @75°F CLEAR BREEZY
Time In: 1300 **Time Out:**

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)			
Water Table Depth	(feet)	11.35		

check where appropriate

Well Type:	Flushmount	☒	Stick-Up	☐
Well Locked:	Yes	☒	No	☐
Measuring Point Marked:	Yes	☐	No	☒
Well Diameter:	1"	☐	2" ☒	Other:

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@250 mL/MIN
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		50 MIN
Total Volume Removed:	(gal)	@ 3.3 gal

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
- TCL VOCs (2 - 40 mL vials) ☒
- TCL SVOCs ☒
- TAL Metals (6 metals) ☒
- PCBs ☒
- TOTAL CN- ☒

Sample ID: MW-35
Sample Time: 1400
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID:
Total Bottles:

EVACUATION INFORMATION

Purging Method:	Bailer ☐	Waterra ☐	Whale ☐	Other Pump ☒	PERISTALTIC
Tubing Used:	Dedicated ☐	Deconned ☐			
Sampling Method:	Bailer ☒	Waterra ☐	Whale ☐	Other Pump ☒	PERISTALTIC

Did well go dry? Yes ☐ No ☒ Water Quality Meter Type: HORIBA U22

Time / Parameter	1 1310 Initial	2 1315	3 1320	4 1325	5 1330	6 1335	7 1340	8 1345	9 1350
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	16.1	14.6	14.5	14.4	14.2	14.4	14.5	14.7	14.7
pH	7.52	7.66	7.55	7.43	7.35	7.32	7.32	7.33	7.34
Conductance (mS/cm)	2.12	0.383	0.362	0.351	0.349	0.343	0.341	0.340	0.340
ORP (mV)	-231	-204	-183	-164	-153	-146	-141	-136	-134
DO (mg/L)	4.03	1.78	1.58	1.59	1.52	1.56	1.58	1.60	1.61
Turbidity (NTU)	999.9	38.6	34.9	33.6	33.5	33.9	33.4	33.3	33.2

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010 - Target Analyte List Metals (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide (Total Cn-)

+ SULFUR ODOR

SAMPLE DESTINATION

Laboratory: Galson Laboratories — Sample was ☐ shipped day of sampling — Chain of Custody Signed By:
Shipped Via: ☒ Federal Express ☐ Other: ☐ sent on

Nimo Harper

Site

Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: JCS/WPH

Job Number: 36487

Weather: p. cloudy, slight breeze, 80°F

Well ID. MW-4

Date: ~~8/22/99~~ 8/26/99 & 8/23/99

Time In: 0940 Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)	14.88		
Water Table Depth	(feet)	11.79		

check where appropriate

Well Type: Flushmount ☐ Stick-Up ☐

Well Locked: Yes ☐ No ☐

Measuring Point Marked: Yes ☐ No ☐

Well Diameter: 1" ☐ 2" ☐ Other: ____

WELL WATER INFORMATION

Length of Water Column:	(feet)	3.19
Volume of Water in Well:	(gal)	0.53
Pumping Rate of Pump:	(mL/min)	~100 mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		
Total Volume Removed:	(gal)	3.0

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.041	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

Unit Stability

pH	DO	Cond	ORP
± 0.1	± 10%	± 3.0%	± 10 mV

SAMPLING INFORMATION

Analyses:

- PCB ☒
- VOC ☒
- SVOC ☒
- ~~TAL Inorganics~~ ☒
- ☐
- ☐

Sample ID: MW-4

Sample Time: 1125

MS/MSD: Yes ☐ No ☒

Duplicate: Yes ☐ No ☒

Duplicate ID:

Total Bottles: 6

EVACUATION INFORMATION

Evacuation Method: Bailer ☐ Peristaltic ☒ Grudfos ☐ Other Pump ☐ ____

Tubing Used: Teflon ☐ Polyethylene ☒

Sampling Method: Bailer ☒ Peristaltic ☐ Grudfos ☐ Other Pump ☐ ____

Did well go dry? Yes ☒ No ☐ Water Quality Meter Type: YSI

Time / Parameter	1 0958 Initial	2 1000	3 1030	4 1110 pump stopped	5 1030 8/23/99	6 1035	7 1040	8 1050	9 1100
Volume Purged (gal)	~	1.25	1.50	2.0	<0.5	0.5	1.0	1.5	2.0
Depth to Water (ft. TIC)	11.79	dry	dry	dry	12.41	13.11	13.11	dry	dry
Temperature (°C)	—	14.77	15.56	14.66	14.83	15.89	16.00	16.02	15.99
pH	—	7.31	7.45	7.59	7.04	7.19	7.30	7.40	7.49
Conductance (mS/cm)	—	0.904	0.619	0.488	0.834	0.859	~~0.670~~ 0.870	0.528	0.446
Dissolved Oxygen mg/L)	—	6.30	9.70	9.95	6.00	6.02	3.76	2.12	1.87
Turbidity (NTU)	—	>1000	>1000	>1000	665.0	>1000	746.0	627.0	158.0
ORP (mV)	—	—	—	—	—	—	—	—	—

Time / Parameter	10 1110 8/23/99	11 1120	12
Volume Purged (gal)	2.5	3.0	
Depth to Water (ft. TIC)	dry	dry	
Temperature (°C)	15.79	15.81	
pH	7.53	7.58	
Conductance (mS/cm)	0.431	0.412	
Dissolved Oxygen mg/L)	1.80	1.80	
Turbidity (NTU)	53.5	36.8	
ORP (mV)	—	—	

MISCELLANEOUS OBSERVATIONS/PROBLEMS

initial purge turn brown; turbid where "dry" water level – water is being pumped as it's being recovered

PID: 0.0 ppm

SAMPLE DESTINATION

Laboratory: Galson

Shipped Via: ☐ Federal Express ☐ Other: car

Sample was ☒ shipped day of sampling ☒ sent on ____

Chain of Custody Signed By: JCS

NMPC - Harper Substation, Buffalo, New York — Low Flow Sampling Program

Site — Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Aaron D. Richardson
Well ID. MW-4
Job Number: 36487
Date: APRIL 24TH 2007
Weather: @55°F SUNNY
Time In: 1100 Time Out: 1250

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)	~~29.96~~	14.96	
Water Table Depth	(feet)	~~14.76~~	13.63	

check where appropriate

Well Type: Flushmount [X] Stick-Up [ ]
Well Locked: Yes [X] No [ ]
Measuring Point Marked: Yes [X] No [ ]
Well Diameter: 1" [ ] 2" [X] Other:

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 150 ML/MIN
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		
Total Volume Removed:	(gal)	@ 4.0 GAL

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
TCL VOCs (2 - 40 mL vials) [X]
TCL SVOCs [X]
TAL Metals (6 metals) [X]
CYANIDE [X]
LEAD [X]
Sample ID: MW-4
Sample Time: 1245
MS/MSD: Yes [ ] No [ ]
Duplicate: Yes [ ] No [ ]
Duplicate ID:
Total Bottles: 6

EVACUATION INFORMATION

Purging Method: Bailer [ ] Waterra [ ] Whale [ ] Other Pump [ ] ISCO
Tubing Used: Dedicated [ ] Deconned [ ]
Sampling Method: Bailer [ ] Waterra [ ] Whale [ ] Other Pump [ ] ISCO

Did well go dry? Yes [ ] No [X] Water Quality Meter Type: YSI-6100

Time / Parameter	1 1115 Initial	2 1120	3 1125	4 1130	5 1135	6 1140	7 1145	8	9
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	12.71	12.59	12.03	12.01	11.99	11.93	11.91		
pH	7.60	7.60	7.59	7.39	7.49	7.50	7.51		
Conductance (mS/cm)	0.879	0.831	0.839	0.842	0.839	0.832	0.839		
ORP (mV)	+172.0	—	—	—	—	—	—		
DO (mg/L)	+3.60	+1.60	+1.29	+1.09	+0.89	+0.99	+1.01		
Turbidity (NTU)	1320.1	1129.9	1012.3	994.9	874.2	937.9	987.3		

MISCELLANEOUS OBSERVATIONS/PROBLEMS

* WELL WAS SET FOR 1 HOUR PRIOR TO SAMPLING

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (SVOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010/7000 - Taget Analyte Inorganics (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide

SAMPLE DESTINATION

Laboratory: Galson Laboratories — Sample was [ ] shipped day of sampling [ ] sent on ____ — Chain of Custody Signed By:
Shipped Via: [ ] Federal Express [ ] Other: Blasland, Bouck and Lee

NMPC - Harper Substation, Buffalo, New York — Low Flow Sampling Program
Site — Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Aaron D. Richardson
Job Number: 36487
Weather: @ 60°F RAIN

Well ID. MW-4
Date: May 18th 2010
Time In: Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)	14.96		
Water Table Depth	(feet)	13.72		

check where appropriate

Well Type:	Flushmount	☒	Stick-Up	☐
Well Locked:	Yes	☒	No	☐
Measuring Point Marked:	Yes	☒	No	☐
Well Diameter:	1" ☐	2" ☒	Other:	

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 100mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		
Total Volume Removed:	(gal)	

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
- TCL VOCs (2 - 40 mL vials) ☐
- TCL SVOCs ☒
- TAL Metals (6 metals) ☐
- _____ ☐
- _____ ☐

Sample ID: MW-4
Sample Time: 1210
MS/MSD: Yes ☐ No ☐
Duplicate: Yes ☐ No ☐
Duplicate ID:
Total Bottles: 1

EVACUATION INFORMATION

Purging Method:	Bailer ☐	Waterra ☐	Whale ☐	Other Pump ☒	ISCO	
Tubing Used:	Dedicated ☒	Deconned ☐				
Sampling Method:	Bailer ☐	Waterra ☐	Whale ☐	Other Pump ☒	ISCO	

Did well go dry? Yes ☒ No ☐ Water Quality Meter Type: YSI-6100

Time / Parameter	1 1010 Initial	2 1015	3 1020	4	5	6	7	8	9
Volume Purged (gal)	--	--	--						
Depth to Water (ft. TIC)	--	--	--						
Temperature (°C)	12.11	12.03	11.97						
pH	7.63	7.63	7.59						
Conductance (mS/cm)	0.937	0.927	0.927						
ORP (mV)	--	--	--						
DO (mg/L)	1.05	0.97	0.79						
Turbidity (NTU)	879.2	799.1	892.3						

MISCELLANEOUS OBSERVATIONS/PROBLEMS

* WELL WENT DRY @ 1020
WILL NOT SET FOR UNTIL RECOVERY

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (SVOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010/7000 - Taget Analyte Inorganics (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide

SAMPLE DESTINATION

Laboratory: Galson Laboratories — Sample was ☐ shipped day of sampling — Chain of Custody Signed By:
Shipped Via: ☐ Federal Express ☐ Other: Blasland, Bouck and Lee ☐ sent on _____

NMPC - Harper Substation, Niagara Falls, New York — *Site*

Low Flow Sampling Program — *Event*

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Anthony J. Browne
Job Number: 36605
Weather: @ 60°F SUNNY

Well ID. MW-4
Date: 9/6/06
Time In: 0935 **Time Out:**

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)			
Water Table Depth	(feet)	11.34		

check where appropriate

Well Type: Flushmount [X] Stick-Up [ ]
Well Locked: Yes [X] No [ ]
Measuring Point Marked: Yes [X] No [ ]
Well Diameter: 1" [ ] 2" [X] Other: ____

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 200 mL/MIN
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		@ 45 MIN
Total Volume Removed:	(gal)	2.37 gal

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
- TCL VOCs (2 - 40 mL vials) [X]
- TCL SVOCs [X]
- TAL Metals (6 metals) [X]
- PCBs [X]
- TOTAL CN- [X]

Sample ID: MW-4
Sample Time: 1030
MS/MSD: Yes [ ] No [ ]
Duplicate: Yes [ ] No [ ]
Duplicate ID:
Total Bottles:

EVACUATION INFORMATION

Purging Method:	Bailer [ ]	Waterra [ ]	Whale [ ]	Other Pump	[X]	PERISTALTIC
Tubing Used:	Dedicated [ ]	Deconned [ ]				
Sampling Method:	Bailer [X]	Waterra [ ]	Whale [ ]	Other Pump	[X]	PERISTALTIC

Did well go dry? Yes [ ] No [X]
Water Quality Meter Type: HORIBA U22

Time / Parameter	1 0940 Initial	2 0945	3 0950	4 0955	5 1000	6 1005	7 1010	8 1015	9 1020
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	14.5	13.8	13.6	13.6	13.7	13.8	13.9	14.1	14.2
pH	7.24	6.93	6.92	6.92	6.94	6.97	6.99	7.02	7.05
Conductance (mS/cm)	0.912	0.860	0.619	0.584	0.545	0.519	0.502	0.487	0.478
ORP (mV)	+168.0	+173.0	+175.0	+167.0	+160.0	+157.0	+156.0	+157.0	+158.0
DO (mg/L)	5.16	1.57	3.26	3.89	4.75	5.43	5.98	6.84	6.87
Turbidity (NTU)	85.4	190.0	89.5	77.7	62.0	57.8	63.3	55.5	47.2

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010 - Target Analyte List Metals (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide (Total CN-)

SAMPLE DESTINATION

Laboratory: Galson Laboratories
Shipped Via: [X] Federal Express [ ] Other: ____
Sample was [ ] shipped day of sampling [ ] sent on ____
Chain of Custody Signed By: ____

Ni Mo Harper

Site | Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: JCS / WPH
Job Number: 36487
Weather: overcast, rain, 65°F

Well ID: MW-5
Date: 8/20/99
Time In: 1445 Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)	29.16		
Water Table Depth	(feet)	15.89		

check where appropriate

Well Type: Flushmount ☒ Stick-Up ☐
Well Locked: Yes ☐ No ☒
Measuring Point Marked: Yes ☒ No ☐
Well Diameter: 1" ☐ 2" ☒ Other:

WELL WATER INFORMATION

Length of Water Column:	(feet)	13.27
Volume of Water in Well:	(gal)	2.19
Pumping Rate of Pump:	(mL/min)	~200 mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		
Total Volume Removed:	(gal)	6.5

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.041	0.165	0.66	1.5

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

Unit Stability

pH	DO	Cond	ORP
± 0.1	± 10%	± 3.0%	± 10 mV

EVACUATION INFORMATION

Evacuation Method: Bailer ☐ Peristaltic ☒ Grudfos ☐ Other Pump ☐
Tubing Used: Teflon ☐ Polyethylene ☒
Sampling Method: Bailer ☒ Peristaltic ☐ Grudfos ☐ Other Pump ☐
Did well go dry? Yes ☐ No ☒ Water Quality Meter Type: YSI

SAMPLING INFORMATION

Analyses:
PCB ☐
VOC ☐
SVOC ☐
Total Inorganics ☐
☐
☐
Sample ID: ~~MW-5~~ MW-5
Sample Time: 1620
MS/MSD: Yes ☒ No ☐
Duplicate: Yes ☒ No ☐
Duplicate ID: Dup 2
Total Bottles: 18

Time / Parameter	1 1500 Initial	2 1510	3 1520	4 1530	5 1540	6 1550	7 1600	8 1610	9
Volume Purged (gal)	0.5	2.0	2.5	3.5	4.0	4.5	5.5	6.5	
Depth to Water (ft. TIC)	16.08	16.08	16.01	16.01	16.01	16.01	16.01	16.01	
Temperature (°C)	12.15	11.39	11.87	11.89	11.99	12.01	12.02	11.92	
pH	11.75	11.33	11.05	9.83	9.73	9.46	9.31	9.32	
Conductance (mS/cm)	0.532	0.614	0.545	0.337	0.331	0.332	0.332	0.330	
Dissolved Oxygen mg/L)	1.07	0.70	0.71	0.95	0.89	0.83	0.79	0.75	
Turbidity (NTU)	91.7	88.1	68.7	15.4	11.6	6.38	4.85	5.09	
ORP (mV)									

Time / Parameter	10	11	12
Volume Purged (gal)			
Depth to Water (ft. TIC)			
Temperature (°C)			
pH			
Conductance (mS/cm)			
Dissolved Oxygen mg/L)			
Turbidity (NTU)			
ORP (mV)			

MISCELLANEOUS OBSERVATIONS/PROBLEMS

initial purge - water clear

SAMPLE DESTINATION

Laboratory: Groton
Shipped Via: Federal Express ☐ Other: Car
Sample was: shipped day of sampling ☐ sent on 8/21/99 ☒
Chain of Custody Signed By: JCS

NMPC - Harper Substation, Buffalo, New York — Site

Low Flow Sampling Program — Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Aaron D. Richardson
Job Number: 36487
Weather: @ 45°F SUNNY

Well ID. MW-5
Date: APRIL 25TH 2000
Time In: ~~0845~~ Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)	29.30		
Water Table Depth	(feet)	17.17		

check where appropriate

Well Type: Flushmount [X] Stick-Up [ ]
Well Locked: Yes [X] No [ ]
Measuring Point Marked: Yes [X] No [ ]
Well Diameter: 1" [ ] 2" [X] Other:

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 225 mL/MIN
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		
Total Volume Removed:	(gal)	@ 6.75 GAL

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
TCL VOCs (2 - 40 mL vials) [X]
TCL SVOCs [X]
TAL Metals (6 metals) [X]
CYANIDE [X]
LEAD [X]
Sample ID: MW-5
Sample Time: 0845
MS/MSD: Yes [ ] No [ ]
Duplicate: Yes [X] No [ ]
Duplicate ID: FD042500
Total Bottles: 12

EVACUATION INFORMATION

Purging Method: Bailer [ ] Waterra [ ] Whale [ ] Other Pump [X] ISCO
Tubing Used: Dedicated [X] Deconned [ ]
Sampling Method: Bailer [X] Waterra [ ] Whale [ ] Other Pump [X] ISCO

Did well go dry? Yes [ ] No [X] Water Quality Meter Type: YSI - 6100

Time / Parameter	1 0815 Initial	2 0820	3 0825	4 0830	5 0835	6 0840	7 0845	8	9
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	10.9	10.8	10.9	10.9	10.9	10.9	10.9		
pH	12.11	11.98	10.09	9.81	9.82	9.83	9.81		
Conductance (mS/cm)	0.630	0.631	0.629	0.630	0.630	0.630	0.632		
ORP (mV)	-	—	—	—	—	—	—		
DO (mg/L)	1.01	~~0.69~~ 0.69	0.71	0.72	0.70	0.69	0.61		
Turbidity (NTU)	123.2	111.1	71.9	93.2	33.1	23.9	15.9		

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (SVOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010/7000 - Taget Analyte Inorganics (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide

* FIELD DUPLICATE *

SAMPLE DESTINATION

Laboratory: Galson Laboratories — Sample was [ ] shipped day of sampling — Chain of Custody Signed By:
Shipped Via: [ ] Federal Express [ ] Other: Blasland, Bouck and Lee [ ] sent on _____

NMPC - Harper Substation, Buffalo, New York — Low Flow Sampling Program

Site — Event

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / ~~Aaron D. Richardson~~
Well ID. MW-5
Job Number: 36487
Date: MAY 18TH 2006
Weather: @ 60°F RAIN
Time In: Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)	29.30		
Water Table Depth	(feet)	17.35		

check where appropriate
Well Type: Flushmount ☒ Stick-Up ☐
Well Locked: Yes ☒ No ☐
Measuring Point Marked: Yes ☒ No ☐
Well Diameter: 1" ☐ 2" ☒ Other:

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 300 mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		
Total Volume Removed:	(gal)	

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
TCL VOCs (2 - 40 mL vials) ☐
TCL SVOCs ☒
TAL Metals (6 metals) ☐
☐
☐
Sample ID: MW-5
Sample Time: 1345
MS/MSD: Yes ☒ No ☐
Duplicate: Yes ☒ No ☐
Duplicate ID:
Total Bottles: 4

EVACUATION INFORMATION

Purging Method:	Bailer ☐	Waterra ☐	Whale ☐	Other Pump ☒	ISCO	
Tubing Used:	Dedicated ☒	Deconned ☐				
Sampling Method:	Bailer ☐	Waterra ☐	Whale ☐	Other Pump ☒	ISCO	

Did well go dry? Yes ☐ No ☒ Water Quality Meter Type: YSI-610-D

Time / Parameter	1 1315 Initial	2 1320	3 1325	4 1330	5 1335	6 1340	7	8	9
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	11.9	11.8	11.9	11.7	11.8	11.9			
pH	10.11	10.02	9.98	9.99	10.1	10.2			
Conductance (mS/cm)	0.721	0.732	0.691	0.692	0.693	0.699			
ORP (mV)	—	—	—	—	—	—			
DO (mg/L)	1.11	1.09	1.05	1.05	1.05	1.05			
Turbidity (NTU)	98.2	78.3	51.2	39.3	18.2	11.9			

MISCELLANEOUS OBSERVATIONS/PROBLEMS

- FIELD DUPLICATE = FD051806
- MS/MSD

~~USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)~~
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (SVOCs)
~~USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)~~
~~USEPA SW-846 Method 6010/7000 - Target Analyte Inorganics (TAL Metals)~~
~~USEPA SW-846 Method 9010 - Total Cyanide~~

SAMPLE DESTINATION

Laboratory: Galson Laboratories — Sample was ☐ shipped day of sampling — Chain of Custody Signed By:
Shipped Via: ☐ Federal Express ☐ Other: Blasland, Bouck and Lee ☐ sent on

NMPC - Harper Substation, Niagara Falls, New York — *Site*

Low Flow Sampling Program — *Event*

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Anthony J. Browne
Job Number: 36605
Weather: @65°F Sunny

Well ID. MW-5
Date: 9/6/00
Time In: 1255 **Time Out:**

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)			
Water Table Depth	(feet)	16.11		

check where appropriate

Well Type:	Flushmount	☒	Stick-Up	☐
Well Locked:	Yes	☒	No	☐
Measuring Point Marked:	Yes	☒	No	☐
Well Diameter:	1" ☐	2" ☒	Other:	

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@250 mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		45 min
Total Volume Removed:	(gal)	@3.00

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
- TCL VOCs (2 - 40 mL vials) ☒
- TCL SVOCs ☒
- TAL Metals (6 metals) ☒
- PCBs ☒
- TOTAL LOAD ☒

Sample ID: MW-5
Sample Time: 1410
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☐ No ☒
Duplicate ID:
Total Bottles:

EVACUATION INFORMATION

Purging Method:	Bailer	☐	Waterra ☐	Whale ☐	Other Pump	☒ PERISTALTIC
Tubing Used:	Dedicated	☐	Deconned ☐			
Sampling Method:	Bailer	☒	Waterra ☐	Whale ☐	Other Pump	☒ PERISTALTIC

Did well go dry? Yes ☐ No ☒ Water Quality Meter Type: HORIBA U22

Time / Parameter	1 1305 Initial	2 1310	3 1315	4 1320	5 1325	6 1330	7 1335	8 1340	9 1345
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	14.3	13.1	11.9	11.9	11.9	11.9	11.9	11.9	11.9
pH	8.31	7.96	7.78	7.60	7.50	7.44	7.42	7.42	7.40
Conductance (mS/cm)	0.489	0.479	0.421	0.395	0.382	0.377	0.373	0.371	0.368
ORP (mV)	+234	+236	+236	+239	+240	+232	+237	+236	+233
DO (mg/L)	+3.72	+2.51	+1.42	+1.53	+1.43	+1.36	+1.32	+1.36	+1.44
Turbidity (NTU)	37.4	31.3	29.7	28.6	28.5	28.6	27.7	27.8	26.5

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Sem-Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010 - Target Analyte List Metals (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide (Total Cn-)

SAMPLE DESTINATION

Laboratory: Galson Laboratories — Sample was ☐ shipped day of sampling ☐ sent on _____ — Chain of Custody Signed By: _____

Shipped Via: ☒ Federal Express ☐ Other: _____

NMPC - Harper Substation, Niagara Falls, New York — *Site*

Low Flow Sampling Program — *Event*

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Anthony J. Browne
Job Number: 36605
Weather: @ 60°F PARTLY CLOUDY

Well ID. MW-6
Date: 9/5/00
Time In: 1305 **Time Out:**

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)			
Water Table Depth	(feet)	14.92		

check where appropriate

Well Type:	Flushmount	☒	Stick-Up	☐
Well Locked:	Yes	☒	No	☐
Measuring Point Marked:	Yes	☐	No	☑
Well Diameter:	1" ☐	2" ☒	Other:	

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 300 mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		45
Total Volume Removed:	(gal)	@ 3.5 gal

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
- TCL VOCs (2 - 40 mL vials) ☒
- TCL SVOCs ☒
- TAL Metals (6 metals) ☒
- PCBs ☒
- TOTAL CN⁻ ☒

Sample ID: MW-6
Sample Time: 1430
MS/MSD: Yes ☐ No ☒
Duplicate: Yes ☒ No ☐
Duplicate ID: FD090500
Total Bottles:

EVACUATION INFORMATION

Purging Method:	Bailer ☐	Waterra ☐	Whale ☐	Other Pump ☒	PERISTALTIC
Tubing Used:	Dedicated ☐	Deconned ☐			
Sampling Method:	Bailer ☒	Waterra ☐	Whale ☐	Other Pump ☒	PERISTALTIC

Did well go dry? Yes ☐ No ☒ Water Quality Meter Type: HORIBA U22

Time / Parameter	1 1326 Initial	2 1330	3 1335	4 1340	5 1345	6 1350	7 1355	8 1400	9 1405
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	15.5	13.5	13.9	13.9	13.8	13.7	14.0	13.6	13.9
pH	7.51	7.24	7.23	7.28	7.37	7.45	7.50	7.52	7.54
Conductance (mS/cm)	0.495	0.488	0.452	0.449	0.446	0.446	0.443	0.443	0.442
ORP (mV)	+37	-35	-41	-49	-59	-67	-72	-75	-79
DO (mg/L)	+3.04	+0.82	+0.69	+0.66	+0.58	+0.51	+0.51	+0.43	0.42
Turbidity (NTU)	56.9	32.2	22.1	78.1	15.8	15.8	15.6	15.3	14.8

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010 - Target Analyte List Metals (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide (Total Cn-)

* FIELD DUPLICATE - FD090500 *

SAMPLE DESTINATION

Laboratory: Galson Laboratories
Shipped Via: ☒ Federal Express ☐ Other: _____
Sample was ☐ shipped day of sampling ☐ sent on _____
Chain of Custody Signed By: _____

NMPC - Harper Substation, Niagara Falls, New York — *Site*

Low Flow Sampling Program — *Event*

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Anthony J. Browne
Job Number: 36605
Weather: @ 70°F SUNNY

Well ID. MW-7
Date: 9/7/00
Time In: Time Out:

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)			
Water Table Depth	(feet)	16.97		

check where appropriate

Well Type: Flushmount [X] Stick-Up [ ]
Well Locked: Yes [X] No [ ]
Measuring Point Marked: Yes [ ] No [X]
Well Diameter: 1" [ ] 2" [X] Other: ____

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 350 mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		45 MIN
Total Volume Removed:	(gal)	@ 3.5 GAL

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
TCL VOCs (2 - 40 mL vials) [X]
TCL SVOCs [X]
TAL Metals (6 metals) [X]
PCBs [X]
TOTAL CN- [X]
Sample ID: MW-7
Sample Time: 1725
MS/MSD: Yes [ ] No [ ]
Duplicate: Yes [ ] No [ ]
Duplicate ID:
Total Bottles:

EVACUATION INFORMATION

Purging Method: Bailer [ ] Waterra [ ] Whale [ ] Other Pump [X] PERISTALTIC
Tubing Used: Dedicated [ ] Deconned [ ]
Sampling Method: Bailer [X] Waterra [ ] Whale [ ] Other Pump [X] PERISTALTIC

Did well go dry? Yes [ ] No [X] Water Quality Meter Type: HORIBA U22

Time / Parameter	1 1540 Initial	2 1545	3 1550	4 1555	5 1600	6 1605	7 1610	8 1615	9 1620
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	17.0	15.9	14.2	14.2	13.9	14.1	14.0	14.1	14.0
pH	7.69	7.67	7.63	7.62	7.56	7.54	7.53	7.52	7.51
Conductance (mS/cm)	1.05	1.03	1.03	1.01	0.98	0.93	0.97	0.97	0.96
ORP (mV)	-89	-90	-90	-90	-105	-94	-102	-107	-110
DO (mg/L)	+4.61	+3.21	+1.16	+1.54	1.09	1.39	1.39	2.12	1.57
Turbidity (NTU)	433.0	558.2	999.0	999.0	999.0	449.2	272.2	229.3	223.0

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010 - Target Analyte List Metals (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide (Total Cn-)

* WILL ALLOW THE WELL TO SET 1 HOUR PRIOR TO SAMPLING DUE TO HIGH TURBIDITY

SAMPLE DESTINATION

Laboratory: Galson Laboratories
Shipped Via: [X] Federal Express [ ] Other:
Sample was [ ] shipped day of sampling [ ] sent on
Chain of Custody Signed By:

NMPC - Harper Substation, Niagara Falls, New York — **Low Flow Sampling Program**

Site — *Event*

GROUND-WATER SAMPLING LOG

Sampling Personnel: Michael R. Arlauckas / Anthony J. Browne
Job Number: 36605
Weather: C 65°F Sunny

Well ID. MW-8
Date: 9/6/00
Time In: 1430 **Time Out:**

WELL INFORMATION

		TIC	TOC	BGS
Well Depth	(feet)			
Water Table Depth	(feet)	15.04		

check where appropriate

Well Type: Flushmount [X] Stick-Up [ ]
Well Locked: Yes [X] No [ ]
Measuring Point Marked: Yes [ ] No [X]
Well Diameter: 1" [ ] 2" [X] Other:

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	@ 300 mL/min
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:		50 min
Total Volume Removed:	(gal)	3.96 gal

Conversion Factors

gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.165	0.66	1.5

1 gal = 3.785 L =3785 mL = 0.1337 cubic ft.

SAMPLING INFORMATION

Analyses:
TCL VOCs (2 - 40 mL vials) [X]
TCL SVOCs [X]
TAL Metals (6 metals) [X]
PCBs [X]
TOTAL CN- [X]
Sample ID: MW-8
Sample Time: 1525
MS/MSD: Yes [ ] No [ ]
Duplicate: Yes [ ] No [ ]
Duplicate ID:
Total Bottles:

EVACUATION INFORMATION

Purging Method: Bailer [ ] Waterra [ ] Whale [ ] Other Pump [X] PERISTALTIC
Tubing Used: Dedicated [ ] Deconned [ ]
Sampling Method: Bailer [X] Waterra [ ] Whale [ ] Other Pump [X] PERISTALTIC
Did well go dry? Yes [ ] No [X] Water Quality Meter Type: HORIBA U22

Time / Parameter	1 1430 Initial	2 1435	3 1440	4 1445	5 1450	6 1455	7 1500	8 1505	9 1510
Volume Purged (gal)									
Depth to Water (ft. TIC)									
Temperature (°C)	15.7	14.2	14.1	14.3	14.3	14.1	14.1	14.1	14.1
pH	7.68	7.54	7.50	7.50	7.48	7.49	7.51	7.49	7.50
Conductance (mS/cm)	+1.39	+0.502	+0.472	+0.462	+0459	0.483	+0.471	+0.469	+0.457
ORP (mV)	+255	+237	+234	+243	+229	+225	+221	+220	+215
DO (mg/L)	+3.47	+1.98	+1.81	+1.79	+1.63	+1.69	+1.70	+1.59	+1.51
Turbidity (NTU)	208.3	37.3	30.8	31.8	28.2	29.2	21.9	18.2	15.1

MISCELLANEOUS OBSERVATIONS/PROBLEMS

USEPA SW-846 Method 8260 - Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8270 - Semi-Volatile Organic Compounds (VOCs)
USEPA SW-846 Method 8082 - Polychlorinated Biphenyls (PCBs)
USEPA SW-846 Method 6010 - Target Analyte List Metals (TAL Metals)
USEPA SW-846 Method 9010 - Total Cyanide (Total Cn-)

SAMPLE DESTINATION

Laboratory: Galson Laboratories — Sample was [ ] shipped day of sampling [ ] sent on ____ — Chain of Custody Signed By:
Shipped Via: [X] Federal Express [ ] Other:

Appendix G

Geoprobe® Soil Boring Logs

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

Date Start/Finish: 8-24-00 / 8-24-00 **Drilling Company:** Parratt Wolff **Driller's Name:** Mark Eaves **Drilling Method:** Hollow Stem Auger **Bit Size:** -in. **Auger Size** : -in. **Rig Type:** CME-75 **Spoon Size:** 2"-in.	**Northing:** **Easting:** **Well Casing Elev.:** ft. **Corehole Depth:** ft. **Borehole Depth:** 15.0 ft. **Ground Surface Elev.:** ft. **Geologist:** Michael R. Arlauckas	**Well No. GP-01** **Site:** Niagara Mohawk Power Corporation **Client:** Harper Substation Niagara Falls, New York

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft.									**GROUND SURFACE**	
	(S-1)				2.0	0.0			Dark brown SAND and SILT, trace organics, rock fragemnts, dry.	
	(S-2)				2.0	0.0			Brown vf SAND and SILT, tan mottling, trace vf angular Gravel, dry.	
5	(S-3)				2.0	0.0			Brown, vf SAND and SILT, tan mottling, moist.	
	(S-4)				2.0	0.0			same as above, dry.	Bentonite pellets from ground surface 15.0'.
	(S-5)				2.0	0.0			Reddish brown CLAY, trace Silt, tan mottling, dry.	
10	(S-6)				2.0	0.0			No Recovery.	
	(S-7)				2.0	0.0			Reddish brown vf SAND and SILT, trace subangular vf Gravel.	
	(S-8)				1.0	0.0			Dark gray SILT and vf SAND, rock fragments, moist.	
17									End of boring at 15.0' bgs.	

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Water Levels

Date / Time	Elevation	Depth

Date Start/Finish: 8-24-00 / 8-24-00 **Drilling Company:** Parratt Wolff **Driller's Name:** Mark Eaves **Drilling Method:** Hollow Stem Auger **Bit Size:** -in. **Auger Size :** -in. **Rig Type:** CME-75 **Spoon Size:** 2"-in.	**Northing:** **Easting:** **Well Casing Elev.:** ft. **Corehole Depth:** ft. **Borehole Depth:** 13.5 ft. **Ground Surface Elev.:** ft. **Geologist:** Michael R. Arlauckas	**Well No. GP-02** **Site:** Niagara Mohawk Power Corporation **Client:** Harper Substation Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
	gs elevation ft.									**GROUND SURFACE**	
		(S-1)				2.0	0.0			Dark brown SAND and SILT, trace organics, vf Gravel.	
		(S-2)				2.0	0.0			Brown vf SAND and SILT, tan mottling, trace vf angular Gravel, moist.	
5		(S-3)				2.0	0.0			Brown, vf SAND and SILT, tan mottling, moist.	
		(S-4)				2.0	0.0			same as above, dry. @7.2' brown to Tan SILT, gray mottling.	Bentonite pellets from ground surface 13.5'.
		(S-5)				2.0	0.0			Brown vf SAND and SILT. @8.9' dark gray CLAY and SILT, moist, trace vf subangular Gravel.	
10		(S-6)				2.0	0.0			same as above.	
		(S-7)				1.5	0.0			Dark gray vf SAND and SILT, rock fragments, moist.	
										End of boring at 13.5' bgs.	
17											

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Water Levels

Date / Time	Elevation	Depth

Date Start/Finish: 8-24-00 / 8-24-00 **Drilling Company:** Parratt Wolff **Driller's Name:** Mark Eaves **Drilling Method:** Hollow Stem Auger **Bit Size:** -in. **Auger Size** : -in. **Rig Type:** CME-75 **Spoon Size:** 2"-in.	**Northing:** **Easting:** **Well Casing Elev.:** ft. **Corehole Depth:** ft. **Borehole Depth:** 11.9 ft. **Ground Surface Elev.:** ft. **Geologist:** Michael R. Arlauckas	**Well No. GP-03** **Site:** Niagara Mohawk Power Corporation **Client:** Harper Substation Niagara Falls, New York

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft.									**GROUND SURFACE**	
	(S-1)				2.0	0.0			Dark brown vf SAND and SILT, trace rootlets, organics.	
	(S-2)				2.0	0.0			Tan vf SAND, trace Silt, gray mottling.	
5	(S-3)				2.0	0.0			same as above. @4.3'-4.4' brown CLAY seam.	
	(S-4)				2.0	0.0			same as above.	Bentonite pellets from ground surface 11.9'.
	(S-5)				2.0	0.0			No Recovery.	
10	(S-6)				1.9	0.0			Dark gray CLAY, very soft, trace rock fragments, moist.	
									End of boring at 11.9' bgs.	
17										

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Water Levels

Date / Time	Elevation	Depth

Date Start/Finish: 8-24-00 / 8-24-00 **Drilling Company:** Parratt Wolff **Driller's Name:** Mark Eaves **Drilling Method:** Hollow Stem Auger **Bit Size:** -in. **Auger Size** : -in. **Rig Type:** CME-75 **Spoon Size:** 2"-in.	**Northing:** **Easting:** **Well Casing Elev.:** ft. **Corehole Depth:** ft. **Borehole Depth:** 13.3 ft. **Ground Surface Elev.:** ft. **Geologist:** Michael R. Arlauckas	**Well No. GP-04** **Site:** Niagara Mohawk Power Corporation **Client:** Harper Substation Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
	gs elevation ft.									**GROUND SURFACE**	
		(S-1)				2.0	0.0			Dark brown, vf SAND and SILT, trace organics, rootlets.	
		(S-2)				2.0	0.0			Tan vf SAND, trace Silt, gray mottling, organics.	
5		(S-3)				2.0	0.0			@3.7' Brown SILT, gray mottling, moist Reddish brown SILTY SAND, moist.	
		(S-4)				2.0	0.0			Same as above. @7.2' Brown SILT, gray mottling	Bentonite pellets from ground surface 13.3'.
		(S-5)				2.0	0.0			same as above. @9.0' Reddish brown CLAY, tan mottling.	
10		(S-6)				2.0	0.0			same as above, except @ 10.4' rock fragments.	
		(S-7)				1.3	0.0			Dark gray CLAY, very soft, trace rock fragments, moist.	
17										End of boring at 13.3' bgs.	

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Water Levels

Date / Time	Elevation	Depth

Date Start/Finish: 8-24-00 / 8-24-00 **Drilling Company:** Parratt Wolff **Driller's Name:** Mark Eaves **Drilling Method:** Hollow Stem Auger **Bit Size:** -in. **Auger Size :** -in. **Rig Type:** CME-75 **Spoon Size:** 2"-in.	**Northing:** **Easting:** **Well Casing Elev.:** ft. **Corehole Depth:** ft. **Borehole Depth:** 12.8 ft. **Ground Surface Elev.:** ft. **Geologist:** Michael R. Arlauckas	**Well No. GP-05** **Site:** Niagara Mohawk Power Corporation **Client:** Harper Substation Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft.										**GROUND SURFACE**	
		(S-1)				2.0	0.0			Dark brown, vf SAND and SILT, trace organics, rootlets.	
		(S-2)				2.0	0.0			Brown vf SAND and SILT.	
5		(S-3)				2.0	0.0			Brown vf SAND and SILT. @5.3' Brown SILT, tan mottling.	
		(S-4)				2.0	0.0			Reddish brown SILT, gray mottling.	Bentonite pellets from ground surface 12.8'.
		(S-5)				2.0	0.0			Reddish brown vf SAND and SILT. @9.0' dark gray CLAY, very soft, rock fragments.	
10		(S-6)				2.0	0.0			same as above, except little rock fragments.	
		(S-7)				0.8	0.0			No Recovery.	
17										End of boring at 12.8' bgs.	

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Water Levels

Date / Time	Elevation	Depth

Date Start/Finish: 8-24-00 / 8-24-00 **Drilling Company:** Parratt Wolff **Driller's Name:** Mark Eaves **Drilling Method:** Hollow Stem Auger **Bit Size:** -in. **Auger Size :** -in. **Rig Type:** CME-75 **Spoon Size:** 2"-in.	**Northing:** **Easting:** **Well Casing Elev.:** ft. **Corehole Depth:** ft. **Borehole Depth:** 13.0 ft. **Ground Surface Elev.:** ft. **Geologist:** Michael R. Arlauckas	**Well No. GP-06** **Site:** Niagara Mohawk Power Corporation **Client:** Harper Substation Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft.										**GROUND SURFACE**	
		(S-1)				2.0	0.0			Dark brown, vf SAND and SILT, trace organics, rootlets.	
		(S-2)				2.0	0.0			Brown vf SAND and SILT, tan/gray mottling.	
		(S-3)				2.0	0.0			same as above.	
5		(S-4)				2.0	0.0			@5.8' Reddish brown SILT, tan mottling, dry. same as above, except CLAY increase from 6.0' to 6.4' bgs.	Bentonite pellets from ground surface 13.0'.
		(S-5)				2.0	0.0			same as above.vf SAND and SILT. @9.0' Gray CLAY, very soft, moist.	
10		(S-6)				2.0	0.0			@9.6' Sand seam (9.6'-9.7'). same as above. @11.0' SANDY CLAY, moist to wet.	
		(S-7)				1.0	0.0			Gray vf SAND and SILT, trace Clay, rock fragments.	
17										End of boring at 13.0' bgs.	

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Water Levels

Date / Time	Elevation	Depth

Date Start/Finish: 8-24-00 / 8-24-00
Drilling Company: Parratt Wolff
Driller's Name: Mark Eaves
Drilling Method: Hollow Stem Auger
Bit Size: -in. **Auger Size** : -in.
Rig Type: CME-75
Spoon Size: 2"-in.

Northing:
Easting:
Well Casing Elev.: ft.
Corehole Depth: ft.
Borehole Depth: 13.3 ft.
Ground Surface Elev.: ft.

Geologist: Michael R. Arlauckas

Well No. GP-07

Site:
Niagara Mohawk Power Corporation

Client:
Harper Substation
Niagara Falls, New York

Date Start/Finish: 8-24-00 / 8-24-00 **Drilling Company:** Parratt Wolff **Driller's Name:** Mark Eaves **Drilling Method:** Hollow Stem Auger **Bit Size:** -in. **Auger Size** : -in. **Rig Type:** CME-75 **Spoon Size:** 2"-in.	**Northing:** **Easting:** **Well Casing Elev.:** ft. **Corehole Depth:** ft. **Borehole Depth:** 13.3 ft. **Ground Surface Elev.:** ft. **Geologist:** Michael R. Arlauckas	**Well No. GP-07** **Site:** Niagara Mohawk Power Corporation **Client:** Harper Substation Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft.										**GROUND SURFACE**	
		(S-1)				2.0	0.0			Dark brown, vf SAND and SILT, trace organics, rootlets.	
		(S-2)				2.0	0.0			Brown vf SAND, little Silt, tan mottling.	
5		(S-3)				2.0	0.0			Brown vf SAND and SILT, tan mottling.	
		(S-4)				2.0	0.0			same as above. @7.0' Brown SILT, tan/gray mottling.	Bentonite pellets from ground surface 13.3'.
		(S-5)				2.0	0.0			Reddish brown vf SAND, little Silt. @9.0' Gray CLAY, very soft, moist.	
10		(S-6)				2.0	0.0			same as above, except trace vf subangular Gravel, moist.	
		(S-7)				1.3	0.0			same as above, except rock fragments.	
										End of boring at 13.3' bgs.	
17											

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Water Levels

Date / Time	Elevation	Depth

Date Start/Finish: 8-24-00 / 8-24-00
Drilling Company: Parratt Wolff
Driller's Name: Mark Eaves
Drilling Method: Hollow Stem Auger
Bit Size: -in. **Auger Size :** -in.
Rig Type: CME-75
Spoon Size: 2"-in.

Northing:
Easting:
Well Casing Elev.: ft.
Corehole Depth: ft.
Borehole Depth: 14.5 ft.
Ground Surface Elev.: ft.

Geologist: Michael R. Arlauckas

Well No. GP-08

Site:
Niagara Mohawk Power Corporation

Client:
Harper Substation
Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft.										**GROUND SURFACE**	
		(S-1)				2.0	0.0			Dark brown vf SAND and SILT, trace organics.	
		(S-2)				2.0	0.0			Brown vf SAND, little Silt, tan mottling.	
		(S-3)				2.0	0.0			same as above.	
5		(S-4)				2.0	0.0			@5.8' Brown SILT, tan/gray mottling. same as above. @7.0' SAND increases.	Bentonite pellets from ground surface 14.5'.
		(S-5)				2.0	0.0			No Recovery.	
10		(S-6)				2.0	0.0			Gray CLAY, very soft, moist.	
		(S-7)				2.0	0.0			same as above, except trace vf subangular Gravel.	
		(S-8)				0.5	0.0			same as above, except rock fragments.	
17										End of boring at 14.5' bgs.	

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Water Levels

Date / Time	Elevation	Depth

Date Start/Finish: 8-25-00 / 8-25-00
Drilling Company: Parratt Wolff
Driller's Name: Mark Eaves
Drilling Method: Hollow Stem Auger
Bit Size: -in. **Auger Size :** -in.
Rig Type: CME-75
Spoon Size: 2"-in.

Northing:
Easting:
Well Casing Elev.: ft.
Corehole Depth: ft.
Borehole Depth: 15.3 ft.
Ground Surface Elev.: ft.

Geologist: Michael R. Arlauckas

Well No. GP-09

Site:
Niagara Mohawk Power Corporation

Client:
Harper Substation
Niagara Falls, New York

DEPTH / ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
gs elevation ft.									**GROUND SURFACE**	
	(S-1)				2.0	0.0			Brown f. SAND, SILT, and CLAY, little f, subangular Gravel.	
	(S-2)				2.0	0.0			Brown vf SAND and SILT, tan mottling.	
5	(S-3)				2.0	0.0			same as above.	
	(S-4)				2.0	0.0			same as above.	Bentonite pellets from ground surface 15.3'.
	(S-5)				2.0	0.0			@7.5' reddish brown SILT, tan/gray mottling. 8.0'-8.4' vf-f SILT, wet. @8.4' reddish brown SILT, tan/gray mottling.	
10	(S-6)				2.0	0.0			Reddish brown vf SAND and SILT, trace subangular vf Gravel, very soft, moist.	
	(S-7)				2.0	0.0			same as above. @13.2 dark gray SILTa, trace subangular vf Gravel, hard.	
	(S-8)				1.3	0.0			same as above, broken rock fragments.	
17									End of boring at 15.3' bgs.	

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

Water Levels

Date / Time	Elevation	Depth

Date Start/Finish: 8-25-00 / 8-25-00 **Drilling Company:** Parratt Wolff **Driller's Name:** Mark Eaves **Drilling Method:** Hollow Stem Auger **Bit Size:** -in. **Auger Size :** -in. **Rig Type:** CME-75 **Spoon Size:** 2"-in.	**Northing:** **Easting:** **Well Casing Elev.:** ft. **Corehole Depth:** ft. **Borehole Depth:** 14.7 ft. **Ground Surface Elev.:** ft. **Geologist:** Michael R. Arlauckas	**Well No. GP-10** **Site:** Niagara Mohawk Power Corporation **Client:** Harper Substation Niagara Falls, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Blows/6 In.	N	Recovery (ft.)	PID (ppm) Headspace	Geotechnical Test	Geologic Column	Stratigraphic Description	Well Construction
	gs elevation ft.									**GROUND SURFACE**	
		(S-1)				2.0	0.0			Brown f. SAND, SILT, and CLAY, trace orange brick fragments, glass, wood (fill), rock fragments.	
		(S-2)				2.0	0.0			Brown vf SAND and SILT, tan/gray mottling, moist.	
5		(S-3)				2.0	0.0			Reddish brown SILT, tan mottling.	
		(S-4)				2.0	0.0			same as above.	Bentonite pellets from ground surface 14.7'.
		(S-5)				2.0	0.0			same as above.	
10		(S-6)				2.0	0.0			Brown vf SAND, wet. @11.0 dark gray CLAY, very soft, wet.	
		(S-7)				2.0	0.0			same as above, except SILT increases.	
		(S-8)				1.7	0.0			same as above, rock fragments.	
17										End of boring at 14.7' bgs.	

BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

Remarks:

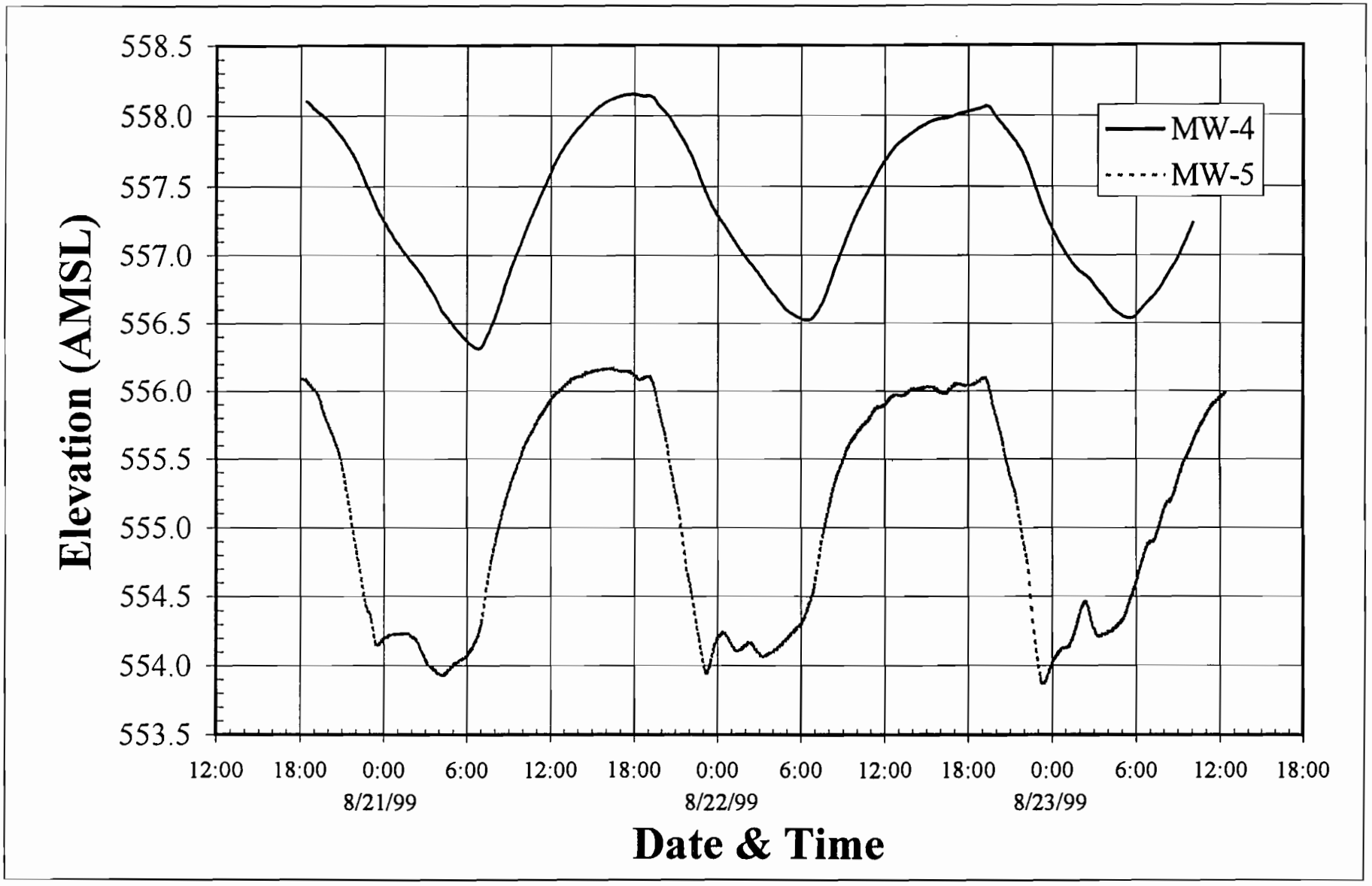
Water Levels

Date / Time	Elevation	Depth

Initial Continuous Water Level Measurements (August 1999)

Niagara Mohawk Power Corporation
Harper Substation
Niagara Falls, New York

Continuous Ground-Water Elevations at Monitoring Wells MW-4 & MW-5



Niagara Mohawk Power Corporation
Harper Substation
Niagara Falls, New York

Continuous Ground-Water Elevations at Monitoring Wells MW-4 & MW-5

Notes:

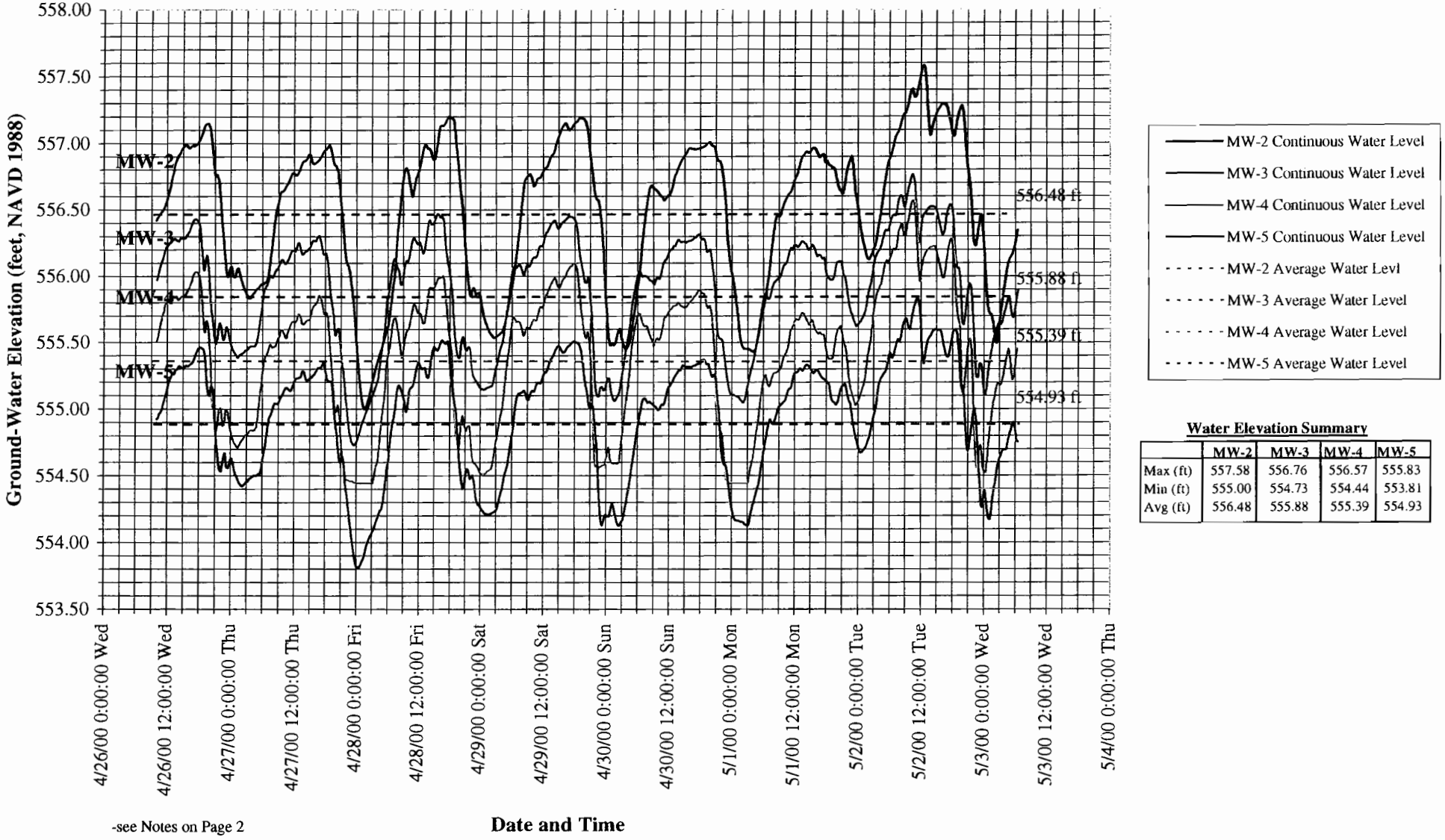
1. Continuous water level measurements were obtained by Blasland, Bouck & Lee, Inc. using the following equipment:
   - Two In-Situ 10 psi pressure transducers (Model 10T50); and
   - Two In-Situ Hermit 1000C 2-channel data loggers (Model H1K2).
2. Water level measurements were recorded every five minutes.
3. Final water levels recorded by the data loggers for MW-4 and MW-5 were within 0.003-feet and 0.016-feet, respectively, of the field measurements of the final water level.
4. Monitoring well MW-4 is installed in the overburden and monitoring well MW-5 is installed in bedrock.
5. Hydrological data obtained from the web site for the National Weather Service regional office in Buffalo, New York indicates no precipitation was received in the Buffalo area during the continuous water level measurement monitoring period from August 21-23, 1999.
6. Surface water from the Niagara River is diverted through two New York Power Authority subsurface aqueducts adjacent to the Harper Substation for hydroelectric power generation at the Lewiston Pump/Generating Plant located approximately 4 miles downstream from the intakes and the Robert Moses Niagara Power Plant located approximately 4.5 miles downstream from the intakes.
7. A 1950 treaty between the United States and Canada requires that at least 100,000 cubic feet/second (cfs) of water spill over Niagara Falls during daylight hours of the tourist season (April through October) and at least 50,000 cfs at night during the tourist season and at all times the rest of the year. Any excess river flow may be shared between the U.S. and Canada and utilized for power production.

Additional Continuous Water Level Measurements (April/May 2000)

Niagara Mohawk Power Corporation
Harper Substation
Niagara Falls, New York

Preliminary Site Assessment

Continuous Ground-Water Elevations (April 26, 2000 - May 4, 2000)



-see Notes on Page 2

Water Elevation Summary

	MW-2	MW-3	MW-4	MW-5
Max (ft)	557.58	556.76	556.57	555.83
Min (ft)	555.00	554.73	554.44	553.81
Avg (ft)	556.48	555.88	555.39	554.93

Niagara Mohawk Power Corporation
Harper Substation
Niagara Falls, New York

Preliminary Site Assessment

Notes:

1. Continuous water levels were collected between April 26 and May 4, 2000.
2. Water levels were measured using Troll Model 4000 Pressure Transducers/Data Loggers.
3. Water levels were measured to the nearest 0.001 foot.
4. Due to a battery failure in the Troll installed at monitoring well MW-1, continuous water level data was not obtained for monitoring well MW-1.
5. After an initial monitoring period of approximately 4 to 5 hours (during which water levels were collected at a rate between several per second and one every few minutes), water level measurements were collected at a rate of one measurement every 20 minutes.