REVISED
REMEDIAL INVESTIGATIONS
REPORT
WARD PRODUCTS CORPORATION SITE
61 EDSON STREET
AMSTERDAM, NEW YORK
SITE CODE 4-29-004

VOLUME ONE

Prepared for
NEW WATER REALTY CORPORATION
(f/k/a Ward Products Corporation)
c/o 2900 Orchard Place
Orchard Lake, Michigan 48324

Prepared by
NORMANDEAU ASSOCIATES INC.
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Bedford, New Hampshire 03110-5527

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Table of Contents

EXECUTIVE SUMMARY

This report is an updated and revised version of the Remedial Investigations Report (RIR) that was submitted to the New York State Department of Environmental Conservation (NYSDEC) in July 2001. This report, the Revised Remedial Investigations Report (RRIR) supersedes and replaces the original RIR in its entirety. The revisions to the 2001 RIR were made in response to comments received from the NYSDEC since its submittal and incorporates the results of field investigations performed since July 2001.

In addition to the results of the site investigations documented in this report, the Ward Products Corporation (n/k/a New Water Realty Corporation) has voluntarily performed several Interim Remedial Measures (IRMs) to remove hazardous materials from the site since 1996. Specifically, the IRMs included the removal of a stockpile of electroplating contaminated soils in 1997 (Ward Products), the removal of PCB contaminated soils in October and November 1999 (Ward Products), the removal of contaminated sediments from a drain pipe in December 2000 (Ward Products) and the removal of contaminated soils and sediment in January 2004 (New Water Realty). The objective of all of the IRMs was to reduce the potential risk to human health and the environment associated with the historical release of electroplating associated contaminants at the site.

The past release of electroplating bath solutions and sludges into the environment during historical operations (1957 to 1985) resulted in the contamination of soils below and in proximity to the manufacturing building and along the northern and eastern portions of the site. The contaminants identified in these soils include the electroplating related inorganics: cadmium, chromium, cyanide, lead, nickel and zinc. Several of these (cadmium, chromium, cyanide, nickel and zinc) are present in the soil at concentrations that exceed their NYSDEC Soil Cleanup Objectives (SCO) and are considered Contaminants of Concern (CoC) in the soil at the site. As stated by the NYSDEC, the SCOs are guideline levels that if achieved by remediation would eliminate all significant threats to human health and/or the environment. Due to the elimination of the source of these inorganics (the metal finishing operations) and the site geochemistry there appears to be limited potential for the further leaching of these inorganics into the underlying ground water. The removal of the soils located north and east of the manufacturing building, as part of an IRM performed in January 2004, has significantly reduced the amount electroplating related inorganic contaminated soils at the site. In addition, an IRM performed in 1999 resulted in the removal of PCB contaminated soils in the areas of the electrical transformers, thereby eliminating this CoC from the site.

Electroplating related inorganics have also been detected in the sediments of a drainage ditch on the site, in two drainages located downstream of the site and in the Mohawk River. The source of these contaminants was the historical release of untreated and treated electroplating spent solutions from Ward Product's operations to the drainage ditch via a drain pipe. Sediment samples collected from the drainage ditch on site, from the East and West Branch drainages downstream of the site and from the Mohawk River have confirmed the presence of electroplating related metals cadmium, chromium, lead, nickel and/or zinc at concentrations that exceed their NYSDEC's Severe Effect Level (SEL) in these areas. As stated by the NYSDEC, the SEL indicates the concentration at which pronounced disturbance of the sediment dwelling biological community can be expected. Cadmium, chromium and nickel have also been detected at concentrations that exceed their NYSDEC SELs in the sediments of the Mohawk River at the outlet of one of the drainages (East Branch) over 3,000 feet downstream of the site.

As part of an IRM performed in January 2004, electroplating related inorganic contaminated sediments in the drainage ditch, the upper East Branch drainage and at two culverts on Sam Stratton Road were removed. The removal of this material has eliminated a significant source of contaminated sediment to the drainages downstream and to the Mohawk River. Sediments containing concentrations of cadmium, chromium and nickel at concentrations above their NYSDEC SELs remain in the East and West Branch drainages and in the Mohawk River. As a result, each of these metals is considered a CoC in the off site sediments. The principal migration pathway for these CoCs will be their continued transport by runoff further down the East and West Branch drainages and into the Mohawk River.

The past release of metal finishing materials into the environment has also resulted in the contamination of the ground water at the site. The predominant inorganic contaminant found in the ground water is hexavalent chromium. The chromium contaminated ground water is presently migrating southwest across the site through both glacial till and fractured dolostone/limestone bedrock. The two suspected sources of the chromium contaminated ground water include surface releases of metal finishing materials in the vicinity of the northeast corner of the manufacturing building and the leakage of waste water from the former drain pipe. The extent of the chromium contaminated ground water is presently limited to the site where it is has been detected at concentrations greater than its NYSDEC Groundwater Quality Standard (GQS). Although the concentration of chromium in the ground water at the site has been decreasing it still is present at concentrations above its standard and as a result, chromium (total and hexavalent) is considered to be a CoC at the site.

The past release of the vapor degreasing solvent trichloroethene (TCE) has also resulted in the contamination of ground water in the glacial till and in the fractured bedrock underlying the site. TCE is present in ground water on and off of the site at concentrations exceeding its NYSDEC GQS. As a result, TCE is considered a CoC in ground water at and off of the site. TCE has been transported by ground water in the fractured bedrock approximately 250 feet south of the site. The suspected sources of the TCE include surface releases of metal finishing materials in the vicinity of the northeast corner of the manufacturing building and the historical leakage of waste water from the drain pipe.

Ground water represents a potential migration pathway for chromium and TCE. The closest ground water wells, in the vicinity of the site, includes an abandoned bedrock water supply well located over 200 feet downgradient of the site on the Universal Custom Millwork, Inc. (UCMI) property and two active bedrock water supply wells located over 200 and 500 feet east and upgradient of the site on the Fiber Glass Industries, Inc. (FGI) property. The inactive well on the UCMI property has not been sampled, but due to its proximity to the VOC plume it is expected that TCE would be detected in any samples collected from this well. Samples collected from the two recently identified wells located on the FGI property have confirmed that TCE is present in the well located closest to the site (FGI-1) at concentrations exceeding its NYSDEC GQS. The source for the TCE detected in the FGI well has not been confirmed and may require further investigation. The water pumped from this well is not currently used as a potable water supply but for the production of fiber glass products. If used as a potable water supply the water produced from this well would require treatment. After discussion with NYSDEC it was agreed that given the distance of well FGI-1 from the Ward Products site and the existing delineation of the contaminant plume downgradient of the Ward Products site, the completion of this RRIR would not be delayed by the new data at the FGI-1 well.

Due to the presence of high concentrations of VOCs in ground water at the site, samples of indoor air were collected from the manufacturing building in November 2002 and January 2005 to evaluate the potential for chemical vapor intrusion. The results of the November 2002 indoor air sampling can be seen as somewhat inconclusive, in that VOCs were not detected at concentrations greater than the 2004 New York State Department of Health (NYSDOH) draft guidance values (NYSDOH 2004a) for indoor air in one of the three samples, while the detection limits in the two other samples were greater than those guidance values. As a result, additional indoor air samples and three sub-slab soil gas samples were collected from the manufacturing building in January 2005. The results of these samples indicate that TCE and chloroform were present in the manufacturing building at concentrations that exceed the 2004 NYSDOH (2004b) draft guidance values for indoor air and that elevated concentrations of TCE were detected in three sub-slab soil gas samples.

The investigations performed during the RIs have evaluated the sources, nature and extent of the contamination identified at the site. Based on the findings of these investigations the following actions are recommended:

- Electroplating related inorganics remain in the soils at the Ward Products site and in the sediments of the East and West Branch drainages and the Mohawk River at concentrations above their NYSDEC SCO and/or SELs. Chromium and TCE have been detected in ground water at concentrations exceeding their NYSDEC GQS. In addition, TCE has been detected in indoor air and in sub-slab soil gas samples collected in the manufacturing building. As a result, a Risk Assessment (RA) and Feasibility Study (FS) should be completed. The objective of the RA would be to evaluate the risk to human health and the environment posed by the CoC identified in the contaminated soil, sediment, ground water, indoor air and/or sub-slab soil gas associated with the site. The objective of the FS would be to evaluate the remedial alternatives that are available, appropriate and practical to reduce the risk posed by the CoC in these environmental media. A Fish and Wildlife Impact Analysis (FWIA) has already been performed and a report (Normandeau Associates 2002) has been submitted to the NYSDEC as part of the RA work.

- The water quality monitoring program should be continued, in the short term, to assess and document the migration and attenuation of ground water contamination at and from the site. Water quality samples should continue to be collected from the site twice a year during the spring (high ground water levels) and summer (low ground water levels) for at least two more years. In addition to the collection of water quality samples from the established monitoring well network, samples should also be collected from the one production well located on the FGI property and closest to the site (FGI-1).

- A schedule for the implementation of these recommendations is contingent upon the NYSDEC’s review and approval of this RRIR, the extent of the NYSDEC’s comments, if any, and the impacts of those comments on these proposals. If additional sampling is required, for example, that sampling may delay the preparation of the RA and/or FS reports. Within a reasonable period of time, after receipt of the NYSDEC’s comments, New Water Realty will provide a schedule for any further site activities, RA or FS reports.

1.0 INTRODUCTION

The Ward Products Corporation (Ward or Ward Products; a/k/a New Water Realty Corporation or NWR) site is located at 61 Edson Street Extension in Amsterdam, New York (Figure 1) (the site) and is on the New York State Department of Environmental Conservation (NYSDEC) Registry (Site Code 4-29-004) of Inactive Hazardous Waste Disposal Sites. The site was added to the Registry due to past handling, storage and disposal practices for the following hazardous wastes: spent cyanide plating bath solutions (F007), plating bath residues with cyanide (F008), chromium (D007) and trichloroethene (U228). These materials had been used historically at the site as part of a metal finishing operation (cyanide and chromium) and as part of vapor degreasing operations (trichloroethene) associated with the manufacturing of radio antennas.

Due to the presence of these materials in the soil and/or ground water at the site, the NYSDEC listed the site as being Class 2 pursuant to ECL 27-1305.4.b. On April 10, 1997, the NYSDEC signed an Order on Consent (Index #W4-0762-96-06) with Ward to perform Remedial Investigation (RI) and Feasibility Studies (FS) of the site. By letter from counsel to the NYSDEC dated August 16, 2001, New Water Realty Corporation (then known as Ward Products Corporation, also identified as Ward Products) provided notice of the following transaction: MidMark Equity Partners II, L.P. (“MidMark”) purchased, and New Water Realty Corporation, sold the business and operating assets (but not the real estate), formerly owned and operated by New Water Realty Corporation on the site, pursuant to a certain Asset Sale and Purchase Agreement.

After closing of the transaction, New Water Realty Corporation changed its name, but retained the obligation to complete the requirements of the Order on Consent at the site. New Water Realty Corporation retained title to the site and leased it to Ward Products, LLC (“Tenant” or “WPLLC”), an entity formed by MidMark to operate the business and operations purchased from Ward Products. The use of the site did not change by reason of this transaction. In advance of the transaction, the tenant was advised of the existence and terms of the Order on Consent and the recorded Declaration of Environmental Covenants and Restrictions for the site, executed on April 24, 1997 by Ward Products, Inc. By reason of the transaction the tenant assumed none of the obligations under the Order on Consent at the site, but does have various rights and obligations with respect to the continuing efforts of New Water Realty Corporation under the Order on Consent.

This document, the Revised Remedial Investigations Report (sometimes Revised RI Report), presents the findings of field investigations performed for Ward Products from August 1996 to August 2001 (then known as Ward or Ward Products), and after August 2001(then known as NWR). Originally, the Remedial Investigations Report (RI Report) was submitted to the NYSDEC by Normandeau Associates (Normandeau) in July 2001. In response to comments received from the NYSDEC on the RI Report, additional field investigations have been completed to further evaluate the nature and extent of sediment and ground water contamination at and in the vicinity of the site. In addition, a major Interim Remedial Measure (IRM) was performed in January 2004 to address the contaminated sediments and soils associated with the site. Thus, the information presented in this report includes what was previously presented in the original RI Report (Normandeau Associates 2001) along with results of the additional site investigations (2001 to 2005) and the IRM performed January 2004 and therefore supersedes the original RI Report. The data presented in the Appendices of the original RI Report (Normandeau Associates 2001) are not included in the Appendices of this Revised RI Report (RRIR), but are referenced when discussed in this report.

1.1 SITE LOCATION

The site is located in the Amsterdam Industrial Park at 61 Edson Street Extension near the eastern boundary of the City of Amsterdam with the Town of Amsterdam (Figure 1). The site is located approximately 2,000 feet northwest of the intersection of Edson Street Extension and Widow Susan Road, 2,000 feet southeast of the intersection with Vrooman Avenue and 3,000 feet north of Route 5.

The site encompasses approximately 8.6 acres, which can be divided into a northern and a southern parcel. The northern parcel (3.5 acres) is undeveloped and is covered by vegetation (brush and trees). The southern parcel (5.1 acres) consists of a large paved parking lot in the western third of the site, a 69,556 square foot single story, brick and cinder block construction, manufacturing and warehouse building in the central portion of the site and a lawn area in the southern and eastern portions of the southern parcel of the site. The site is bordered by a small business to the west (Saratoga Horseworks), undeveloped land to the north, a commercial property (formerly Safari Enterprises, Inc.) to the southeast, a fiberglass manufacturing company (Fiber Glass Industries or FGI) to the east, and Edson Street Extension and an industrial property (Universal Custom Millwork Incorporated or UCMI) to the south (Figure 2) and a wood working business (Bush Millworks) to the southwest.

1.2 OPERATIONAL HISTORY

The facility was originally constructed in 1957 by the Amsterdam Industrial Development Authority (AIDA) and was leased by the Gabriel Corporation. In 1959, Ward Products purchased Gabriel's antenna manufacturing operations. In 1972, Ward purchased the site from the City under the title of Water Realty, Inc.

Both Gabriel's (1957 to 1959) and Ward's (1959 to 2001) businesses involved the manufacturing of automobile radio antennas and related wiring assemblies and products. WPLLC has continued these operations in a manner similar to those existing on the date of its purchase. From 1957 to 1973, the general manufacturing process involved the machining of brass tubing and other small metal parts, electroplating of the machined parts and assembly of the components. An integral part of the manufacturing process was the metal finishing operations, which included: an automated nickel/chromium electroplating line, manually operated zinc/cyanide and cadmium/cyanide electroplating lines and vapor degreasing.

From 1957 to 1973, untreated spent electroplating solutions were discharged from the site, via a drain pipe, into a small drainage ditch located along the eastern property line. During this time the solvent used in the vapor degreasing may have been discharged to floor drains, which were also connected to the drain pipe.

In 1973, in response to the requirements of the Clean Water Act (CWA), a treatment system was installed at the facility for the pretreatment of the nickel/chromium plating solutions. Sludge generated during the pretreatment process was removed and dried on a pad located outside of the building prior to off-site disposal (Figure 3). The spent cadmium/cyanide plating solution was discharged to a tank located adjacent to the sludge drying pad for both natural and mechanical evaporation. The sludges were drummed and shipped off-site for disposal. Also, in 1973, Ward discontinued the use of the zinc/cyanide electroplating line.

In 1983, Ward connected to the City of Amsterdam’s sewer system and discontinued the used of the vapor degreasing system. In 1985, Ward discontinued all electroplating operations, subsequently the electroplating lines (cadmium/cyanide and nickel/chromium), the treatment system and the vapor degreasing system have been disassembled and removed from the facility. The discharge (also referred to as the drain) pipe remains in place and is used for the collection and discharge of stormwater runoff from the manufacturing buildings roof drain system (Figure 3).

As mentioned previously, in August 2001 Ward sold its business and operating assets (but not the site itself) to MidMark Equity Partners II, L.P.   New Water Realty Corporation retained ownership of the site and the building and property were leased to WPLLC. At the writing of this report WPLLC is the current tenant of the site and continues to manufacture automobile antennas and related wiring assemblies and products at the site.

1.3 FINDINGS OF PREVIOUS INVESTIGATIONS

Normandeau Engineers in 1988 (Normandeau Engineers 1988) and Normandeau Associates in 1996 (Normandeau Associates 1996) performed hydrogeologic investigations at the site. Copies of these reports have been previously submitted to the NYSDEC. During the 1988 investigation, soil test pits were excavated in the area east and southeast of the former electroplating and the former treatment operations (Figure 4). Soil and ground water samples were collected from the test pits and analyzed for metals and volatile organic compounds (VOCs). Surface water and sediment samples were collected from the drainage ditch and analyzed for metals and VOCs. Shallow soil samples were also collected from below the sludge drying pad and analyzed for metals and VOCs.

During the 1996 field investigation Normandeau Associates installed four ground water monitoring wells (MW-1 to MW-4, Figure 2), collected ground water samples and collected sediment samples from the drainage ditch. The ground water and sediment samples were analyzed for inorganics and VOCs.

The previous field investigations (Normandeau 1988 and 1996) identified the following inorganic and organic contaminants present at the site:

Soil and Sediments
- Cadmium
- Chromium (total and hexavalent)
- Cyanide
- Lead
- Nickel
- Zinc

Surface Water
- Cadmium
- Chromium (total and hexavalent)
- Cyanide
- Nickel
- Zinc
- Trichloroethene

Ground Water
- Chromium (total and hexavalent)
- Cyanide
- Carbon tetrachloride
- Trichloroethene
- cis-1,2-Dichloroethene

Each of these contaminants was used either in the metal finishing operations (inorganics) or vapor degreasing process (organics) at the site. Based upon the results of the 1996 investigations, chromium and trichloroethene (TCE) were found at concentrations exceeding the NYSDEC Ground Water Standards and appeared to be migrating from the suspected source area (former metal finishing operations) to the southwest towards the property line.

2.0 REMEDIAL INVESTIGATION

The objective of a Remedial Investigation (RI) is to characterize the nature and extent of contamination and the site conditions so that an informed decision can be made on how to reduce the risk (if any) posed by the contaminants to the environment and humans by implementing a remedial action. Thus, the focus of an RI is the detailed characterization of the hydrology, geology and hydrogeology of the site.

The site characterization process includes:

- Definition of the nature and extent of contamination
- Evaluation of geologic and hydrologic characteristics
- Identification of contaminant migration pathways
- Identification of potential receptors of contamination

The information gathered during the site characterization process then can be used in an assessment of the risk (Risk Assessment or RA) that the identified contaminants pose to human health and the environment. If the identified contaminants are found to pose an unacceptable risk, then an analysis of appropriate remedial action(s) is performed as part of a Feasibility Study (FS). This report summarizes the findings of the field investigations performed during the RI. Any RA and FS will be performed following NYSDEC review and approval of this RRIR.

2.1 FIELD INVESTIGATIONS

To further evaluate the extent of contamination at the site additional sediment, soil, water quality, indoor air and sub-slab soil gas samples were collected from 1996 to 2005. Sediment samples were collected from several locations along the drainages at and downstream of the site. Soil samples were collected from the areas below the former sludge drying pad, the vapor degreaser, the drain pipe and from outside of the manufacturing building. Water quality samples were collected from a network of ground water monitoring wells installed on and off of the site, while surface water quality samples were collected from two locations along the drainage ditch and from multiple locations in the East and West Branch drainages downstream. Indoor air samples were collected in the manufacturing building to evaluate the potential impact from chemical vapor intrusion. The following sections present the methods used during the field investigations.

2.1.1 Investigation of Former Sludge Drying Pad Area

From 1973 to 1985, sludge from the nickel/chromium treatment system was dried on a pad located outside the northeast corner of the building (Figure 3). The sludge drying pad was constructed of a 12-inch thick concrete slab and featured a wastewater return system for the removal of drained fluids to the treatment system.

During the 1986 site investigation by Normandeau Engineers (Normandeau Engineers 1988), two borings were drilled through the drying pad to a depth of 30 inches (Figure 4). Two composited soil samples were collected and analyzed for VOCs, cyanide and the 13 priority pollutant metals (following EP toxicity procedures). During the collection of the samples, cracks were observed in the drying pad. Considering that electroplating metals were detected in the subsurface, and that the former drying pad is located in the vicinity of monitoring well MW-1 (where high concentrations of chromium and TCE have been detected); this area was suspected as potential source for the electroplating related inorganics.

To further evaluate the presence of residual electroplating inorganics and organics in the area of the former sludge drying pad, additional soil samples were collected at five different locations (A to E) in July 1997. Soil samples were collected from each corner quadrant and from the center of the former pad area (Figure 6). At each location a one foot by one foot hole was cut through the concrete slab using a concrete saw. A hand auger and/or soil shovel was used to collect samples at one foot intervals to the lesser depth of three feet or refusal at each location. Due to site soil conditions the depth of sample recovery varied from two to three feet. Samples for each one foot interval and one duplicate (12 total samples) were submitted to the analytical laboratory for the analysis of the electroplating related inorganics (cadmium, chromium, hexavalent chromium, cyanide, lead, nickel, zinc) and VOCs. Sufficient sample volumes were collected so that the soil could also be tested using the Toxic Characteristic Leaching Procedure (TCLP) and analyzed for the same inorganic and organic contaminants listed above. The laboratory reports for these analyses were presented in Appendix A (Volume Two) of the original RI Report (Normandeau Associates 2001).

2.1.2 Investigation of Former Vapor Degreaser Area and Floor Drain

From 1957 to 1983, a chlorinated solvent-based vapor degreasing system was operated at the site. The system was located, inside the building, immediately east of the former electroplating operations and south west of the former sludge drying pad (Figure 6). Trichloroethene (TCE) was reported (Normandeau Associates 1986) to have been used in the vapor degreasing system. Spills from the vapor degreasing system may have discharged to nearby floor drains, which then discharged into the main drain pipe. TCE was also detected in samples collected from monitoring wells located in this general area. Therefore, this area was evaluated as a suspected source for the TCE.

To evaluate the extent of soil contamination in the vicinity of the former vapor degreaser station, soil samples were collected from an opening cut in the floor of the manufacturing building (Location G, Figure 6) in July 1997. The one foot by one foot opening was cut using a concrete saw. A bucket-type hand auger and/or soil shovel was used to collect the soil samples at one foot intervals to a maximum depth of three feet.

An opening to the drain pipe is located immediately south of the former electroplating line (Location F, Figure 6). A sample of the material found in the drain pipe was collected using a soil coring device.

The soil and the drain sediment samples were submitted to the laboratory for the analysis of the electroplating related inorganics and VOCs. Two of the soil samples and the sample collected from the drain were also submitted for leachability testing using the TCLP. These samples were analyzed for selected inorganics or VOCs. The laboratory reports for these analyses were presented in Appendix A (Volume Two) of the original RI Report (Normandeau Associates 2001).

2.1.3 Investigation of the Soil Pile

During the construction of a warehouse addition in 1988-1989, soils were excavated from the area of the former sludge drying pad and were stockpiled on site. Following discussions with representatives of the NYSDEC, the excavated soils were placed on a geosynthetic liner and covered with sheets of plastic to prevent the infiltration of precipitation and the leaching of the electroplating related inorganics. Four samples were collected from the soil pile prior to its removal from the site in July 1997. The four samples included a composite sample (A) collected in August 1996 and three individual samples (1 - 3) collected in July 1997. Sample A was a composite of five individual samples while Samples 1 to 3 were collected from the pile with each sample representing a third of the total pile area. The samples were collected from the surface of the soil pile to a depth of one-half foot using a soil shovel and submitted to the laboratory for the analysis of the electroplating inorganics (A) or the RCRA metals (1 - 3). The samples collected from locations 1 to 3 were also analyzed using the TCLP and tested for the RCRA metals and cyanide. The laboratory reports for the samples collected from the soil pile were presented in Appendix B (Volume Two) of the original RI Report (Normandeau Associates 2001).

2.1.4 Investigation of the Exterior Soils

Since 1997, several series of soil samples have been collected from the area surrounding the manufacturing building to determine the extent of contamination and to establish background concentrations for the contaminants of concern. Four samples were collected from the footprint of the soil pile following its removal. One sample (4) was collected in July 1997 from near the center of where the soil pile was located. The sample was collected from the ground surface to a depth of one-half foot using a soil shovel. This sample was analyzed for the electroplating inorganics. Based upon the results of this sample, the NYSDEC requested that additional samples be collected from this area to determine the extent of the contaminated soil. In November 1997, soil samples were collected from three different locations (5 - 7) within the footprint of the former soil pile (Figure 7). A shallow (0-1 ft.) and a deep (1-2 ft.) sample was collected from each location using either a hand auger and/or a soil shovel. Additional samples were collected from locations 5 and 6 at a depth of 2-3 ft to further evaluate the vertical distribution of the electroplating inorganics in the soil. The laboratory reports for these analyses were presented in Appendix B (Volume Two) of the original RI Report (Normandeau Associates 2001).

In July and November 1997, soil samples were collected from 15 different locations in the lawn area east of the manufacturing facility (Figure 7). Five shallow soil samples (1- 2 and 13-15) were collected from the area located east of the former location of the sludge drying pad (presently the grinding shop, Figure 7). The purpose of collecting these samples was to determine the extent of soil contamination in the vicinity of the former drying pad. These samples were collected from a depth of 0-0.5 feet using a hand auger. The samples were submitted to the laboratory for the analysis of the electroplating inorganics.

Soil samples were also collected from the area around the transformer pad and in the vicinity of the vents of the former vapor degreasing system (Figure 7) in July 1997 and January 1998. At locations 3 and 16-18 both a shallow (0-1 ft) and deep sample (1-2 ft) were collected. Each of these samples was analyzed for the electroplating inorganics and VOCs. The shallow sample collected from location 18 was also analyzed for PCBs. At locations 20 and 21 only a shallow (0-1 ft) sample was collected and these samples were analyzed for the electroplating inorganics and PCBs.

During July and November 1997, six shallow (0-0.5 ft) soil samples (4-12) were collected from areas which were considered to be representative of background conditions (Figure 8). One sample (4) was collected from the lawn area south of the manufacturing building, one sample was collected along the western portion of the site (5) and one sample (6) was collected from an area located immediately northwest of the manufacturing building. In this area, the upper half foot of soil had recently been removed as part of a construction project. Three soil samples (7 to 9) were collected south of the fence in the northwest corner of the site. Three additional soil samples (10-12) were collected from the field north of the drainage ditch. These soil samples were submitted to the laboratory for the analysis of the electroplating inorganics. The laboratory reports for these samples were presented in Appendix B (Volume Two) of the original RI Report (Normandeau Associates 2001).

Based on the results of the samples collected in 1997 and in response to comments received from the NYSDEC on the Report on Remedial Investigations (Normandeau 1998), the soil sampling grid was expanded outward from the former soil stockpile to the north, west and south (Figure 7). In August 1999, Normandeau collected soil samples using a soil auger at locations 5, 6, 8 to 11 and 12A to 17A (Figure 7). At locations 5 and 6 soil samples were collected at a depth of 2 to 3 feet. Sampling locations 8 to 11 and 12A to 17A were established 10 feet from areas (4-7) where soil samples had been previously collected. At these locations soil samples were collected at depths of: 0-0.2 feet, 0.2 - 1.0 feet, 1.0-2.0 feet, and 2.0-3.0 feet. Each of these samples was analyzed for the electroplating inorganics. The laboratory reports for these soil samples were presented in Appendix A (Volume Two) of the original RI Report (Normandeau Associates 2001).

In August 2000, 44 soil samples were collected at 22 locations (22-43) east and north of the manufacturing building (Figure 7). The soil samples were collected at depths ranging from the ground surface to 0.2 feet and from 0.2 to one foot using a soil auger. Each soil sample was analyzed by the laboratory for the electroplating inorganics. The laboratory results for these samples were presented in Appendix A (Volume Two) of the original RI Report (Normandeau Associates 2001).

In February 2001, 40 soil samples were collected from 20 locations (44-63) followed by the collection of 50 additional soil samples at 25 locations (64-88) in April 2001. The soil samples were collected at depths ranging from the ground surface to 0.2 feet and from 0.2 to one foot using a soil auger. Each soil sample was analyzed by the laboratory for the electroplating inorganics. The laboratory reports for these samples were presented in Appendix C (Volume Two) of the original RI Report (Normandeau Associates 2001).

In May 2001, a total of nine samples (53 and 88A to 94) were collected in an area where miscellaneous debris (crushed metal pails and drum lids, wooden pallets and broken glass) was encountered in the undeveloped portion of the site (Figure 7). The purpose of the soil sampling was to determine if VOCs were present in the soil in this area. The samples were collected in shallow (less than two foot depth) test pits that were excavated using a soil shovel. The soil samples were collected at depths ranging from 0.5 to 1 feet and were submitted to the laboratory for the analysis of VOCs. The laboratory results for these samples were presented in Appendix C (Volume Two) of the original RI Report (Normandeau Associates 2001).

2.1.5 Collection and Analysis of Sediment Samples

During the site investigations (1996 to 2003) sediment samples have been collected from a drainage ditch located on the site, from two drainages downstream of the site, a background stream and the Mohawk River. In 2002, sediment samples were also collected from a detention basin that had been constructed on one of the drainages discharging from the Amsterdam Industrial Park and downstream of the site. The following sections discuss where and how the samples were collected and what they were analyzed for by the testing laboratory.

Drainage Ditch, East and West Branch Drainages and the Mohawk River

Prior to the connection of the site's treatment discharge line to the City of Amsterdam's sewer system in 1983, untreated (1957 to 1973) and treated (1973-1983) spent electroplating solutions were discharged to a drainage ditch that runs north of the manufacturing building and along the eastern property line (Figure 4). This drainage ditch is actually a former ephemeral stream that was diverted around the site in the late 1960s to early 1970s. The drainage ditch then flows under Edson Street and through the Amsterdam Industrial Park (Figure 9). Prior to the development of the industrial park in the 1980s the drainage diverged into a Western Branch (WB) and Eastern Branch (EB). Both of these branches flow south to the lowlands adjacent to the Mohawk River (Figure 9).

Four sediment samples were collected from the drainage ditch and the Eastern Branch drainage in 1986 by Normandeau Engineers. These samples were collected in the drainage ditch upstream of the drain pipe outfall (Stream-Upgradient/S-20), downstream of the drain pipe outfall (Steam-Outfall, SW-1/S-24) and on the East Branch drainage upstream of the culvert on Sam Stratton Road (SW-2/S-33) and upstream of the culvert on the railroad spur (SW-3/S-34). These samples were analyzed for EP Toxicity priority pollutant metals and cyanide (Normandeau Engineers 1988). The results of the analysis of these samples indicated that elevated concentrations of the electroplating metals (hexavalent and trivalent chromium, lead, nickel and zinc) and cyanide were present in the channel sediments.

To confirm the presence of the electroplating related contaminants in the drainage ditch sediments additional samples were collected by Normandeau Associates (Normandeau) in 1996 (Normandeau Associates 1996). Two sediment samples were collected from the drainage ditch at the site: one sample was collected upstream of the drain pipe outfall (SEDUP) and one sample was collected upstream of the culvert at Edson Street, which is located downstream of the drain pipe outfall (SEDN). These samples were collected using a trowel or soil shovel that was decontaminated between samples to reduce the potential for cross contamination. The samples were analyzed for total cadmium, hexavalent chromium, chromium, cyanide, lead, nickel and zinc. The results of the samples collected in 1996 indicated that several of the electroplating associated inorganics were still present in the stream sediments downstream of the drain pipe outfall.

To further investigate the extent of the contaminated sediments additional samples were collected from the drainage ditch, the East Branch (EB) drainage, the West Branch (WB) drainage and from the Mohawk River during the period of 1997 to 2003. Overall, the sediment sampling performed to date started at the site and has progressed down the EB and WB drainages and finally into the Mohawk River.

In August 1997, sediment samples were collected from the drainage ditch on site at four locations: upstream of the facility, downstream of the drain pipe outfall, halfway between the outfall pipe and the culvert under Edson Street and immediately upstream of the culvert. Two samples were also collected from the EB drainage at a point immediately downstream of the Edson Street culvert and 50 feet downstream of the culvert (Figure 9). At each location a shallow (0-0.5 feet) and deep (0.5-1.0 feet) sample was collected from the channel bed. The samples were submitted to the laboratory for the analysis of the electroplating related inorganics (cadmium, hexavalent and total chromium, lead, nickel and zinc) and cyanide. These samples were also submitted for TCLP analysis. Elevated concentrations of several of the electroplating associated inorganics were detected in the samples collected from the drainage ditch and from the EB drainage so additional sampling was proposed.

In November 1997, additional sediment samples were collected from the drainage ditch and from the upper portion of the EB drainage. Sediment samples were collected from the drainage ditch at two locations: the midpoint between the previous upstream sample collected in August 1997 and the outfall pipe and immediately downstream of the outfall pipe. The sediment samples collected from the drainage ditch were collected using a hand auger and/or a soil shovel from a depth of 0-1.0 feet and 1.0-2.0 feet. In the upper EB drainage the samples were collected at points 100 feet and 200 feet downstream of the culvert at Edson Street (Figure 9). These samples were collected using a hand auger/or a shovel from a depth of 0-0.5 feet and 0.5-1.0 feet. A total of eight samples were submitted to the laboratory for the analysis of the electroplating inorganics (cadmium, hexavalent chromium, total chromium, lead, nickel and zinc) and cyanide. The two samples collected at the drain pipe outfall were also analyzed for VOCs and TPH. Elevated concentrations of several of the electroplating related inorganics were detected in the samples collected from the EB drainage, so additional sampling was proposed.

In August 1999, Normandeau collected additional sediment samples from the EB and WB drainages at locations downstream of those sampled in November 1997. Sediment samples were collected from the EB at a point located 400 feet downstream from the culvert under Edson Street and immediately upstream of a culvert on this drainage crossing under Sam Stratton Road. Sediment samples were also collected from the WB drainage immediately upstream of a culvert crossing under Sam Stratton Road (Figure 9). The sediment samples were collected using either a trowel or soil auger at each of these locations at depths of 0-0.2 feet, 0.2-0.5 feet and 0.5-1.0 feet. Each of the samples was then submitted to the laboratory for the analysis of the electroplating related inorganics and cyanide.

Since elevated concentrations of cadmium, chromium and nickel were detected in the sediment samples collected from the EB and WB drainages on the upstream side of the culverts on Sam Stratton Road, additional sediment samples were collected further downstream in both of these drainages in August 2000. The sampling locations were spaced at approximately 300 foot intervals from Sam Stratton Road to where each of the drainages flowed under a railroad spur located north of Chapman Drive. These samples are designated as EB-1 to EB-6 on the East Branch and WB-1 to WB-5 on the West Branch (Figure 9). Downstream of the railroad spur sediment samples (EB-7 and WB-6) were also collected from each of the drainages upstream of the culverts passing below Route 5 (Figure 9). At each location a soil sample was collected from a depth of 0-0.5 feet and 0.5-1.0 feet using a soil shovel or auger. Each of the samples was submitted to the laboratory for the analysis of total cadmium, chromium and nickel. Hexavalent chromium, cyanide, lead and zinc were not analyzed because they had not been detected at concentrations above their NYSDEC Severe Effect Limits (SELs) in the sediment samples collected at Sam Stratton Road.

To establish the background concentrations of cadmium, chromium and nickel in sediment, several samples were collected from an unnamed perennial stream located approximately 600 feet west of the site (Figure 9) in April 2001. The sediment samples were collected at two locations: 550 feet upstream of where the stream flows under Edson Street (background upstream) and at a point located 1,100 feet downstream of Edson Street (background downstream) and upstream of the culvert passing under the railroad spur line. The samples were collected using a trowel or soil shovel from the channel bed surface to a depth of 0.5 feet and from 0.5 feet to 1.0 feet at both locations. The sediment samples were submitted to the laboratory for the analysis of total cadmium, total chromium and total nickel. The laboratory reports for all of the sediment samples collected from 1997 to 2001 were presented in Appendix D (Volume Two) of the original RI Report (Normandeau Associates 2001).

The downstream extent of the metals contaminated sediment was further evaluated with the collection of sediment samples from the lower reaches of the EB and WB drainages in January 2002. In both of these reaches the drainages transition from intermittent to perennial flow due to the contribution of runoff from several tributaries. Sediment samples were collected from three locations along the lower WB, 100 feet downstream of Route 5 (WB-7), midpoint between Route 5 and the railroad tracks (WB-8) and upstream of the railroad tracks (WB-9) (Figure 9). On the EB, sediment samples were collected 100 feet downstream of Route 5 (EB-8), immediately upstream of an inlet structure at the railroad tracks (EB-9) and upstream of a culvert under Quist Road (EB-10). Both a shallow (0-0.5 feet) and a deep (0.5-1.0 feet) sediment sample was collected at each location. Each sample was submitted to the laboratory for the analysis of total cadmium, total chromium and total nickel. The laboratory reports for these samples are included in Appendix A and the results are discussed in Section 4.2 of this report.

Due to the presence of elevated concentrations of total cadmium, total chromium and total nickel in the samples collected from the EB, the collection of additional sediments from the lower portion of this drainage and in the Mohawk River was requested by the NYSDEC in September 2002. In response to the NYSDEC's request, a total of 29 sediment samples were collected from the lower EB and WB drainages and from the northern bank of the Mohawk River in December 2002. In the lower WB drainage sediment samples were collected at seven different locations. One set (WB-10) of sediment samples was collected immediately upstream of the dual culverts at the Amtrak railroad tracks and from three locations (WB-11 to WB-13) within the active channel downstream of these culverts as it crossed the northern bank of the Mohawk River. One set of sediment samples was also collected along the northern bank of the Mohawk River upstream of the WB channel (WB-16) and two sets were collected downstream of the WB channel (WB-14 and WB-15) (Figures 9 and 10).

In the lower EB drainage, sediment samples were collected from two locations (EB-11 and EB-12) in the lower reach prior to its confluence with the bank of the Mohawk River. Sediment samples were also collected from two locations (EB-13 and EB-14) in the active channel on the northern bank of the Mohawk River (Figures 9 and 10). A set (EB-17) of sediment samples was collected on the northern bank of the Mohawk River upstream of the EB channel, while two additional sets of samples (EB-15 and EB-16) were collected downstream of the EB channel. A duplicate sample was collected at EB-16. At each location the sediment samples were collected using either a soil shovel, hand auger or hand trowel from a depth of 0-0.5 feet and 0.5-1.0 feet below grade. Due to the high amount of gravel in the riverbank samples, each sample was placed in a stainless steel bowl and the coarse material was removed before the sample was mixed thoroughly and then placed in the sample container. The samples were then transported to the laboratory where they were analyzed for total cadmium, total chromium, total lead, total nickel and total zinc. The laboratory reports for these analyses are presented in Appendix A and the results are discussed in Section 4.2 of this report.

Based on discussions with NYSDEC staff in a meeting held on March 20, 2003, additional sediment samples were collected from the Mohawk River in April 2003. Six sediment samples were collected in the vicinity of WB-16, near the outlet of the WB drainage, to confirm the previous sampling results from this location (Figure 10). The sediment samples were collected from three different locations five to seven feet away from WB-16. When the samples were originally collected at WB-16 in December 2002, the area was open shoreline, on April 10, 2003 this area was covered by almost one foot of water. The samples were collected using a hand auger from a depth of 0-0.5 feet and 0.5-1.0

feet below grade and were submitted to the testing laboratory for the analysis of total cadmium, total chromium, total lead, total nickel and total zinc.

Sediment samples were also collected at five locations along the shoreline of the Mohawk River near the outlet of the EB drainage. The water levels in April 2003 were one to two feet higher than when the last set of samples were collected from the area in December 2002, so four of the five sampling locations were submerged. The samples were collected 10 feet south of the shoreline, which was roughly parallel to the location of EB-16. Sample EB-18 was collected south of EB-17, EB-19 was collected south of the active channel of the EB and south of EB-14, EB-20 was collected south of EB-16 and EB-21 was collected 30 feet east from EB-20. EB-22 was collected from a deposit of silt material located five feet west of the active channel (Figure 10). The samples collected from EB-18 to EB-21 were collected using a hand auger and only one sample was collected from the top of the channel bed to a depth of 0.5 feet. A second sample from 0.5-1.0 feet could not be collected due to poor water visibility. The samples at EB-22 were collected using a hand trowel and were collected from 0-0.5 feet and 0.5-1.0 feet below the surface. The samples were submitted to the testing laboratory for the analysis of total cadmium, total chromium, total lead, total nickel and total zinc. The laboratory reports for the analyses performed on the samples collected in April 2003 are presented in Appendix A and the results are discussed in Section 4.2 of this report.

Detention Basin

In 2001-2002, a detention basin structure was constructed, by unrelated third parties, on the EB drainage immediately downstream of Sam Stratton Road. According to AIDA staff (Gustafson, pers. comm.) the detention basin was constructed to reduce the runoff produced from the industrial park, which was contributing to flooding in the lower sections of the drainage. Because of the potential for the redistribution of contaminated sediment during the construction of detention basin and the potential accumulation of contaminated sediment during its operation, sediment samples were collected from the basin for analysis. Two rounds of samples were collected with the first round in April 2003 and the second round in September 2003. In April 2003, three samples were collected from the bottom of the basin from a depth of 0-0.5 feet using a hand trowel. Sample DB-1 was collected in the northeast corner of the basin, DB-2 was collected near the inlet of the basin and DB-3 was collected near the outlet structure of the basin (Figure 11). The samples were placed in clean containers and were submitted to the testing laboratory for the analysis of total cadmium, total chromium, total lead, total nickel and total zinc.

In September 2003, a total of 17 soil samples (DB-4 to DB-19 and a duplicate at DB-13) were collected from the banks of the detention basin. As shown in Figure 11, the majority of the samples were collected from along the north, west and south sides of the basin. The distribution of samples was decided upon by the NYSDEC and Normandeau based upon visual evidence of where excavated material may have been deposited during the construction of the basin. Because the eastern bank of the basin appears to consist of undisturbed native soil only one sample (DB-19) was collected from this area.

Each of the samples was collected from a depth of 0-0.5 feet using a plastic hand trowel. As with all of the other soil and sediment sampling the hand trowel was decontaminated between samples to reduce the potential for cross contamination. The soil was placed in clean containers and the samples were then delivered to the testing laboratory for the analysis of total cadmium, total chromium, total lead, total nickel and total zinc. For quality control purposes a blind duplicate was collected from sampling location DB-13 and submitted for analysis. The laboratory reports for the sediment samples collected in April 2003 and the soil samples collected in September 2003 are presented in Appendix A and the results are discussed in Section 4.2 of this report.

2.1.6 Installation of Ground Water Monitoring Wells

From 1996 through 2003, a total of 22 ground water monitoring wells have been installed at or downgradient of the site. During the 1996 field investigation by Normandeau (Normandeau Associates 1996) four shallow water table monitoring wells (MW-1 to MW-4) were installed at the site (Figures 2 and 5). Ground water quality samples were collected from each of the monitoring wells in August 1996 and the results indicated the presence of chromium (hexavalent and total) in monitoring wells MW-1, MW-2 and MW-4, carbon tetrachloride, trichloroethene (TCE) and cis-1,2-dichloroethene in monitoring well MW-1 and TCE in monitoring well MW-4 at concentrations greater than their New York State Department of Environmental Conservation Groundwater Quality Standards (NYSDEC GQS).

As originally proposed, four shallow monitoring wells (MW-5S to MW-8S) and four bedrock monitoring wells (MW-1R, MW-4R, MW-5R and MW-7R) were to be installed at the site in 1997. During the drilling in August 1997 ground water was not intercepted in the glacial till, so the decision was made to eliminate the shallow borings and to only install deeper bedrock monitoring wells. Bedrock monitoring wells were installed at MW-1R, MW-4R and at MW-5 to MW-8 (Figure 2). Based upon the water quality results for the samples collected from the monitoring well network in September and November 1997, a third series of monitoring wells were installed at the site. Bedrock monitoring wells MW-9, MW-10 and MW-11 were installed in December 1997-January 1998 (Figures 2 and 5). Based on the detection of TCE in ground water samples collected from monitoring wells MW-9 and MW-10, the monitoring well network was further expanded with the installation of monitoring wells MW-12 and MW-13 in July 1999 and monitoring wells MW-14 and MW-15 in July 2000. The geologic logs for monitoring wells MW-1 to MW-15 were included in Appendix E (Volume Two) of the original RI Report (Normandeau Associates 2001).

The detection of TCE in samples collected from monitoring wells MW-12 and MW-13 prompted the installation of three more bedrock wells (MW-16 to MW-18) downgradient of the site during May-June 2002. Monitoring wells MW-16 and MW-17 were installed on the northern portion of the AIDA/UCMI property (south of the site) and monitoring well MW-18 was installed on the Bush Mill Works property (west of the site) (Figures 2 and 5). The detection of TCE in ground water samples collected from monitoring well MW-16 in September 2002 and in monitoring well MW-17 in June and September 2002 led to the installation of the last two bedrock monitoring wells MW-19 and MW-20, which are located in the central portion of the AIDA/UCMI property (Figures 2 and 5). The geologic logs for monitoring wells MW-16 to MW-20 are presented in Appendix B of this report.

Due to the dense nature of the glacial till at the site, the shallow water table monitoring wells (MW-1 to MW-4) were installed in borings advanced into the glacial till using air rotary drilling methods. At each boring, soil samples were collected either continuously or at five foot intervals using a split-spoon sampler. The samples were collected using ASTM procedures and classified using the Burmister soil classification system. The presence of VOCs was tested by performing a headspace analysis of the soil samples using a PID. Each of the shallow borings was drilled until refusal on bedrock was encountered.

A two-inch diameter monitoring well was installed in each boring. The monitoring wells were constructed of threaded, flush joint, schedule 40 PVC screen and PVC riser. The screen section used had a 0.010 inch slot size and ranged in length from five to ten feet depending on the depth to ground water and the depth to refusal. The annular space between the screen and the glacial till was backfilled with clean sand to approximately one to two feet above the top of the screen. A three foot thick bentonite seal was then placed above the sand pack. The remaining annulus between the riser and the borehole wall was grouted with a bentonite/cement mixture to one foot below the ground surface. A flush mounted, water tight, steel protective cover was then cemented over the riser to protect the monitoring well and to limit access. The location and elevation of each of the shallow monitoring wells were then established by a field survey performed by a New York State licensed land surveyor.

The bedrock monitoring wells were drilled in two stages. The first stage of the drilling was the advancement of 4-inch diameter steel casing to the top of bedrock by driving and washing or by air rotary methods. At each boring, soil samples were collected either continuously or at five foot intervals using a split-spoon sampler. The samples were collected using ASTM procedures and classified using the Burmister soil classification system. The presence of VOCs was tested by performing a headspace analysis of the soil samples using a PID.

At the top of bedrock the drilling casing was seated into the bedrock. An HX or NX-size rock core was then used to advance the borehole into bedrock and to collect rock core samples. If a HX-size rock core was used, upon completion of the boring the hole was reamed using a tri-cone roller bit. The borehole was then developed by pumping to remove the fine grain particles produced by the drilling.

A two-inch diameter monitoring well was installed in each boring. The monitoring wells were constructed of threaded, flush joint, schedule 40 PVC screen and PVC riser. The screen section used had a 0.010 inch slot size with the screen length varying from 10 to 15 feet. The length and the depth at which the screen was placed were dependent upon the number and depth of the water bearing fractures encountered. The annular space between the screen and the bedrock core hole was backfilled with clean sand to approximately one to two feet above the top of the screen. A two to three foot thick bentonite seal was placed above the sand pack. The remaining annulus between the riser and the borehole wall was grouted with a bentonite/cement mixture to one foot below the ground surface. A flush mounted, water tight, steel protective cover or a locking steel casing was cemented over the riser. The location and elevation of each of the monitoring wells were then established by a field survey by a New York State licensed land surveyor.

During the drilling at MW-6, a sample of the glacial till was collected at a depth of six feet using a Shelby tube. This sample was analyzed for hydraulic conductivity, particle size distribution, bulk dry density and porosity. In addition, a sample of the glacial till was collected from a depth of 7.5 feet at this boring and submitted for the analysis of total organic carbon.

2.1.7 Hydraulic Conductivity Testing

To estimate the velocity of ground water flow in the glacial till and in the bedrock at the site in-situ hydraulic conductivity tests were performed in selected monitoring wells (MW-1R, MW-3, MW-4, MW-6, MW-7 and MW-8) in August 1997. The hydraulic conductivity tests were performed using the slug injection/extraction method and a pressure transducer. The change in head levels were recorded on an electronic data logger and transferred to a portable computer for analysis using the Bouwer and Rice (1976) method. Due to the low ground water levels experienced in August 1997, hydraulic conductivity tests could only be performed in the bedrock monitoring wells. A second round of hydraulic conductivity tests were performed in March 1998, during higher water level conditions, in each of the shallow monitoring wells installed in the glacial till (MW-1 to MW-4) and in each of the bedrock monitoring wells not previously tested (MW-4R, MW-5, MW-9, MW-10 and MW-11). The results of the hydraulic conductivity tests were presented in Appendix F (Volume Two) of the original RI Report and are discussed in Section 3.5 of this report.

2.1.8 Water Quality Monitoring Program

The development and implementation of a water quality monitoring program for the site was necessary to further evaluate the nature and extent of surface water and ground water contamination, to evaluate the variation of ground water quality over time and to provide information for the analysis of potential remedial alternatives.

2.1.8.1 Surface Water

A limited number of surface water quality samples were originally collected from the site during the initial site investigations performed by Normandeau Engineers in the 1980s (Normandeau Engineers 1988). Samples were collected in October and December 1986. In October 1986 samples were collected at a location upstream of the outfall pipe and where the outfall discharges into the drainage ditch. These samples were analyzed for the 13 priority pollutant metals, hexavalent chromium, total cyanide and for VOCs. In December 1986, a second round of surface water samples was collected from the site. One of the samples was collected immediately upstream of the outfall, one sample was collected immediately downstream of the outfall and one sample was obtained upstream of the culvert under Edson Street. These samples were analyzed for hexavalent chromium, total chromium, total cyanide and VOCs.

To further evaluate the impact of the release of contaminants from the site on surface water quality a monitoring program was begun in August 1996. When flowing, surface water samples have been collected from two locations on the site: upstream of the outfall (SW-1) and downstream of the outfall (SW-2) just upstream of the culvert that passes under Edson Street (Figure 12). Due to the intermittent nature of flow in the drainage ditch only five samples have been collected at SW-1 and 11 samples have been collected from SW-2 since 1996.

During each sampling round field measurements of water temperature, specific conductance, pH, Eh and dissolved oxygen have been recorded. In addition, these samples have been submitted to the testing laboratory for the analysis of inorganic (electroplating related metals), organic (VOCs), potential remediation associated parameters, hardness, total suspended solids (TSS) and turbidity. Due to the low concentration of inorganic and organic contaminants detected in the surface water samples collected from the drainage ditch, this monitoring requirement was eliminated beginning in 2004. The results of the water quality samples collected at from the drainage ditch from 2001 to 2003 are presented in Appendix C and discussed in Section 4.3.

A limited number of surface water quality samples have also been collected from the drainages located downstream of the site. On March 28, 2002 a round of surface water quality samples were collected from station SW-2 and from 10 locations downstream of the site on the East and West Branch drainages. Surface water samples were collected at the following locations (Figure 12):

- The downstream side of culverts on Sam Stratton Road on the East Branch (EB-SS) and West Branch (WB-SS),
- The upstream side of culverts at the railroad spur line on the East Branch (EB-RR) and West Branch (WB-RR),
- The upstream of culverts at State Route 5 on an unnamed perennial background stream (BK-R5), the East Branch (EB-R5) and the West Branch (WB-R5),
- The lower reach of the East Branch (EB-QR) downstream of the Amtrak railroad tracks and upstream of Quist Road,
- The lower reach of the West Branch (WB-OUT) above an industrial outfall (Longview Fiber) and above the Amtrak railroad tracks.

These samples were submitted to the testing laboratory for the analysis of the electroplating related metals (cadmium, hexavalent chromium, total chromium, cyanide, lead, nickel and zinc), hardness and turbidity. The laboratory reports for these analyses are included in Appendix C and the results are discussed in Section 4.3.

2.1.8.2 Ground Water

Although a limited number of ground water samples were collected from test pits excavated at the site in the 1980s (Normandeau Engineers 1988), insufficient information was available regarding the nature and extent of ground water contamination at the site. To obtain this information a monitoring network consisting of 22 monitoring wells (four shallow glacial till wells and 18 fractured bedrock wells) has been installed at and in the vicinity of the site (Figures 2 and 5).

The ground water monitoring program began in August 1996 with the collection of one round of water quality samples from the four shallow ground water monitoring wells, MW-1 to MW-4, installed at the site that year. From 1997 to 2000, three rounds of water quality samples were collected each year during the months of May (spring), September (summer) and November (fall) from all of the monitoring wells installed at that time. These sampling events coincided with periods of high ground water elevations and runoff (spring and fall) and low ground water elevations and runoff (summer). Beginning in 2000, the monitoring program was reduced to two rounds a year with samples being collected in May and August from all of the monitoring wells. In 2003, only one round of samples was collected (September) and in 2004 two rounds (May and August) of samples were collected.

Prior to sampling, three volumes of the standing water in each monitoring well were evacuated (purged) to introduce fresh formation water into the well for sample collection. Purging was performed using dedicated PVC bailers or an inertial pump and tubing. The purged water was placed in 55 gallon drums and transported for off site disposal at a licensed treatment facility. The wells were then allowed to recover to at least 75 percent of static water level. Disposable polyethylene bailers or an inertial pump with tubing were then used for the collection of the samples.

Field measurements of selected water quality parameters have been recorded since the water quality monitoring program began in August 1996. Since the August 1996 sampling round field measurements of water temperature, specific conductance and pH have been recorded for both ground water and surface water. Beginning with the May 1997 sampling round field measurements of dissolved oxygen (DO) and redox potential (Eh) were added.

The water quality parameters tested by the laboratory have occasionally changed over the past five years. Since the water quality monitoring program started in August 1996 all ground water and surface water samples have been analyzed for chromium and VOCs. From 1996 through 1997 the water quality samples were also analyzed for the electroplating inorganics (cadmium, lead, nickel and zinc). The electoplating inorganics (except chromium) were dropped from the water monitoring program in 1998, because they were not being detected at significant concentrations.

During the 1997 monitoring year, a suite of water quality parameters were added to evaluate the potential for the natural attenuation of the contaminants (inorganic and organic) at the site. These parameters included: iron, manganese, ammonia, nitrate, nitrite and sulfate. These parameters were not analyzed in 1998, but were repeated in 1999. During the 1999 monitoring program chloride was added, while ammonia and nitrate were dropped. Chloride was added to determine if there was any evidence that the natural dechlorination of the VOCs in the ground water at the site was occurring. Ammonia and nitrate were dropped because they had not been detected in significant concentrations during the previous sampling rounds in 1997.

Beginning in the September 1997, sampling round TSS and turbidity were added to the water quality monitoring program. Both of these parameters are a measure of the concentration of solid material in a water sample. These parameters were added to evaluate the amount of fine grain size sediment being collected in the ground water and surface water samples. The presence of fine grain sediment can be of a concern due to the affinity for metals to adsorb onto these particles. For ground water, high TSS and/or turbidity values indicate that the resulting total concentrations may include both a solid and dissolved component. TSS was eventually dropped from the monitoring program in May 2000 since a correlation with turbidity was apparent.

During the period of 2000 through 2003, all of the ground water quality samples were analyzed for hexavalent chromium, total chromium and VOCs, while field measurements of pH, Eh, specific conductance, water temperature and dissolved oxygen were recorded. Beginning in May 2004 the water quality monitoring program was further modified with the following changes:

- Collection of water quality samples from upgradient monitoring wells MW-3 and MW-11 will occur once every other year, for at least two more years. These samples will be analyzed for hexavalent chromium, total chromium and VOCs.
- Reduction in analysis for hexavalent and total chromium to those wells located adjacent to, along and downgradient of the chromium plume (MW-1, MW-1R, MW-2, MW-4, MW-4R, MW-6, MW-7, MW-9, MW-10 and MW-13).
- Reduction in the measurement of field parameters to those monitoring wells located downgradient of the site (MW-14, MW-15, MW-16, MW-17, MW-18, MW-19 and MW-20).
- The collection of surface water samples from SW-1 and SW-2 was eliminated.

During the water quality sampling a duplicate, a matrix spike and/or a matrix spike duplicate sample was collected and submitted for the analysis of the contamination parameters to meet quality assurance objectives. The results for the laboratory analyses of the ground water and surface water samples collected since the submittal of the original RI Report in July 2001 are presented in Appendix C and are discussed in Section 4.4.

The ground water work conducted in connection with the recently identified wells at the FGI site, east of the Ward Products site, and believed to be sidegradient of the natural direction of ground water flow from the Ward Products site, is discussed in Section 2.1.10.

2.1.9 Indoor Air Sampling

Based on the concentrations of VOCs reported in on site ground water The RETEC Group (RETEC) performed an assessment of indoor air quality to evaluate the existence and impact, if any, of chemical vapor intrusion into the manufacturing building at the site in November 2002. This work was intended to assist the evaluation in the Risk Assessment (RA) of whether the post-remediation presence of the VOCs (tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene and cis-1,2 dichloroethene) in the ground water or other media at or near the building could induce elevated levels in indoor air within the building itself sufficient to affect the conclusions in the RA (RETEC 2002).

RETEC inspected the building and reviewed the floor plan to determine that four sample locations were appropriate and sufficient to identify and characterize the indoor air concentrations of the VOCs of interest. One sampling location was in the office area in the front of the building (AS-1), two (AS-2 and AS-3) sampling locations were in the main manufacturing/assembly area and one background sampling location was outside the building in the lawn area south of the building (Figure 1, Volume Two, Appendix F).

On November 21, 2002, a pre-sampling inspection of the building and a review of the available Material Safety Data Sheets (MSDS) of materials then used by WPLLC were performed. None of the VOCs of interest were found from that review to be currently used in the current manufacturing operations of WPLLC. All windows and doors were closed and the building heating systems (overhead natural gas and electric baseboard) were on.

Following the inspection, the air samples were collected in six-liter “summa” canisters over a four-hour time period during normal business hours while the building was occupied. The samples were collected from approximately three feet above the floor. All inspections and sampling were conducted under New York State Department of Health (NYSDOH) standard protocols.

The canisters were sent to Air Toxics Analytical Laboratory (ATAL) of Folsom, California for analysis by USEPA Method TO15-S (low level, <0.5 ppb) for PCE, TCE, 1,1-dichloroethene, cis-1,2 dichloroethene, chloroform and carbon tetrachloride. ATAL was certified to perform these analyses in New York State clients under the Environmental Laboratory Approval Program (ELAP). The laboratory reports for these analyses are included in Appendix F and the results are discussed in Section 4.5.

In January 2005, in response to comments received from the NYSDOH, and to confirm the results of the November 2002 sampling, RETEC proposed to collect soil gas and additional indoor air samples from the manufacturing building at the site. The work was conducted in accordance with the NYSDEC and NYSDOH approved 2005 Work Plan for Indoor Air/Soil Gas Sampling (RETEC 2005).

On January 21, 2005 RETEC collected seven air and soil gas samples: one outside ambient air (AA-1), one indoor air (IA-1) and one sub-slab soil gas (SG-1) from the main assembly room, one indoor air (IA-2) and one sub-slab soil gas (SG-2) from the grinding room, and one indoor air (IA-3) and one sub-slab soil gas (SG-3) from the warehouse (see Figure 1 in Appendix G). The samples were collected during normal business hours, while the building was occupied. The outside temperature was approximately 10^{o} F, with snow covered frozen ground.

The indoor and ambient air samples were collected from approximately three feet above the floor level. The soil gas samples were collected from immediately below the concrete slab foundation. The ambient air sample was collected first, then the indoor air samples followed by the sub-slab soil gas samples.

All samples were collected in one-liter “summa” canisters equipped with a flow restrictor. The flow restrictors were pre-set to collect the samples over a two-hour time period. Prior to sampling, all sample tubing was purged using a PID.

For soil gas sampling, 3/8-inch diameter holes were bored through the foundation slab using a hammer drill. The sample tubing was installed through the borehole and sealed with hydrated bentonite clay. The relative vapor pressure below the slab was measured to be +0.01 inches of H_2O or less. Following the sub-slab soil gas collection, all boreholes were sealed and patched with Portland cement mortar to match the existing construction.

The air and soil gas samples were sent to Centek Laboratories, LLC of Syracuse, New York for analysis using USEPA Method TO15-S (low level, <0.5 ppb) for PCE, TCE, 1,1-dichloroethene, cis-1,2 dichloroethene, chloroform and carbon tetrachloride. Centek is currently certified to perform these analyses in New York State under the Environmental Laboratory Approval Program (ELAP). The laboratory reports for these analyses are included in Appendix G and the results are discussed in Section 4.5.

2.1.10 FGI Water Supply Well Sampling

In September 2004, representatives of Normandeau and New Water Realty met with neighboring property owners to provide them with an update on the progress of the RI and to confirm the absence of any water supply production wells on their properties. Normandeau contacted and/or met with representatives of Saratoga Horseworks, Bush Carpentry and Millwork, Losurdo Foods, UCMI, Breton Industries and FGI. The presence of an inactive bedrock water supply well on the UCMI property downgradient of the Site was previously known. During discussions with Mr. Paul Lierheimer, the President of FGI, it was discovered that two bedrock production wells are located on their property. The wells are located north of the FGI production facility and northeast and upgradient of the Ward Products Site (Figure 35). According to Mr. Lierheimer, these wells have been primarily used as a water supply source for the production of fiber glass, although the water from these wells has also been used in the past periodically as a potable water supply, but were not being so used at the time of the visit. The wells are not currently being used at all by FGI because their pumps are inoperative. Subsequently, an effort was made to locate well construction information about the two wells and water sampling data believed by FGI to have been collected historically. Eventually it was determined that no meaningful information on well construction or water quality for either well was available.

Based on discussions with the NYSDEC and with FGI, Normandeau proposed that a round of ground water samples be collected from both of the wells. On December 29, 2004 Normandeau personnel visited the site to: survey the well locations, measure the depth to ground water and collect the water quality samples. The location of the wells was surveyed using a handheld Global Positioning System (GPS) receiver (Garmin etrex Vista). The depth of the wells and the depth to ground water were measured using a water level indicator (Keck TUFF TAPE^{TM}) with a 500 foot long tape, but the presence of existing pumps in the wells interfered with a proper measurement.

Prior to their sampling, one casing volume of water was purged from each well using a Waterra Hydrolift II actuator (pump) and a high capacity flow system because the existing FGI pumps were not functional. The high capacity flow system consisted of one-inch diameter high density polyethylene (HDPE) plastic tubing and a Delrin^{TM} plastic footvalve. The tubing was set at a depth of 80 feet in each well. The rate of purging was barely adequate to meet the rate of recharge occurring into the well as it was purged.

Following this purging of each well a sample was collected using a disposable HDPE plastic bailer. The samples were then transferred from the bailers and into bottles provided by the testing laboratory (Adirondack Environmental Services of Albany, New York). A duplicate set of samples was collected from well FGI-2 for quality assurance/quality control. During the collection of the samples measurements of dissolved oxygen, specific conductance, temperature, oxidation-reduction potential (or Eh) and pH were recorded using field instruments.

The samples were hand delivered to AES on the same day using chain-of-custody protocols. AES analyzed the two samples and the duplicate for: VOCs, total chromium, hexavalent chromium and turbidity. A trip blank provided by AES was only analyzed for VOCs. The laboratory reports for these samples are presented in Appendix H and the results are discussed in Section 4.6.

Based on the results obtained from samples collected in December 2004 a confirmatory round of samples was collected from well FGI-1 on February 1, 2005. The well pump in FGI-1 remains inoperative and unrepaired; according to FGI no schedule yet exists for repair of these wells. The purging and sampling methods that were used in December 2004 were also used during the February 2005 sampling round. The only major change during this sampling round was the addition of the analysis of dissolved chromium. Also, although a trip blank was provided by AES, the bottle was destroyed in the field during sampling. The laboratory report for the sample collected from FGI-1 and its duplicate are presented in Appendix H and the results are discussed in Section 4.6.

3.0 PHYSICAL CHARACTERISTICS OF THE SITE

This section discusses the physical setting of the site, which includes: topography, land use, soils, surficial geology, bedrock geology, surface water hydrology and ground water hydrology. This characterization is based upon the findings of the field investigations performed to date and from a review of publicly available information. Data sources include: the City of Amsterdam Engineering and Water Departments, the State of New York Geological Survey, the Natural Resource Conservation Service and the United States Geological Survey.

3.1 SURFACE FEATURES AND LAND USE

The site is located in the Amsterdam Industrial Park at 61 Edson Street in Amsterdam, New York (Figure 1). The site is approximately 3,300 feet northeast of the Mohawk River and is located in the southeast corner of the City of Amsterdam. The site consists of approximately 8.6 acres, which can be divided into a northern and a southern parcel (Figure 2). The northern parcel (3.5 acres) is undeveloped and is covered by vegetation (brush and trees). The southern parcel (5.1 acres) is developed and includes the manufacturing building, two paved parking areas and lawn areas in the front (south) and east side of the building. The manufacturing building is a 69,556 square foot, single story, brick and cinder block structure. The manufacturing building, parking lots and the loading dock driveway cover 131,144 square feet or 60 percent of the total area of the southern parcel.

Topographically the site is located on an upland portion of the Mohawk River valley at elevations ranging from 485 feet, in the northern parcel, to 465 feet along Edson Street. The land surface gently slopes from the north to the south with an average topographic slope of 0.032 feet per foot (or 3.2 feet per 100 feet). The steepest slopes on site are found between the northern side of the building and a drainage ditch. These steeper slopes were the result of the construction of the manufacturing building (late 1950s), the diversion of an ephemeral stream channel around the east side of the site (late 1960s to early 1970s) and the addition of a warehouse along the northern portion of the manufacturing building (in the late 1980s).

The site is bordered by undeveloped land to the north, a fiberglass manufacturing plant (Fiber Glass Industries or FGI) to the east, a commercial property (Safari Enterprises, Inc.) to the southeast, Edson Street and an industrial property (UCMI) to the south, a wood working business (Bush Millworks) to the southwest and a small business (Saratoga Horseworks) to the west (Figure 2).

3.2 SOILS AND SURFICIAL GEOLOGY

Based upon mapping by the Natural Resources Conservation Service (NRCS 1972) the northern part of the site is underlain by the Mosherville loam soil, while the southern portion of the site is underlain by the Darien silt loam soil. The Mosherville soil series is described as consisting of deep, nearly level and gently sloping, somewhat poorly drained, medium textured soil material. These soils formed on a loamy eolian (wind transported) mantle that is underlain by firm glacial till derived from limestone (NRCS 1972). The Mosherville loam is relatively dense, has low permeability and high water table conditions that restricts their use for building construction, septic tank or septic field construction.

The Darien soil series consists of deep, nearly level to sloping, somewhat poorly drained, medium-textured soils on glacial till plains. These soils formed directly on the glacial till derived from limestone (NRCS 1972). These soils are relatively dense, have low permeabilities and high water table conditions that restrict their use for building construction, septic tank or septic field construction.

Both the Mosherville and the Darien soils have developed on glacial till parent material. Based upon the observations made during the excavation of test pits in 1986, and from the soil samples collected from the soil borings drilled at the site (1996-2003), the glacial till consists of an upper and lower unit. The upper unit is tan to olive colored and consists of dense silt with varying amounts of fine to coarse sand and gravel. The sediments in this unit are poorly sorted and do not appear to be highly stratified. This unit probably represents an ablation till which was deposited during the retreat of the glaciers from the Mohawk River valley during the last ice age.

The thickness of the upper till unit ranges from roughly two feet immediately north of the building (MW-5) to just over 32 feet south of the site (MW-13). The thin cover of ablation till above bedrock in the area behind the building may be the result of the excavation and removal of some of the till material for the construction of the building and the warehouse. Overall, the average thickness of the upper till is 15.7 feet.

In 17 of the borings, a dense, grey silt unit was encountered immediately above bedrock. The thickness of this lower till unit ranges from under one foot (MW-6) east of the manufacturing building to 45.5 feet (MW-19) on the AIDA/UCMI property located south of the site. Overall, the average thickness of the lower till is 13 feet. This till would have been deposited at the base of the glacier as it advanced through the region during the last ice age. This unit is poorly sorted and typically includes angular to subangular fragments of the underlying bedrock. Some thin layers of fine to medium sands were occasionally encountered and they were typically saturated.

As shown in the geologic cross-sections (Figures 5, 13 and 14), the thickness of the glacial till unit generally increases across the site from the north to the south in the direction toward the Mohawk River. The thickness of the till ranges from 11.5 feet at MW-2 on site to 51.6 feet at MW-19 on the AIDA/UCMI property. From east to west the thickness of the till ranges from 20.3 feet (MW-8) to 30.8 feet at MW-10.

3.3 BEDROCK GEOLOGY

The bedrock geology of the Mohawk River valley area has been previously mapped by Fisher (1980). According to Fisher (1980), the bedrock underlying the site is part of the lower Ordovician (490 mya) Chuctanunda Creek Dolostone of the Tribes Hill Formation. Fischer (1980) describes the bedrock as “light bluish-gray, medium to thick bedded, fine to medium grained, dolostone with an erratic distribution of bluish-gray to white chert; locally very vuggy with crystals of dolomite, calcite and, rarely quartz.”

Samples of the bedrock were obtained by rock coring the borings drilled for each of Ward Product’s bedrock monitoring wells. As shown in the test boring logs presented in Appendix B, the bedrock encountered at and near the site through such borings is similar to that described by Fisher (1980). The bedrock was typically massive with rock quality determination (RQD) values ranging from 10 (very poor) to 100 (excellent) with an average of 86 (good). The majority of the fractures observed in the cores were horizontal to subhorizontal with infrequently occurring vertical to subvertical fractures. The horizontal fractures were typically associated with changes in rock texture and bedding features. The RQD values were also found to vary with the depth at which the rock core was collected. In general, lower RQD values were recorded in the rock cores collected from a depth of 0-10 feet, when compared to depths ranging from 10 to 25 feet below the top of bedrock. These results suggest that the shallower bedrock is more highly fractured than the deeper bedrock and that this zone likely represents a preferential flow pathway for ground water.

During drilling, water bearing fractures were identified by the loss of drilling water and the presence of solution features (pitting) on the fracture plane surface in the rock core and the presence of iron/manganese oxide precipitates. The identification of these water bearing fractures was then used to determine the depth at which the bedrock monitoring wells were installed.

In order to collect additional information visual inspections were conducted of outcroppings. The Chuctanunda Creek Dolostone outcrops along the streambed of Degraff Creek along Widow Susan Drive located approximately 2,000 feet southeast of the site (Figure 1). Measurements of the strike (orientation) of 71 fractures were recorded along the stream channel bed. As shown in Figure 15, there are two principal sets of vertical fractures in the Chuctanunda Creek Dolostone, one set striking northeast-southwest, while the second set strikes east-west. These sets of fractures appear to control the development of drainages in the Amsterdam area. As shown in Figure 1, several of the stream channels have segments that are either oriented northeast-southwest or east-west. Very few vertical fractures were intercepted in the bedrock during the subsurface investigations (drilling) at the site. As a result, it is believed that the horizontal bedding type fractures have a greater influence on ground water flow at and immediately downgradient of the site.

Horizontal fractures were also observed in rock outcrops along Widow Susan Road. The spacing of the horizontal fractures varies between one and three feet, which is similar to the spacing observed in the rock cores. These horizontal fractures generally occur parallel to changes in the bedding within the bedrock. The dip (slope) of the horizontal fractures ranged from 6 to 12 degrees to the south, toward the Mohawk River valley.

3.4 SURFACE WATER HYDROLOGY

The site is located approximately 3,000 feet northeast of the Mohawk River (Figure 1). Two perennial tributaries to the Mohawk River are found in the vicinity of the site. An unnamed tributary is located 600 feet northwest of the site and the western branch of Degraff Creek is located 1,900 feet east of the site. The natural drainage system has been modified as a result of the construction of the manufacturing facility on-site and the industrial park off-site. Prior to site development, runoff flowed across the site to a small intermittent stream to the southwest. With the construction of Edson Street and the development of the site the drainage system was altered. A ditch was constructed along the northeastern part of the site to intercept runoff from the undeveloped uplands in the late 1960s or early 1970s. The diversion channel continued along the eastern portion of the site and discharges into a culvert under Edson Street (Figure 12). Presently, runoff from the parking lots and lawn areas discharge to a small drainage ditch that runs along the north side of Edson Street, which then discharges into the lower end of the drainage ditch. Runoff from the roof of the manufacturing building is captured in a roof drain system and discharges into the drainage ditch along the eastern property line.

The drainage ditch that borders the northeastern and eastern portions of the developed site can be classified as being ephemeral to intermittent. Based on field observations, runoff only occurs in the drainage ditch during periods of high ground water conditions (spring snow melt) and in response to rainfall events. During the 18 trips made to the site to collect water quality samples, from 1996 to 2003, the upper portion of the drainage ditch was only observed flowing six times (sampled five times). Each of these flow events occurred in late winter or spring and was in response to either snowmelt or rainfall runoff.

Downstream of the site the drainage ditch flows through a culvert below Edson Street and into a channel in the Amsterdam Industrial Park. With the construction of the buildings, now occupied by UCMI, in the 1980s, the stream channel was redirected to the east to connect to a pre-existing stream channel. This drainage is referred to in this report as the East Branch (or EB). The western portion of the West Branch (WB) of the channel was cut off and filled to construct a parking lot on the UCMI property (Figure 12). At Sam Stratton Road, both the EB and WB drainages flow through concrete culverts. The EB then discharges into a detention basin that was constructed in late 2001-early 2002, while the WB discharges into its natural channel. According to AIDA personnel (C. Gustafson, pers. comm.), the detention basin was constructed to reduce runoff produced from the industrial park, thereby reducing flood flows on the lower section of the EB drainage.

The EB and the WB drainages then flow to the south through undeveloped forest land (Figure 12). Both drainages are then crossed by a railroad spur line located north of Chapman Drive (also known as East Main Street). At the railroad spur both the EB and the WB enter stone lined culverts. The EB then flows into the culvert and under the railroad tracks, briefly surfaces (15 to 20 feet) and then enters another culvert under Chapman Drive. The EB then emerges from a 36-inch diameter concrete pipe south of Chapman Drive and flows over 100 feet through an open channel and into a 31-inch diameter concrete pipe. The upper section of the open channel (75 feet) is bordered by residential property to the west and a steep embankment to the east. The EB then flows to the southwest, under Route 5 and discharges from a 36-inch diameter reinforced concrete pipe. From Route 5 to the Amtrak railroad tracks, a distance of approximately 400 feet, the EB flows through an open channel. The channel is bordered by an industrial property to the west and undeveloped land to the east. At the time of the visit in January 2002, no flow was observed in the EB up to this point.

At the Amtrak railroad tracks the EB flows through a grated vertical inlet into a culvert. The culvert then conveys the EB under the railroad tracks. Downstream of the railroad tracks the EB discharges from a stone lined culvert measuring 2.3 feet high and 3 feet wide an into an open channel. The EB is then crossed by Quist Road and flows through a 24-inch diameter metal iron pipe. A second, but higher, 24-inch diameter corrugated metal pipe was observed 30 feet to the east.

Below Quist Road, the EB flows through a constructed unlined channel and into the Mohawk River. The channel appears to have been both straightened and widened, which most likely occurred during the construction of the wastewater treatment plant and its access (Quist) road. Other than the railroad tracks and the access road, the land bordering the lower section of the EB channel is undeveloped.

Upon entering the culvert at the railroad spur, the WB is directed through a residential neighborhood and below Chapman Drive and eventually discharges from a 30-inch wide by 39-inch high stone lined culvert, located under a building east of Holly Street. The WB then flows through an open channel for 65 feet, with its east bank fenced and its west bank open and bordering a lawn area. The WB then enters a 36-inch diameter corrugated metal culvert and flows under Route 5. The channel appears to flow under Route 5 to the west and discharges from a 48-inch diameter corrugated metal culvert and intercepts a perennial stream (Figure 12). At the time of the site visit in January 2002, no flowing water was observed in the WB, while an estimated flow of less than 0.25 cubic feet per second (cfs) was observed in the perennial stream. The combined stream then flows 600 feet through an open channel to the southwest. This channel appears to have been constructed, rather than being a natural channel, because of its trapezoidal form and because its banks and bed are lined by slabs of rock. The stream then flows into two 36-inch diameter corrugated metal culverts upstream of the railroad tracks, through the culverts and then discharges into the Mohawk River.

3.5 HYDROGEOLOGY

To evaluate the hydrogeologic conditions on and in the vicinity of the site a total of 22 monitoring wells have been installed (Figures 2 and 5). Four of the monitoring wells (MW-1, MW-2, MW-3 and MW-4) were installed in the glacial till, while the remaining monitoring wells (MW-1R, MW-4R and MW-5 to MW-20) were installed in the fractured bedrock. Beginning with the installation of the first four monitoring wells in the summer of 1996, ground water elevation measurements have been recorded during the collection of each round of water quality samples. The ground water elevation data recorded from August 1996 to August 2004 are summarized in Table 1.

3.5.1 Glacial Till

The ground water flow system at the site consists of an upper and lower zone. The upper zone occurs in the glacial till, while the lower zone is found in the fractured bedrock. In both zones the depth to ground water is observed to change over the course of a year in response to varying recharge conditions. As shown in Figure 16, the water levels in the shallow monitoring wells MW-1 and MW-4 roughly parallel the water levels in monitoring wells MW-1R and MW-4R. Monitoring wells MW-1 and MW-4 are completed in the glacial till, while MW-1R and MW-4R are completed in the fractured bedrock. The highest ground water levels have occurred during the spring and the lowest levels have been experienced in the summer. The high water levels recorded in the spring reflect higher than average recharge conditions due to snowmelt and low evapotranspiration losses, while the low water levels observed in the summer reflects below normal recharge due to high evapotranspiration losses.

At both of these couplets, the ground water levels in the shallow glacial till wells are usually higher than those recorded in their neighboring fractured bedrock wells. In couplet MW-1/1R, the average ground water elevation difference (or head) is less than one foot, while at couplet at MW-4/4R the average head difference is 9.6 feet, which suggests that shallow ground water is recharging the underlying fractured bedrock.

A control for the separation of the ground water system at the site into an upper and lower zone is most likely the change in the permeability between the glacial till and the fractured bedrock at their contact. Due to the lower vertical permeability of the fractured bedrock, ground water perches above the bedrock surface and saturates the lower portion of the glacial till. This is evidenced by the difference in the average elevations of ground water above or below the bedrock contact. In the glacial till wells (MW-1 and MW-4), the average elevation of ground water from 1996 to 2004 was 2.3 (MW-1) to 2.7 (MW-4) feet above the bedrock surface. In the bedrock wells (MW-1R and MW-4R), the average elevation of ground water was 1.2 (MW-1R) to 7.1 (MW-4R) feet below the bedrock surface.

Horizontally, the direction of ground water flow in the glacial till, as measured on May 19, 2004, is from the northeast to the southwest across the site (Figure 17). The suspected recharge area for the shallow ground water is the infiltration of precipitation on site and the movement of ground water from the area upgradient and northeast of these wells. The direction of ground water flow in the glacial till is roughly parallel to the direction in slope of the top of the underlying bedrock (Figure 18), which would be expected since the elevation of the contact between these two units most likely controls the elevation of the perched ground water table in the glacial till.

The velocity of ground water flow in the glacial till can be estimated using Darcy's flow equation (Fetter 1994):

$$v = K/n * h/l \quad (1)$$

where:

v = flow velocity in feet/day
K = hydraulic conductivity of the glacial till in feet/day
n = effective porosity or specific yield in percent
h = hydraulic head in feet
l = length of flowline in feet

The hydraulic conductivity of the glacial till was evaluated by performing slug-type in-situ permeability tests in the four monitoring wells (MW-1 to MW-4) installed in the glacial till in March 1998. Based on the results of the tests, the hydraulic conductivity of the glacial till was found to range from 0.002 ft/day (MW-2) to 0.64 ft/day (MW-1), with a geometric mean of 0.037 ft/day (Table 2). This value is within the range of hydraulic conductivities reported for glacial till (0.0028 ft/day to 0.28 ft/day) by Fetter (2001). The effective porosity of the till, which consists of silt with fine sand and trace of fine gravel and clay, is estimated at 15 percent. The hydraulic gradient of the water table was estimated from the slope of a flowline from the contour map of the May 2004, ground water elevations. The hydraulic gradient for the water table in May 2004 was 0.044 ft/ft. Based on the values presented above, the estimated velocity for ground water flow in the glacial till is 0.01 ft/day or 4 ft/year. In the original RI Report (Normandeau Associates 2001) the ground water flow velocity in the glacial till was estimated to be 2.9 ft/year and this was based on ground water levels measured in May 2001. Using these two values the estimated average velocity of ground water flow in the glacial till would be close to 3.5 ft/yr. The low ground water flow velocity in the glacial till reflects both the low permeability of the till material and the low gradient of the water table at the site.

Ground water in the area flows to the southwest and toward the Mohawk River valley. The distance to Mohawk River from the site is approximately 3,000 feet. Using an estimated velocity of 4 ft/year, the travel time for ground water flow in the glacial till from the site to the Mohawk River is approximately 750 years. This time of travel estimate is based on the data obtained from the site, which may or may not be representative of the hydrogeologic conditions existing downgradient of the site. As a result, the actual time of travel for ground water flow in the glacial till could be higher or lower. Also, this value does not represent the potential travel time for the contaminated ground water identified at the site since the rate of movement of the contaminants is also dependent upon their physio-chemical properties, the advection and dispersion of the contaminants in the ground water and the hydrogeologic characteristics of the glacial till downgradient of the site.

3.5.2 Fractured Bedrock

As shown in Figure 16, the elevation of ground water in the fractured bedrock varies over time in response to changes in ground water recharge. Ground water levels in the fractured bedrock are highest during the spring in response to recharge from snowmelt and low evapotranspiration losses. Ground water levels are typically lowest during the summer when net recharge is relatively low due to high evapotranspiration losses (Table 1).

Using the ground water elevation measurements recorded in the fractured bedrock monitoring wells on May 18 and 19, 2004, a contour map of the ground water elevations in the fractured bedrock was prepared (Figure 19). As shown in this figure, at the site, the direction of ground water flow in the fractured bedrock is from the northeast to the southwest towards Edson Street. Just southwest of Edson Street, the ground water elevation contours begin to bend to the south-southeast, with the direction of ground water flow now being oriented towards monitoring well MW-19, located on the AIDA/UCMI property. The change in the direction of ground water flow reflects the change in the direction of the slope of the fractured bedrock. As shown in Figure 18, at the site, the bedrock surface slopes from northeast to southeast, while south of Edson Street the bedrock surface begins to slope in a south-southeast direction. Since the ground water in the fractured bedrock is confined by overlying till, ground water flow in the bedrock is going to follow the more highly fractured zone in the upper portion of bedrock unit. Ground water flow in the upper portion of the bedrock will be principally controlled by the elevation of this zone along with number, orientation and permeability of the fractures. Based on this information, it appears that a local receptor of ground water discharge would be the East Branch drainage southeast of the site, while the ultimate receptor would be the Mohawk River valley.

The velocity of ground water flow in the fractured bedrock can be estimated using two different approaches. Depending on the amount of fracturing and the hydraulic connectivity of the fractures the flow system could have the hydraulic characteristics of a porous media (or equivalent porous media, EPM) and Darcy’s flow equation (1) would be appropriate. If the bedrock is not well fractured and a low percentage of the fractures are interconnected the system would be characterized as consisting of discrete fractures and an alternative approach to calculating the velocity of ground water flow through the fractures would be used. This approach requires detailed information on the width of the fracture (the aperture), the transmissivity of the fracture and the hydraulic head in the fracture system. The velocity of ground water in a fracture can be estimated using (Bear 1972):

$$v = ((p * g)/ 12 * u) * (2b)^2 * i \quad (2)$$

where:

- v = ground water velocity in fracture
- p = density of water
- g = gravitational acceleration
- u = dynamic viscosity of water
- 2b = aperture width of fracture
- i = hydraulic gradient

The discrete fractures (DF) in bedrock can dominate ground water flow at the local scale, but at a larger or regional scale ground water flow in the bedrock approaches an equivalent porous media (EPM), in which Darcian flow conditions exist.

For this analysis, it was assumed that an EPM is representative of the ground water flow system at the site, so Darcian flow conditions are valid and the velocity of the ground water at the site scale can be estimated using the Darcy equation. To determine the hydraulic conductivity of the fractured bedrock at the site in-situ slug type permeability tests were performed at selected fractured bedrock monitoring wells in August 1997 (MW-6, MW-7, MW-8) and March 1998 (MW-4R, MW-8, MW-9 and MW-10). Unlike the tests performed in the shallow monitoring wells, the slug tests performed in the bedrock wells evaluate the hydraulic response of the fractured bedrock and the unfractured rock matrix. As a result, slug tests may underestimate the transmissivity of individual fractures, which may be the primary pathway for contaminant transport.

The results of the slug tests performed in the fractured bedrock are summarized in Table 2. The hydraulic conductivity of the fractured bedrock ranged from 0.72 ft/day (MW-9) to 13.1 ft/day (MW-8) with a geometric mean of 3.04 ft/day. This value is within average range of published values for the hydraulic conductivity of carbonate rocks (Heath 1998).

The effective porosity of the carbonate rock is estimated at 14 percent (Domenico and Schwartz 1990). The hydraulic gradient of the ground water table in the fractured rock was estimated from a central flow line from the contour map prepared using the May 18 and 19, 2004 ground water elevations. The hydraulic gradient for ground water in the fractured rock in May 2004 was 0.015 ft/ft. Assuming that the flow regime in the fractured bedrock is an EPM, the values presented above and using the Darcy flow equation (1), the estimated velocity for ground water flow in the fractured rock on the site is 0.33 ft/day or 118 ft/year. In the original RI Report (Normandeau Associates 2001) the estimated velocity of ground water flow was 277 ft/year, based on water level measurements recorded in May 2001. Using these two values the estimated average velocity of ground water flow in the bedrock is close to 200 ft/yr, which is close to 60 times greater than the estimated velocity of ground water flow in the glacial till.

Knowing the velocity of ground water flow, the travel time of ground water flow from the site to the Mohawk River can be estimated. The distance to Mohawk River from the site is approximately 3,000 feet. Using an estimated velocity of 200 ft/year, the hypothetical travel time for ground water flow in the fractured bedrock from the site to the Mohawk River is approximately 15 years. This time of travel estimate is based on the hydraulic conductivity measurements recorded in selected bedrock monitoring wells in 1997 and 1998 and on ground water elevation data obtained from the bedrock monitoring well network located on and off site. These data may not be representative of the hydrogeologic conditions that exist further downgradient of the site. As a result, the actual time of travel for ground water flow in the fractured bedrock could be higher or lower. Also, this value does not represent the potential travel time for the contaminated ground water identified at the site since the rate of movement of the contaminants is also dependent upon their physio-chemical properties, their advection and dispersion in the ground water and the hydrogeologic characteristics of the fractured bedrock downgradient of the site. Indeed, the actual distribution of the contaminants in the ground water at the site suggests that this hypothetical travel time has limited application in understanding the past or future migration of any contaminants of concern in ground water.

4.0 NATURE AND EXTENT OF CONTAMINATION

The purpose of the site investigations performed as part of the RIs was to determine the nature and extent of the site contamination. Previous investigations performed by Normandeau (1988, 1996, 1998 and 2001) have indicated that soils, ground water and/or sediments are contaminated by the historical release of electroplating solutions and/or vapor degreasing solvents to the environment. The two electroplating related inorganics, cadmium and hexavalent chromium, and the solvent TCE are the predominant contaminants identified at the site. As stated in the Phase I Investigation Report (Normandeau Associates 1986), each of these materials were previously utilized in the metal finishing operations:

Raw Material	Process Operation	Date of Usage
▪ Cadmium Anodes	Electroplating	1957-1985
▪ Cadmium Cyanide Plating Solution	Electroplating	1957-1985
▪ Cadmium Oxide	Electroplating	1957-1985
▪ Chromium Oxide	Electroplating	1957-1985
▪ Lead Anodes	Electroplating	1957-1985
▪ Nickel Chloride Plating Solution	Electroplating	1957-1985
▪ Trichloroethene (TCE)	Vapor Degreasing	1959-1983
▪ Zinc Cyanide Plating Solution	Electroplating	1957-1973

The results of the investigations performed to date (Normandeau Associates, 1986, 1996, 1998 and 2001 and Normandeau Engineers 1988) have identified the presence of electroplating related contaminants in the following areas: soils outside of the manufacturing building, soils underlying the former sludge drying pad, in the former soil stockpile, soils underlying the former vapor degreaser, in a floor drain and the former wastewater drain pipe, sediments in the drainage ditch and in the ground water below the site and downgradient of the site. The following sections present the results of the field investigations performed from 1996 to 2004 at the site.

4.1 SOILS

The results of past investigations at the site indicated that contaminated soils were present in the vicinity of past electroplating operations, both beneath and outside of the northern and eastern edges of the manufacturing building. From 1996 to 2004 additional investigations were performed at the site to more fully characterize the nature and extent of the contaminated soils. In addition, several Interim Remedial Measures (IRMs) were performed to reduce the potential risk posed by the contaminated soils. The scope and results of these IRMs are discussed along with the site investigations in the following sections.

4.1.1 Site Background

To evaluate the extent of contaminated soil material at the site and to establish cleanup limit concentrations, a background concentration for the each of the identified contaminants needed to be established. Initially, a series of six shallow (0-0.5 ft) soil samples (4 to 6 and 10 to 12, Figure 8) were collected from around the manufacturing building and analyzed for the electroplating inorganics. In four of the six samples (Table 3), detectable concentrations of cyanide were identified, which eliminated them for consideration as being representative of background conditions. In one of the samples (5) zinc was detected at a concentration that exceeded the reported background concentration for the eastern United States (NYSDEC 1994) by a factor of roughly 2 to 3 times. Only one of the original samples (6) did not have detectable concentrations of cadmium, hexavalent chromium or cyanide, but its concentration of zinc slightly exceeded the published background concentration for the eastern United States.

Since the initial soil samples were collected in 1997 over 200 soil samples have been collected from over 90 different sampling locations at the site (Figure 7). The results of these samples were screened based on having all of the electroplating inorganics analyzed, having non detectable concentrations of cadmium, hexavalent chromium and total cyanide and the use of consistent detection limits for these analyses. The absence of cadmium, hexavalent chromium and total cyanide was required to meet the background condition, since they are not commonly found in native (uncontaminated) soils.

A total of 23 samples were identified as meeting these criteria (Table 4). The results of the total chromium, lead, nickel and zinc analyses were then averaged and compared with their reported concentrations in the eastern United States and with the NYSDEC SCOs. Each of these inorganics was found at a concentration less than that reported for soils in the eastern United States. When compared to their NYSDEC SCOs, the average concentration of total chromium, nickel and zinc were slightly higher. No numeric value has been proposed for lead, although the NYSDEC (1994) does note that the average levels of lead in undeveloped, rural areas may range from 4-61 ppm (mg/Kg). As a result, the average concentrations for total chromium (17 ppm), lead (6.6 ppm), nickel (16 ppm) and zinc (46.1) are used in this report as being representative of background concentrations for the soils at the site.

4.1.2 Former Sludge Drying Pad

During the period of 1973 to 1985, plating bath solutions from a nickel/chromium plating line and from a cyanide/cadmium plating line were treated using two different treatment systems which were located in the area of the present grinding shop. The spent solution generated from the nickel/chromium plating line was first treated using chromium reduction, followed by conventional metal hydroxide precipitation in two subgrade tanks. The precipitated nickel/chromium solids were then pumped onto a concrete sludge drying pad, which was equipped with underdrains to collect the leachate produced. The leachate was then recycled to the plating treatment system. The treated nickel/chromium water was discharged to the drainage ditch until 1982, when the discharge was rerouted to the sanitary sewer. The dewatered sludge material was placed in containers and shipped off site for disposal. According to Ward personnel (F. Heeder and R. Dantz, pers. com.) following the cessation of the electroplating lines in the mid 1980s the two subgrade tanks were removed from the building in the mid 1980s and the excavation was backfilled with soil and then covered by concrete. This area now underlies the southern portion of the present grinding shop.

During this 12-year period (1973 to 1985), spent solution from the cyanide/cadmium electroplating operation was piped to an aboveground evaporation tank located in the vicinity of the sludge drying pad. The liquids were evaporated and the remaining solids were removed, placed in drums and shipped off site for disposal.

As part of the 1986 Phase II investigation (Normandeau Engineers 1988) two soil borings were drilled through the sludge drying pad and into the underlying soil material. Soil samples were collected from each of the borings at a depth of 30 to 36 inches below the top of the concrete (Figure 3). These samples were composited and analyzed for leachable concentrations of the 13 priority pollutant metals using the EP Toxicity Leaching Procedure and analyzed for total free cyanide and VOCs. Detectable concentrations of arsenic, lead, chromium, nickel and zinc were found in the leachate, with the concentration of lead exceeding its RCRA limit. Free cyanide was detected, while no VOCs were detected in the soil sample.

In July 1997, Normandeau personnel collected 11 soil samples from below the former sludge drying pad (Figure 6). The soil samples were collected at five different openings cut through the concrete floor. At each of the five locations an attempt was made to collect samples at one foot intervals, to a maximum of three feet below the concrete floor. Due to the shallow depth to bedrock or the presence of large rock fragments in the till, samples could only be collected from a depth up to two feet, except at location B where a sample was collected from a depth of two to three feet. Ground water was not encountered in the till at any of the sampling locations. The samples were submitted to the laboratory for the analysis of electroplating related inorganics, leachable inorganics and VOCs. The results of the laboratory analyses are summarized in Table 5.

The electroplating related inorganics (cadmium, chromium, cyanide, lead, nickel and zinc) were detected in the majority of the soil samples at concentrations greater than their recommended NYSDEC SCO (Table 5). The concentration of the particular inorganics varied both horizontally and vertically. Relative to their horizontal distribution, the highest concentrations of chromium, cyanide, lead, nickel and zinc were detected in the samples collected at location B, near the southeast corner of the former pad. The highest concentrations of cadmium were detected in the samples collected at location E, near the southwest corner of the pad. A possible explanation for the distribution of the higher concentrations of the inorganics near the edge of the pad, as opposed to its center, is the runoff of the liquids that had drained from the sludge pile onto the surrounding ground surface. The lowest concentrations of these inorganics were distributed throughout the samples with no preferred location.

Three VOCs were detected in the soils samples collected from the area below the former sludge drying pad. These included methylene chloride, toluene and TCE (Table 5). The presence of methylene chloride in the samples is believed to be a laboratory associated contaminant since it is commonly used for the cleaning of laboratory equipment and since it was not historically used at the site. Toluene was detected in two of the 12 samples, but at a concentration below its NYSDEC SCO. The source of the toluene is unknown, but it is commonly used as a solvent in manufacturing operations. TCE was detected in nine of the 12 samples, with the highest concentration (13 ug/kg) detected in the sample collected at location E at 1 to 2 feet (Table 5). TCE was used in the vapor degreaser and some of this material may have been present in the liquids that drained from the sludge drying pad. As shown in Table 5, the concentration of each of these VOCs is several orders of magnitude below their associated NYSDEC SCO. Since the concentration of the three VOCs identified are below their NYSDEC SCOs, their presence in the soils located below the floor of the present grinding shop does not represent a source for ground water contamination at concentrations above their NYSDEC Ground Water Standards.

The distribution of the inorganic and organics in the till below the former sludge drying pad varies both horizontally and vertically. The variation in their distribution is probably due to the random and discontinuous nature of any fractures in the concrete drying pad and in the underlying till. As mentioned in the Phase II Report (Normandeau Engineers 1988) several fractures in the concrete of the sludge drying pad were observed following the removal of the sludge material. The low permeability of the underlying till material would have also limited the vertical migration of any leachate derived from the sludge pile with any preferential flow occurring in fractures in the till. The expansion of the manufacturing building onto this area has further reduced the potential migration of the inorganics into ground water by eliminating the infiltration of precipitation. Thus, the inorganic contaminants cannot be leached from the soils. Also, the hydrochemistry of the ground water at the site is a limiting factor in the transport of the principal contaminant cadmium. The mobility of cadmium in soil and ground water has been shown to be limited (Christensen and others 1996) unless the pH of ground water is acidic. The pH of ground water at the site is slightly basic (greater than 7) which would favor sorption onto the soil, thus limiting its migration. Supporting evidence is the absence of cadmium in the ground water samples collected from the site (refer to Section 4.4). The fate and transport of cadmium in soils at the site is further discussed in Section 5.2 of this report.

4.1.3 Former Soil Stockpile and IRM

In 1988-1989, the building at the site was expanded with the construction of a new grinding shop in the area of the former sludge drying pad and a new warehouse along the north side of the manufacturing building (Figure 6). During construction, till material from the area of the former sludge drying pad was removed and stockpiled on site. The excavated till material was placed on a geosynthetic liner and then covered with additional liner material. The pile measured roughly 14 feet by 17 feet and on average was 3.5 feet high. The pile was located immediately off of the northeast corner of the manufacturing facility (Figure 6).

Samples were collected from the soil pile during the summer of 1996 (Sample A) and the summer of 1997 (Samples 1 to 3). Sample A was a composite of five separate surficial samples while Samples 1 to 3 were individual samples collected from each third of the pile. The samples were analyzed for the electroplating inorganics and the RCRA metals. The three samples collected in the summer of 1997 were also submitted for leachability testing (Table 6).

The only inorganic not detected in the soil pile samples was selenium, while the concentrations of cadmium, chromium, hexavalent chromium, cyanide and lead in each of the samples exceeded their NYSDEC SCO (Table 6). The inorganics found in the highest concentrations were total and hexavalent chromium and zinc.

In the three samples (1 to 3) that were submitted for leachability testing the inorganics barium, cadmium, hexavalent chromium, total chromium, cyanide, lead and mercury were detected in the leachate. Although several inorganics were detected in the leachate, only cadmium was detected in two of the samples (1 and 3) at a concentration exceeding its State and Federal toxicity limit of 1 mg/L.

Due to the presence of high concentrations of electroplating related metals in the soil pile material an IRM was proposed to remove and dispose of the soil pile at a licensed hazardous waste facility. On July 2, 1997, Clean Harbors excavated the soil pile using a backhoe and placed it into a lined roll off container. All of the soil material that had been placed on the liner material was removed along with the liner material and approximately one foot of soil material below the former pile. According to the hazardous waste manifest 21 cubic yards of material was removed and disposed of at a hazardous waste facility.

The NYSDEC, in a letter dated August 29, 1997, requested that a soil sample be collected from the middle of the area where the former soil pile was located and that it be analyzed for the electroplating related inorganics. A sample (Sample 4) was collected on September 5, 1997 and the results are presented in Table 7. Due to the elevated concentrations of each of the inorganics tested, additional samples were collected from this area on November 21, 1997. These samples were collected at three locations and at intervals of 0-1 feet and 1-2 feet below the ground surface. To further evaluate the vertical distribution of the electroplating inorganics in the soils at depth 2-3 feet, two additional soil samples were collected at locations 5 and 6 on August 25, 1999. The results of these samples are presented in Table 7.

Each of the electroplating inorganics was detected, in at least one of the samples, at concentrations that exceed their NYSDEC SCO at each location. The highest concentrations of cadmium, hexavalent chromium, chromium, cyanide and lead were detected in the sample collected at a depth of 1-2 feet at sampling location 7. The highest concentration of nickel was detected in the 0-1 foot sample collected from sampling location 7 while the highest concentration of zinc was detected in the 0-1 foot sample collected from sampling location 6. The lowest concentrations of each of the inorganics were detected in the sample collected from 2-3 feet at location 6.

To identify any trends in the concentration of the inorganics with increasing depth, the results of each sample were compared with the result of the sample collected below it. For the 35 pairs of samples, 46 percent had increasing inorganic concentrations with increasing depth, 49 percent had decreasing concentrations with increasing depth and 5 percent were unchanged. None of the inorganics consistently increased or decreased in concentration with increasing depth.

The results of these samples suggest that these soils were impacted by the historic release of spent electroplating solution in this area. Considering that the soil pile was placed onto a geomembrane liner and covered by liner material the potential for the leaching of the electroplating inorganics into the underlying soils is relatively low. A more probable source would have been the historic release of electroplating solution onto the ground surface in this area.

The IRMs performed in 1997 and in 2004 (refer to Section 4.1.8) have effectively removed the contaminated soil material associated with the soil stockpile and in the area around its former location. In addition, no impact to ground water from cadmium in this location has been observed. In 1996 and 1997, the ground water samples collected from the three monitoring wells (MW-1, MW-1R and MW-2) located downgradient of the former soil pile area were analyzed for cadmium. Cadmium was not detected in any of the ground water samples collected from these wells. This finding suggests that while cadmium was present in the soils in the area of the former stockpile, it did not leach from these soils and did not impact ground water quality. For further discussion of ground water quality at the site refer to Section 4.4.

4.1.4 Former Vapor Degreaser

A vapor degreaser was previously located in the area immediately southwest of the present grinding shop and along the wall of the manufacturing building (Figures 3 and 6). The only evidence of the former vapor degreasing operation is the presence of two vents in the east wall of the manufacturing building. These vents were used for the discharge of vapors generated by the degreasing operations.

To evaluate the nature and extent of contamination associated with the operation of the former vapor degreasing system, soil samples were collected from below the interior concrete floor slab in the area where the degreasing system was previously located (Figure 6). An opening was cut through the concrete floor slab and soil samples were collected at one foot intervals to a depth of three feet. The soil samples were analyzed for the electroplating related inorganics and VOCs. If the total concentration of any of the inorganics or VOCs exceeded their RCRA TC limit by a factor of 20, they were then also tested for leachability.

The soil material below the concrete floor was tan to brown in color and consisted of clayey silt with a trace of gravel and was dry. These sediments are glacial till and due to their dense nature and high cohesiveness represented reasonable substrate material for the concrete floor.

The results of the laboratory analyses of the soil samples are summarized in Table 8. All of the electroplating related inorganics, except for hexavalent chromium, were detected in each of the samples at a concentration that exceeds their NYSDEC SCO. The concentration of hexavalent chromium in the sample collected from a depth of 1 to 2 feet was below the analytical detection limit. Only the concentration of cadmium was high enough in the 0-1 ft and 2-3 ft. samples to further test for leachability. The results of the leachability tests indicate that leachable concentrations of cadmium are present in the soils at these depths at levels that exceed State and Federal TC standards (Table 8).

Since only one location was sampled, the horizontal distribution of the electroplating inorganics cannot be assessed. Vertically, the concentration of 50 percent of the inorganics tend to decrease with increasing depth while the other 50 percent have increasing concentrations with increasing depth. In the deepest sample collected (2-3 feet) the concentration of each of the inorganics exceeds their NYSDEC SCO. The leachate produced from this sample had cadmium at a concentration that exceeded its State and Federal TC standard.

As mentioned previously, the low permeability of the till material below the building would potentially limit the vertical migration of any electroplating materials released to the subsurface. In addition, the presence of the building (floor slab and roof) has further reduced the potential migration of the inorganics into ground water by eliminating the infiltration of precipitation. Further limiting factors include the chemistry of the soils and ground water at the site. The mobility of cadmium in soil and ground water has been shown to be limited (Christensen and others 1996) unless the pH of ground water is acidic. The pH of ground water at the site is slightly basic (greater than 7) which would favor sorption onto the soil, thus limiting its migration. The fate and transport of cadmium in the soils at the site is further discussed in Section 5.2 of this report.

In addition to the inorganics, the soil samples were analyzed for VOCs. The VOCs methylene chloride, cis-1,2-dichloroethene and TCE were detected in the soil samples (Table 8). Methylene chloride was also detected in the laboratory blanks, so the suspected source of this VOC is the laboratory. Cis-1,2-dichloroethene was detected in two of the soil samples while TCE was detected in each of the soil samples. Cis-1,2-dichloroethene is a breakdown product of TCE, so its presence most likely reflects the natural degradation of TCE in the subsurface. The source of the TCE was most likely the former vapor degreasing system.

The concentrations of cis-1,2-dichloroethene and TCE detected in the soil samples were orders of magnitude lower than their respective NYSDEC SCOs. As a result, the presence of the these VOCs in the soils below the floor slab to do not represent a source for ground water contamination above their NYSDEC Groundwater Quality Standards (GQS).

4.1.5 Floor Drain and Former Discharge Pipe IRM

The former electroplating operations were located inside the building immediately northwest of the vapor degreaser (Figures 3 and 6). Evidence of the former electroplating operations includes the outlines of the former rinse water troughs and a floor drain on the interior floor. As discussed in the Phase I Report (Normandeau Associates 1986), spilled electroplating bath solution was collected in four parallel concrete floor troughs, which discharged to drains below the concrete slab floor. These drains then discharged to a concrete pipe that transported the wastewater to the drainage ditch east of the building. The former rinse water troughs were previously filled with concrete and only stormwater from the roof of the manufacturing building is now discharged into the drain pipe.

An interior floor drain was identified immediately south of the former electroplating lines (Figure 6). A sample of the sediment found in the drain pipe was collected using a soil coring device. The sample was collected at a depth three feet below the concrete floor and it consisted of dark brown to black colored fine sand and gravel. This material also included metal grindings fragments, had an organic odor and a sheen. The sample was submitted to the laboratory for the analysis of the electroplating related inorganics and the vapor degreasing related VOCs. Leachability tests were also performed on the drain sample for selected inorganics and the VOCs. The results of the laboratory analyses are summarized in Table 9.

Based on the presence of metal fragments in, and the associated organic odor of, the drain sample, high concentrations of inorganic and organics were expected and the results of the laboratory analyses confirmed their presence. The concentration of cadmium, hexavalent chromium, total chromium, nickel and zinc exceeded their NYSDEC SCOs. Due to the high concentration of cadmium, total chromium and zinc in the sediment sample, the leachability of these contaminants was also tested. The resulting concentration of cadmium in the leachate exceeded its State and Federal TC standard (Table 9).

The VOCs detected in the sediment sample collected from within the floor drain included aromatic and chlorinated hydrocarbons (Table 9). The principal VOCs detected were TCE (19,000 ug/kg), cis-1,2-dichloroethene (6,200 ug/kg) and vinyl chloride (380 ug/kg). The concentration of each of these compounds exceeds their NYSDEC SCO. The suspected source of these compounds is the former vapor degreasing operations. TCE was used as the principal solvent, while the presence of cis-1,2-dichloroethene and vinyl chloride may reflect the reductive dehalogenation of TCE since the metal finishing operations were terminated.

Due to the high concentration of these VOCs in the sediment sample it was also submitted for leachability testing. The concentration of TCE in the sediment sample leachate produced by the test was found to exceed its State and Federal TC standard.

Due to the high concentrations of cadmium and TCE detected in the floor drain sediment, an IRM was proposed to evaluate the presence of contaminated sediments that were present in the drain pipe outside of the building, any contaminated exterior soils below the drain pipe and to remove any contaminated material encountered. In August 1999, ThermoRetec of Ithaca, New York submitted a Work Plan for the drain pipe IRM (ThermoRetec 1999a). The Interim and Final Reports for the IRM were included in Appendix H (Volume Two) of the RI Report submitted in July 2001.

In the initial phase of the IRM, the condition of the 18 and 24-inch diameter drain pipe was evaluated using a robot mounted video camera. The extent of this evaluation was limited to the straight section of the drain pipe underlying the lawn area east of the manufacturing building. Due to a bend in the 18-inch diameter pipe section near the building the video survey could not continue beyond this point (Figure 20). The drain pipes were observed to be in a weathered condition with some cracks throughout and corrosion in the bottom half. Both the 18-inch and the 24-inch pipe are reinforced concrete (RCP) with bell and socket joints. The joints contained no gaskets or mortar and all observed joints appeared to leak uniformly (ThermoRetec 1999c).

In the second Phase of the IRM, four test pits were excavated along the drain pipe. Two test pits were excavated along the 18-inch pipe section, one at the junction of the three pipes encountered and one adjacent to a manhole along the 24-inch pipe section. During the excavation of test pit TP-1 (Figure 20), the top of the 18-inch pipe was broken. Through the opening in the pipe a sample of the sediment along the bottom of the pipe was collected. The sediment sample was submitted to the laboratory for the analysis of chromium and VOCs. The results of these analyses are presented in Table 9. Due to the high concentration of chromium detected in the sediment sample it was decided to also have this sample submitted for leachability testing. As shown in Table 9, the concentrations of cadmium, chromium and lead in the leachate produced from the sediment sample exceeded their State and Federal standards.

As part of the IRM, the removal of the contaminated sediments from the 18-inch pipe section was proposed. In December 2000, ThermoRetec and Op-Tech Environmental Services completed the flushing of this pipe section. To remove the sediment from the drain pipe a pit was excavated at the junction of the 18 inch and the 24 inch diameter pipes (Figure 20). A 20 gallon tote box was placed in the pit and the excavation was lined with plastic. The 18-inch drain pipe was then cleaned with a truck-mounted “Laser” sewer jet. The fluids and sediments that were discharged from the pipe were temporarily collected in the tote box that was continuously emptied by a vacuum truck and hose. During the jetting process, a faint sheen and odor was noted in the discharge water and a sample was collected for VOC analysis. The entire cleaning process was done twice, following which the pipe was visibly free of sediments. A total of 1,123 gallons of water and sediment were generated. The water and sediment were manifested, transported and disposed of as a presumed hazardous liquid at Chemical Waste Management’s Model City landfill (ThermoRetec 2001). A new manhole was then installed at the junction of the 18 inch and 24 inch diameter pipes, east of the manufacturing building.

4.1.6 Transformer Pad Area and PCB IRM

Several rounds of soil samples have been collected in the area outside of the manufacturing building. In July 1997, one shallow (0-0.5 ft.) soil sample (S-3) was collected from the area between the manufacturing building and the transformer pad (Figure 7). This sample was analyzed for the electroplating related inorganics and VOCs. The results of this sample are presented in Table 10. Due to the high concentration of several of the inorganics in this sample, additional samples were collected at six different locations (S-16 to S-21, Figure 8) in January 1998. At each of these locations a shallow (0-1 ft) and a deep (1-2 ft) sample was collected. Each of the samples was analyzed for the electroplating related inorganics (except cyanide), VOCs and three of the shallow samples were tested for PCBs. The results of the laboratory analyses are presented in Table 10.

Although each of the electroplating related inorganics were detected in at least one of the soil samples, the highest concentrations were detected in the shallow samples collected at sample locations S-3, 18 and 19. These samples were collected along the pathway between the transformer pad and the eastern wall of the manufacturing building. In each of these samples the concentration of cadmium, hexavalent chromium, total chromium, lead, nickel, and zinc exceeded their NYSDEC SCO.

To identify any trends in the concentration of the inorganics with increasing depth, the results of each sample were compared with the result of the sample collected below it. For the 36 pairs of samples, only 8 percent had increasing inorganic concentrations with increasing depth. For the majority of the samples (83 percent) the inorganic concentrations decreased with increasing depth. For eight percent of the samples the inorganic concentrations did not change with depth. These results suggest that the bulk of the contamination was in the shallow soils and that their vertical migration was limited.

Although leachability tests were not performed on any of these samples, sufficient analyses have been performed on other soil or sediment samples collected from the site to determine the potential for the leaching of these inorganics from the soil. The concentrations of cadmium, cyanide, nickel and zinc were high enough to leach from the soil, with the concentration of cadmium being high enough to result in an exceedance of its State and Federal TC standard.

VOCs were detected in five of the 12 soil samples collected around the transformer pad (Table 10). The VOCs detected in the soil samples were methylene chloride (five samples) and TCE (one sample) at concentrations lower than 20 ug/Kg. The presence of methylene chloride in the soil samples likely does not reflect a release of this organic compound at the site, but more likely reflects a laboratory contaminant as it is commonly used as a solvent by laboratories to clean their equipment. The only sample that had detectable concentrations of TCE present was the shallow soil sample collected at sampling location S-18, which is located below the former vapor degreasing station vents. Neither the concentration of methylene chloride or TCE exceeded their recommended NYSDEC SCO. Thus, this area is not an existing source for the contamination of ground water by VOCs.

The presence of PCBs was tested in three of the shallow soil samples (S-18, 20 and 21). No operations of Ward Products are known or suspected to have used PCBs. The three samples were collected outside of the fence that encloses the transformer pad and three active transformers. A fourth inactive transformer is stored in the southeast corner of the fenced transformer pad area. The transformers are owned by the Niagara Mohawk Corporation and are marked non-PCB containing.

The results of the PCB analyses are summarized in Table 10. PCBs were detected in two of the three soil samples, with the concentration of PCBs ranging from 60 ug/Kg (S-20) to 6,170 ug/Kg (S- 18). In both samples the only PCB detected was Aroclor-1254. The highest concentration of PCBs was detected in the sample (S-18) that was collected outside the door to the grinding shop and northwest of the transformer pad. The shallow soil material at this location consisted of a 0.5 foot layer of fill material over glacial till. The fill material consisted of silt, sand and gravel that was partially iron stained and included metal fragments, green colored paint chips and coal or cinder fragments.

In December 1998, Blasland, Bouck & Lee, Inc. (BB&L), as a contractor to Niagara Mohawk, collected soil samples from 10 different locations in the area around the transformers. At five of the locations a shallow (0-0.5 ft.) and a deep (0.5-2.0 ft.) sample were collected while at the five remaining locations only a shallow sample was collected. Each sample was then submitted to Galson Laboratories, Inc. for the analysis of PCBs. In the 15 samples analyzed only one sample contained total PCBs at a concentration (11 mg/Kg) that exceeded the NYSDEC SCO of 1 mg/kg for surficial soils. This sample was collected between sampling locations 3 and 18 and is located outside of the transformer pad. In a letter report dated June 14, 1999 Niagara Mohawk denied responsibility for the

PCBs detected in the soils at the site because they had no record of PCB-containing oil having ever been used in the transformers at Ward Products, no record of any spills or releases at this facility, and because the highest PCB concentrations were detected in soils outside and slightly upgradient of the transformer area.

Since Niagara Mohawk declined to take responsibility for addressing the PCB contaminated soils, Ward retained ThermoRetec to prepare a Work Plan for an IRM to remove and dispose of the PCB contaminated soils. The IRM (ThermoRetec 1999b) included the excavation of the soil to a depth of 8 to 12 inches from the area located between the manufacturing building and the transformer pad in the vicinity of sampling locations S-3 and S-17, roughly a 255 sq. foot area. In October 1999, the soils were excavated by West Central Environmental, under supervision by ThermoRetec, using a backhoe and placed in a 20 cubic yard rolloff container. A total of 15 cubic yards of soil material were excavated and placed in the container. Following the removal of the PCB contaminated soil, eight confirmatory soil samples (C1 to C8) were collected from the bottom and sidewalls of the excavation and analyzed for PCBs and cadmium. The concentration of PCBs in these soil samples ranged from non-detected (three samples) to 2.20 mg/Kg (C6). The concentration of cadmium ranged from 11 mg/Kg (C5) to 6,900 mg/Kg (C6). Due to the presence of PCB in sample C6 at a concentration greater than the NYSDEC SCO, additional soil material was removed along the eastern portion of the excavation in November 1999 and an additional soil sample was collected (C9) from the side wall of the excavation. PCBs were not detected in this sample, but cadmium was detected at a concentration of 130 mg/Kg, which exceeds its NYSDEC SCO. This portion of the site, an active electric transformer pad, is fenced and controlled by Niagara Mohawk and access was not granted by them for the removal any additional material.

A composite sample was also collected from the excavated material temporarily stored in the rolloff container. This sample was submitted to the laboratory for disposal characterization, which included leachability testing for: RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver), VOCs, SVOCs, herbicides/pesticides, corrosivity, ignitability, cyanide reactivity and sulfide reactivity. Only three parameters were identified above their detection limit: barium, cadmium and chromium. Of these three inorganics only cadmium was identified at a concentration that exceeded its State and Federal TC standard. As a result, the excavated material was classified as hazardous waste and was transported to Chemical Waste Management's facility in Model City, New York.

4.1.7 Exterior Soils North and East of the Manufacturing Building

Beginning in 1997, several rounds of soil samples have been collected from the areas north and east of the manufacturing building. These areas include the narrow strip of land between the manufacturing building and the fence along the drainage ditch, the undeveloped land north of the drainage ditch, and the area east of the manufacturing building from the fence along drainage ditch to the access road for the loading dock (refer to Figure 7). As discussed in Section 2.1.4, the soil samples have been collected at varying depths and have been analyzed for the electroplating related inorganics (cadmium, chromium, hexavalent chromium, cyanide, lead, nickel and zinc. In addition, nine samples (S-53, S-88A, S-89 to S-95) were collected from the undeveloped area north of the drainage ditch and analyzed for VOCs.

4.1.7.1 Electroplating Related Inorganics

Soil samples have been collected in phases from the areas north and east of the manufacturing building to determine the extent of electroplating related inorganics in the shallow soils. In the initial sampling phases soil samples were collected from the area around the former soil pile (Table 7), around the transformer pad (Table 10) and the area east of the present grinding shop. The sampling grid was progressively expanded south into the lawn area and north and east of the manufacturing building. The results of the soil samples collected from these areas are presented in Table 11.

Hexavalent chromium was only detected in 9 of the 168 samples analyzed (or 5.4 percent), while total cyanide was detected in 10 of the 165 samples analyzed (or 6.1 percent). Where the concentration of hexavalent chromium or total cyanide exceeded their detection limits they also exceeded their NYSDEC SCO, which is the site background (non detected). The highest concentrations of hexavalent chromium (6 mg/Kg to 10.2 mg/Kg) were detected in three of the shallow (0-0.5 ft) samples (1, 2 and 14) collected in the area located immediately east of the present grinding shop. High concentrations of hexavalent chromium were also detected in several of the samples (S-3, S-18 and S-19) collected from the area near the transformer pad. These shallow (0-0.5 ft) soils were removed from the site during the PCB IRM (refer to Section 4.1.6). The highest total cyanide concentrations (16 mg/Kg and 24 mg/Kg) were detected in shallow (0-0.2 ft or 0.2-1.0 ft) soil samples collected in the area east of the grinding shop (S-30 and S-34) and in the area north of the manufacturing building (S-40 and S-42).

To evaluate the distribution of cadmium, total chromium, lead, nickel and zinc in the shallow (0-1.0 ft) soils at the site, the sampling results were plotted and contoured (see Figures 21 to 25). Since these inorganics were used as part of the same general process (electroplating/metal finishing) that produced the materials released at the site, it would be expected that they would be similarly distributed where they were introduced into the environment. The limited distribution of hexavalent chromium in the soils at the site is most likely due to its reduction to trivalent chromium (refer to Section 5.2.2). The limited distribution of cyanide in the soils at the site is most likely due to its natural degradation (refer to Section 5.2.3 for further discussion of the fate of chromium and cyanide in the environment).

The highest concentrations of cadmium were detected in the soil samples collected northwest of the transformer pad (S-3, 206 mg/Kg, Table 10) and northeast of the manufacturing building (S-42, 263 mg/Kg, Table 11). The NYSDEC SCO for cadmium is the site background concentration or non detected (<0.25 mg/Kg). As shown in Figure 21, the areas where cadmium concentrations in the shallow soil exceed its NYSDEC SCO are outlined by the 1 mg/Kg contour line. This includes most of the lawn area, the strip of land between the manufacturing building and the fence along the drainage ditch and a nearly circular area in the undeveloped land north of the drainage ditch. Note that Figure 21 does not reflect the removal of the soil material near the manufacturing building as part of the IRM performed in 2004 (refer to Section 4.1.8).

The distribution of chromium in the shallow soil at the site is similar to cadmium (Figure 22). The highest chromium concentrations were detected in the soil samples collected in the vicinity of the transformer pad (S-18, 507 mg/Kg, Table 10), the areas east of the present grinding shop (S-15A, 885 mg/Kg, Table 11) and north of the warehouse (S-42, 730 mg/Kg) and in the undeveloped parcel north of the drainage ditch (S-82, 1134 mg/Kg). The NYSDEC SCO for chromium at the site is equal to its background concentration of 17 mg/Kg and the areas where the concentration of chromium in the shallow soils exceeds its NYSDEC SCO are outlined by the 17 mg/Kg contour line in Figure 22. Note that Figure 22 does not reflect the removal of the soil material near the manufacturing building as part of the IRM performed in 2004 (refer to Section 4.1.8).

Lead was found in the shallow soils at concentrations exceeding the NYSDEC SCO of 6.6 mg/Kg (site background) in the lawn area east of the manufacturing building and in the undeveloped area north of the manufacturing area (Figure 23). The highest concentrations of lead were found in the soils located in the vicinity of the former soil pile (S-11, 354 mg/Kg) along the north side of the manufacturing building (S-46, 252 mg/Kg) and in the semicircular area north of the building (S-53, 548 mg/Kg) in the undeveloped parcel owned by the New Water Realty Corporation. Note that Figure 23 does not reflect the removal of the soil material near the manufacturing building part of the IRM performed in 2004 (refer to Section 4.1.8).

The distribution of nickel in the soils at the site is similar to that of the other electroplating inorganics with the highest concentrations of nickel detected in the area located west of the transformer pad (S-19, 1300 mg/Kg), the vicinity of the former soil pile (S-7, 691 mg/Kg) and in the semicircular area north of the building (S-56, 945 mg/Kg) (Figure 24). The NYSDEC SCO for nickel is equal to the site background concentration, which is 16 mg/Kg. The areas at the site where the concentration of nickel in the shallow soils exceeds its NYSDEC SCO are outlined by the 16 mg/Kg contour line in Figure 24. Note that Figure 24 does not reflect the removal of the soil material as part of the IRM performed in 2004 (refer to Section 4.1.8).

The highest concentrations of zinc in the exterior soils were found west of the transformer pad (S-19, 2,080 mg/Kg, Table 10) and in the vicinity of the former soil pile (S-11, 2,020 mg/Kg and 2,080 mg/Kg, Table 11). As shown in Figure 25, elevated zinc concentrations are also found in the soils east of the manufacturing building, the strip of land between the manufacturing building and the fence along the drainage ditch and in the undeveloped parcel north of the drainage ditch. The areas at the site where the concentration of zinc exceed its background concentration of 46.1 mg/Kg are shown in Figure 25. Note that Figure 25 does not reflect the removal of the soil material as part of the IRM performed in 2004 (refer to Section 4.1.8).

To assess the vertical distribution of the electroplating inorganics in the soils at the site, pair wise comparisons were performed on each of the depth stratified samples collected from below the former soil pile (Table 7), around the transformer pad (Table 10) and the building exterior (Table 11). For each pair an increasing or decreasing concentration trend was noted with increasing depth. For this comparison at least one of the sampling values had to be greater than the analytical detection limit. Hexavalent chromium and cyanide were not included in this analysis because of the limited number of samples that had detectable concentrations of these inorganics.

The concentration of cadmium, total chromium, lead, nickel and zinc in the soils outside of the manufacturing building typically decreased with increasing depth. On average, 61 percent of the sample pairs had decreasing concentrations of the electroplating inorganics with increasing depth, while 37 percent of the samples had increasing concentrations with increasing depth. In the remaining two percent of the samples, the inorganic concentrations did not change with increasing depth. These findings suggest that most of the impacted soils were shallow in depth and that the electroplating related metals haven’t migrated downward to any great depth. A factor limiting the vertical migration of these contaminants into the subsurface is the low permeability of the glacial till. The fate and transport of these inorganics in the area around the manufacturing building will be discussed further in Section 5.2 of this report.

The suspected source of the electroplating inorganics in the exterior soils north and east of the building is most likely to have been the release or disposal of spent electroplating solutions or sludges onto the ground surface. The highest concentrations of the electroplating inorganics are located in the immediate vicinity of the grinding shop, which is the location of the former sludge drying pad and the electroplating line waste water treatment system (Figure 4). These materials may have been redistributed along the northern portion of the manufacturing building and in the lawn area east of the building during the construction of the drainage ditch in the late 1960s or early 1970s.

The elevated concentration of the electroplating inorganics in the undeveloped parcel north of the manufacturing facility may have been associated with the disposal of the miscellaneous debris in this area. The miscellaneous debris in this area consists of crushed metal drum lids, metal pails, wiring, broken amber glass and decomposing wooden palettes. An aerial photograph obtained from the US Department of Agriculture and dated from 1978 shows a partially cleared area north of the manufacturing area, roughly where the miscellaneous debris has been observed. According to Ward Products personnel (Al Darmofal, pers. comm.), this area was originally cleared for the construction of a septic system. The construction was never completed, most likely due to the low permeability of the glacial till and the shallow depth to ground water. Ward Products personnel also acknowledged that miscellaneous solid wastes from the manufacturing facility were placed, in the past, in this area. The discovery of this material during the collection of the soil samples confirms this information.

4.1.7.2. Volatile Organic Compounds

During the collection of the soil sample S-53 in February 2001 and sample S-82 in April 2001 miscellaneous debris was observed in the shallow soils in the exterior soils located in the undeveloped parcel. This debris included crushed metal drum lids, wiring, nails, and broken glass. The results of the inorganic analyses (Table 11) for these samples indicated that several of the electroplating related inorganics were present at higher than average concentrations. Having confirmed the presence of electroplating inorganics in the shallow soils in this area and noting the presence of crushed drum lids, it was decided to collect several additional soil samples for VOC analysis. In June 2001, nine soil samples (S-53, S-88A, and S-89 to S-95) were collected from an area where miscellaneous debris was observed at the ground surface in the undeveloped parcel north of the drainage ditch (Figure 7).

The soil samples were collected at locations where metal debris was observed at the ground surface. The soil samples were collected from shallow test pits excavated by hand using a soil shovel. The test pit excavation was terminated when shallow ground water was encountered, which ranged from 1.2 to 1.8 feet below grade. The soil samples were collected from the soil horizon above the ground water table and, if possible, below the disturbed surficial soil. Each sample was analyzed for VOCs and no VOCs were detected in any of the soil samples collected from this area.

4.1.8 2004 Soils IRM

In January 2004, The RETEC Group (RETEC, formerly ThermoRetec) performed an IRM for the metals contaminated sediments and soils at the site. The Construction Complete – Final Engineering Report for the Soils and Sediments IRM is included in Appendix D, while a discussion of the Sediments IRM is presented in Section 4.2.5 of this report. The Soils IRM targeted the metals contaminated exterior soils located north and east of the manufacturing building. It was the objective of the Soils IRM to significantly reduce the potential exposure of humans and the environment to the metals contaminated soils by removing the more highly contaminated material followed by the placement of clean fill.

As discussed in Section 4.1.7, metals contaminated soils and debris were discovered in a portion of the undeveloped property located north of the manufacturing building. Metals contaminated soils were also discovered around the exterior of the building near the present grinding shop. This portion of the building was once the location of the electroplating sludge drying pad, which was eliminated in the mid 1980s. Immediately northeast of this area, metals contaminated soils excavated during the expansion of the manufacturing building in 1988-1989 were stockpiled until their removal in 1997.

Prior to the excavation work, RETEC collected a composite soil sample for waste disposal characterization. One sample (NH Composite) was collected to represent the onsite metals impacted soils. This sample was analyzed for full TCLP parameters and PCBs, the results of which were found to be acceptable to the City of Albany (non-hazardous) Landfill.

The Soils IRM included the excavation, temporary stockpiling, transport and disposal of the metals contaminated soils at the City of Albany Landfill. Based on the findings from the site characterization work the proposed depth of excavation ranged from 0.5 feet to 3 feet, with a typical depth of excavation of 1.5 feet. Throughout the work RETEC collected confirmatory soil samples and their locations are shown in Figures 2 and 3 of the Soils and Sediments IRM Report in Appendix D.

The soil samples were composites of sub-samples taken around the bottom of each excavation area and each of the samples was analyzed for total cadmium. In several locations (approximately one out of four) the cleanup objective was not initially met, so after receipt of the sampling data, additional soil was excavated from those locations and confirmation sampling was repeated. In three locations (C2, S46 and S82), the remaining cadmium concentrations were found to be slightly above the total cadmium IRM cleanup objective of 30 mg/Kg (ppm), but subsequent TCLP analyses of those samples showed that the remaining soil was not hazardous and that, with NYSDEC concurrence, the objective of the IRM was met. At two of the sampling locations (S14 and S54) the soil samples were also analyzed for total chromium. The results of the final confirmatory soil sampling are summarized in Table 12.

When the pre and post IRM soil sampling results are compared (Table 12), a significant reduction in the cadmium and/or chromium concentrations in the remaining soil is apparent. It is also expected that the concentration of any cyanide, lead, nickel and/or zinc would have also been significantly reduced by the removal of the highly contaminated soil material. In addition, at several of the locations (S10, S11, S12, S13, S15A, S16A, S17A and S54) all of the soil was removed down to the top of bedrock, so no contaminated soils remain in place at those locations.

In June 2004, the excavated areas were backfilled with clean soil material and hydroseeded to control erosion. The removal of the most highly contaminated soils has reduced the potential threat of exposure to humans and the environment and, as a result, has fulfilled the objective of this IRM.

4.2 SEDIMENTS

Beginning in 1986 and ending in 2003, multiple sediment samples have been collected from the drainage ditch located on the site, from the East and West Branch (EB and WB) drainages downstream of the site, from a neighboring background stream and from the Mohawk River. In addition, sediment samples have been collected from a detention basin that was recently constructed in the upper reach of the EB drainage. The following sections summarize the results of the sediment samples collected from each of these locations.

4.2.1 Drainage Ditch

As discussed in Section 1.2, untreated electroplating solutions were discharged from the manufacturing plant and into the adjoining drainage ditch via the drain pipe from the late 1950's to approximately 1973. From 1973 to 1983, the electroplating solutions were pretreated and then discharged to the drainage ditch. Treatment system discharges to the drainage ditch ended in 1983 with the connection to the City of Amsterdam’s sewer system.

The presence of electroplating related inorganics in the drainage ditch sediments was first evaluated during the initial site investigations performed in 1986 (Normandeau Engineers 1988). Six sediment samples were collected along the length of the drainage ditch and tested for the USEPA Priority Pollutant Metals using the EP Toxicity procedure. The results of these analyses indicated that electroplating related inorganics (cadmium, chromium, lead, nickel and zinc) and cyanide were present in sediments in the drainage ditch (Normandeau Engineers 1988).

Additional sediment samples were collected from the drainage ditch at multiple locations (Figure 9) during the period of 1996 to 1998. The results of these samples are summarized in Table 13. Elevated concentrations of each of the electroplating related inorganics were detected in the drainage ditch sediments collected from both upstream and downstream of the drain pipe outfall on the site (Table 13). The highest concentrations of each of the inorganics (except cadmium) were detected in the samples collected at the drain pipe outfall. The highest concentration of cadmium was detected in the sample collected near the beginning of the drainage ditch. The presence of the electroplating related inorganics in the sediments located upstream of the outfall is most likely due to the release of these contaminants onto the soils bordering the drainage ditch and in an area north of the drainage ditch.

The highest concentrations of the electroplating related inorganics were typically detected in the shallow (0-0.5 feet) samples when compared with the results for the deeper (0.5-1.0 feet) samples. This distribution suggests that the source of these contaminants were materials discharged to the drainage ditch and that some of this material did migrate vertically downward into the underlying material (glacial till). In addition, this distribution confirms that the concentration of these contaminants decreases with increasing depth and supports the conclusion that the vertical extent of the contaminated material would be limited to several feet below the bed of the drainage ditch.

When the sediment sample results were compared with the NYSDEC Sediment Criteria (NYSDEC 1993), the concentration of total cadmium, total chromium, total lead, total nickel and total zinc in the majority of the sediment samples were found to exceed their Severe Effect Levels (SELs). The sediment samples were also tested using the TCLP method to determine if the electroplating related inorganics could be leached from the sediment. The results in Table 13 indicate that, of the metals tested, only cadmium was leached from the sediment at concentrations greater than its RCRA TC standard. This result indicated that the cadmium contaminated sediment in the drainage ditch might represent a source for ground water contamination and is considered hazardous. In response to these findings an IRM was performed by RETEC to remove the contaminated sediments from the drainage ditch (refer to Section 4.2.5).

In addition to the analysis of the sediment samples for the electroplating related inorganics, two sediment samples, collected near the drain pipe outfall in November 1997, were also analyzed for VOCs and TPH. No VOCs were detected in the shallow (0-0.5 feet) sediment sample, while low concentrations of VOCs were detected in the deeper (0.5-1.0 feet) sample. Specifically, TCE was detected at 11 ug/Kg and PCE at 6 ug/Kg. Considering their low concentrations, the presence of these VOCs does not appear to represent a significant continuing source for the contamination of the ground water at the site.

During the collection of the sediment samples at the outfall a strong organic odor was noticed and an organic sheen appeared on the water surface. The results of the TPH analyses performed on these samples confirmed that high concentrations of petroleum hydrocarbons are present in the sediments near the outfall. The concentration of TPHs ranged from 4,000 mg/Kg, in the shallow sediment sample, to 6,000 mg/Kg, in the deeper sediment sample. The source of the TPHs is suspected to be associated with the former releases from the drain pipe outfall. This material was removed from the drainage ditch during an IRM performed by RETEC in January 2004 (refer to Section 4.2.5).

4.2.2 East and West Branch Drainages

Runoff and sediment produced from the eastern portion of the site discharges through a culvert under Edson Street and into the upper portion of two tributary drainages to the Mohawk River. Prior to the construction of the Amsterdam Industrial Park, runoff flowed into the West Branch (WB) drainage. During the construction of the industrial park, the upper reach of the WB drainage was redirected to discharge into the East Branch (EB) drainage.

To determine if contaminated sediments were present in the EB and WB drainages, samples were collected along the length of each of these drainages from their origin near Edson Street and downstream to their confluence with the Mohawk River. These samples were collected starting from the upper portion of the drainages to the lower portion of the drainages from 1997 to 2002. The results for the sediment samples collected in the drainage ditch are presented in Table 13, the results of the samples collected from the upper reaches of the EB and WB drainage are presented in Table 14, while the results for the samples collected in the intermediate and lower portions of the drainages, including the Mohawk River, are presented in Tables 15 to 17. In addition, two sediment samples were also collected from a perennially flowing stream located west of the site to establish background concentrations for total cadmium, total chromium and total nickel. The laboratory results for the sediment samples were compared with their NYSDEC SELs. No SELs have been established for hexavalent chromium or cyanide. Since these two inorganics are not commonly found in the environment, their detection limit concentrations were used to determine their extent in the sediments of the EB and WB drainages.

The longitudinal distribution of the contaminated sediments in the EB and WB drainages downstream of the site varies with the specific parameter. For hexavalent chromium, cyanide, lead and zinc, their distribution in the sediments appears to be limited to portions of the upper EB and WB drainages in the Amsterdam Industrial Park, which is located between Edson Street and Sam Stratton Road (Tables 13 and 14). The concentrations of total cyanide and hexavalent chromium in the upper reach of the EB drainage begin to fall consistently below their detection limits between 200 and 400 feet downstream of the Edson Street culvert (Table 14). In the upper section of the WB drainage, hexavalent chromium was detected in two of the three sediment samples collected upstream of the culvert at Sam Stratton Road (Table 14). This area is favorable for the deposition of sediment due to the ponding of runoff immediately upstream of the culvert. For lead and zinc their concentration in sediments in the EB drainage consistently fall below their NYSDEC SELs between 50 and 100 feet downstream of the Edson Street culvert (Table 14) and they were not detected at concentrations above their NYSDEC SELs in the samples collected from the WB drainage immediately above the Sam Stratton Road culvert (Table 14).

Downstream of Sam Stratton Road cadmium, chromium and nickel were the only electroplating related contaminants that were detected above their NYSDEC SELs in the sediment samples collected from the EB and WB drainages. The variation in the concentration of each of these inorganics in the shallow sediment samples along the length of the EB and WB drainages is shown in Figures 26 and 27. The upper 765 feet of both of these drainages are the same, while downstream of this point they diverge into two separate channels.

In the EB drainage (Figure 26), the variation in the concentration of each of the inorganics roughly parallels each other, reflecting their common source (the former electroplating operations at Ward Products). From the drain pipe outfall on the site to the downstream side of the Sam Stratton Road culvert, in the industrial park, the concentration of cadmium, chromium and nickel rapidly decreases to concentrations below their NYSDEC SELs. This decreasing concentration trend would be expected because of the increasing distance from the suspected source and because these sediments would most likely become mixed with uncontaminated sediment over time.

From Sam Stratton Road (Sample EB-1) to the culvert at the railroad spur (Sample EB-6) the East Branch flows through undeveloped forest land (Figure 26 and Table 15). The concentrations of the three inorganics increase in this section to levels above their NYSDEC SELs.

In the reach of the East Branch drainage downstream of the railroad spur, channel flows into a culvert, which then passes through a residential neighborhood before discharging into an open channel south of Chapman Drive and into a culvert at State Route 5. The concentrations of cadmium, chromium and nickel increase between Chapman Drive (railroad spur) and State Route 5.

Downstream of State Route 5, the concentrations of cadmium, chromium and nickel trend lower, but with a significant spike in the concentration of all three organics upstream of the culvert at the Amtrak railroad tracks (Figure 26 and EB-9 in Table 15) and in the portion of the channel downstream of Quist Road (EB-11). The increase in the concentration of cadmium, chromium and nickel at the culvert (EB-9) is most likely due to the deposition of sediment in this area following periods of high flow. During sampling it was noted that the inlet to the culvert had become clogged with debris, so that under high flow conditions runoff would have been temporarily impounded in this area. The impoundment of the water would have promoted the deposition of sediment.

The lowest most section of the EB drainage, where samples EB-11 and EB-12 were collected appears to flow perennially and may experience backwater effects from the Mohawk River during periods of high water levels. The concentration of cadmium, chromium and nickel were detected in several of the sediment samples collected from these two locations were greater than their NYSDEC SELs.

The West Branch drainage, having its channel filled during the construction of the industrial park, now originates immediately upstream of a culvert (West Branch Culvert, Figure 9) located at Sam Stratton Road. From Sam Stratton Road (near WB-1) to the railroad spur culvert (near WB-5) this reach of the WB drainage flows through undeveloped forest land (Figure 9). In this section the concentration of cadmium, chromium and nickel in the channel sediments typically exceed their

NYSDEC SELs (Table 16). At the railroad spur the channel of the WB is diverted into a culvert which then flows under a residential neighborhood and then discharges into an open channel on a property located east of Holly Street (upstream of WB-6, Figure 9). At sampling location WB-6, the concentration of cadmium, chromium and nickel in the channel sediment were found to be below their NYSDEC SELs (Table 16). The stream then enters a culvert and flows under State Route 5 and discharges into an open channel and merges with an unnamed perennially flowing stream (upstream of WB-7, Figure 9). The combined streams then flow through a rock lined constructed channel south to a culvert at the Amtrak railroad tracks. From Route 5 to the culvert at the Amtrak railroad tracks, the concentrations of cadmium, chromium and nickel all decrease to below their NYSDEC SELs (Figure 27 and Table 16).

In the drainage ditch and in the EB and WB drainages, both shallow (0-0.5 feet) and deeper (0.5-1.0 feet) samples were collected. The results of the shallow and the deeper samples were compared to evaluate the vertical distribution of these contaminants in the channel sediments. In general, the highest concentrations of the inorganics were found in the shallow samples. The trend of decreasing inorganic concentrations with increasing depth was observed in 62 percent of the samples, with increasing concentrations observed in 35 percent of the samples. No change in contaminant concentration with increasing depth was observed in 3 percent of the samples. The decrease in contaminant concentrations with increasing depth most likely reflects the transition from channel sediment to the underlying native material. For the 35 percent of the samples where increasing concentrations were observed, younger cleaner sediment may have buried older more contaminated sediment.

In addition to having the sediment samples analyzed for their total concentrations, the samples collected from the drainage ditch and in the EB channel downstream of the culvert on Edson Street and 50 feet further downstream were also submitted for leachability testing. Of the inorganics tested only cadmium was detected at a concentration that exceeded its RCRA TC standard. Leachable cadmium was present in the shallow samples collected from the drainage ditch and in both the shallow and deep samples collected at the outfall, in the EB channel downstream of the culvert on Edson Street and 50 feet further downstream. Although not tested for leachable cadmium, the concentration of total cadmium in the samples collected from the EB and WB channels upstream of the culverts on Sam Stratton Road would probably have produced cadmium leachate at a concentration that would have exceeded its TC standard. As a result, the sediments in the drainage ditch, the EB drainage downstream of Edson Street and upstream of the culverts on Sam Stratton Road were removed as part of an IRM performed by RETEC in January 2004 (refer to Section 4.2.5).

4.2.3 Mohawk River

The lowest reaches of the EB and WB drainages discharge into the Mohawk River. The WB drainage discharges into the Mohawk River from two corrugated metal culverts under the Amtrak railroad tracks, while the EB drainage discharges into the Mohawk River from a constructed channel that flows south of Quist Road (Figure 9). Due to the control of the water levels in the Mohawk River by the New York State Canal System the lowest portions of the EB and WB drainages are submerged from the late spring (May) through to the late fall (November), while they are exposed on the northern bank of the Mohawk River during the winter, when the water levels are several feet lower.

Sediment samples were collected from multiple locations from the Mohawk River’s bank and active channel near the outlets of the EB and WB drainages in December 2002 and April 2003. The sampling locations are shown in Figure 10, the laboratory results are summarized in Tables 15 and 16, while the laboratory reports are presented in Appendix A of this report.

At the outlet of the EB drainage, sediment samples (EB-13, 14 and 15) were collected from the channel that the East Branch was flowing through across the bank of the Mohawk River (Figure 10). Sediment samples were also collected at one location upstream (EB-17) of the EB channel and at two locations downstream (EB-15 and 16). In April 2003, sediment samples were also collected from the active channel of the Mohawk River, upstream (EB-18 and downstream (EB-20 and 21) of where the EB discharged into the river (Figure 10).

As shown in Table 15, the results of the sediment samples indicate that cadmium, chromium and/or nickel are present in sediment in the lowermost channel of the EB (EB-13 and 14), along the bank (EB-17) and in the active channel (EB-19) of the Mohawk River at concentrations greater than their NYSDEC SEL. The presence of cadmium, chromium and/or nickel in the sediment samples collected from the lowermost section of the EB channel suggests that these contaminants have been transported along with the sediment load carried by the EB and were deposited into the Mohawk River. The presence of high concentrations of chromium and nickel in the sediment collected at the end of the EB channel (EB-19) suggests that these inorganics may also be present in the sediments of the active channel of the Mohawk River.

At the outlet of the WB drainage, sediment samples (WB-11, 12 and 13) were collected on the northern bank of the Mohawk River, but in the area where the West Branch was flowing in a well defined channel (Figure 10) across the bank. Sediment samples were also collected at one location upstream (WB-16) and at two locations (WB-14 and WB-15) downstream of the channel (Figure 10).

When the results of the shallow (0-0.5 feet) and deeper (0.5-1.0 feet) samples are compared with their NYSDEC SELs, only chromium and lead were detected in one sample (WB-16, 0.5-1.0 feet) at concentrations exceeding these levels. As a result, a round of additional samples (WB-16A, B and C) were collected in April 2003 in the area where WB-16 had been collected to further evaluate the extent of the chromium and lead contaminated sediments. As shown in Table 17, none of the electroplating inorganics (cadmium, chromium, lead, nickel or zinc) were detected in either the shallow (0-0.5 feet) or deeper (0.5-1.0 feet) samples at concentrations exceeding their NYSDEC SELs. Based on these results, it appears that the extent of sediment contamination by the electroplating inorganics in the lowest portion of the WB drainage and on the bank of the Mohawk River is limited and that the extent of the contamination has been sufficiently characterized.

4.2.4 Detention Basin

A detention basin was constructed on the EB drainage just downstream of Sam Stratton Road in late 2001 or early 2002. According to AIDA sources, the purpose of this basin is to reduce the peak flows generated by runoff from the industrial park to the lower portion of the EB drainage. The construction of the detention basin in the EB channel most likely resulted in the redistribution of contaminated sediment in this area and its operation will most likely result in the accumulation of sediment within the basin, some contaminated, thereby reducing transport of contamination downstream.

To determine if contaminated sediments are present in the basin, three sediment samples were collected from its floor in April 2003 followed by the collection of 17 soil samples (including a duplicate) from the banks of the basin in September 2003. Although the material along the detention basin banks is not technically sediment, meaning that it is not subaqueous (it was not deposited in water nor is it being transported by flowing water) some of it likely was originally sediment in the channel of the EB. As such, it may represent a potential source of contaminated sediment to the basin. Thus, the results of these samples are included in the discussion of contaminated sediments in this section of the report. The sediment and soil sampling locations are shown in Figure 11, their laboratory results are summarized in Tables 18 and 19 and the laboratory reports are included in Appendix A of this report.

In the three sediment samples collected in April 2003, the concentration of each of the metals tested (cadmium, chromium, lead, nickel and zinc) exceeded their detection limits (Table 18). Only in sample DB-2 did the concentration of three of the metals (cadmium, chromium and nickel) exceed their NYSDEC SEL. This sample was collected closest to the inlet of the EB drainage (Figure 11) and the elevated concentrations of these metals in this sample most likely reflects the recent deposition of sediments transported from the upper portion of the EB drainage. As shown in Table 14, much higher concentrations of cadmium, chromium and nickel were detected in sediment samples (Sam Stratton EB Culvert) previously collected from the upstream side of the culvert located on Sam Stratton Road and upstream of the detention basin. Due to the high concentration of the metals detected in these sediment samples, the material that had accumulated upstream of the EB culvert was removed during an IRM performed by RETEC in January 2004 (refer to Section 4.2.5).

The results of the soil samples collected from the banks of the detention basin were compared with several different reference data including published background values for soils in the eastern United States, background values for soils at the Ward Products site and the NYSDEC SCOs (Table 19). Three of the soil samples collected from the banks of the detention basin had concentrations of cadmium (samples DB 4, 8 and 16) and chromium (samples DB 8, 14 and 16) that exceeded their background values and one sample (sample DB 8) had nickel at a concentration exceeding its background values. These results suggest that some electroplating metals are present in the soils around the detention basin, but they are not in sufficient quantity to represent a significant continuous source of contamination to the lower portion of the EB drainage. The impoundment of water in the detention basin and the deposition of sediment within it should reduce the transport of contaminated sediment from the upper to the lower portion of the EB drainage.

4.2.5 2004 Sediments IRM

In January 2004, RETEC performed an IRM to address the contaminated sediments in the drainage ditch on the site and in portions of the East and West Branch drainages downstream of the site. The scope and findings of the Sediments IRM are discussed in detail in the Soils and Sediments IRM Report included in Appendix D. The main objectives of the Sediments IRM were to remove and properly dispose of TCLP “hazardous” sediments within the drainage ditch and the East and West Branch drainages so that the potential exposure of humans and the environment to the electroplating related inorganics (cadmium, chromium, cyanide, nickel and zinc) would be significantly reduced.

Prior to the implementation of the IRM, RETEC collected two composite sediment samples (Ditch) for pre-characterization and waste disposal analysis. These samples were considered to be representative of the sediments present in the drainage ditch and the off site drainages. One sample was collected in December 2003 and was analyzed for the TCLP metals, while the second sample was collected in January 2004 and was analyzed for PCBs and reactivity. The results of these tests were found to be acceptable (as a D006 hazardous waste) for disposal at Chemical Waste Management’s landfill in Model City, New York.

Based on the results of the site characterization studies that have been performed since 1996, five areas of contaminated sediment were targeted by the IRM. These areas included; a 60 foot long section of the drainage ditch located north of the manufacturing building, a 180 foot long section of the drainage ditch along the eastern property line, a 100 foot long section of the upper East Branch drainage (immediately downstream of Edson Street), and upstream of the culverts on the East and West Branch drainages at Sam Stratton Road (refer to Figures 2 and 3 in Appendix D).

The contaminated sediment was removed using excavators from bank to bank and to depths ranging from 0.5 to 3.5 feet below the channel bed. Throughout the work, RETEC collected confirmatory sediment samples and they were analyzed for the electroplating related inorganics. Following review of the analytical data, and in consultation with the NYSDEC and New Water Realty Corporation, RETEC instructed the testing laboratory to analyze some of the ditch samples for additional parameters (TCLP cadmium and total chromium, nickel, zinc and cyanide). These analyses were performed to provide a more complete comparison of pre versus post IRM residuals. The locations of the confirmatory samples are shown in Figures 2 and 3 of Soils and Sediments IRM Final Report (Appendix D) along with the complete sampling results.

In Tables 20 and 21, the results of the confirmatory samples are compared with the results of samples previously collected from the drainage ditch (upstream, outfall, midpoint and upstream culvert), the upper portion of the East Branch drainage (downstream culvert, downstream 50 ft) and on the East and West Branch drainages at the culverts at Sam Stratton Road. In comparing the pre versus post IRM results, the concentrations of each of the electroplating inorganics have been significantly reduced, with the majority of them falling below their NYSDEC SELs. The only exceedances included two samples (D10-B and D11) for total cadmium, two samples (D10-B and WC-1) for total chromium and two samples (D7-B and D10-B) for nickel. The concentrations of these metals were also found to exceed their NYSDEC SCO levels (Tables 20 and 21). The concentrations of cadmium in the sediments remaining at sampling locations D10-B and at D11 were not high enough to produce cadmium at a concentration that exceeds its RCRA TC limit. Although a few of the electroplating related inorganics remain in place at concentrations exceeding their NYSDEC soil and sediment standards, their overall mass has been significantly reduced by this IRM and the remaining sediments are covered by geofabric and armor stone, thereby eliminating transport by erosion. The material excavated from the drainage ditch, the upper East Branch drainage and the culverts at Sam Stratton Road was transported to and disposed at the Chemical Waste Management's Model City landfill.

4.3 SURFACE WATER QUALITY

Surface water is present on an intermittent basis in the drainage ditch that is located along the northern and eastern portions of the site. This drainage ditch then discharges through a culvert below Edson Street into the upper reach of the East Branch drainage. The West Branch drainage originates at a culvert located on Sam Stratton Road, immediately south of the AIDA/UCMI property. During the site investigations performed in the 1980s and the 1990s/2000s water quality samples have been collected from both the drainage ditch and the East and West Branch drainages to characterize surface water quality.

4.3.1 Drainage Ditch

The first attempt at characterizing the surface water quality at the site was made by Normandeau Engineers, which collected two rounds of water quality samples from the drainage ditch in 1988

(Normandeau Engineers 1988). The results of the April 1988 sampling round indicated the presence of total chromium, hexavalent chromium and TCE at concentrations greater than their NYSDEC Surface Water Quality Standards (SWQS) in the sample collected from the drainage ditch below the outfall. The October 1988 results also showed the presence of total and hexavalent chromium in surface water at concentrations greater than their standards in the sample collected immediately downgradient of the outfall, but were not detected in the sample collected immediately upstream of the culvert on Edson Street (Normandeau Engineers 1988).

To evaluate the impact of the historical releases of electroplating solutions into the drainage ditch on surface water quality, several rounds of surface water samples have been collected from the drainage ditch at the site from 1996 to 2003. The water quality samples have been collected at two locations along the drainage ditch, one upstream of the drain pipe outfall in the northeastern portion of the site (SW-1) and one downstream of the drain pipe outfall on the upstream side of the Edson Street culvert (SW-2, Figure 12). The surface water quality samples have been analyzed for both inorganic and organic contaminants by a certified laboratory (Table 22), while measurements of water temperature, specific conductance, pH, Eh and dissolved oxygen (Table 23) were recorded in the field.

Due to the ephemeral nature of the drainage ditch, a limited number of water quality samples have been collected over the past eight years. Out of 18 sampling rounds, five grab samples have been collected upstream of the drain pipe outfall and 11 samples have been collected downstream of the drain pipe outfall. The difference in the number of samples collected upstream and downstream of the outfall is due to the discharge of the roof drain system on the manufacturing building into the drainage ditch via the drain pipe outfall. During rainfall events runoff is quickly generated from the roof of the building, while runoff from the upland soils is relatively slow and in low volumes. On only five occasions were water quality samples collected at both the upstream and downstream sampling locations. These sampling events occurred either during spring snowmelt or during or immediately after significant rainfall had occurred.

When the upper portion of the drainage ditch was flowing (SW-1), the quality of the runoff was relatively good. None of the parameters tested were detected at concentrations greater than their applicable NYSDEC SWQS, except for turbidity (Table 22). Only one of the electroplating related inorganics (chromium) was detected above its limit of quantitation during one sampling event (May 2000). Although chromium was detected in this sample, its concentration was several orders of magnitude below its standard. No VOCs were detected in any of the samples (Table 22) collected from SW-1.

The pH of the surface water samples collected from SW-1 ranged from slightly acidic to mildly basic (6.96 to 7.83 standard units or S.U.), moderately to poorly oxygenated (4.3 to 6.6 mg/L) and had specific conductivity readings ranging from 140 to 561 umhos/cm (Table 23). None of these field parameters exceeded their NYSDEC SWQS for Class D surface waters.

At the downstream sampling station (SW-2, Figure 12), electroplating related inorganics were detected in eight of the ten samples collected (Table 22). The concentrations of cadmium (one sample) and hexavalent chromium (four samples) were detected above their NYSDEC SWQS. The possible sources of these inorganics include the remobilization of contaminated sediments in the drain pipe and/or the drainage ditch. Since the repair and cleaning of the drain pipe, as part of an IRM completed in December 2000, the concentration of hexavalent chromium has declined below its detection limit. This result suggests that the drain pipe IRM has reduced the release of contaminants into the drainage ditch and their impact on surface water quality. Of the VOCs tested only TCE was detected, in one of the ten samples analyzed (November 1997), at an estimated concentration of 1 ug/L (Table 22).

As with the samples collected at SW-1, the water quality samples collected downstream of the outfall had a pH ranging from slightly acidic to mildly basic (7.04 to 8.22 S.U.). The samples were moderately oxygenated (3.5 to 12.3 mg/L) and had specific conductance (30 to 277 umhos/cm) that were slightly higher than those recorded upstream of the outfall (Table 23). None of the field parameters exceeded their NYSDEC SWQSs for Class D surface waters.

Starting in 2004, the requirement for the collection and analysis of surface water quality samples from the drainage ditch was eliminated. This decision was based on the low concentration of metals and the lack of any VOCs in the surface water samples collected from the drainage ditch following the cleaning and repair of the drain pipe. In addition, an IRM performed in the spring of 2004 removed the metals contaminated sediment in the drainage ditch, thereby eliminating another potential source of the contamination.

4.3.2 East and West Branch Drainages

A limited number of surface water quality samples have also been collected from the drainages located downstream of the site. On March 28, 2002 a round of surface water quality samples were collected from station SW-2 in the drainage ditch and from 10 locations downstream of the site on the East and West Branch drainages (Figure 12). These samples were submitted to the testing laboratory for the analysis of the electroplating related metals (cadmium, hexavalent chromium, total chromium, cyanide, lead, nickel and zinc), hardness and turbidity. The results of these samples are summarized in Tables 24 and 25, while the laboratory report is included in Appendix E.

When compared with the NYSDEC SWQS, only cadmium was identified in one sample (EB-QR) at a concentration higher than its standard. The elevated concentration of cadmium in this sample was most likely due to the re-suspension of stream sediment by maintenance activities performed by CSX Transportation personnel. While sampling, it was observed that CSX Transportation crews were attempting to clear the upstream side of the culverts on the East and West Branches at the railroad tracks. The inlets to both culverts had become clogged during a recent snowmelt/rainfall event. To reduce the threat of flooding and to increase the flow through the culverts material around the inlets was excavated and placed along the banks of the channel. The high turbidity (300 ntu) of the water sample collected downstream of the railroad tracks (EB-QR) suggests that the excavation activities had re-suspended metal contaminated sediment into the flowing water. The presence of metals contaminated sediments in this area was previously discussed in Section 4.2.2.

The results of the surface water sampling suggest that although metal contaminated sediments are present in the East and West Branch drainages, they are not, under normal conditions, impacting the surface water quality in these drainages or in the Mohawk River.

4.4 GROUND WATER QUALITY

A network of 22 ground water monitoring wells has been installed on at the site and on several downgradient properties (Figures 2 and 5). Four of the monitoring wells (MW-1 to MW-4) are installed in the glacial till and the remaining wells (MW-1R, MW-4R and MW-5 to MW-20) have been installed in fractured bedrock. Ground water quality samples have been regularly collected from the monitoring wells beginning in 1996 with the most recent sampling round collected in August 2004. Field measurements of water temperature, specific conductance, Eh, pH, and dissolved oxygen have also been recorded during each sampling period and those results are summarized in Table 26. The specific laboratory analyses performed on the ground water samples along with their laboratory results are summarized in Table 27. The specific parameters analyzed by the laboratory or measured in the field have changed over time in response to the addition of new monitoring wells, to eliminate unnecessary testing and to address specific data needs (refer to Section 2.1.8).

4.4.1 Ground Water Quality of the Glacial Till

Unconfined shallow ground water is present in the glacial till at the site. Information on the elevation of the ground water table, direction of ground water flow and water quality in the glacial till unit has been obtained from a network of four shallow monitoring wells (MW-1 to MW-4) that were installed at the site (Figures 2 and 5). These wells were installed in the area east of the manufacturing building to confirm the findings of an earlier investigation of ground water contamination performed at the site. During a site investigation by Normandeau Associates in 1986, chromium contaminated ground water was encountered in several test pits excavated in the vicinity of the former sludge drying pad and the drain pipe. No monitoring wells were installed as part of that investigation so the nature and extent of the contaminated ground water were not fully evaluated at that time.

4.4.1.1 Field Measurements

Field measurements of water temperature, specific conductance, pH, Eh and dissolved oxygen have been measured during the collection of ground water quality samples from the glacial till monitoring wells from August 1996 to September 2003. These parameters were dropped from the water quality monitoring program beginning in 2004. The temperature of the ground water in the till has ranged from 10.1 ^{o}C (MW-3) to 22.0 ^{o}C (MW-1) with an overall average of 14.8 ^{o}C. As expected, the highest shallow ground water temperatures were recorded during the summer sampling rounds (August and September), while the lowest ground water temperatures were recorded during the spring. Although water temperature is not impacted by the contamination at the site this parameter does have an influence on the measurement of the specific conductance, pH, Eh and dissolved oxygen of the ground water.

The average specific conductance of the shallow ground water ranged from 538 umhos/cm (MW-4) to 690 umhos/cm (MW-1). These values are much higher than those recorded in the surface water samples collected from the drainage ditch (Table 23), which reflects the dissolution of cations and anions from the glacial till by ground water. The highest specific conductivities have been recorded in the samples collected from monitoring well MW-1, which is located near the former electroplating sludge drying pad. The higher than average conductivities measured in the samples collected from MW-1 probably reflects the presence of dissolved inorganics (metals) that were released from the former electroplating operations in this area (see discussion in Section 4.4.1.2).

The pH of the shallow ground water was mildly basic with average pH values ranging from 7.42 (MW-1) to 7.68 (MW-4). These pH values fall within the range of pH values (6.0 to 8.5) typically reported for ground water (Hem 1989). The mildly basic nature of the ground water reflects the composition of the glacial till that predominantly consists of fine-grained carbonate material (limestone and dolostone).

Eh is a measure of the electron activity in a solution. The average Eh of the shallow ground water ranged from 0.202 volts (MW-1) to 0.219 volts (MW-2). The Eh data in combination with the pH results provides information on the oxidation-reduction state of the hydrochemical system and can be used to determine the principal form of inorganic species present in the ground water. With an average pH of 7.56 and an average Eh of 0.212 volts, the shallow ground water has the characteristics of a transitional environment between shallow ground water and surface water. The effect on the species of dissolved metals found in the ground water is further discussed in Section 4.4.1.2.

The average concentrations of dissolved oxygen (D.O.) in the shallow ground water ranged from 5.5 mg/L (MW-1) to 9.1 mg/L (MW-3), which are indicative of oxygenated conditions. These relatively high concentrations of D.O. suggest that low concentrations of organic material are present in the ground water and that oxygen consuming microbial activity is generally limited in the glacial till.

4.4.1.2 Inorganic Contaminants

Both metal and nonmetal inorganics were analyzed in the samples collected from the monitoring wells, MW-1 to MW-4, installed in shallow glacial till (Table 27). These analyses have included the electroplating associated inorganics (cadmium, cyanide, chromium, hexavalent chromium, lead, nickel and zinc) and several hydrochemical constituents (chloride, iron, manganese, nitrate and sulfate) that are important for the evaluation of the fate and transport of VOCs (refer to Section 5.2). The specific inorganic analyses performed on the samples collected from the glacial till wells have changed over time in response to the results of past sampling rounds (refer to Section 2.1.8).

Cadmium and lead were not detected in any of the samples collected from the shallow monitoring wells in 1996 and 1997 (Table 27). Cyanide was only detected in the samples collected from MW-1 in 1996 and 1997, but at concentrations below its NYSDEC GQS. Nickel was only detected in the samples collected from monitoring wells MW-1 and MW-3 in November 1997. Zinc was detected in one sample collected from MW-1 (November 1997) and in two samples collected from MW-3 (May and November 1997). Since cadmium, cyanide, lead, nickel and zinc were either not detected or were only detected infrequently and at concentrations below their NYSDEC GQSs they were all dropped from the water quality monitoring program beginning in 1998.

The principal inorganic contaminant identified in the ground water in the glacial till is chromium. Analyses for total chromium and hexavalent chromium were performed by the laboratory, while the concentration of trivalent chromium was estimated as the difference between the results of the total and hexavalent chromium analyses. The predominant form of chromium detected in the shallow ground water was hexavalent chromium, with little to no trivalent chromium estimated to be present. Hexavalent chromium is soluble and mobile in ground water having pH greater than 7.0, while trivalent chromium is characterized as being relatively insoluble and immobile (USEPA 2000).

The highest concentrations of total chromium (as hexavalent chromium) have been observed in the samples collected from monitoring wells MW-1 and MW-2, while lower concentrations of chromium have been detected in ground water samples collected from MW-4. Total chromium has only been detected in two of the 17 samples collected from monitoring well MW-3 with those being at concentrations well below its NYSDEC GQS (Table 27). The low concentrations of total chromium in monitoring well MW-3 are not unexpected since this well is located near the eastern property line and hydraulically side gradient of the majority of the site (Figure 17). Based on these results, it appears that the extent of the chromium contaminated ground water, in the glacial till, is localized to the area east of the manufacturing building.

Since the ground water monitoring program began at the site in 1996, the concentration of total chromium in the ground water samples collected from monitoring wells MW-1 and until most recently (2002) also in MW-2 have consistently exceeded its NYSDEC GQS. During the first several years of sampling, the high concentration of chromium in these wells was evidenced by the yellow/green discoloration of the ground water. This discoloration was most likely the result of the presence of monomeric chromate $(CrO_4)^{-2}$ at concentrations exceeding 1 mg/L (Palmer and Puls 1994). This discoloration has slowly decreased over time reflecting the declining concentration of chromium in the ground water at these wells. This decreasing trend in chromium concentrations at monitoring wells MW-1 and MW-2 is shown in Figure 28. At MW-1 the concentration of total chromium has declined from a maximum of 33.1 mg/L (November 1997) to 0.232 mg/L (September 2003), while at MW-2 the concentration of chromium has declined from a maximum of 1.81 mg/L (May 1998) to an estimated concentration of 0.0037 mg/L (August 2004). At monitoring well MW-4, the concentration of chromium had declined from 1998 to 2003, but in 2004 it rebounded to levels close to or just exceeding its standard. Overall, the decline of total chromium in the shallow monitoring wells installed in the glacial till is most likely due to several factors including the dilution of the chromium by its mixing with clean ground water flowing onto the site, its dispersion with ground water flow, its mixing with infiltrating precipitation, the adsorption of the chromium onto the glacial till and the removal of the suspected sources of this contaminant.

The suspected sources of the chromium found in the ground water in the glacial till are the past releases of chromium oxide that was used in the former electroplating operations at the site (Normandeau Associates 1986). Based on the ground water quality data these releases may have occurred in two different areas. Soil samples collected from the area east of the grinding shop and in the area of the former soil pile (refer to Section 4.1.3) contained high concentrations of total chromium. In addition, cyanide was detected in several of the soil samples collected from the vicinity of the former soil pile and in the ground water samples collected from MW-1. Cyanide was used at the site in the cadmium/cyanide electroplating process. The presence of elevated concentrations of chromium and cyanide in the shallow soils in the vicinity of MW-1 suggests that electroplating solutions were released at the ground surface in the area of MW-1 in the past. The electroplating solution appears to have migrated into the glacial till and has contaminated the shallow ground water in this area. As part of an IRM performed in January 2004, the electroplating related inorganic contaminated soils located in the areas east and north of the manufacturing building were excavated and removed from the site. The completion of this IRM significantly reduced the amount of material available to potentially leach chromium into the shallow ground water in these areas near MW-1.

The second suspected source area is the drain pipe and outfall located near monitoring well MW-4 (Figure 5). Leakage from the drain pipe or the infiltration of the discharge from the outfall into the subsurface may represent the source for the chromium contamination in this area of the site. Evidence supporting this view was discovered during an evaluation of the drain pipe by Normandeau in 1997 and by ThermoRetec in November 1999 (ThermoRetec 1999c). In 1997, Normandeau collected a sample of sediment from a floor drain located in the area of the former electroplating operations. This sample contained high concentrations of hexavalent chromium (refer to Section 4.1.5). During ThermoRetec's investigation in 1999 four test pits were excavated along the 18-inch and 24-inch diameter sections of the drain pipe (Figure 20). A soil sample was collected from each test pit from below an exposed pipe joint, roughly a depth of four feet below grade and a sample of the sediment within the drain pipe was also collected. These samples were then submitted for the analysis of total chromium and VOCs. Chromium was detected in each of the soil samples at concentrations ranging from 540 mg/Kg (TP-1) to 9,500 mg/Kg (TP-3) with the highest concentration being detected at a bend in the drain pipe near the building (Figure 20). Total chromium was detected at a concentration of 11,000 mg/Kg in the drain pipe sediment sample (refer to Section 4.1.5).

Based on the observations made by ThermoRetec during their investigation, they concluded "the pipe appears to have leaked significantly in the vicinity of TP-3, but only moderately (and uniformly) from all other joints." Considering that the depth to ground water in the vicinity of the drain pipe, as measured at MW-4, can be as shallow as four feet below grade, the potential for the past migration of wastewater from the drain pipe joints or its outfall to the underlying ground water is high. With the elimination of the discharge of electroplating materials to the drain pipe in the 1980s, the repair of the drain pipe connection and the removal of chromium contaminated sediment from within the drain pipe as part of an IRM performed by ThermoRetec in December 2000 (ThermoRetec 2001) the principal sources of the chromium contamination in the shallow ground water in this area of the site have been removed.

The horizontal extent of chromium contamination in the shallow ground water is presently limited to the site and is dependent upon both the direction of ground water flow and the proximity to the source areas. Based on the direction of ground water flow (Figure 17) the chromium contaminated ground water in the glacial till is horizontally migrating to the southwest on site and towards Edson Street with decreasing concentrations along this flowpath. The decrease in chromium concentration with increasing distance downgradient is observed at monitoring wells MW-1 and MW-2. Monitoring well MW-1 is located near the former sludge drying pad while MW-2 is located approximately 75 feet downgradient. Over this distance the concentration of total chromium in the shallow ground water decreases by two orders of magnitude, to levels below its NYSDEC GQS at MW-2 (Figure 28). The decrease in the concentration of chromium between these wells is most likely due to the dispersion of this contaminant in the ground water and its mixing with infiltrating precipitation, which will further dilute its concentration. Some of the chromium may be absorbing onto the glacial till material, which will further retard its movement and reduce its concentration in the shallow ground water. For a more detailed discussion of the fate and transport of chromium in the ground water at the site refer to Section 5.2 of this report.

4.4.1.3 Volatile Organic Compounds

The ground water samples collected from each of the shallow ground water monitoring wells have also been analyzed for VOCs. The laboratory results of the VOC analyses for the ground water samples collected from MW-1 to MW-4 are summarized in Table 27. Since sampling of the shallow ground water monitoring wells began in August 1996, VOCs have only been detected in the samples collected from monitoring wells MW-1 and MW-4. The VOCs detected in the samples collected from MW-1 have included: carbon tetrachloride (8 of 17 samples), chloroform (5 of 17 samples), cis-1,2-dichloroethene (7 of 17 samples, individually or as total), TCE (all 17 samples) and PCE (estimated in 2 of 17 samples). The concentrations of carbon tetrachloride, chloroform, cis-1,2-dichloroethene and TCE in the ground water samples collected from this well typically exceeded their NYSDEC GQSs (ranging from 5 to 7 ug/L).

The only VOCs detected in the ground water samples collected from MW-4 were chloroform (estimated in 2 of 19 samples) and TCE (in all 19 samples). The concentration of TCE in all 19 of the samples collected from this monitoring well exceeded its standard (Table 27).

At monitoring well MW-1, both carbon tetrachloride and chloroform have been detected at concentrations exceeding their NYSDEC GQSs. Carbon tetrachloride is a common industrial solvent, but previous evaluations of Ward Products operations haven't documented its use on site (Normandeau Associates 1986) and this VOC hasn't been detected in any of the other soil or sediment samples collected from the site. The presence of chloroform in monitoring well MW-1 may be related to the carbon tetrachloride. Studies have shown that chloroform is an intermediate product of the biodegradation of carbon tetrachloride (Kehew 2001) and over the long term this compound may further biodegrade to carbon dioxide, water and the release of a chloride ion.

As shown in Figure 29, the concentration of TCE in ground water at MW-1 has ranged from 18 to 1,400 ug/L and appears to be slowly decreasing over time. The decline in the concentration in TCE at this monitoring well reflects its dilution by its mixing with clean ground water migrating onto the site, the infiltration of precipitation, its adsorption onto the glacial till, its biodegradation and/or the removal of its source. At MW-4, the concentration of TCE has ranged from 240 to 6,000 ug/L, without any significant trend over time.

The suspected source of the TCE detected in the shallow ground water at the site is its release from the former electroplating operations at Ward Products. As noted in the Phase I Site Investigation Report prepared by Normandeau Associates in 1986, TCE was reportedly used in the vapor degreasing operations at Ward during the period of 1957-1983 (Normandeau Associates 1986). Tetrachloroethene (PCE) and carbon tetrachloride are also common solvents and may have been used at the site. The presence of cis-1,2-dichloroethene in the ground water is most likely the result of the degradation of TCE by biotic or abiotic processes, while the presence of chloroform is probably the result of the degradation of carbon tetrachloride.

Since the highest concentrations of TCE in the shallow ground water have been detected in the vicinity of monitoring wells MW-1 and MW-4, this distribution suggests that there may have been at least two different sources for the TCE. The suspected source for TCE in the vicinity of MW-1 is the past discharge of electroplating solution, treatment liquids and/or vapor degreaser solvents in the area east of the present grinding shop. Soil samples collected from below the areas where the former vapor degreaser and the former sludge drying pad (now the grinding shop) were located, in the eastern portion of the manufacturing building, contained low levels of TCE (refer to Section 4.1.2 and 4.1.4). The presence of electroplating associated inorganics in the soils east of the building suggest that VOCs may have also been released in this area, although this has not been directly confirmed by the collection of soil samples from this area for the analysis of VOCs.

The suspected sources of the VOCs found in the ground water at MW-4 are leaks and the discharge of VOC contaminated wastewater from the drain pipe. TCE was detected at a concentration of 19 mg/Kg in a sediment sample collected by Normandeau from a floor drain located in the former electroplating operations area in 1997 (refer to Section 4.1.5). In addition, TCE was detected in soil samples collected by ThermoRetec in 1999 from two of the four test pits excavated adjacent to the drain pipe (Figure 20). The concentration of TCE in these samples ranged from 1.20 mg/Kg (TP-2) to 1.40 mg/Kg (TP-3). These results suggest that that the drain pipe did leak in the past and that TCE has migrated into the underlying soils and into shallow ground water.

Based on the direction of ground water flow (Figure 17), the TCE contaminated ground water in the glacial till is migrating to the southwest and appears to be limited to the site. As shown in Figure 17, monitoring well MW-2 is located approximately 75 feet downgradient of MW-1. No VOCs have been detected in the ground water samples collected from this monitoring well (Table 27), which would suggest that the transport of these contaminants in the shallow ground water at the site is limited to the areas close to its suspected sources. The reduction of the TCE in the shallow ground water may be the result of the dispersion of this contaminant in the ground water and its mixing with infiltrating precipitation, which will further dilute its concentration. Some of the TCE may be absorbing onto the glacial till material or biodegrading, which will further retard its movement and reduce its concentration in the shallow ground water. For a more detailed discussion of the fate and transport of TCE in the ground water at the site refer to Section 5.2 of this report.

4.4.2 Ground Water Quality in the Fractured Bedrock

Water quality information on the fractured bedrock has been gathered from a network of 18 monitoring wells (MW-1R, MW-4R, MW-5 to MW-20) that have been installed since September 1997. Two of the wells (MW-1R and MW-4R) were installed as a couplet adjacent to a shallow glacial till monitoring well (MW-1 and MW-4) on the site to evaluate the hydrologic relationship between the glacial till and the fractured bedrock units. Nine individual bedrock wells (MW-12 to MW- 20) were also installed south and southwest of the site to evaluate the horizontal extent of the contaminated ground water downgradient from the site (Figures 2 and 5).

4.4.2.1 Field Measurements

From 1997 through 2003, measurements of water temperature, specific conductance, pH, Eh and dissolved oxygen were recorded during the collection of the water quality samples from all the bedrock wells using field instrumentation. Beginning in 2004, the measurement of these field parameters were only made at the downgradient off site monitoring wells (MW-14 to MW-20). This change in the monitoring program was made because sufficient data had been collected from the on-site monitoring wells to characterize existing water quality conditions. The results of the field measurements for the fractured bedrock monitoring wells are summarized in Table 26.

The average temperature of the ground water in the fractured bedrock has ranged from 12.2 ^{o}C (MW-4R) to 15.3 ^{o}C (MW-1R) with an overall average of 13.4 ^{o}C. The highest average ground water temperatures were recorded at monitoring well MW-1R, which may be explained by the shallow depth to bedrock at this well (4 feet) and the relatively shallow depth of the well (19 feet). As with the glacial till, the temperature of the ground water varies seasonally with the lowest water temperatures recorded in the spring and the highest recorded during the summer. Although water temperature is not impacted by the contamination at the site, this parameter does have an influence on the specific conductance, pH, Eh and the concentration of dissolved oxygen in the ground water.

An indicator of the concentration of dissolved solids in the ground water is its specific conductance. The average specific conductance of ground water in the fractured bedrock has ranged from 625 umhos/cm (MW-11) to 1,104 umhos/cm (MW-4R) with an overall average of 854 umhos/cm (Table 26). On the site, the specific conductance of the ground water in the fractured bedrock is clustered into two groups, those with low (less than 800 umhos/cm) and high (greater than 800 umhos/cm) conductivities. The lower average specific conductivities have been recorded at monitoring wells MW-1R, MW-5 and MW-11, while the highest average specific conductivities have been recorded at monitoring wells MW-4R and MW-6 to MW-10. The major difference between these two groups of monitoring wells is their location at the site. Monitoring wells MW-1R, MW-5 and MW-11 are located in the northern portion of the site and are hydraulically upgradient of the majority of the site. The wells with the highest average specific conductances (MW-4R and MW-6 to MW-10) are located in the central and southern portion of the site and are downgradient of the drain pipe and outfall. This difference would suggest that the drain pipe had released inorganic contaminants that have migrated through the glacial till and into the fractured bedrock and are now migrating with ground water flow.

The pH of the ground water in the fractured bedrock is slightly basic (7.5) with average values ranging from 7.1 (MW-19) to 7.7 (MW-1R and MW-11). The average Eh of ground water in the fractured rock is 0.2 volts and ranges from -0.022 volts (MW-15) to 0.230 volts (MW-4R). When the average Eh - pH values are plotted onto an Eh-pH diagram they fall within the field representative of ground water (Langmuir 1997).

The average concentration of dissolved oxygen in ground water in the fractured bedrock has ranged from 1.2 mg/l (MW-18) to 8.7 mg/l (MW-11) with an average concentration of 4.6 mg/l. The high average dissolved oxygen concentrations in MW-11 reflect background conditions since this well is located hydraulically upgradient of the site. The low average concentration of dissolved oxygen in MW-18 and, in general, the other fractured bedrock monitoring wells located downgradient of the site may reflect the consumption of oxygen due to the biodegradation of the chlorinated solvents present in the contaminant plume migrating off of the site.

4.4.2.2 Inorganic Contaminants

Both metal and nonmetal inorganics were analyzed in the samples collected from the monitoring wells installed in the fractured bedrock. These have included the electroplating associated inorganics (cadmium, cyanide, chromium, hexavalent chromium, lead, nickel and zinc) and several hydrochemical constituents (chloride, iron, manganese, nitrate, nitrite and sulfate) that are important for the evaluation of the fate and transport of VOCs (refer to Section 5.2). As with the shallow glacial till monitoring wells, the specific inorganic analyses performed on the samples collected from the fractured bedrock wells have changed over time in response to the results of past sampling rounds (refer to Section 2.1.8.2).

Of the inorganics tested, the only electroplating inorganic not detected in the fractured bedrock ground water samples was cadmium. In the eight wells that were tested cadmium was not detected above its quantitation limit (Table 27). Cyanide was only detected in the samples collected from monitoring MW-1R. As discussed in Section 4.4.1.2, cyanide was only detected in one of the glacial till wells, MW-1 which is located next MW-1R and east of the former electroplating sludge drying pad. Lead wasn’t detected in any of the samples collected from the fractured bedrock monitoring wells at a concentration greater than its quantitation limit. Nickel and zinc were detected at several of the monitoring wells, but at concentrations close to their analytical detection limits.

As with the shallow ground water in the glacial till, the predominant electroplating related inorganic detected in the fractured bedrock was chromium. Since monitoring of the fractured bedrock began in 1997, total chromium, mostly in the hexavalent form, has been detected in samples collected from 13 of the 18 monitoring wells (Table 27). Within the past two years (2002 to 2004) total chromium has been detected in samples collected from bedrock monitoring wells MW-1R, MW-4R, MW-5, MW-6, MW-7, MW-9 and MW-10, with the highest concentrations of total chromium detected in monitoring wells MW-1R, MW-6 and MW-7 (Figure 30). Monitoring well MW-1R is located east of the former electroplating sludge drying pad, while monitoring wells MW-6 and M-7 are located downgradient of MW-1R and the drain pipe (Figure 5). The concentration of total chromium in all of the samples collected from monitoring wells MW-1R and MW-6 have exceeded its NYSDEC GQS (Figure 30). The concentration of total chromium in the samples collected from monitoring MW-7 has typically exceeded its standard, but recently it decreased below this level.

In the beginning of the monitoring program, samples collected from monitoring well MW-1R had a slight yellow/green color, which is indicative of the presence of monomeric chromate $(CrO_4)^{-2}$ at concentrations exceeding 1 mg/L (Palmer and Puls 1994). This discoloration has slowly decreased over time reflecting the declining concentration of chromium in the ground water at this well (Figure 30). In comparison, the concentrations of total chromium in monitoring wells MW-6 and MW-7 have varied over time without a distinct trend.

The highest concentration of total chromium in the fractured bedrock is found in the area east of the grinding shop near MW-1R. When the chromium results for MW-1R are compared with the results obtained for the samples collected from MW-1, the average concentration of chromium in MW-1R is found to be 50 percent lower. The decrease in the concentration of chromium from well MW-1 to MW-1R, along with a downward flow gradient, suggests that the source of the chromium would have been a surface release in this area. The results of soil samples collected from this area showed the presence of chromium and other electroplating related metals (see Section 4.1), which indicates that releases did occur in this area and that this area represents a suspected source area. In January 2004, RETEC performed an IRM that removed the chromium contaminated soils from this area, eliminating these materials as a potential continuing source of ground water contamination (refer to Section 4.1.8).

The concentration of total chromium in the fractured bedrock is observed to decrease steadily in the downgradient direction (south-southwest) at monitoring wells MW-6, MW-7 and MW-10 (Figure 30). The source of chromium in these wells could be a combination of releases near the former electroplating sludge drying pad or from the drain pipe. As mentioned in the discussion of water quality in the shallow glacial till (refer to Section 4.4.1.2) chromium contaminated sediment was found within the drain pipe and below the drain pipe specifically in the area of a pipe junction located east of the building. With the elimination of the discharge of electroplating materials to the drain pipe in the 1980s, the repair of the drain pipe connection and the removal of chromium contaminated sediment from within the drain pipe as part of an IRM performed by ThrermoRetec in December 2000 (ThermoRetec 2001) the principal sources of the chromium contamination to the ground water below and downgradient of the drain pipe has been removed.

Based on the results of the water quality monitoring program, the extent of the chromium contaminated ground water in the fractured bedrock appears to have been delineated. As mentioned, in the past two years (June 2002 to August 2004) total chromium has only been detected in samples collected from fractured bedrock monitoring wells MW-1R, MW-4R, MW-5, MW-6, MW-7 and MW-10. During this same period, total chromium was not detected in any of the ground water samples collected from the downgradient off site bedrock monitoring wells (MW-14 to MW-20). This distribution of total chromium suggests that chromium contaminated ground water is limited to the eastern portion of the site, but that the plume is migrating to the south-southwest towards Edson Street.

Total chromium was also recently detected in samples collected from the two bedrock water supply wells located on the FGI property east of the site (Figure 35). As discussed in Section 4.6, total chromium was detected at concentrations ranging from 0.006 to 0.016 mg/L (Table 28), which is below its NYSDEC GQS of 0.05 mg/L. To confirm if the chromium was in dissolved or only total form (including solids and colloids) samples were collected from well FGI-1 and analyzed for both total and dissolved chromium. Dissolved chromium was not detected either in the original sample or its duplicate at a concentration above its PQL. These results suggest that the total chromium detected at low concentrations in the well may be associated with particulate material and not transported by ground water.

4.4.2.3 Volatile Organic Compounds

Based on the results of the ground water samples collected from the fractured bedrock monitoring wells for the period of record (September 1997 to August 2004) the following VOCs have been detected on or downgradient of the site:

- Carbon tetrachloride
- Chlorobenzene
- Chloroform
- 1,1-dichloroethene
- Cis-1,2-dichloroethene
- 1,2-dichloropropane
- PCE
- TCE
- Vinyl chloride

Several of these VOCs have only been detected infrequency and/or at concentrations below their NYSDEC Ground Water Quality Standard (Table 27). Chlorobenzene was detected in one sample (May 1999) collected from monitoring well MW-8, chloroform was detected in a few of the samples collected from several wells (MW-1R, 5, 10, 11 and 12) at the beginning of the monitoring program in the late 1990's, but hasn't been detected in any samples in the past two years. This VOC was detected in samples recently (February 2005) collected from one of the FGI bedrock water supply wells, but at concentration below its NYSDEC GQS (see Section 4.6). 1,1-dichloroethene was detected in only one or two samples collected from four of the monitoring wells (MW-5, 10, 13 and 17). 1,2-dichloropropane was only detected in one sample (September 2003) collected from monitoring well MW-15. PCE was detected in one or two samples collected from several monitoring wells (MW-1R, 4R, 5, 6 and 7) at the beginning of the monitoring program and was only recently (August 2004) detected at an estimated concentration in monitoring well MW-6. Vinyl chloride has only been detected in one sample collected from monitoring well MW-5 in September 1997.

The principal VOCs detected in the ground water at the site are carbon tetrachloride, cis-1,2-dichloroethene and TCE. Carbon tetrachloride has been frequently detected in monitoring well MW-1R and infrequently in MW-5 (Table 27). As discussed in Section 4.4.1.3, carbon tetrachloride has also been detected in ground water samples collected from the shallow glacial till monitoring well MW-1. When the concentration of carbon tetrachloride in the samples collected from monitoring wells MW-1 and MW-1R are compared, it is typically found at slightly higher concentrations in the shallow well. This would suggest that carbon tetrachloride was released at the surface in the vicinity of monitoring well MW-1 and has migrated through the glacial till and into the underlying fractured bedrock.

The predominant VOC at the site by both concentration and frequency of detection is TCE. TCE has been detected in ground water samples collected from 14 of the 18 fractured bedrock monitoring wells, on site and downgradient. TCE also was recently detected offsite in one (FGI-1) of the two bedrock water supply wells on the FGI property (see Section 4.6). The concentration of TCE in the monitoring wells has ranged from not detected (MW-14, 15, 19 and 20) to 140,000 ug/L (or 140 ppm) at monitoring well MW-4R. Based on the results of the water quality monitoring program, the downgradient extent of the VOC contaminated ground water in the fractured bedrock appears to have been delineated. The distribution of TCE in the fractured bedrock is in the form of a plume that originates in the eastern portion of the site in the vicinity of drain pipe and the outfall near monitoring well MW-4R (Figure 31). On site, the TCE plume is oriented in an east-west direction, but as it moves off site it turns to the south, roughly following the direction of ground water flow (refer to Figure 19). Laterally, the concentration of TCE decreases to the west (MW-12) and to the east (MW-8). The downgradient edge of the plume presently appears to be located on the Bush Mill Works property to the west of the site and in the northern portion of the AIDA/UCMI property southwest of the site (Figure 31).

As previously mentioned, TCE has been detected in ground water samples collected from the FGI water supply well located closest to the Ward Products site (see Section 4.6). This well is located east and either hydraulically side or upgradient from the site. With the detection of TCE in this well, it appears that the full upgradient extent of the TCE contaminated ground water has not been established. The hydrogeologic connection between the site and the FGI wells would need to be established to determine if the operation of this well induced the flow of TCE contaminated ground water onto the FGI property. Information on the type and depth of the fractures intercepted by the FGI well along with hydraulic information derived from pump testing would be needed to determine if there is a hydraulic connection between the site and well FGI-1. The issues associated with the FGI-1 well are now under consideration and will be the subject of a future submission to be provided to the NYSDEC prior to the completion of the RA and FS.

The concentrations of TCE in the monitoring wells located along the plume, over the period of record, are shown in Figure 32. In general, the average concentration of TCE at each of the five monitoring wells decreases with increasing distance downgradient of monitoring wells MW-4R and MW-6. The highest average TCE concentrations have been detected at MW-4R (31,794 ug/L), followed by MW-6 (5,788 ug/L), MW-10 (5,731 ug/L), MW-13 (689 ug/L), MW-17 (601 ug/L), with TCE not being detected in ground water samples collected from monitoring wells MW-19 or MW-20 (Figure 31).

The concentration of TCE in these wells has also varied over time with several trends becoming apparent (Figure 32). At monitoring well MW-4R the concentration of TCE has varied over a wide range, but with most concentrations exceeding 10,000 ug/L. The concentration of TCE at monitoring well MW-6 has been slowly declining, while at MW-10 TCE concentrations increased from 1998 to 2000 and since then they have also been slowly declining. At monitoring wells MW-13 and MW-17 the concentration of TCE has varied over a relatively narrow range after having initially increased.

The VOC cis-1,2 dichloroethene has also been frequently detected in several of the monitoring wells (MW-12, 13, 16 and 17) in the downgradient portion of the main plume and was detected in the samples recently collected from one (FGI-1) of the FGI bedrock water supply wells. Research has shown (USEPA 2000) that cis-1,2-dichloroethene can be produced by the degradation of both PCE and TCE. Since TCE is the dominant chlorinated hydrocarbon found at the site, it is suspected that its dehalogenation (through biodegradation) has produced the cis-1,2-dichloroethene detected in the ground water samples collected from these fractured bedrock monitoring wells and possibly the FGI well. The absence of cis-1,2-dichloroethene in the samples collected from the wells with the highest concentrations (MW-4R, 6 and 10) may be due to the high detection limits in these samples or due to the inability of microorganisms to degrade these contaminants at such high concentrations.

The suspected sources for the TCE detected in the monitoring wells located downgradient of the drain pipe and outfall include the leakage of spent electroplating solutions from the drain pipe and the discharge of these materials to the drainage ditch. As discussed in Section 4.1.5, TCE was detected in two soil samples collected from below the drain pipe during the IRM performed by ThermoRetec in December 2000. These two samples were collected from below a section of the drain pipe located northeast of monitoring well MW-6. These results suggest that electroplating solution and vapor degreasing materials leaked from the drain pipe joints and migrated through the glacial till and into the underlying fractured bedrock. Evidence supporting this conclusion is that the highest concentrations of TCE have been detected in the two monitoring wells (MW-4R and MW-6) that are located either immediately downgradient of the drain pipe (MW-6) or in the vicinity of the outfall (MW-4R).

A second and smaller source area for TCE in the fractured bedrock is located upgradient of the drain pipe near the present grinding shop where well couplet MW-1/1R and monitoring well MW-5 are located. Both of these wells are located hydraulically upgradient of the drain pipe and outfall and as a result, the source of TCE in these wells is believed to have been more localized. At monitoring couplet MW-1 and MW-1R, the average concentration of TCE is higher (325 ug/L) in the glacial till than in the fractured bedrock (246 ug/L). The difference in the vertical distribution of TCE at these wells suggests that the source was a surficial release and that the TCE has migrated downward with ground water and into the underlying fractured bedrock. Further supporting evidence of the past release of TCE in this area of the site is the presence of low concentrations of TCE in the soil samples that were collected from below the former electroplating sludge drying pad and the former vapor degreaser in the building and in the vicinity of the transformer pad outside the building (refer to Section 4.1). The low concentration of TCE in these soils do not represent a continuing source of this contaminant to ground water, but is evidence of its past release in these areas.

As shown in Figure 33, the concentration of TCE at monitoring well MW-1R has slowly declined from a maximum concentration of 690 ug/L in November 1997 to 180 ug/L in August 2004, while at MW-5 it has declined from 460 ug/L in November 1998 to 260 ug/L in August 2004. The decline in the concentration of TCE at monitoring wells MW-1R and MW-5 over the past seven years may be the result of several factors including the mixing of the TCE contaminated ground water with clean ground water and precipitation recharge, adsorption of the TCE onto the aquifer material and/or its biodegradation. The presence of cis-1,2-dichloroethene in the ground water in these two wells suggests that the TCE in the fractured rock in this area may be undergoing biodegradation, which would result in a decrease in its concentration.

4.5 INDOOR AIR QUALITY

Due to the high concentration of VOCs in the ground water at the site, and in preparation for the yet to be drafted and submitted RA, indoor air quality samples were collected in November 2002 and January 2005 to evaluate the existence and the potential impact, if any, of chemical vapor intrusion into the manufacturing building at the site. The 2002 work was intended to assist the evaluation in the RA of whether the post-remediation presence of the VOCs (tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene and cis-1,2 dichloroethene) in the ground water or other media at or near the building could induce elevated levels in indoor air within the building itself sufficient to affect the conclusions in the RA (RETEC 2002). In November 2002, three indoor air samples were collected along with an outdoor background sample. Two of the indoor air samples were collected from the manufacturing area and one from the management offices (Figure 1, Appendix F). Each of the samples was analyzed for the VOCs: PCE, TCE, 1,1-dichloroethene, cis-1,2-dichloroethene, chloroform and carbon tetrachloride. The results of the laboratory analyses are summarized in Table 1 in Appendix F.

In the November 2002 samples, only PCE and TCE were detected above their method detection limit and only in the sample collected from the manufacturing office (AS-1). The concentration of PCE was 4.7 $\mu g/M^3$, while the concentration of TCE was 4.8 $\mu g/M^3$. When compared with USEPA and NYSDOH indoor and outdoor air quality data, these results fall within the 75th percentile. The 75th percentile represents the concentrations of these substances that would typically be expected in indoor air in approximately three out of four random samples, unrelated to the existence of a discrete source of contamination (RETEC 2002). The concentrations of PCE and TCE in these samples were also below their NYSDOH recommended exposure levels for residential indoor air (NYSDOH 2003 and 2004). The detection limits in two of the three samples were almost four times higher (19 $\mu g/M^3$) than the 2004 NYSDOH (2004a) recommended indoor air exposure level of 5 $\mu g/M^3$. Thus, the level of TCE in these samples could only be considered to be less than its detection limit.

Because of the elevated detection limits of the November 2002 samples and with the development of recommended guidance values for sub-slab vapor by the NYSDOH (2004b), RETEC, in January 2005, collected both indoor air and sub-slab soil gas samples at three locations within the manufacturing building (Figure 1, Appendix G). Each of the samples was analyzed for the VOCs: PCE, TCE, 1,1-dichloroethene, cis-1,2-dichloroethene, chloroform and carbon tetrachloride. The results of the laboratory analyses are summarized in Table 1 in Appendix G. TCE was the predominant VOC detected in the three indoor air samples at concentrations ranging from 6.4 to 13 $\mu g/M^3$, while chloroform was detected in two of the samples at concentrations less than 1 $\mu g/M^3$. The concentrations of the other VOCs of interest were all below their reported detection limits.

The concentrations of TCE in the indoor air samples collected in January 2005 slightly exceeded the 2004 NYSDOH's (2004a) recommended guideline of 5 $\mu g/M^3$ in residential indoor air, but are orders of magnitude less than the recommended exposure levels for workplace environments. The three TCE concentrations recorded in the January 2005 samples were slightly higher than the November 2002 results. This difference could be due to either the colder weather (January vs. November), or to normal variation between sampling events and analyses (RETEC 2005).

TCE was the predominant VOC detected in the sub-slab soil gas samples collected in January 2005. The concentration of TCE ranged from 1,500 to 1,800 $\mu g/M^3$. The only other VOC detected at a concentration greater than 100 $\mu g/M^3$ in the sub-slab soil gas samples was cis-1,2-DCE, which was detected in the sample collected from below the warehouse foundation at a concentration of 940 $\mu g/M^3$. It was at this location that the highest TCE concentration was also detected. The presence of TCE and cis-1,2-DCE in this sample may be due to the fact that cis-1,2-DCE is a byproduct of the natural degradation of TCE in the environment. When the results of the indoor air and the sub-slab vapor samples are compared with these 2004 guidance values, as recently proposed by the NYSDOH

(2004b), the NYSDOH recommends mitigation to minimize existing or potential risks associated with soil vapor intrusion.

The suspected source for TCE in the sub-slab soil gas is the volatilization of this compound from the ground water underlying the building. As discussed in Section 4.1, TCE has been detected in soil samples collected from below the building in the area of the former sludge drying pad (now the grinding room) and the former vapor degreaser, but the concentrations only ranged from 6 to 98 μg/kg. As discussed in Section 4.4, TCE has also been detected in the ground water (MW-1, MW-1R and MW-5) in the vicinity of the northeastern corner of the manufacturing building near both the warehouse and the grinding room. The concentration of TCE in the ground water in this area has ranged from 18 to 1,400 μg/L with a mean concentration of 276 ug/L. Based on water level measurements recorded at MW-1 the depth to ground water below the northern portion of the building could range from as shallow as one foot to greater than seven feet over a year depending on recharge conditions. This suggests that TCE contaminated ground water in the glacial till unit could represent a potential source for the TCE detected in the sub-slab soil gas.

4.6 FGI WATER SUPPLY WELLS

In December 2004, water quality samples were collected from the two production wells (FGI-1 and FGI-2) located on the FGI property. A confirmatory sample was collected from well FGI-1 was collected in February 2005. These samples along with a duplicate collected each sampling round were analyzed for VOCs, total chromium, hexavalent chromium and turbidity. The sample collected from well FGI-1 in February 2005 was also analyzed for dissolved chromium. During both sampling events the concentration of dissolved oxygen, specific conductance, temperature, oxidation-reduction potential and pH were recorded using field instrumentation. The results for the laboratory analyses are summarized in Table 28 and the field measurements are summarized in Table 29.

In the December 2004 sampling round VOCs were only detected in the sample collected from well FGI-1. In this sample, TCE was detected at a concentration of 440 ug/L, which is above its NYSDEC GQS of 5 ug/L (or ppb). No other VOCs were identified at a concentration above their detection limit in any of the samples. Due to the detection of TCE in the sample collected from FGI-1 a confirmatory sample was collected from this well in February 2005. In this sample the VOCs TCE, cis-1,2-dichloroethene (cis-1,2-DCE) and chloroform were detected at concentrations above their practical quantitation limit (PQL). TCE was detected at a concentration of 190 ug/L in the original FGI-1 sample and 200 ug/L in its duplicate, which exceed its standard. Cis-1,2-DCE was detected at a concentration of 6.0 ug/L and chloroform was detected at a concentration of 6.5 ug/L in both the original and duplicate sample. The concentration of cis-1,2-DCE is slightly higher than its standard of 5 ug/L, while chloroform is slightly below its standard of 7 ug/L. Neither of these compounds was detected in the sample collected from this well in December 2004. The absence of these two compounds in the December 2004 sample is most likely due to the higher PQL (25 ug/L) used in the analysis of that sample.

The source of the VOCs in well FGI-1 is presently unknown. Potential sources of these contaminants would include their migration from the Ward Products Site to this well, most likely if this occurred induced by the pumping from the FGI wells, or as a result of a release of these VOCs on property other than the Ward Products site.

FGI does not meter the water produced from either of its wells and has no records regarding the frequency of their use (Lierheimer, per. comm.). Their records do indicate that this well was installed by Woodcock Brothers of Ft. Ann, New York in 1986. The driller reported that well FGI-1 is 300 feet deep, has a capacity of 1,800 gallons of water per hour and was tested at a flow rate of 47 gallons per minute. No other construction details are available about either well. The pumps in both wells are presently broken and it is not known when these pumps will be repaired or replaced. FGI initially reported that water quality from these wells had been tested (in February 2004) and met standards. These samples were only tested total coliform bacteria and none were detected. FGI has been given copies of the test results of the sampling of its wells and has been advised that so long as water from their wells includes VOCs above potable water standards, water from these wells should not be used for potable purposes.

Relative to the Ward Products Site, well FGI-1 is located approximately 240 feet due east (side or upgradient) of bedrock monitoring well MW-1R. TCE has been detected in well MW-1R at concentrations ranging from 62 to 690 ug/L (Table 28). Based on the ground water elevation data recorded in the monitoring wells at the Ward Products Site, the direction of natural ground water flow in the fractured bedrock aquifer is from the northeast (FGI property) to the southwest across the Site. For TCE to have migrated from the Ward Products Site to well FGI-1, the existing data suggests that the only explanation would be that the operation of this well locally reversed the direction of ground water flow sufficiently to draw VOCs from the Ward Products site onto the FGI site. Insufficient information is presently available to reach conclusions about the source of VOCs into the FGI-1 well.

Total chromium was detected in the samples collected from both of the FGI wells (Table 28). The concentration of total chromium ranged from 0.006 to 0.016 mg/L (or ppm), which are all below the NYSDEC GQS of 0.05 mg/L. To determine the portion of chromium in dissolved form, the samples (original and duplicate) collected from FGI-1 in February 2005 were analyzed for dissolved chromium. Dissolved chromium was not detected in either of the samples at a concentration greater than its PQL of 0.005 mg/L. The difference between the results for the total chromium analyses and the dissolved chromium analyses suggests that solids or colloidal material suspended in the well water contributed to the higher total chromium results. All of the samples were also analyzed for hexavalent chromium (Table 28). Hexavalent chromium was not detected above its PQL in any of the samples.

The turbidity of the water quality samples varied greatly depending upon the well. At FGI-1 the turbidity of the samples ranged from 66 to 170 NTU, while the turbidity of the samples collected from FGI-2 ranged from 1,300 to 1,900 NTU. For comparison, the turbidity values recorded at FGI-1 are within the range of those observed for the upgradient bedrock monitoring well (MW-11) at the Ward Products Site. The turbidity levels of the samples collected from FGI-2 are higher than those reported for any of the bedrock monitoring wells at the Ward Products Site. The high turbidity levels in well FGI-2 were evident by the discoloration of the water purged from the well. This water had a light brown color and fine grain materials appeared to be suspended in the water. FGI has had recurring problems with the pump in this well and it is currently inactive and FGI is considering its repair or replacement.

5.0 CONTAMINANT FATE AND TRANSPORT

The previous section discussed the nature and extent of the contaminants identified in and around the site in various media including: soil, sediment, ground water and surface water. This section focuses on the fate and transport of the contaminants of concern (CoC) associated with the site and identifies their potential migration pathways. The results of this evaluation will be used in the assessment of the potential risk that the CoCs may pose to human and environmental receptors (Risk Assessment) and in the evaluation of potential remedial measures to reduce this risk (Feasibility Study). A Risk Assessment (RA) and Feasibility Study (FS) will be performed to evaluate the appropriate measures to be taken to reduce any human health or environmental risks posed by the CoC documented at or having migrated from the site. Identification of a material as a CoC is not a determination that further remediation is necessary or advisable, but rather is a determination that further evaluation of the CoCs in the RA and the FS is advisable.

5.1 POTENTIAL ROUTES OF MIGRATION

The contaminants identified at the site historically include electroplating related inorganics, VOCs and PCBs. Several of the electroplating related inorganics have been detected in samples collected from the soils below the former sludge drying pad and vapor degreaser (under the manufacturing building), in soils outside of the manufacturing building, in sediments that accumulated in a former floor drain and drain pipe, in sediments located within a drainage ditch and in two drainages downstream of the site, in ground water and/or in surface water. VOCs were detected in the sediments in the floor drain and drain pipe, in soils located below the former sludge drying pad, vapor degreaser and in ground water. PCBs were detected in several soil samples collected in the vicinity of the transformer pad outside of the manufacturing building.

Several IRMs have been performed at the site to eliminate the sources of the contaminants and to reduce the potential for their migration off site. These IRMs have included the removal of the metals contaminated soil pile in 1997, the removal of the PCB contaminated soils in 1999, the cleaning and repair of the drain pipe in 2000 and the removal of metals contaminated soils from the areas east and north of the manufacturing building and sediments from the drainage ditch, the upper portion of the East Branch drainage and from two culverts on Sam Stratton Road in January 2004. The removal of these materials has effectively eliminated several sources of contamination, thereby reducing the potential for the migration of their associated contaminants off site. In addition with the cessation of electroplating and degreasing operations at and from the site, those continuing sources have been eliminated.

The potential pathways for the migration of the contaminants remaining at the site, following the completion of the IRMs, are dependent upon the location of the contaminant, the media it is found within and the physical/chemical properties of the contaminant. In general, the contaminants at the site have been found in soil, sediment, ground water and/or surface water. As shown in Figure 34, there are several potential migration pathways for any of the contaminants remaining at the site. For soils, contaminated material could be eroded during rainfall events and be carried from the site by overland flow. The drainage system at the site would direct this material to the drainage ditch located along the eastern property line. Alternatively, the infiltration of precipitation through the surface soils may result in the leaching of any soluble contaminants resulting in their migration downward into the shallow ground water. Contaminants such as VOCs and/or cyanide could also volatilize and discharge into the atmosphere.

Any contaminated sediment produced at the site could be transported off site by runoff via the drainage ditch. Metals containing sediments have been identified in the two drainages downstream of the site. Runoff in these drainages may continue to transport these sediments downstream, ultimately discharging to the Mohawk River. Soluble contaminants within the sediment could also leach through the underlying soils and migrate downward into ground water.

As noted, surface water represents a potential migration pathway for the contaminants associated with the site. Runoff from the site may carry soil material that would either be deposited in the channel of the drainage ditch as sediment or transported offsite via surface water. The dissolution of any soluble contaminants in the sediments by surface water could also lead to their leaching into ground water or their transport downstream by runoff.

Ground water also represents a potential migration pathway for several of the contaminants identified at the site. Both inorganic (chromium) and organic (VOC) contaminants have been detected in the shallow ground water in the glacial till and in the fractured bedrock at the site. VOCs have also been detected in several ground water monitoring wells located immediately downgradient of the site. These findings indicate that ground water flow represents an actual migration pathway for the transport of VOCs from the site, and a potential pathway for the transport of chromium from the site.

An additional potential migration pathway for the VOCs includes their volatilization from soils or ground water. Where the ground surface is uncovered the VOCs would readily volatilize into the atmosphere, whereas, if a structure covered the ground surface the gas phase of the VOCs could concentrate below the structure and/or infiltrate into the building.

5.2 FATE AND TRANSPORT OF THE PRINCIPAL CONTAMINANTS

As mentioned, the principal contaminants identified at the site include the electroplating related inorganics, the vapor degreasing related VOCs and the electrical transformer PCBs. The electroplating related inorganics include: cadmium, chromium (trivalent and hexavalent), cyanide, lead, nickel and zinc (see sections 5.2.1 through 5.2.6). The vapor degreasing related VOCs include PCE and TCE (see sections 5.2.7 and 5.2.8) and their breakdown products. The PCBs, which are believed to be related to a release from the Niagara Mohawk electrical transformers on site, are discussed in section 5.2.9. It should be noted that several IRMs have been performed, since 1996, to remove contaminated soil from the site and contaminated sediment from the drainage ditch on site and from the upper East Branch and West Branch drainages downstream of the site. These actions have reduced the amount of contaminated sediment and soil remaining at the site and their potential migration from the site.

In the following sections, the anticipated fate and transport of each of the contaminants identified in sediment, soil or water and their potential migration pathways are discussed.

5.2.1 Cadmium

Cadmium was used at the site from 1957 to 1985 as part of the cadmium/cyanide electroplating process. Raw materials used in the process included: cadmium anodes, cadmium oxide and cadmium/ cyanide plating solution. From 1957 to 1973 the cadmium/cyanide electroplating materials were directly discharged, untreated, to the drainage ditch. From 1973 to 1985 the cadmium/cyanide containing materials from the plating process were discharged to a steel evaporation tank located adjacent to the sludge drying pad in the northeast corner of the facility. In 1985, the electroplating operations were discontinued.

Cadmium was detected in soil samples on site at concentrations exceeding its NYSDEC SCO of 0.25 mg/Kg (detection limit and site background) and in sediment at concentrations exceeding its NYSDEC SEL of 9 mg/Kg. Specifically, elevated concentrations of cadmium were detected in:

- Ten of eleven soil samples collected below the former sludge drying pad. Six of these samples were submitted for leachability testing and two of these samples exceeded the State and Federal TC standard for cadmium.
- All three soil samples collected from below the former vapor degreaser and in the sediment samples collected from the floor drain and the drain pipe. Two of the soil samples, a floor drain sample and drain pipe sediment sample were submitted for leachability testing and cadmium in all four samples exceeded its State and Federal TC limit. The sediments in the drain pipe were removed as part of an IRM performed in December 2000 (ThermoRetec 2001).
- All four samples collected from the soil pile. Three samples were submitted for leachability testing and cadmium in two of the samples exceeded its State and Federal TC standard. The soil pile was removed from the site, as part of an IRM performed in July 1997.
- Sixty five percent (127) of the soil samples collected from the area north and east of the manufacturing facility (including the area under the former soil pile and the area around the transformer pad). The cadmium containing soils in the areas north and east of the manufacturing building were removed as part of an IRM in January 2004 (RETEC 2004), while the soils located around the transformer pad were removed as part of an IRM performed in 1999 (ThermoRetec 1999b).
- Sixty seven percent (45) of the sediment samples collected from the drainage ditch and the East and West Branch drainages and in two of thirty five (six percent) sediment samples collected from the Mohawk River. The cadmium containing sediments in a portion of the drainage ditch, in the upper portion of the East Branch drainage and at two culverts located on Sam Stratton Road were removed as part of an IRM in January 2004 (RETEC 2004).

The highest concentrations of cadmium were found in the soils located below the former sludge drying pad. These soils are covered by the concrete foundation of the grinding shop in the manufacturing building. The suspected source of the cadmium in these soils was the release of electroplating solutions from the former sludge drying pad. The removal of the sludge drying operation and the expansion of the manufacturing building over this area has eliminated the potential for either the infiltration of precipitation through these soils, reducing the potential for leaching and their erosion by storm runoff.

Cadmium was also detected at high concentrations in soil samples collected from the soil pile and in the areas north, east and south of the manufacturing building (near the former sludge drying pad). Cadmium containing soils were removed from the site as part of three IRMs performed in 1997, 1999 and 2004. Most of the exterior soil with the highest cadmium concentrations was removed from the site during the January 2004 IRM (RETEC 2004). Of the 19 confirmatory samples collected from the soils remaining in place, only two were found to have concentrations of cadmium that exceed their IRM cleanup objective. These two samples were tested further and were not found to produce cadmium in a leachate at concentrations that exceed its State and Federal TC limit. Following the completion of the three IRMs, some soils with cadmium concentrations exceeding its NYSDEC SCO remain at the site and, as a result, cadmium is considered a CoC in soil (Table 30).

The removal of most of the exterior soil having high cadmium concentrations has effectively reduced this potential source of cadmium to the environment. This action has also significantly reduced the potential transport of cadmium containing soil material from the site by wind or runoff. The transport of the silty/clay soil material by rainfall and/or wind was already limited due to the compact nature of the soil and the presence of vegetation covering the site.

Any cadmium in the soil remaining at the site is expected to persist since this metal is unaffected by chemical transformation processes (Callahan and others 1979). The immobility of the cadmium in the soil is due to its sorption onto the soil particles or by its precipitation with carbonate material in the soil. Studies by Anderson and others (1988) and Christensen and others (1996) suggest that sorption and precipitation are the two major processes that control the transport of cadmium in soils. Cadmium is readily adsorbed onto the iron and manganese hydroxides that commonly coat soil particles. The resulting mineral species would be cadmium hydroxide $Cd(OH)_2$. Cadmium would also precipitate with the carbonate ion (as cadmium carbonate, $CdCO_3$) or replace calcium in the calcium carbonate mineral. Carbonate should be readily available in the glacial till soils at the site since this material is derived from the local carbonate bedrock (dolomite and limestone).

In sediment, the highest consistent concentrations of cadmium were detected in the samples collected from the drainage ditch immediately downstream of the drain pipe outfall. The suspected source for the cadmium in these sediments was the former direct discharge of cadmium containing materials from Ward's electroplating operations into the drainage ditch. The cadmium containing sediments were removed from the drainage ditch, the upper portion of the East Branch drainage and from two culverts on Sam Stratton Road during an IRM performed in January 2004. A total of 17 confirmatory sediment samples were collected during this IRM for cadmium analysis. Only four of these samples were found to have cadmium concentrations that exceeded its NYSDEC SEL and none exceeded their site specific SCO. These results suggest that the cadmium containing sediment has been effectively removed from these areas, thereby eliminating a major source of this material to the lower East Branch drainage and the Mohawk River. With the elimination of the electroplating operations, the removal of the contaminated sediment from the drain pipe, the removal of most of the cadmium containing soils at the site and the removal of the cadmium containing sediment in the drainage ditch, the off site transport of cadmium via the runoff in the drainage ditch has been eliminated.

Cadmium containing sediments are still present in the East and West Branch drainages downstream of the site. These cadmium containing sediments are now, or hereafter will be, covered in place by more recent and cleaner sediments; some, however, may be transported to the Mohawk River by runoff. The rate of transport will be dependent upon the frequency, duration and magnitude of runoff events in the lower drainages. Since the lower drainages appear to flow intermittently in response to snowmelt runoff and/or rainfall, the amount of time required to completely remove the cadmium containing sediments from the channels of the lower drainages by erosion could be substantial. As a result, cadmium is considered to be a CoC in the sediment found in the East and West Branch drainages downstream of the site (Table 30).

In surface water, cadmium has been detected in only one of three samples collected downstream of the former drain pipe outfall. The concentration of cadmium in this sample exceeded its NYSDEC Surface Water Quality Standard SWQS. Cadmium was also detected in one of eight surface water quality samples collected downstream of the site and at a concentration exceeding its NYSDEC SWQS. With the discontinuation of the direct discharge of aqueous electroplating materials into the drainage ditch, the removal of the cadmium containing soils, the removal of the contaminated sediment from within the drain pipe and the drainage ditch the potential sources of cadmium at the site have been eliminated. Downstream of the site, the presence of cadmium containing sediment in the East and West Branch drainages does represent a potential source for this contaminant in surface water. Suspended and/or dissolved cadmium could still be transported down these drainages by runoff, eventually discharging into the Mohawk River. Although cadmium does not appear to be a CoC in surface water, the runoff in the East and West Branch drainages may represent a potential migration pathway for cadmium containing sediment (Table 30).

In ground water, cadmium has not been detected in any of the water quality samples collected from the monitoring wells, including the three monitoring wells (MW-1, MW-1R and MW-5) located in the immediate area of the former cadmium/cyanide solution evaporation tank. The absence of cadmium in the ground water at the site suggests that cadmium is not leaching from the soils and it is not contaminating ground water. As a result, cadmium is not considered a CoC in ground water and ground water does not represent a potential migration pathway for this contaminant (Table 30).

5.2.2 Chromium

Chromium was used at the site from 1957 to 1985 as part of the nickel/chromium electroplating process. Nickel/chromium containing materials from the electroplating line were directly discharged, untreated, to the drainage ditch from 1957 to 1973. Beginning in 1973, the nickel/chromium containing materials from the electroplating process were pretreated prior to their discharge to the drainage ditch. From 1982 to 1985, the pretreated materials were discharged to the municipal waste water system, instead of the ditch, and in 1985 the electroplating operations were discontinued.

Unlike the other electroplating inorganics, chromium has two valence states, Cr^{+3} (trivalent) and Cr^{+6} (hexavalent) in the environment. The trivalent form of chromium is considered less mobile and less toxic than the hexavalent form (Calder 1988). As part of the electroplating process hexavalent chromium was used in the form of chromic acid (H_2CrO_4). From 1973 to 1985, the chromic acid solution was treated, prior to discharge, by reducing the hexavalent chromium to trivalent chromium by injecting sulfur dioxide under acidified conditions (Normandeau Associates 1986). The trivalent chromium then formed metal hydroxides and was precipitated from solution.

Due to the use of hexavalent chromium in the plating process and the generation of trivalent chromium during the pretreatment process, both forms are present in the sediments, soils and/or ground water at the site. Total chromium (trivalent and hexavalent) has been detected in soil samples at concentrations exceeding its NYSDEC SCO of 17 mg/kg (site background), in ground water at concentrations exceeding its NYSDEC Groundwater Quality Standard (GQS) of 0.05 mg/L and in sediment at concentrations exceeding its NYSDEC SEL of 110 mg/kg. Specifically, elevated concentrations of total chromium were detected in:

- All eleven soil samples collected below the former sludge drying pad. Four of these samples were tested for leachability and none of the samples exceeded its State and Federal TC standard.

- Two of the three soil samples collected from below the former vapor degreaser and in the sediment samples collected from the floor drain and drain pipe. The floor drain sample was submitted for leachability testing and chromium was not detected. The drain pipe sample was also submitted for leachability testing and the concentration of chromium in the leachate exceeded its State and Federal TC standard. The sediment in the drain pipe was subsequently removed as part of the IRM performed in 2000 (ThermoRetec 2001).

- All four samples collected from the former soil pile. Three samples were submitted for leachability testing and the concentrations of chromium in all of the samples were below its State and Federal TC standard. The soil pile was removed from the site as part of the IRM performed in 1997.

- Seventy four percent (146) of the soil samples collected from the area north and east of the manufacturing facility (including the area below the former soil pile and the area around the transformer pad). In January 2004, the chromium containing soils in the areas north and east of the manufacturing facility were removed during an IRM (RETEC 2004). The soils around the transformer pad were removed during an IRM performed in 1999 (ThermoRetec 1999b).

- Sixty seven percent (67) of the sediment samples collected from the drainage ditch and the two drainages downstream of the site and in 14 percent (5) of the samples collected from the Mohawk River. In January 2004, an IRM was performed to remove the chromium containing sediments in the drainage ditch, the upper portion of the East Branch drainage and at two culverts located on Sam Stratton Road (RETEC 2004).

- Ground water samples collected from three of the glacial till monitoring wells (MW-1, 2 and 4) and three of the fractured bedrock monitoring wells (MW-1R, 6 and 7), which are all located on site.

In soil, the highest concentrations of chromium were detected in the four samples collected from the test pits excavated below the drain pipe. These samples were collected at a depth between four and five feet below grade, and indicate that electroplating materials had leaked from the drain pipe. The chromium containing soils below the drain pipe remain in place. High concentrations of chromium were also detected in the samples collected from below the former sludge drying pad at levels greater than its NYSDEC SCO and higher than the values (1.5 to 40 mg/kg) reported by the NYSDEC (1994) for soils in the eastern United States. These soils are covered by the concrete foundation of the present grinding shop in the manufacturing building. The suspected source of the chromium in these soils was the release of electroplating solutions from the former sludge drying pad. The removal of the sludge drying operation and the expansion of the manufacturing building over this area has eliminated the potential for either the infiltration of precipitation through these soils, reducing the potential for leaching and their erosion by storm runoff.

The highest concentrations of total chromium in the shallow exterior soils were consistently found in the samples collected from the area of the former soil pile and the areas north, east and south of the former sludge drying pad (grinding shop). The source for the chromium in these areas was the past release or disposal of electroplating solutions or sludges. Most of these soils were subsequently removed from the site during the IRM performed in January 2004 (RETEC 2004). Since the focus of the IRM was the removal of the cadmium containing materials only two confirmatory soil samples were analyzed for total chromium. When compared with their pre-IRM concentrations, the post-IRM chromium values were reduced by 68 to 80 percent and to levels below their site specific cleanup objective. Although three IRMs (1997, 1999 and 2004) have removed the most highly contaminated soil at the site, chromium is still present in the soil at the site at concentrations greater than its NYSDEC SCO and higher than background values reported for soils in the eastern United States (NYSDEC 1994). As a result, chromium is considered a CoC in the soil at the site (Table 30).

Any chromium in the soil remaining at the site is expected to persist, but may change its form due to its chemical reduction. The predominance of the trivalent form of chromium in the soil at the site suggests that the material released had either undergone treatment or was reduced naturally due to the presence of ferrous iron in the soil. Prior to 1973, untreated electroplating materials containing hexavalent chromium may have been released at the site, whereas following the installation of the treatment system trivalent chromium would have been produced. The natural reduction of hexvalent chromium to trivalent chromium by iron rich soil minerals has been documented at other hazardous waste sites (Palmer and Wittbrodt 1991, Davis and Olsen 1995). The reduction of the chromium from its hexavalent to its trivalent state is important since the trivalent form of chromium is considerably less soluble and immobile in moderately alkaline soils (USEPA 2000), like those present at the site.

Since most of the exterior soils with high concentrations of chromium were removed from the site during the January 2004 IRM, the potential migration of chromium by leaching or erosion has been significantly reduced. Furthermore, the transport of the silty/clay soil material present at the site by rainfall and/or wind may already be limited due to the compact nature of the soil and the presence of vegetation covering the site.

In sediment, the highest consistent concentrations of total chromium were found in the drainage ditch downstream of the drain pipe outfall. The suspected source for the total chromium in these sediments is the former direct discharge of chromium containing materials into the drainage ditch. The chromium containing sediments in the drainage ditch, the upper East Branch drainage and at two culverts on Sam Stratton Road were removed during an IRM performed in January 2004 (RETEC 2004). Nine post IRM samples were collected and analyzed for total chromium. The concentrations of chromium in two of the samples were higher than their NYSDEC SEL, although under the levels targeted for removal in the IRM. Overall these results indicate that the bulk of the chromium containing sediment has been effectively removed from these areas, thereby eliminating a major source of chromium containing sediment to the lower East Branch drainage and the Mohawk River.

With the elimination of the electroplating operations, in 1985, the removal of the majority of the highly contaminated chromium containing soils along with the removal of the sediment in the drain pipe and the drainage ditch the potential for the transport of chromium containing sediment off site is limited. Chromium containing sediments are still present in the East and West Branch drainages downstream of the site. The fate and transport of the chromium in the sediments is dependent upon their movement due to erosion. Ultimately, these sediments will either be further covered in place by more recent and cleaner sediments or they will continue to be slowly transported to the Mohawk River. Considering that these drainages appear to flow intermittently, the time required for the chromium containing sediments to be completely removed by erosion could be substantial. As a result, chromium is a CoC in the sediments found in the East and West Branch drainages downstream of the site and surface runoff in these drainages represents a migration pathway (Table 30).

In surface water, total chromium has not been detected in any of the samples collected from the drainage ditch downstream of the drain pipe outfall at concentrations exceeding its NYSDEC SWQS. Hexavalent chromium was only detected in four of the eleven samples collected from this location at concentrations exceeding its standard. Following the cleaning of the drain pipe during the IRM in 2000, hexavalent chromium was not detected in runoff in the drainage ditch at concentrations greater than its detection limit. With the elimination of the direct discharge of aqueous electroplating materials into the drainage ditch, the removal of the chromium containing soils and the removal of the contaminated sediment from within the drain pipe and the drainage ditch the transport of chromium via runoff from the site has been eliminated. As a result, chromium is not considered a CoC in surface water (Table 30).

In ground water, chromium, predominantly in its hexavalent state, has been detected on site in three of the glacial till monitoring wells (MW-1, 2 and 4) and in three of the fractured bedrock monitoring wells (MW-1R, 6 and 7) at concentrations exceeding its NYSDEC GQS. As a result, chromium is considered a CoC in the ground water at the site. The highest concentrations of chromium have been detected in monitoring wells MW-1 and MW-1R, which are located in the area east of the present grinding shop and in the vicinity of the highest recorded chromium concentrations in soil. High concentrations of chromium have also been detected in the fractured bedrock monitoring wells MW-6 and MW-7, which are located downgradient of the drain pipe. The suspected sources of the chromium detected in these monitoring wells is the past release of untreated nickel/chromium electroplating solution in the area of the former sludge drying pad and/or by leakage from the drain pipe.

The fate of the hexavalent chromium in the ground water is controlled by the hydrochemistry of the ground water. Hexavalent chromium is most mobile in ground water with a pH greater than 7.0 (alkaline or basic), well oxygenated and with limited availability of reducing elements (ferrous iron, and reduced sulfur compounds). Based on the results of the water quality monitoring program each of these conditions is found in the ground water at the site. Under these conditions the migration of hexavalent chromium will most likely be controlled by its adsorption onto iron hydroxides (Calder 1988 and Palmer and Wittbrodt 1991).

Since the beginning of the water quality monitoring program in 1996, the concentration of chromium in three of the shallow glacial till monitoring wells (MW-1, MW-2 and MW-4) has decreased appreciably, with the concentration of chromium in two of these wells (MW-2 and MW-4) having decreased to levels below its NYSDEC GQS. At monitoring well MW-1, the concentration of chromium continues to decrease, but remains at levels above its standard. The decline in chromium concentrations in the glacial till is most likely the result of the elimination of its sources, its dispersion with ground water flow, the adsorption of chromium onto the aquifer material and its mixing with clean infiltrating precipitation. Although the movement of shallow ground water will continue to transport chromium through the glacial till toward the southern property line, the trend of decreasing chromium concentrations in the shallow ground water suggests that this CoC will not be transported off site at concentrations that would exceed its standard.

Over the past 40 years, chromium released at the ground surface near monitoring well MW-1R and from the drain pipe near monitoring wells MW-4R and MW-6 has migrated into fractured bedrock. At monitoring well MW-1R, the concentration of chromium has declined by almost two orders of magnitude in the past seven years, but still remains above its standard. Chromium released from the drain pipe has been transported by ground water flow in the fractured bedrock to the southern portion of the site in the vicinity of monitoring wells MW-7 and MW-10. The concentration of chromium in the fractured bedrock decreases with increasing distance downgradient of the drain pipe. In addition, at those fractured bedrock monitoring wells located in the vicinity of (MW-4R and MW-6) or downgradient of (MW-7 and MW-10) the drain pipe, chromium concentrations have declined over the past seven years and have decreased to levels below its NYSDEC GQS at monitoring wells MW-4R and MW-10. These trends suggest that while there is the potential for the migration of chromium contaminated ground water off site, its concentration will most likely be less than its standard.

The closest ground water receptors in the vicinity of the site include a former water supply well located on the UCMI property approximately 230 feet southwest of the southern property line of the site (water well in Figure 2) and two water supply production wells are located on the FGI property approximately 240 feet east (FGI-1) and 500 feet northeast of the site (Figure 35). All other water users in the Amsterdam Industrial Park are reportedly serviced by the City of Amsterdam's Water Department (Michael Ryba, pers. comm.).

No water quality samples have been collected from the UCMI well during the RI because according to information provided by owner (Chapman per. comm.) this well has been abandoned and the facility is provided water by the City of Amsterdam. Water quality samples were collected from the wells located on FGI's property in December 2004 and February 2005 and tested for chromium. Although total chromium was detected in the samples collected from these wells it was detected at concentrations below its NYSDEC GQS (see Section 4.6). Also, no dissolved chromium or hexavalent chromium was detected at concentrations above their PQLs. These results suggest that off site water users are not receptors of the chromium contaminated ground water documented at the Ward Products Site.

5.2.3 Cyanide

Cyanide was used at the site from 1957 to 1985 as part of the cadmium/cyanide electroplating process and from 1957 to 1973 in the zinc/cyanide electroplating process. The raw materials used in the electroplating operations included cadmium/cyanide plating solution and zinc/cyanide plating solution. The discharge of cyanide containing materials from the cadmium/cyanide electroplating was discussed previously. Cyanide containing materials from the zinc/cyanide plating line were directly discharged, untreated, to the drainage ditch via the drain pipe until 1973 when the zinc/cyanide electroplating process was discontinued.

Cyanide was detected in samples of soil and sediment at concentrations exceeding site background, which is at a concentration above its detection limit. The NYSDEC has not established a numerical SCO for cyanide and only refers to a site specific concentration. In addition, the NYSDEC has not established a SEL for cyanide in sediments. For this discussion, cyanide concentrations above background levels (1 mg/kg or the detection limit) are considered elevated. Elevated concentrations of cyanide were detected in:

- Five of eleven soil samples collected below the former sludge drying pad.
- All three soil samples collected from below the former vapor degreaser. Cyanide was not detected in the sediment sample collected from the floor drain.
- All four samples collected from the soil pile. Three samples were submitted for leachability testing and cyanide was detected in two of the three leachate samples. The soil pile was removed as part of the IRM performed in 1997.

- Nine percent (17) of the soil samples collected from the area north and east of the manufacturing facility (including the area below the former soil pile and the area around the transformer pad). During January 2004, the soils in the area north and east of the manufacturing facility were removed from the site, while the soils in the area of the transformer pad were removed during an IRM in 1999 (ThermoRetec 1999b).
- Eighteen of 27 sediment samples collected from the drainage ditch and the two drainages downstream of the site. The highest concentrations of cyanide were detected in the sediment samples collected from drainage ditch and the upper portion of the East Branch drainage. The sediments in these areas were removed as part of an IRM performed in January 2004 (RETEC 2004).

Cyanide can exist in the environment in several different forms including free cyanide (-CN), hydrogen cyanide (HCN), cyanide salts (NaCN or KCN), or iron complexed cyanides (Kjeldsen 1999). The behavior and toxicity of cyanide is dependent upon its form. Free cyanide and hydrogen cyanide are considered the most toxic forms, but these are also the most likely to naturally attenuate when released to the environment. Laboratory tests performed on sediment, soil and water samples collected in 1986 showed that free cyanide, which includes both –CN and HCN forms, was present in these media (Normandeau Engineers 1988). All of the environmental samples collected since 1996 have been analyzed for either total cyanide or reactive cyanide (for hazardous waste classification).

For the soils, the highest concentration of cyanide was found in a sample collected from below the former sludge drying pad. The suspected source for the cyanide in this area is the past release of cadmium/cyanide electroplating solution from the evaporation unit. The potential for the migration of cyanide through the glacial till located below the floor of the manufacturing building is low because of its low permeability. Due to the presence of the overlying concrete foundation the underlying glacial till is not subject to the infiltration of precipitation, eliminating the potential for leaching. For this same reason, cyanide containing material cannot be eroded and transported from this area.

High concentrations of cyanide were also detected in the soils located outside the manufacturing building in the areas around the former treatment operations. The soils located between the manufacturing building and the transformer pad were removed as part of an IRM in 1999 (ThermoRetec 1999b) and the soils in the area north and east of the manufacturing building were removed from the site as part of an IRM performed in January 2004 (RETEC 2004). As a result, most of the cyanide contaminated exterior soils have been removed from the site. Although the cyanide contaminated exterior soils have been removed, cyanide contaminated soil remains below the manufacturing building in the areas of the former vapor degreaser and the sludge drying pad at concentrations above its NYSDEC SCO (1 mg/kg). As a result, cyanide is considered a CoC in soil at the site (Table 30).

The persistence of cyanide in the soils remaining at the site is dependent upon its form. If it is in the form of free or hydrogen cyanide, then biodegradation or volatilization may occur, decreasing the concentration of cyanide over time (Kjeldsen 1999). Under volatilization hydrogen cyanide first disassociates into hydrogen and free cyanide and then the free cyanide would be transported up through the soil and discharged into the atmosphere. Under aerobic conditions the cyanide can also be biodegraded producing carbon dioxide and ammonium. The biodegradation and/or volatilization of cyanide in the exterior soils may explain the low percentage of samples that it was detected in, when compared with the other electroplating inorganics.

Cyanide in the soil remaining at the site may undergo volatilization or could be transported by soil erosion. Volatilization would occur directly into the atmosphere. As for soil erosion, the compact nature of the soils at the site and the presence of vegetation effectively reducing the potential for the migration of the cyanide contaminated soil by runoff.

In the sediments, the highest consistent concentrations of cyanide were found in the samples collected from the drainage ditch downstream of the drain pipe outfall and in those samples collected from the upper portion of the East Branch drainage. The cyanide containing sediments in the drainage ditch, the upper portion of the East Branch drainage and at two culverts located at Sam Stratton Drive were removed as part of an IRM performed in January 2004 (RETEC 2004). The results of the nine confirmatory samples collected from these areas indicate that cyanide concentrations in the sediment were reduced to below their detection limits. These results indicate that the cyanide containing sediment has been effectively removed from the site and has eliminated this material as a potential continuing source of contamination to the downstream drainages.

A limited amount of cyanide containing sediment does remain in the channel of the East Branch drainage within the Amsterdam Industrial Park. The transport of the remaining cyanide containing materials in the East Branch drainage will be dependent on the frequency, magnitude and duration of flow events in the drainage. The downstream movement of this material will be further limited because of the construction of a detention basin on the East Branch drainage immediately downstream of Sam Stratton Road. This basin will promote the deposition of fine grain sediment, thereby limiting the downstream migration of this contaminant. In either the case, the cyanide can undergo volatilization and/or biodegradation, which will further reduce its concentration in the sediment over time. Considering the limited amount of cyanide remaining in the sediment in the upper East Branch drainage and the potential for its volatilization and/or biodegradation, it is not considered a CoC in this medium (Table 30).

Cyanide has not been detected in the surface water quality samples collected from either the drainage ditch or the East and West Branch drainages. These results show that cyanide is not a CoC in surface water and that surface runoff is not a significant migration pathway for this contaminant (Table 30).

In ground water, cyanide has only been detected in samples collected from monitoring wells MW-1 and MW-1R, on site, but at concentrations below its NYSDEC GQS. These two monitoring wells are located in the vicinity of the former electroplating solution evaporation tank and the former sludge drying pad. The limited distribution of cyanide in the ground water at the site most likely reflects a relatively small source volume and/or the effects of the natural degradation of cyanide in the environment. Callahan and others (1979) report that cyanide (in the form of hydrogen cyanide) has a half life of 22 to 111 hours in water. Considering that the electroplating operations were discontinued close to 20 years ago, most if not all the cyanide released to the ground water should have degraded. Thus, cyanide is not a CoC in ground water and ground water flow does not represent migration pathway for the transport of this contaminant off site (Table 30).

5.2.4 Lead

Lead, in the form of lead anodes, was used at the site from 1957 to 1985 as part of the nickel/chromium electroplating process. Potential sources of lead in the soil at the site include surficial spills or releases, while sources of lead in the sediment may include runoff from the contaminated soils and discharges from the drain pipe outfall.

Lead was detected in soil samples at concentrations exceeding its NYSDEC SCO of 6.6 mg/kg (site background) and in sediments at concentrations exceeding its NYSDEC SEL of 110 mg/kg. Specifically, elevated concentrations of lead were detected in:

- Ten of eleven soil samples collected below the former sludge drying pad.
- All three soil samples collected from below the former vapor degreaser and in the sediment samples collected from the floor drain and drain pipe. The drain pipe sample was submitted for leachability testing and the concentration of lead in the leachate exceeded its State and Federal TC standard. The sediment in the drain pipe was subsequently removed as part of the IRM performed in 2000 (ThermoRetec 2001).
- All four samples collected from the soil pile. Three samples were submitted for leachability testing and lead was detected in one of the leachate samples, but at a concentration below its State and Federal TC standard. The soil pile was subsequently removed as part of the IRM performed in 1997.
- Eighty-seven percent (171) of the soil samples collected from the area north and east of the manufacturing facility (including the area below the former soil pile and the area around the transformer pad). The soils in the areas north and east of the manufacturing facility were removed as part of an IRM performed in January 2004, while the soils located around the transformer pad were removed as part of an IRM done in 1999 (ThermoRetec 1999b).
- Thirty percent (10) of the sediment samples collected from the drainage ditch and the two drainages downstream of the site and in one sample collected from the Mohawk River. The lead containing sediments in the drainage ditch and in the upper portion of the East Branch drainage were removed during an IRM performed in January 2004 (RETEC 2004).

For the soils, the highest concentrations of lead were found in the samples collected from the area of the former soil pile and in the undeveloped parcel north of the manufacturing facility. In January 2004, the soils present in these areas were excavated and removed from the site. As a result, most of the soil with high concentrations of lead has been removed from the site. Although soils containing lead remain on the site, the concentration of lead in these materials falls within or close to the range (4 to 61 mg/kg) of lead levels in rural soils as reported by the NYSDEC (1994). As a result, lead is not considered a CoC in the soils at the site (Table 30).

Any lead in the soil remaining at the site is expected to persist since it is not degraded by any natural processes. Due to its tendency to adsorb onto solids and its ability to precipitate in the presence of anions, lead is not highly mobile in soil and would not readily leach into underlying ground water (Tidball 1976 and Callahan and others 1979).

With the removal of the lead containing soil from the site the potential for its migration by runoff or wind erosion has also been eliminated. In addition, due to the compact nature of the soil at the site and its vegetation cover, the potential migration of any remaining lead containing soil at the site by runoff would be low.

In sediment, the highest concentrations of lead were consistently found in the drainage ditch between the drain pipe outfall to a point 50 feet downstream of Edson Street. These sediments were removed as part of an IRM performed in January 2004 (RETEC 2004). No confirmatory sampling was performed for lead, so the concentrations of this metal in the remaining material is unknown, but based on correlation of pre-excavation lead concentrations and pre-excavation cadmium and projecting based on the post-excavation results for cadmium, it is expected that post-excavation lead concentrations would be significantly less than their pre-IRM concentrations. The removal of the lead containing sediments from the drainage ditch and the upper portion of the East Branch drainage has eliminated this material as a major source of this contaminant to the lower drainages.

Lead has been detected in sediment samples collected from the East and West Branch drainage, but at concentrations well below its NYSDEC SEL. Lead was detected in one sample collected from the Mohawk River near the outlet of the West Branch drainage, but the results of additional samples indicated that this was an isolated hot spot. As a result, lead is not considered a CoC in sediment (Table 30).

In surface water, lead was not detected in the three water quality samples collected from the drainage ditch downstream of the drain pipe outfall. Lead was detected in two of the eight samples collected from the East and West Branch drainages, but at concentrations below its NYSDEC SWQS. As a result, lead is not a CoC in surface water and surface water does not represent a significant migration pathway for this metal (Table 30).

Lead has not been detected in any of the ground water samples collected from the monitoring wells at the site. The absence of lead in the ground water at the site is most likely due to its geochemical reaction with carbonates, sulfates and hydroxides present in the ground water to form precipitates having low solubilities (Hem 1976). The movement of lead in the glacial till and fractured bedrock is mostly likely limited by its sorption onto iron hydroxides ($Pb(OH)_2$) or by its precipitation as lead carbonate ($PbCO_3$). As a result, lead is not a CoC in ground water and ground water does not represent a migration pathway for this metal (Table 30).

5.2.5 Nickel

Nickel, in the form of nickel chloride electroplating solution, was used at the site from 1957 to 1985 as part of the nickel/chromium electroplating process. Potential sources of nickel in the soil at the site include surficial spills or releases, while sources of nickel in the sediment may include runoff from the contaminated soils and discharges from the drain pipe outfall.

Nickel was detected in soil samples at concentrations exceeding its NYSDEC SCO of 16 mg/kg (site background) and in sediment at concentrations exceeding its NYSDEC SEL of 50 mg/kg. Specifically, elevated concentrations of nickel were detected in:

- Ten of eleven soil samples collected below the former sludge drying pad. Three of these samples were submitted for leachability testing and nickel was detected in all three samples.
- In all three soil samples collected from below the former vapor degreaser. Nickel was also detected in the sediment sample collected from the floor drain. The sediments in the drain pipe were removed as part of the IRM performed in 2000 (ThermoRetec 2001).
- The one sample analyzed for nickel, which was collected from the soil pile. The soil pile was removed as part of the IRM performed in 1997.
- Ninety percent (176) of the soil samples collected from the area north and east of the manufacturing facility (including the area below the former soil pile and the area around the transformer pad). The soils in the areas north and east of the manufacturing facility were

removed as part of the IRM performed in January 2004 (RETEC 2004), while the soils in the area of the transformer pad were removed during an IRM in 1999 (ThermoRetec 1999b).

- Seventy eight percent (67) of sediment samples collected from the drainage ditch and two drainages downstream of the site and in 17 percent (6) of the sediment samples collected from the Mohawk River. The nickel containing sediments in the drainage ditch, the upper portion of the East Branch drainage and at two culverts on Sam Stratton Road were removed as part of an IRM performed in January 2004 (RETEC 2004).

Elevated concentrations of nickel were detected in the soil samples collected from below the former sludge drying pad. The concentration of nickel in the majority of these samples exceeded their NYSDEC SCO and these materials remain in place. The suspected source for the nickel in this area is the past release of nickel/chromium electroplating materials from the sludge drying pad. Due to the presence of the concrete foundation, the underlying glacial till is not subject to the infiltration of precipitation and as a result the potential migration of this contaminant by leaching is considered low. For this same reason, nickel containing material cannot be eroded and transported away from this area.

The highest concentrations of nickel were detected in the exterior soils in the vicinity of the former soil pile, the transformer pad and in the undeveloped parcel north of the manufacturing building. The soil pile and its underlying soils were removed as part of an IRM in 1997, the soils around the transformer pad were removed as part of an IRM in 1999 (ThermoRetec 1999b), while the soils in the undeveloped parcel north of the manufacturing building and in the vicinity of the former soil pile were removed as part of an IRM performed in January 2004 (RETEC 2004). Although the three IRMs have reduced the amount of nickel contaminated soil at the site, nickel is still present in the soils at concentrations greater than its NYSDEC SCO and above background values (0.5 to 25 mg/kg) reported by the NYSDEC (1994) for the eastern United States. As a result, nickel is considered a CoC in soil at the site (Table 30).

Any nickel in the soil remaining at the site is expected to persist since this metal is not readily degraded by natural processes. The results of the leachability tests performed on soil samples collected from the site indicate that nickel could be potentially leached from the exterior soils. The migration of nickel from the exterior soils by leaching is most likely controlled by its sorption and precipitation onto the underlying soil material. Several studies (Anderson and Christensen 1988 and Bruemmer, Gerth and Tiller 1988) have shown that the sorption of nickel ($Ni(OH)_2$) on iron coated sediments is a dominant removal process in environments which have pH values greater than 7. Also, nickel in the presence of high concentrations of carbonate can lead to the precipitation of $NiCO_3$. Since the glacial till is derived from the local carbonate bedrock the pH of these soils is greater than 7. Also, carbonate ions should be readily available in the soil increasing the potential for the precipitation of $NiCO_3$, thereby reducing the potential leaching of nickel from the soil.

Prior to the completion of the soil IRMs in 1999 (ThermoRetec 1999b) and 2004 (RETEC 2004) another potential pathway for the migration of nickel from the site was erosion by rainfall and/or wind. With the removal of the nickel containing soils from the areas north and east of the manufacturing area and around the transformer pad this potential migration pathway has been eliminated because the source has been removed. For any remaining nickel containing soil the potential for erosion is considered low due to the compact nature of the soil and due to its vegetation cover (grasses).

In the sediments, the highest concentrations of nickel were detected in the samples collected immediately downgradient of the drain pipe outfall. These sediments were removed from the site as part of an IRM performed in January 2004 (RETEC 2004). The results of the confirmatory samples collected after the completion of the IRM indicate that the concentration of nickel had been reduced by several orders of magnitude when compared to their pre-IRM values. At one half of the locations (two of four) the concentration of nickel in the remaining sediment exceeded its NYSDEC SEL. These materials were capped in place to reduce the potential for their erosion and transport off site.

Sediment was also removed from a section of the upper East Branch drainage and from two areas located upstream of two culverts on Sam Stratton Road. The results of confirmatory samples collected from these locations show that the concentration of nickel in the remaining sediments falls below its NYSDEC SEL. Sediment, with nickel concentrations exceeding its NYSDEC SEL, remains in place in a portion of the East Branch drainage in the Amsterdam Industrial Park, in the East Branch and West Branch drainages downstream of Sam Stratton Drive and in the Mohawk River at the outlet of the East Branch drainage. The nickel containing sediments at these locations will either be further covered in place by more recent and cleaner sediments or may be slowly transported to the Mohawk River. The rate at which these sediments are transported through the drainage will be dependent upon the frequency, magnitude and duration of flow events. Since the lower drainages appear to flow intermittently, in response to snowmelt runoff and/or rainfall, the amount of time that it will take for the nickel containing sediments to be transported through the drainages would be substantial. As a result, nickel is considered a CoC in the sediments downstream of the site (Table 30).

In surface water, nickel was detected in only one of the three water quality samples collected from the drainage ditch downstream of the drain pipe outfall. The concentration of nickel in this sample was below its NYSDEC SWQS. Nickel was only detected in one of eight samples collected from the East and West Branch drainages, but also at a concentration below its standard. As a result, nickel is not considered a CoC in surface water, although surface water may represent a potential migration pathway for the transport of nickel containing sediment in the East and West Branch drainages (Table 30).

Nickel has been detected in low concentrations in one of the glacial till monitoring wells and four of the fractured bedrock monitoring wells sampled at concentrations above its detection limit. None of the samples had nickel at a concentration that exceeded its NYSDEC GQS. As a result, nickel is not considered a CoC in ground water and ground water does not represent a significant potential migration pathway for this metal (Table 30).

5.2.6 Zinc

Zinc, in the form of zinc/cyanide electroplating solution, was used at the site from 1957 to 1973 as part of the zinc/cyanide electroplating process. Untreated zinc containing material generated by the zinc/cyanide electroplating process was directly discharged into the drainage ditch until the elimination of this electroplating line in 1973.

Zinc was detected in soil samples at concentrations exceeding its NYSDEC SCO of 46.1 mg/kg (site background) and in sediment at concentrations exceeding its NYSDEC SEL of 270 mg/kg. Specifically, elevated concentrations of zinc were detected in:

- Ten of eleven soil samples collected below the former sludge drying pad. Five of these samples were submitted for leachability testing and zinc was detected in all five samples.

- All three samples collected from below the vapor degreaser and in the sediment sample collected from the floor drain. The sediments in the drain pipe were removed as part of an IRM performed in 2000 (ThermoRetec 2001).
- The one sample analyzed for zinc, which was collected from the soil pile. The soil pile was removed as part of an IRM performed in 1997.
- Eighty-four percent (165) of the soil samples collected from the area north and east of the manufacturing facility (including the area below the former soil pile and the area around the transformer pad). The soils in the areas located north and east of the manufacturing facility were removed as part of an IRM performed in January 2004, while the soils located around the transformer pad were removed as part of an IRM done in 1999 (ThermoRetec 1999b).
- Twenty seven percent (9) of the sediment samples collected from the drainage ditch and in two drainages located downstream of the site. The zinc containing sediments in the drainage ditch and in the upper East Branch drainage were removed as part of an IRM performed in January 2004 (RETEC 2004).

Elevated concentrations of zinc were detected in the majority of the soil samples collected from below the former sludge drying pad. The concentration of zinc in the majority of these samples exceeded its NYSDEC SCO and these materials remain in place. The suspected source for the zinc in this area is the past release of zinc/cyanide electroplating materials from the sludge drying pad. Due to the presence of the concrete foundation the underlying glacial till is not subject to the infiltration of precipitation. As a result, the potential for the migration of zinc from the glacial till located below the floor of the manufacturing building is low. For this same reason, zinc containing material cannot be eroded and transported away from this area, so surface runoff is not a potential migration pathway for this material.

For the exterior soils, the highest concentrations of zinc were found in the samples collected from the area of the former soil pile. Elevated concentrations of zinc were also detected in the area around the transformer pad and in the undeveloped parcel north of the manufacturing building. The soil pile was removed as part of an IRM in 1997, the shallow soil along the transformer pad were removed as part of an IRM in 1999 (ThermoRetec 1999b) and the shallow soil located in the undeveloped parcel north of the manufacturing building were removed as part of an IRM performed in January 2004 (RETEC 2004). Although these three IRMs have removed most of the soil containing high concentrations of zinc, it is still present in the soil at the site at concentrations greater than its NYSDEC SCO and at values greater than background (9.0 to 50 mg/kg) as reported by the NYSDEC (1994) for soils in the eastern United States. As a result, zinc is considered a CoC in the soil at the site (Table 30).

For any zinc containing soil remaining on site, the zinc is expected to persist since this metal is not readily degraded by natural processes. The results of the leachability tests performed on soil samples collected from the site indicate that zinc could be leached from the exterior soils. The migration of zinc from the exterior soils by leaching is most likely controlled by its sorption onto the fine grain unconsolidated material. Callahan and others (1979), Shuman (1980), Bruemmer, Gerth and Tiller (1988), Anderson and Christensen (1988) and Fic and Isenbeck-Schroter (1989) suggest that the sorption of zinc onto iron oxides or hydroxides is the dominant transport limiting process in the subsurface where oxic and alkaline conditions exist. These conditions are most likely present at the site due to the low concentration of organic material and the high carbonate content of the soil, thereby limiting the potential migration of zinc into the subsurface.

In sediment, the highest concentrations of zinc were detected in the samples collected from the drainage ditch immediately downgradient of the drain pipe outfall, while elevated concentrations of zinc were also detected in the sediment from below the outfall to a distance 50 feet downstream of Edson Street. In January 2004, an IRM was performed in which the zinc containing sediment in the drainage ditch and in the upper portion of the East Branch drainage was removed (RETEC 2004). The analysis of six confirmatory sediment samples collected after the IRM was completed showed that the concentrations of zinc in the sediment remaining in these areas were below their NYSDEC SEL. The completion of the IRM has eliminated these sources of zinc and as a result, zinc is not considered a CoC in sediment (Table 30).

In surface water, zinc was detected in two of the three surface water samples collected from the drainage ditch downstream of the drain pipe outfall, but at concentrations below its NYSDEC SWQS. Zinc was also detected in six of eight samples collected from the East and West Branch drainages downstream of the site, but below its standard and close to its background value. With the discontinuation of the discharge of the electroplating materials, the removal of the zinc containing soils and drain pipe sediment, the removal of the sediment from the drainage ditch and the upper East Branch drainage the major sources of zinc in surface water have been eliminated. Zinc containing sediment is present in the lower portions of the East and West Branch drainages, but at concentrations below its NYSDEC SEL. As a result, zinc is not considered a CoC in surface water and surface water does not represent a significant migration pathway for this metal (Table 30).

The results of the ground water quality samples collected from the monitoring wells since 1996 indicates that zinc is present in the ground water at the site, but at concentrations close to its detection limit. Zinc has been detected in five of the nine fractured bedrock wells sampled and in one of the four glacial till wells. The NYSDEC has not established a ground water quality standard for zinc, and as a result, zinc is not considered to be a CoC in ground water and ground water flow is not considered a significant migration pathway for this metal (Table 30).

5.2.7 Tetrachloroethene

Tetrachloroethene (PCE) is a chlorinated aliphatic hydrocarbon that is commonly used as an industrial solvent. The use of this solvent at the Ward facility was not previously noted (Normandeau Associates 1986) and it was not detected in the samples collected from the site in the 1986 field investigation (Normandeau Engineers 1988). PCE was not detected in any of the soil samples collected as part of the RI Investigations recently performed at the site (Normandeau Associates 2001) and in only one sediment sample collected from the drainage ditch. PCE has also not been detected in any surface water samples collected from the site. As a result, PCE is not considered a CoC in soil, sediment or surface water on or off of the site (Table 30).

PCE was detected in samples collected from three of the fractured bedrock monitoring wells (MW-4R, MW-6 and MW-10) in samples collected in 1997 and/or 1998. This VOC has only been detected one time since 1998, and that was at an estimated concentration in a sample collected from monitoring well MW-6 in August 2004. The source of this PCE is unknown.

The fate of PCE in ground water has been reviewed by Callahan and others (1979) and Howard (1990). PCE is a highly volatile compound and readily evaporates into the atmosphere when released to the environment. As a result, volatilization is the major limiting process for the transport of PCE in ground water. Alternatively, diffusion, sorption and biodegradation have been identified as processes that can also result in the loss of PCE from ground water. In fractured bedrock, PCE can diffuse into the matrix of the rock, which can reduce the mass of the contaminant in the ground water (Parker, Gillham and Cherry 1994). PCE can also adsorb onto the surface of sediments and the surface of bedrock and can also be transformed into TCE by naturally occurring microorganisms (Yager, Bilotta, Mann and Madsen 1997) in the ground water. The ground water quality data indicates that PCE was present in the ground water at the site, but it hasn't been detected in samples collected since the late 1990's. This may be the result of its diffusion, sorption or biodegradation or possibly its presence is masked by the high detection limits in the most highly contaminated samples (MW-4R, MW-6 and MW-10). Since PCE has not been detected in the ground water at significant concentrations recently it is not considered a CoC on or off of the site (Table 30).

PCE was detected in one indoor air sample collected from within the manufacturing building in 2002 and was not detected in any of the indoor air samples collected from the building in 2005. In the sample collected in 2002 the concentration of PCE was detected at a level below the level recently recommended by the NYSDOH (2003) for residential indoor air. In the January 2005 indoor air and sub-slab vapor samples PCE was not detected at concentrations that would warrant any further action (NYSDOH 2004b). As a result, PCE is not considered a CoC in indoor air at the site (Table 30).

5.2.8 Trichloroethene

The predominant organic contaminant identified at the site is trichloroethene (TCE), which was used from 1959 to 1983 in the vapor degreasing system. TCE has been detected in soil, sediment, ground water and indoor air samples collected from the site at concentrations exceeding its cleanup objective, limits, standards or guidance values. In soil, the highest concentrations of TCE were detected in two samples collected from test pits excavated below the drain pipe outside of the building. The concentration of TCE in both of these samples slightly exceeded the NYSDEC SCO of 700 ug/Kg (ppb). The suspected source of the TCE in these soils was the leakage of electroplating and degreasing solutions from the drain pipe. TCE was also detected in low concentrations (<15 ug/Kg) in soil samples collected from below the former sludge drying pad (inside the building) and from around the transformer pad (outside the building). The source of the low concentrations of TCE in the soils below the sludge drying pad may have been leakage through the base of the pad, while the source of the low concentrations of TCE in the soils around the transformer pad could have been the exhaust of the vapor degreaser or spills. As part of an IRM performed in 1999 the soils around the transformer pad were removed (ThermoRetec 1999b).

Considering that TCE is no longer being introduced to the soils on site by the manufacturing operations and since it has only been detected at two locations (near the drain pipe) at concentrations slightly above its NYSDEC SCO, the probable fate of this VOC in the soils at the site will most likely be its continued volatilization and biodegradation. In the areas of open ground the volatilization of TCE from the soils will result in its discharge into the atmosphere. Where TCE is present in soils and/or shallow ground water that is covered by the manufacturing building the volatilization of this compound could potentially result in chemical vapor intrusion into the building. As a result, TCE is considered a CoC in the shallow ground water in the area overlain by the manufacturing building (Table 30).

The highest concentration of TCE in sediment, 19,000 ug/Kg, was detected in a sample collected from the floor drain. This sample was also tested for the leachability of TCE and its concentration in the leachate exceeded its State and Federal TC standard. The suspected source of the TCE in the floor drain was the operation of the former vapor degreasing system or spills from the electroplating operations. As part of an IRM performed in December 2000, the TCE contained sediments were flushed from the drain pipe, thereby eliminating the potential for the continued discharge of this material from the pipe to the drainage ditch. Low concentrations of TCE were also detected in a sediment sample collected at the outlet of the drain pipe. These sediments were removed as part of an IRM performed in January 2004. With the completion of these IRMs TCE is not considered a CoC in sediment (Table 30).

In surface water, TCE was detected in one sample collected downstream of the drain pipe outfall, but at an estimated concentration 1 ug/L. Because of the limited number of detections and its low concentration, TCE is not considered a CoC in surface water and surface water is not considered a potential migration pathway for this contaminant (Table 30).

In ground water, TCE has been consistently detected above its NYSDEC GQS in samples collected from two of the four glacial till monitoring wells and in 12 of the 18 fractured bedrock monitoring wells installed at and in the vicinity of the site. The highest concentrations of TCE have been detected in monitoring wells MW-4R and MW-6. Monitoring wells MW-4R and MW-6 are located immediately downgradient of the drain pipe, which is the suspected source of the TCE. Once released to the environment the TCE would have migrated downward with ground water flow through the glacial till and into the underlying fractured bedrock. Due to the high concentrations of TCE detected in the ground water and its presence in monitoring wells located both on and off site it is considered a significant CoC and ground water flow represents a significant migration pathway (Table 30).

The fate of TCE in ground water is dependent upon the existing site specific hydrochemical conditions. In most environments, volatilization is the most important removal process (Callahan and others 1979, Howard 1990 and USEPA 2000) for TCE. TCE would volatilize from the shallow ground water and migrate upward through the overlying soil material and discharge into the atmosphere in open areas. Where the ground surface is covered by pavement or structures, such as the manufacturing building, the TCE would concentrate below these barriers and either biodegrade, slowly diffuse through them, migrate through cracks or move laterally outward from below them. The TCE in the deeper fractured bedrock would have limited potential for volatilization since the ground water is at depth and confined by the overlying glacial till.

The mass of TCE may be further reduced by its diffusion into the rock matrix (Parker, Gillham and Cherry 1994). Adsorption of the TCE onto sediments or the surfaces of the bedrock fractures would further reduce the mass of TCE and retard its migration. Due to the low organic carbon content of the glacial till and the fractured carbonate bedrock at the site, adsorption by organic material may be limited (Benker, Davis and Barry 1998).

In anaerobic environments, the degradation of TCE by bacteria has been documented (McCarty and others 1981, USEPA 2000). The reductive dehalogenation of the TCE by microorganisms results in the production of a sequence of daughter products including: cis-1,2-dichloroethene, trans-1,2-dichloroethene and vinyl chloride. Low concentrations of cis-1,2-dichloroethene have been detected in the samples collected from three fractured bedrock monitoring wells (MW-13, 16 and 17) located downgradient of the central mass of the contaminant plume migrating from the site. The presence of this daughter product along with an increase in chloride concentrations and a decrease in dissolved oxygen concentrations in these downgradient monitoring wells suggests that some of the TCE may be undergoing reductive dehalogenation.

Regarding off site receptors, TCE has been detected in four of the offsite downgradient monitoring wells (MW-13, 16, 17 and 18) at concentrations greater than its NYSDEC GQS. These results confirm that TCE is migrating with ground water flow off of the site. The closest downgradient ground water receptor is a former water supply well that is located on the UCMI property over 230 feet southwest site (water well in Figure 2). As mentioned previously, this water well is not used by UCMI and the property is provided water by the City of Amsterdam's Water Department (Michael Ryba, pers. comm.).

The only other water users located downgradient of the site and not on the municipal water supply system are located in the Town of Amsterdam along Chapman Drive and off of East Main Street in the City of Amsterdam, approximately 2,600 feet southeast of the site (Figure 35). At least seven residential properties, located along Chapman Drive between the City/Town boundary and its intersection with Widow Susan Road have domestic water supply wells. Most of the domestic water supply wells are located immediately east of the railroad spur that crosses Chapman Drive (Figure 35) and where the municipal water line ends.

Based on interviews with local property owners in September 2004, the only other water supply wells identified in the immediate vicinity of the site are located on FGI's property, which is immediately east and adjacent to the Ward Products Site. There are no public records regarding the existence of these two wells and FGI (Lierheimer pers. comm.) acknowledged that they had been installed to supplement municipally supplied water. Water quality samples were collected from these wells in December 2004 and February 2005. The results of these samples documented the presence of TCE at concentrations exceeding its NYSDEC GQS in one of the two wells on FGI's property. This well, FGI-1, is located over 200 feet east of the Ward Products Site. This well has been used as a source of water by FGI for the production of fiber glass and reportedly has been used in the past as a potable water source (Lierheimer pers. comm.). Due to problems experienced with the pump in this well it is currently inoperative. Normandeau has informed FGI of the results of the water quality tests and has recommended that the water produced from this well not be used as a potable water source without appropriate treatment. Although TCE is present in the ground water at the Ward Products Site, insufficient information is presently available to confirm its migration from the site to the FGI well. This issue is under consideration and further evaluation of the hydraulic connection between the site and the FGI well will be addressed in a future submission to the NYSDEC.

As mentioned, TCE was detected in indoor air samples collected from within the manufacturing building in one of three samples collected in 2002 and in all three samples collected in 2005. In the 2002 sample, TCE was detected at a concentration below the guidance value recently recommended by the NYSDOH (2004a) for residential indoor air. In 2005, TCE was detected in all three indoor air samples and their associates sub-slab vapor samples at concentrations that, when compared with guidance values recently recommended by the NYSDOH (2004b), indicates that it should be considered a CoC in indoor air at the site (Table 30). The mitigation of TCE in the sub-slab soil gas using a sub-slab depressurization system will be evaluated as part of the RA/FS to be performed following the approval of this report.

5.2.9 PCBs

As discussed in Section 4.1.6, in October and November 1999, PCB contaminated soils were excavated from the area around the transformer pad and then transported off site for disposal at a licensed hazardous waste facility (ThermoRetec 1999b). Post excavation sampling of the underlying soils confirmed that the concentration of PCBs in the remaining soils were below the NYSDEC SCO of 10 ppm (mg/Kg) for sub-surface soils. As a result, PCBs are not considered to be a CoC in the soils at the site (Table 30).

No surface water samples have been analyzed for PCBs. Only one sediment sample has been tested for PCBs and that was a composite sample collected from the drainage ditch by RETEC in December 2003. PCBs (Arochlor 1254) were detected in this sample at a concentration of 0.15 mg/Kg. This type of PCB had been previously detected in the soils located in the vicinity of the transformer pad, which were removed from the site as part of an IRM in 1999 (ThermoRetec 1999b). The concentration of PCBs in the drainage ditch sample were below its NYSDEC SCO of 1.0 mg/Kg (ppm), but were removed anyway as part of the Sediments IRM performed in January 2004 (RETEC 2004). Due to the removal of the PCB contaminated soils in 1999 and the removal of the sediment in 2004 the potential sources of this contaminant have been eliminated and PCBs are not considered to be a CoC in surface water or sediment (Table 30).

To evaluate whether PCBs had migrated from the soils and into the ground water in the vicinity of the transformer pad, ground water quality samples were collected in September 1997 from the three monitoring wells (MW-1, MW-2 and MW-6) located closest to the transformer pad. No PCBs were detected in these ground water samples. As a result, PCBs are not considered to be a CoC in ground water and ground water does not represent a migration pathway for this contaminant (Table 30).

6.0 CONCLUSIONS

This report summarizes the results of the Remedial Investigations performed at the site since 1996. During the RI numerous sediment, soil, ground water and surface water samples have been collected and analyzed to determine the nature and extent of contamination at and off the site and to identify potential migration pathways. Based upon the results of the field investigations Normandeau has reached the following conclusions:

1. The past release or disposal of electroplating and vapor degreasing materials at the site resulted in the contamination of soil at concentrations above applicable State and/or Federal standards. The concentration of several of the electroplating related inorganics (cadmium, chromium, cyanide, nickel and/or zinc) in the soils located beneath the former treatment operations within the manufacturing building exceed their applicable State and/or Federal standards. The source of this soil contamination appears to have been releases from the former electroplating and treatment operations. These operations have ceased and no longer serve as a continuing source of contamination. Because the soils beneath the former treatment operations are covered by the manufacturing building the potential for their migration into ground water or off site is limited. The soils having the greatest concentrations of the electroplating related inorganics identified north and east of the manufacturing building were removed during IRMs performed in 1997, 1999 and 2004. The completion of the IRMs has dramatically reduced the potential for the further migration of these contaminants into the subsurface or off of the site by surface erosion. Although the completion of these three IRMs has reduced the amount of soil contaminated by the electroplating related inorganics, soils contaminated by chromium, cyanide, nickel and zinc at concentrations greater than their NYSDEC SCO (and background values for the eastern United States) remain on site and as a result these are considered to be CoC in the soil at the site.

2. The past release of untreated and treated electroplating and vapor degreasing materials into the drainage ditch via the drain pipe has resulted in the contamination of sediments onsite and downstream of the site at concentrations above applicable State and/or Federal standards. These operations have ceased and no longer serve as a continuing source of contamination. The electroplating related inorganics were detected in sediment samples collected from the drainage ditch on the site, in two drainages located downstream of the site and in the Mohawk River. In January 2004, an IRM was performed that removed the metals contaminated sediment from the drainage ditch on site, a portion of the upper East Branch drainage south of Edson Street and from two culverts on Sam Stratton Road. This IRM has significantly reduced the potential future migration of the electroplating inorganics from these areas to the two drainages downstream. The metals cadmium, chromium and nickel have also been detected at concentrations above their applicable State standards in sediment samples collected from the East and West Branch drainages located downstream of Sam Stratton Road and in sediment samples collected from the Mohawk River at the outlet of the East Branch drainage located over 3,000 feet downstream of the site. As a result, cadmium, chromium and nickel are considered CoC in sediment. The principal migration pathway for residual amounts of these three metals in the sediment will be their transport by surface water in the East and West Branch drainages and in the Mohawk River. The transport of the contaminated sediments will be dependent upon the frequency, magnitude and duration of runoff. Since the

East and West Branch drainages flow intermittently, the transport of the contaminated sediments through these drainages could take a considerable amount of time.

3. The past release of electroplating solutions has resulted in the contamination of ground water in the glacial till and fractured bedrock underlying the site by chromium. The suspected sources of the chromium include surface releases in the area of the grinding shop (northeast corner of building) and the former drain pipe. These operations have ceased and no longer serve as a continuing source of contamination. The concentration of chromium (total and hexavalent) in the ground water at the site exceeds applicable State and/or Federal standards and as a result is considered a CoC in ground water. The plume of the chromium contaminated ground water in the glacial till and the fractured bedrock units is limited to the site and the concentration of chromium appears to be declining in several of the shallow glacial till and fractured bedrock monitoring wells over time. There are no known active ground water users located immediately downgradient of the site, although there is an abandoned water supply well on a neighboring property (UCMI) south of the site and two bedrock water supply wells are located on the property (FGI) located east and immediately adjacent to the site. Total chromium was detected in both of the FGI wells, but at concentrations below its standard and hexavalent chromium was not detected. The only other known ground water users located downgradient of the site are on East Main Street and Chapman Drive approximately 2,600 feet south-southeast of the site. No water quality samples have been collected from these wells as part of this project and considering their distance from the site and the limited migration of chromium at the site they are not considered at risk.

4. The past release of vapor degreasing solvents has resulted in the contamination of ground water in the glacial till and fractured bedrock underlying the site by TCE. The suspected sources of the TCE at the site include leakage from the drain pipe, surface releases in the area of the grinding shop (northeast corner of building) and possibly from a neighboring upgradient source. The vapor degreasing discharges on the site have ceased and no longer serve as a continuing source of contamination. The concentration of TCE detected in ground water samples collected from the site exceeds its applicable State and Federal standards and as a result it is considered a CoC in ground water. The highest concentrations of TCE have been detected in the monitoring wells installed in the fractured bedrock unit. The plume of TCE contaminated ground water in the fractured bedrock has migrated south-southwest and off of the site and onto two neighboring properties downgradient. The contaminant plume is migrating very slowly and it appears that the TCE may be undergoing both dispersion and biodegradation, which is decreasing the concentration of TCE in the downgradient direction. There are no known active ground water users located immediately downgradient of the site, although there is an abandoned water supply well on a neighboring property (UCMI) to the south and two bedrock water supply wells are located on the property (FGI) located east and immediately adjacent to the site. TCE was detected in samples collected from one (FGI-1) of the two wells, which is located closest to the site. The concentration of TCE in these samples exceeded both State and Federal standards. Insufficient hydrogeologic information is presently available to determine if the Ward Products site is the source of the TCE detected in the FGI well. The water produced from this well has been used by FGI for the production of fiber glass, but the well is presently inactive due to problems with its pump. FGI has acknowledged that this well has been used as a potable water supply in the past, but has not

used it for this purpose recently. FGI has been informed of the sampling results and it has been recommended that they not used this well as a potable water supply without treatment. The only other known ground water users that are located downgradient of the site on East Main Street and Chapman Drive, approximately 2,600 feet south-southeast of the site. No water quality samples have been collected from these wells as part of this project and considering their distance from the site and the TCE plume they are not considered at risk.

5. The presence of VOCs in shallow ground water underlying the manufacturing building at the site may be contributing to their presence, at low concentrations, in that building's indoor air. TCE has been detected in indoor air samples and in sub-slab vapor samples at concentrations that, when compared with the guidance values recently proposed by the NYSDOH (2004b), justify inclusion as a CoC for discussion and evaluation in the RA and FS.

6. The four IRMs voluntarily performed at the site by Ward Products and/or New Water Realty have removed significant quantities of hazardous materials from the site and have eliminated several potential exposure and migration pathways. The four IRMs voluntarily performed include: the removal of the soil pile in 1997, the removal of soils near the transformer pad in 1999, the flushing and repair of the drain pipe in 2000 and the excavation and removal of soil and sediment from the site in 2004. The removal of the soil pile eliminated a potential source of electroplating related inorganics from the site. The excavation and the removal of the PCB contaminated soils from the area around the transformer pad eliminated PCB as a CoC at the site. The removal of the contaminated sediment from the drain pipe has eliminated a potential contributing source for contaminated sediment to the drainage ditch, while the repair of the drain pipe has reduced the leakage of contaminated water into the subsurface. The removal of the electroplating related inorganics contaminated soils from the areas north and east of the manufacturing building and the contaminated sediments from the drainage ditch, the upper East Branch drainage and the two culverts located on Sam Stratton Road have reduced the potential for the continued migration of these contaminants from the site.

7. The nature and extent of the sediment and soil contamination associated with the Ward Products site has been sufficiently characterized to proceed with the RA and FS for these environmental mediums. Part of the RA for the contaminated sediment has been completed by Normandeau with the submittal of a Fish and Wildlife Impact Analysis (FWIA) to the NYSDEC in October 2002. The detection of TCE in the FGI water supply well will require further investigation so that appropriate remedial measures can be evaluated and implemented. The completion of this evaluation is necessary prior to the finalization of the RA and FS for this project.

7.0 RECOMMENDED ACTIONS

Based upon the findings and our conclusions presented in this report Normandeau recommends the following:

1. Electroplating related inorganics (cadmium, chromium, cyanide, nickel and zinc) remain in the soils at the site and in the sediments (cadmium, chromium and nickel) of the East and West Branch drainages and the Mohawk River at concentrations above their NYSDEC SCO and/or SELs. Chromium (hexavalent and total) and TCE have been regularly detected in ground water at concentrations exceeding their NYSDEC GQS. In addition, TCE has been detected in indoor air and sub-slab vapor samples, in the manufacturing building on site, at concentrations that, according to 2004 NYSDOH (2004 a and b) guidance, justify discussion as a CoC. As a result, a Risk Assessment (RA) and Feasibility Study (FS) should be completed. The objective of the RA would be to evaluate the risk to human health and the environment posed by the CoC identified in the contaminated soil, sediment, ground water, indoor air and soil gas associated with the site. The objective of the FS would be to evaluate the remedial alternatives that are available, appropriate and practical to reduce the risk posed by the CoC in soil, sediment, ground water, indoor air and/or soil gas. A Fish and Wildlife Impact Analysis (FWIA) has already been performed and a report (Normandeau Associates 2002) has been submitted to the NYSDEC as part of the RA process.

2. The water quality monitoring program should be continued, for at least two more years, to assess and document the migration and attenuation of ground water contamination at the site. Water quality samples should be collected from the site twice a year during the spring and summer to monitor seasonal high and low ground water conditions. The frequency of sampling and the parameters analyzed or measured should be reviewed regularly to determine if the monitoring program is effective in its detection of the CoC identified in ground water. In addition to the collection of water quality samples from the existing monitoring well network, samples should also be collected from the FGI water supply well (FGI-1) twice a year and be analyzed for VOCs, chromium (total, dissolved and hexavalent) and turbidity.

3. Due to the presence of TCE in the water supply well located on the FGI property, FGI should limit its use solely to a source of production water for FGI's manufacturing operations. This well should only be used as a potable water supply source if a treatment system is installed and its water quality monitored. Further assessment of the hydraulic connection of the Ward Products site to the FGI well (FGI-1) is under consideration. After consultation with NYSDEC, it appears NYSDEC has concluded it is not necessary to delay completion and submission of this RRIR pending further site investigation activities because either the VOCs in the FGI-1 well are unrelated to the Ward Products site, or if related, are relatively minor in the context of the above observations for the Ward Products site and the southwesterly downgradient plume and, in such event, can readily be addressed as part of the FS and RA without adverse effects on the remaining remedial planning and implementation process. NWR is considering what additional information or efforts, if any, are necessary or advisable to enhance the understanding and decision making associated with VOCs in the FGI-1 well and will make appropriate separate submissions in advance of submission of the FS and RA.

4. A schedule for the implementation of these recommendations is contingent upon the NYSDEC's review and approval of this report, the extent of the NYSDEC's comments, if any, and the impacts of those comments on these proposals. If additional investigation or sampling is required, for example, that work may delay the preparation of any RA and/or FS reports. Within a reasonable period of time, after receipt of the NYSDEC's comments, New Water Realty will provide a schedule for any further activities and the preparation and submission of the RA or FS or other reports or workplans.

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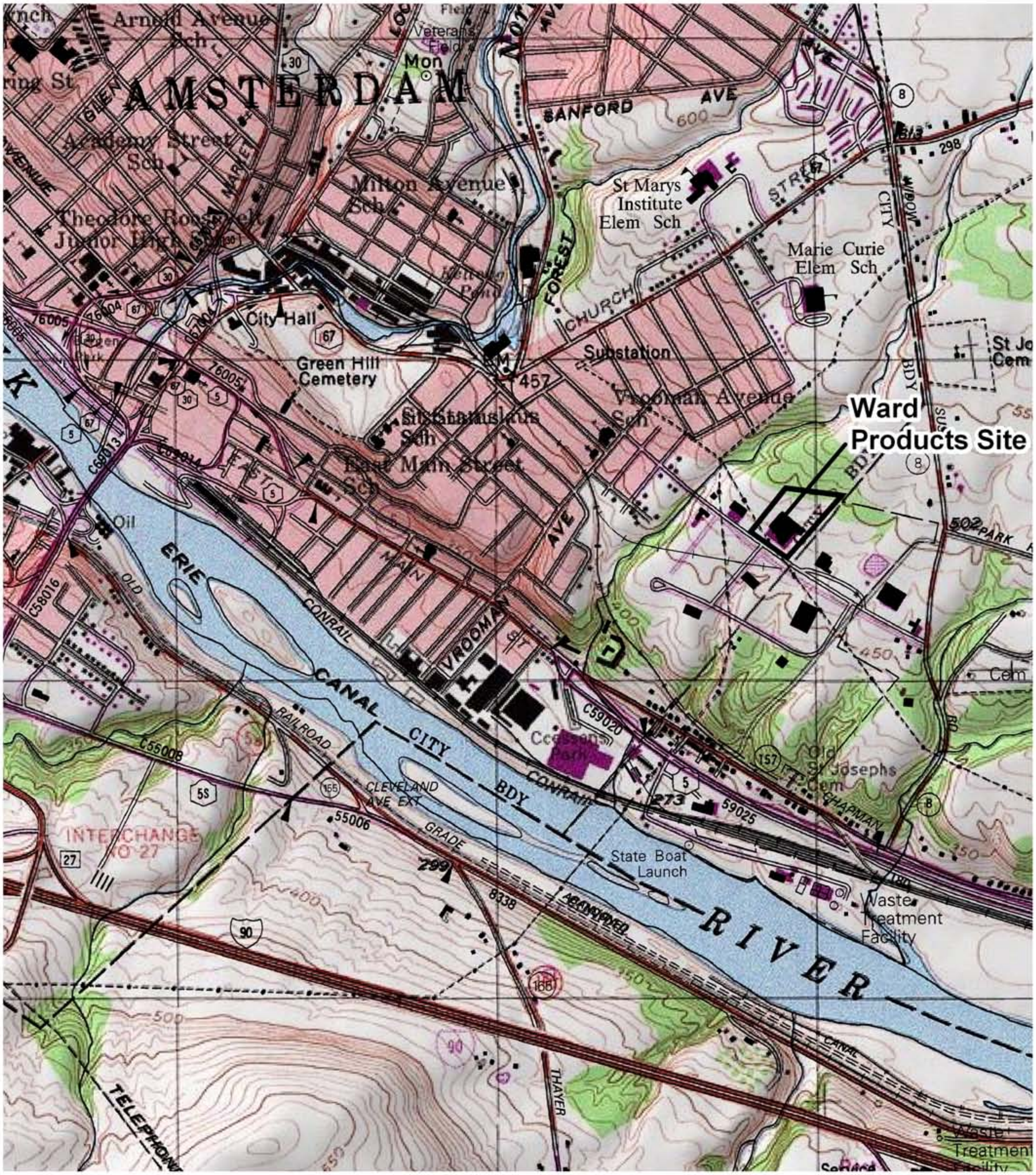
FIGURES



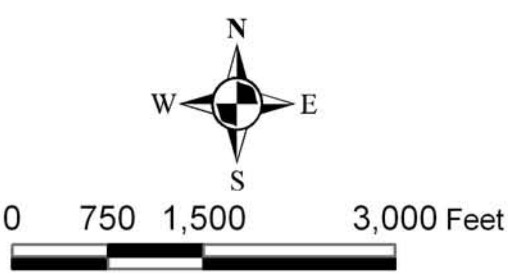


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Figure 1 : Location Map for
Ward Products Site
61 Edson St. Amsterdam, NY

Prepared by: DRS	Date: July 12, 2004

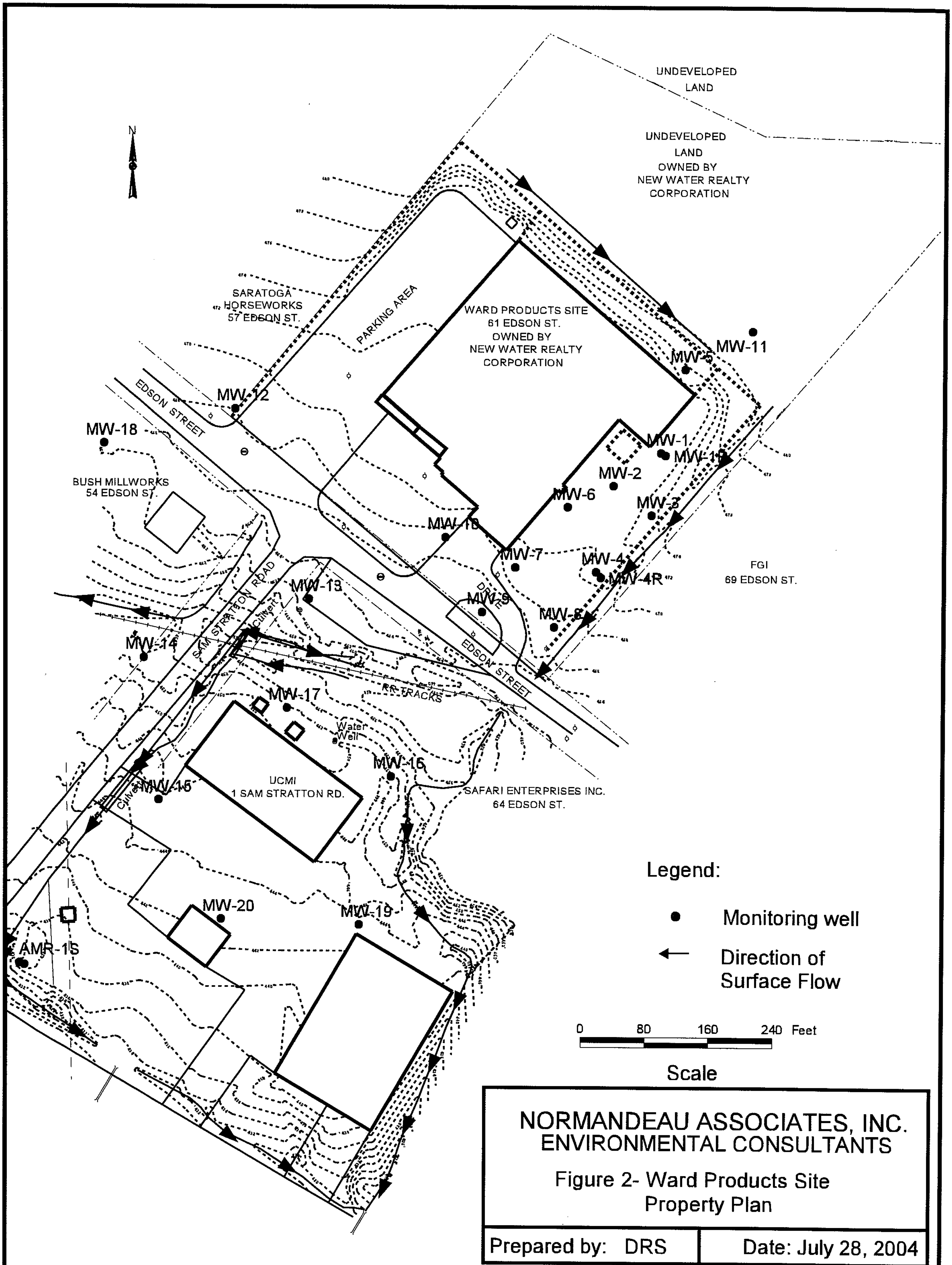


Figure 2- Ward Products Site Property Plan

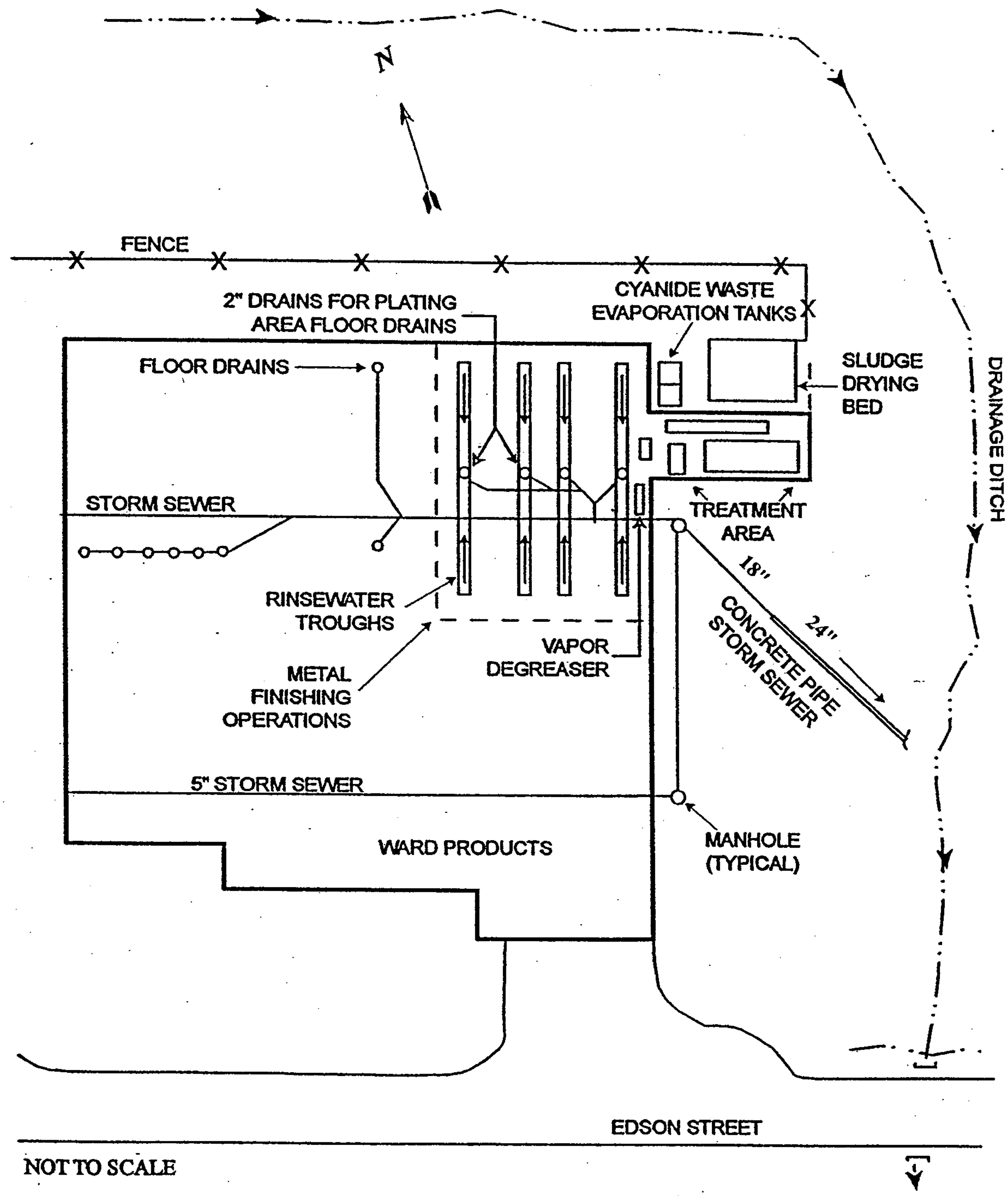


Figure 3. Site Plan Showing the Location of the Former Metal Finishing, Degreasing and Waste Treatment Systems in the Early 1980's. Source Normandeau (1986).

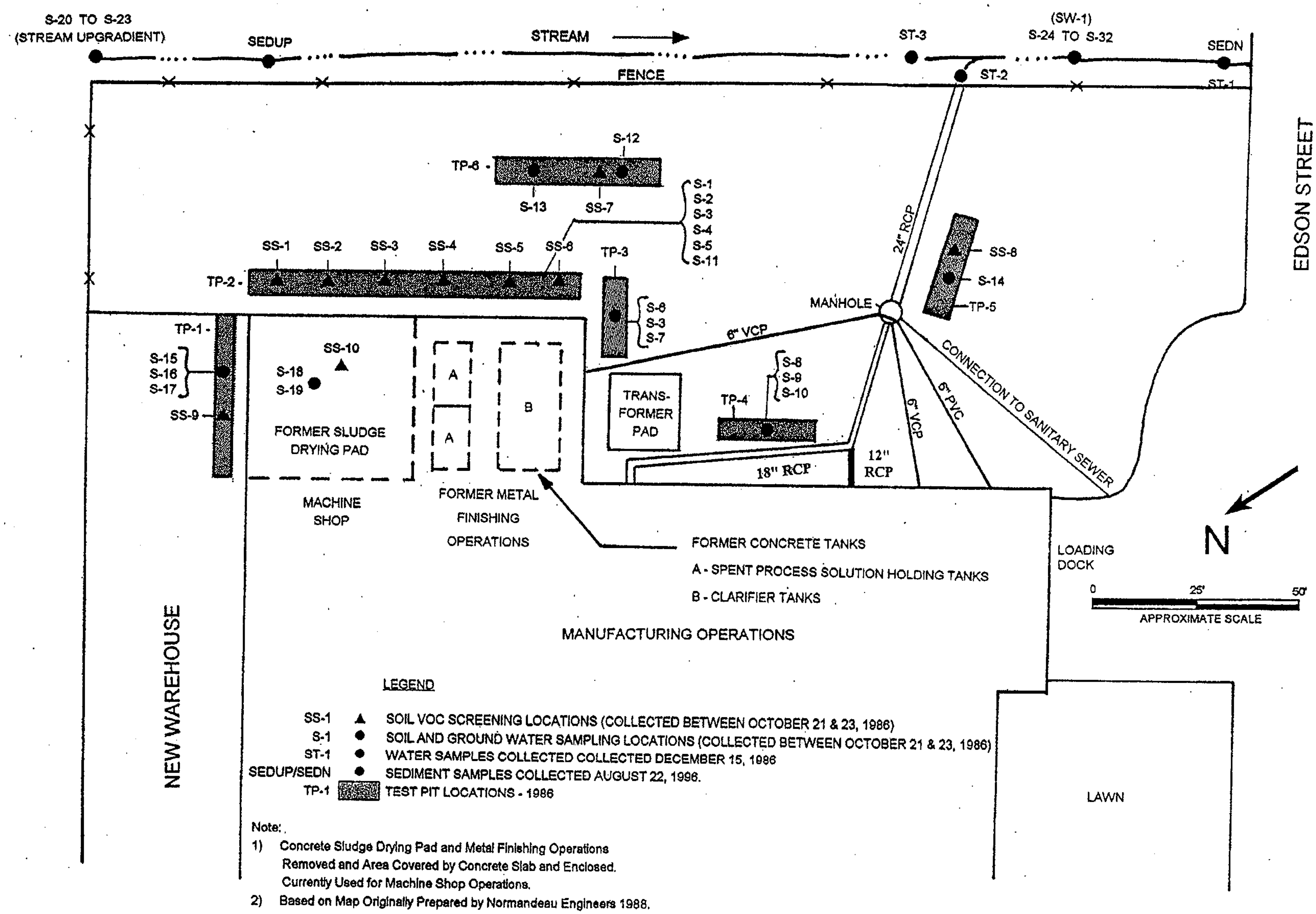


Figure 4. Site Plan Showing the Location of the Former Metal Finishing Operations, Waste Treatment Operations and Sediment, Soil and Test Pit Locations from Previous Investigations Performed by Normandeau in 1986 and 1996.

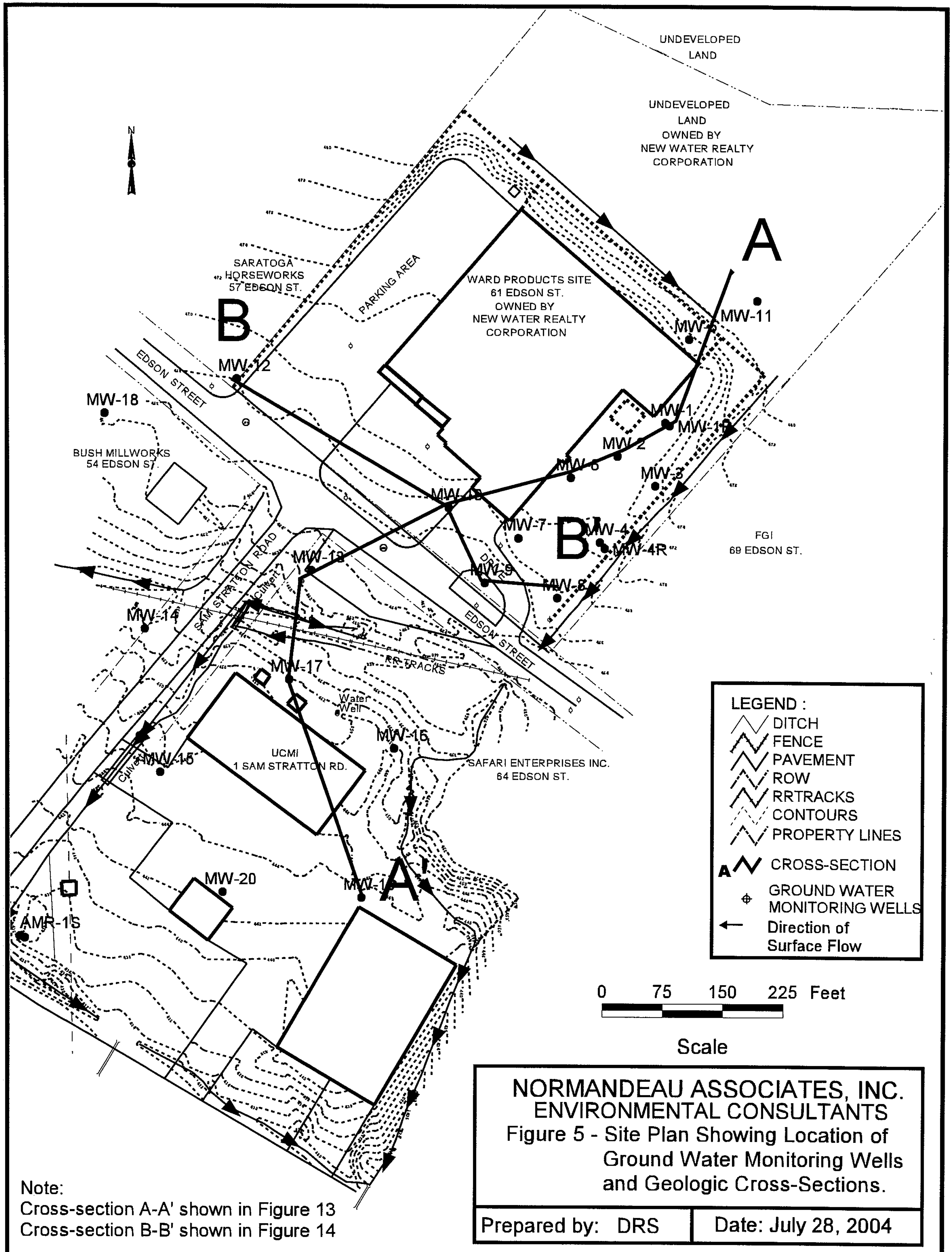


Figure 5 - Site Plan Showing Location of Ground Water Monitoring Wells and Geologic Cross-Sections.

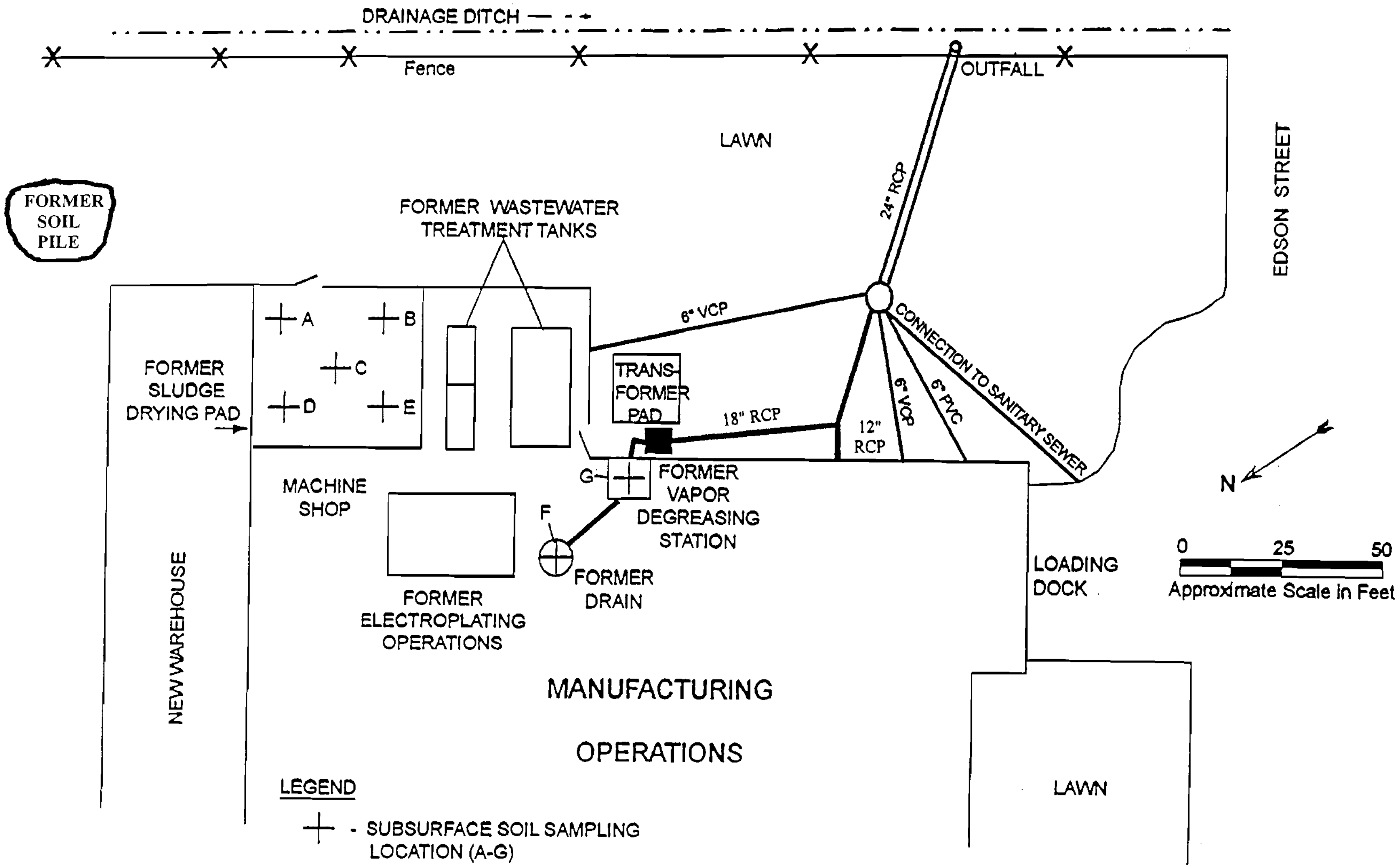


Figure 6. Location of Subsurface Soil Samples in Areas of Former Sludge Drying Pad, Vapor Degreasing Station and Floor Drain. Ward Products Corporation, Amsterdam, New York.

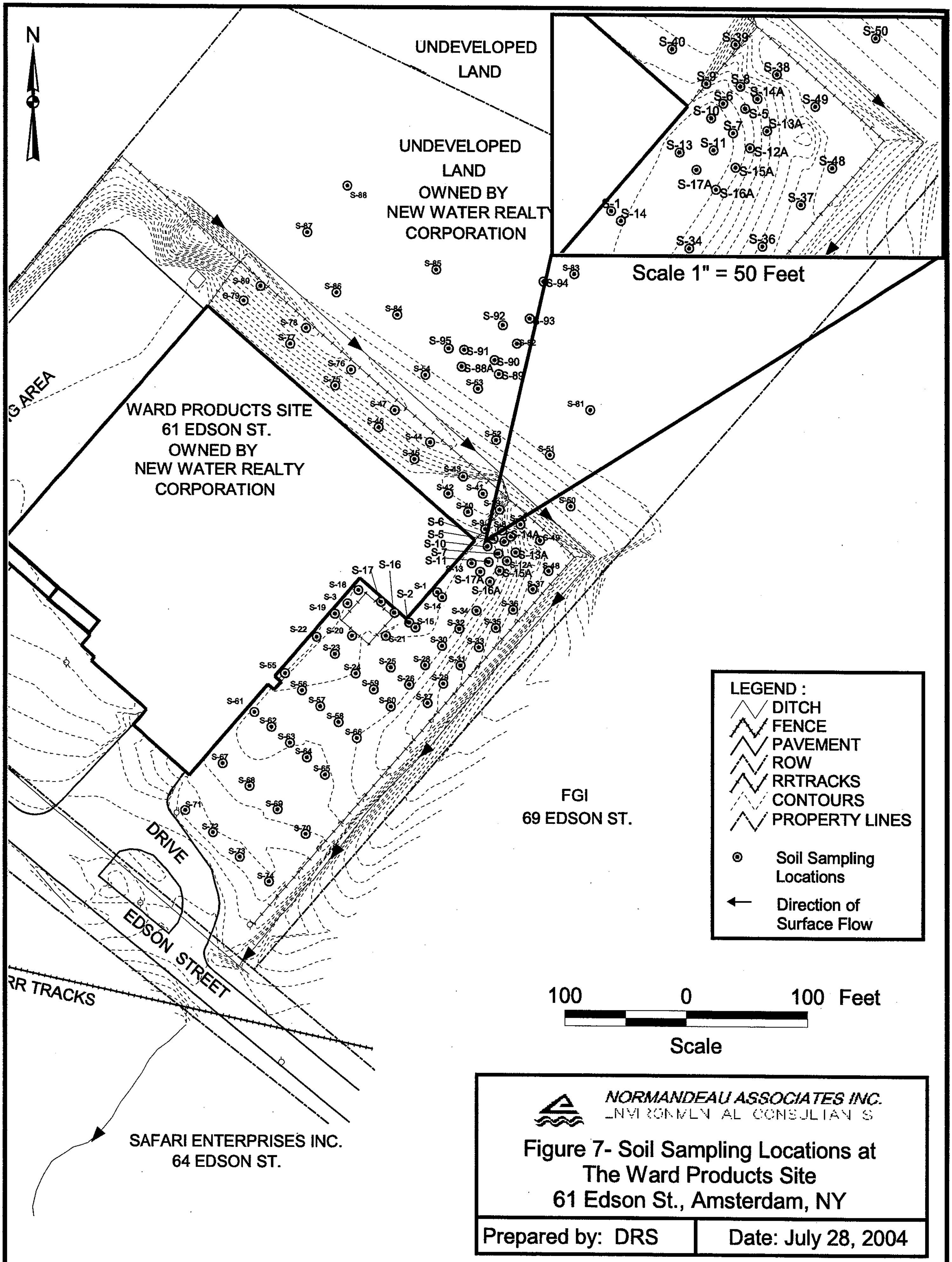


Figure 7- Soil Sampling Locations at The Ward Products Site 61 Edson St., Amsterdam, NY

Prepared by: DRS | Date: July 28, 2004

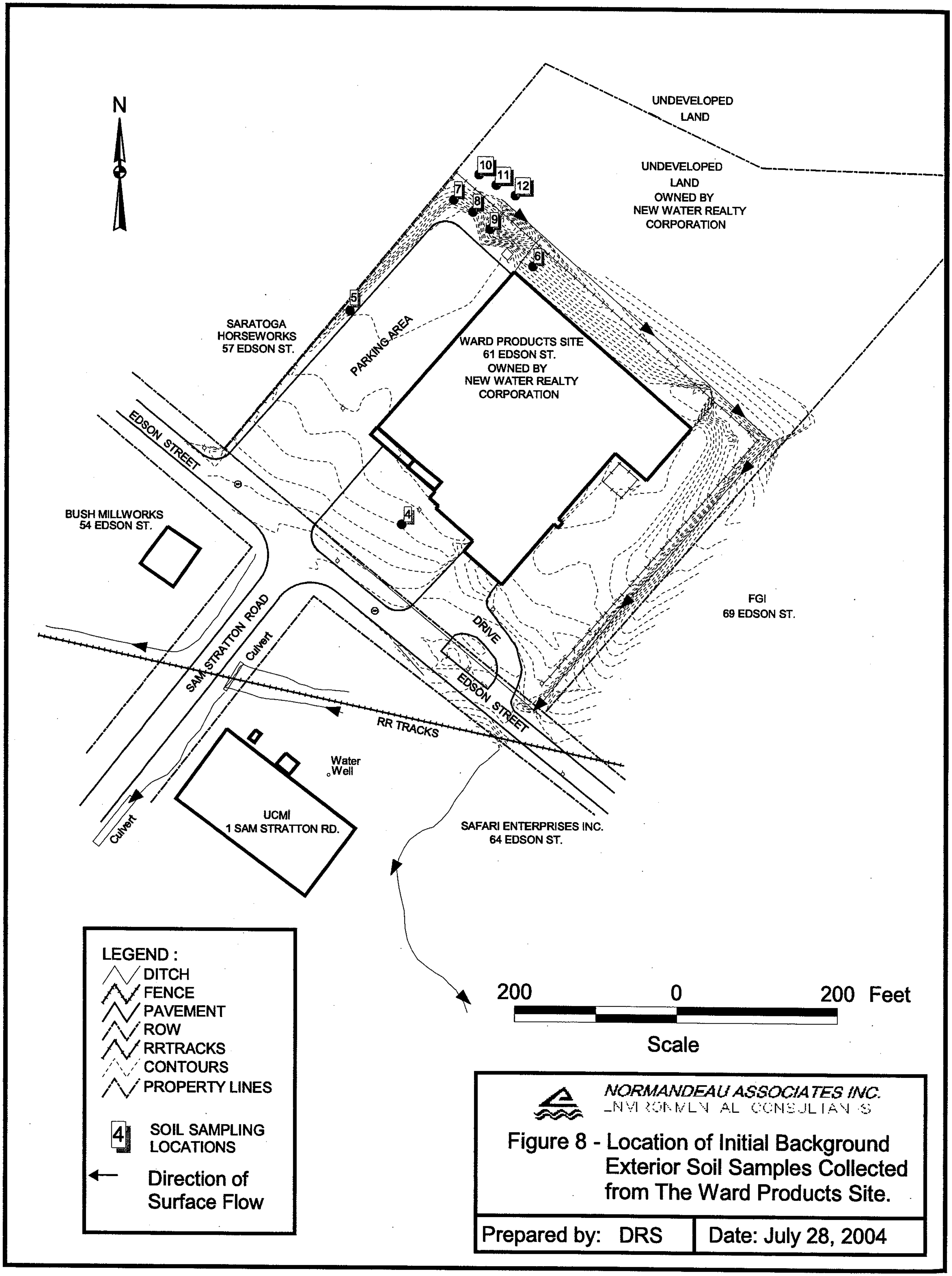
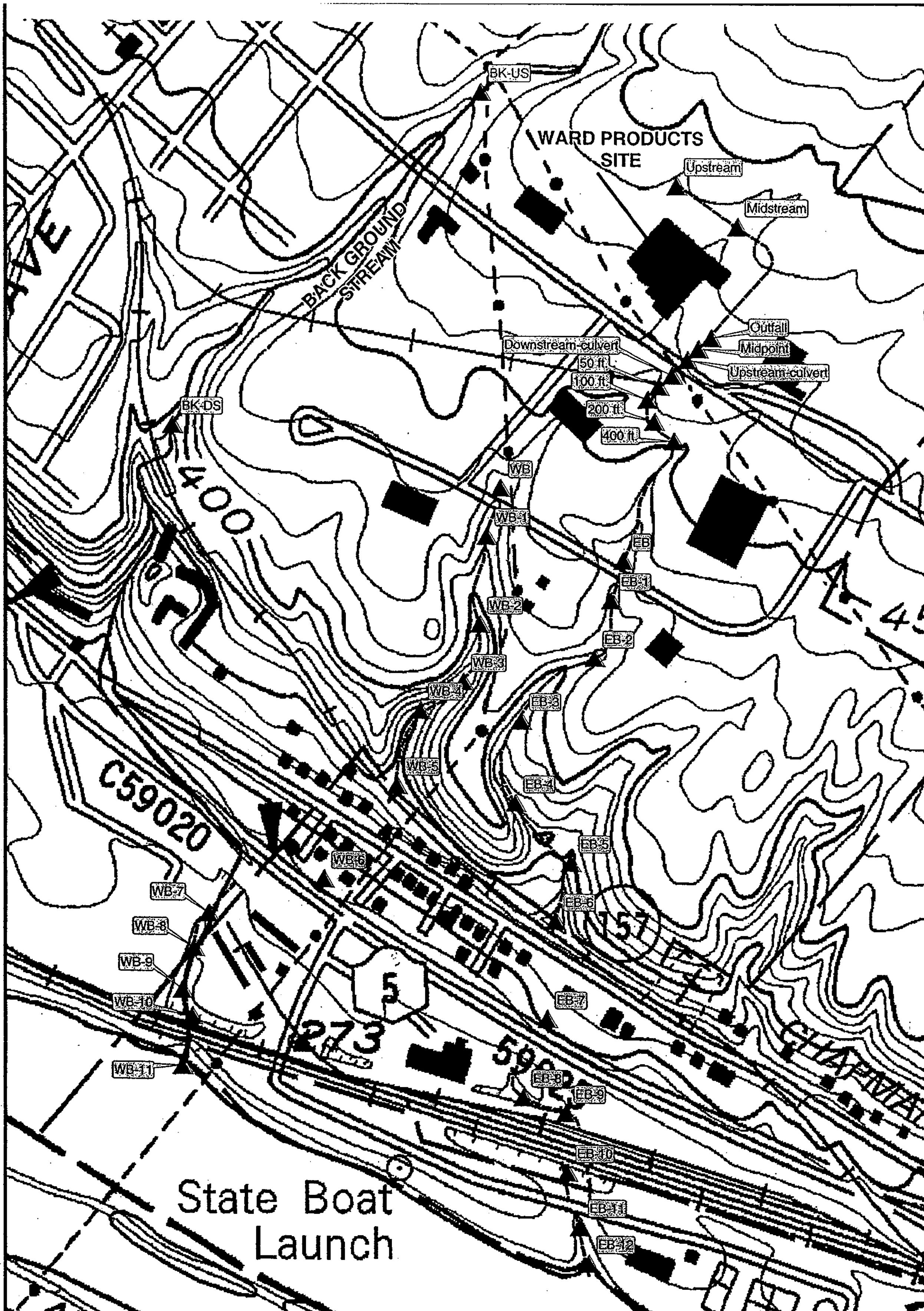


Figure 8 - Location of Initial Background Exterior Soil Samples Collected from The Ward Products Site.



N
W E
S

LEGEND:

▲ SEDIMENT SAMPLING LOCATION

400 200 0 400 Feet

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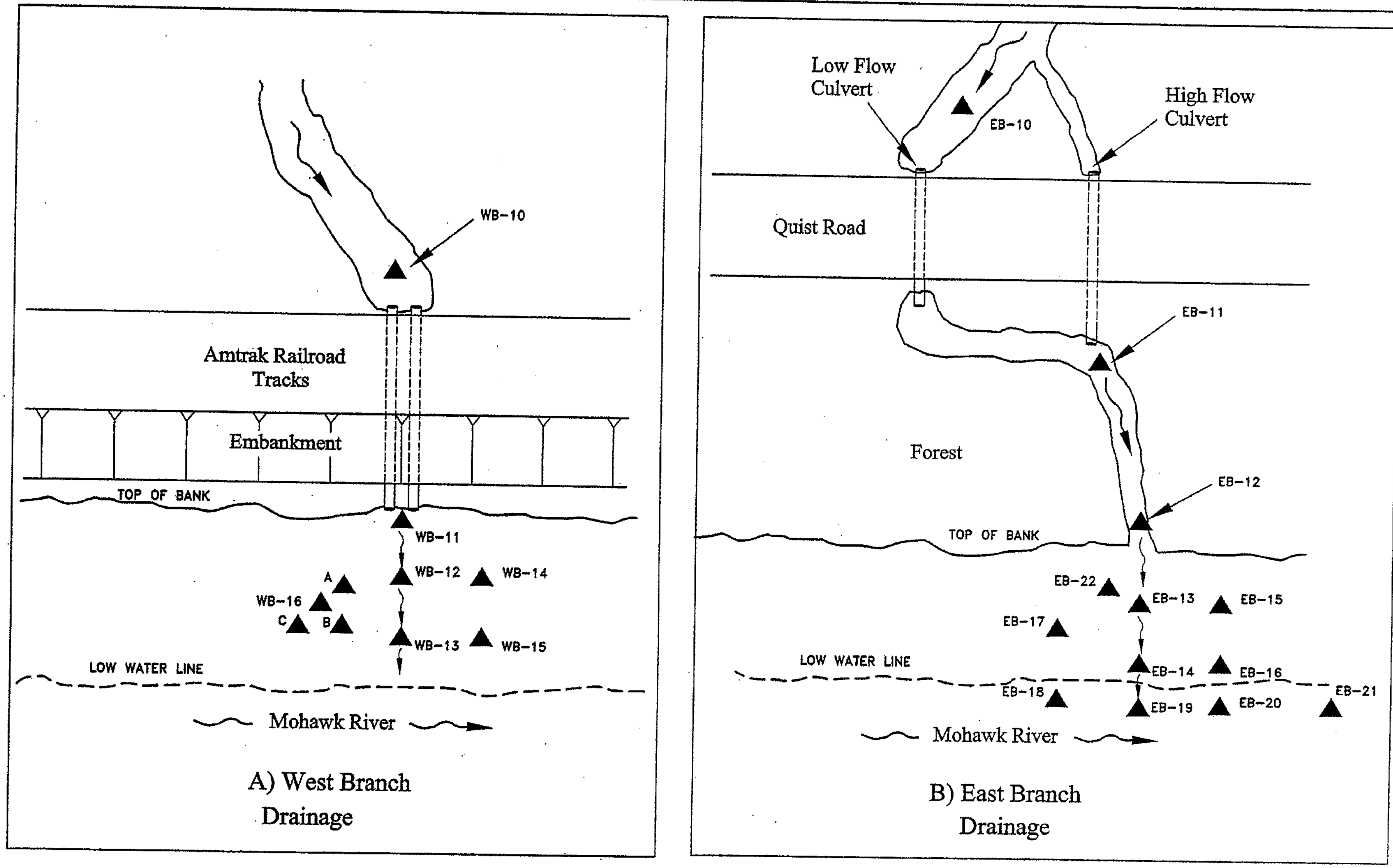
Figure 9: Sediment Sampling Location Map
Ward Products Site
61 Edson St. Amsterdam, NY

Prepared by: DRS	Date: July 12, 2004



EB-19 Sediment sampling location

Active Channel

Samples EB-10 collected in Jan. 2002

Samples WB-10 to WB-15, EB-11 to 17 collected Dec. 2002

Samples WB-16A to C, EB-18 to 22 collected April 2003

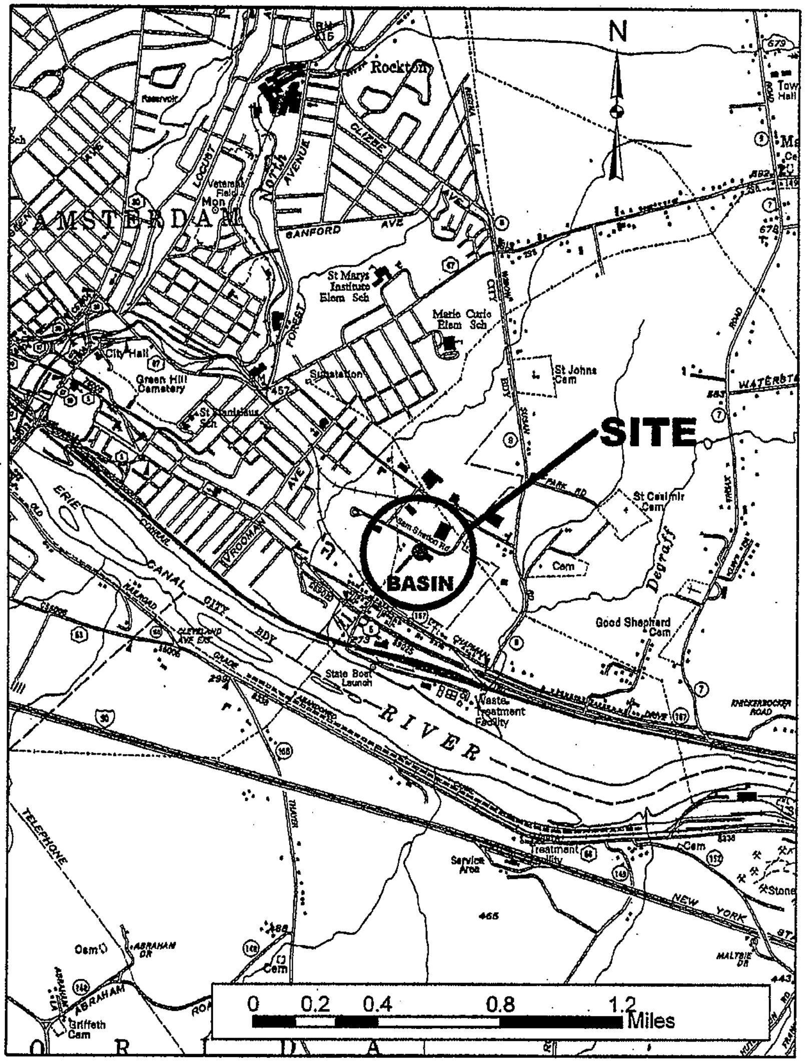
Drawing is not to scale.

Prepared By: NORMANDEAU ASSOCIATES INC. ENVIRONMENTAL CONSULTANTS 25 Nashua Road Bedford, New Hampshire 03110-5500

Project: 19279.005

DATE: 05/08/03

Title: Figure 10: Sediment Sampling Locations for East and West Drainages and the Mohawk River, Amsterdam,NY.



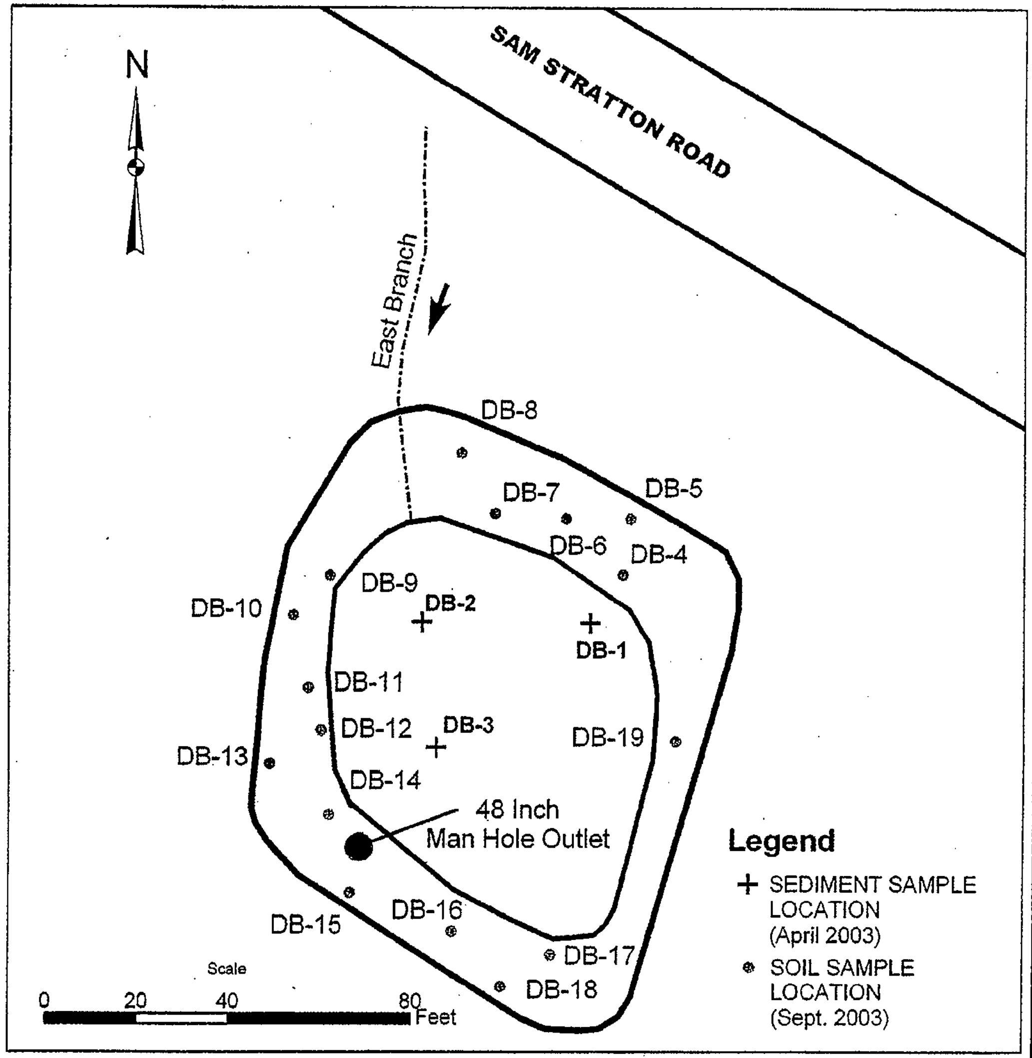


Figure 11: Sediment and Soil Sampling Locations in Detention Basin South of Sam Stratton Road, Amsterdam, NY.

Prepared By: NORMANDEAU ASSOCIATES INC. ENVIRONMENTAL CONSULTANTS

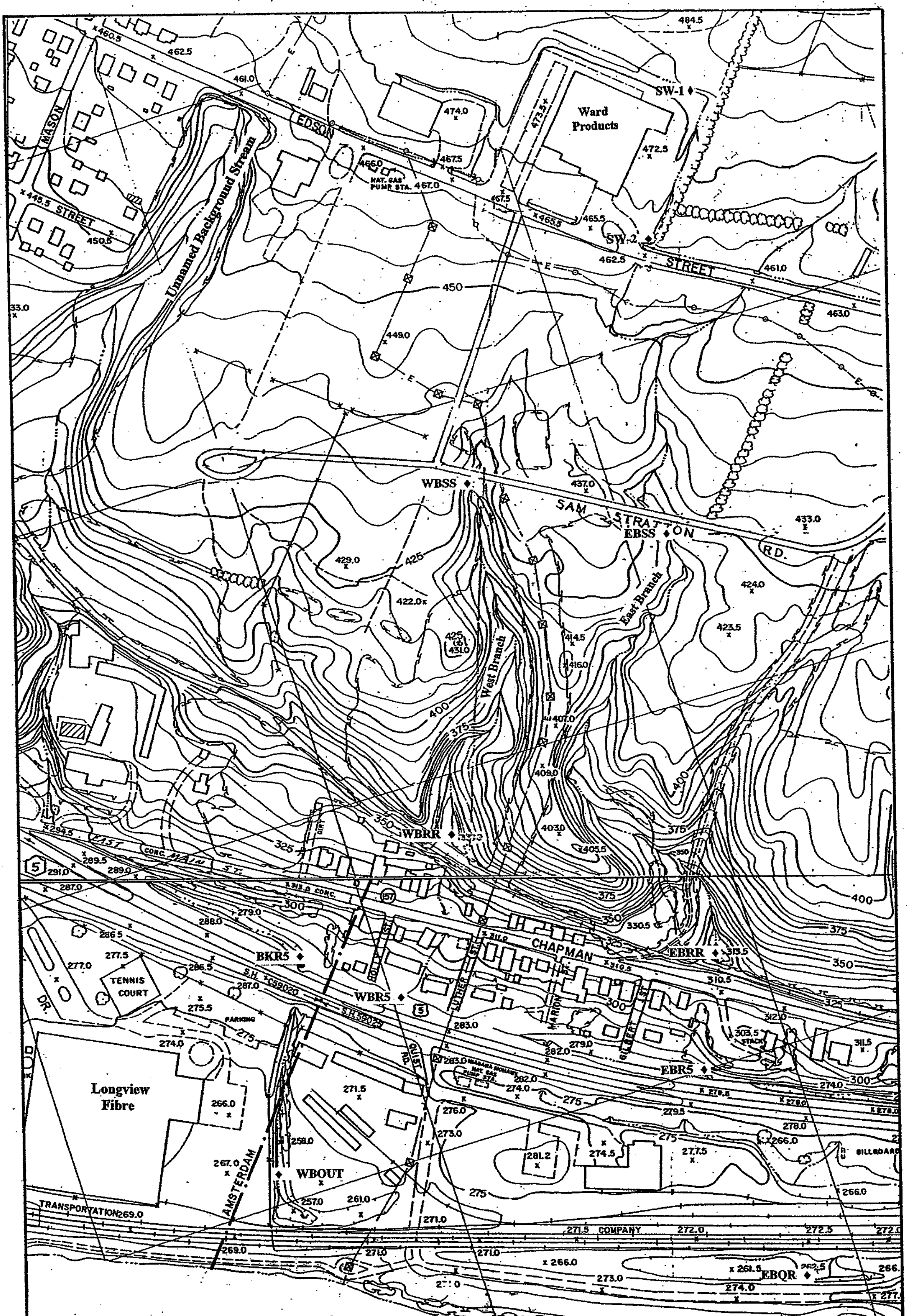
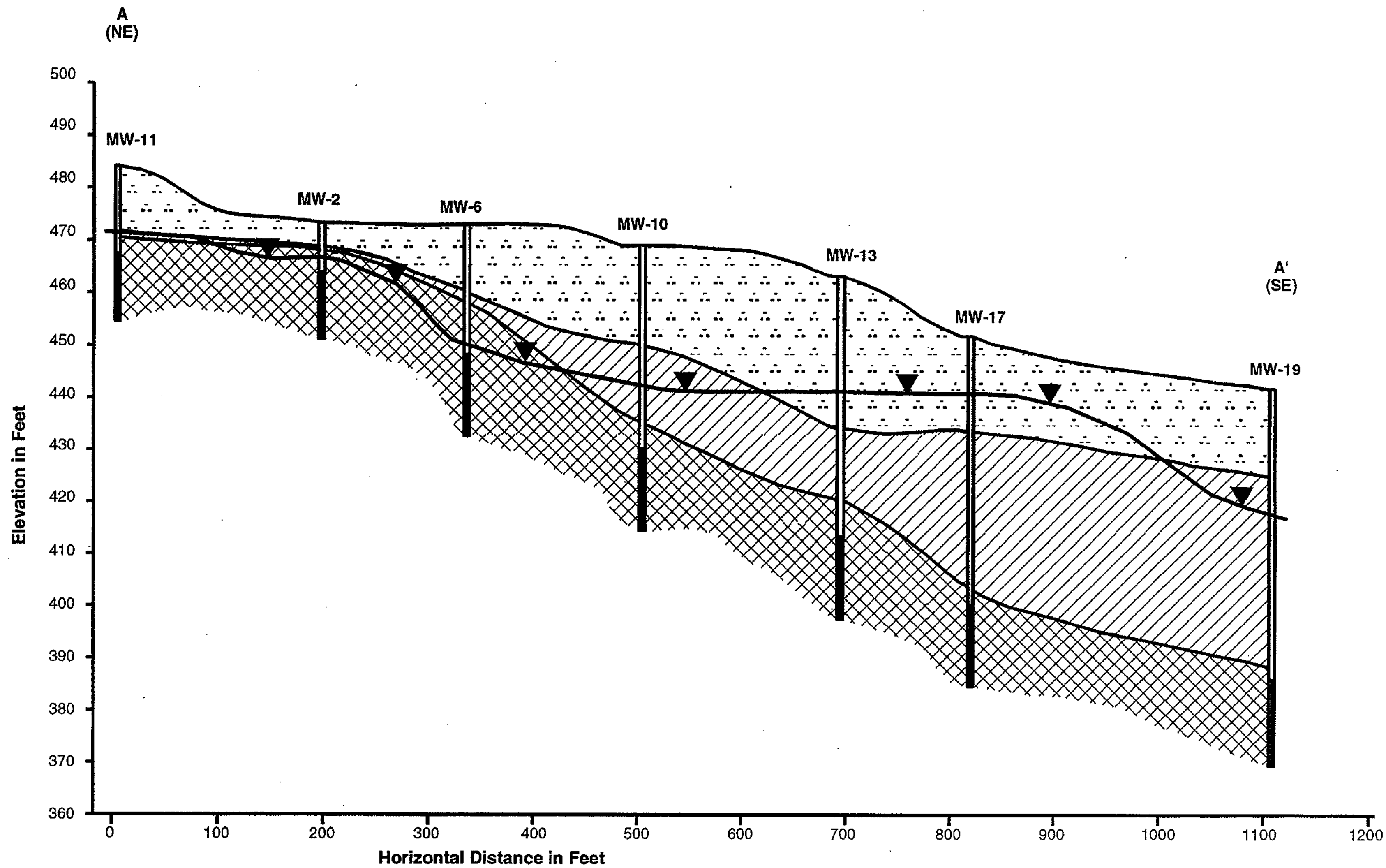


Figure 12 – Surface Water Quality Sampling Locations For Samples Collected March 28, 2002.

♦ Sampling Location

200 0 200 400 600 800 1000 FEET

Scale
Contour Interval 5 ft.



Note: Location of Cross-section shown on Figure 5.

Legend

- Groundwater Levels in Bedrock May 18-19, 2004
- Brown Ablation Till
- Gray Lodgement Till
- Chuctanunda Creek Dolostone - Bedrock

Monitoring Well

- Riser
- Screen

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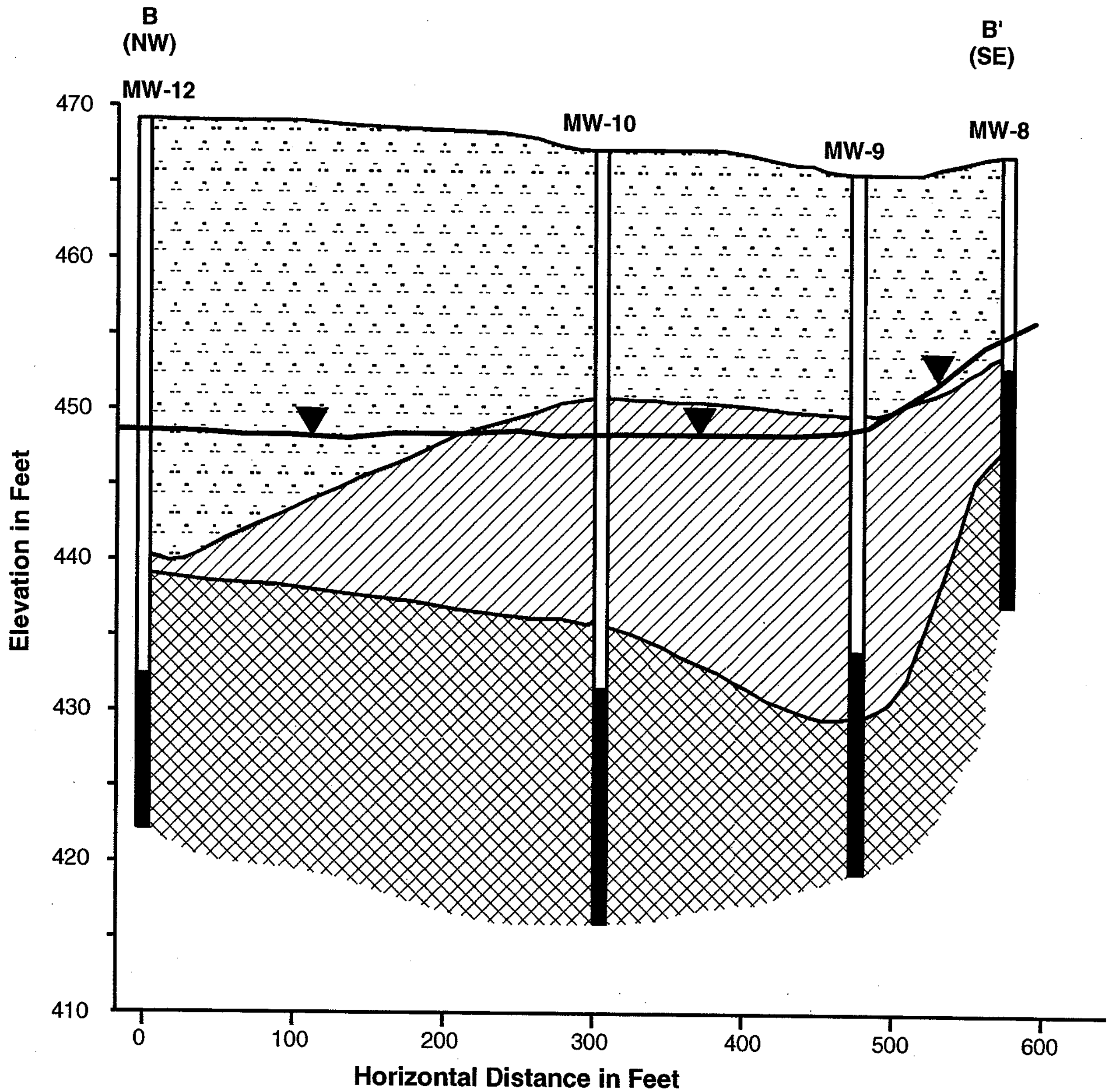
Figure 13: Geologic Cross-Section A-A'
Ward Products Site
61 Edson St. Amsterdam, NY

Prepared by: DRS	Date: July 28, 2004



Note: Location of Cross-section shown on Figure 5.

Legend

Groundwater Levels in Bedrock May 18-19, 2004

Brown Ablation Till

Gray Lodgement Till

Chuctanunda Creek Dolostone - Bedrock

Monitoring Well

Riser

Screen

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Figure 14 :Geologic Cross-Section B-B'
Ward Products Site
61 Edson St. Amsterdam, NY

Prepared by: DRS	Date: July 28, 2004

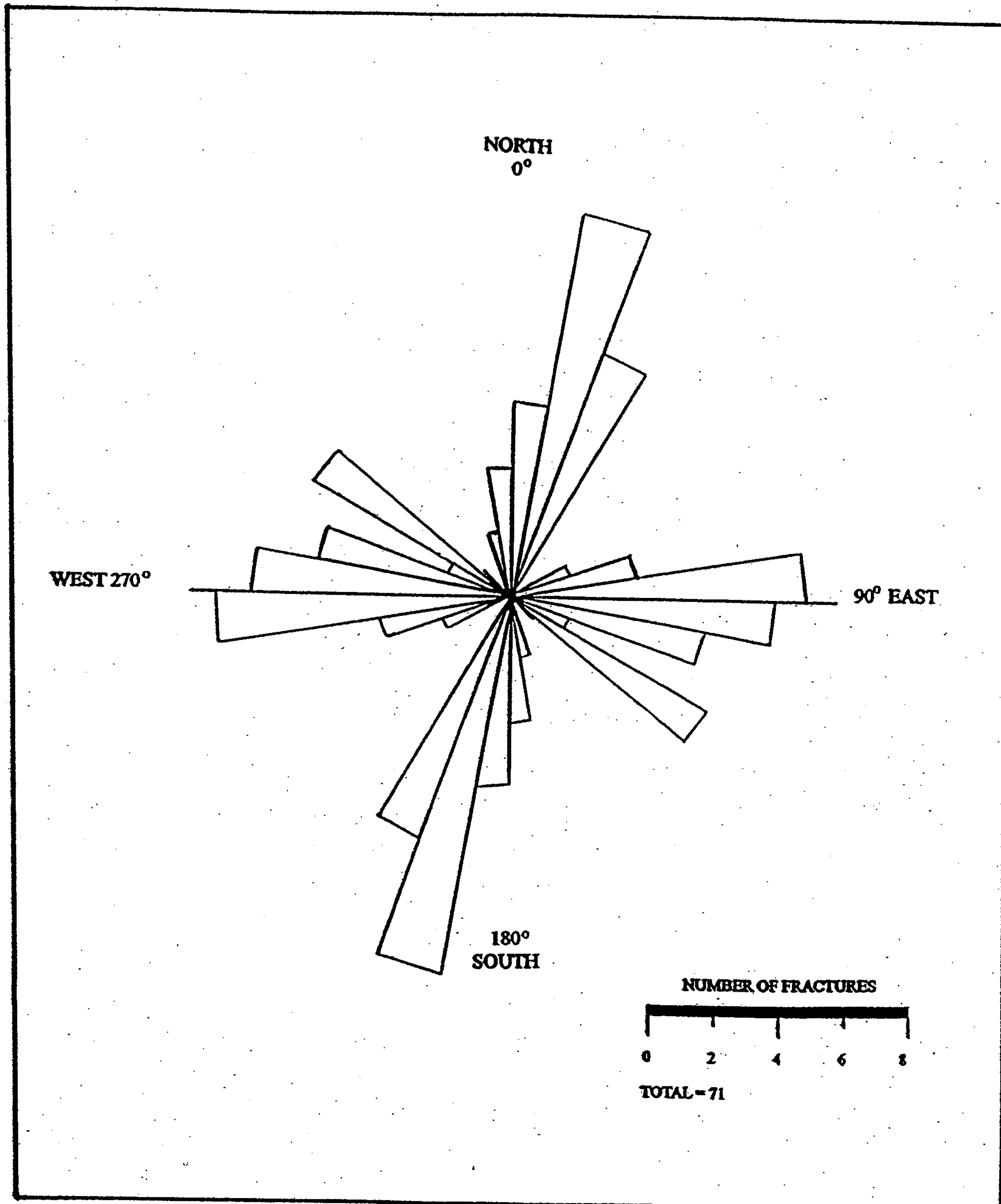
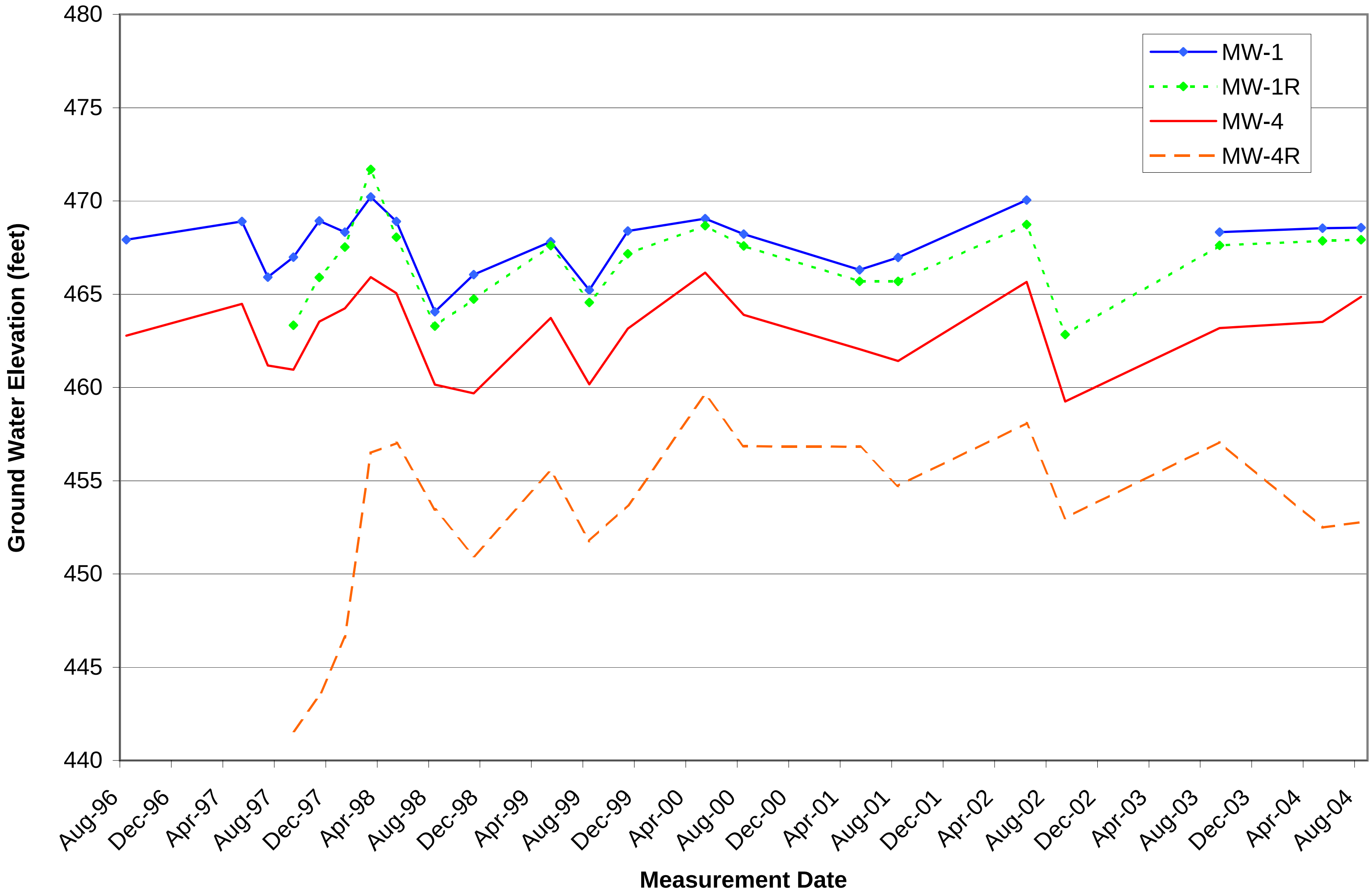


Figure 15. Rose Diagram of Vertical Joint Orientations Measured in the Chuctanunda Creek Dolostone along Widow Susan road in Amsterdam, New York.

Figure 16 - Ground Water Elevations at Well Couplets MW-1/1R and MW-4/4R
1996 to 2004



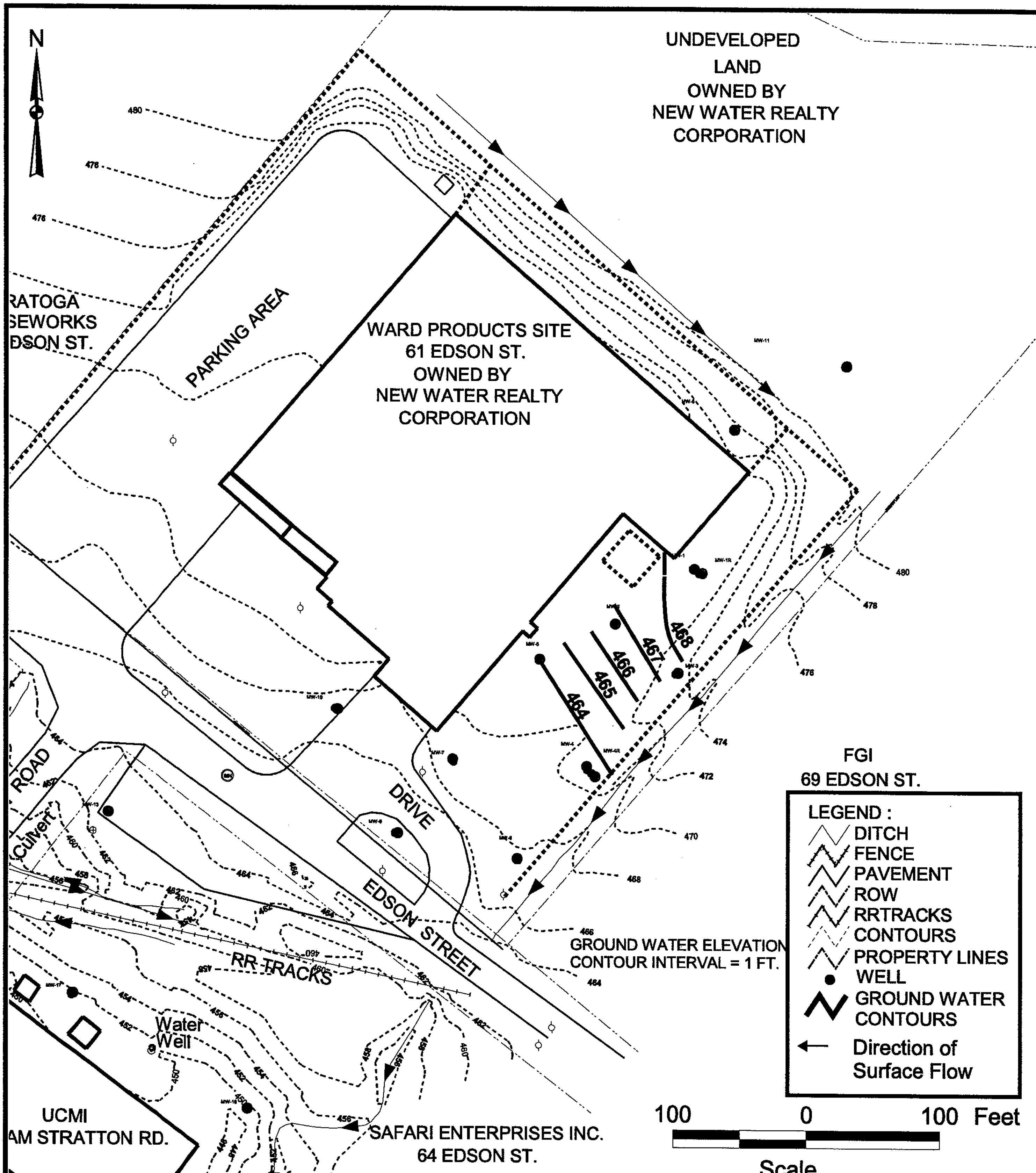


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Figure 17: Contour Map of Ground Water Elevations in Glacial Till. May 19, 2004

Prepared by: DRS	Date: July 28, 2004

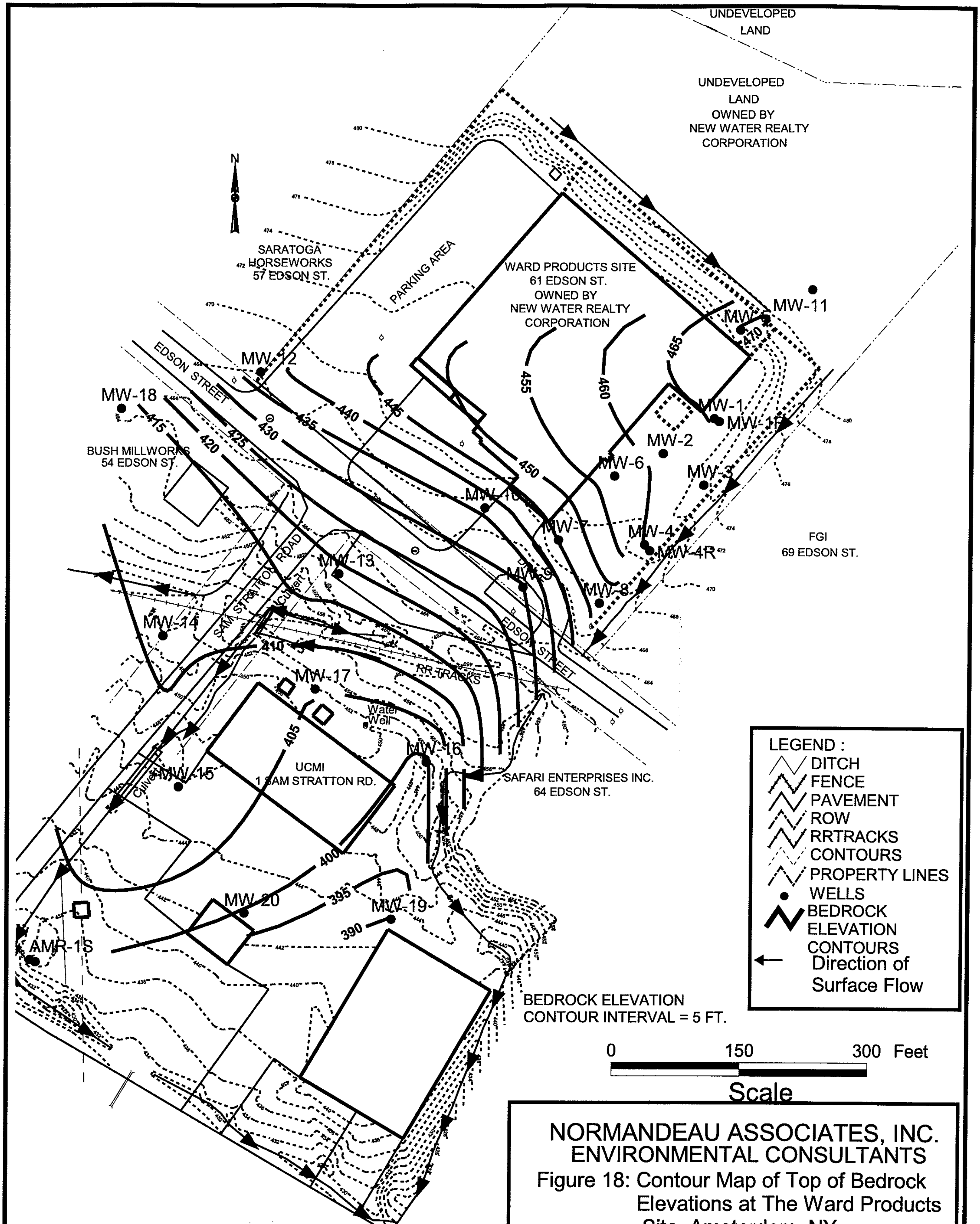

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Figure 18: Contour Map of Top of Bedrock Elevations at The Ward Products Site, Amsterdam, NY

Prepared by: DRS	Date: July 28, 2004

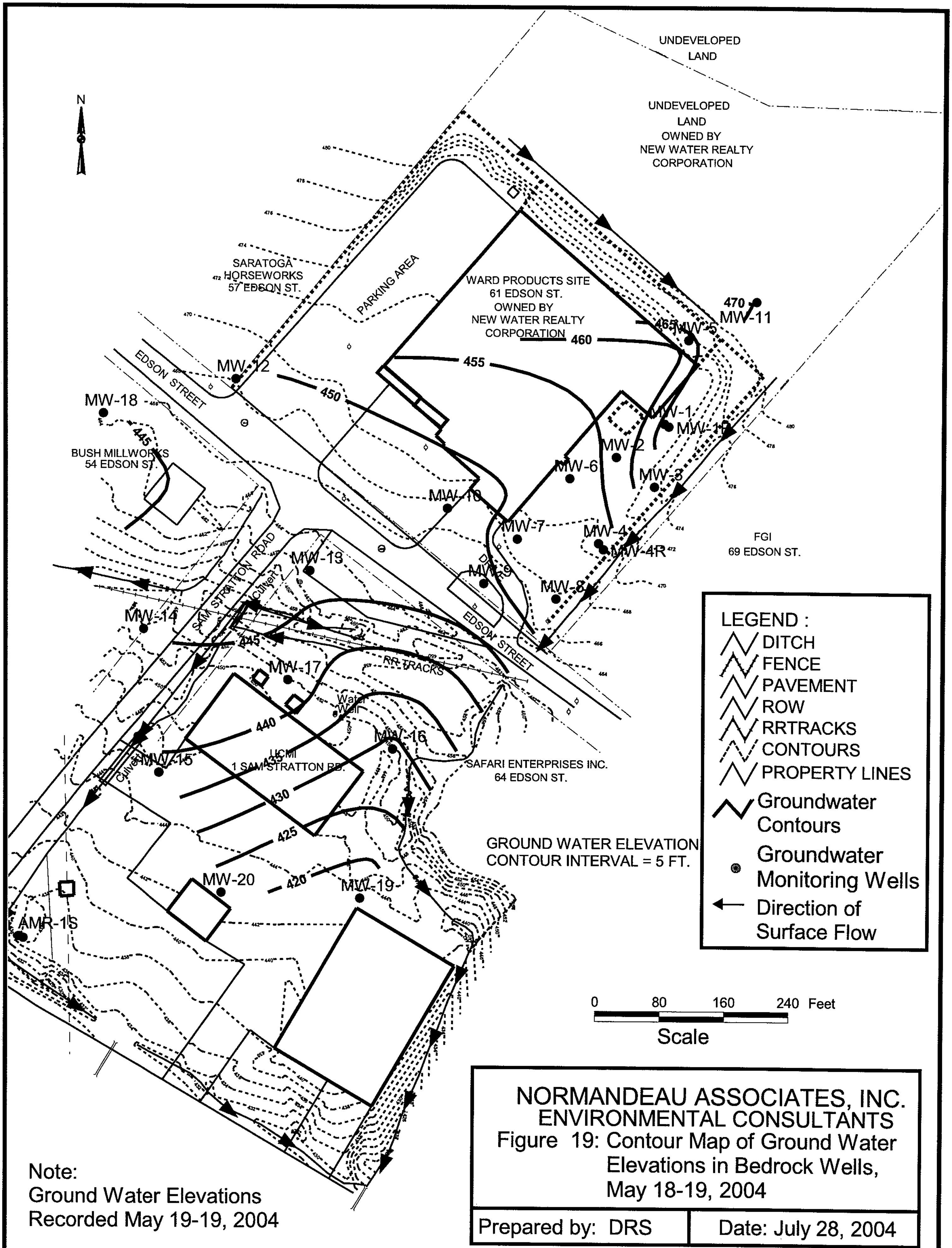

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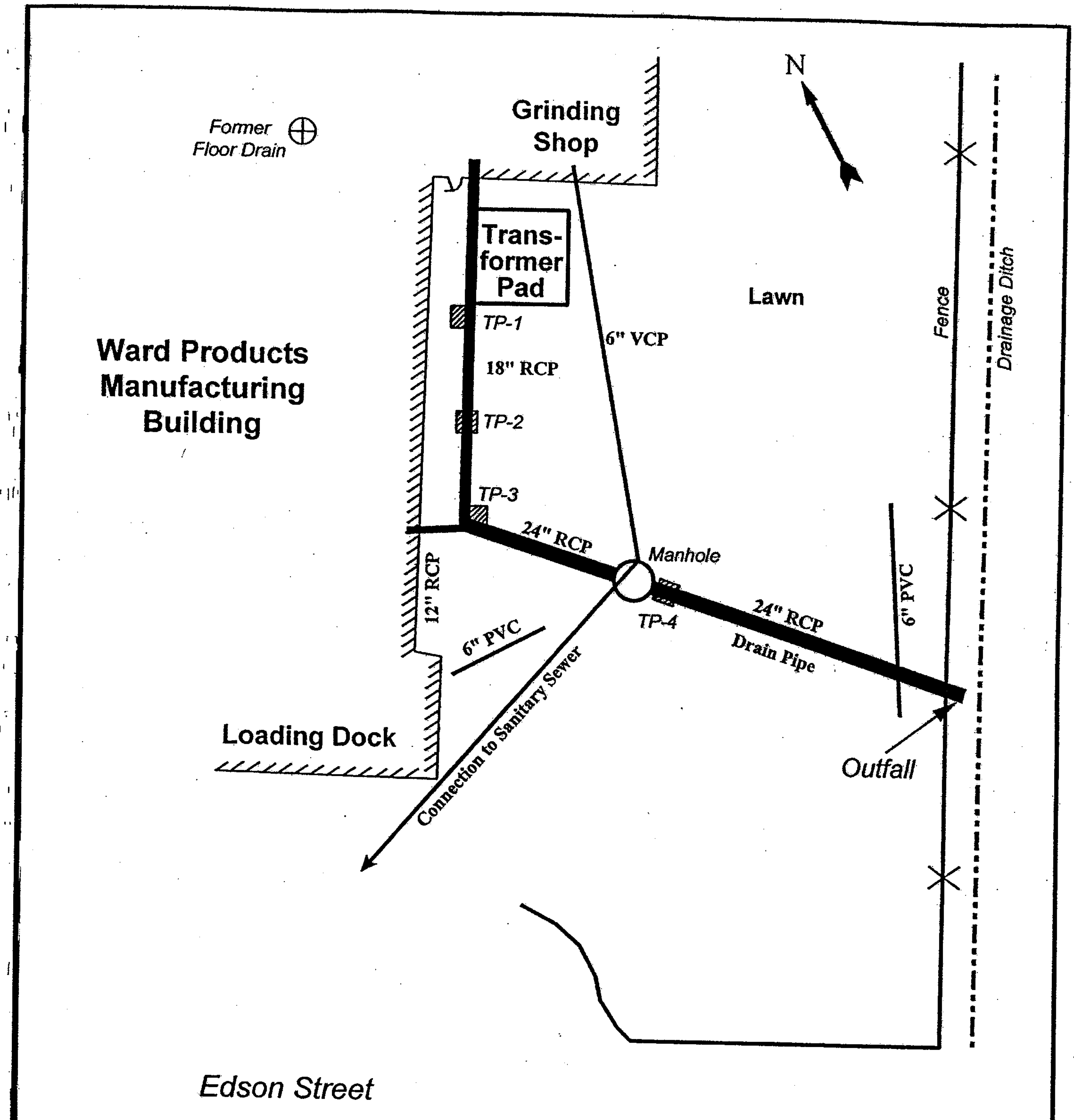
Figure 19: Contour Map of Ground Water Elevations in Bedrock Wells, May 18-19, 2004

Prepared by: DRS	Date: July 28, 2004

Note:
Ground Water Elevations
Recorded May 19-19, 2004



LEGEND

▨ Test Pit Location

Not to Scale

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS
25 Nashua Road, Bedford, New Hampshire 03110-5500

Client: New Water Realty Corporation				Figure 20: Location of Test Pit Excavations During Drain Pipe IRM in 2000.	
Drawn:	Date: 6/29/01	Checked:	Date:	Project Name: Ward RI	
Rechecked:	Date:	Approved:	Date:	Scale: As Shown	NAI Project No. 17092

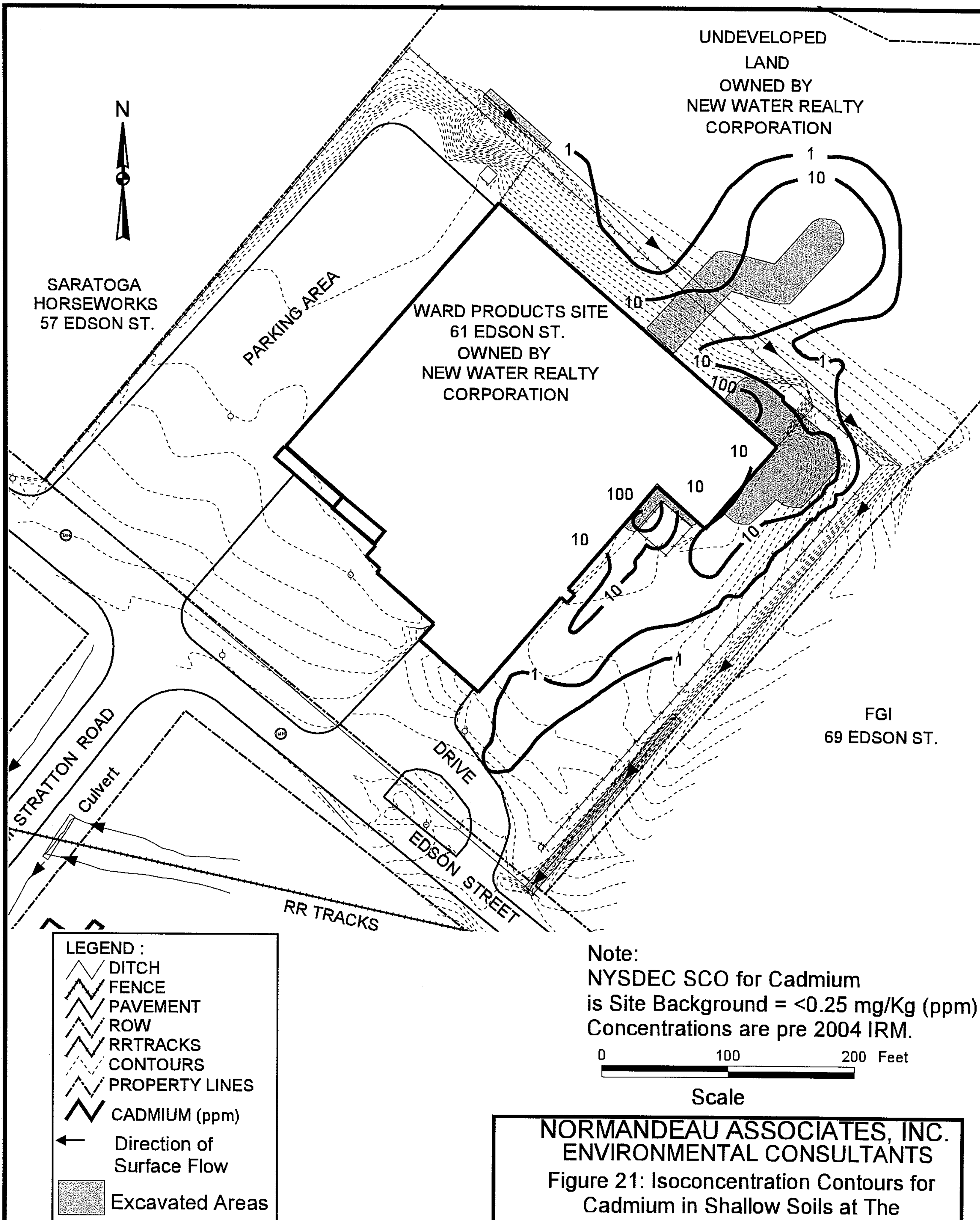


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Figure 21: Isoconcentration Contours for Cadmium in Shallow Soils at The Ward Products Site
61 Edson St, Amsterdam, NY

Prepared by: DRS	Date: July 28, 2004

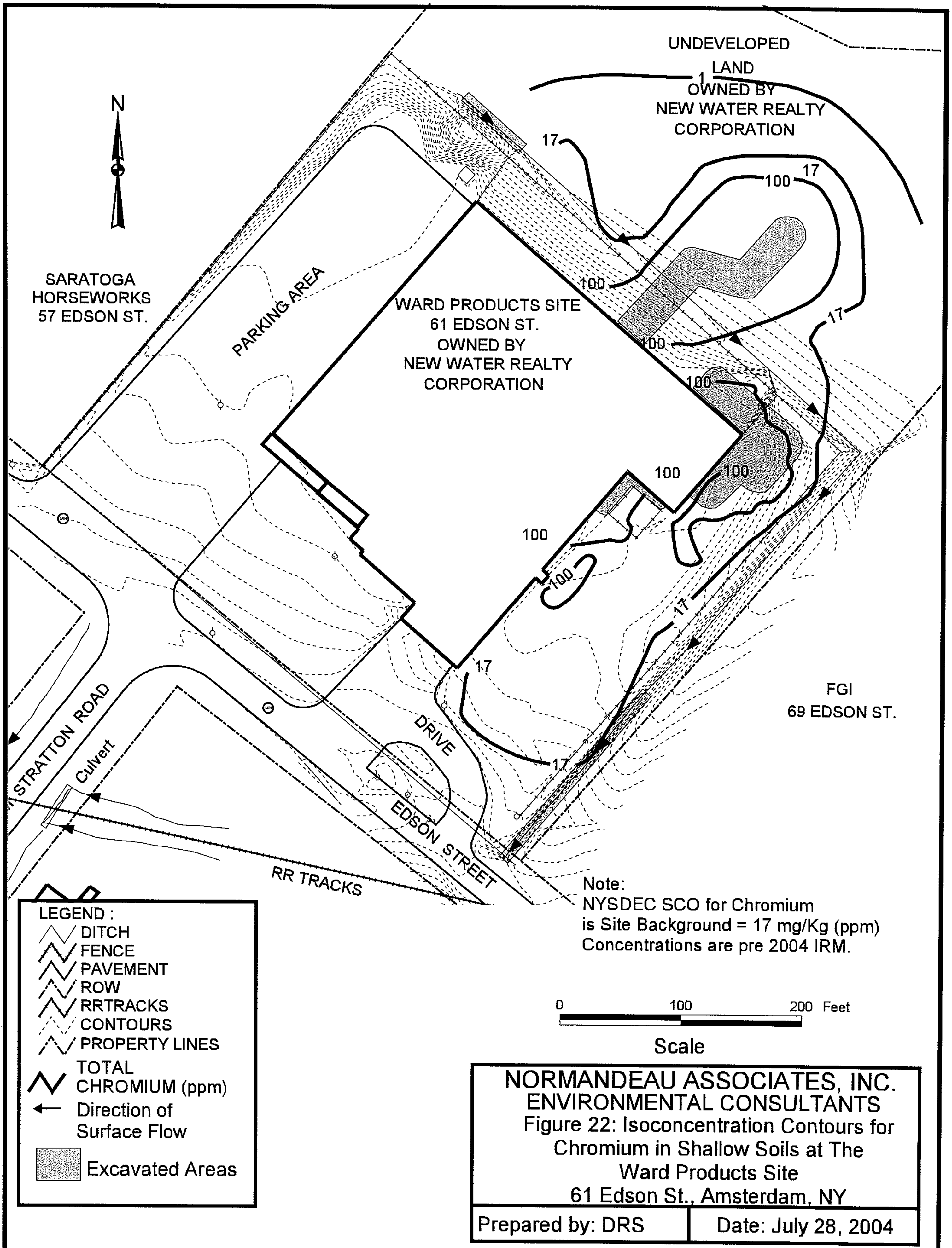

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Figure 22: Isoconcentration Contours for Chromium in Shallow Soils at The Ward Products Site
61 Edson St., Amsterdam, NY

Prepared by: DRS	Date: July 28, 2004

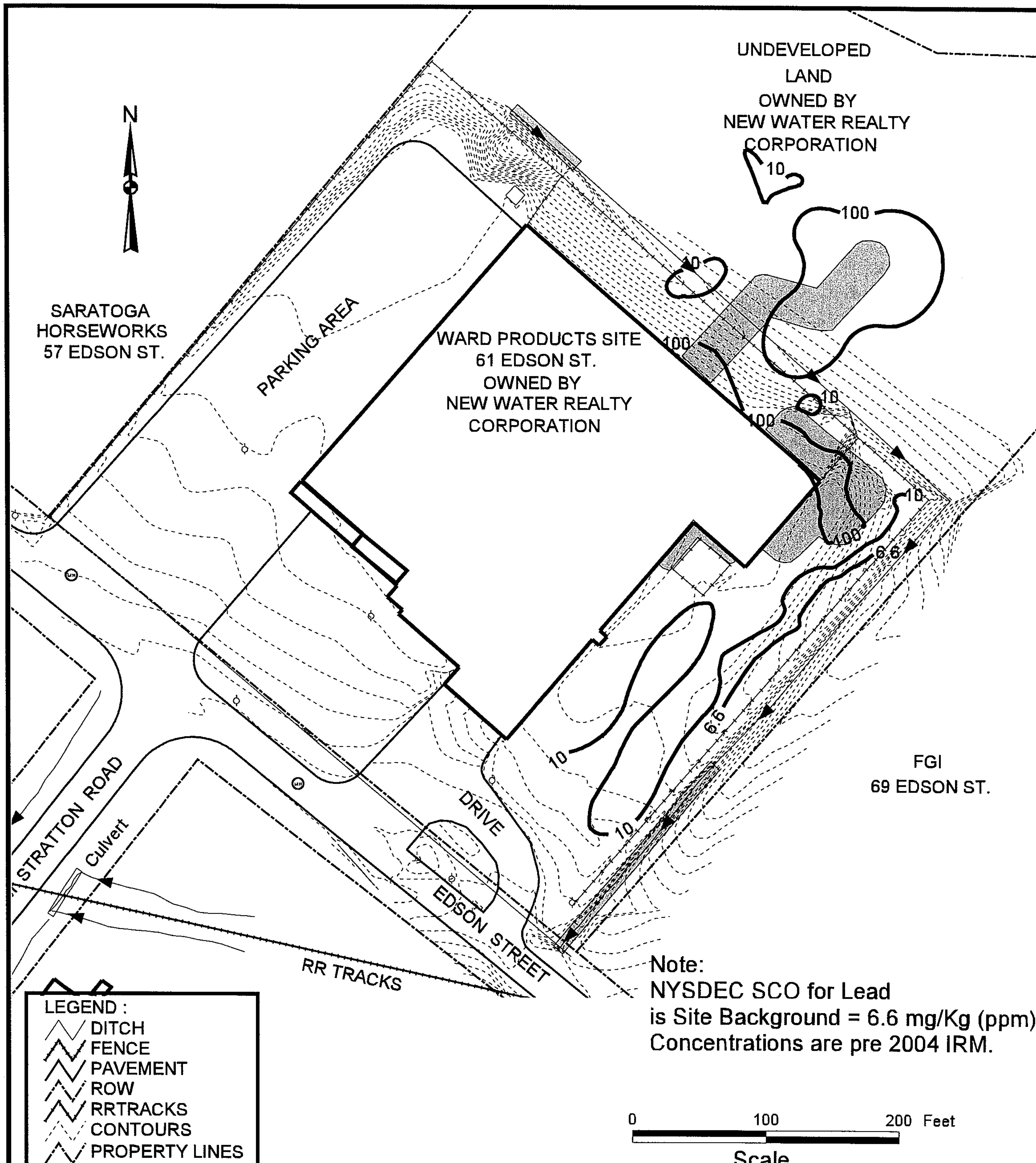

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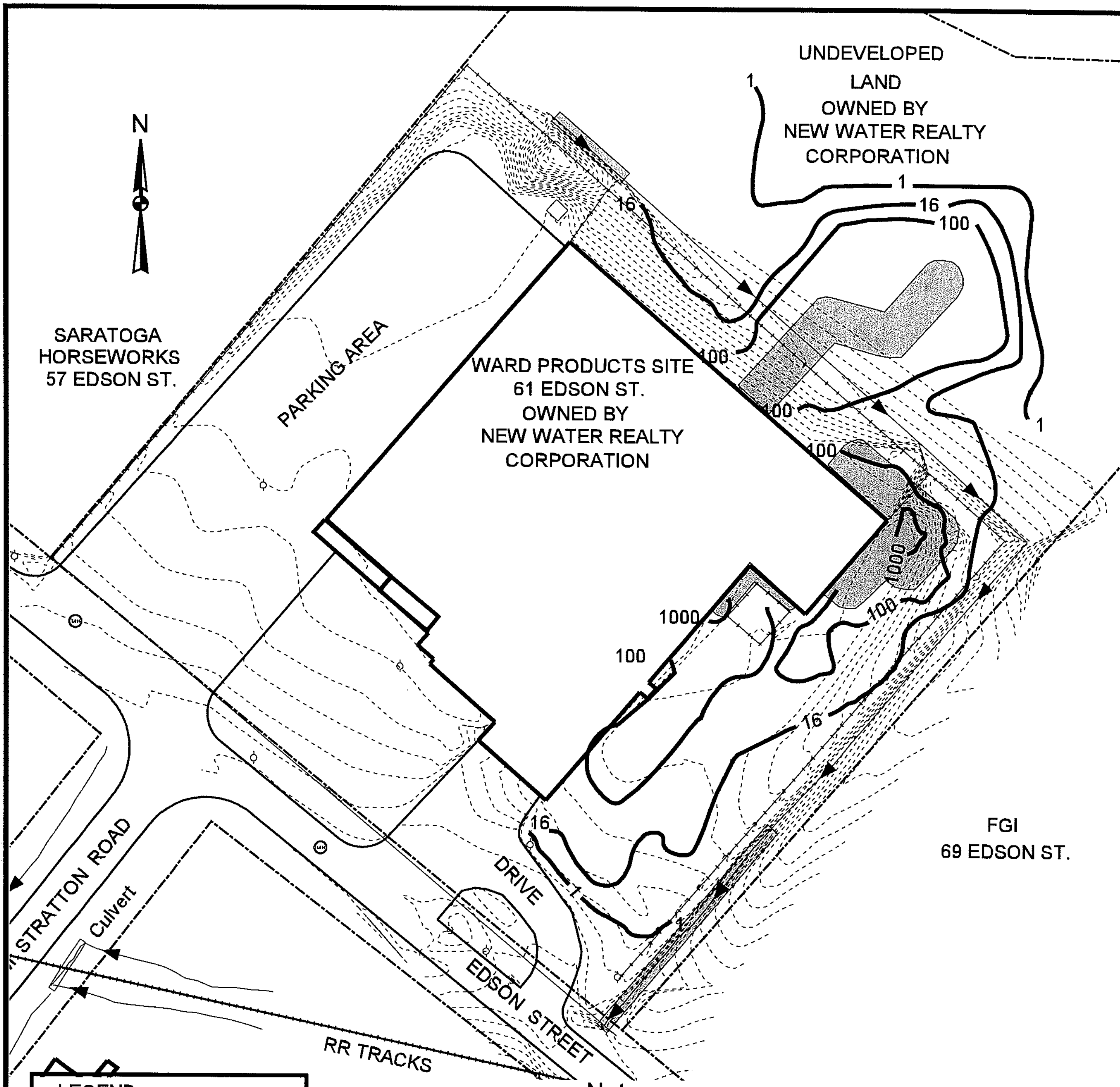
Figure 23: Isoconcentration Contours for Lead in Shallow Soils at The Ward Products Site
61 Edson St., Amsterdam, NY

Prepared by: DRS	Date: July 28, 2004



LEGEND :
- DITCH
- FENCE
- PAVEMENT
- ROW
- RRTRACKS
- CONTOURS
- PROPERTY LINES
- NICKEL (ppm)
- Direction of Surface Flow
- Excavated Areas

Note:
NYSDEC SCO for Nickel
is Site Background = 16 mg/Kg (ppm)
Concentrations are pre 2004 IRM.

0 100 200 Feet
Scale

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Figure 24: Isoconcentration Contours for Nickel in Shallow Soils at The Ward Products Site 61 Edson St., Amsterdam, NY

Prepared by: DRS	Date: July 28, 2004

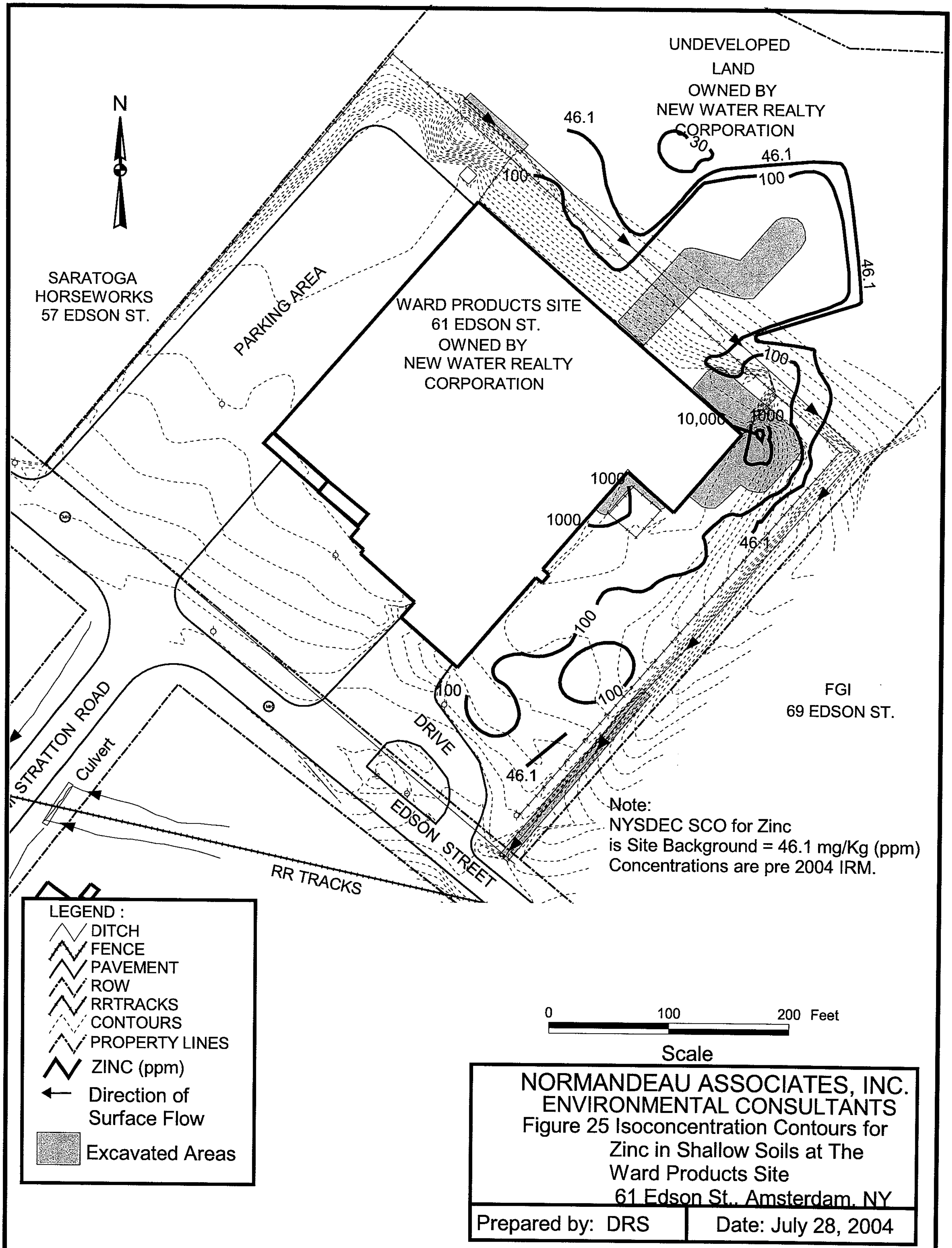


Figure 25 Isoconcentration Contours for Zinc in Shallow Soils at The Ward Products Site 61 Edson St., Amsterdam, NY

Figure 26 - Concentration of Cadmium, Chromium and Nickel in Sediment Samples Collected from the East Branch Drainage

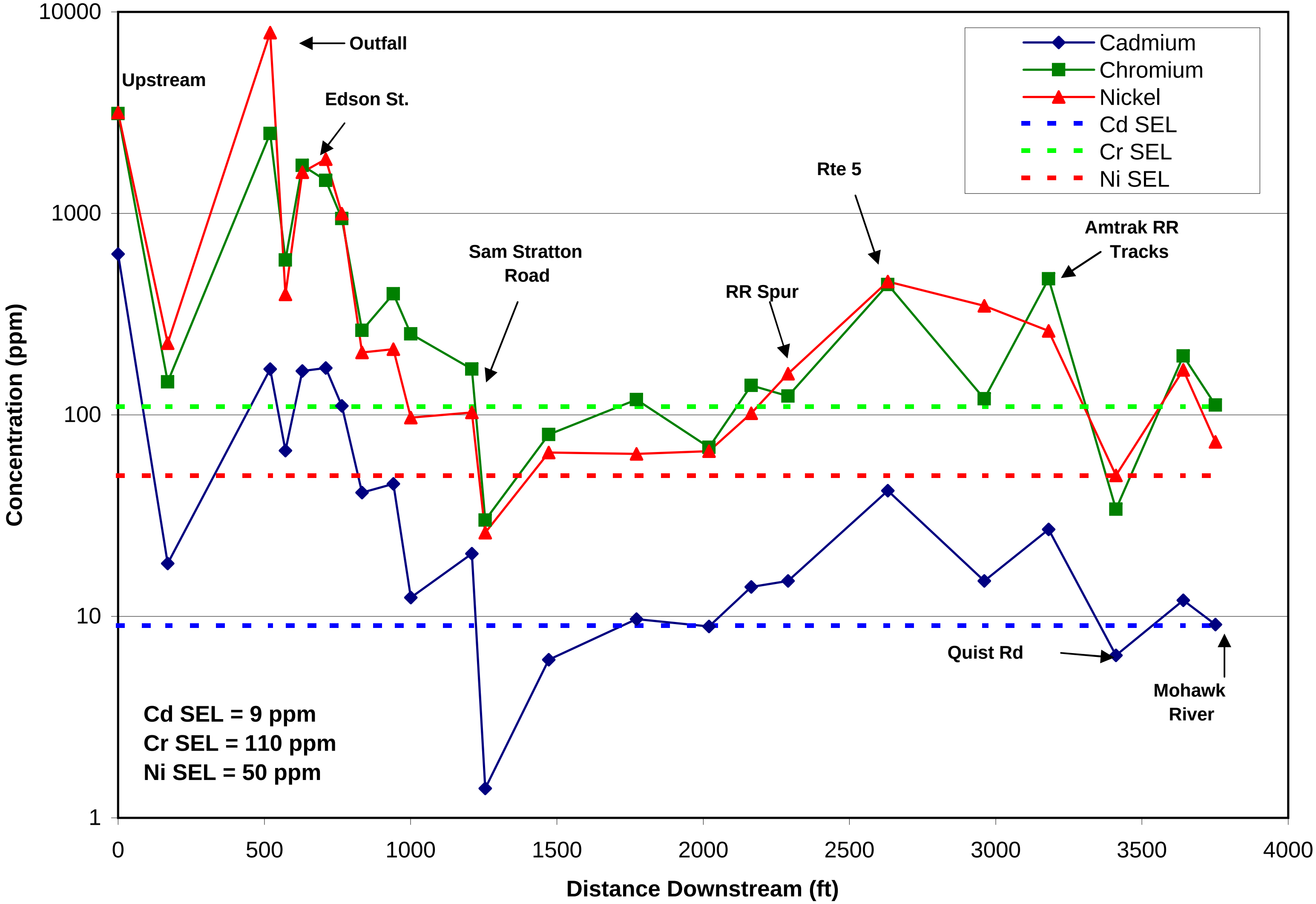
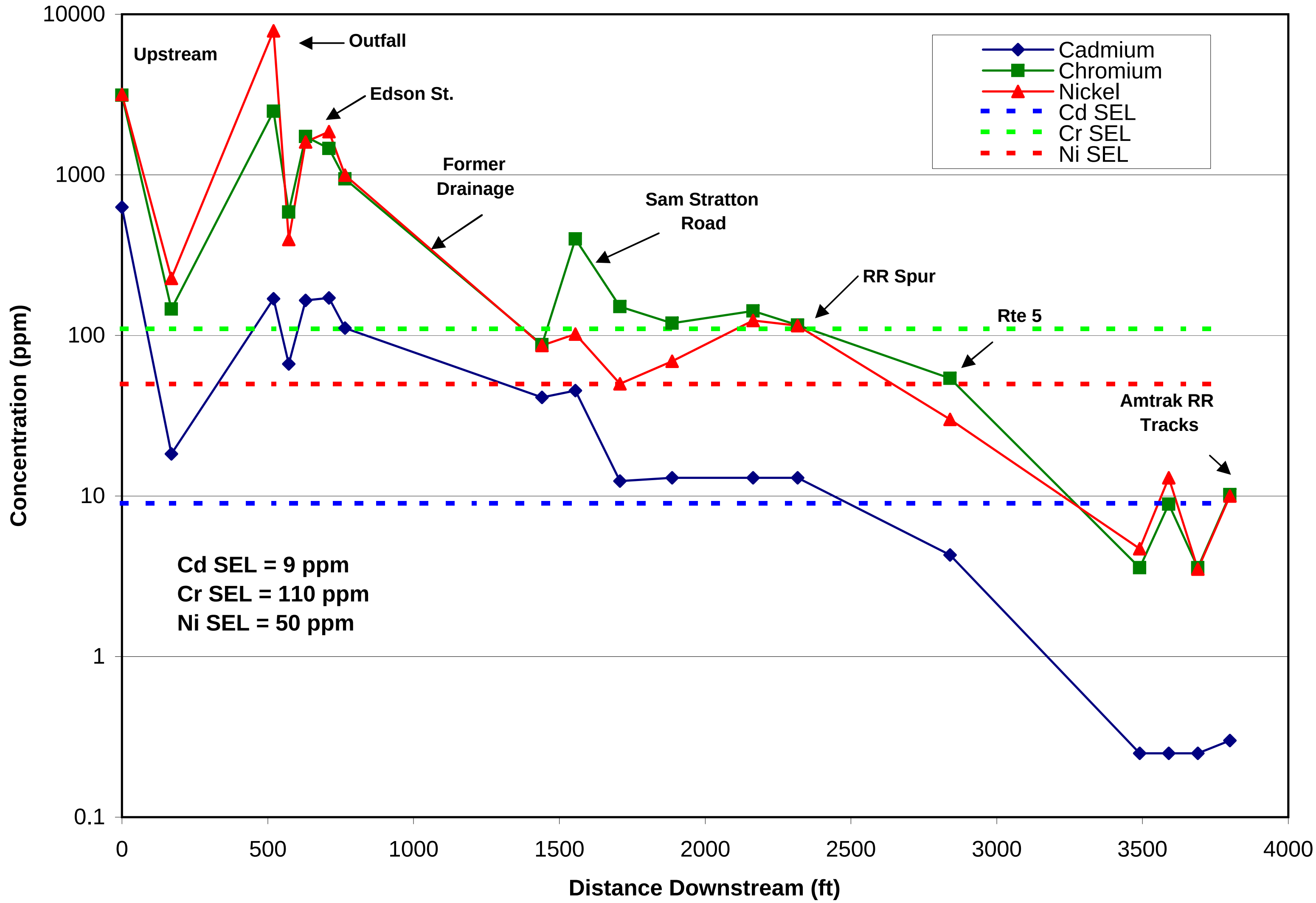


Figure 27 - Concentration of Cadmium, Chromium and Nickel in Sediment Samples Collected from the West Branch Drainage



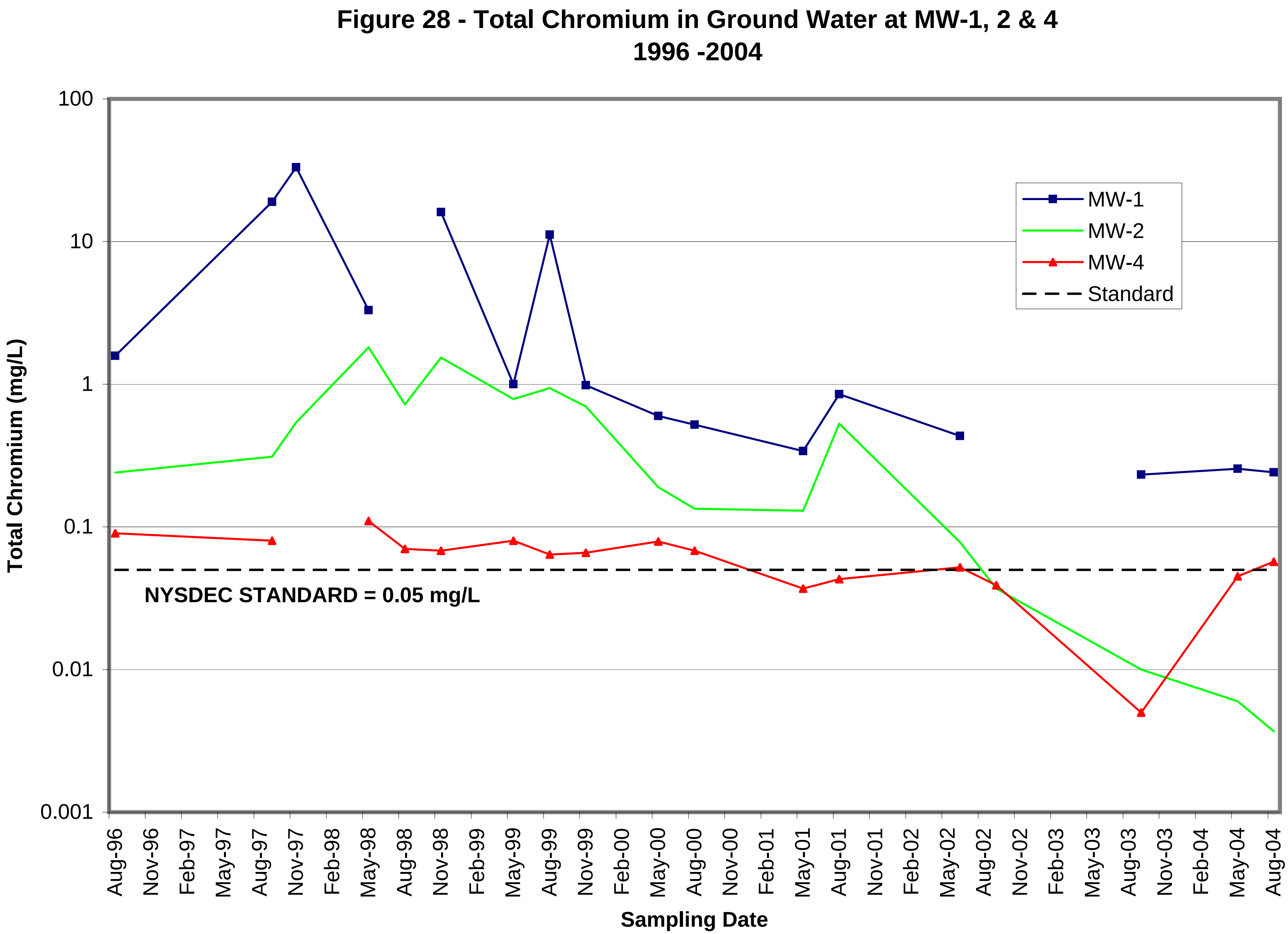
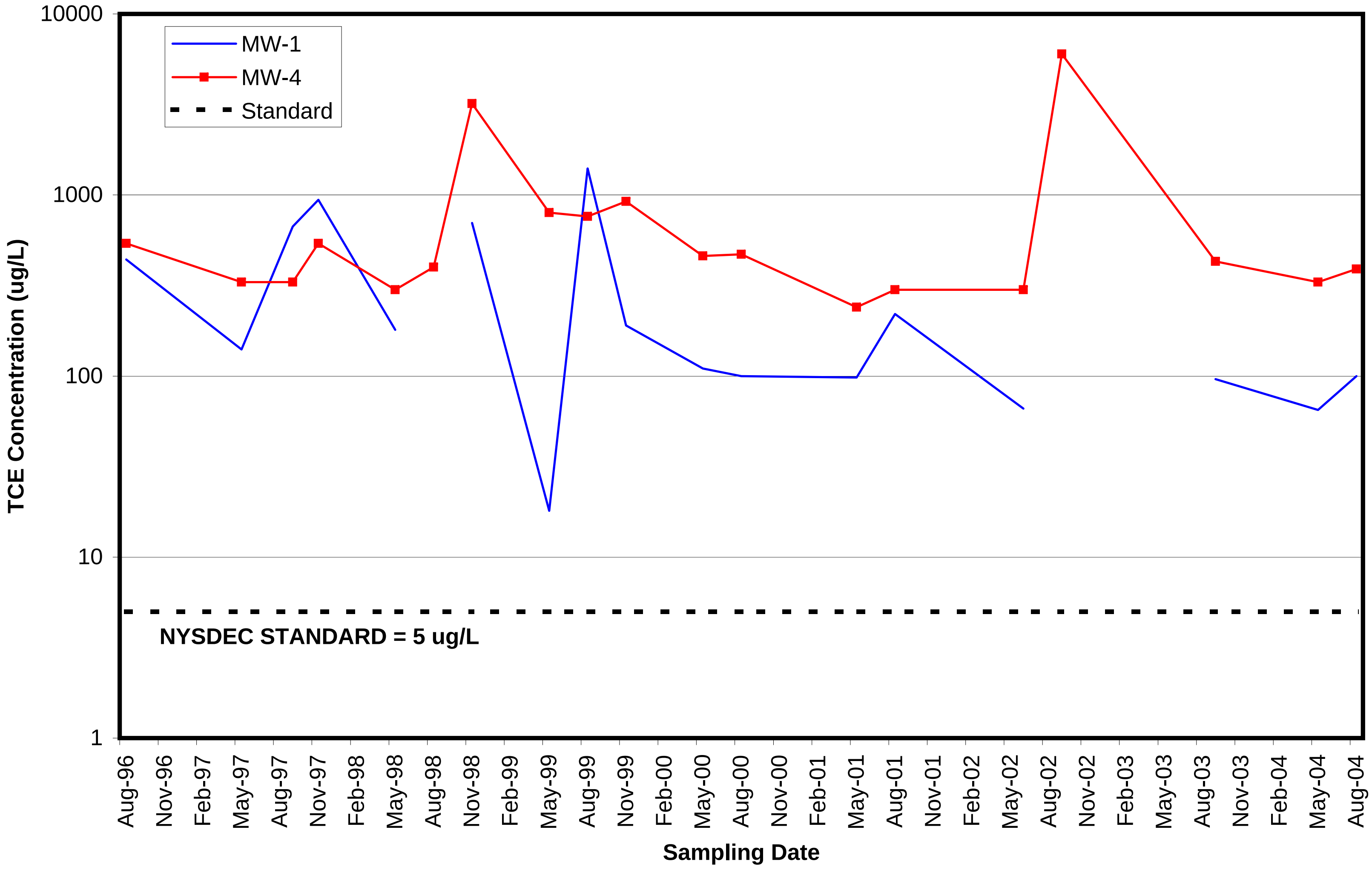


Figure 28 - Total Chromium in Ground Water at MW-1, 2 & 4
1996 -2004
Total Chromium (mg/L)
100
10
1
0.1
0.01
0.001
MW-1
MW-2
MW-4
Standard
NYSDEC STANDARD = 0.05 mg/L
Aug-96
Nov-96
Feb-97
May-97
Aug-97
Nov-97
Feb-98
May-98
Aug-98
Nov-98
Feb-99
May-99
Aug-99
Nov-99
Feb-00
May-00
Aug-00
Nov-00
Feb-01
May-01
Aug-01
Nov-01
Feb-02
May-02
Aug-02
Nov-02
Feb-03
May-03
Aug-03
Nov-03
Feb-04
May-04
Aug-04
Sampling Date

Figure 29 - TCE Concentrations in Ground Water at MW-1 and 4
1996 to 2004



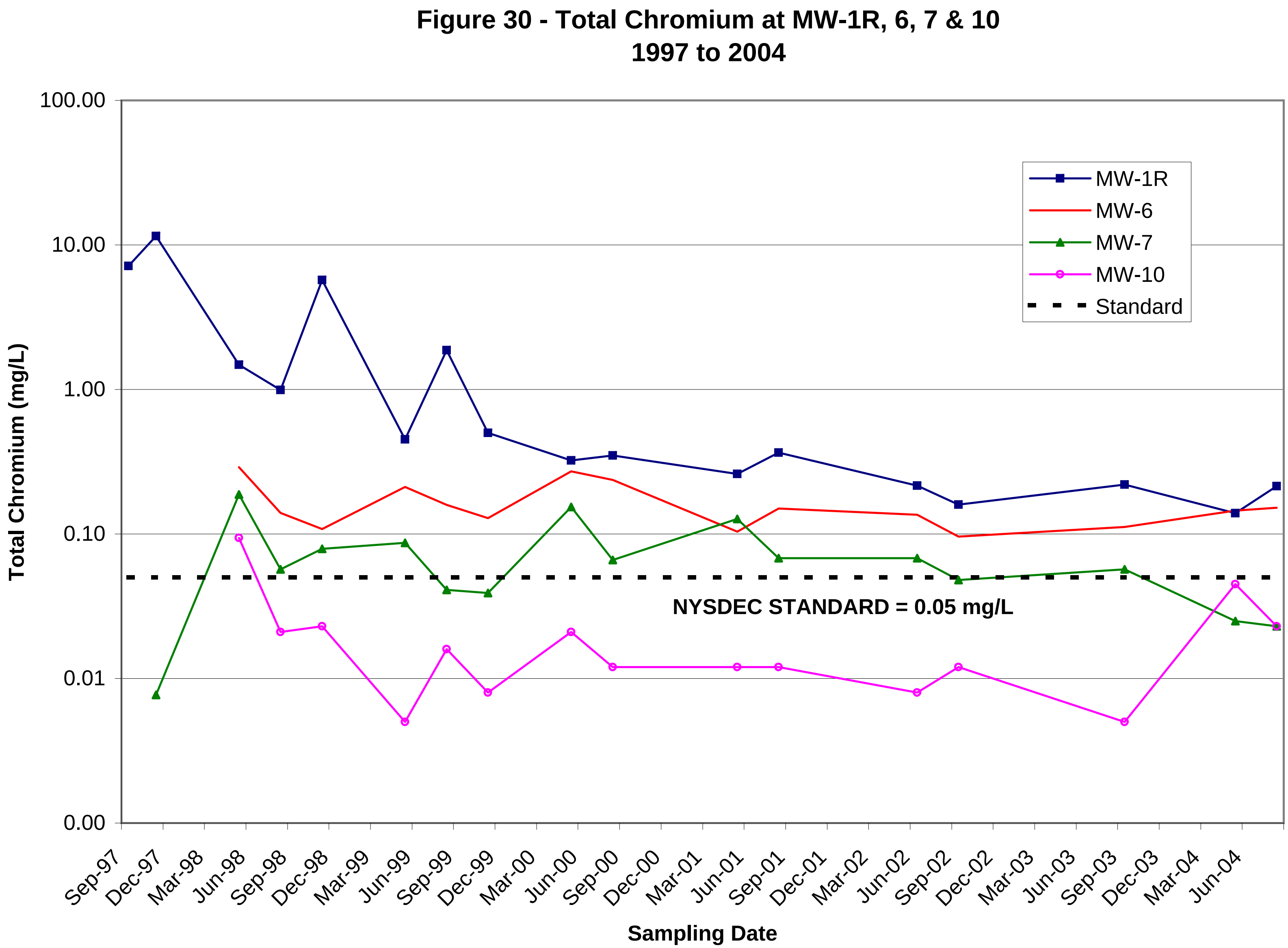


Figure 30 - Total Chromium at MW-1R, 6, 7 & 10
1997 to 2004
Total Chromium (mg/L)
100.00
10.00
1.00
0.10
0.01
0.00
MW-1R
MW-6
MW-7
MW-10
Standard
NYSDEC STANDARD = 0.05 mg/L
Sep-97
Dec-97
Mar-98
Jun-98
Sep-98
Dec-98
Mar-99
Jun-99
Sep-99
Dec-99
Mar-00
Jun-00
Sep-00
Dec-00
Mar-01
Jun-01
Sep-01
Dec-01
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Dec-03
Mar-04
Jun-04
Sampling Date

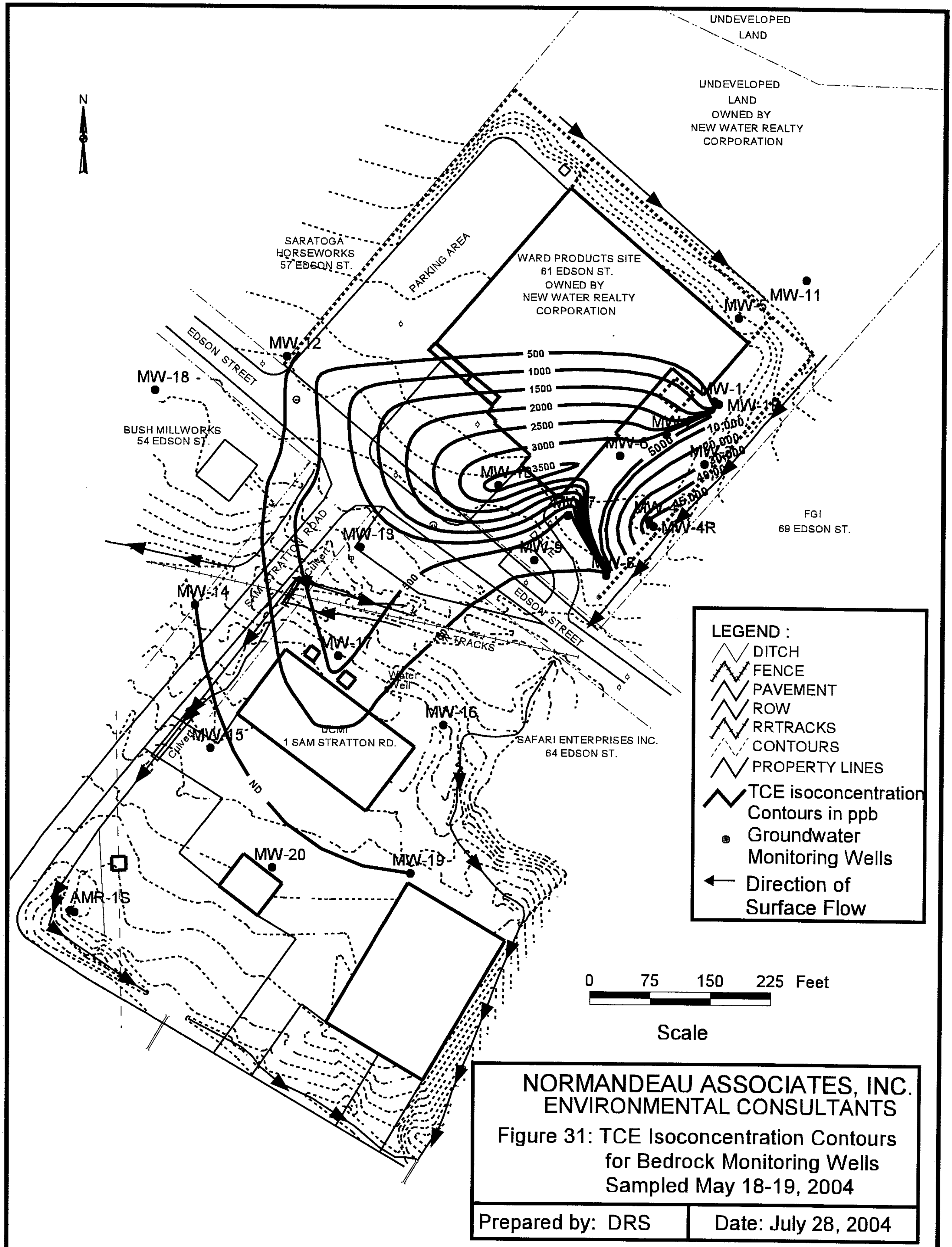


Figure 31: TCE Isoconcentration Contours for Bedrock Monitoring Wells Sampled May 18-19, 2004

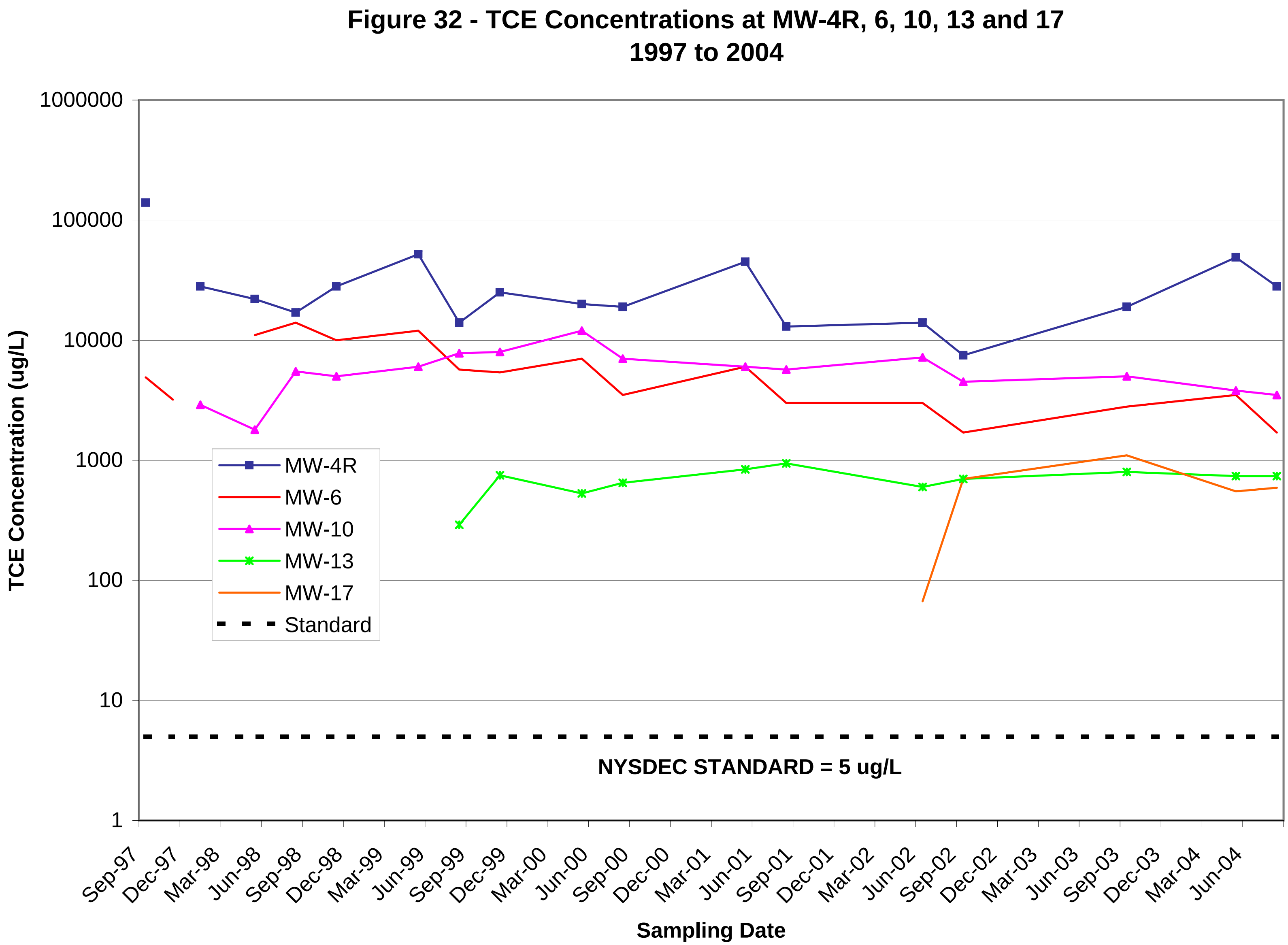
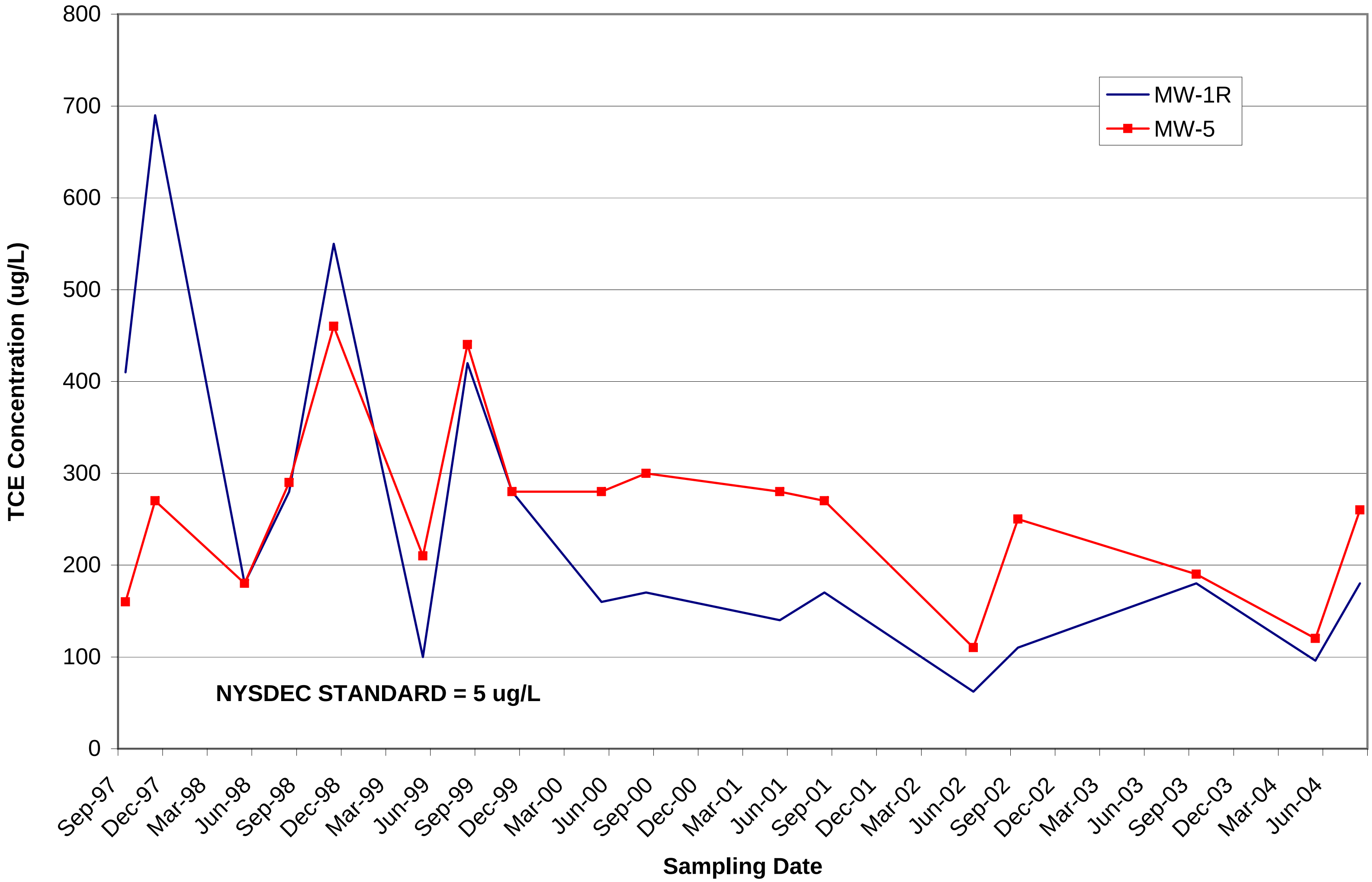


Figure 32 - TCE Concentrations at MW-4R, 6, 10, 13 and 17
1997 to 2004
TCE Concentration (ug/L)
1000000
100000
10000
1000
100
10
1
MW-4R
MW-6
MW-10
MW-13
MW-17
Standard
NYSDEC STANDARD = 5 ug/L
Sep-97
Dec-97
Mar-98
Jun-98
Sep-98
Dec-98
Mar-99
Jun-99
Sep-99
Dec-99
Mar-00
Jun-00
Sep-00
Dec-00
Mar-01
Jun-01
Sep-01
Dec-01
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Dec-03
Mar-04
Jun-04
Sampling Date

Figure 33 - Concentrations of TCE at MW-1R and MW-5
1997 to 2004



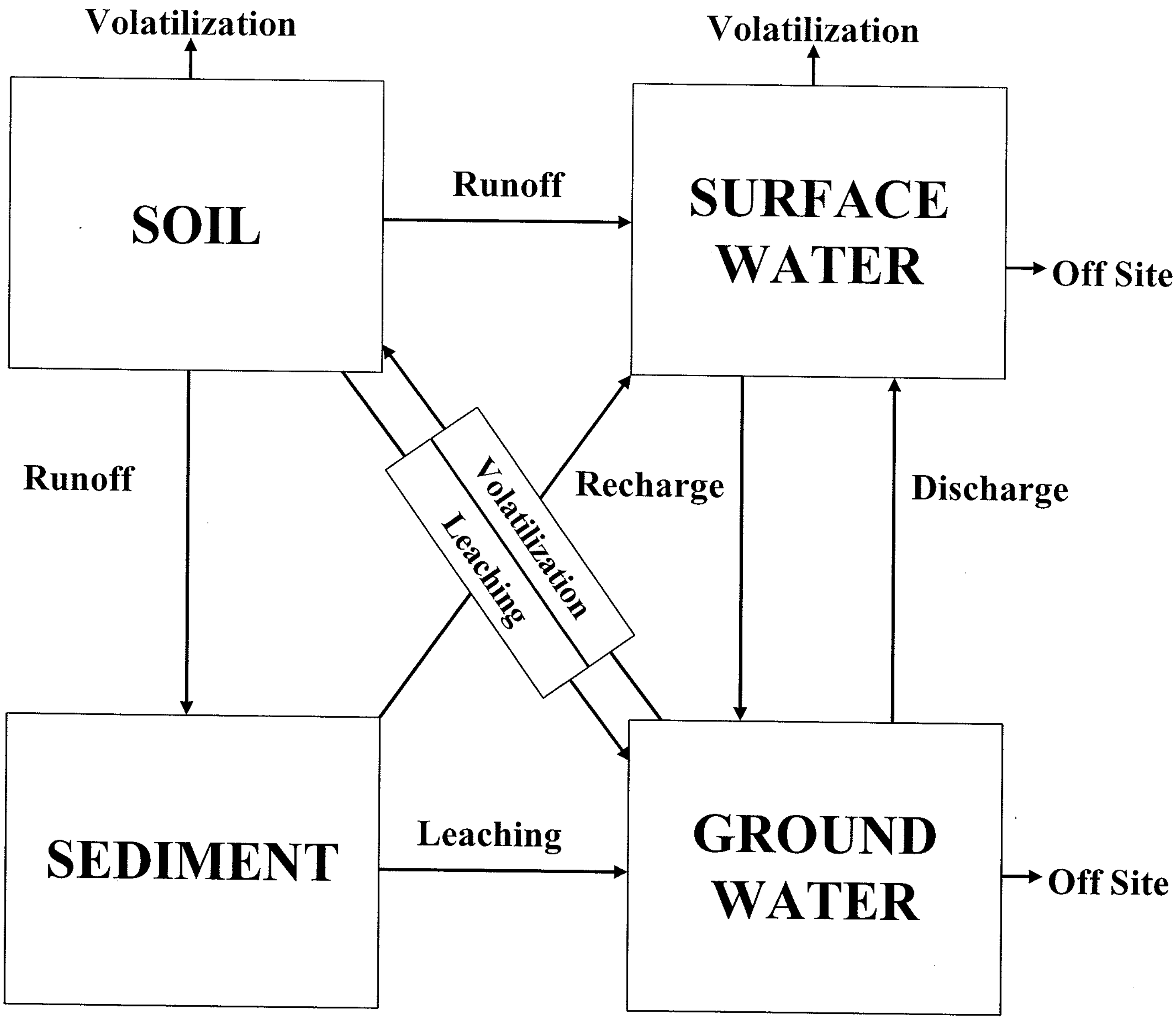
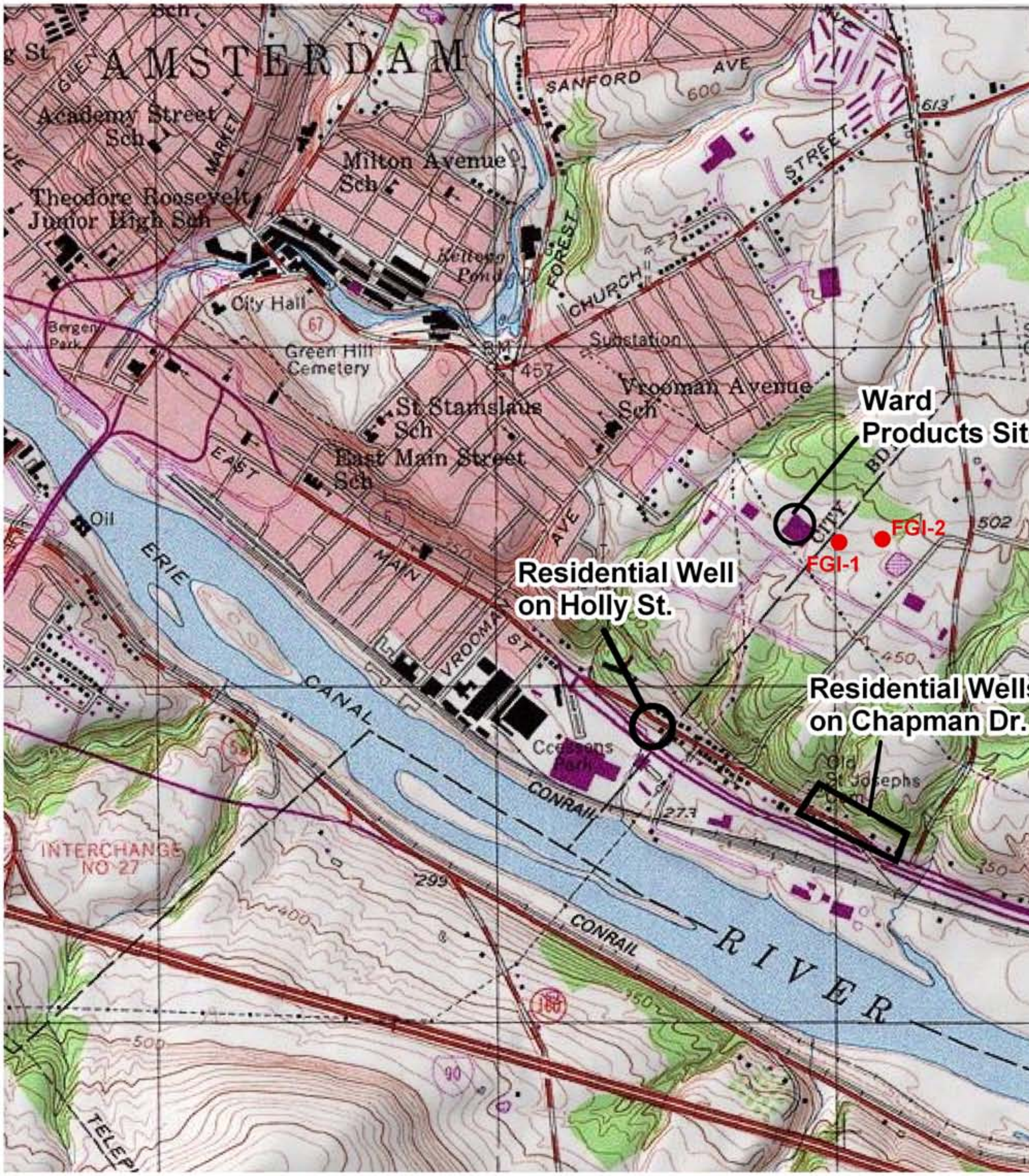


Figure 34. Potential Mitigation Pathways at a Typical Hazardous Waste Site.



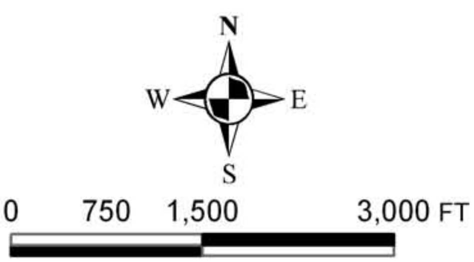


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Figure 35: Location of FGI and Residential Wells Near the Ward Products Site 61 Edson St. Amsterdam, NY

Prepared by: DRS	Date: July 12, 2004

TABLES

TABLE 1 - GROUND WATER ELEVATIONS RECORDED AT THE WARD PRODUCTS SITE, AMSTERDAM, NEW YORK FROM 1996 TO 2004.

WELL ID	REFERENCE ELEVATION (FEET)	August 22, 1996		May 22, 1997		July 3, 1997		September 4, 1997		November 11, 1997		January 22, 1998		March 23, 1998		May 7, 1998	
		DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)
MW-1	471.55	3.63	467.92	2.65	468.90	5.64	465.91	4.57	466.98	2.62	468.93	3.23	468.32	1.34	470.21	2.65	468.90
MW-1R	471.46	NI	NI	NI	NI	NI	NI	8.12	463.34	5.57	465.89	3.93	467.53	-0.23	471.69	3.40	468.06
MW-2	471.20	4.80	466.40	3.28	467.92	6.69	464.51	6.15	465.05	2.95	468.25	3.50	467.70	1.52	469.68	3.54	467.66
MW-3	473.03	5.22	467.81	3.89	469.14	7.07	465.96	12.32	460.71	4.06	468.97	4.05	468.98	2.66	470.37	3.64	469.39
MW-4	470.17	7.40	462.77	5.69	464.48	9.00	461.17	9.22	460.95	6.64	463.53	5.93	464.24	4.26	465.91	5.11	465.06
MW-4R	470.29	NI	NI	NI	NI	NI	NI	28.71	441.58	26.87	443.42	23.70	446.59	13.80	456.49	13.28	457.01
MW-5	475.62	NI	NI	NI	NI	NI	NI	16.80	458.82	15.79	459.83	16.11	459.51	15.45	460.17	15.88	459.74
MW-6	470.97	NI	NI	NI	NI	NI	NI	30.14	440.83	29.77	441.20	28.11	442.86	15.30	455.67	14.47	456.50
MW-7	469.14	NI	NI	NI	NI	NI	NI	27.22	441.92	25.73	443.41	22.56	446.58	12.75	456.39	12.28	456.86
MW-8	467.38	NI	NI	NI	NI	NI	NI	24.34	443.04	22.82	444.56	19.56	447.82	10.43	456.95	10.05	457.33
MW-9	465.43	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	31.87	433.56	14.65	450.78	13.75	451.68
MW-10	466.77	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	38.96	427.81	17.22	449.55	15.95	450.82
MW-11	485.37	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	8.61	476.76	7.87	477.50	8.34	477.03

WELL ID	REFERENCE ELEVATION (FEET)	August 25, 1998		November 16, 1998		May 24-25, 1999		August 23-24, 1999		November 15-16, 1999		May 23-24, 2000		August 22-23, 2000		May 21, 2001	
		DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)
MW-1	471.55	7.49	464.06	5.50	466.05	3.74	467.81	6.33	465.22	3.17	468.38	2.50	469.05	3.33	468.22	5.24	466.31
MW-1R	471.46	8.17	463.29	6.73	464.73	3.86	467.60	6.90	464.56	4.29	467.17	2.78	468.68	3.87	467.59	5.78	465.68
MW-2	471.20	8.37	462.83	7.60	463.60	5.02	466.18	7.36	463.84	4.43	466.77	3.13	468.07	4.12	467.08	5.89	465.31
MW-3	473.03	9.52	463.51	13.59	459.44	4.51	468.52	12.48	460.55	4.51	468.52	3.92	469.11	5.39	467.64	6.77	466.26
MW-4	470.17	10.02	460.15	10.48	459.69	6.45	463.72	10.01	460.16	7.02	463.15	4.01	466.16	6.28	463.89	8.12	462.05
MW-4R	470.29	16.84	453.45	19.32	450.97	14.79	455.50	18.52	451.77	16.60	453.69	10.69	459.60	13.44	456.85	13.47	456.82
MW-5	475.62	17.38	458.24	17.05	458.57	15.99	459.63	17.44	458.18	16.41	459.21	14.84	460.78	16.99	458.63	17.15	458.47
MW-6	470.97	17.74	453.23	20.25	450.72	15.84	455.13	19.76	451.21	17.81	453.16	11.79	459.18	14.53	456.44	14.40	456.57
MW-7	469.14	15.69	453.45	18.15	450.99	13.75	455.39	17.26	451.88	15.60	453.54	9.63	459.51	12.23	456.91	12.45	456.69
MW-8	467.38	13.75	453.63	15.96	451.42	11.45	455.93	15.01	452.37	13.33	454.05	7.53	459.85	10.26	457.12	10.39	456.99
MW-9	465.43	16.83	448.60	21.67	443.76	15.38	450.05	18.74	446.69	16.83	448.60	10.05	455.38	12.72	452.71	12.99	452.44
MW-10	466.77	18.61	448.16	21.33	445.44	16.89	449.88	20.40	446.37	18.10	448.67	11.30	455.47	13.97	452.80	14.05	452.72
MW-11	485.37	14.38	470.99	17.40	467.97	10.43	474.94	16.12	469.25	12.32	473.05	10.80	474.57	12.84	472.53	14.86	470.51
MW-12	468.18	NI	NI	NI	NI	NI	NI	21.64	446.54	20.40	447.78	14.04	454.14	16.87	451.31	16.89	451.29
MW-13	462.12	NI	NI	NI	NI	NI	NI	17.37	444.75	15.62	446.50	8.99	453.13	11.71	450.41	12.17	449.95
MW-14	453.66	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	8.85	444.81	9.50	444.16
MW-15	445.20	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	8.82	436.38	8.22	436.98
MW-16	449.50	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW-17	450.84	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
MW-18	463.76	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

WELL ID	REFERENCE ELEVATION (FEET)	August 29-30, 2001		June 17-19, 2002		Sept. 16-18, 2002		Sept. 10-12, 2003		May 18-19, 2004	
		DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)
MW-1	471.55	4.58	466.97	1.51	470.04	Dry	Dry	3.22	468.33	3.01	468.54
MW-1R	471.46	5.77	465.69	2.73	468.73	8.63	462.83	3.85	467.61	3.60	467.86
MW-2	471.20	5.61	465.59	1.69	469.51	10.49	460.71	4.04	467.16	3.91	467.29
MW-3	473.03	8.08	464.95	2.77	470.26	14.74	458.29	5.71	467.32	4.41	468.62
MW-4	470.17	8.75	461.42	4.51	465.66	10.92	459.25	6.99	463.18	6.65	463.52
MW-4R	470.29	15.57	454.72	12.20	458.09	17.30	452.99	13.21	457.08	17.80	452.49
MW-5	475.62	17.33	458.29	16.46	459.16	17.27	458.35	17.22	458.40	16.61	459.01
MW-6	470.97	16.56	454.41	13.40	457.57	18.42	452.55	14.05	456.92	19.86	451.11
MW-7	469.14	14.39	454.75	11.13	458.01	16.31	452.83	11.99	457.15	16.33	452.81
MW-8	467.38	12.26	455.12	8.95	458.43	14.08	453.30	9.90	457.48	13.09	454.29
MW-9	465.43	15.31	450.12	12.34	453.09	17.22	448.21	12.81	452.62	16.73	448.70
MW-10	466.77	16.37	450.40	13.40	453.37	18.18	448.59	13.85	452.92	19.12	447.65
MW-11	485.37	16.37	469.00	13.39	471.98	22.12	463.25	15.84	469.53	15.01	470.36
MW-12	468.18	18.98	449.20	16.41	451.77	20.07	448.11	16.83	451.35	19.47	448.71
MW-13	462.12	14.27	447.85	11.70	450.42	16.47	445.65	12.79	449.33	16.46	445.64
MW-14	453.66	11.91	441.75	7.96	445.70	13.24	440.42	8.87	444.79	8.28	445.38
MW-15	445.20	10.19	435.01	6.80	438.40	12.22	432.98	7.19	438.01	6.15	439.05
MW-16	449.50	NI	NI	25.33	424.17	28.80	420.70	25.37	424.13	20.78	428.72
MW-17	450.84	NI	NI	4.57	446.27	9.89	440.95	5.34	445.50	6.38	444.46
MW-18	463.76	NI	NI	18.05	445.71	22.85	440.91	19.35	444.41	19.20	444.56
MW-19	441.64	NI	NI	NI	NI	NI	NI	27.75	413.89	25.45	416.19
MW-20	442.38	NI	NI	NI	NI	NI	NI	21.72	420.66	20.70	421.68

Note: Reference elevation is top of PVC riser
Depth to ground water measured from top of PVC riser
NI - not installed at time of measurement

TABLE 2. RESULTS OF IN-SITU HYDRAULIC CONDUCTIVITY TESTS PERFORMED IN SELECTED GLACIAL TILL AND FRACTURED BEDROCK MONITORING WELLS IN 1997 AND 1998 AT WARD PRODUCTS, AMSTERDAM, NEW YORK.

WELL NO.	HYDRAULIC CONDUCTIVITY (FT/DAY)	GEOLOGIC FORMATION
MW-1	0.64	GLACIAL TILL
MW-2	0.002	GLACIAL TILL
MW-3	0.03	GLACIAL TILL
MW-4	0.05	GLACIAL TILL
MW-4R	2.9	FRACTURED BEDROCK
MW-6	2.7	FRACTURED BEDROCK
MW-7	6.7	FRACTURED BEDROCK
MW-8	13.1	FRACTURED BEDROCK
MW-9	0.72	FRACTURED BEDROCK
MW-10	1.6	FRACTURED BEDROCK
GEOMETRIC MEAN	0.037	GLACIAL TILL
	3.04	FRACTURED BEDROCK

Note: Hydraulic conductivity of MW-8 is the average of two independent tests (1997 and 1998).

Fractured bedrock at site is the Chuctanunda Creek Dolostone

TABLE 3. SUMMARY OF INORGANIC RESULTS FOR INITIAL BACKGROUND SOIL SAMPLES COLLECTED FROM WARD PRODUCTS CORPORATION, AMSTERDAM, NEW YORK.

Sampling Location	Sampling Depth (Ft.)	Cadmium	Hexavalent Chromium	Total Chromium	Total Cyanide	Lead	Nickel	Zinc
4	0-0.5	<0.13	<4.3	15.3	0.14J	16J	14.2J	53J
5	0-0.5	<0.13	<2.2	15.9	<0.1	12J	20.3J	122J
6	0-0.5	<0.13	<0.46	13.8	<0.1	9.3J	19.7J	55J
10	0-0.5	<2.0	<10	16.3	0.32	19J	16.6J	80
11	0-0.5	<2.0	<10	18.7	0.18	24J	18.6J	67
12	0-0.5	<2.0	<10	16.1	0.19	25J	17.5J	56
	Eastern US	0.1-1	NA	1.5-40	NA	4.0-61	0.5-25	9.0-50
	NYSDEC SCO	1	10	10	SS	SB	13	20

Samples collected in 1997, all concentrations in ppm, based on dry weight.
J - Estimated
NA - Not Available
SB - Site Background, SS - Site Specific

TABLE 4. SUMMARY OF BACKGROUND SOIL CONCENTRATIONS FOR INORGANICS AT WARD PRODUCTS CORPORATION, AMSTERDAM, NEW YORK.

Sampling Location	Sampling Depth (Ft.)	Cadmium	Hexavalent Chromium	Total Chromium	Total Cyanide	Lead	Nickel	Zinc
27	0-0.2	<0.25	<0.4	14	<1	6.8	9.9	52
	0.2-1	<0.25	<0.4	20	<1	0.99	22	58
29	0-0.2	<0.25	<0.4	15	<1	4.1	17	54
	0.2-1	<0.25	<0.4	17	<1	3.5	19	53
31	0-0.2	<0.25	<0.4	16	<1	5.2	19	49
	0.2-1	<0.25	<0.4	16	<1	4.3	20	59
33	0-0.2	<0.25	<0.4	15	<1	4.5	17	52
	0.2-1	<0.25	<0.4	14	<1	4.3	20	51
35	0-0.2	<0.25	<0.4	14	<1	4	17	47
	0.2-1	<0.25	<0.4	15	<1	3.6	15	41
36	0-0.2	<0.25	<0.4	4.3	<1	1.5	5.1	18
	0.2-1	<0.25	<0.4	24	<1	4.3	16	41
37	0-0.2	<0.25	<0.4	25	<1	7.2	15	45
39	0.2-1	<0.25	<0.4	17	<1	7	20	50
43	0.2-1	<0.25	<0.4	17	<1	4.6	18	55
48	0-0.2	<0.25	<0.4	11.8	<1	6.35	8.55	28.8
	0.2-1	<0.25	<0.4	16.8	<1	9.65	12.8	34.6
49	0.2-1	<0.25	<0.4	24.9	<1	10.4	24.6	64.8
50	0.2-1	<0.25	<0.4	17.8	<1	12.8	12.6	36.5
51	0-0.2	<0.25	<0.4	13.5	<1	12.8	11.4	32.6
	0.2-1	<0.25	<0.4	22.6	<1	12.9	19.4	53.3
52	0.2-1	<0.25	<0.4	11.3	<1	12.6	10.9	34.3
58	0.2-1	<0.25	<0.4	28.9	<1	7.49	18.5	50.1
	Maximum	<0.25	<0.4	28.9	<1	12.9	24.6	64.8
	Minimum	<0.25	<0.4	4.3	<1	0.99	5.1	18
	Average	<0.25	<0.4	17.0	<1	6.6	16.0	46.1
	Eastern US	0.1-1	NA	1.5-40	NA	4.0-61	0.5-25	9.0-50
	NYSDEC SCO	1	10	10	SS	SB	13	20

Samples collected in 2000 (27 to 43) and 2001 (48 and up), all concentrations in ppm, based on dry weight.
NA - Not Available
SB - Site Background, SS - Site Specific

TABLE 5- SUMMARY OF LABORATORY ANALYSES PERFORMED ON SAMPLES COLLECTED FROM BELOW THE FORMER SLUDGE DRYING PAD AT WARD PRODUCTS.

Inorganics (mg/kg)	SLUDGE DRYING PAD														NYSDEC
	LOCATION A		LOCATION B			LOCATION C		LOCATION D		LOCATION E			SITE	EASTERN USA	SOIL CLEANUP
	0-1 ft.	1-2 ft.	0-1 ft.	1-2 ft.	2-3 ft.	0-1 ft.	1-2 ft.	0-1 ft.	1-2 ft.	0-1 ft.	DUP	1-2 ft.	BACKGROUND	BACKGROUND	OBJECTIVE
Cadmium	<0.14	**5**	**7.9J**	**16.4J**	**1.18J**	**31.9J**	**56.9J**	**26.6J**	**72.4J**	**263J**	**161**	**314J**	<0.25	0.1-1	1 or SB
Chromium, Hexavalent	**4.3**	**11.2**	**14.7**	**11.8**	**6.3**	**8.8**	**1.7**	**3.5**	**2.3**	**3.6J**	<0.46	<0.46	<0.40	NA	10 or SB
Chromium, Total	**47**	**139**	**162**	**273**	**37**	**153**	**24.3**	**70.7**	**59.2**	**54.1**	**131**	**51.4**	17	1.5-40	10 or SB
Cyanide, Total	<0.11	<0.11	**28.4J**	0.24J	<0.11	**13.8J**	**9.61J**	**13.2J**	**10.4J**	<0.11	<0.11	<0.11	<1	NA	SS
Lead	**13J**	**50J**	**16J**	**33J**	**9.8J**	**13J**	**10.9J**	**11.1J**	**12J**	**10.9J**	**9.7J**	**10J**	6.6	4-61	SB
Nickel	**52.8J**	**110J**	**270J**	**309J**	**17.2J**	**18.1J**	**18.4J**	**73.4J**	**20.7J**	**45.5J**	**59.7**	**44.8J**	16	0.5-25	13 or SB
Zinc	**99J**	**217J**	**128J**	**588J**	**52J**	28J	**63J**	**86J**	**74J**	**193J**	**259**	**241J**	46.1	9-50	20 or SB
TCLP Leachate (mg/l)															RCRA TC LIMIT
Cadmium	NA	NA	NA	NA	NA	0.248	0.611	**1.75**	NA	**1.82**	NA	**1.42**	NA	NA	1
Chromium, Total	NA	0.0229	0.047	0.056	NA	0.038	NA	NA	NA	NA	NA	NA	NA	NA	5
Chromium, Hexavalent	NA	0.018	0.051J	0.049	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5
Nickel	NA	0.08	0.115	0.139	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NE
Zinc	NA	0.585	0.171	1.54	NA	NA	NA	NA	NA	0.84	NA	0.843	NA	NA	NE
Volatile Organics (ug/kg)															NYSDEC SCO
Methylene Chloride	2J	3J	4J	6	5J	5J	6B	6JB	6JB	6JB	6JB	6JB	NA	NA	100
Toluene	<6	<6	<6	<6	<6	6	<6	3J	<6	<6	<6	<6	NA	NA	1500
Trichloroethene	<6	1J	3J	1J	<6	2J	<6	5J	6	6	8	13	NA	NA	700

NOTE:

CONCENTRATIONS BASED ON DRY WEIGHT
B - DETECTED IN BLANK
J - ESTIMATED
NA - NOT AVAILABLE
NE - NOT ESTABLISHED

DUP - IS DUPLICATE OF 0-1 ft.
SAMPLES COLLECTED JULY 1997
BOLD VALUES ABOVE STANDARDS

TABLE 6 - SUMMARY OF LABORATORY ANALYSES PERFORMED ON SAMPLES COLLECTED FROM THE SOIL PILE.

INORGANICS	TOTAL CONCENTRATION (mg/kg)							EXTRACT LEACHATE (mg/l)			RCRA TC LIMIT (mg/l)
	Sample A	Sample 1	Sample 2	Sample 3	SITE BACKGROUND	EASTERN USA BACKGROUND	NYSDEC SCO	Sample 1	Sample 2	Sample 3	
Arsenic	NA	7	4.3	6.2	NA	3-12	7.5 or SB	ND	ND	ND	5
Barium	NA	55J	48J	53J	NA	15-600	300 or SB	0.68	0.75	0.91	100
Cadmium	**31.2**	**36.1**	**24.7**	**32.6**	<0.25	0.1-1	1 or SB	**1.01**	0.624	**1.06**	1
Chromium, Hexavalent	**48**	**31.7**	**44**	**30.2**	<0.40	NA	10 or SB	0.0578	0.0287	0.164	NONE
Chromium, Total	**471**	**666**	**315**	**495**	17	1.5-40	10 or SB	0.234	0.147	0.0287	5
Cyanide, Total	**1.7**	**2.87J**	**2.8J**	**2.84J**	<1	NA	SS	0.0169	0.0301	ND	NONE
Lead	**118**	**82J**	**56J**	**125J**	6.6	4-61	SB	ND	ND	0.036	5
Mercury	NA	0.1J	0.0448	0.058J	NA	0.001-0.2	0.1	0.00004	0.00004	0.00003	0.2
Nickel	**577**	NA	NA	NA	16	0.5-25	13 or SB	NA	NA	NA	NONE
Selenium	NA	<0.40	<0.38	<0.39	NA	0.1-3.9	2 or SB	ND	ND	ND	1
Silver	NA	0.69J	<0.46	1.59	NA	NA	SB	ND	ND	ND	5
Zinc	**798**	NA	NA	NA	46.1	9-50	20 or SB	NA	NA	NA	NONE

NOTE:

CONCENTRATIONS BASED ON DRY WEIGHT
J - ESTIMATED
NA - NOT ANALYZED OR NOT AVAILABLE
SB - SITE BACKGROUND BASED ON TABLE 4.
SS - SITE SPECIFIC

NYSDEC SCO - SOIL CLEANUP OBJECTIVE
A - COMPOSITE SAMPLE COLLECTED AUGUST 23, 1996
1, 2 & 3 - SURFACE GRAB SAMPLES COLLECTED JULY 2, 1997
BOLD VALUES ABOVE STANDARDS

TABLE 7 - SUMMARY OF LABORATORY ANALYSES PERFORMED ON SOIL SAMPLES COLLECTED FROM BELOW THE FORMER LOCATION OF THE SOIL PILE.

INORGANICS	TOTAL CONCENTRATION (mg/kg)												NYSDEC SCO
	Sample 4	Sample 5			Sample 6			Sample 7		SOIL PILE	SITE BACKGROUND	EASTERN USA BACKGROUND	
		0-1 ft	1-2 ft	2-3 ft	0-1 ft	1-2 ft	2-3 ft	0-1 ft	1-2 ft				
Cadmium	**48.7**	**10.1J**	**13.2J**	**22.9**	**21.9J**	**19.3J**	**1.4**	**30.7J**	**31.6J**	24.7-36.1	<0.25	0.1-1	1 or SB
Chromium, Hexavalent	0.95J	**3.1J**	**6.1J**	<0.40	<1.0	**9.8J**	<0.40	<1.0	**16.8J**	30.2-44	<0.40	NA	10 or SB
Chromium, Total	**447**	**136**	**146**	**198**	**380**	**438**	**21.4**	**352**	**691**	315-666	17	1.5-40	10 or SB
Cyanide, Total	**1.23J**	**1.57**	0.35	<1.0	0.61	0.17	<1.0	**1.94**	**2.19**	2.8-2.87	<1	NA	SS
Lead	**494J**	**42J**	**35.5J**	**171**	**102J**	**108J**	**11.5**	**117J**	**261J**	56-125	6.6	4-61	SB
Nickel	**1600**	**186J**	**173J**	**290**	**1840J**	**404J**	**52.5**	**1960J**	**776J**	NA	16	0.5-25	13 or SB
Zinc	**3380**	**305**	**292**	**720**	**15600**	**665**	**126**	**4110**	**1440J**	NA	46.1	9-50	20 or SB

NOTE:

J - ESTIMATED VALUE
NA - NOT AVAILABLE
SB - SITE BACKGROUND
SS - SITE SPECIFIC

NYSDEC SCO - SOIL CLEANUP OBJECTIVES
SAMPLE 4 COLLECTED SEPT. 5, 1997
SAMPLES 5-7, DEPTH 0-2 FT COLLECTED NOV. 21, 1997
SAMPLES 5 & 6, DEPTH 2-3 FT COLLECTED AUGUST 25, 1999
BOLD VALUES ABOVE STANDARDS

TABLE 8 - SUMMARY OF LABORATORY ANALYSES PERFORMED ON SOIL SAMPLES COLLECTED FROM BELOW THE FORMER VAPOR DEGREASING SYSTEM AT WARD PRODUCTS, AMSTERDAM, NEW YORK.

Inorganics (mg/kg)	VAPOR DEGREASER LOCATION F				SITE BACKGROUND	EASTERN USA BACKGROUND	NYSDEC SOIL CLEANUP OBJECTIVE
	0-1 ft.	DUP	1-2 ft.	2-3 ft.			
Cadmium	**62.8**	**58.4**	**1.17J**	**65.9**	<0.25	0.1-1	1 or SB
Chromium, Hexavalent	**1.7**	**1.7**	<0.46	**2.8**	<0.40	NA	10 or SB
Chromium, Total	**27.4**	**23.5**	**17.3**	**35.8**	17	1.5-40	10 or SB
Cyanide, Total	**6.5J**	**6.81J**	**3.1J**	**10.9J**	<1	NA	SS
Lead	**7.2J**	5.3J	**8.4J**	**7.8J**	6.6	4-61*	SB
Nickel	**19.5**	14.5	**22.7**	**20.7**	16	0.5-25	13 or SB
Zinc	**75**	**64**	**57**	**72**	46.1	9-50	20 or SB
TCLP Leachate (mg/L)							RCRA TC LIMIT
Cadmium	**1.75**	NA	NA	**1.69**	NA	NA	1
Volatile Organics (ug/kg)							NYSDEC SCO
Methylene Chloride	6B	6B	8B	8	NA	NA	100
Vinyl Chloride	<6	<6	<6	<6	NA	NA	120
1,1-Dichloroethene	<6	<6	<6	<6	NA	NA	400
cis-1,2-Dichloroethene	<6	<6	7	20	NA	NA	300
Ethylbenzene	<6	<6	<6	<6	NA	NA	5500
Tetrachloroethene	<6	<6	<6	<6	NA	NA	1400
Toluene	<6	<6	<6	<6	NA	NA	1500
Trichloroethene	3J	6	79	98	NA	NA	700
Xylene, Total	<6	<6	<6	<6	NA	NA	1200

NOTE:

CONCENTRATIONS BASED ON DRY WEIGHT
B - DETECTED IN LAB BLANK
J - ESTIMATED VALUE
NA - NOT AVAILABLE
NE - NOT ESTABLISHED
SB - SITE BACKGROUND
SS - SITE SPECIFIC

DUP - IS DUPLICATE OF 0-1 ft.
SAMPLES COLLECTED JULY 1997
NYSDEC SCO - SOIL CLEANUP OBJECTIVE
BOLD VALUES ABOVE STANDARDS

TABLE 9 - SUMMARY OF LABORATORY ANALYSES PERFORMED ON SEDIMENT SAMPLES COLLECTED FROM THE DRAIN AND DRAIN PIPE IN 1997 AND 1999 AT WARD PRODUCTS, AMSTERDAM, NEW YORK.

Inorganics (mg/Kg)	FLOOR DRAIN	DRAIN PIPE	SITE BACKGROUND	EASTERN USA BACKGROUND	NYSDEC SOIL CLEANUP OBJECTIVE
Cadmium	**192J**	NA	<0.25	0.1-1	1 or SB
Chromium, Hexavalent	**291**	NA	<0.40	NA	10 or SB
Chromium, Total	**38.5**	**11,000**	17	1.5-40	10 or SB
Cyanide, Total	<0.12	NA	<1	NA	SS
Lead	**11.5J**	NA	6.6	4-61	SB
Nickel	**32.4J**	NA	16	0.5-25	13 or SB
Zinc	**163J**	NA	46.1	9-50	20 or SB
TCLP Leachate (mg/L)					RCRA TC LIMIT
Cadmium	**3.2**	**25.1**	NA	NA	1
Chromium, Hexavalent	<0.0030	0.15	NA	NA	5
Chromium	NA	**8.67**	NA	NA	5
Lead	NA	**22.1**	NA	NA	5
Zinc	31.6	NA	NA	NA	NE
Volatile Organics (ug/Kg)					NYSDEC SCO
Methylene Chloride	31JB	<300	NA	NA	100
Vinyl Chloride	**380**	<120	NA	NA	120
1,1-Dichloroethene	130	<300	NA	NA	400
cis-1,2-Dichloroethene	**6,200**	<300	NA	NA	300
Ethylbenzene	180	<300	NA	NA	5500
Tetrachloroethene	17J	<300	NA	NA	1400
Toluene	19J	<300	NA	NA	1500
Trichloroethene	**19,000**	<300	NA	NA	700
Xylene, Total	940	<300	NA	NA	1200
TCLP Leachate (ug/L)					RCRA TC LIMIT
Vinyl Chloride	5J	NA	NA	NA	200
1,1-Dichloroethene	2J	NA	NA	NA	700
cis-1,2-Dichloroethene	92J	NA	NA	NA	NE
Ethylbenzene	3J	NA	NA	NA	NE
Toluene	4J	NA	NA	NA	NE
Trichloroethene	**530J**	NA	NA	NA	500
Xylene, Total	20J	NA	NA	NA	NE

NOTE:

B - DETECTED IN LAB BLANK
J - ESTIMATED VALUE
NA - NOT AVAILABLE
NE - NOT ESTABLISHED
SB- SITE BACKGROUND
SS - SITE SPECIFIC

FLOOR DRAIN SAMPLE COLLECTED 1997
DRAIN PIPE SAMPLE COLLECTED 1999
NYSDEC SCO - SOIL CLEANUP OBJECTIVE
BOLD VALUES HIGHER THAN STANDARD

TABLE 10 - SUMMARY OF LABORATORY ANALYSES PERFORMED ON SOIL SAMPLES COLLECTED FROM THE AREA AROUND THE TRANSFORMER PAD.

INORGANICS (mg/kg)	TOTAL CONCENTRATION														NYSDEC CLEANUP OBJECTIVE
	Sample 3		Sample 16		Sample 17		Sample 18		Sample 19		Sample 20	Sample 21	SITE BACKGROUND	EASTERN USA BACKGROUND	
	0-0.5 ft	1-2 ft	0-1 ft	1-2 ft	0-1 ft	1-2 ft	0-1 ft	1-2 ft	0-1 ft	1-2 ft	0-1 ft	0-1 ft			
Cadmium	**206J**	<2.4	<2.2	<2.1	<2.2	<2.2	**129J**	<2.2	**71J**	<2.3	**6.4J**	<2.4	<0.25	0.1-1	1 or SB
Chromium, Hexavalent	**11.6**	**4.8**	<1.1	<1.1	<1.1	**4.5**	**23.2**	**1.5**	**36.7**	**10**	<1.2	**2.3**	<0.40	NA	10 or SB
Chromium, Total	**502**	**60.5**	**27.6**	**25.9**	**33.6**	**48**	**507**	**30.4**	**419**	**122**	**130**	**45.6**	17	1.5-40	10 or SB
Cyanide, Total	**8.85J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	SS
Lead	**77J**	<12	**13J**	<11	**16J**	**11J**	**58J**	<11	**30J**	<11	**22J**	<12	6.6	4-61	SB
Nickel	**828J**	**27.1J**	**31.3J**	**27.3J**	**40.2J**	**27.6J**	**339J**	**31.4J**	**1300J**	**26.8J**	**357J**	**49.8J**	16	0.5-25	13 or SB
Zinc	**1760J**	**62**	**105**	**79**	**99**	**96**	**1140**	**75**	**2080**	**57**	**595**	**100**	46.1	9-50	20 or SB
ORGANICS (ug/kg)															
Methylene Chloride	NA	9	<5	<5	<5	<5	15	7	9	6	NA	NA	ND	NA	100
Trichloroethene	NA	<6	<5	<5	<5	<5	7	<6	<6	<6	NA	NA	ND	NA	700
PCBs	NA	NA	NA	NA	NA	NA	**6170**	NA	NA	NA	80	<19	ND	NA	1000/10000*

NOTE:

J = ESTIMATED VALUE
CONCENTRATIONS BASED ON DRY WEIGHT
NA - NOT AVAILABLE
SB - SITE BACKGROUND
SS - SITE SPECIFIC
* - 1000 PPB FOR SURFICIAL, 10,000 PPB FOR SUBSURFACE

BOLD VALUES ABOVE STANDARD

TABLE 11 - SUMMARY OF LABORATORY RESULTS FOR EXTERIOR SOIL SAMPLES,
WARD PRODUCTS CORPORATION, 61 EDSON STREET, AMSTERDAM, NEW YORK.

Sampling Location	Sampling Depth	Cadmium	Hexavalent Chromium	Total Chromium	Total Cyanide	Lead	Nickel	Zinc
1	0-0.5 ft	**2.2J**	**6**	**68.6**	0.17J	**20J**	**63J**	**146J**
2	0-0.5 ft	**1.78J**	**7**	**66.2**	<0.1	**18J**	**50.1J**	**108J**
Dup. of 2	0-0.5 ft	**2.1J**	**6.4**	**59.1**	0.12J	**18J**	**53.7J**	**124J**
8	0-0.2 ft	**13**	<0.40	**120**	<1	**103**	**225**	**660**
	0.2-1.0 ft	**7.9**	<0.40	**96.5**	<1	**113**	**183**	**381**
	1-2 ft	**0.35**	<0.40	13.2	<1	**11.1**	**21.5**	**63**
	2-2.5 ft	**0.65**	<0.40	14.3	<1	**19.3**	**23.5**	**100**
9	0-0.2 ft	**36.6**	<0.40	**250**	<1	**154**	**251**	**760**
	0.2-1 ft	**54.5**	<0.40	**472**	<1	**430**	**740**	**1240**
	1-1.5 ft	**14.9**	<0.40	**75**	<1	**117**	**99**	**195**
10	0-0.2 ft	**74.5**	<0.40	**650**	<1	**330**	**1780**	**1900**
	0.2-1 ft	**60.5**	<0.40	**447**	<1	**280**	**725**	**1120**
11	0-0.2 ft	**59.5**	<0.40	**810**	<1	**318**	**1750**	**2020**
	0.2-1.0 ft	**61.5**	<0.40	**735**	<1	**354**	**1760**	**2080**
	1-1.3 ft	**50**	<0.40	**565**	<1	**265**	**845**	**1290**
12	0-0.2 ft	**26.6**	<0.40	**206**	<1	**65**	**262**	**362**
	0.2-1 ft	**25**	**0.56**	**299**	<1	**71**	**338**	**444**
	1-2 ft	**22.6**	<0.40	**224**	<1	**50**	**169**	**282**
	2-2.5 ft	**42.7**	<0.40	**382**	<1	**193**	**510**	**860**
13	0-0.5 ft	**7.8J**	**5.8**	**135**	NA	**50J**	**127J**	**236**
13A	0-0.2 ft	**46.2**	<0.40	**111**	<1	**24.5**	**100**	**187**
	0.2-1 ft	**21**	<0.40	**146**	<1	**39.2**	**174**	**246**
	1-1.7 ft	**3.3**	<0.40	**29.6**	<1	**11.4**	**30.5**	**133**
	2-2.5 ft	**6.25**	<0.40	**134**	<1	**15.1**	**48.3**	**146**
14	0-0.5ft	**9.5J**	**10.2**	**510**	NA	**22J**	**991J**	**222**
14A	0-0.2 ft	**30.2**	<0.40	**280**	<1	**84**	**290**	**420**
	0.2-1.0 ft	**87**	<0.40	**206**	<1	**41.8**	**171**	**515**
	1-2 ft	**0.95**	<0.40	**19.1**	<1	**12.3**	**23.6**	**64.5**
	2-3 ft	**1.5**	<0.40	**18**	<1	**10.2**	**25**	**61**
15	0-0.5 ft	**28.9J**	**3.8**	**126**	NA	**30J**	**144J**	**204**
15A	0-0.2 ft	**24.1**	<0.40	**207**	<1	**80.5**	**221**	**331**
	0.2-1 ft	**66**	**0.54**	**885**	<1	**300**	**855**	**1100**
16A	0-0.2 ft	**37.8**	<0.40	**409**	<1	**110**	**414**	**880**
	0.2-1 ft	**61**	<0.40	**695**	<1	**208**	**1120**	**1010**
17A	0-0.2 ft	**33**	<0.40	**302**	<1	**122**	**349**	**515**
	0.2-1 ft	**44.4**	<0.40	**479**	<1	**160**	**427**	**800**
Eastern US Background		0.1-1	NA	1.5-40	NA	4-61	0.5-25	9-50
Ward Site Background		<0.25	<0.40	17	<1	6.6	16	46
NYSDEC SCO		1 or SB	NE	10 or SB	SS	SB	13 or SB	20 or SB

Note:

All Concentrations in mg/Kg (ppm)
J - Estimated Value
NA - Not Available
NYSDEC SCO - Soil Cleanup Objective
SB - Site Background
SS - Site Specific

BOLD VALUES EXCEED NYSDEC SCO
Samples 1-2 Collected July 1997
Samples 13, 14 and 15 Collected January 1998
Samples 8-12 and 13A to 17A
Collected August 1999

TABLE 11 - SUMMARY OF LABORATORY RESULTS FOR EXTERIOR SOIL SAMPLES, WARD PRODUCTS CORPORATION, 61 EDSON STREET, AMSTERDAM, NEW YORK (cont.).

Sampling Location	Sampling Depth (Ft.)	Cadmium	Hexavalent Chromium	Total Chromium	Total Cyanide	Lead	Nickel	Zinc
22	0-0.2	**13**	<0.4	**170**	**1.6**	**27**	**749**	**663**
	0.2-1	**8.3**	<0.4	**118**	<1	**18**	**593**	**678**
23	0-0.2	**7.7**	<0.4	**90**	<1	**20**	**206**	**367**
	0.2-1	**17**	<0.4	**67**	<1	**8.6**	**231**	**304**
24	0-0.2	**2.9**	<0.4	**54**	<1	**13**	**143**	**165**
	0.2-1	**0.43**	<0.4	**18**	<1	5	**24**	**59**
25	0-0.2	**5.3**	<0.4	**45**	<1	**9.5**	**106**	**231**
	0.2-1	**3.5**	<0.4	**63**	<1	**12**	**103**	**220**
26	0-0.2	**2.4**	<0.4	**32**	<1	**11**	**34**	**78**
	0.2-1	**1.3**	<0.4	**30**	<1	**8.9**	**33**	**78**
27	0-0.2	<0.25	<0.4	14	<1	**6.8**	9.9	**52**
	0.2-1	<0.25	<0.4	**20**	<1	0.99	**22**	**58**
28	0-0.2	**4.1**	<0.4	**69**	<1	**18**	**59**	**129**
	0.2-1	**16**	<0.4	**191**	<1	**47**	**172**	**292**
29	0-0.2	<0.25	<0.4	15	<1	4.1	**17**	**54**
	0.2-1	<0.25	<0.4	17	<1	3.5	**19**	**53**
30	0-0.2	**6.6**	<0.4	**60**	**16**	**12**	**49**	**88**
	0.2-1	<0.25	<0.4	**21**	**11**	**6.9**	**30**	**65**
31	0-0.2	<0.25	<0.4	16	<1	5.2	**19**	**49**
	0.2-1	<0.25	<0.4	16	<1	4.3	**20**	**59**
32	0-0.2	**4.5**	<0.4	**25**	<1	**7.4**	**26**	**63**
	0.2-1	**3.3**	<0.4	**42**	<1	**11**	**41**	**91**
33	0-0.2	<0.25	<0.4	15	<1	4.5	**17**	**52**
	0.2-1	<0.25	<0.4	14	<1	4.3	**20**	**51**
34	0-0.2	**0.96**	<0.4	**28**	<1	**7.7**	**32**	**73**
	0.2-1	**14**	<0.4	**294**	**16**	**76**	**188**	**395**
35	0-0.2	<0.25	<0.4	14	<1	4	**17**	**47**
	0.2-1	<0.25	<0.4	15	<1	3.6	15	41
36	0-0.2	<0.25	<0.4	4.3	<1	1.5	5.1	18
	0.2-1	<0.25	<0.4	**24**	<1	4.3	16	41
37	0-0.2	<0.25	<0.4	**25**	<1	**7.2**	15	45
	0.2-1	**0.64**	<0.4	**62**	<1	**15**	**35**	**77**
38	0-0.2	**2.3**	<0.4	**71**	<1	**30**	**58**	**156**
	0.2-1	**0.29**	<0.4	**29**	<1	**8**	**28**	**67**
39	0-0.2	**4.9**	<0.4	**82**	<1	**29**	**63**	**245**
	0.2-1	<0.25	<0.4	17	<1	**7**	**20**	**50**
40	0-0.2	**48**	<0.4	**702**	**11**	**134**	**605**	**626**
	0.2-1	**47**	<0.4	**229**	**16**	**82**	**681**	**336**
41	0-0.2	**12**	<0.4	**230**	<1	**55**	**136**	**372**
	0.2-1	**0.43**	<0.4	**21**	**13**	**9.5**	**24**	**78**
42	0-0.2	**263**	<0.4	**730**	**24**	**247**	**255**	**696**
	0.2-1	**1.3**	<0.4	**20**	<1	4.9	16	**50**
43	0-0.2	**0.96**	<0.4	**24**	<1	**12**	**34**	**88**
	0.2-1	<0.25	<0.4	17	<1	4.6	**18**	**55**
Eastern US Background		0.1 - 1	NA	1.5 - 40	NA	4.0-61	0.5 - 25	9 - 50
Ward Site Background		<0.25	<0.4	17	<1	6.6	16	46
NYSDEC SCO		1 or SB	NE	10 or SB	SS	SB	13 or SB	20 or SB

Note: All concentrations in ppm.
NYSDEC SCO - Soil Cleanup Objective

Bold Values Exceed NYSDEC SCO
Samples Collected 1999

TABLE 11 - SUMMARY OF LABORATORY RESULTS FOR EXTERIOR SOIL SAMPLES, WARD PRODUCTS CORPORATION, 61 EDSON STREET, AMSTERDAM, NEW YORK (cont.).

Sampling Location	Sampling Depth (Ft.)	Cadmium	Hexavalent Chromium	Total Chromium	Total Cyanide	Lead	Nickel	Zinc
44	0-0.2	**6.4**	<0.4	**62**	<1	**50.8**	**54.5**	**144**
	0.2-1	**14.6**	<0.4	**236**	<1	**104**	**198**	**375**
45	0-0.2	**3.18**	<0.4	**37.4**	<1	**20**	**40.3**	**114**
	0.2-1	**1.97**	**3.4**	**37.9**	<1	**25.6**	**31.9**	**94.9**
46	0-0.2	**3.96**	<0.4	**39**	<1	**13.6**	**27.1**	**89.2**
	0.2-1	**38**	<0.4	**447**	<1	**252**	**369**	**585**
47	0-0.2	**1.35**	<0.4	**27.8**	<1	**18.3**	**31.8**	**86**
	0.2-1	**44.7**	<0.4	**282**	<1	**137**	**427**	**549**
48	0-0.2	<0.25	<0.4	11.8	<1	6.35	8.55	28.8
	0.2-1	<0.25	<0.4	16.8	<1	**9.65**	12.8	34.6
49	0-0.2	**0.82**	**0.72**	**28**	<1	**12.6**	**23.8**	**58.8**
	0.2-1	<0.25	<0.4	**24.9**	<1	**10.4**	**24.6**	**64.8**
50	0-0.2	**0.48**	<0.4	**28.3**	<1	**17.2**	**17.8**	45.2
	0.2-1	<0.25	<0.4	17.8	<1	**12.8**	12.6	36.5
51	0-0.2	<0.25	<0.4	13.5	<1	**12.8**	11.4	32.6
	0.2-1	<0.25	<0.4	**22.6**	<1	**12.9**	**19.4**	**53.3**
52	0-0.2	**0.42**	<0.4	15.9	<1	**15.5**	15.5	44
	0.2-1	<0.25	<0.4	11.3	<1	**12.6**	10.9	34.3
53	0-0.2	**52.2**	<0.4	**730**	<1	**548**	**689**	**927**
	0.2-1	**7.15**	<0.4	**102**	<1	**145**	**113**	**245**
54	0-0.2	**4.98**	<0.4	**42.3**	<1	**33.5**	**37**	**119**
	0.2-1	**2.4**	<0.4	**463**	<1	**12.1**	**880**	**836**
55	0-0.2	**2.65**	<0.4	**53**	<1	**13.8**	**92.5**	**155**
	0.2-1	**3.05**	<0.4	**21.4**	0.9	**17.7**	**24.7**	**73.9**
56	0-0.2	**5.94**	<0.4	**51.4**	<1	**14.5**	**169**	**264**
	0.2-1	**20.3**	<0.4	**266**	<1	**46.2**	**945**	**778**
57	0-0.2	**2.92**	<0.4	**34.3**	<1	**10.3**	**107**	**172**
	0.2-1	**1.24**	<0.4	**23.7**	<1	**8.02**	**60.3**	**89.5**
58	0-0.2	**1.15**	<0.4	**27.2**	<1	**8.59**	**33.9**	**77.1**
	0.2-1	<0.25	<0.4	**28.9**	<1	**7.49**	**18.5**	**50.1**
59	0-0.2	**5.89**	<0.4	**54.8**	<1	**13.8**	**95.7**	**175**
	0.2-1	**0.26**	<0.4	**20.7**	<1	**8.8**	**54.9**	**88.2**
60	0-0.2	**2.51**	<0.4	**23.6**	<1	**10.4**	**28**	**58.9**
	0.2-1	**0.34**	<0.4	**20.5**	<1	**8.06**	**23.3**	**48.9**
61	0-0.2	**7.92**	<0.4	**84.1**	<1	**40.9**	**236**	**385**
	0.2-1	**0.56**	<0.4	**22.9**	<1	**10.6**	**76.1**	**117**
62	0-0.2	**6.08**	<0.4	**41.1**	<1	**13.1**	**506**	**504**
	0.2-1	**12.6**	<0.4	**91.1**	<1	**21.1**	**313**	**564**
63	0-0.2	**4.06**	<0.4	**35.4**	<1	**13.5**	**120**	**206**
	0.2-1	**0.83**	<0.4	**31**	<1	**14**	**53.6**	**84.7**
Eastern US Background		0.1 - 1	NA	1.5 - 40	NA	4.0-61	0.5 - 25	9.0-50
Ward Site Background		<0.25	<0.4	17	<1	6.6	16	46
NYSDEC SCO		1 or SB	NE	10 or SB	SS	SB	13 or SB	20 or SB

Note: All concentrations in ppm.
NYSDEC SCO - Soil Cleanup Objective

Bold Values Exceed NYSDEC SCO
Samples Collected 1999-2000

TABLE 11 - SUMMARY OF LABORATORY RESULTS FOR EXTERIOR SOIL SAMPLES,
WARD PRODUCTS CORPORATION, 61 EDSON STREET, AMSTERDAM, NEW YORK (cont.).

Sampling Location	Sampling Depth (Ft.)	Cadmium	Hexavalent Chromium	Total Chromium	Total Cyanide	Lead	Nickel	Zinc
64	0-0.2	**1.15**	<0.4	**41**	<1	**10.3**	**46.3**	**117**
	0.2-1	<0.25	<0.4	**20**	<1	5.8	<2.5	41.6
65	0-0.2	**10.4**	<0.4	**120**	<1	**40.5**	**112**	**266**
	0.2-1	**3**	<0.4	**63.8**	<1	**9.9**	**55.4**	**79.9**
66	0-0.2	**1.25**	<0.4	**25.4**	<1	**14.8**	13	**59.5**
	0.2-1	<0.25	<0.4	**45.8**	<1	**12.2**	15.7	**72.5**
67	0-0.2	**1.35**	<0.4	**27.4**	<1	**16.7**	**115**	**155**
	0.2-1	<0.25	<0.4	10.2	<1	**6.9**	11.4	**49.6**
68	0-0.2	**1**	<0.4	**33.3**	<1	**17.2**	**63**	**135**
	0.2-1	<0.25	<0.4	12.5	<1	**7.05**	8.05	**51.5**
69	0-0.2	**0.32**	<0.4	**25.3**	<1	**12.7**	**20.1**	**68**
	0.2-1	<0.25	<0.4	16.5	<1	**7.2**	<2.5	45.2
70	0-0.2	<0.25	<0.4	**26.8**	<1	**12.6**	7.3	**63**
	0.2-1	<0.25	<0.4	**51**	<1	**11.9**	3.23	33.8
71	0-0.2	**0.3**	<0.4	14.8	<1	**18.7**	4.85	**132**
	0.2-1	<0.25	<0.4	12.3	<1	**8.1**	2.8	**46.6**
72	0-0.2	**4.86**	<0.4	**78.7**	<1	**26.2**	**132**	**292**
	0.2-1	<0.25	<0.4	11.8	<1	5.3	<2.5	39
73	0-0.2	<0.25	<0.4	**19.7**	<1	**13.2**	**39.4**	**95**
	0.2-1	<0.25	<0.4	15.2	<1	**7.55**	<2.5	**50.4**
74	0-0.2	<0.25	<0.4	8.75	<1	5.55	<2.5	30.3
	0.2-1	<0.25	<0.4	11.2	<1	**10.6**	<2.5	37.3
75	0-0.2	**2.9**	<0.4	**56.5**	<1	**22.5**	**22.8**	**140**
	0.2-1	**6.95**	<0.4	**96**	<1	**38.1**	**94**	**263**
76	0-0.2	<0.25	<0.4	14.1	<1	**9.15**	<2.5	**66**
	0.2-1	<0.25	<0.4	**17.1**	<1	4.8	<2.5	**47**
77	0-0.2	**2.72**	<0.4	**54.2**	<1	**34**	**54**	**236**
	0.2-1	**0.95**	<0.4	**19.2**	<1	**24.7**	3.86	**73**
78	0-0.2	**2.28**	<0.4	**35.8**	<1	**27**	10.8	**132**
	0.2-1	<0.25	<0.4	16	<1	6.4	<2.5	**55.6**
79	0-0.2	**3.03**	<0.4	**42.5**	<1	**17.2**	**28.2**	**94.5**
	0.2-1	**1.35**	<0.4	**32**	<1	**17**	**19**	**160**
80	0-0.2	**2.67**	<0.4	**59**	<1	**28.8**	**30.1**	**157**
	0.2-1	<0.25	<0.4	**27**	<1	**19.8**	8	**106**
81	0-0.2	<0.25	<0.4	13.1	<1	**15.6**	<2.5	44
	0.2-1	<0.25	<0.4	10.2	<1	**7.5**	<2.5	34.6
82	0-0.2	**19.9**	<0.4	**171**	<1	**69.4**	**134**	**424**
	0.2-1	**47.5**	<0.4	**1134**	<1	**496**	**670**	**962**
83	0-0.2	<0.25	<0.4	13	<1	**16.9**	<2.5	41.4
	0.2-1	<0.25	<0.4	15	<1	**14.2**	<2.5	43.8
84	0-0.2	<0.25	<0.4	10.2	<1	**13.2**	<2.5	35.3
	0.2-1	<0.25	<0.4	10.7	<1	**10.4**	<2.5	32.4
85	0-0.2	<0.25	<0.4	5.65	<1	**10.6**	<2.5	22.3
	0.2-1	<0.25	<0.4	8.3	<1	**6.95**	<2.5	24.7
86	0-0.2	<0.25	<0.4	12.1	<1	**18.5**	<2.5	45.7
	0.2-1	<0.25	<0.4	11.9	<1	**17**	<2.5	41.6
87	0-0.2	<0.25	<0.4	10.3	<1	**15.6**	<2.5	36.6
	0.2-1	<0.25	<0.4	14.1	<1	**14.2**	<2.4	44.4
88	0-0.2	<0.25	<0.4	9.15	<1	**12.5**	<2.5	31.2
	0.2-1	<0.25	<0.4	16.5	<1	**10.8**	<2.5	41.6
Eastern US Background		0.1 - 1	NA	1.5 - 40	NA	4.0-61	0.5 - 25	9.0-50
Ward Site Background		<0.25	<0.4	17	<1	6.6	16	46
NYSDEC SCO		1 or SB	NE	10 or SB	SS	SB	13 or SB	20 or SB

Note: All concentrations in ppm.
NYSDEC SCO - Soil Cleanup Objective

Bold Values Exceed NYSDEC SCO
Samples Collected 2000-2001

TABLE 12 - SUMMARY OF PRE AND POST 2004 SOIL IRM SAMPLING RESULTS FOR WARD PRODUCTS SITE, AMSTERDAM, NEW YORK.

Sample Location	PRE IRM			POST IRM				
	Sample Depth (ft)	Total Cadmium	Total Chromium	Sample Location	Sample Depth (ft)	Total Cadmium	TCLP Cadmium	Total Chromium
C2	1.0	**150**	NA	C2A	1.0-2.0	NA	<0.05	NA
S9	1.0	**54.5**	**472**	S9-C	1.17	<0.25	NA	NA
S10	1.0	**60.5**	**447**	S10	1.2	NS	NS	NS
S11	1.3	**50**	**565**	S11	1.2	NS	NS	NS
S12	2.5	**42.7**	**382**	S12	2.37	NS	NS	NS
S13	0.5	**7.8**	**135**	S13	0.9	NS	NS	NS
S13A	0.2	**46.2**	**111**	S13A-B	0.59	1.0	NA	NA
S14	0.5	**9.5**	**510**	S14-B	1.08	NA	NA	164
S14A	1.0	**87**	**206**	S14A-B	1.06	11.4	NA	NA
S15A	1.0	**66**	**885**	S15A	1.5	NS	NS	NS
S16A	1.0	**61**	**695**	S16A	0.9	NS	NS	NS
S17A	1.0	**44.4**	**479**	S17A	0.9	NS	NS	NS
S40	1.0	**47**	**229**	S40-B	1.28	15.3	NA	NA
S42	0.2	**263**	**730**	S42-C	1.86	<0.25	NA	NA
S46	1.0	**38**	**447**	S46-B	1.37	53.5	0.33	NA
S47	1.0	**44.7**	**282**	S47-B	1.78	4.71	NA	NA
S53	0.2	**52.2**	**730**	S53-B	0.46	28.7	NA	NA
S54	1.0	**2.4**	**463**	S54-B	0.95	NA	NA	94.2
S82	1.0	**47.5**	**1134**	S82-B	1.51	30.2	0.24	NA
Eastern US Background		0.1-1	1.5-40			0.1-1	NA	1.5-40
Ward Site Background		<0.25	17			<0.25	NA	17
NYSDEC SCO		1 or SB	10 or SB					
2004 IRM SCO						<30	<1	<450

Note:

Total concentrations in mg/kg, TCLP concentrations in mg/L
NA - Not available
NS - Not sampled, soil removed to top of bedrock
NYSDEC SCO - Soil cleanup objective
2004 IRM SCO - Soil cleanup objective established for 2004 Soil IRM
Bold values exceed NYSDEC SCO, shaded values exceed 2004 IRM SCO
Pre IRM samples collected 1999 to 2001, Post IRM samples collected January 2004

TABLE 13 - SUMMARY OF LABORATORY RESULTS FOR SEDIMENT SAMPLES COLLECTED FROM DRAINAGE DITCH ON THE WARD PRODUCTS SITE UPSTREAM OF EDSON STREET.

Sample Location	Total Cadmium	Leachable Cadmium	Total Chromium	Leachable Chromium	Total Hex. Chromium	Leachable Hex. Chromium	Total Cyanide	Leachable Cyanide	Total Lead	Leachable Lead	Total Nickel	Leachable Nickel	Total Zinc	Leachable Zinc
Upstream														
0-0.5 ft	**628**	**8.35**	**3130**	0.128	36.8J	<0.010	47.6J	<0.0050	**218J**	<0.10	**3170**	3.1	**1010**	1.15
0.5-1.0 ft	2.5	0.022	49.8	<0.030	<10	<0.010	0.42J	<0.0050	39J	<0.10	**57.3**	0.077	240	0.418
Midpoint														
0-1.0 ft	**18.3J**	NA	**146**	NA	<10	NA	<0.17	ND	**115J**	NA	**227J**	NA	**769**	NA
1-2 ft	**13.4J**	NA	**130**	NA	<10	NA	0.23	ND	**259J**	NA	**148J**	NA	**342**	NA
Outfall														
0-0.5 ft	**169**	**2.17**	**2490**	0.307	106J	<0.010	27J	<0.0050	**340J**	0.19	**7890**	3.1	**1370**	5.61
0.5-1.0 ft	**143**	**2.75**	**3550**	0.773	150J	0.017	51.7J	<0.0050	**614J**	0.32	**2250**	3.21	**2020**	16.4
Midpoint														
0-0.5 ft	**66.5**	**1.32**	**587**	0.053	35J	<0.010	3.35J	<0.0050	**219J**	0.2	**396**	0.794	241	0.728
0.5-1.0 ft	<2.6	0.017	38.1	<0.030	<0.010	0.01	2.35J	0.005	34J	0.1	43.4	0.05	193	0.025
Upstream Culvert														
0-0.5 ft	**165**	**1.57**	**1730**	0.042	32.5J	<0.010	19.7J	<0.0050	**185J**	<0.10	**1600**	0.889	**607**	1.21
Duplicate of 0-0.5 ft.	**160**	**1.57**	**1770**	0.041	39.9J	<0.010	18.1J	<0.0050	**157J**	<0.10	**1400**	0.956	**522**	1.03
0.5-1.0 ft	**37.2**	0.276	**395**	<0.030	25J	<0.010	4.63J	0.0189	37J	<0.10	**413**	0.264	123	0.147
Sediment Criteria - LEL	0.6	NE	26	NE	NE	NE	NE	NE	31	NE	16	NE	120	NE
Sediment Criteria - SEL	9	NE	110	NE	NE	NE	NE	NE	110	NE	50	NE	270	NE
Soil Cleanup Objective	1 or SB	NE	10 or SB	NE	10 or SB	NE	SS	NE	SB	NE	13 or SB	NE	20 or SB	NE
RCRA TC Limit	NE	1	NE	5	NE	5	NE	NE	NE	5	NE	NE	NE	NE

NOTE:

J - Estimated value

NA - Not Available, ND - Not Detected, NE-None Established

Total concentrations in mg/kg, Leachable concentrations in mg/L

NYSDEC Sediment Criteria for Metals: LEL - Lowest Effect Level, SEL - Severe Effect Level

Soil Cleanup Objective - NYSDEC TAGM 1994, SB- site background, SS- site specific

TC Limit - Toxic Characteristic (RCRA) Standard (mg/L)

BOLD VALUES EXCEED SEL AND/OR TC LIMIT

TABLE 14 - SUMMARY OF LABORATORY RESULTS FOR SEDIMENT SAMPLES COLLECTED FROM THE UPPER REACHES OF THE EAST BRANCH AND WEST BRANCH DRAINAGES FROM EDSON STREET TO SAM STRATTON ROAD.

Sample Location	Total Cadmium	Leachable Cadmium	Total Chromium	Leachable Chromium	Total Hex. Chromium	Leachable Hex. Chromium	Total Cyanide	Leachable Cyanide	Total Lead	Leachable Lead	Total Nickel	Leachable Nickel	Total Zinc	Leachable Zinc
Downstream Culvert														
0-0.5 ft	**171**	**1.6**	**1460**	0.046	21.3J	<0.010	9.35J	<0.0050	**227J**	<0.10	**1860**	1.36	**1080**	2.28
0.5-1.0 ft	**149**	**1.77**	**1360**	0.056	9.3	0.016	10.3	<0.0050	**133J**	<0.10	**1580**	1.61	**808**	1.81
Downstream 50 ft														
0-0.5 ft	**111**	**1.33**	**943**	0.031	29.5	<0.010	7.74	<0.0050	**151J**	<0.10	**996**	0.84	**553**	1.17
0.5-1.0 ft	**61.6**	**1.15**	**313**	<0.030	15	<0.010	6.94	<0.0050	25J	<0.10	**349**	0.469	183	0.598
Downstream 100 ft														
0-0.5 ft	**41.2J**	NA	**263**	NA	9.9J	NA	1.67	NA	29J	NA	**204J**	NA	146	NA
0.5-1.0 ft	3J	NA	66.4	NA	4.3J	NA	0.96	NA	ND	NA	**58.4J**	NA	58	NA
Downstream 200 ft														
0-0.5 ft	**45.4J**	NA	**399**	NA	ND	NA	2.83	NA	50J	NA	**212J**	NA	180	NA
0.5-1.0 ft	**39.2J**	NA	**403**	NA	10.2J	NA	6.52	NA	18J	NA	**328J**	NA	95	NA
Downstream 400 ft														
0-0.2 ft	**12.4**	NA	**252**	NA	<0.40	NA	<1.0	NA	6.4	NA	**97**	NA	93	NA
0.2-0.5 ft	5.65	NA	**150**	NA	<0.40	NA	<1.0	NA	9.9	NA	**69.5**	NA	93.5	NA
0.5-1.0 ft	5	NA	102	NA	<0.40	NA	<1.0	NA	8.4	NA	48	NA	60.5	NA
Sam Stratton EB Culvert														
0-0.2 ft	**20.5**	NA	**169**	NA	<0.40	NA	<1.0	NA	16.4	NA	**103**	NA	95	NA
0.2-0.5 ft	**44.7**	NA	**287**	NA	<0.40	NA	<1.0	NA	17.1	NA	**266**	NA	123	NA
0.5-1.0 ft	**71**	NA	**660**	NA	<0.40	NA	6.5	NA	26.5	NA	**605**	NA	209	NA
Sam Stratton WB Culvert														
0-0.2 ft	**67**	NA	87.5	NA	<0.40	NA	<1.0	NA	16.3	NA	**86.5**	NA	103	NA
0.2-0.5 ft	**31.8**	NA	**700**	NA	1.7	NA	<1.0	NA	24.1	NA	**210**	NA	130	NA
0.5-1.0 ft	**26.5**	NA	**214**	NA	0.74	NA	<1.0	NA	18.8	NA	**102**	NA	85	NA
Sediment Criteria - LEL	0.6	NE	26	NE	NE	NE	NE	NE	31	NE	16	NE	120	NE
Sediment Criteria - SEL	9	NE	110	NE	NE	NE	NE	NE	110	NE	50	NE	270	NE
Soil Cleanup Objective	1 or SB	NE	10 or SB	NE	10 or SB	NE	SS	NE	SB	NE	13 or SB	NE	20 or SB	NE
RCRA TC Limit	NE	1	NE	5	NE	5	NE	NE	NE	5	NE	NE	NE	NE

NOTE:

NA - Not Available, ND - Not Detected, NE-None Established
Total concentrations in mg/kg, Leachable concentrations in mg/L
NYSDEC Sediment Criteria for Metals: LEL - Lowest Effect Level, SEL - Severe Effect Level

Soil Cleanup Objective - NYSDEC TAGM 1994, SB- site background, SS- site specific
TC Limit - Toxic Characteristic (RCRA) Standard (mg/L)
BOLD VALUES EXCEED SEL AND/OR TC LIMIT

TABLE 15 - SUMMARY OF SEDIMENT CHEMISTRY RESULTS FOR EAST BRANCH DRAINAGE DOWNSTREAM OF SAM STRATTON DRIVE, AMSTERDAM, NEW YORK.

Sampling Location and Depth		EAST BRANCH				
		Cadmium	Chromium	Lead	Nickel	Zinc
EB1	0-0.5 ft.	1.4	30		26	
	0.5-1.0 ft.	1.2	29		27	
EB2	0-0.5 ft.	6.1	80		**65**	
	0.5-1.0 ft.	NA	NA		NA	
EB3	0-0.5 ft.	**9.7**	**119**		**64**	
	0.5-1.0 ft.	8.8	82		**61**	
EB4	0-0.5 ft.	8.9	69		**66**	
	0.5-1.0 ft.	**19**	**198**		**259**	
EB5	0-0.5 ft.	**14**	**140**		**102**	
	0.5-1.0 ft.	**19**	**156**		**126**	
EB6	0-0.5 ft.	**15**	**124**		**160**	
	0.5-1.0 ft.	**18**	**111**		**201**	
EB7	0-0.5 ft.	**42**	**443**		**459**	
	0.5-1.0 ft.	**31**	**238**		**58**	
EB8	0-0.5 ft.	**15**	**120**		**129**	
	0.5-1.0 ft.	**36**	**385**		**348**	
EB9	0-0.5 ft.	**27**	**473**		**261**	
	0.5-1.0 ft.	**37**	**405**		**305**	
EB10	0-0.5 ft.	6.40	34		50	
	0.5-1.0 ft.	3.58	48		45	
EB11	0-0.5 ft.	12.0	**196**	48.2	**167**	91.5
	0.5-1.0 ft.	**16.4**	**206**	33.0	**164**	131
EB12	0-0.5 ft.	**9.05**	**112**	21.7	**73.5**	88.0
	0.5-1.0 ft.	8.45	93.0	21.4	**68.5**	86.5
		MOHAWK RIVER				
EB13	0-0.5 ft.	5.55	96.0	19.6	**68.5**	85.5
	0.5-1.0 ft.	5.90	70.0	15.5	**103**	108
EB14	0-0.5 ft.	8.58	**227**	20.8	**156**	118
	0.5-1.0 ft.	**27.1**	**519**	82	**247**	158
EB15	0-0.5 ft.	0.70	23.6	22.8	23.0	76.0
	0.5-1.0 ft.	<0.25	8.30	7.80	8.90	37.0
EB16	0-0.5 ft.	1.55	25.7	16.9	22.9	58.0
	Duplicate	1.70	40.3	16.6	45.0	79.0
	0.5-1.0 ft.	0.42	20.2	8.10	17.1	62.5
EB17	0-0.5 ft.	**64.6**	64.5	28.0	37.0	110
	0.5-1.0 ft.	3.50	**210**	24.4	**74.5**	92.5
EB18	0-0.5 ft.	2.05	69.6	33.0	14.0	50.8
EB19	0-0.5 ft.	6.55	**211**	15.8	**80.2**	90.2
EB20	0-0.5 ft.	0.25	14.4	<0.25	3.70	26.4
EB21	0-0.5 ft.	<0.25	7.10	<0.25	<2.50	30.2
EB22	0-0.5 ft.	2.55	45.4	5.85	14.30	61.7
	0.5-1.0 ft.	1.85	46.8	7.10	9.50	58.2
NYSDEC Criteria						
Lowest Effect Level		0.6	26	31	16	120
Severe Effect Level		9	110	110	50	270
Stream Background		<0.25	4.4 to 9.0		<2.5	

Note:
All concentrations in ppm
Stream background based on two samples collected from west drainage, lower value for chromium from upstream sample.
Blank cell indicates no sample collected or analyzed
Lowest and severe effect levels from Table 2. Sediment Criteria for Metals, NYSDEC 1999.
Bold values exceed severe effect level
EB1 to EB7 collected 2001, EB8 to EB10 collected January 2002, EB11 to EB17 samples collected December 2002.

TABLE 16 - SUMMARY OF SEDIMENT CHEMISTRY RESULTS FOR WEST BRANCH DRAINAGE DOWNSTREAM OF SAM STRATTON DRIVE, AMSTERDAM, NEW YORK.

Sampling Location and Depth		WEST BRANCH				
		Cadmium	Chromium	Lead	Nickel	Zinc
WB1	0-0.5 ft.	**29**	**398**		**102**	
	0.5-1.0 ft.	**15**	**316**		**52**	
WB2	0-0.5 ft.	**12**	**151**		50	
	0.5-1.0 ft.	6	95		40	
WB3	0-0.5 ft.	**13**	**119**		**69**	
	0.5-1.0 ft.	**16**	**184**		**106**	
WB4	0-0.5 ft.	**13**	**142**		**124**	
	0.5-1.0 ft.	**15**	**134**		**165**	
WB5	0-0.5 ft.	**13**	**116**		**115**	
	0.5-1.0 ft.	**9**	70		**91**	
WB6	0-0.5 ft.	4.3	54		30	
	0.5-1.0 ft.	4.2	46		37	
WB7	0-0.5 ft.	<0.25	3.58		4.70	
WB8	0-0.5 ft.	<0.25	8.90		13	
WB9	0-0.5 ft.	<0.25	3.57		3.5	
WB10	0-0.5 ft.	0.3	10.2	15.7	10	70.5
	0.5-1.0 ft.	0.75	8.75	17.9	12.7	60.7
		MOHAWK RIVER				
WB11	0-0.5 ft.	0.38	7.50	10.6	8.30	51.6
	0.5-1.0 ft.	0.38	9.10	13.7	11.1	70.5
WB12	0-0.5 ft.	0.36	8.70	10.8	8.75	54.0
	0.5-1.0 ft.	0.34	11.0	14.7	8.60	55.8
WB13	0-0.5 ft.	1.20	9.20	12.0	11.9	57.0
	0.5-1.0 ft.	1.0	5.70	9.10	6.65	39.7
WB14	0-0.5 ft.	0.31	7.45	17.9	9.50	58.2
	0.5-1.0 ft.	0.30	12.1	16.2	13.4	57.8
WB15	0-0.5 ft.	1.10	47.0	18.3	16.6	65.5
	0.5-1.0 ft.	0.25	9.42	10.9	14.0	54.6
WB16	0-0.5 ft.	<0.25	16.7	10.7	6.45	39.5
	0.5-1.0 ft.	0.61	**162**	**955**	15.0	117
NYSDEC Guidelines						
Lowest Effect Level		0.6	26	31	16	120
Severe Effect Level		9	110	110	50	270
Stream Background		<0.25	4.4 to 9.0		<2.5	

Note:
All concentrations in ppm
Stream background based on two samples collected from west drainage, lower value for chromium from upstream sample.
Blank cell indicates no sample collected or analyzed
Lowest and severe effect levels from Table 2. Sediment Criteria for Metals, NYSDEC 1999
Bold values exceed severe effect level
WB1 to WB6 samples collected 2001, WB7 to WB9 collected January 2002, WB10 to WB16 collected December 2002.

TABLE 17 - SUMMARY OF SEDIMENT CHEMISTRY RESULTS FOR WEST BRANCH DRAINAGE AND MOHAWK RIVER IN AREA AROUND SAMPLE LOCATION WB-16.

Sampling Location and Depth		WEST BRANCH/MOHAWK RIVER				
		Cadmium	Chromium	Lead	Nickel	Zinc
WB16A	0-0.5 ft.	<0.25	63.8	13.0	<2.50	53.2
	0.5-1.0 ft.	<0.25	83.6	12.0	<2.50	58.8
WB16B	0-0.5 ft.	<0.25	32.8	6.35	<2.50	29.0
	0.5-1.0 ft.	<0.25	25.9	15	<2.50	58.1
WB16C	0-0.5 ft.	<0.25	52.6	9.65	<2.50	45.8
	0.5-1.0 ft.	<0.25	18.0	11.1	<2.50	59.4
WB16	0-0.5 ft.	<0.25	16.7	10.7	6.45	39.5
	0.5-1.0 ft.	0.61	**162**	**955**	15.0	117
NYSDEC Guidelines						
Lowest Effect Level		0.6	26	31	16	120
Severe Effect Level		9	110	110	50	270
Stream Background		<0.25	4.4 to 9.0	NA	<2.5	NA

Note:
All concentrations in ppm
NA - Not available
Stream background based on two samples collected from west drainage, lower value for chromium from upstream sample.
Lowest and severe effect levels from Table 2. Sediment Criteria for Metals, NYSDEC 1999
Bold values exceed severe effect level
Samples at WB16 collected December 2002, samples WB16A-C collected April 2003.

TABLE 18 - SUMMARY OF SEDIMENT CHEMISTRY RESULTS FOR SAMPLES COLLECTED FROM DETENTION BASIN ON EAST DRAINAGE SOUTH OF SAM STRATTON DRIVE, AMSTERDAM, NEW YORK.

Sampling Location	Sampling Depth (ft.)	Cadmium	Chromium	Lead	Nickel	Zinc
DB1	0-0.5	4.9	74.6	13.6	41.6	68.4
DB2	0-0.5	**12.2**	**175**	9.15	**78.4**	69
DB3	0-0.5	5.1	75.4	12.2	44	66
NYSDEC Criteria						
Lowest Effect Level		0.6	26	31	16	120
Severe Effect Level		9	110	110	50	270
Stream Background		<0.25	4.4	NA	<2.5	NA

Note:
All concentrations in ppm
Stream background based on two samples collected from West Drainage
Lowest and severe effect levels from Table 2. Sediment Criteria for Metals, NYSDEC 1999.
Bold values exceed severe effect level
Samples collected April 30, 2003
NA- Not available

TABLE 19 - RESULTS OF SOIL SAMPLES COLLECTED SEPTEMBER 12, 2003 FROM THE DETENTION BASIN LOCATED ON THE EAST BRANCH DRAINAGE SOUTH OF SAM STRATTON ROAD, AMSTERDAM, NEW YORK.

Sampling Location	Sampling Depth (Ft.)	Cadmium	Chromium	Lead	Nickel	Zinc
DB4	0-0.5	**1.31**	32.8	5.90	3.06	50.1
DB5	0-0.5	0.68	32.8	11.2	<2.50	56.8
DB6	0-0.5	<0.25	30.4	<0.25	<2.50	54.0
DB7	0-0.5	<0.25	16.9	<0.25	<2.50	53.6
DB8	0-0.5	**31.2**	**560**	4.04	**146**	76.5
DB9	0-0.5	0.77	27.0	<0.25	<2.50	51.8
DB10	0-0.5	<0.25	15.7	<0.25	<2.50	54.2
DB11	0-0.5	<0.25	18.0	<0.25	<2.50	62.0
DB12	0-0.5	<0.25	18.6	<0.25	<2.50	58.3
DB13	0-0.5	<0.25	14.8	<0.25	<2.50	57.0
Dup. of DB13	0-0.5	<0.25	15.1	<0.25	<2.50	54.6
DB14	0-0.5	0.77	**42.2**	<0.25	18.1	59.1
DB15	0-0.5	<0.25	17.7	<0.25	<2.50	48.4
DB16	0-0.5	**1.40**	**56.4**	<0.25	4.57	55.6
DB17	0-0.5	<0.25	21.8	<0.25	<2.50	56.7
DB18	0-0.5	<0.25	22.4	<0.25	<2.50	57.8
DB19	0-0.5	<0.25	17.2	<0.25	<2.50	57.2
Eastern US Background		0.1 - 1	1.5 - 40	4 - 61*	0.5 - 25	9 - 50
Ward Site Background		<0.25	13.8 - 18.7	9.3 - 25	13.2 - 20.3	55 - 80
NYSDEC Cleanup Objective		1 or SB	10 or SB	SB	13 or SB	20 or SB

Note: All concentrations are in ppm.
Values in **BOLD** are greater than background values for Eastern U.S., the site and the NYSDEC Soil Cleanup Objectives
NYSDEC Soil Cleanup Objectives from TAGM HWR-94-4046 (1994)

TABLE 20 - SUMMARY OF LABORATORY RESULTS FOR SEDIMENT SAMPLES COLLECTED FROM DRAINAGE DITCH ON THE WARD PRODUCTS SITE UPSTREAM OF EDSON STREET BEFORE AND AFTER THE 2004 SEDIMENT IRM.

Sample Location	Sample Depth (ft)	Total Cadmium	Leachable Cadmium	Total Chromium	Total Cyanide	Total Lead	Total Nickel	Total Zinc
Upstream (D2)								
Pre IRM	0.5	**628**	**8.35**	**3130**	47.6	**218**	**3170**	**1010**
Post IRM	0.7	0.34	<0.05	24.5	<0.5	NA	<2.5	67.7
Outfall (D4)								
Pre IRM	1.0	**143**	**2.75**	**3550**	51.7	**614**	**2250**	**2020**
Post IRM	1.6	2.04	<0.05	58.5	<0.5	NA	41.8	55.9
Midpoint (D7-B)								
Pre IRM	0.5	**66.5**	**1.32**	**587**	3.35	**219**	**396**	241
Post IRM	2.2	4.87	0.22	42.6	<0.5	NA	**68.4**	35.9
Upstream Culvert (D10-B)								
Pre IRM	0.5	**165**	**1.57**	**1730**	19.7	**185**	**1600**	**607**
Post IRM	1.1	**12.2**	0.24	**148**	<0.5	NA	**193**	76.6
Sediment Criteria - LEL		0.6	NE	26	NE	31	16	120
Sediment Criteria - SEL		9	NE	110	NE	110	50	270
Soil Cleanup Objective for IRM		1 or SB	NE	10 or SB	SS	SB	13 or SB	20 or SB
RCRA TC Limit		NE	1	NE	NE	NE	NE	NE

NOTE:

NA - Not Available, NE-None Established
Total concentrations in mg/kg, Leachable concentrations in mg/L
( ) - Sample collected during 2004 IRM
NYSDEC Sediment Criteria for Metals: LEL - Lowest Effect Level, SEL - Severe Effect Level
Soil Cleanup Objective - NYSDEC TAGM 1994, SB- site background, SS - site specific
TC Limit - Toxic Characteristic (RCRA) Standard (mg/L)
BOLD VALUES EXCEED SEL AND/OR TC LIMIT

TABLE 21 - SUMMARY OF LABORATORY RESULTS FOR SEDIMENT SAMPLES COLLECTED FROM THE UPPER REACHES OF THE EAST AND WEST BRANCH DRAINAGES FROM EDSON STREET TO SAM STRATTON ROAD BEFORE AND AFTER THE 2004 SEDIMENT IRM.

Sample Location	Sample Depth (ft)	Total Cadmium	Leachable Cadmium	Total Chromium	Total Cyanide	Total Lead	Total Nickel	Total Zinc
Downstream Culvert (D11)								
Pre IRM	1.0	**149**	**1.77**	**1360**	10.3	**133**	**1580**	**808**
Post IRM	1.6	**14.8**	0.38	97.9	<0.5	NA	22.2	53.9
Downstream 50 ft (D13)								
Pre IRM	1.0	**61.6**	**1.15**	**313**	6.94	25	**349**	183
Post IRM	1.2	<0.25	<0.05	17	<0.5	NA	<2.5	46.3
Sam Stratton EB Culvert (EC1-B, EC2-B)								
Pre IRM	1.0	**71**	NA	**660**	6.5	26.5	**605**	209
Post IRM	3.5	**10.2**	0.05	84.8	<0.5	NA	48.9	37.4
Post IRM	3.5	4.69	0.08	45.9	<0.5	NA	21.6	32.2
Sam Stratton WB Culvert (WC-1)								
Pre IRM	0.5	**31.8**	NA	**700**	<1.0	24.1	**210**	130
Post IRM	0.5	4.16	0.08	**191**	<0.5	NA	12.9	58.4
Sediment Criteria - LEL		0.6	NE	26	NE	31	16	120
Sediment Criteria - SEL		9	NE	110	NE	110	50	270
Soil Cleanup Objective for IRM		1 or SB	NE	10 or SB	SS	SB	13 or SB	20 or SB
RCRA TC Limit		NE	1	NE	NE	NE	NE	NE

NOTE:

NA - Not Available, NE-None Established
Total concentrations in mg/kg, Leachable concentrations in mg/L
( ) - Sample collected during 2004 IRM
NYSDEC Sediment Criteria for Metals: LEL - Lowest Effect Level, SEL - Severe Effect Level
Soil Cleanup Objective - NYSDEC TAGM 1994, SB- site background, SS - site specific
TC Limit - Toxic Characteristic (RCRA) Standard (mg/L)
BOLD VALUES EXCEED SEL AND/OR TC LIMIT

TABLE 22 - SUMMARY OF INORGANICS AND VOLATILE ORGANIC COMPOUNDS IN SURFACE WATER SAMPLES COLLECTED AT WARD PRODUCTS CORPORATION, 61 EDSON STREET, AMSTERDAM, NEW YORK.

	SW-1																		NYSDEC
INORGANICS (mg/l)	8/22/96	5/22/97	9/04/97	11/03/97	5/7/98	8/26/98	11/17/98	5/24/99	8/23/99	11/16/99	5/23/00	8/23/00	5/22/01	8/29/01	3/28/02	6/17/02	9/16/02	9/10/03	STANDARD
Cadmium	DRY	<0.010	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	*0.001
Hexavalent Chromium	DRY	<0.010	DRY	DRY	<0.02	DRY	DRY	<0.02	DRY	DRY	<0.02	DRY	DRY	DRY	NS	<0.02	DRY	DRY	*0.011
Total Chromium	DRY	NA	DRY	DRY	<0.005	DRY	DRY	<0.005	DRY	DRY	0.009	DRY	DRY	DRY	NS	<0.005	DRY	DRY	*0.207
Cyanide	DRY	<0.0050	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	0.005
Hardness, total as CaCO3	DRY	NA	DRY	DRY	NA	DRY	DRY	95	DRY	DRY	93	DRY	DRY	DRY	NS	68.3	DRY	DRY	None Set
Iron	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	None Set
Lead	DRY	<0.10	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	*0.001
Manganese	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	None Set
Nickel	DRY	<0.050	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	*0.096
Nitrite Nitrogen	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	0.1
Nitrate Nitrogen	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	10
Ammonia Nitrogen	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	**
Sulfate	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	250
Zinc	DRY	<0.025	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	*0.083
Total Suspended Solids	DRY	NA	DRY	DRY	5.0	DRY	DRY	41.0	DRY	DRY	NA	DRY	DRY	DRY	NS	NA	DRY	DRY	None Set
Turbidity (in NTU)	DRY	NA	DRY	DRY	**11**	DRY	DRY	**60**	DRY	DRY	**17**	DRY	DRY	DRY	NS	**85**	DRY	DRY	5
VOCs (ug/l)																			
Trichloroethene	DRY	<5	DRY	DRY	<5	DRY	DRY	<5	DRY	DRY	<5	DRY	DRY	DRY	NS	<5	DRY	DRY	None Set

	SW-2																		NYSDEC
INORGANICS (mg/l)	8/22/96	5/22/97	9/04/97	11/3/97	5/7/98	8/26/98	11/17/98	5/24/99	8/23/99	11/16/99	5/23/00	8/23/00	5/22/01	8/29/01	3/28/02	6/17/02	9/16/02	9/10/03	STANDARD
Cadmium	DRY	<0.010	DRY	**0.028**	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	<0.005	NA	NA	DRY	*0.001
Hexavalent Chromium	DRY	<0.010	DRY	**0.0457J**	**0.02**	DRY	<0.02	<0.02	DRY	DRY	**0.02**	**0.08**	<0.02	DRY	<0.02	<0.02	<0.02	DRY	*0.011
Total Chromium	DRY	NA	DRY	0.047	0.037	DRY	0.007	<0.005	DRY	DRY	0.014	0.066	0.006	DRY	<0.005	0.006	0.015	DRY	*0.207
Cyanide	DRY	<0.0050	DRY	<0.004	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	<0.01	NA	NA	DRY	0.005
Hardness, total as CaCO3	DRY	NA	DRY	NA	NA	DRY	NA	74	DRY	DRY	105	NA	12.1	DRY	40	87.8	NA	DRY	None Set
Iron	DRY	NA	DRY	<0.015	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	NA	NA	NA	DRY	None Set
Lead	DRY	<0.10	DRY	<0.021	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	<0.005	NA	NA	DRY	*0.001
Manganese	DRY	NA	DRY	<0.0031	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	NA	NA	NA	DRY	None Set
Nickel	DRY	<0.050	DRY	0.044	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	<0.05	NA	NA	DRY	*0.096
Nitrite Nitrogen	DRY	NA	DRY	<0.015	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	NA	NA	NA	DRY	0.1
Nitrate Nitrogen	DRY	NA	DRY	<0.030	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	NA	NA	NA	DRY	10
Ammonia Nitrogen	DRY	NA	DRY	<0.030	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	NA	NA	NA	DRY	**
Sulfate	DRY	NA	DRY	16.1	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	NA	NA	NA	DRY	250
Zinc	DRY	<0.025	DRY	0.033J	NA	DRY	NA	NA	DRY	DRY	NA	NA	NA	DRY	0.02	NA	NA	DRY	*0.083
Total Suspended Solids	DRY	NA	DRY	<3.4	3.0	DRY	<1	7.0	DRY	DRY	NA	NA	NA	DRY	NA	NA	NA	DRY	None Set
Turbidity (in NTU)	DRY	NA	DRY	1.91	6.8	DRY	2.9	**15**	DRY	DRY	**11**	5	4.7	DRY	16	**48**	1.7	DRY	5
VOCs (ug/l)																			
Trichloroethene	DRY	<5	DRY	1J	<5	DRY	<5	<5	DRY	DRY	<5	<5	<5	DRY	NA	<5	<5	DRY	None Set

NOTE:

J - Estimated value
SW-1 - LOCATED UPSTREAM OF OUTFALL
SW-2 - LOCATED DOWNSTREAM OF OUTFALL
DRY - DRAINAGE DITCH NOT FLOWING
NA - NOT ANALYZED
NS - NOT SAMPLED

NYSDEC STANDARD FOR CLASS C STREAMS
* - DEPENDENT UPON HARDNESS (calculated for hardness of 100 mg/L)
** - VARIES WITH PH AND TEMPERATURE
BOLD VALUES EXCEED SURFACE WATER STANDARDS
(PART 703 AMENDED AUGUST 1999)

TABLE 23 - FIELD MEASUREMENTS OF WATER TEMPERATURE, SPECIFIC CONDUCTIVITY, pH, Eh and DISSOLVED OXYGEN IN SURFACE WATER SAMPLES COLLECTED AT WARD PRODUCTS, AMSTERDAM, NY.

Sample ID	SAMPLING DATE	WATER TEMPERATURE (^{o}C)	SPECIFIC CONDUCTANCE (uMHOS/CM)	pH (S.U.)	Eh (V)	DISSOLVED OXYGEN (mg/L)
SW-1	8/22/1996					
	5/22/1997	12.9	561*	7.45	0.091	6.6
	9/4/1997					
	11/3/1997					
	5/7/1998	20.9	262	6.96	0.218	4.4
	8/26/1998					
	11/17/1998					
	5/24/1999	15.8	160	7.63	0.235	6
	8/23/1999					
	11/16/1999					
	5/23/2000	15.3	184	7.63	0.175	NA
	8/23/2000					
	5/22/2001					
	8/29/2001					
	3/28/2002	NS	NS	NS	NS	NS
	6/17/2002	17.8	140	7.83	0.11	4.3
	9/16/2002					
	9/10/2003					
SW-2	8/22/1996					
	5/22/1997	11.1	201*	8.09	0.3	12.3
	9/4/1997					
	11/3/1997	13.7	207	7.08	0.171	6.8
	5/7/1998	18.9	277	7.66	0.214	7.5
	8/26/1998					
	11/17/1998	6.3	94	7.04	NA	9.7
	5/24/1999	16.4	134	7.81	0.235	8.1
	8/23/1999					
	11/16/1999					
	5/23/2000	14.8	205	7.96	0.165	NA
	8/23/2000	19	120	7.63	0.155	6.9
	5/22/2001	15.8	30	8.22	0.15	8.1
	8/29/2001					
	3/28/2002	NR	NR	NR	NR	NR
	6/17/2002	17.8	180	7.96	0.12	5.3
	9/16/2002	20.2	240	7.79	0.135	3.5
	9/10/2003					
NYSDEC Standard**		None Set	None Set	6-9.5	None Set	<3.0 mg/L

Note: SW - 1 is located upstream of the outfall pipe
SW - 2 is located downstream of the outfall pipe on upstream side of culvert on Edson St.
* - Analysis performed by analytical testing laboratory
**- NYSDEC Surface Water Standard
Blank - Dry, not flowing
NR - Not recorded
NS- Not sampled

TABLE 24 - SUMMARY OF LABORATORY RESULTS FOR SURFACE WATER QUALITY SAMPLES COLLECTED IN MARCH 2002 FROM THE DRAINAGE DITCH AND THE EAST BRANCH DRAINAGE DOWNSTREAM OF WARD PRODUCTS, AMSTERDAM, NEW YORK.

WATER QUALITY PARAMETER	EAST BRANCH SAMPLING LOCATION							NYSDEC WATER QUALITY STANDARD*
	SW-2	DUP	EB-SS	EB-RR	EB-R5	BK-R5	EB-QR	
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.017**	0.007**
Hexavalent Chromium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.016
Chromium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.029	1.83**
Cyanide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.022
Lead	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.090	0.17**
Nickel	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	1.37**
Zinc	0.02	0.02	0.01	0.01	0.02	0.01	0.11	0.11**
Hardness (as $CaCO_3$)	40	41	107	123	121	127	241	NE
Turbidity (ntu)	16	16	20	27	23	24	300	NE

Note:

All concentrations in mg/L otherwise noted.
DUP - Duplicate sample collected at SW-2, upstream of Edson Street culvert.
*Based on NYSDEC Class D Fresh Surface Water Quality Standard
**Value calculated using hardness of 241 mg/L
BOLD value exceeds standard

TABLE 25 - SUMMARY OF LABORATORY RESULTS FOR SURFACE WATER QUALITY SAMPLES COLLECTED IN MARCH 2002 FROM THE DRAINAGE DITCH AND THE WEST BRANCH DRAINAGE DOWNSTREAM OF WARD PRODUCTS, AMSTERDAM, NEW YORK.

WATER QUALITY PARAMETER	WEST BRANCH SAMPLING LOCATION							NYSDEC WATER QUALITY STANDARD*
	SW-2	DUP	WB-SS	WB-RR	WB-R5	BK-R5	WB-OUT	
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007**
Hexavalent Chromium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.016
Chromium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	1.9**
Cyanide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.022
Lead	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.18**
Nickel	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.42**
Zinc	0.02	0.02	0.04	<0.01	<0.01	0.01	0.03	0.5**
Hardness (as $CaCO_3$)	40	41	253	231	232	127	137	NE
Turbidity (ntu)	16	16	1.5	2.1	2.2	24	65	NE

Note:

All concentrations in mg/L otherwise noted.
DUP - Duplicate sample collected at SW-2, upstream of Edson Street culvert.
*Based on NYSDEC Class D Fresh Surface Water Quality Standard
**Value calculated using hardness of 253 mg/L
BOLD value exceeds standard

TABLE 26 - FIELD MEASUREMENTS OF WATER TEMPERATURE, SPECIFIC CONDUCTIVITY, pH, Eh, AND DISSOLVED OXYGEN IN WATER SAMPLES COLLECTED AT WARD PRODUCTS, AMSTERDAM, NY.

WELL ID	DATE	WATER TEMPERATURE (C°)	SPECIFIC CONDUCTANCE (uMHOS/CM)	pH (S.U.)	Eh (V)	DISSOLVED OXYGEN (mg/L)
MW-1	08/22/96	18.8	661	7.46	NA	NA
	05/22/97	12.1	660	7.47	0.276	6.7
	09/05/97	19.4	805	7.46	0.261	6.1
	11/03/97	16.0	948	7.34	0.176	4.8
	05/08/98	14.1	935	7.41	0.320	7.9
	08/25/98	NA	NA	NA	NA	NA
	11/17/98	11.1	789	7.14	NA	4.5
	05/24/99	15.3	630	7.20	0.220	7.2
	08/24/99	22.0	694	7.48	0.210	3.2
	11/15/99	10.4	630	7.47	0.240	7.2
	05/23/00	14.0	658	7.40	0.170	NA
	08/23/00	17.9	670	7.40	0.155	5.6
	05/22/01	13.0	610	7.52	0.130	5.2
	08/29/01	20.6	590	7.46	0.145	4.3
	06/17/02	16.2	570	7.78	0.160	4.1
	09/16/02	Dry	Dry	Dry	Dry	Dry
	09/10/03	19.4	500	7.3	0.161	4.6
MW-1R	09/05/97	15.6	691	7.67	0.247	9.9
	11/03/97	16.9	731	7.40	0.159	7.7
	05/08/98	12.8	825	8.14	0.306	7.7
	08/26/98	20.8	909	7.84	0.251	12.5
	11/17/98	11.1	673	9.21	NA	8.5
	05/24/99	13.4	592	7.58	0.205	6.6
	08/24/99	19.4	619	7.57	0.220	7.1
	11/15/99	10.4	591	7.54	0.230	7.1
	05/23/00	12.8	610	7.51	0.185	NA
	08/23/00	16.4	630	7.47	0.155	5.6
	05/22/01	12.0	580	7.53	0.155	7.7
	08/29/01	18.2	560	7.69	0.155	6.9
	06/17/02	15.2	470	7.68	0.145	5.5
	09/16/02	17.1	470	7.72	0.045	6.0
	09/10/03	17.5	480	7.5	0.153	7.9
MW-2	08/22/96	14.4	665	7.41	NA	NA
	05/22/97	10.5	702	7.41	0.280	7.8
	09/05/97	15.9	637	7.43	0.265	5.0
	11/03/97	17.8	639	7.46	0.164	7.3
	05/08/98	12.5	843	8.26	0.441	7.5
	08/28/98	18.8	870	7.19	0.313	10.2
	11/17/98	11.7	620	8.01	NA	5.5
	05/24/99	12.8	621	7.53	0.235	7.1
	08/24/99	17.2	635	7.49	0.200	5.0
	11/15/99	11.4	631	7.45	0.245	6.2
	05/23/00	12.9	440	7.61	0.190	NA
	08/23/00	15.3	520	7.60	0.145	4.5
	05/22/01	11.2	630	7.58	0.125	5.7
	08/29/01	17.7	570	7.52	0.155	4.4
	06/18/02	15.7	440	7.56	0.150	4.6
	09/16/02	19.7	650	7.49	NA	5.4
	09/10/03	17.6	410	7.4	0.156	3.3

Note:

NA- Not available

TABLE 26 - FIELD MEASUREMENTS OF WATER TEMPERATURE, SPECIFIC CONDUCTIVITY, pH, Eh, AND DISSOLVED OXYGEN IN WATER SAMPLES COLLECTED AT WARD PRODUCTS, AMSTERDAM, NY (cont.).

WELL ID	DATE	WATER TEMPERATURE (C°)	SPECIFIC CONDUCTANCE (uMHOS/CM)	pH (S.U.)	Eh (V)	DISSOLVED OXYGEN (mg/L)
MW-3	08/22/96	15.8	665	7.60	NA	NA
	05/22/97	10.9	633	7.55	0.321	11.4
	09/05/97	NA	NA	NA	NA	NA
	11/03/97	14.5	322	7.55	0.159	8.7
	05/08/98	11.4	783	8.05	0.357	9.7
	08/26/98	15.1	846	7.43	0.323	11.7
	11/17/98	NA	NA	NA	NA	NA
	05/24/99	12.1	607	7.51	0.240	10.2
	08/23/99	18.0	615	7.53	0.190	8.7
	11/15/99	10.1	600	7.38	0.215	8.0
	05/23/00	12.4	595	7.47	0.195	NA
	08/22/00	18.3	620	7.58	0.090	7.5
	05/21/01	13.7	610	7.43	0.190	8.9
	08/29/01	16.3	580	7.64	0.145	8.8
	06/17/02	14.3	540	8.03	0.190	6.6
	09/16/02	NA	NA	NA	NA	NA
	09/11/03	15.7	540	7.5	0.164	8.5
MW-4	08/22/96	17.8	592	7.46	NA	NA
	05/22/97	12.0	509	7.71	0.301	9.2
	09/05/97	13.6	565	7.62	0.295	8.4
	11/03/97	13.6	563	7.69	0.183	6.9
	05/08/98	11.9	643	8.35	0.252	9.5
	08/26/98	17.0	758	7.54	0.321	18.6
	11/17/98	10.6	558	7.81	NA	8.7
	05/24/99	11.2	509	7.53	0.240	10.5
	08/24/99	16.3	549	7.86	0.170	7.2
	11/15/99	11.4	526	7.57	0.245	8.9
	05/23/00	12.3	490	7.76	0.185	NA
	08/23/00	14.6	530	7.59	0.150	8.1
	05/22/01	10.7	440	7.78	0.175	8.5
	08/30/01	16.9	510	7.61	0.175	8.5
	08/30/01	16.9	510	7.61	0.175	8.5
	06/18/02	14.2	470	7.64	0.150	6.2
	09/17/02	16.4	500	7.66	NA	5.5
	09/11/03	16.7	470	7.5	0.172	8.7
MW-4R	09/05/97	11.3	812	7.57	0.265	9.9
	11/03/97	NA	NA	NA	NA	NA
	01/22/98	8.8	1261	7.61	0.209	8.2
	05/08/98	13.0	1605	7.98	0.370	5.4
	08/26/98	15.3	1721	7.33	0.422	10.3
	11/16/98	9.7	1118	6.24	NA	3.9
	05/24/99	11.6	998	7.40	0.230	6.0
	08/24/99	13.4	1115	7.31	0.225	4.8
	11/15/99	9.4	1036	7.32	0.255	5.3
	05/23/00	10.8	979	7.48	0.215	NA
	08/23/00	12.9	1010	7.42	0.170	6.5
	05/22/01	11.4	1000	7.44	0.205	5.1
	08/30/01	15.0	1100	7.38	0.135	4.3
	06/18/02	12.2	1000	7.42	0.130	4.2
	09/17/02	15.0	840	7.50	NA	3.0
	09/11/03	13.8	970	7.3	0.163	4.6

Note:

NA- Not available

TABLE 26 - FIELD MEASUREMENTS OF WATER TEMPERATURE, SPECIFIC CONDUCTIVITY, pH, Eh, AND DISSOLVED OXYGEN IN WATER SAMPLES COLLECTED AT WARD PRODUCTS, AMSTERDAM, NY (cont.).

WELL ID	DATE	WATER TEMPERATURE (C°)	SPECIFIC CONDUCTANCE (uMHOS/CM)	pH (S.U.)	Eh (V)	DISSOLVED OXYGEN (mg/L)
MW-5	09/05/97	15.6	564	7.40	0.270	6.2
	11/03/97	12.3	527	7.44	0.163	7.2
	05/08/98	13.3	1198	8.07	0.288	5.8
	08/26/98	17.4	1407	7.67	0.343	8.2
	11/17/98	10.1	975	8.60	NA	3.8
	05/24/99	12.2	803	7.44	0.235	5.4
	08/24/99	16.7	910	7.34	0.215	3.7
	11/15/99	10.3	542	7.56	0.215	7.7
	05/23/00	12.2	570	7.60	0.155	NA
	08/23/00	14.6	600	7.51	0.125	3.4
	05/22/01	10.9	580	7.56	0.110	5.3
	08/30/01	18.1	500	7.42	0.200	6.7
	06/18/02	16.0	540	7.80	0.010	4.5
	09/16/02	17.4	490	7.83	0.030	6.1
	09/11/03	16.1	540	7.5	0.128	7.2
MW-6	09/05/97	12.4	701	6.95	0.264	9.0
	11/03/97	12.3	527	7.44	0.163	7.2
	05/08/98	13.3	1198	8.07	0.288	5.8
	08/26/98	17.4	1407	7.67	0.343	8.2
	11/17/98	10.1	975	8.60	NA	3.8
	05/24/99	12.2	803	7.44	0.235	5.4
	08/24/99	16.7	910	7.34	0.215	3.7
	11/15/99	10.4	864	7.41	0.220	4.5
	05/23/00	12.4	786	7.48	0.230	NA
	08/23/00	13.6	910	7.38	0.145	4.1
	05/21/01	13.8	890	7.39	0.140	4.1
	08/29/01	17.1	880	7.46	0.185	4.3
	06/18/02	14.8	850	7.48	0.110	3.4
	09/16/02	15.0	910	7.55	0.110	3.0
	09/10/03	15.0	710	7.3	0.096	4.8
MW-7	09/05/97	11.9	870	7.43	0.260	5.2
	11/03/97	11.4	852	7.40	0.197	3.9
	05/07/98	14.0	1220	7.17	0.246	6.2
	08/25/98	15.3	1022	7.58	0.203	6.0
	11/16/98	10.1	1094	6.65	NA	4.3
	05/25/99	11.9	1248	7.44	0.250	4.6
	08/23/99	14.7	1021	7.33	0.220	4.3
	11/15/99	9.4	1014	7.28	0.280	4.1
	05/23/00	12.3	843	7.41	0.220	NA
	08/23/00	13.3	920	7.33	0.245	3.4
	05/21/01	11.2	780	7.55	0.215	5.1
	08/29/01	16.1	1020	7.35	0.145	4.6
	06/18/02	14.3	870	7.47	0.120	3.3
	09/16/02	14.5	970	7.44	0.140	3.1
	09/10/03	13.8	750	7.30	0.153	4.6
MW-8	09/05/97	12.8	910	7.38	0.298	6.5
	11/03/97	11.2	942	7.33	0.231	6.8
	05/07/98	12.2	1466	7.15	0.243	6.3
	08/25/98	12.8	1284	7.50	0.239	6.1
	11/16/98	10.2	1121	6.45	NA	4.5
	05/24/99	13.1	1106	7.37	0.250	5.4
	08/23/99	15.2	1219	7.31	0.215	3.9
	11/15/99	9.5	990	7.30	0.305	4.3
	05/23/00	10.7	953	7.45	0.245	NA
	08/22/00	14.8	1230	7.40	0.115	4.2
	05/21/01	11.2	780	7.55	0.215	5.1
	08/29/01	15.9	1270	7.28	0.150	3.3
	06/18/02	12.6	1010	7.59	0.165	2.6
	09/17/02	15.5	1190	7.44	NA	2.1
	09/10/03	14.0	800	7.1	0.018	3.0

Note:

NA- Not available

TABLE 26 - FIELD MEASUREMENTS OF WATER TEMPERATURE, SPECIFIC CONDUCTIVITY, pH, Eh, AND DISSOLVED OXYGEN IN WATER SAMPLES COLLECTED AT WARD PRODUCTS, AMSTERDAM, NY (cont.).

WELL ID	DATE	WATER TEMPERATURE (C^o)	SPECIFIC CONDUCTANCE (uMHOS/CM)	pH (S.U.)	Eh (V)	DISSOLVED OXYGEN (mg/L)
MW-9	01/22/98	9.4	761	7.78	0.300	7.4
	05/08/98	12.9	1072	7.94	0.183	2.9
	08/26/98	16.3	1218	7.31	0.144	5.1
	11/17/98	10.1	907	8.80	NA	3.4
	05/25/99	11.9	1188	7.41	0.090	2.0
	08/23/99	14.2	925	7.43	0.025	1.5
	11/16/99	9.5	933	7.25	0.065	2.3
	05/23/00	12.4	940	7.45	0.035	NA
	08/23/00	13.2	930	7.42	-0.010	2.5
	05/22/01	12.6	980	7.49	-0.150	3.3
	08/30/01	14.3	890	7.34	0.130	3.2
	06/18/02	14.4	930	6.43	0.195	2.3
	09/18/02	14.3	930	7.72	NA	1.3
	09/11/03	14.2	810	7.3	0.136	2.1
MW-10	01/22/98	10.0	955	7.52	0.270	11.1
	05/08/98	14.3	1568	7.68	0.366	3.1
	08/26/98	17.9	1556	7.04	NA	3.2
	11/17/98	10.8	1083	7.32	NA	2.0
	05/25/99	12.3	1331	7.37	0.235	3.2
	08/24/99	15.8	989	7.31	0.120	1.2
	11/15/99	10.5	981	7.14	0.18	3.6
	05/23/00	13.6	968	7.44	0.205	NA
	08/23/00	14.2	960	7.38	0.225	3.8
	05/22/01	12.5	870	7.41	0.055	2.0
	08/30/01	14.5	850	7.28	0.155	2.2
	06/18/02	14.4	860	7.40	0.185	2.4
	09/18/02	14.5	830	7.51	NA	0.9
	09/11/03	14.8	710	7.4	0.141	2.1
MW-11	01/22/98	6.5	631	7.82	0.259	17.8
	05/07/98	13.4	832	7.38	0.191	8.8
	08/25/98	14.5	862	7.96	0.129	9.1
	11/17/98	9.0	627	7.91	NA	7.8
	05/24/99	11.8	611	7.84	0.280	9.8
	08/23/99	15.4	599	7.83	0.195	9.0
	11/15/99	9.0	606	7.55	0.210	7.4
	05/23/00	12.2	620	7.90	0.145	NA
	08/22/00	15.4	620	7.83	0.100	9.3
	05/21/01	12.2	590	7.59	0.110	9.2
	08/29/01	14.4	530	7.69	0.135	9.9
	06/17/02	12.6	550	7.64	0.120	2.3
	09/16/02	17.3	570	7.52	0.030	6.3
	09/10/03	13.7	500	7.7	0.168	6.7
MW-12	08/23/99	15.4	891	7.53	0.140	4.0
	11/16/99	9.1	848	6.98	0.160	3.1
	05/24/00	13.1	843	7.51	0.095	NA
	08/22/00	15.7	780	7.49	0.045	2.1
	05/21/01	13.1	730	7.38	0.150	3.3
	08/30/01	13.8	740	7.37	0.085	4.3
	06/19/02	13.8	740	7.85	0.045	2.2
	09/17/02	14.7	710	7.47	NA	1.4
	09/11/03	13.3	630	7.5	0.158	2.1

Note:

NA- Not available

TABLE 26 - FIELD MEASUREMENTS OF WATER TEMPERATURE, SPECIFIC CONDUCTIVITY, pH, Eh, AND DISSOLVED OXYGEN IN WATER SAMPLES COLLECTED AT WARD PRODUCTS, AMSTERDAM, NY (cont.).

WELL ID	DATE	WATER TEMPERATURE (C°)	SPECIFIC CONDUCTANCE (uMHOS/CM)	pH (S.U.)	Eh (V)	DISSOLVED OXYGEN (mg/L)
MW-13	08/23/99	14.7	854	7.40	0.040	1.9
	11/16/99	8.0	875	7.11	0.045	1.9
	05/24/00	11.3	861	7.45	0.010	NA
	08/22/00	13.7	890	7.32	0.005	1.1
	05/21/01	12.4	820	7.38	0.040	1.4
	08/30/01	14.5	770	7.11	0.040	1.3
	06/18/02	13.2	690	7.51	0.165	2.1
	09/18/02	13.8	760	7.49	NA	1.1
	09/11/03	13.5	630	7.5	0.112	1.5
MW-14	08/22/00	14.1	790	7.57	0.025	6.0
	05/21/01	12.2	840	7.44	-0.020	3.2
	08/30/01	15.5	760	7.45	-0.045	5.8
	06/19/02	13.2	860	7.70	0.105	3.6
	09/17/02	14.1	760	7.81	NA	6.8
	09/12/03	12.9	670	7.4	0.113	5.6
	05/18/04	NA	880	7.4	0.094	NA
	08/16/04	12.1	770	7.5	0.072	1.5
MW-15	08/22/00	15.3	850	7.62	-0.065	4.7
	05/21/01	13.1	820	7.41	-0.045	2.1
	08/30/01	13.8	820	7.34	<-0.080	1.6
	06/19/02	14.3	800	7.76	-0.080	2.3
	09/17/02	14.8	800	7.55	NA	1.4
	09/12/03	15.0	710	7.1	0.010	1.2
	05/18/04	NA	800	7.4	0.064	NA
	08/16/04	14.3	731	7.4	0.045	2.4
MW-16	06/19/02	13.4	760	7.65	0.065	3.5
	09/17/02	14.4	740	7.51	NA	2.1
	09/11/03	12.2	680	7.5	0.070	2.6
	05/18/04	NA	540	7.4	0.172	NA
	08/17/04	12.3	566	7.5	0.169	3.2
MW-17	06/19/02	14.2	900	7.46	0.105	3.7
	09/17/02	13.3	800	7.40	NA	1.8
	09/11/03	13.3	740	7.3	0.059	1.5
	05/18/04	NA	870	7.3	0.061	NA
	08/17/04	12.8	768	7.1	0.102	1.1
MW-18	06/19/02	14.3	710	7.85	0.045	1.3
	09/17/02	13.9	650	7.72	NA	0.9
	09/12/03	12.5	620	7.4	0.015	1.7
	05/18/04	NA	690	7.4	0.070	NA
	08/17/04	12.6	560	7.5	0.077	0.8
MW-19	09/11/03	13.1	810	7.3	0.181	3.4
	05/18/04	NA	1000	7.1	0.145	NA
	08/17/04	13.1	858	6.9	0.170	2.8
MW-20	09/11/03	13.1	650	7.3	0.123	1.5
	05/18/04	NA	700	7.6	0.130	NA
	08/16/04	13.3	856	7.5	0.101	2.5

Note:

NA- Not available

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-1 AT THE WARD PRODUCTS SITE
61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-1																			NYSDEC
METALS (mg/L)	8/22/96	5/22/97	9/5/97	11/3/97	5/8/98	8/26/98	11/17/98	5/24/99	8/24/99	11/15/99	5/23/00	8/23/00	5/22/01	8/29/01	6/17/02	9/16/02	9/10/03	5/19/04	8/18/04	**STANDARD**
Cadmium	<0.010	<0.010	<0.0031	<0.0031	NA	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NA	NA	NA	0.005
Hexavalent Chromium	**1.7**	**0.58**	**19.8**	**36.6J**	**3.2**	NS	**19.0**	**1.3**	**0.15**	**1.20**	**0.69**	**0.46**	**0.37**	**1.08**	**0.39**	NS	**0.27**	**0.24**	**0.230**	0.05
Total Chromium	**1.58**	NA	**19J**	**33.1**	**3.3**	NS	**16.1**	**1.0**	**11.2**	**0.985**	**0.60**	**0.520**	**0.34**	**0.85**	**0.434**	NS	**0.232**	**0.256**	**0.241**	0.05
Iron	NA	<0.10	**0.330**	**1.51J**	NA	NS	NA	0.29	**1.13**	**0.60**	NA	NA	NA	NA	NA	NS	NA	NA	NA	0.30
Lead	<0.10	<0.10	<0.021	<0.021	NA	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NA	NA	NA	0.025
Manganese	NA	<0.010	0.033J	0.106J	NA	NS	NA	ND	0.19	0.05	NA	NA	NA	NA	NA	NS	NA	NA	NA	0.30
Nickel	<0.050	<0.050	<0.0078	0.0074	NA	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NA	NA	NA	0.10
Zinc	<0.025	<0.025	<0.0090	0.0184J	NA	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NA	NA	NA	None Set
NONMETALS (mg/L)																				
Chloride	NA	NA	NA	NA	NA	NS	NA	7.2	8.6	4.4	NA	NA	NA	NA	NA	NS	NA	NA	NA	250
Cyanide, total	0.012	0.0053	0.0573	0.0881	NA	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NA	NA	NA	0.20
Ammonia Nitrogen	NA	0.074	0.09	0.14	NA	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NA	NA	NA	2
Nitrate Nitrogen	NA	0.37	1.16J	1.29	NA	NS	NA	0.47	2.8	0.48	NA	NA	NA	NA	NA	NS	NA	NA	NA	10
Nitrite Nitrogen	NA	<0.020	0.021	<0.015	NA	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NA	NA	NA	1
Sulfate	NA	45.0	81.9J	121	NA	NS	NA	49	64	52	NA	NA	NA	NA	NA	NS	NA	NA	NA	250
Total Suspended Solids	NA	NA	14J	251	36	NS	602	42	238	40	NA	NA	NA	NA	NA	NS	NA	NA	NA	None Set
Turbidity (NTU)	NA	NA	**79J**	**200**	**45.0**	NS	**600**	**52**	**460**	**140**	**37**	**126**	**35**	**42**	**37**	NS	**8.7**	**39**	**30**	5
VOCs (ug/L)																				
Acrylonitrile	<50	<50	<10	<20	<25	NS	<250	<25	<125	<25	<25	<25	<25	<25	<25	NS	<25	NA	NA	5
Carbon Tetrachloride	**20**	<5	**30**	**24**	<5	NS	**70**	<5	**300**	<5	<5	<5	**14**	**29**	<5	NS	**6.3**	<5	<10	5
Chlorobenzene	<5	<5	<1	<2	<5	NS	<50	<5	<25	<5	<5	<5	<5	<5	<5	NS	<5	<5	<10	5
Chloroform	<5	<5	7	6J	<5	NS	**90**	<5	**40**	<5	<5	<5	<5	**6.0**	<5	NS	<5	<5	<10	7
Dichlorodifluoromethane	NA	NA	NA	NA	<5	NS	<100	<10	<50	<10	<10	<10	<10	<10	<10	NS	<10	NA	NA	5
1,1-Dichloroethene	<5	<5	<1	<4	<5	NS	<50	<5	<25	<5	<5	<5	<5	<5	<5	NS	<5	<5	<10	5
cis-1,2-Dichloroethene	**47**	<5	**45**	**36**	NA	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	<5	<5	<10	5
trans-1,2-Dichloroethene	<5	<5	<2	<4	NA	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	<5	<5	<10	5
1,2-Dichloroethene, Total	NA	NA	NA	NA	<5	NS	60	<5	170	<5	<5	<5	8	38	<5	NS	NA	NA	NA	None Set
Tetrachloroethene	<5	<5	3J	3J	<5	NS	<50	<5	<25	<5	<5	<5	<5	<5	<5	NS	<5	<5	<10	5
Trichloroethene	**440**	**140**	**670**	**940**	**180**	NS	**700**	**18**	**1400**	**190**	**110**	**100**	**98**	**220**	**66**	NS	**96**	**65**	**100**	5
Vinyl Chloride	<5	<5	<2	<4	<10	NS	<100	<10	<50	<10	<10	<10	<10	<10	<10	NS	<10	<10	<10	2

Notes:

B, J - Estimated Value
NA - Not Available
NS - Not Sampled, Insufficient Water

Monitoring well MW-1 is installed in glacial till
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-1R AT THE WARD PRODUCTS SITE
61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-1R																	NYSDEC
METALS (mg/L)	9/5/97	11/3/97	5/8/98	8/26/98	11/17/98	5/24/99	8/24/99	11/15/99	5/23/00	8/23/00	5/22/01	8/29/01	6/17/02	9/16/02	9/10/03	5/19/04	8/18/04	**STANDARD**
Cadmium	<0.0031	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	**6.77**	**12.0**	**0.89**	**1.20**	**6.40**	**0.55**	**1.99**	**0.68**	**0.30**	**0.41**	**0.26**	**0.43**	**0.16**	**0.16**	**0.25**	**0.14**	**0.200**	0.05
Total Chromium	**7.16J**	**11.5**	**1.48**	**0.99**	**5.71**	**0.451**	**1.87**	**0.50**	**0.32**	**0.349**	**0.26**	**0.365**	**0.216**	**0.16**	**0.220**	**0.139**	**0.214**	0.05
Iron	<0.015	0.092J	NA	NA	NA	<0.05	0.18	0.20	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	<0.021	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	0.026J	0.03J	NA	NA	NA	<0.02	**0.05**	**0.05**	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	0.0078	0.0044J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	<0.0090	<0.0090	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																		
Chloride	NA	NA	NA	NA	NA	3.4	4.0	2.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	0.0367	0.0366	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	0.075	0.078J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	0.64J	0.57	NA	NA	NA	0.35	0.76	0.38	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	0.023	<0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	50.9J	66.1	NA	NA	NA	34	40	38	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	<3.4	30.8	1.5	2.5	52	1.5	<1	3.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	1.06J	**27.2**	**5.4**	**8.5**	**41.0**	2.5	**7.0**	**21**	2.6	**37.0**	4.6	**5.5**	**16.0**	**5.4**	2.7	3.5	3.8	5
VOCs (*u* g/L)																		
Acrylonitrile	<10	<10	<25	<25	<120	<25	<50	<25	<50	<25	<50	<50	<25	<50	<50	NA	NA	5
Carbon Tetrachloride	**14**	**33**	<5	**11**	**65**	<5	**48**	**36**	<10	**10**	**10**	**11**	<5	<10	**17**	<5	<10	5
Chlorobenzene	<1	<1	<5	<5	<25	<5	<10	<5	<10	<5	<10	<10	<5	<10	<10	<5	<10	5
Chloroform	4J	6	<5	<5	**30**	<5	<10	<5	<10	<5	<10	<10	<5	<10	<10	<5	<10	7
Dichlorodifluoromethane	NA	NA	<10	<10	<50	<10	<20	<10	<20	<10	<20	<20	<10	<20	<20	NA	NA	5
1,1-Dichloroethene	<2	<2	<5	<5	<25	<5	<10	<5	<10	<5	<10	<10	<5	<10	<10	<5	<10	5
cis-1,2-Dichloroethene	**36**	**34**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**14**	<5	<10	5
trans-1,2-Dichloroethene	<2	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10	<5	<10	5
1,2-Dichloroethene, Total	NA	NA	7	29	50	7	50	16	<10	14	<10	16	<5	24	NA	NA	NA	None Set
Tetrachloroethene	3J	4J	<5	<5	<25	<5	<10	<5	<10	<5	<10	<10	<5	<10	<10	<5	<10	5
Trichloroethene	**410**	**690**	**180**	**280**	**550**	**100**	**420**	**280**	**160**	**170**	**140**	**170**	**62**	**110**	**180**	**96**	**180**	5
Vinyl Chloride	<2	<2	<10	<10	<50	<10	<20	<10	<20	<10	<20	<20	<10	<20	<20	<10	<10	2

Notes:

B, J - Estimated value
NA - Not Available

Monitoring well MW-1R is installed in bedrock
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-2 AT THE WARD PRODUCTS SITE
61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-2																			NYSDEC
METALS (mg/L)	8/22/96	5/22/97	9/5/97	11/3/97	5/8/98	8/26/98	11/17/98	5/24/99	8/24/99	11/15/99	5/23/00	8/23/00	5/22/01	8/29/01	6/18/02	9/17/02	9/10/03	5/19/04	8/18/04	**STANDARD**
Cadmium	<0.010	<0.010	<0.0031	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	**0.38**	**1.42**	**0.17**	**0.338J**	**0.81**	**0.78**	**1.70**	**0.84**	**0.22**	**0.78**	**0.19**	**0.15**	**0.11**	**0.98**	**0.09**	<0.02	<0.02	<0.02	<0.020	0.05
Total Chromium	**0.24**	NA	**0.306J**	**0.54**	**1.81**	**0.72**	**1.54**	**0.788**	**0.939**	**0.699**	**0.190**	**0.134**	**0.13**	**0.528**	**0.078**	0.037	0.010	0.006	0.0037B	0.05
Iron	NA	**4.64**	**1.10**	**0.73J**	NA	NA	NA	0.12	0.28	**0.33**	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	<0.10	<0.10	<0.021	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	NA	**0.084**	**0.046J**	**0.041J**	NA	NA	NA	<0.02	<0.02	<0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	<0.050	<0.050	<0.0078	<0.0016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	<0.025	<0.025	<0.0090	<0.0090	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																				
Chloride	NA	NA	NA	NA	NA	NA	NA	4.0	4.1	4.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	<0.005	<0.0050	<0.0040	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	NA	<0.050	0.053	<0.030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	NA	0.317	<0.030	0.13	NA	NA	NA	0.11	0.21	0.11	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	NA	<0.020	0.02J	<0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	NA	51.0	58.8J	53.3	NA	NA	NA	38	39	40	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	NA	NA	54J	<3.4	2.0	36	139	2.0	52	1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	NA	NA	**43.2J**	4.1	**5.8**	**68**	**140**	1.8	**160**	**7**	**20**	**43**	**220**	**520**	**6.5**	**260**	**13**	**76**	**6**	5
VOCs (ug/L)																				
Acrylonitrile	<50	<50	<10	<10	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	NA	NA	5
Carbon Tetrachloride	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
Chlorobenzene	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
Chloroform	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	7
Dichlorodifluoromethane	NA	NA	NA	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	5
1,1-Dichloroethene	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
cis-1,2-Dichloroethene	<5	<5	<2	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<10	5
trans-1,2-Dichloroethene	<5	<5	<2	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<10	5
1,2-Dichloroethene, Total	NA	NA	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	NA	NA	None Set
Tetrachloroethene	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
Trichloroethene	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
Vinyl Chloride	<5	<5	<2	<2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2

Notes:

B, J - Estimated value
NA - Not Available

Monitoring well MW-2 is installed in glacial till
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-3 AT THE WARD PRODUCTS SITE
61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-3																			NYSDEC
METALS (mg/L)	8/22/96	5/22/97	9/5/97	11/3/97	5/8/98	8/26/98	11/17/98	5/24/99	8/23/99	11/15/99	5/23/00	8/23/00	5/23/01	8/29/01	6/17/02	9/16/02	9/11/03	5/19/04	8/18/04	**STANDARD**
Cadmium	<0.010	<0.010	<0.0031	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.005
Hexavalent Chromium	<0.01	<0.010	0.004J	<0.0004	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NS	<0.02	NS	NS	0.05
Total Chromium	<0.030	NA	<0.0066	<0.0066	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.010	0.005	<0.005	<0.005	<0.005	NS	<0.005	NS	NS	0.05
Iron	NA	**4.39**	NA	**1.66J**	NA	NA	NA	0.11	NA	0.23	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.30
Lead	<0.10	<0.10	<0.021	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.025
Manganese	NA	**0.152**	NA	0.088	NA	NA	NA	<0.02	NA	ND	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.30
Nickel	<0.050	<0.050	<0.0078	0.0028J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.10
Zinc	<0.025	0.038	<0.0090	0.015J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	None Set
NONMETALS (mg/L)																				
Chloride	NA	NA	NA	NA	NA	NA	NA	<1	NA	ND	NA	NA	NA	NA	NA	NA	NA	NS	NS	250
Cyanide, total	<0.005	<0.0050	<0.0040	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.20
Ammonia Nitrogen	NA	<0.050	NA	<0.030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	2
Nitrate Nitrogen	NA	0.27	NA	0.23	NA	NA	NA	0.19	NA	0.25	NA	NA	NA	NA	NA	NA	NA	NS	NS	10
Nitrite Nitrogen	NA	<0.020	NA	<0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	1
Sulfate	NA	<8.0	NA	25.7	NA	NA	NA	13	NA	14	NA	NA	NA	NA	NA	NA	NA	NS	NS	250
Total Suspended Solids	NA	NA	27.6J	4.4J	7.0	93	NA	1.0	123	2.5	NA	NA	NA	NA	NA	NA	NA	NS	NS	None Set
Turbidity (NTU)	NA	NA	**15.9J**	4.9	**12**	**75**	NA	1.5	**680**	**19**	**6.1**	**6**	**82**	**300**	**7.7**	NS	**5.7**	NS	NS	5
VOCs (ug/L)																				
Acrylonitrile	<50	<50	<10	<10	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	NS	NS	5
Carbon Tetrachloride	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	5
Chlorobenzene	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	5
Chloroform	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	7
Dichlorodifluoromethane	NA	NA	NA	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NS	NS	5
1,1-Dichloroethene	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	5
cis-1,2-Dichloroethene	<5	<5	<2	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	NS	NS	5
trans-1,2-Dichloroethene	<5	<5	<2	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	NS	NS	5
1,2-Dichloroethene, Total	NA	NA	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	NS	NS	None Set
Tetrachloroethene	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	5
Trichloroethene	<5	<5	<1	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	5
Vinyl Chloride	<5	<5	<2	<2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NS	NS	2

Notes:

B, J - Estimated value
NA - Not Available

Monitoring well MW-3 is installed in glacial till
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-4 AT THE WARD PRODUCTS SITE
61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-4																			NYSDEC
METALS (mg/L)	8/22/96	5/22/97	9/5/97	11/3/97	5/8/98	8/26/98	11/17/98	5/24/99	8/24/99	11/15/99	5/23/00	8/23/00	5/22/01	8/30/01	6/18/02	9/17/02	9/11/03	5/19/04	8/18/04	**STANDARD**
Cadmium	<0.010	<0.010	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	**0.07**	**0.086**	**0.082**	0.027J	**0.10**	**0.10**	**0.06**	**0.08**	**0.08**	**0.10**	**0.08**	**0.07**	0.04	0.04	**0.05**	0.04	0.05	**0.06**	0.040	0.05
Total Chromium	**0.09**	NA	**0.078J**	NA	**0.11**	**0.070**	**0.068**	**0.080**	**0.064**	**0.066**	**0.079**	**0.068**	0.037	0.043	**0.052**	0.039	<0.005	0.045	**0.057**	0.05
Iron	NA	**0.39**	**0.50**	NA	NA	NA	NA	0.08	NA	0.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	<0.10	<0.10	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	NA	0.023	0.016J	NA	NA	NA	NA	<0.02	NA	<0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	<0.050	<0.050	<0.0078	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	<0.025	<0.025	<0.0090	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																				
Chloride	NA	NA	NA	NA	NA	NA	NA	1.9	NA	1.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	<0.005	<0.005	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	NA	<0.050	0.045J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	NA	0.479	0.39J	NA	NA	NA	NA	0.64	NA	0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	NA	<0.020	<0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	NA	16.5	12.1J	NA	NA	NA	NA	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	NA	NA	8.8J	NA	5.0	10	39	1.0	31	<1	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	NA	NA	**9.92J**	NA	**7.1**	**9.3**	**27**	2.5	**24**	**19**	2.2	**10**	**25**	**5.1**	2.0	**5.3**	**7.8**	**16**	1.2	5
VOCs (ug/L)																				
Acrylonitrile	<50	<50	<10	<10	<25	<62	<500	<125	<125	<125	<125	<125	<50	<50	<63	<1250	<62	NA	NA	5
Carbon Tetrachloride	<5	<5	<1	<1	<5	<12	<100	<25	<25	<25	<25	<25	<10	<125	<13	<250	<12	<10	<20	5
Chlorobenzene	<5	<5	<1	<1	<5	<12	<100	<25	<25	<25	<25	<25	<10	<25	<13	<250	<12	<10	<20	5
Chloroform	<5	<5	1J	1J	<5	<12	<100	<25	<25	<25	<25	<25	<10	<25	<13	<250	<12	<10	<20	7
Dichlorodifluoromethane	NA	NA	NA	NA	<10	<25	<200	<50	<50	<50	<50	<50	<20	<20	<25	<500	<25	NA	NA	5
1,1-Dichloroethene	<5	<5	<1	<1	<5	<12	<100	<25	<25	<25	<25	<25	<10	<25	<13	<250	<12	<10	<20	5
cis-1,2-Dichloroethene	<5	<5	<2	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<12	<10	<20	5
trans-1,2-Dichloroethene	<5	<5	<2	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<12	<10	<20	5
1,2-Dichloroethene, Total	NA	NA	NA	NA	<5	<12	<100	<25	<25	<25	<25	<25	<10	<25	<13	<250	NA	NA	NA	None Set
Tetrachloroethene	<5	<5	<1	<1	<5	<12	<100	<25	<25	<25	<25	<25	<10	<25	<13	<250	<12	<10	<20	5
Trichloroethene	**540**	**330**	**330**	**540**	**300**	**400**	**3200**	**800**	**760**	**920**	**460**	**470**	**240**	**300**	**300**	**6000**	**430**	**330**	**390**	5
Vinyl Chloride	<5	<5	<2	<2	<10	<25	<200	<50	<50	<50	<50	<50	<20	<50	<25	<500	<25	<20	<20	2

Notes:

B, J - Estimated value
NA - Not Available

Monitoring well MW-4 is installed in glacial till
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-4R AT THE WARD PRODUCTS SITE
61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-4R																		NYSDEC
METALS (mg/L)	9/4/97	11/3/97	1/22/98	5/8/98	8/26/98	11/16/98	5/24/99	8/24/99	11/15/99	5/23/00	8/23/00	5/22/01	8/30/01	6/18/02	9/17/02	9/11/03	5/19/04	8/18/04	**STANDARD**
Cadmium	<0.010	NS	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	0.016	NS	0.0052	0.03	0.03	0.03	0.04	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.020	0.05
Total Chromium	<0.030	NS	0.0092J	0.03	0.005	0.015	0.006	0.008	<0.005	0.017	0.006	0.012	0.009	0.008	0.005	0.006	<0.005	0.0071B	0.05
Iron	**0.95**	NS	NA	NA	NA	NA	**0.49**	**0.31**	**0.35**	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	<0.010	NS	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	0.074J	NS	NA	NA	NA	NA	0.06	0.05	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	<0.050	NS	0.0056	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	<0.025	NS	0.093	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																			
Chloride	NA	NS	NA	NA	NA	NA	86	120	89	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	<0.0050	NS	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	<0.050	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	0.61J	NS	NA	NA	NA	NA	1.3	1.7	1.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	<0.020	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	46.4J	NS	NA	NA	NA	NA	84	102	97	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	<9.0	NS	39.2	29	119	37	34	38	41	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**50.1J**	NS	**21.8**	**34**	**180**	**32**	**44**	28	**38**	**7.2**	**28**	**17**	**62**	**17**	**16**	**5.5**	4.8	**49**	5
VOCs (ug/L)																			
Acrylonitrile	<5000	NS	<200	<2500	<2500	<6200	6200	<2500	<6250	<2500	<2500	<13000	<6250	<2500	<1250	<2500	NA	NA	5
Carbon Tetrachloride	<500	NS	<20	<500	<500	<1200	<1200	<500	<1250	<500	<500	<2500	<1250	<500	<250	<500	<1000	<2000	5
Chlorobenzene	<500	NS	<20	<500	<500	<1200	<1200	<500	<1250	<500	<500	<2500	<1250	<500	<250	<500	<1000	<2000	5
Chloroform	<500	NS	<20	<500	<500	<1200	<1200	<500	<1250	<500	<500	<2500	<1250	<500	<250	<500	<1000	<2000	7
Dichlorodifluoromethane	NA	NS	NA	<1000	<1000	<2500	<2500	<1000	<2500	<1000	<1000	<2500	<2500	<1000	<500	<1000	NA	NA	5
1,1-Dichloroethene	<500	NS	<20	<500	<500	<1200	<1200	<500	<1250	<500	<500	<2500	<1250	<500	<250	<250	<1000	<2000	5
cis-1,2-Dichloroethene	<500	NS	**80J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<500	<1000	<2000	5
trans-1,2-Dichloroethene	<500	NS	<40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<500	<1000	<2000	5
1,2-Dichloroethene, Total	NA	NS	NA	<500	<500	<1200	<1200	<500	<1250	<500	<500	<2500	<1250	<500	<250	NA	NA	NA	None Set
Tetrachloroethene	**1000**	NS	**210**	<500	<500	<1200	<1200	<500	<1250	<500	<500	<2500	<1250	<500	<250	<500	<1000	<2000	5
Trichloroethene	**140000**	NS	**28000**	**22000**	**17000**	**28000**	**52000**	**14000**	**25000**	**20000**	**19000**	**45000**	**13000**	**14000**	**7500**	**19000**	**49000**	**28000**	5
Vinyl Chloride	<500	NS	ND	<1000	<1000	<2500	<2500	<1000	<2500	<2500	<2500	<5000	<2500	<1000	<500	<1000	<2000	<2000	2

Notes:

B, J - Estimated value
NA - Not Available
NS - Not Sampled, Insufficient Water

Monitoring well MW-4R is installed in bedrock
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-5 AT THE WARD PRODUCTS SITE
61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-5																	NYSDEC
METALS (mg/L)	9/5/97	11/3/97	5/7/98	8/25/98	11/17/98	5/24/99	8/23/99	11/15/99	5/23/00	8/23/00	5/22/01	8/30/01	6/18/02	9/16/02	9/11/03	5/19/04	8/17/04	STANDARD
Cadmium	<0.0031	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	0.007	0.004J	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	0.05
Total Chromium	<0.0066	<0.0060	<0.005	<0.005	0.006	<0.005	0.013	<0.005	0.006	<0.005	<0.005	0.008	0.005	0.006	0.005	NA	NA	0.05
Iron	0.22	**0.74J**	NA	NA	NA	<0.05	0.16	**0.34**	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	<0.021	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	0.011J	0.008J	NA	NA	NA	<0.02	<0.02	<0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	<0.0078	<0.0016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	0.01J	0.029J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																		
Chloride	NA	NA	NA	NA	NA	2.2	2.6	2.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	<0.0040	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	<0.040	<0.030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	<0.030	0.032J	NA	NA	NA	0.07	0.02	0.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	<0.015	<0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	20.5J	20.7	NA	NA	NA	16	20	21	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	7.2J	15.6	5.0	32	28	2.0	32	31	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**6.29J**	**12.1**	**7.8**	**30**	**31**	**22**	**17**	**38**	3.0	**15**	**30**	29	0.9	**8.9**	**34**	NA	NA	5
VOCs (*u* g/L)																		
Acrylonitrile	<10	<10	<25	<25	<120	<25	<125	<50	<50	<125	<50	<75	<25	<50	<62	NA	NA	5
Carbon Tetrachloride	**6**	**12**	<5	<5	<25	<5	<25	<10	<10	<25	<10	<15	<5	<10	<12	<5	<20	5
Chlorobenzene	<1	<1	<5	<5	<25	<5	<25	<10	<10	<25	<10	<15	<5	<10	<12	<5	<20	5
Chloroform	2J	2J	**10**	<5	<25	<5	<25	<10	<10	<25	<10	<15	<5	<10	<12	<5	<20	7
Dichlorodifluoromethane	NA	NA	<10	<10	<50	<10	<50	<20	<20	<50	<20	<30	<10	<20	<25	NA	NA	5
1,1-Dichloroethene	2J	3J	<5	<5	<25	<5	<25	<10	<10	<25	<10	<15	<5	<10	<12	<5	<20	5
cis-1,2-Dichloroethene	**72**	**94**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<12	6.3	<20	5
trans-1,2-Dichloroethene	<2	2J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<12	<5	<20	5
1,2-Dichloroethene, Total	NA	NA	<5	38	100	11	90	30	14	<25	<10	32	6	52	NA	NA	NA	None Set
Tetrachloroethene	<1	1J	<5	<5	<25	<5	<25	<10	<10	<25	<10	<15	<5	<10	<12	<5	<20	5
Trichloroethene	**160**	**270**	**180**	**290**	**460**	**210**	**440**	**280**	**280**	**300**	**280**	270	**110**	**250**	**190**	**120**	**260**	5
Vinyl Chloride	**7**	<2	<10	<10	<50	<10	<50	<20	<20	<50	<20	<30	<10	<20	<25	<10	<20	2

Notes:

B, J - Estimated value
NA - Not Available

Monitoring well MW-5 is installed in bedrock
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-6 AT THE WARD PRODUCTS SITE
61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-6																	NYSDEC
METALS (mg/L)	9/4/97	11/3/97	5/7/98	8/26/98	11/17/98	5/24/99	8/24/99	11/15/99	5/23/00	8/23/00	5/21/01	8/29/01	6/18/02	9/16/02	9/10/03	5/19/04	8/18/04	**STANDARD**
Cadmium	<0.010	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	0.0187	<0.00040	**0.26**	**0.18**	**0.10**	**0.23**	**0.17**	**0.20**	**0.28**	**0.27**	**0.12**	**0.08**	**0.14**	**0.08**	**0.14**	**0.14**	**0.140**	0.05
Total Chromium	<0.030	<0.0066	**0.290**	**0.140**	**0.108**	**0.212**	**0.159**	**0.129**	**0.271**	**0.237**	**0.104**	**0.150**	**0.136**	**0.096**	**0.112**	**0.145**	**0.152**	0.05
Iron	<0.10	**0.32J**	NA	NA	NA	0.12	0.27	0.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	<0.10	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	0.038J	0.246J	NA	NA	NA	<0.02	<0.02	<0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	<0.050	0.004J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	<0.025	0.047J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																		
Chloride	NA	NA	NA	NA	NA	54	78	65	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	<0.0050	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	<0.050	0.03J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	0.47J	<0.030	NA	NA	NA	0.78	0.97	0.70	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	<0.020	<0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	42.5J	62.0	NA	NA	NA	58	72	75	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	<9.0	18.4	7.5	120	14	4.5	74	7.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**12.4J**	**40.3**	**11.0**	**150**	**12**	**6**	**33**	**10**	**45**	**67**	2.4	**29**	1.8	**93**	**7.0**	**62**	**49**	5
VOCs (ug/L)																		
Acrylonitrile	<250	<50	<500	<2500	<2500	<2500	<1250	<1250	<1250	<2500	<1250	<500	<2500	<500	<500	NA	NA	5
Carbon Tetrachloride	<25	<5	<100	<500	<500	<500	<250	<250	<250	<500	<250	<100	<500	<100	<100	<250	<100	5
Chlorobenzene	<25	<5	<100	<500	<500	<500	<250	<250	<250	<500	<250	<100	<500	<100	<100	<250	<100	5
Chloroform	<25	<5	<100	<500	<500	<500	<250	<250	<250	<500	<250	<100	<500	<100	<100	<250	<100	7
Dichlorodifluoromethane	NA	NA	<200	<1000	<1000	1000	<500	<500	<500	<1000	<500	<200	<1000	<200	<200	<200	NA	5
1,1-Dichloroethene	<25	<5	<100	<500	<500	<500	<250	<250	<250	<500	<250	<100	<500	<100	<100	<250	<100	5
cis-1,2-Dichloroethene	<25	<5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<100	<250	<100	5
trans-1,2-Dichloroethene	<25	<5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<100	<250	<100	5
1,2-Dichloroethene, Total	NA	NA	<100	<500	<500	<500	<250	<250	<250	<500	<250	<100	<500	<100	NA	NA	NA	None Set
Tetrachloroethene	**48**	**22J**	<100	<500	<500	<500	<250	<250	<250	<500	<250	<100	<500	<100	<100	<250	**34J**	5
Trichloroethene	**4900**	**3200**	**11000**	**14000**	**10000**	**12000**	**5700**	**5400**	**7000**	**3500**	**6000**	**3000**	**3000**	**1700**	**2800**	**3500**	**1700**	5
Vinyl Chloride	<25	<10	<200	<1000	<1000	<1000	<500	<500	<500	<1000	<500	<200	<1000	<200	<200	<500	<100	2

Notes:

B, J - Estimated value
NA - Not Available

Monitoring well MW-6 is installed in bedrock
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-7 AT THE WARD PRODUCTS SITE
61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-7																	NYSDEC
METALS (mg/L)	9/4/97	11/4/97	5/7/98	8/25/98	11/16/98	5/25/99	8/23/99	11/15/99	5/23/00	8/23/00	5/21/01	8/29/01	6/18/02	9/16/02	9/10/03	5/19/04	8/18/04	**STANDARD**
Cadmium	<0.010	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	0.018	0.0065	**0.18**	**0.08**	**0.07**	**0.13**	0.04	**0.07**	**0.17**	**0.07**	**0.12**	<0.02	**0.07**	0.04	**0.06**	0.04	<0.020	0.05
Total Chromium	<0.030	0.0077J	**0.188**	**0.057**	**0.079**	**0.087**	0.041	0.039	**0.154**	**0.066**	**0.127**	**0.068**	**0.068**	0.048	**0.057**	0.025	0.0232	0.05
Iron	**1.97**	<0.015	NA	NA	NA	0.08	**1.87**	**0.35**	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	<0.10	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	**0.031J**	0.0096J	NA	NA	NA	<0.02	**0.19**	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	<0.050	0.0081	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	<0.025	0.0191J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																		
Chloride	NA	NA	NA	NA	NA	62	81	76	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	<0.0050	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	<0.050	<0.030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	0.27J	0.18	NA	NA	NA	1.3	1.32	1.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	<0.020	<0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	72.7J	71.8	NA	NA	NA	83	95	111	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	33.2J	<3.4	9.0	840	65	20	490	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**36.8J**	3.7	**7.5**	**590**	**56**	**12**	**470**	**23**	**93**	**170**	**285**	**83**	**69**	**390**	**140**	**14**	**26**	5
VOCs (*u* g/L)																		
Acrylonitrile	<50	<10	<250	<125	<120	<120	<125	<125	<125	<250	<500	<250	<125	<50	<120	NA	NA	5
Carbon Tetrachloride	<5	<1	<50	<25	<25	<25	<25	<25	<25	<50	<100	<50	<25	<10	<25	<10	<20	5
Chlorobenzene	<5	<1	<50	<25	<25	<25	<25	<25	<25	<50	<100	<50	<25	<10	<25	<10	<20	5
Chloroform	<5	<1	<50	<25	<25	<25	<25	<25	<25	<50	<100	<50	<25	<10	<25	<10	<20	7
Dichlorodifluoromethane	NA	NA	<100	<50	<50	<50	<50	<50	<50	<100	<200	<100	<50	<20	<50	NA	NA	5
1,1-Dichloroethene	<5	<1	<50	<25	<25	<25	<25	<25	<25	<50	<100	<50	<25	<10	<25	<10	<20	5
cis-1,2-Dichloroethene	<5	3J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<25	<10	<20	5
trans-1,2-Dichloroethene	<5	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<25	<10	<20	5
1,2-Dichloroethene, Total	NA	NA	<50	<25	<25	<25	<25	<25	<25	<50	<100	<50	<25	<10	NA	NA	NA	None Set
Tetrachloroethene	<5	1J	<50	<25	<25	<25	<25	<25	<25	<50	<100	<50	<25	<10	<25	<10	<20	5
Trichloroethene	**450**	**450**	**730**	**800**	**360**	**1300**	**420**	**650**	**1800**	**680**	**2200**	**600**	**600**	**280**	**750**	**210**	**250**	5
Vinyl Chloride	<5	<2	<100	<50	<50	<50	<50	<50	<50	<100	<200	<100	<50	<20	<50	<20	<20	2

Notes:

B, J - Estimated value
NA - Not Available

Monitoring well MW-7 is installed in bedrock
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-8 AT THE WARD PRODUCTS SITE
61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-8																	NYSDEC
METALS (mg/L)	9/4/97	11/4/97	5/7/98	8/25/98	11/16/98	5/24/99	8/23/99	11/15/99	5/23/00	8/23/00	5/21/01	8/29/01	6/18/02	9/17/02	9/10/03	5/18/04	8/17/04	**STANDARD**
Cadmium	<0.010	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	<0.0050	<0.00040	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	0.05
Total Chromium	<0.030	<0.0066	<0.005	<0.005	0.021	0.005	0.009	0.005	0.019	0.006	0.007	0.009	<0.005	<0.005	<0.005	NA	NA	0.05
Iron	**3.07**	**1.98J**	NA	NA	NA	**1.88**	**0.72**	**1.86**	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	<0.10	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	**0.053J**	0.044J	NA	NA	NA	**0.14**	**0.05**	**0.19**	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	<0.050	0.0036J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	0.078J	0.084J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																		
Chloride	NA	NA	NA	NA	NA	87	136	75	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	<0.0050	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	<0.050	0.030J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	1.02J	1.07	NA	NA	NA	1.8	2.1	1.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	<0.020	<0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	87J	85.6	NA	NA	NA	95	121	109	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	48J	68.0	167	646	171	276	124	304	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**56.3J**	**49.3**	**180**	**620**	**210**	**154**	**150**	**410**	**28**	**240**	**83**	**170**	**23**	**250**	**31**	NA	NA	5
VOCs (u g/L)																		
Acrylonitrile	<50	<10	<25	<25	<25	<25	<25	<250	<50	<25	<50	<25	<25	<25	<25	NA	NA	5
Carbon Tetrachloride	<5	<1	<5	<5	<5	<5	<5	<50	<10	<5	<10	<5	<5	<5	<5	<5	<10	5
Chlorobenzene	<5	<1	<5	<5	<5	**18**	<5	<50	<10	<5	<10	<5	<5	<5	<5	<5	<10	5
Chloroform	<5	<1	<5	<5	<5	<5	<5	<50	<10	<5	<10	<5	<5	<5	<5	<5	<10	7
Dichlorodifluoromethane	NA	NA	<10	<10	<10	<10	<10	<100	<20	<10	<20	<10	<10	<10	<10	NA	NA	5
1,1-Dichloroethene	<5	<1	<5	<5	<5	<5	<5	<50	<10	<5	<10	<5	<5	<5	<5	<5	<10	5
cis-1,2-Dichloroethene	<5	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<10	5
trans-1,2-Dichloroethene	<5	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<10	5
1,2-Dichloroethene, Total	NA	NA	6	<5	<5	<5	<5	<50	14	6	<10	<5	6	<5	NA	NA	NA	None Set
Tetrachloroethene	<5	<1	<5	<5	<5	<5	<5	<50	<10	<5	<10	<5	<5	<5	<5	<5	<10	5
Trichloroethene	**51J**	**34**	**250**	**77**	**120**	**190**	**61**	**550**	**720**	**130**	**340**	**55**	**170**	**32**	**130**	**74**	**180**	5
Vinyl Chloride	<5	<2	<10	<10	<10	<10	<10	<100	<20	<10	<20	<10	<10	<10	<10	<10	<10	2

Notes:

B, J - Estimated value
NA - Not Available

Monitoring well MW-8 is installed in bedrock
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-9 AT THE WARD PRODUCTS SITE, 61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-9																NYSDEC
METALS (mg/L)	1/22/98	5/8/98	8/26/98	11/17/98	5/25/99	8/23/99	11/16/99	5/23/00	8/23/00	5/22/01	8/30/01	6/18/02	9/18/02	9/11/03	5/19/04	8/18/04	STANDARD
Cadmium	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	0.00051J	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.020	0.05
Total Chromium	<0.0066	0.007	<0.005	0.006	<0.005	<0.005	**0.813**	0.006	0.005	<0.005	<0.007	<0.005	<0.005	<0.005	<0.005	0.011	0.05
Iron	NA	NA	NA	NA	**1.77**	**2.73**	**0.84**	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	NA	NA	NA	NA	0.15	0.29	**0.56**	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	<0.0016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	0.0134J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																	
Chloride	NA	NA	NA	NA	54	65	61	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	NA	NA	NA	NA	0.22	0.23	0.19	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	NA	NA	NA	NA	99	94	112	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	<2.6	151	455	1940	256	516	236	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	4.8	**155**	**560**	**1000**	**>200**	**220**	**370**	**500**	**265**	**180**	**610**	**365**	**150**	**46**	**38**	**800**	5
VOCs (ug/L)																	
Acrylonitrile	<10	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	NA	NA	5
Carbon Tetrachloride	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
Chlorobenzene	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
Chloroform	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	7
Dichlorodifluoromethane	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	5
1,1-Dichloroethene	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
cis-1,2-Dichloroethene	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<10	5
trans-1,2-Dichloroethene	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<10	5
1,2-Dichloroethene, Total	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	NA	NA	None Set
Tetrachloroethene	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
Trichloroethene	**200**	**150**	**200**	**180**	**180**	**200**	**240**	**190**	**150**	**150**	**120**	**100**	**140**	**170**	**110**	**160**	5
Vinyl Chloride	<2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2

Note:

J - Estimated Value

NA - Not Available

Monitoring well MW-9 is installed in bedrock

BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-10 AT THE WARD PRODUCTS SITE, 61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-10																NYSDEC
METALS (mg/L)	1/22/98	5/8/98	8/26/98	11/17/98	5/25/99	8/24/99	11/16/99	5/23/00	8/23/00	5/22/01	8/30/01	6/18/02	9/18/02	9/11/03	5/19/04	8/18/04	STANDARD
Cadmium	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	0.007	**0.09**	0.05	0.05	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.020	0.05
Total Chromium	0.0146J	**0.094**	0.021	0.023	<0.005	0.016	0.008	0.021	0.012	0.012	0.012	0.008	0.012	<0.005	0.045	0.0229	0.05
Iron	NA	NA	NA	NA	0.30	**0.49**	**0.54**	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	NA	NA	NA	NA	0.08	0.09	0.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	0.0017J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	0.114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																	
Chloride	NA	NA	NA	NA	64	70	66	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	NA	NA	NA	NA	0.37	0.26	0.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	NA	NA	NA	NA	139	144	174	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	7.6J	83	63	38	124	82	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**29**	**74**	**85**	**48**	**140**	**52**	**120**	**8.0**	**25**	**46**	**86**	8.8	**65**	3.3	**31**	**75**	5
VOCs (ug/L)																	
Acrylonitrile	<20	<250	<625	<1200	<620	<1250	<1250	<1250	<1250	<1250	<1250	<2500	<625	<620	NA	NA	5
Carbon Tetrachloride	<2	<50	<125	<250	<120	<250	<250	<250	<250	<250	<250	<500	<125	<120	<120	<250	5
Chlorobenzene	<2	<50	<125	<250	<120	<250	<250	<250	<250	<250	<250	<500	<125	<120	<120	<250	5
Chloroform	5J	<50	<125	<250	<120	<250	<250	<250	<250	<250	<250	<500	<125	<120	<120	<250	7
Dichlorodifluoromethane	NA	<100	<250	<500	<250	<500	<500	<500	<500	<500	<500	<1000	<250	<250	NA	NA	5
1,1-Dichloroethene	**7J**	<50	<125	<250	<120	<250	<250	<250	<250	<250	<250	<500	<125	<120	<120	<250	5
cis-1,2-Dichloroethene	**39**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<120	<120	<250	5
trans-1,2-Dichloroethene	**6J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<120	<120	<250	5
1,2-Dichloroethene, Total	NA	<50	<125	<250	<120	<250	<250	<250	<250	<250	<250	<500	<125	NA	NA	NA	None Set
Tetrachloroethene	**8J**	<50	<125	<250	<120	<250	<250	<250	<250	<250	<250	<500	<125	<120	<120	<250	5
Trichloroethene	**2900**	**1800**	**5500**	**5000**	**6000**	**7800**	**8000**	**12000**	**7000**	**6000**	**5700**	**7200**	**4500**	**5000**	**3800**	**3500**	5
Vinyl Chloride	<4	<100	<250	<500	<250	<500	<500	<500	<500	<500	<500	<1000	<250	<250	<250	<250	2

Note:

J - Estimated Value
NA - Not Available

Monitoring well MW-10 is installed in bedrock
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-11 AT THE WARD PRODUCTS SITE, 61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-11																NYSDEC
METALS (mg/L)	1/22/98	5/8/98	8/25/98	11/17/98	5/24/99	8/23/99	11/15/99	5/23/00	8/22/00	5/21/01	8/29/01	6/17/02	9/16/02	9/10/03	5/19/04	8/18/04	STANDARD
Cadmium	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.005
Hexavalent Chromium	<0.0005	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NS	NS	0.05
Total Chromium	<0.0066	<0.005	<0.005	0.006	<0.005	0.006	<0.005	0.008	0.007	<0.005	0.007	<0.005	<0.005	<0.005	NS	NS	0.05
Iron	NA	NA	NA	NA	0.19	**1.29**	**1.55**	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.30
Lead	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.025
Manganese	NA	NA	NA	NA	0.06	0.09	0.09	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.30
Nickel	<0.0016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.10
Zinc	0.0104J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	None Set
NONMETALS (mg/L)																	
Chloride	ND	NA	NA	NA	1.5	1.5	1.5	NA	NA	NA	NA	NA	NA	NA	NS	NS	250
Cyanide, total	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	0.20
Ammonia Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	2
Nitrate Nitrogen	NA	NA	NA	NA	0.02	<0.02	<0.02	NA	NA	NA	NA	NA	NA	NA	NS	NS	10
Nitrite Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NS	NS	1
Sulfate	NA	NA	NA	NA	37	36	41	NA	NA	NA	NA	NA	NA	NA	NS	NS	250
Total Suspended Solids	4.4J	3.5	31	21	5.5	71	25	NA	NA	NA	NA	NA	NA	NA	NS	NS	None Set
Turbidity (NTU)	**35.8**	**6.5**	**35**	**31**	**14**	**25**	**120**	**6.4**	**98**	**58**	**260**	**155**	**32**	**61**	NS	NS	5
VOCs (ug/L)																	
Acrylonitrile	<10	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	NS	NS	5
Carbon Tetrachloride	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	5
Chlorobenzene	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	5
Chloroform	<1	<5	<5	<5	<5	<5	<5	<5	6.0	<5	<5	<5	<5	<5	NS	NS	7
Dichlorodifluoromethane	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NS	NS	5
1,1-Dichloroethene	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	5
cis-1,2-Dichloroethene	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	NS	NS	5
trans-1,2-Dichloroethene	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<5	NS	NS	5
1,2-Dichloroethene, Total	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	NS	NS	None Set
Tetrachloroethene	<1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	5
Trichloroethene	<1	<5	<5	**180**	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NS	NS	5
Vinyl Chloride	<2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NS	NS	2

Note:

J - Estimated Value
NA - Not Available
NS - Not Sampled

Monitoring well MW-11 is installed in bedrock

BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-12 AT THE WARD PRODUCTS SITE, 61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-12											**NYSDEC**
METALS (mg/L)	8/23/99	11/16/99	5/24/00	8/22/00	5/21/01	8/30/01	6/19/02	9/17/02	9/11/03	5/18/04	8/17/04	**STANDARD**
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	0.05
Total Chromium	0.008	0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NA	NA	0.05
Iron	0.11	0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	0.13	0.11	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)												
Chloride	47	41	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	<0.02	<0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	131	140	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	12	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**11**	**20**	**7.9**	**430**	**134**	**57**	**380**	**92**	**120**	NA	NA	5
VOCs (ug/L)												
Acrylonitrile	<25	<25	<25	<25	<25	<25	<25	<25	<25	NA	NA	5
Carbon Tetrachloride	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
Chlorobenzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
Chloroform	<5	<5	<5	7.0	7.0	<5	<5	<5	<5	<5	<10	7
Dichlorodifluoromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	5
1,1-Dichloroethene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	**9.8**	**8.5**	<10	5
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	<5	<5	<10	5
1,2-Dichloroethene, Total	10.0	8.0	9.9	8.0	7.0	9.0	7.0	8.0	NA	NA	NA	None Set
Tetrachloroethene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10	5
Trichloroethene	**110**	**120**	**120**	**83**	**79**	**86**	**75**	**110**	**120**	**96**	**110**	5
Vinyl Chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2

Note:

NA - Not Available

Monitoring well MW-12 is installed in bedrock

BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELL MW-13 AT THE WARD PRODUCTS SITE, 61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-13											NYSDEC
METALS (mg/L)	8/23/99	11/16/99	5/24/00	8/23/00	5/21/01	8/30/01	6/18/02	9/18/02	9/11/03	5/19/04	8/18/04	STANDARD
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.020	0.05
Total Chromium	<0.005	<0.005	<0.005	<0.005	0.005	0.006	<0.005	<0.005	<0.005	<0.005	0.0027B	0.05
Iron	**0.37**	0.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	0.28	0.23	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)												
Chloride	48	49	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	<0.02	<0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	97	124	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	27	5.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**28**	**10**	**908**	**57**	**96**	**210**	**370**	**110**	**280**	**95**	**68**	5
VOCs (ug/L)												
Acrylonitrile	<50	<250	<25	<125	<250	<250	<125	<250	<120	NA	NA	5
Carbon Tetrachloride	<10	<50	<5	<25	<50	<50	<25	<50	<25	<25	<50	5
Chlorobenzene	<10	<50	<5	<25	<50	<50	<25	<50	<25	<25	<50	5
Chloroform	<10	<50	<5	<25	<50	<50	<25	<50	<25	<25	<50	7
Dichlorodifluoromethane	<20	<100	<10	<50	<100	<100	<50	<100	<50	NA	NA	5
1,1-Dichloroethene	<10	<50	**14**	<25	<50	<50	<25	<50	<25	<25	<50	5
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	**59**	**46**	**44J**	5
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	<25	<25	<50	5
1,2-Dichloroethene, Total	20	66	58	55	<50	60	30	<50	NA	NA	NA	None Set
Tetrachloroethene	<10	<50	<5	<25	<50	<50	<25	<50	<25	<25	<50	5
Trichloroethene	**290**	**750**	**530**	**650**	**840**	**940**	**600**	**700**	**800**	**740**	**740**	5
Vinyl Chloride	<20	<100	<10	<50	<100	<100	<50	<100	<50	<50	<50	2

Note:

NA - Not Available

Monitoring well MW-13 is installed in bedrock

BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELLS MW-14 AND MW-15
AT THE WARD PRODUCTS SITE, 61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-14								MW-15								NYSDEC
METALS (mg/L)	8/22/00	5/21/01	8/30/01	6/19/02	9/17/02	9/12/03	5/18/04	8/16/04	8/22/00	5/21/01	8/30/01	6/19/02	9/17/02	9/12/03	5/18/04	8/16/04	STANDARD
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NA	NA	0.05
Total Chromium	0.011	<0.005	<0.005	<0.005	<0.005	<0.005	NA	NA	0.009	<0.005	0.005	<0.005	<0.005	<0.005	NA	NA	0.05
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																	
Chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**89**	**22**	**88**	**57**	**32**	**20**	NA	NA	**150**	**68**	**27**	**28**	**32**	**12**	NA	NA	5
VOCs (ug/L)																	
Acrylonitrile	<25	<25	<25	<25	<25	<25	NA	NA	<25	<25	<25	<25	<25	<25	NA	NA	5
Carbon Tetrachloride	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<10	5
Chlorobenzene	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<10	5
Chloroform	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<10	7
Dichlorodifluoromethane	<10	<10	<10	<10	<10	<10	NA	NA	<10	<10	<10	<10	<10	<10	NA	NA	5
1,1-Dichloroethene	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<10	5
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	<5	<5	<10	NA	NA	NA	NA	NA	<5	<5	<10	5
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	<5	<5	<10	NA	NA	NA	NA	NA	<5	<5	<10	5
1,2-Dichloroethene, Total	<5	<5	<5	<5	<5	NA	NA	NA	<5	<5	<5	<5	<5	NA	NA	NA	None Set
1,2-Dichloropropane	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	**28**	<5	<10	5
Tetrachloroethene	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<10	5
Trichloroethene	<5	<5	<5	<5	<5	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<10	5
Vinyl Chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2

Notes:

NA - Not Available
All wells installed in bedrock
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELLS MW-16 TO MW-18 AT THE WARD PRODUCTS SITE, 61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-16					MW-17					MW-18					NYSDEC
METALS (mg/L)	6/19/02	9/17/02	9/11/03	5/16/04	5/16/04	6/19/02	9/17/02	9/11/03	5/18/04	8/17/04	6/19/02	9/17/02	9/12/03	5/18/04	8/17/04	**STANDARD**
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	<0.02	<0.02	<0.02	NA	NA	<0.02	<0.02	<0.02	NA	NA	<0.02	<0.02	<0.02	NA	NA	0.05
Total Chromium	<0.005	<0.005	<0.005	NA	NA	<0.005	<0.005	<0.005	NA	NA	<0.005	<0.005	<0.005	NA	NA	0.05
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																
Chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**480**	**290**	**150**	NA	NA	**460**	**650**	**33**	NA	NA	**155**	**190**	**150**	NA	NA	5
VOCs (ug/L)																
Acrylonitrile	<25	<25	<50	NA	NA	<25	<250	<25	NA	NA	<25	<25	<25	NA	NA	5
Carbon Tetrachloride	<5	<5	<10	<5	<10	<5	<50	<5	<5	<50	<5	<5	<5	<5	<10	5
Chlorobenzene	<5	<5	<10	<5	<10	<5	<50	<5	<5	<50	<5	<5	<5	<5	<10	5
Chloroform	<5	<5	<10	<5	<10	<5	<50	<5	<5	<50	<5	<5	<5	<5	<10	7
Dichlorodifluoromethane	<10	<10	<20	NA	NA	<10	<100	<10	NA	NA	<10	<10	<10	NA	NA	5
1,1-Dichloroethene	<5	<5	<10	<5	<10	<5	<50	**9.9**	<5	<50	<5	<5	<5	<5	<10	5
cis-1,2-Dichloroethene	NA	NA	**26**	<5	<10	NA	NA	**35**	**20**	**13J**	NA	NA	<5	<5	<10	5
trans-1,2-Dichloroethene	NA	NA	<10	<5	<10	NA	NA	<5	<5	<50	NA	NA	<5	<5	<10	5
1,2-Dichloroethene, Total	<5	11	NA	NA	NA	<5	<50	NA	NA	NA	<5	<5	NA	NA	NA	None Set
Tetrachloroethene	<5	<5	<10	<5	<10	<5	<50	<5	<5	<50	<5	<5	<5	<5	<10	5
Trichloroethene	<5	**33**	**400**	**33**	**43**	**67**	**700**	**1100**	**550**	**590**	<5	<5	**6.7**	**6.7**	4J	5
Vinyl Chloride	<10	<10	<20	<10	<10	<10	<100	<10	<10	<50	<10	<10	<10	<10	<10	2

Notes:

NA - Not Available

All wells installed in bedrock

BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES COLLECTED FROM MONITORING WELLS MW-19 and MW-20 AT THE WARD PRODUCTS SITE, 61 EDSON STREET, AMSTERDAM, NEW YORK.

	MW-19				MW-20				NYSDEC
METALS (mg/L)	9/11/03	1/7/04	5/18/04	8/17/04	9/11/03	1/7/04	5/18/04	8/16/04	**STANDARD**
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	<0.02	NA	NA	NA	<0.02	NA	NA	NA	0.05
Total Chromium	<0.005	NA	NA	NA	<0.005	NA	NA	NA	0.05
Iron	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Lead	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	0.30
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)									
Chloride	NA	NA	NA	NA	NA	NA	NA	NA	250
Cyanide, total	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	10
Nitrite Nitrogen	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	250
Total Suspended Solids	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Turbidity (NTU)	**190**	NA	NA	NA	**28**	NA	NA	NA	5
VOCs (ug/L)									
Acrylonitrile	<25	NA	NA	NA	<25	NA	NA	NA	5
Carbon Tetrachloride	<5	<5	<5	<10	<5	<5	<5	<10	5
Chlorobenzene	<5	<5	<5	<10	<5	<5	<5	<10	5
Chloroform	<5	<5	<5	<10	<5	<5	<5	<10	7
Dichlorodifluoromethane	<10	NA	NA	NA	<10	NA	NA	NA	5
1,1-Dichloroethene	<5	<5	<5	<10	<5	<5	<5	<10	5
cis-1,2-Dichloroethene	<5	<5	<5	<10	<5	<5	<5	<10	5
trans-1,2-Dichloroethene	<5	<5	<5	<10	<5	<5	<5	<10	5
1,2-Dichloroethene, Total	NA	NA	NA	NA	NA	NA	NA	NA	None Set
Tetrachloroethene	<5	<5	<5	<10	<5	<5	<5	<10	5
Trichloroethene	<5	<5	<5	<10	<5	<5	<5	<10	5
Vinyl Chloride	<10	<10	<10	<10	<10	<10	<10	<10	2

Notes:

NA - Not Available
All wells installed in bedrock
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 27 - SUMMARY OF WATER QUALITY RESULTS FOR GROUND WATER SAMPLES AND THEIR DUPLICATES COLLECTED FROM MONITORING WELLS AT THE WARD PRODUCTS SITE, 61 EDSON STREET, AMSTERDAM, NEW YORK.

	May 1997		Sept. 1997		Nov. 1997		Jan. 1998		May 1998		Aug. 1998		Nov. 1998		May 1999		Aug. 1999		Nov. 1999		NYSDEC
METALS (mg/L)	MW-2	Dup.	MW-6	Dup.	MW-7	Dup.	MW-4R	Dup.	MW-4R	Dup.	MW-4R	Dup.	MW-4R	Dup.	MW-7	Dup.	MW-6	Dup.	MW-7	Dup.	STANDARD
Cadmium	<0.010	<0.010	<0.010	<0.010	<0.0031	<0.0031	<0.0031	<0.0031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.005
Hexavalent Chromium	**1.42**	**0.397**	0.0187	0.0214	0.0065J	0.0071J	0.0052	0.00431J	0.03	0.02	0.03	0.03	0.03	0.02	**0.13**	**0.13**	**0.17**	**0.17**	**0.07**	**0.07**	0.05
Total Chromium	NA	NA	<0.030	<0.030	0.0077J	0.0083J	0.0092J	0.0081J	0.03	0.02	0.005	0.008	0.015	0.014	**0.087**	**0.079**	**0.159**	**0.15**	0.039	0.035	0.05
Iron	**4.64**	**1.23**	<0.10	<0.10	<0.015	<0.015	NA	NA	NA	NA	NA	NA	NA	NA	0.08	NA	0.27	0.38	**0.35**	**0.36**	0.30
Lead	<0.10	<0.10	<0.10	<0.10	<0.021	<0.021	<0.021	<0.021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025
Manganese	0.084	0.068	0.038	0.040	0.0096J	0.0062J	NA	NA	NA	NA	NA	NA	NA	NA	<0.02	NA	<0.02	<0.02	0.02	0.02	0.30
Nickel	<0.050	<0.050	<0.050	<0.050	0.0081	0.0024J	0.0056	0.0047J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10
Zinc	<0.025	<0.025	<0.025	<0.025	0.0191J	0.0176J	0.093	0.076	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	None Set
NONMETALS (mg/L)																					
Chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	62	NA	78	77	76	75	250
Cyanide, total	<0.0050	<0.0050	<0.0050	<0.0050	<0.0040	<0.0040	<0.0040	<0.0040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20
Ammonia Nitrogen	<0.050	<0.050	<0.050	<0.050	<0.030	<0.030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2
Nitrate Nitrogen	0.317	0.206	0.47	0.54	0.18	0.17J	NA	NA	NA	NA	NA	NA	NA	NA	1.3	NA	0.97	0.93	1.4	1.4	10
Nitrite Nitrogen	<0.020	<0.020	<0.020	<0.020	<0.015	<0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1
Sulfate	51.0	60.6	42.5	41.2	71.8	72.2J	NA	NA	NA	NA	NA	NA	NA	NA	83	NA	72	72	111	110	250
Total Suspended Solids	NA	NA	<9.0	10.0	<3.4	<3.4	39.2	31.2	29	31	119	114	37	13	20	NA	74	57	20	47	None Set
Turbidity (NTU)	NA	NA	**12.4**	**12.5**	3.7	2.99	21.8	18.7	**34**	**53**	**180**	**220**	**32**	**14**	**12**	NA	**33**	**30**	**23**	**32**	5
VOCs (u g/L)																					
cis-1,2-Dichloroethene	<5	<5	<25	<25	3J	3J	**80J**	**76J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5
trans-1,2-Dichloroethene	<5	<5	<25	<25	<2	<2	<40	<40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5
1,2-Dichloroethene, Total	NA	NA	NA	NA	NA	NA	NA	NA	<500	<500	<500	<500	<1200	<1200	<25	<25	<250	<250	<25	<25	None Set
Tetrachloroethene	<5	<5	**48**	**49**	1J	1J	**210**	**210**	<500	<500	<500	<500	<1200	<1200	<25	<25	<250	<250	<25	<25	5
Trichloroethene	<5	<5	**4900**	**5200**	**450**	**410**	**28000**	**26000**	**22000**	**28000**	**17000**	**23000**	**28000**	**23000**	**1300**	**1400**	**5700**	**5000**	**650**	**570**	5
Vinyl Chloride	<5	<5	<25	<25	<2	<2	ND	ND	<1000	<1000	<1000	<1000	<2500	<2500	<50	<50	<500	<500	<50	<50	2

Notes:

Dup. - Duplicate sample
J - Estimated Value
NA - Not Available
BOLD VALUES EXCEED GROUND WATER STANDARDS (PART 703 AMENDED AUGUST 1999)

TABLE 28 - RESULTS OF LABORATORY ANALYSES FOR SAMPLES COLLECTED AT FIBER GLASS INDUSTRIES WELLS FGI-1 AND FGI-2 IN DECEMBER 2004 AND IN FEBRUARY 2005.

WELL ID	TCE (ug/L)	cis-1,2-DCE (ug/L)	Chloroform (ug/L)	Total Chromium (mg/L)	Dissolved Chromium (mg/L)	Hexavalent Chromium (mg/L)	Turbidity (NTU)
FGI - 1							
12/29/2004	**440**	<25	<25	0.011	NA	<0.02	**170**
2/1/2005	**190**	**6.0**	6.5	0.007	<0.005	<0.02	**82**
Duplicate	**200**	**6.0**	6.5	<0.005	<0.005	<0.02	**66**
FGI - 2							
12/29/2004	<5.0	<5.0	<5.0	0.006	NA	<0.02	**1300**
Duplicate	<5.0	<5.0	<5.0	0.016	NA	<0.02	**1900**
Standard	5	5	7	0.05	0.05	0.05	5

Notes:

cis-1,2-DCE - cis-1,2-dichloroethene
TCE - Trichloroethene
NA - Not analyzed
NTU - Nephelometric turbidity unit
Standard - Ground Water Quality Standards, NYSDEC 6 NYCRR Part 703
Bold values above standard

TABLE 29 - RESULTS OF FIELD PARAMETERS MEASURED AT FIBER GLASS INDUSTRIES WELLS FGI-1 AND FGI-2 DURING SAMPLING IN DECEMBER 2004 AND FEBRUARY 2005.

WELL ID	Dissolved Oxygen (mg/L)	Specific Conductance (umhos)	Water Temperature (°C)	Eh (mV)	pH (SU)
FGI - 1					
12/29/2004	2.77	342	9.0	33	8.2
2/1/2005	2.52	500	9.5	65	8.1
FGI - 2					
12/29/2004	2.60	655	9.2	103	6.9

Notes:

mV - millivolts
SU - standard units

TABLE 30 - THE CONTAMINANTS OF CONCERN (CoC) IDENTIFIED IN THE ENVIRONMENT AT THE WARD PRODUCTS SITE AT 61 EDSON STREET IN AMSTERDAM, NY.

	ENVIRONMENTAL MEDIUM				
CONTAMINANT	SOIL	SEDIMENT	SURFACE WATER	GROUND WATER	INDOOR AIR
CADMIUM	**YES**	**YES**	No	No	No
CHROMIUM	**YES**	**YES**	No	**YES**	No
CYANIDE	**YES**	No	No	No	No
LEAD	No	No	No	No	No
NICKEL	**YES**	**YES**	No	No	No
ZINC	**YES**	No	No	No	No
TETRACHLOROETHENE	No	No	No	No	No
TRICHLOROETHENE	No	No	No	**YES**	**YES**
PCBs	No	No	No	No	No

Notes:

YES - a contaminant of concern (CoC)
No - not a contaminant of concern (CoC)