

# NEW YORK STATE SUPERFUND CONTRACT

## Remedial Investigation Data Report

### Volume I • Report

United Plating Site  
Remedial Investigation/Feasibility Study

Site No. 447018

Work Assignment No. D002676-10

**DATE:** December 1995



Prepared for:

**New York State  
Department of  
Environmental Conservation**

50 Wolf Road, Albany, New York 12233  
Michael Zagata, *Commissioner*

Division of Hazardous Waste Remediation  
Michael J. O'Toole, Jr., P.E., *Director*

**By:**

**Lawler, Matusky & Skelly Engineers LLP**

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REMEDIAL INVESTIGATION DATA REPORT**

**VOLUME I - REPORT**

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**LAWLER, MATUSKY & SKELLY ENGINEERS LLP**  
Environmental Science and Engineering Consultants  
One Blue Hill Plaza  
Pearl River, NY 10965

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## CHAPTER 1

### INTRODUCTION

#### 1.1 SITE LOCATION AND DESCRIPTION

The United Plating (UP) site is located at 1776 Foster Avenue in the City of Schenectady, New York (Figure 1-1). The site is approximately 1.7 acres, half of which is covered by the building footprint (Figure 1-2). UP operated as a metal plating facility from 1945 until 1990. The site is bounded by Seneca Street to the north, Foster Avenue to the west, a vacant field to the east, and residential housing to the south. A children's playground lies to the southeast of the site. The west side of the property consists of a parking area in front of Building 1 and an overgrown area in front of Building 2. The east side of the property consists of a graveled road, concrete pads, and an area of mostly grass and weeds. A chain link fence fitted with three-strain barbed wire runs from the northeast corner of Building 1 along the entire eastern property line and ends at the southeast corner of Building 2. Access to the facility is through a locked gate off of Seneca Street. The Mohawk River is approximately 0.25 mile northwest of the site. The natural topography drains to the northwest toward the Mohawk River.

The site is occupied by two buildings, the first containing the remnants of the plating operations and offices, and the second containing the treatment facility. The building footprint occupies approximately 26,195 ft<sup>2</sup>. Building 1 is a five-story brick building, which at the time of the site reconnaissance contained metallic and other debris. Building 2 is a two-story metal structure; the roof on the south end has collapsed. At the time of the site reconnaissance Building 2 contained some vats or tanks used for treatment. Also during the site reconnaissance, the area to the east of the building was covered with metal and other debris.

#### 1.2 REPORT ORGANIZATION

This data report presents the results of Task 2b - Detailed Site Characterization conducted by Lawler, Matusky & Skelly Engineers LLP (LMS) for the New York State Department of Environmental Conservation (NYSDEC) for the UP site. Chapter 2 presents the field investigation procedures and Chapter 3 summarizes the data collected during the investigation. Chapter 4 presents recommendations for additional work.





FOSTER AVE.

CONC. WALK

GRAVEL

ASPHALT

CONC. RETAINING WALL

OFFICE

BRUSH

ASPHALT

DRUM STORAGE  
(2nd FLOOR)

MAIN PLATING ROOM

6-STORY BRICK BUILDING

SILVER PLATING ROOM

CONC. RET. WALL

ASPHALT

CONC. PAD

ANNODIZING ROOM  
(2nd FLOOR)

CHROME PLATING ROOM

CONC.  
LOADING DOCK

SENECA ST.

DRUM STORAGE

2-STORY CONCRETE BUILDING

WASTEWATER  
TREATMENT BUILDING

1-STORY METAL BUILDING

CONC. PAD

GRAVEL DRIVE

CITY OF SCHENECTADY  
(Reputed Owner)

CODINO REALTY, INC.  
(Reputed Owner)



SCALE  
1 in. = 40 ft

Figure 1-2

Site Plan

UNITED PLATING CORPORATION  
NYSDEC I.D. No. 447018

LAWLER, MATUSKY & SKELLY ENGINEERS LLP  
Pearl River, New York

Base map source: M.J. Engineering and Land Surveying 1995.

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## CHAPTER 2

### FIELD INVESTIGATION PROCEDURES

#### 2.1 INTRODUCTION

The objectives of the Detailed Site Characterization Task were to accurately characterize the groundwater quality upgradient and downgradient of the site and to locate and characterize the sump area in back of the building. In order to locate the monitoring wells needed to characterize the groundwater quality, the data (chemical and water table) collected from the soil probe investigation conducted as part of Task 2a and the test pit investigation conducted as part of Task 2b were used. Three sets of triplicate wells were installed (one upgradient and two downgradient) to characterize the groundwater of the overburden, weathered till/bedrock interface, and bedrock. Three overburden wells were installed inside the building to monitor the levels of contamination in the fill material beneath the building.

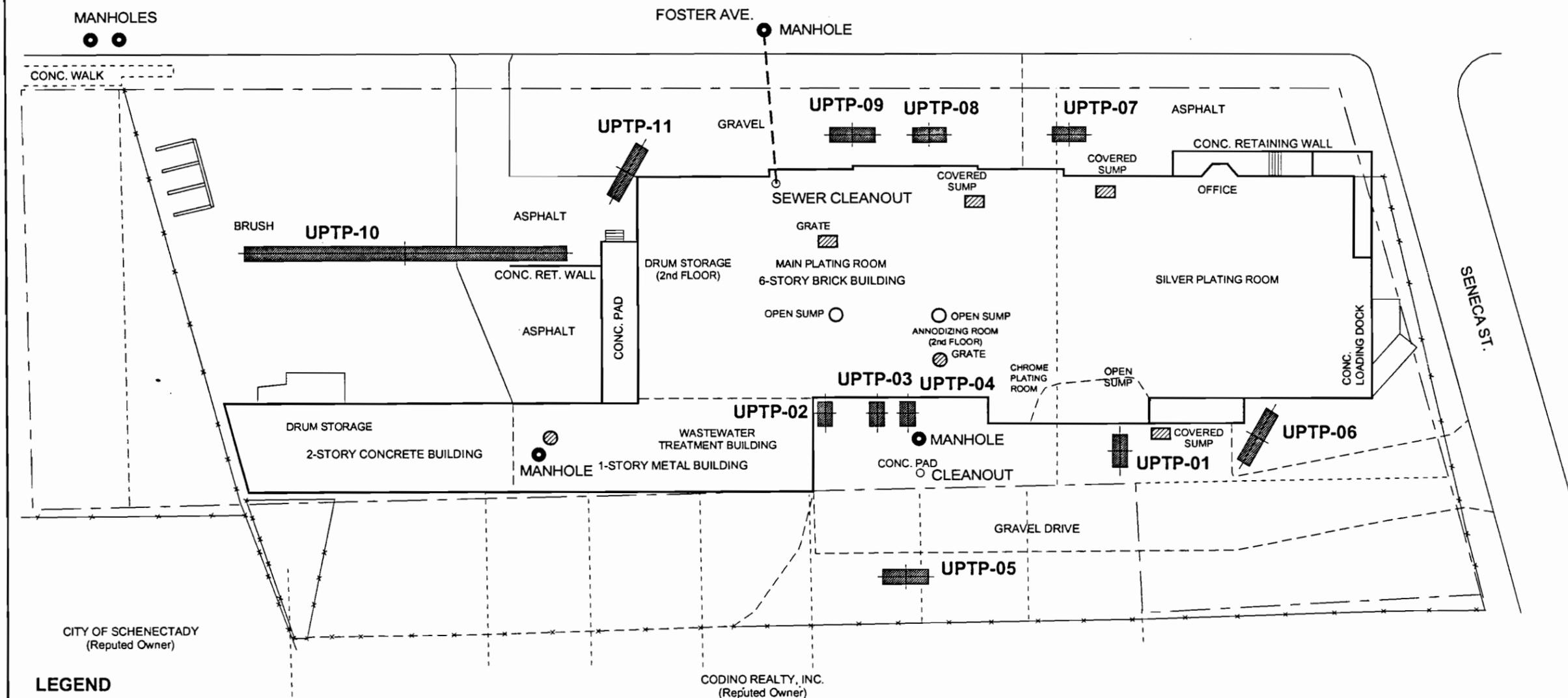
Test pits were used to characterize the sump area in back of the building, locate discharge lines and other pipes, and locate potential on-site disposal areas.

#### 2.2 TEST PIT INVESTIGATION

A total of 11 test pits were excavated on 21 and 22 August 1995 to accurately establish the location of drainlines exiting the UP buildings (see Figure 2-1). The test pitting was performed by MC Environmental Services, under subcontract to Pollution Solutions of Vermont, Inc. using a Komatsu PC150 track-mounted excavator. All excavations were supervised by an LMS geologist.

The test pits conducted in the lot behind the main building revealed stone fill of varying thickness overlying brown weathered glacial till. Below the weathered layer, dark gray glacial till was uncovered. In the front of the building, the weathered till was overlain by sandy cobble fill and asphalt. The glacial till is laden with cobbles and was extremely difficult to remove. The till is also tightly consolidated, forming vertical walls. Water was not present in most of the excavations, and where water was found in the excavation it was perched. At these locations, the excavation walls were damp but the water did not flow readily.

Several pipes were discovered during the test pitting operation. At UPTP-01 a perforated PVC pipe embedded in a coarse-stone fill was uncovered. The pipe led to the metal-covered sump



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CODINO REALTY, INC.  
(Reputed Owner)

- LEGEND**
- Test pit location
  - Sump with grate
  - Open sump
  - Manhole
  - Cleanout

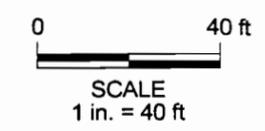


Figure 2-1  
**Location of Manholes,  
Cleanouts, Sumps, and Test Pits**  
UNITED PLATING CORPORATION  
NYSDEC I.D. No. 447018  
LAWLER, MATUSKY & SKELLY ENGINEERS LLP  
Pearl River, New York

Base map source: M.J. Engineering and Land Surveying 1995.

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adjacent to the building. It is believed that the sump and lateral drains were used to prevent groundwater infiltration into the chromium sump within the building. Based on visual inspection and sampling it is not believed that process wastes were discharged to this sump. A similar pipe was found at UPTP-05, which leads west to the manhole in the concrete pad behind the building; its use is unknown. A 4-in. masonry pipe containing water was uncovered at UPTP-02, UPTP-03 and UPTP-04, located adjacent to old sumps in the concrete pad at the corner of Buildings 1 and 2. At UPTP-04, above the masonry pipe, an empty 4-in. metal pipe was also found. Based on visual observations it appears that the holes cut into the concrete pad along the wall of the main building were originally constructed as footings for building additions. The additions were never built and the excavations were then used to discharge process wastewaters. These wastewaters could reach the city sewer system via the line discovered in UPTP-04 that was shown to be connected to the city sewer during smoke testing. In front of Building 2, at UPTP-10, a metal pipe was uncovered running from the gas main in the street to Building 2. Several others are known to exit the front of the building and lead to Foster Avenue.

A total of seven samples were collected from the test pits, with the location selection based on visual inspection and photoionization detector (PID) readings. The samples were collected from the bucket of the backhoe using a laboratory-cleaned, stainless steel spoon; the material was placed in a stainless steel bowl for homogenization and then placed in the proper sample containers for analysis. All samples were analyzed for TCL VOCs and TAL metals and cyanide using NYSDEC ASP(December 1991) methods by E3I. The sample for VOCs was collected directly from the bucket without homogenization. The sample bottles were labeled with the site name, job number, sample identification, date, time, and parameters for analysis. The sample containers were placed in iced coolers under chain-of-custody protocols for shipment to the analytical laboratory. The test pit logs are provided in Appendix A.

A field blank was performed on a set of sampling equipment and analyzed for possible routes of contamination during the sample acquisition process. Field blank water, provided by E3I, was poured over the sample collection equipment into a clean set of sample containers. At two sample locations extra soil was collected so that the laboratory could perform MS/MSD analyses for QA/QC purposes.

## 2.3 MONITORING WELL INSTALLATION

### 2.3.1 General Monitoring Well Details

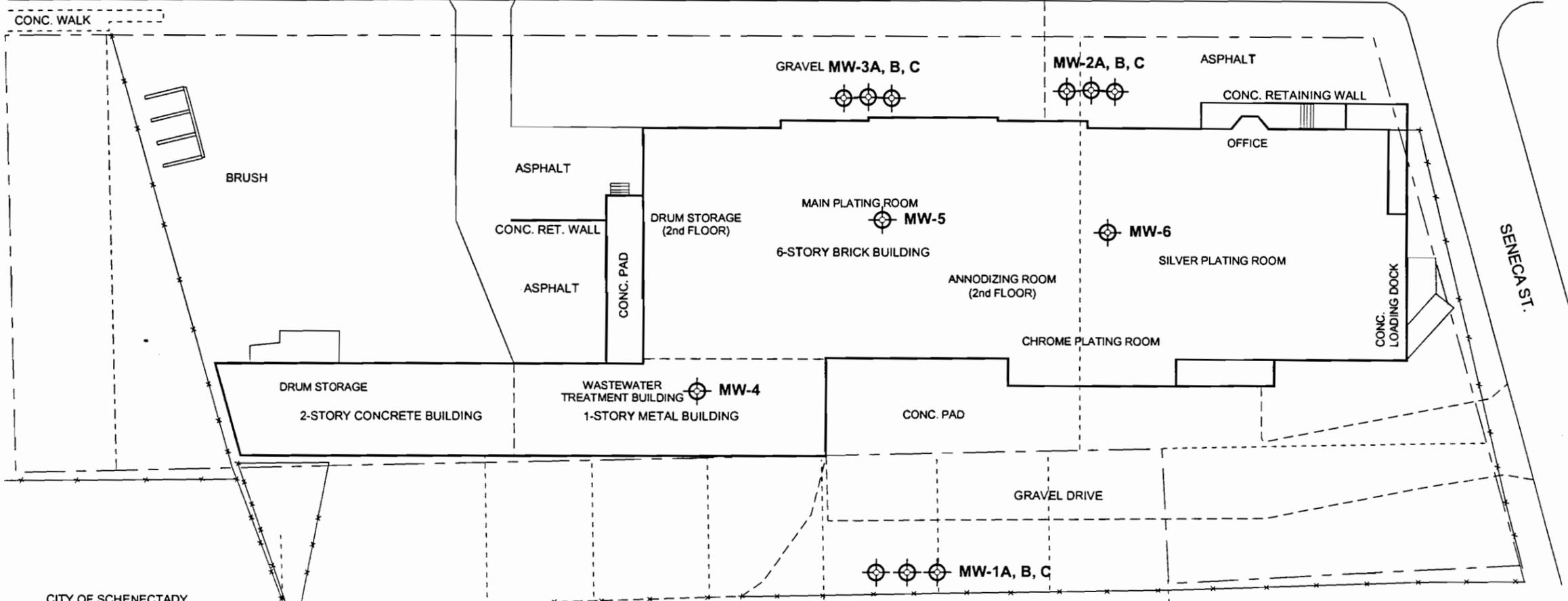
Aquifer Drilling and Testing, Inc. of Albany, New York (ADT) was subcontracted to install a total of 12 monitoring wells at the site (Figure 2-2). Three clusters of three wells each were installed outside the building, and three single wells were installed within the building. Each monitoring well cluster contains one shallow overburden well (designated with an A), one deeper overburden well situated directly on top of the bedrock (designated with a B), and one bedrock well (designated with a C). ADT used a Mobile B-59 drill rig to install the well clusters by using 4.25-in. hollow-stem augers (HSA) for the shallow overburden wells and a 4-in. rollerbit for the deeper overburden wells. The bedrock wells were advanced by first using a 6-in. rollerbit to penetrate the overburden followed by an HQ (3.79-in. O.D.) wireline system to core through the bedrock. For the wells located inside the building, a more maneuverable track-mounted Davy DK-50 low profile drilling rig was used. Indoor wells were advanced by first using a 4.25-in. HSA, followed by an 8-in. solid bit. It was necessary to bore the hole out in two stages due to the tightly consolidated nature of the subsurface. All drilling, well construction, installation and logging were supervised by an LMS geologist.

The overburden "A" and "B" wells were constructed with 2-in. sch 40 PVC casings and screens. The bedrock "C" wells were constructed by pressure grouting 4-in. sch 80 PVC casing several feet into the bedrock. Additionally, 2-in. sch 40 PVC inner casings and screens were installed to the bottom of the bedrock wells to prevent shards of bedrock from obstructing the wells. This was deemed a possibility in an open-hole bedrock well due to the large number of vertical fractures in the formation. Overburden wells installed inside the building were constructed with 4-in. sch 40 PVC. The UPMW-1 well cluster was located within the confines of the perimeter fence in a low traffic area and therefore those wells were finished with locking standpipes. All other wells were finished with curb boxes mounted at or very near grade surface.

Soil samples of the overburden were taken in continuous intervals through the entire depth of the "A" borings. Soil samples of the overburden in the "B" borings were taken in continuous intervals from the end depth of their corresponding "A" boring down to the bedrock.. All of the overburden sampling was conducted by using a 2-in. O.D. split-spoon sampler according to standard penetration test method ASTM-D 1586. Generally, overburden consists of brown weathered glacial till from grade surface to a depth of 4-6 ft., followed by a gray basal glacial till deposit which extends down to bedrock, which was intersected at 22-25.5 ft. Inside the building, artificial fill is encountered down to various depths. Despite their difference in color,



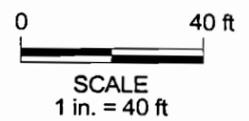
FOSTER AVE.



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(Reputed Owner)

- LEGEND**
- Approximate monitoring well location
  - A Shallow overburden well
  - B Intermediate overburden well
  - C Bedrock well



Base map source: M.J. Engineering and Land Surveying 1995.

V600V650V092site.dwg

Figure 2-2  
**Monitoring Well Locations**

UNITED PLATING CORPORATION  
NYSDEC I.D. No. 447018  
LAWLER, MATUSKY & SKELLY ENGINEERS LLP  
Pearl River, New York

the weathered and basal till deposits both generally consist of silt and fine sand, with some very coarse sand and small amounts of clay. Both the weathered and the basal glacial till deposits are very tightly consolidated, and were extremely difficult to auger through. All bedrock which was recovered during this investigation was from the Schenectady Formation, consisting of alternating layers of shale and sandstone. Details of the soil sample descriptions and monitoring well construction diagrams are documented in the boring logs, which are found in Appendix B. Soil sampling procedures are detailed in the next section.

### 2.3.2 Monitoring Well Soil Sampling

Soil sampling was conducted from 14 September 1995 through 20 September 1995 according to standard penetration test method ASTM-D 1586. This procedure involves sampling the overburden in 2 ft. intervals with a 2-ft. long, 2-in. outside diameter (O.D.) split-spoon sampler driven by a 140-lb. hammer falling 30 in. Samples were taken continuously to a depth of 14 ft. during the installation of the "A" wells. During the installation of the "B" wells, sampling of the overburden continued from 14 ft. to bedrock. No samples of the overburden were taken during the installation of the "C" wells. UPMW-4 and UPMW-6 were advanced at locations inside the building with low overhead clearance. This prevented certain intervals from being sampled; when there were more than 2 ft. of HSA protruding from the borehole, there was not enough clearance for the hammer to be lifted the required distance. The number of blows required to drive the sampler through a 6 in. interval was recorded and used to measure the relative density of the subsurface. If the spoon failed to advance 6 in. per 50 blows of the hammer, the sampler was retrieved and the boring was advanced with either a HSA or a rollerbit to the beginning of the next sampling interval.

Soil samples were examined and described on a boring log, noting the following characteristics: moisture content, lithology, color, texture, and evidence of contamination (odor, staining, sheen, organic vapor readings, and other sample-specific notifications). Depth, blow counts and sample recovery were also noted on the same log. The soil samples were scanned with an HNU photoionization detector (PID) immediately upon opening the split-spoon sampler to detect the presence of any volatile organic compounds. Boring logs may be found in Appendix B.

Based upon visual inspection and PID findings, soil samples were collected for analysis of volatile organic compounds, semivolatile organic compounds, TAL metals/CN<sup>-</sup> and pesticides/PCBs. All soil samples were placed in laboratory-cleaned jars and were shipped to E3I environmental laboratories, Somerville, MA under appropriate chain-of-custody protocol, maintained at 4°C. Those soil samples not selected for analysis by the analytical laboratory were archived for potential testing at a later date.

### 2.3.3 UPMW-1 Cluster

Three wells were installed to the east of the building near the fence, which is believed to be upgradient (Figure 2-2). All three monitoring wells were completed with locking standpipes rising to a height of approximately 3.5 ft. above grade. Weathered glacial till was found from grade surface down to a depth of 3.5 ft. Basal glacial till comprised the rest of the overburden, extending down to bedrock, which was found at 22 ft. Construction and development details are outlined below.

**Monitoring Well UPMW-1A.** Drilling commenced on 14 September 1995. The boring was advanced through the overburden and the well was set to a final depth of 14.74 ft. below grade. A 10 ft. length of 10 slot screen and an appropriate length of riser were used to complete the well. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-1A was developed from 28 September 1995 to 5 October 1995 by using a dedicated teflon bailer. It was necessary to develop this well over several days due to its slow rate of recharge; the well becomes dry after about 10 gallons of purging. Beginning turbidity values were over 200 nephelometric turbidity units (NTU), and cleared to 75 NTU.

**Monitoring Well UPMW-1B.** This well was installed on 18 September 1995 to a total depth of 21.71 ft. below grade. A 4.25-in. HSA was advanced to a depth of about 10 ft. as a temporary casing to guide the 4-in. rollerbit which was used to continue the boring to 25 ft. bedrock. A 5 ft. length of 10 slot screen and an appropriate length of riser were used to construct the well. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-1B was developed from 28 September 1995 to 5 October 1995 by using a dedicated teflon bailer. Recharge at this well was slightly slower than at UPMW-1A, drying out after purging 5-10 gallons. Turbidity changed from greater than 200 NTU to 50 NTU throughout the development.

**Monitoring Well UPMW-1C.** Construction of this well began 21 September 1995. Total depth of this well is 52.47 ft. below grade. A 6.25-in. HSA was advanced to a depth of about 10 ft. as a temporary casing to guide the 6-in. rollerbit which was used to continue the boring to 25 ft.; bedrock was intersected at approximately 22 ft. An HQ wireline system was then used to core 30 ft. into the bedrock. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

Recharge of UPMW-1C is extremely poor. After the drilling wash fluid was evacuated on 28 September 1995, only traces of extremely silty groundwater re-entered the well. On 3 October 1995, five gallons of deionized water were added, then removed with a dedicated teflon bailer, in an effort to open any fractures that might be clogged with silt. On 4 October 1995 only 0.5-0.8 ft. of groundwater was recorded, and on 5 October 1995 only 1.0-1.3 ft. of groundwater was found in the well.

#### 2.3.4 UPMW-2 Cluster

Three wells were installed near the west edge of the building, which is believed to be downgradient (Figure 2-2). All three monitoring wells were completed with flush-mounted curb boxes. Weathered glacial till was found from grade surface down to a depth of 6.4 ft. Basal glacial till comprised the rest of the overburden, extending down to bedrock, which was found at 25.5 ft. Construction and development details are outlined below.

***Monitoring Well UPMW-2A.*** Drilling commenced on 14 September 1995. The boring was advanced through the overburden and the well was set to a final depth of 14.72 ft. from grade. A 10 ft. length of 10 slot screen and an appropriate length of riser were used to complete the well. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-2A was initially dry upon completion, although a piezometer located within feet of this well recorded groundwater at 3.1 ft. It is believed that the overburden was damaged during drilling. The overall low moisture content and high fine sediment content may have resulted in the annulus of the borehole being smeared, preventing groundwater from entering the well. Deionized water was added to the well, which was then surged before the water was removed with a dedicated teflon bailer. The water level was checked in this well the next day and found to be 0.78 ft. below the top of the casing. The sudden rise of water in this well is believed to be the result of very heavy rain the night before.

***Monitoring Well UPMW-2B.*** This well was installed on 19 September 1995. Total depth of this boring was 26.43 ft. below grade. A 4.25-in. HSA was advanced to a depth of about 10 ft. as a temporary casing to guide the 4-in. rollerbit which was used to continue the boring to the top of bedrock. A 5 ft. length of 10 slot screen and an appropriate length of riser were used to construct the well. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-2B was developed from 28 September 1995 to 5 October 1995 by using a dedicated teflon bailer. Turbidity decreased from greater than 200 NTU to 44 NTU by the end of the development.

**Monitoring Well UPMW-2C.** Construction of this well began 22 September 1995. Total depth of this boring was 55.02 ft. from grade. A 6.25-in. HSA was advanced to a depth of about 10 ft. as a temporary casing to guide the 6-in. rollerbit which was used to continue the boring to 28 ft.; bedrock was intersected at approximately 25.5 ft. An HQ wireline system was then used to core 27 ft. into the bedrock. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-2C was developed from 2 October 1995 to 5 October 1995 by using a Grundfos pump and a dedicated teflon bailer. Recharge at this location is fair, yielding 40-50 gallons over the course of the day. Turbidity decreased from greater than 200 NTU to 42 NTU.

### 2.3.5 UPMW-3 Cluster

Three wells were installed south of the UPMW-2 cluster near the west edge of the building, which is believed to be downgradient (Figure 2-2). All three monitoring wells were completed with flush-mounted curb boxes. Weathered glacial till was found from grade surface down to a depth of 4.9 ft. Basal glacial till comprised the rest of the overburden, extending down to bedrock, which was found at 25.5 ft. Construction and development details are outlined below.

**Monitoring Well UPMW-3A.** Drilling commenced on 15 September 1995. The boring was advanced through the overburden and the well was set to a final depth of 14.94 ft. from grade. A 10 ft. length of 10 slot screen and an appropriate length of riser were used to complete the well. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-3A was initially dry upon completion, although a piezometer located nearby this well recorded groundwater at 4.27 ft. It is believed that the overburden was damaged during drilling. The overall low moisture content and high fine sediment content may have resulted in the annulus of the borehole being smeared, preventing groundwater from entering the well. Deionized water was added to the well, which was then surged before the water was removed by a dedicated teflon bailer. The next day the water level was checked and several feet of water came into the well, indicating that at least some portion of the screen was open to a water bearing zone.

**Monitoring Well UPMW-3B.** This well was installed on 20 September 1995. Total depth of this boring was 26.14 ft. below grade. A 4.25-in. HSA was advanced to a depth of about 15 ft. as a temporary casing to guide the 4-in. rollerbit which was used to continue the boring to the top of bedrock. A 5 ft. length of 10 slot screen and an appropriate length of riser were used to construct the well. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-3B was developed from 2 October 1995 to 5 October 1995 by using a dedicated teflon bailer. This well appears to yield approximately 25 gallons of water per day. Turbidity decreased during development from greater than 200 NTU to 113 NTU by the end of the development, with readings taken from the top of the water column showing values as low as 60 NTU.

**Monitoring Well UPMW-3C.** Construction of this well began 22 September 1995. Total depth of this boring was 53.45 ft. from grade. A 6.25-in. HSA was advanced to a depth of about 10 ft. as a temporary casing to guide the 6-in. rollerbit which was used to continue the boring to 28 ft.; bedrock was intersected at approximately 25.5 ft. An HQ wireline system was then used to core 27 ft. into the bedrock. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-3C was developed 4 October 1995 and 5 October 1995 by using a Grundfos pump and a teflon bailer. Recharge at this location is fairly poor, yielding 20-30 gallons over the course of the day. Turbidity remained greater than 200 NTU.

#### 2.3.6 Monitoring Well UPMW-4

Installation commenced on 28 September 1995 inside the wastewater treatment building (Figure 2-2). Approximately one foot of concrete was cored out of the floor. On the first attempt at installing the well, augers encountered refusal at 8 ft. A new hole was cored in the floor and the boring was advanced to a depth of 15 ft. about 5 ft. to the south. Artificial fill was intersected down to a depth of 15 ft. Basal till was discovered in the 15-17 ft. sample. Total depth of the well was 12.74 ft. below grade. A 10 ft. length of 10 slot screen and an appropriate length of riser 4-in. in diameter were put in place and a curb box was set 0.44 ft. above grade to complete the well. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-4 was initially dry upon completion. On 3 October 1995, 30 gallons of deionized water were added to the well; it was then surged and the water was left to stand overnight before

being removed by a dedicated teflon bailer. Water level changed slightly overnight from 2.33 to 2.80, however, very little groundwater entered the well after the deionized water was evacuated. It is still unclear at this time whether or not this well will yield water to a significant degree.

### **2.3.7 Monitoring Well UPMW-5**

Installation commenced on 28 September 1995 in the main plating room of building 1. The concrete floor, about one foot thick, was cored and the boring was advanced through approximately 2 ft. of artificial fill overlying weathered till. The basal glacial till deposit was found in the 13-15 ft. soil sample. Total depth of the well was 12.84 ft. below grade. A 10 ft. length of 10 slot screen and an appropriate length of riser 4-in. in diameter were put in place and a curb box was set 0.44 ft. above grade to complete the well. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-5 was purged with a dedicated teflon bailer on 4 October 1995 and 5 October 1995. This well recovers poorly, becoming dry after purging one to two gallons. Turbidity remained above 200 NTU.

### **2.3.8 Monitoring Well UPMW-6**

Installation commenced on 29 September 1995 in the chrome plating room (Figure 2-2). About one foot of concrete floor was cored through and the boring was advanced through approximately 2 ft. of artificial fill overlying weathered till. Basal glacial till was found at 9 ft. Total depth of the well was 13.70 ft. below grade. A 10 ft. length of 10 slot screen and an appropriate length of riser 4-in. in diameter were put in place and a flush-mounted curb box was set to complete the well. Sandpack, bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-6 was purged with a dedicated teflon bailer on 3 October 1995 through 5 October 1995. This well recovers poorly, becoming dry after purging about 10 gallons. Surging seemed to increase yield slightly. Turbidity decreased during development from greater than 200 NTU to 152 NTU. Groundwater at this location is noticeably discolored greenish-yellow.

## 2.4 GROUNDWATER SAMPLING AND ANALYSIS

Monitoring well sampling was initiated on 16 October 1995 by completing a full round of static water levels (SWL). All of the well exhibited reasonable water levels with the exception of UPMW-4 and UPMW-1C, which appear to be very slow to recover. Based on the SWL and the total depth of the well the purge volume was then calculated. All of the wells were then purged until dry using a dedicated teflon bailer with the exception of UPMW-2C which was purged a minimum of three purge volumes. Monitoring well sampling logs are found in Appendix C.

During the purging process turbidity, temperature, pH and conductance were measured at routine intervals to track the purging process and provide sampling chemistries. Once the purging process was completed, the wells were allowed to recharge overnight. Only those wells which had recharged approximately 90% were sampled the next day (17 October 1995).

Samples were collected from the mid-depth for the water column using new dedicated teflon bailers and rope. Sample chemistries, including temperature, turbidity, pH, and specific conductance were taken if sufficient volume of water was available.

Due to the slow recharge rate of several of the wells the analysis parameters were prioritized as follows: VOCs, unfiltered metals, filtered metals, cyanide, SVOC's, and pesticides/PCBs. Full sets of samples were collected from all the wells with the exception of UPMW-1C and UPMW-4 which only had sufficient volume for VOCs and unfiltered metals.

## CHAPTER 3

### TASK 2b SAMPLING RESULTS

#### 3.1 INTRODUCTION

This chapter contains the data collected during the Task 2b field investigation. All samples collected as part of Task 2b were validated. The data are presented by Task 2b subtask.

#### 3.2 TEST PIT SAMPLING

A total of seven samples were collected from 11 test pits constructed during the test pit investigation. The samples are summarized on Table 3-1 and shown graphically on Figure 3-1. The table also shows the eastern U.S. background soil concentrations for metals and the NYSDEC soil cleanup objectives (NYSDEC 1994a). Results in bold exceed the cleanup objective/background levels. The laboratory analytical data sheets are contained in Appendix C, and the data validation and usability report is still being prepared at the time this report was issued.

None of the VOC results exceeded the NYSDEC cleanup objective. Zinc exceeded the cleanup objective/background level in all seven samples. Cadmium and magnesium exceeded the limit in six samples, copper and nickel in five samples, chromium in four samples, mercury and calcium in three samples, silver in two samples, and barium and thallium in one sample. The highest levels of contamination appeared to be in the three test pits on the southeast side of the building (UPTP-01, -02, -03, and -04).

#### 3.3 MONITORING WELL SOIL SAMPLING

A total of six samples were collected from six monitoring wells constructed during the investigation. At locations where triplicate wells were installed, the sample was collected from the shallow overburden well. The samples are summarized on Table 3-2 and shown graphically on Figure 3-2. The table also shows the eastern U.S. background soil concentrations for metals and the NYSDEC recommended soil cleanup objectives (NYSDEC 1994a). Site background levels could not be established based on available data, so the recommended soil cleanup objectives or eastern U.S. background were used for comparison. Results in bold exceed the cleanup objective/background levels. The laboratory analytical data

TABLE 3-1 (Page 1 of 2)

**TEST PIT SAMPLE DATA SUMMARY (AUGUST 1995)**  
**United Plating Site**

PARAMETER	UPTP-1 (2.5 - 3 ft)	UPTP-02 (2 - 3 ft)	UPTP-02 (5 - 6 ft)	UPTP-03 (4 - 5 ft)	UPTP-04 (4 - 5 ft)	UPTP-06 (2.5 - 3 ft)	UPTP-07 (3.5 - 4 ft)	UPFB-10	RECOMMENDED SOIL CLEANUP OBJECTIVES (a)
								FIELD BLANK (µg/l)	
<b>VOLATILE ORGANICS (mg/kg)</b>									
1,2-Dichloroethylene (total)	ND	ND	0.017	ND	0.070	ND	ND	ND	0.3
2-Butanone	ND	ND	ND	ND	0.012 j	ND	ND	ND	0.3
Trichloroethylene	ND	0.12	0.040	0.045 j	0.14	0.002 j	ND	ND	0.7
Toluene	ND	ND	ND	ND	0.006 j	ND	ND	ND	1.5
<b>VOLATILE ORGANICS (mg/kg)</b>									
<b>Tentatively Identified Compounds</b>									
Unknown	ND	0.028 (2) j	ND	6.7 (5) j	ND	0.006 j	ND	ND	NS
Unknown substituted alkane	ND	ND	ND	9.6 (4) j	ND	ND	ND	ND	NS
Unknown alkane	ND	ND	ND	1.6 j	ND	0.007 j	ND	ND	NS
Unknown hydrocarbon	ND	ND	ND	ND	0.019 j	ND	ND	ND	NS

( ) - Number of compounds in total.

(a) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.

j - Estimated concentration; compound present below quantitation limit.

ND - Not detected at analytical detection limit.

NS - No standard.

TABLE 3-1 (Page 2 of 2)

**TEST PIT SAMPLE DATA SUMMARY (AUGUST 1995)**  
**United Plating Site**

PARAMETER	UPTP-1 (2.5 - 3 ft)	UPTP-02 (2 - 3 ft)	UPTP-02 (5 - 8 ft)	UPTP-03 (4 - 5 ft)	UPTP-04 (4 - 5 ft)	UPTP-06 (2.5 - 3 ft)	UPTP-07 (3.5 - 4 ft)	UPFB-10 FIELD BLANK (µg/l)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)
<b>TAL METALS (mg/kg)</b>										
Aluminum	1,450	8,700	7,330	4,440	5,190	7,860	10,800	10 B	33,000	SB
Antimony	ND N	ND N	ND N	ND N	ND N	ND N	ND N	ND	0.6 - 10 (n)	SB
Arsenic	4.9	9.2	5.0	3.2	4.8	10	7.7	ND	3.0 - 12.0 æ	7.5 or SB
Barium	54 E	<b>728 E</b>	56 E	48 B E	70 E	74 E	61 E	0.87 B	15 - 600	300 or SB
Beryllium	0.24 B	0.69 B	0.46 B	0.31 B	0.37 B	0.54 B	0.75 B	ND	0 - 1.75	0.16 or SB
Cadmium	<b>1.6</b>	<b>2.9</b>	<b>1.9</b>	<b>101</b>	<b>47</b>	<b>1.6</b>	0.73 B	ND	0.1 - 1.0	1 or SB
Calcium	<b>162,000</b>	10,200	30,100	<b>62,500</b>	22,300	<b>42,600</b>	2,550	519 B	130 - 35,000 æ	SB
Chromium	<b>573 R</b>	<b>775 R</b>	32 R	<b>50 R</b>	<b>61 R</b>	22 R	21 R	ND	1.5 - 40.0 æ	10 or SB
Cobalt	4.0 B	6.8 B	10 B	9.5 B	5.8 B	11 B	12	ND	2.5 - 60.0 æ	30 or SB
Copper	<b>712</b>	<b>147 R</b>	<b>55 R</b>	<b>163 R</b>	<b>199 R</b>	46 R	44 R	3.4 B	1.0 - 50.0	25 or SB
Iron	6,300	20,900	20,300	15,500	13,000	22,900	29,700	41 B	2,000 - 550,000	2,000 or SB
Lead	17 E	64 E	14 E	68 E	344 E	35 E	15 E	ND	4.0 - 61 or 200 - 500*	SB*
Magnesium	<b>70,000 E</b>	4,440 E	<b>9,490 E</b>	<b>26,300 E</b>	<b>7,310 E</b>	<b>7,310 E</b>	<b>5,120 E</b>	121 B	100 - 5,000	SB
Manganese	188	281	452	250	280	461	441	2.2 B	50 - 5,000	SB
Mercury	r	r	r	r	r	r	r	0.64	0.001 - 0.2	0.1
Nickel	9.3	<b>27</b>	<b>36</b>	<b>102</b>	<b>37</b>	23	<b>28</b>	ND	0.5 - 25	13 or SB
Potassium	848 B E	1,710 E	1,510 E	1,270 E	900 B E	1,750 E	1,870 E	ND	6,500 - 43,000 æ	SB
Selenium	ND N	0.41 B N W	ND N W	ND N W	ND N W	ND N W	0.30 B N W	ND W	0.1 - 3.9	2 or SB
Silver	1.3 B	<b>39</b>	0.99 B	4.6	<b>10.4</b>	0.83 B	ND	ND	0.1 - 5.0 (n)	SB
Sodium	222 B	184 B	186 B	168 B	128 B	212 B	423 B	239 B	6,000 - 8,000	SB
Thallium	ND	ND	ND	<b>1.4 B</b>	ND	ND	ND	ND	0.1 - 0.8 (q)	SB
Vanadium	7.2 B	24	16	14	12 B	17	25	ND	1.0 - 300	150 or SB
Zinc	<b>45 E N</b>	<b>237 E N</b>	<b>96 E N</b>	<b>712 E N</b>	<b>654 E N</b>	<b>95 E N</b>	<b>83 E N</b>	5.1 B	9.0 - 50	20 or SB
Cyanide	1.0 N	ND N	ND N	1.6 N	ND N	ND N	ND N	ND	N/A	**

**NOTE:** Bold numbers exceed soil cleanup objectives.

\* - Background levels for lead range from 4 to 61 ppm in undeveloped rural areas to 200 to 500 ppm in metropolitan areas or near highways.

\*\* - Some forms of cyanide are complex and stable, while other forms are pH dependent and hence are very unstable. Site-specific form(s) of cyanide should be taken into consideration when establishing soil cleanup objectives.

æ - New York State background concentration.

(b) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.

(n) - Dragun, J., The Soil Chemistry of Hazardous Materials.

(q) - Bowan, H.J., Environmental Chemistry of the Elements.

r - Value rejected; not usable.

B - Value is less than the contract-required detection limit but greater than the instrument detection limit.

E - Value estimated due to interference.

N - Spiked sample recovery is not within control limits.

R - Duplicate analysis not within control limits.

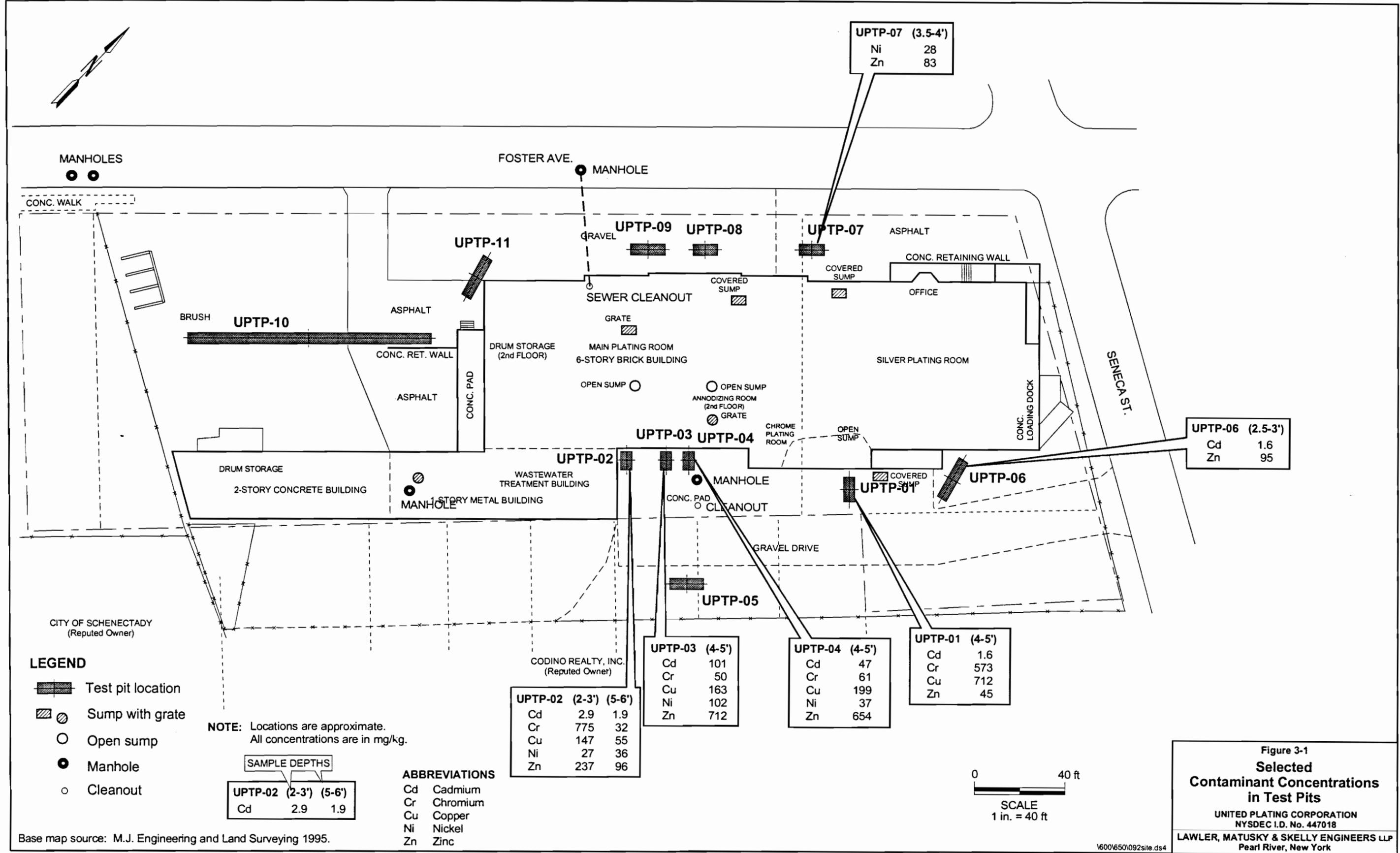
W - Post-digestion spike out of control limits; sample absorbance is less than 50% of spike absorbance.

N/A - Not available.

ND - Not detected at analytical detection limit.

Pb - Background levels for lead range from 4 - 61 ppm in undeveloped, rural areas to 200 - 500 ppm in metropolitan or suburban areas or near highways.

SB - Site background.



## SOIL BORING DATA SUMMARY (SEPTEMBER 1995)

United Plating Site

PARAMETER	RE				RE				UPFB-11	NYSDEC SOIL CLEANUP OBJECTIVES (a)
	UPMW-1A (6 - 8 ft.)	UPMW-2A (8 - 10 ft)	UPMW-2A (8 - 10 ft)	UPMW-3A (2 - 4 ft)	UPMW-4 (12 - 13 ft)	UPMW-4 (12 - 13 ft)	UPMW-5 (3 - 5 ft)	UPMW-6 (3 - 5 ft)	FIELD BLANK (µg/l)	
<b>VOLATILE ORGANICS (mg/kg)</b>										
Methylene chloride	ND	ND	ND	ND	0.0020 j	<b>0.15 j b</b>	ND	ND	2.0 j	0.1
Acetone	0.0070 b j	ND	0.010 b j	0.0090 b j	0.041 b	<b>3.5 b</b>	0.015 b	0.014 b	ND	0.2
Carbon disulfide	ND	ND	ND	ND	ND	ND	ND	ND	7.0 j	2.7
2-Butanone	ND	ND	ND	ND	0.0050 j	ND	0.0030 j	ND	ND	0.3
1,1,1-Trichloroethane	0.0090 j	0.013	0.018	ND	0.0020 j	ND	ND	0.0040 j	ND	0.8
1,2-Dichloropropane	ND	ND	ND	ND	0.060	0.30 j	ND	ND	ND	NS
Trichloroethylene	0.0090 j	0.0090 j	0.009 j	0.012	1.1 e	15	0.099	0.18	ND	0.7
Tetrachloroethylene	ND	ND	ND	ND	0.0020 j	ND	ND	ND	ND	1.4
Toluene	0.0060 j	0.0070 j	0.007 j	0.006 j	0.0020 j	ND	0.0010 j	ND	ND	1.5
Xylene (total)	ND	ND	ND	ND	0.0020 j	ND	ND	ND	ND	12
<b>VOLATILE ORGANICS Tentatively Identified Compounds (mg/kg)</b>										
Unknown	ND	ND	ND	0.080 j	ND	ND	ND	ND	ND	N/A
Hexane (DOT)(8C19Cl)	ND	ND	ND	ND	ND	0.80 b j n	ND	ND	ND	N/A
Unknown alkane	ND	ND	ND	ND	ND	ND	0.0080 j	ND	ND	N/A

**Note: Numbers in bold exceed standards.**

- (a) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.  
b - Found in associated blanks.  
j - Estimated concentration; compound present below quantitation limit.  
e - Estimated concentration; exceeds GC/MS calibration range.  
n - Identification is based on a mass spectral library search.

- ND - Not detected at analytical detection limit.  
N/A - Not available.  
NS - No standard.  
RE - Reanalysis.

**SOIL BORING DATA SUMMARY (SEPTEMBER 1995)**  
United Plating Site

PARAMETER	UPFB-11						FIELD BLANK (µg/l)	NYSDEC SOIL CLEANUP OBJECTIVES (a)
	UPMW-1A (6 - 8 ft)	UPMW-2A (8 - 10 ft)	UPMW-3A (2 - 4 ft)	UPMW-4 (12 - 13 ft)	UPMW-5 (3 - 5 ft)	UPMW-6 (3 - 5 ft)		
[DL: 500:1]								
<b>SEMIVOLATILE ORGANICS (mg/kg)</b>								
Naphthalene	ND	ND	ND	20 j	ND	ND	ND	13.0
Acenaphthene	ND	ND	ND	69 j	ND	0.044 j	ND	50.0***
Dibenzofuran	ND	ND	ND	28 j	ND	ND	ND	6.2
Fluorene	ND	ND	ND	69 j	ND	0.043 j	ND	50.0***
Phenanthrene	ND	0.036 j	ND	390	ND	0.42	ND	50.0***
Anthracene	ND	ND	ND	120 j	ND	0.082 j	ND	50.0***
Carbazole	ND	ND	ND	100 j	ND	0.054 j	ND	50.0***
Di-n-butylphthalate	0.17 j	0.17 j	0.29 j	ND	1.6 b	0.81 b	31 b	8.1
Fluoranthene	ND	0.36 j	ND	490	ND	0.50	ND	50.0***
Pyrene	ND	0.40 j	ND	370	ND	0.47	ND	50.0***
Butylbenzylphthalate	ND	ND	ND	ND	0.22 b j	ND	3.0 b j	50.0***
Benzo(a)anthracene	ND	ND	ND	290	ND	0.25 j	ND	0.224 or MDL
Chrysene	ND	ND	ND	320	ND	0.33 j	ND	0.4
bis(2-Ethylhexyl)phthalate	0.050 j	0.027 j	0.026 j	ND	ND	ND	2.0 b j	50.0***
Benzo(b)fluoranthene	ND	ND	ND	190	ND	0.21 j	ND	1.1
Benzo(k)fluoranthene	ND	ND	ND	110 j	ND	0.19 j	ND	1.1
Benzo(a)pyrene	ND	ND	ND	150 j	ND	0.21 j	ND	0.061 or MDL
Indeno(1,2,3-c,d)pyrene	ND	ND	ND	76 j	ND	0.11 j	ND	3.2
Dibenzo(a,h)anthracene	ND	ND	ND	44 j	ND	0.053 j	ND	0.014 or MDL
Benzo(g,h,i)perylene	ND	ND	ND	74 j	ND	0.13 j	ND	50.0***

Note: Numbers in bold exceed standards.

- \*\*\* - As per TAGM #4046, Total VOCs < 10 ppm, Total SVOCs < 500 ppm, and individual SVOCs < 50 ppm.  
 (a) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.  
 b - Found in associated blanks.  
 j - Estimated concentration; compound present below quantitation limit.  
 DL - Diluted sample analysis.

ND - Not detected at analytical detection limit.  
 MDL - Method detection limit.

**SOIL BORING DATA SUMMARY (SEPTEMBER 1995)**  
**United Plating Site**

PARAMETER	UPMW-1A	UPMW-2A	UPMW-3A	UPMW-4	UPMW-5	UPMW-6	UPFB-11	NYSDEC SOIL CLEANUP OBJECTIVES (a)
	(6 - 8 ft)	(8 - 10 ft)	(2 - 4 ft)	(12 - 13 ft)	(3 - 5 ft)	(3 - 5 ft)	FIELD BLANK (µg/l)	
[DL: 500:1]								
<b>SEMIVOLATILE ORGANICS</b>								
<b>Tentatively Identified</b>								
<b>Compounds (mg/kg)</b>								
1,3-Dioxolane, 2, 2, 4-trimeth	1.0 b j n	0.90 b j n	0.20 b j n	ND	ND	ND	ND	N/A
1,2-Propanediol	6.0 b j n	5.0 b j n	4.0 b j n	ND	1.2 b j n	2.5 b j n	100 b j n	N/A
Unknown	0.30 (2) j	0.30 (2) j	0.60 (3) j	43 j	0.54 (4) j	ND	ND	N/A
2-Pentanone, 4-hydroxy-4-met	3.0 b j n a	2.0 b j n a	2.0 b j n a	ND	3.3 b j n a	2.8 b j n a	ND	N/A
Hexadecanoic acid	0.20 j n	0.20 j n	0.10 j n	ND	0.095 j n	ND	ND	N/A
Unknown carboxylic acid	0.20 j	0.30 j	ND	ND	ND	ND	ND	N/A
1-Octadecanol	ND	ND	ND	ND	0.15 j n	ND	4.0 j n	N/A
Unknown PAH	ND	ND	ND	581 (8) j	ND	0.76 (6) j	ND	N/A
4H-Cyclopenta[def]phenanthre	ND	ND	ND	60 j n	ND	ND	ND	N/A
Unknown alkane	ND	ND	ND	ND	0.21 (2) j	ND	ND	N/A
Unknown hydrocarbon	ND	ND	ND	ND	ND	0.094 j	ND	N/A

- ( ) - Number of compounds in total.  
(a) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.  
a - Suspected aldol condensation product.  
b - Found in associated blanks.  
j - Estimated concentration; compound present below quantitation limit.  
n - Identification is based on a mass spectral library search.

- DL - Diluted sample analysis.  
ND - Not detected at analytical detection limit.  
N/A - Not available.

**SOIL BORING DATA SUMMARY (SEPTEMBER 1995)**  
United Plating Site

PARAMETER	UPMW-1A	UPMW-2A	UPMW-3A	UPMW-4	UPMW-5	UPMW-6	UPFB-11	NYSDEC SOIL CLEANUP OBJECTIVES (a)
	(6 - 8 ft)	(8 - 10 ft)	(2 - 4 ft)	(12 - 13 ft)	(3 - 5 ft)	(3 - 5 ft)	FIELD BLANK (µg/l)	
<b>PESTICIDES/PCBs (mg/kg)</b>				[DL: 2:1]				
beta-BHC	ND	ND	ND	ND	ND	0.00028 j p	ND	0.2
gamma-BHC (lindane)	ND	ND	ND	0.037 p	ND	ND	ND	0.06
Heptachlor	ND	ND	ND	ND	ND	0.00029 j p	ND	0.10
Endosulfan I	ND	ND	ND	ND	ND	0.00053 j p	ND	0.9
Dieldrin	ND	0.00070 j p	ND	<b>0.056 p</b>	0.00048 j p	0.0017 j p	ND	<b>0.044</b>
4,4'-DDE	ND	ND	ND	0.056 p	0.00040 j	ND	ND	2.1
Endrin	ND	ND	ND	ND	0.00033 j p	0.0031 j p	ND	0.10
Endosulfan II	ND	ND	ND	0.037 p	0.00031 j p	0.00045 j p	ND	0.9
4,4'-DDD	ND	ND	ND	0.014 p	ND	0.00039 j p	ND	0.9
4,4'-DDT	ND	0.00064 j	ND	0.020 p	ND	0.0018 j	ND	2.1
Methoxychlor	ND	0.0031 j p	ND	ND	ND	ND	ND	***
Endrin ketone	ND	0.00048 j p	ND	ND	ND	ND	ND	N/A
Endrin aldehyde	ND	ND	ND	ND	0.00027 j p	ND	ND	NS
alpha-Chlordane	ND	ND	ND	0.035 p	0.00021 j p	ND	ND	NS
gamma-Chlordane	ND	ND	ND	ND	0.00027 j p	ND	ND	0.54
Aroclor 1254	ND	ND	ND	0.71	ND	0.0092 j p	ND	10

Note: Numbers in bold exceed standards.

- \*\*\* - As per TAGM #4046, total pesticides < 10 ppm.  
(a) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.  
j - Estimated concentration; compound present below quantitation limit.  
p - Pesticide/Aroclor target analyte has >25% difference for the detected concentrations between the two GC columns.

- DL - Diluted sample analysis.  
N/A - Not available.  
ND - Not detected at analytical detection limit.  
NS - No standard.

## SOIL BORING DATA SUMMARY (SEPTEMBER 1995)

United Plating Site

PARAMETER	UPMW-1A (6 - 8 ft)	UPMW-2A (8 - 10 ft)	UPMW-3A (2 - 4 ft)	UPMW-4 (12 - 13 ft)	UPMW-5 (3 - 5 ft)	UPMW-6 (3 - 5 ft)	UPFB-11	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)
							FIELD BLANK (µg/l)		
<b>TAL METALS (mg/kg)</b>									
Aluminum	7,440	8,930	9,390	7,120	10,100	8,790	ND	33,000	SB
Antimony	3.0 B N	ND N	ND N	ND N	ND N	ND N	ND	0.6 - 10 (n)	SB
Arsenic	6.2	7.0	7.3	7.6 R	5.5 R	6.4 R	ND	3.0 - 12.0 æ	7.5 or SB
Barium	58	65	91	60	78	80	0.90 B	15 - 600	300 or SB
Beryllium	0.46 B	0.52 B	0.51 B	0.51 B	0.66 B	0.66 B	ND	0 - 1.75	0.16 or SB
Cadmium	0.44 B	0.58 B	0.64 B	19 E	5.7 E	11 E	ND	0.1 - 1.0	1 or SB
Calcium	32,500	33,500	36,200	24,000	12,600	4,940	181 B	130 - 35,000 æ	SB
Chromium	16	20	16	733 N R	26 N R	73 N R	ND	1.5 - 40.0 æ	10 or SB
Cobalt	7.9 B	9.1 B	14	14	19	13	ND	2.5 - 60.0 æ	30 or SB
Copper	31 E	34 E	33 E	176 R	50 R	31 R	ND	1.0 - 50.0	25 or SB
Iron	23,200	25,900	23,100	22,900	27,300	22,800	91 B	2,000 - 550,000	2,000 or SB
Lead	11	13	12	33 E R	25 E R	34 E R	ND	4.0 - 61 or 200 - 500*	SB*
Magnesium	11,000	10,800	11,300	12,800 E	5,510 E	4,430 E	ND	100 - 5,000	SB
Manganese	521	494	800	429	937	545	2.7 B	50 - 5,000	SB
Mercury	0.28 N R	ND N R	0.15 N R	0.12 R	ND R	0.14 R	ND	0.001 - 0.2	0.1
Nickel	25	27	34	78	44	25	ND	0.5 - 25	13 or SB
Potassium	1,740 E	2,050 E	1,620 E	1,270	1,340	906 B	ND	8,500 - 43,000 æ	SB
Selenium	ND	ND	ND	ND	ND	ND	ND	0.1 - 3.9	2 or SB
Silver	ND	ND	ND	5.5	1.1 B	2.4	ND	0.1 - 5.0 (n)	SB
Sodium	121 B	132 B	129 B	860 B	219 B	93 B	118 B	6,000 - 8,000	SB
Thallium	ND N	ND N	ND R	ND R	ND R	ND R	ND	0.1 - 0.8 (q)	SB
Vanadium	17	23	20	20	24	21	ND	1.0 - 300	150 or SB
Zinc	61	63	70	628	95	756	34	9.0 - 50	20 or SB
Cyanide	ND N	ND N	ND N	126	ND	2.4	ND	N/A	--

Note: Numbers in bold exceed standards.

- \* - Background levels for lead range from 4 to 61 ppm in undeveloped rural areas to 200 to 500 ppm in metropolitan or suburban areas or near highways.
- \*\* - Some forms of cyanide are complex and stable, while other forms are pH dependent and hence are very unstable. Site-specific form(s) of cyanide should be taken into consideration when establishing soil cleanup objectives.
- æ - New York State background concentration.
- (b) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
- (n) - Dragun, J., The Soil Chemistry of Hazardous Materials.

- (q) - Bowan, H.J., Environmental Chemistry of the Elements.
- B - Value is less than the contract-required detection limit but greater than the instrument detection limit.
- E - Value estimated due to interference.
- N - Spiked sample recovery is not within control limits.
- R - Duplicate analysis not within control limits.
- N/A - Not available.
- ND - Not detected at analytical detection limit.
- SB - Site background.



sheets are contained in Appendix C. Although the data are scheduled to be validated, the report was not completed at the time of submission of this report.

### 3.3.1 Volatile Organic Compounds (VOCs)

With the exception of sample UPMW-4, none of the monitoring well soil samples exceeded the NYSDEC recommended cleanup objective. The reanalyzed sample from UPMW-4 had 15 mg/kg of trichloroethylene (TCE), which exceeded the recommended cleanup objectives of 0.7 mg/kg. The sample was collected from a monitoring well installed inside the building in the chrome plating room (building 1). Other compounds detected above the cleanup guidance level included methylene chloride (MC) at 0.15 mg/kg and acetone at 3.5 mg/kg. However, MC was found in the field blank and acetone was found in the laboratory blank, which indicates that these two compounds are not associated with site but with the laboratory (both compounds are common laboratory contaminants). Low levels of other chlorinated solvents were found in UPMW-4 as well as the rest of the samples. The total VOC concentration of over 18 mg/kg in UPMW-4 also exceeded the total allowable concentration of VOCs of 10 mg/kg.

### 3.3.2 Semivolatile Organic Compounds (SVOCs)

The soil samples from UPMW-1A, -2A, -3A, and -5 contained no SVOCs in concentrations that exceeded the recommended cleanup objective. The concentration of dibenzo(a,h)anthracene of 0.053 mg/kg exceeded the cleanup guidance level of 0.014 mg/kg in UPMW-6. This sample was taken from a monitoring well installed in the wastewater treatment building (Building 2). All the compounds detected in UPMW-4 exceeded the recommended cleanup objective. The compounds most in excess of the recommended cleanup objectives were benzo(a)anthracene, 290 mg/kg - cleanup guidance level of 0.224 mg/kg; chrysene, 320 mg/kg - cleanup guidance level of 0.4 mg/kg; benzo(b)- and benzo(k)fluoranthene, 190 and 110 mg/kg, respectively - cleanup guidance level of 1.1 mg/kg; benzo(a)pyrene, 150 mg/kg - cleanup guidance level of 0.061 mg/kg; indeno(1,2,3-c,d)pyrene - cleanup guidance level of 3.2 mg/kg; and dibenzo(a,h)anthracene, 44 mg/kg - cleanup guidance level of .014 mg/kg. These compounds are all polynuclear aromatic hydrocarbons (PAHs) and are generally associated with fuel oil contamination. The total concentration of SVOCs of 2910 mg/kg also exceeded the total allowable concentration of SVOCs of 500 mg/kg. The other samples had very low levels of PAHs and low levels of phthalate acid esters (PAEs), which are associated with plastics and plasticizers.

### 3.3.3 Pesticides/PCBs

The only pesticide/PCB compound that exceeded the recommended soil cleanup level of 0.044 mg/kg was dieldrin in UPMW-4, which was found at a concentration of 0.056 mg/kg. Low levels of other pesticides (lindane, 4,4'-DDE, endosulfan II, 4,4'-DDD, 4,4'-DDT, and alpha-chlordane) were also detected in UPMW-4. Aroclor 1254, a PCB, was detected at a concentration of 0.71 mg/kg in UPMW-4. Extremely low levels of PCBs were found in sample UPMW-6, and extremely low levels of pesticides were found in samples UPMW-2, -5, and -GA.

### 3.3.4 Metals and Cyanide

The upgradient monitoring well soil sample, UPMW-1A, had concentrations of magnesium, mercury, and zinc in excess of recommended cleanup objectives/background levels. Even though UPMW-2A and -3A are downgradient of the site, the levels of zinc, nickel, magnesium, and calcium (which exceeded the recommended cleanup objectives/background levels) are similar in concentration to those in found in the upgradient well.

UPMW-4 had levels of cadmium, chromium, copper, nickel, silver, and zinc that far exceed the recommended cleanup objective/background levels, indicating that these contaminants are site related. Magnesium was similar in concentration in the upgradient and downgradient locations, indicating that the presence of magnesium is not site related. Although no cleanup level or background concentrations are provided for cyanide, the cyanide concentration of 126 mg/kg in UPMW-4 appears to be site related.

UPMW-5 contained cadmium, nickel, magnesium, and zinc in excess of the recommended cleanup objectives/background levels, but only the magnesium appears to be non-site related. Cadmium, chromium, and zinc are found in excess of the recommended cleanup objectives/background levels in sample UPMW-6.

## 3.4 GROUNDWATER SAMPLING

Groundwater samples were collected from a total of 12 wells installed as part of the RI. TCL organics, unfiltered and filtered TAL metals, and cyanide were to be analyzed on each sample. However, poor recoveries in some of the wells resulted in insufficient sample volumes to perform all the required analyses. A priority was established to determine the order in which samples for analyses were collected. VOCs were collected first, followed by unfiltered metals, filtered metals, cyanide, SVOCs, and finally pesticides/PCBs. VOCs and unfiltered metals were

TABLE 3-3 (Page 1 of 13)

**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER	UPMW-1A	UPMW-1B	UPMW-1BRE	UPMW-1C	UPMW-2A	NYSDEC CLASS GA STANDARDS (a)
<b>VOLATILE ORGANICS (µg/l)</b>						
Methylene chloride	1 b j	ND	ND	2 j	ND	5
Chloroform	ND	ND	ND	7 j	ND	7
Benzene	ND	2 j	ND	ND	ND	0.7
<b>Tentatively Identified Compounds (µg/l)</b>	ND	ND	ND	ND	ND	50

**Note: Numbers in bold exceed standards.**

- (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.  
b - Found in associated blanks.  
j - Estimated concentration; compound present below quantitation limit.  
ND - Not detected at analytical detection limit.  
RE - Reanalysis.

TABLE 3-3 (Page 2 of 13)

**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER	UPMW-2B	UPMW-2C	DUPLICATE		UPMW-3A	UPMW-3B	NYSDEC CLASS GA STANDARDS (a)
			UPMW-2C	UPMW-2C			
<b>VOLATILE ORGANICS (µg/l)</b>							
Methylene chloride	ND	ND	ND	ND	1 b j	ND	5
1,1,1-Trichloroethane	1 j	ND	ND	ND	ND	ND	5
Benzene	1 j	<b>6 j</b>	<b>9 j</b>	ND	ND	<b>3 j</b>	<b>0.7</b>
Toluene	ND	ND	ND	ND	ND	1 b j	5
<b>Tentatively Identified compounds (µg/l)</b>							
Unknown alkane	ND	ND	ND	ND	ND	8 j	50

**Note: Numbers in bold exceed standards.**

- (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.  
b - Found in associated blanks.  
j - Estimated concentration; compound present below quantitation limit.

ND - Not detected at analytical detection limit.  
DUP - Duplicate sample analysis.

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**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER	UPMW-3C	UPMW-4	UPMW-4 DL	UPMW-5	NYSDEC CLASS GA STANDARDS (a)
<b>VOLATILE ORGANICS (µg/l)</b>			[DL:5:1]		
Methylene chloride	ND	2 j	ND	ND	5
1,2-Dichloroethylene (total)	ND	10 j	13 d j	ND	5
Chloroform	ND	1 j	ND	ND	7
1,2-Dichloropropane	ND	17	21 d j	ND	5
Trichloroethylene	ND	320 e	430 d	13	5
<b>Tentatively Identified Compounds (µg/l)</b>	ND	ND	ND	ND	50

**Note: Numbers in bold exceed standards.**

- (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.  
d - Concentration recovered from diluted sample.  
e - Estimated concentration; exceeds GC/MS calibration range.

- j - Estimated concentration; compound present below quantitation limit.  
ND - Not detected at analytical detection limit.  
DL - Diluted sample analysis.

TABLE 3-3 (Page 4 of 13)

**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER	UPMW-6	UPTB-10 TRIP BLANK	UPTB-11 TRIP BLANK	UPFB-12 FIELD BLANK	NYSDEC CLASS GA STANDARDS (a)
<b>VOLATILE ORGANICS (µg/l)</b>					
Methylene chloride	ND	ND	2 j	ND	5
1,1,1-Trichloroethane	<b>93</b>	ND	ND	ND	5
Trichloroethylene	<b>13</b>	ND	ND	ND	5
<b>Tentatively Identified Compounds (µg/l)</b>	ND	ND	ND	ND	<b>50</b>

**Note: Numbers in bold exceed standards.**

- (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.  
j - Estimated concentration; compound present below quantitation limit.  
ND - Not detected at analytical detection limit.

TABLE 3-3 (Page 5 of 13)

**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER								NYSDEC
	UPMW-1A	UPMW-1ARE	UPMW-1B	UPMW-1BRE	UPMW-1C	UPMW-2A	UPMW-2ARE	CLASS GA STANDARDS (#)
<b>SEMIVOLATILE ORGANICS (µg/l)</b>								
4-Chloro-3-methylphenol	3 b j	ND	3 b j	ND	♦	3 b j	ND	5
Diethylphthalate	ND	ND	ND	0.9 j	♦	ND	ND	50 GV
Di-n-butylphthalate	ND	1 b j	ND	2 b j	♦	1 j	2 b j	50
<b>Tentatively Identified Compounds (µg/l)</b>								
1,2-Propanediol	4 b j n	8 b j n	4 b j n	7 b j n	♦	5 b j n	6 b j n	50
Unknown alcohol	31 (4) j	ND	28 (3) j	ND	♦	27 (2) j	ND	50
Unknown	ND	2 j	56 (8) j	32 (5) j	♦	<b>162 (7) j</b>	126(10) j	50
Unknown hydrocarbon	ND	3 j	ND	ND	♦	ND	3 j	50
Hexadecane	ND	ND	8 j n	7 j n	♦	ND	ND	50
Unknown alkane	ND	ND	32 (6) j	29 (6) j	♦	ND	ND	50
Heptadecane	ND	ND	12 j n	ND	♦	ND	ND	50
Unknown carboxylic acid	2 j	ND	ND	ND	♦	3 j	ND	50
1,1'-Biphenyl, 2 - fluoro-	ND	ND	ND	ND	♦	ND	32 b j n	50
Unknown carboxylic acid	ND	ND	ND	ND	♦	ND	5 j	50

**Note: Numbers in bold exceed standards.**

(a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.

( ) - Number of compounds in total.

♦ - Not enough sample to run analysis.

b - Found in associated blanks.

n - Spiked sample recovery not within control limits.

j - Estimated concentration; compound present below quantitation limit.

ND - Not detected at analytical detection limit.

RE - Reanalysis.

GV - Guidance value.

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**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER	DUPLICATE						NYSDEC CLASS GA STANDARDS (a)
	UPMW-2B	UPMW-2C	UPMW-2C	UPMW-3A	UPMW-3ARE	UPMW-3B	
<b>SEMIVOLATILE ORGANICS (µg/l)</b>							
4-Chloro-3-methylphenol	ND	ND	ND	3 b j	ND	ND	5
Di-n-butylphthalate	<b>61 b</b>	<b>67 b</b>	<b>69 b</b>	1 j	2 b j	<b>63 b</b>	50
Butylbenzylphthalate	10	2 j	ND	ND	ND	ND	50 GV
bis(2-Ethylhexyl)phthalate	13	4 j	ND	1 j	ND	ND	50
<b>Tentatively Identified Compounds (µg/l)</b>							
1,2-Propanediol	86 b j n	47 b j n	36 b j n	10 b j n	8 b j n	58 b j n	50
Unknown alcohol	ND	ND	ND	47 (4) j	ND	ND	50
Unknown	20 (5) j	117 (8) j	<b>231 (8) j</b>	ND	ND	30 (5) j	50
Unknown hydrocarbon	3 j	20(3) j	9 (3) j	3 j	ND	2 j	50
Hexadecane	4 j n	ND	4 j n	ND	ND	5 j n	50
Unknown alkane	22 (7) j	32 (6) j	18 (4) j	ND	ND	28 (7) j	50
Heptadecane	6 j n	6 j n	ND	ND	ND	ND	50
Unknown carboxylic acid	ND	ND	ND	ND	ND	ND	50
1 -Hexadecanol	3 j n	ND	ND	ND	ND	ND	50
Unknown phosphoric acid	3 j	ND	ND	ND	ND	ND	50
1,1'Biphenyl, 4,4' -dimethyl	ND	2 j n	ND	ND	ND	ND	50
Unknown PAH	ND	ND	8 j	ND	ND	ND	50
Hexadecanoic acid	ND	ND	ND	6 j n	ND	ND	50
Unknown amide	ND	ND	ND	ND	ND	3 j	50

**Note: Numbers in bold exceed standards.**

- (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.  
 ( ) - Number of compounds in total.  
 b - Found in associated blanks.  
 j - Estimated concentration; compound present below quantitation limit.

- n - Spiked sample recovery not within control limits  
 ND - Not detected at analytical detection limit.  
 GV - Guidance value.  
 DUP - Duplicate sample analysis.  
 RE - Reanalysis.

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**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER	UPMW-3C	UPMW-4	UPMW-5	UPMW-5RE	NYSDEC CLASS GA STANDARDS (a)
<b>SEMIVOLATILE ORGANICS (µg/l)</b>					
4-Chloro-3-methylphenol	ND	♦	3 b j	ND	5
Di-n-butylphthalate	45 b	♦	ND	2 b j	50
bis(2-Ethylhexyl)phthalate	3 j	♦	ND	ND	50
<b>Tentatively Identified Compounds (µg/l)</b>					
1,2-Propanediol	<b>63 b j n</b>	♦	7 b j n	6 b j n	50
Unknown alcohol	ND	♦	22 (2) j	ND	50
Unknown	129 (6) j	♦	62 (7) j	96 (9) j	50
Unknown hydrocarbon	ND	♦	2 j	5 j	50
Hexadecane	6 j n	♦	ND	ND	50
Unknown alkane	32 (10) j	♦	66 j	ND	50
Heptadecane	10 j n	♦	ND	ND	50
Hexadecanoic acid	ND	♦	4 j n	3 j n	50

**Note: Numbers in bold exceed standards.**

- (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.  
♦ - Not enough sample to run analysis.  
( ) - Number of compounds in total.

- b - Found in associated blanks.  
j - Estimated concentration; compound present below quantitation limit.  
n - Spiked sample recovery not within control limits  
ND - Not detected at analytical detection limit.  
RE - Reanalysis.

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**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER	UPMW-6	UPMW-6RE	UPTB-11 TRIP BLANK	UPFB-12 FIELD BLANK	NYSDEC CLASS GA STANDARDS (a)
<b>SEMIVOLATILE ORGANICS (µg/l)</b>					
Di-n-butylphthalate	ND	ND	ND	<b>63 b</b>	<b>50</b>
Butylbenzylphthalate	ND	ND	ND	1 j	50 GV
bis(2-Ethylhexyl)phthalate	ND	ND	ND	1 j	50
<b>Tentatively Identified Compounds (µg/l)</b>					
1,2-Propanediol	6 b j n	2 b j n	NA	68 b j n	50
Unknown alcohol	3 j	ND	NA	ND	50
Unknown	44 (6) j	13 (4) j	NA	78 (5) j	50
Unknown alkane	2 j	ND	NA	9 (3) j	50
Hexadecanoic acid	5 j n	ND	NA	ND	50
Phenol, 4-choloro-5methyl-2-	3 j n	ND	NA	ND	50
Octacosane	ND	ND	NA	3 j n	50

**Note: Numbers in bold exceed standards.**

- (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.  
 ( ) - Number of compounds in total.  
 b - Found in associated blanks.  
 j - Estimated concentration; compound present below quantitation limit.  
 n - Spiked sample recovery not within control limits.  
 NA - Not analyzed.

- GV - Guidance value.  
 ND - Not detected at analytical detection limit.  
 RE - Reanalysis.

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**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER	UPMW1A	UPMW1B	UPMW1C	UPMW2A	UPMW1B	UPMW2B	UPMW2C	DUPLICATE UPMW2C	NYSDEC
									CLASS GA STANDARDS (a)
<b>PESTICIDES/PCBs (µg/l)</b>									
Endrin	<b>0.035 j p</b>	ND	♦	ND	ND	ND	ND	ND	ND
Endosulfan II	<b>0.028 j p</b>	ND	♦	ND	ND	ND	ND	ND	NS
4,4'-DDT	ND	ND	♦	ND	ND	ND	<b>0.007 j</b>	ND	ND
Aroclor 1254	ND	ND	♦	ND	ND	0.074 j p	0.03 j	ND	0.1*
Aroclor 1260	<b>0.59 j p</b>	ND	♦	ND	ND	ND	ND	ND	0.1*

PARAMETER	UPMW3A	UPMW3B	UPMW3C	UPMW4	UPMW5	UPMW6	UPFB12 FIELD BLANK	NYSDEC
								CLASS GA STANDARDS (a)
<b>PESTICIDES/PCBs (µg/l)</b>								
Endrin	ND	ND	ND	♦	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	♦	ND	ND	ND	NS
4,4'-DDT	ND	ND	ND	♦	ND	ND	0.009 j p	ND
Aroclor 1254	0.10 j	0.035 j p	<b>0.16 j p</b>	♦	0.11 j	0.20 j	0.11 j p	0.1*
Aroclor 1260	ND	ND	ND	♦	ND	ND	ND	0.1*

Note: Numbers in bold exceed standards.

- \* - Total PCBs = 0.1.
- Numbers in bold exceed standards.
- (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.
- ♦ - Not enough sample to run analysis.
- j - Estimated concentration; compound present below quantitation limit.
- p - Pesticide/Aroclor target analyte has >25% difference for the detected concentrations between the two GC columns.
- ND - Not detected at analytical detection limit.
- NS - No standard.
- DUP - Duplicate sample analysis.

TABLE 3-3 (Page 10 of 13 )

**GROUNDWATER SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER	FIL		FIL		UPMW1C	FIL UPMW1C	UPMW2A	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS(a)
	UPMW1A	UPMW1A	UPMW1B	UPMW1B					
<b>TAL METALS (µg/l)</b>									
Aluminum	385	141 B	899	90 B	348,000	♦	16,300	<5.0 - 1,000	NS
Antimony	<b>19 B N</b>	<b>28 B N</b>	<b>17 B N</b>	<b>17 B N</b>	ND N	♦	ND N	N/A	3.0 GV
Arsenic	5.6 B	ND	8.4 B	ND	<b>228</b>	♦	9.1 B	<1.0 - 30	25
Barium	70 B	71 B	53 B	41 B	<b>1,720</b>	♦	147 B	10 - 500	1,000
Beryllium	ND	ND	ND	ND	<b>17</b>	♦	1.1 B	<10	3.0 GV
Cadmium	1.1 B	1.5 B	ND	ND	<b>58</b>	♦	1.6 B	<1.0	10
Calcium	140,000 E	134,000 E	34,500 E	30,800 E	1,396,000 E	♦	138,000 E	1,000 - 150,000	NS
Chromium	2.3 B	1.7 B	2.1 B	ND	<b>882</b>	♦	<b>272</b>	<1.0 - 5.0	50
Cobalt	ND	ND	ND	ND	<b>332</b>	♦	19 B	<10	NS
Copper	5.2 B	9.6 B	8.3 B	3.3 B	<b>1,470</b>	♦	43	<1.0 - 30	200
Iron	<b>931</b>	<b>338</b>	<b>1,740</b>	206	<b>851,000</b>	♦	<b>33,000</b>	10 - 10,000	300 (m)
Lead	ND N	ND N	3.1 N	ND N	<b>425 N</b>	♦	20 N	<15	25
Magnesium	<b>56,500 E</b>	<b>53,600 E</b>	18,200 E	16,400 E	<b>266,000 E</b>	♦	<b>64,900 E</b>	1,000 - 50,000	35,000 GV
Manganese	<b>464 E</b>	<b>446 E</b>	103 E	70 E	<b>18,800 E</b>	♦	<b>897 E</b>	<1.0 - 1,000	300 (m)
Mercury	ND N	ND N	ND N	ND N	0.58 N	♦	ND N	<1.0	2.0
Nickel	ND	ND	ND	ND	<b>682</b>	♦	41	<10 - 50	NS
Potassium	8,160	7,500	4,440 B	4,020 B	65,900	♦	37,800	1,000 - 10,000	NS
Selenium	ND W	2.2 B W	ND	ND	ND W	♦	2.1 B W	<1.0 - 10	10
Silver	ND	2.4 B	ND	ND	5.9 B	♦	ND	<5.0	50
Sodium	<b>134,000</b>	<b>129,000</b>	<b>134,000</b>	<b>127,000</b>	<b>857,000</b>	♦	<b>96,800</b>	500 - 120,000	20,000
Thallium	ND R	ND R	ND R	ND R W	ND R W	♦	ND R	N/A	4.0 GV
Vanadium	ND	3.3 B	3.1 B	ND	<b>654</b>	♦	32 B	<1.0 - 10	NS
Zinc	60	ND	32	ND	<b>2,880</b>	♦	86	<10 - 2,000	300
Cyanide	ND	NA	ND	NA	♦	♦	ND	N/A	100

Note: Numbers in bold exceed standards.

- ♦ - Not enough sample to run analysis.
- (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.
- (m) - Iron and manganese not to exceed 500 µg/l.
- (n) - Dragun, J., The Soil Chemistry of Hazardous Materials.
- B - Value is less than the contract-required detection limit but greater than the instrument detection limit.
- E - Value estimated due to interference.
- N - Spiked sample recovery is not within control limits.
- R - Duplicate analysis not within control limits.
- W - Post-digestion spike out of control limits; sample absorbance is less than 50% of spike absorbance.

- GV - Guidance value.
- ND - Not detected at analytical detection limit.
- NA - Not analyzed.
- N/A - Not available.
- FIL - Filtered sample.

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**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
**United Plating Site**

PARAMETER	FIL		FIL		FIL		FIL		NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS (a)
	UPMW2A	UPMW2B	UPMW2B	UPMW2C	UPMW2C	UPMW2C	UPMW2C	UPMW2C		
<b>TAL METALS (µg/l)</b>										
Aluminum	106 B	317	51	158 B	53 B	261	99 B	<5.0 - 1,000	NS	
Antimony	ND N	ND N	ND N	ND N	ND N	ND N	ND N	N/A	3.0 GV	
Arsenic	7.1 B	ND	ND	ND	ND	ND	12	<1.0 - 30	25	
Barium	40 B	21 B	16 B	40 B	18 B	30 B	26 B	10 - 500	1,000	
Beryllium	ND	ND	ND	ND	ND	ND	ND	<10	3.0 GV	
Cadmium	ND	ND	ND	1.5 B	ND	5.7	ND	<1.0	10	
Calcium	104,000 E	36,500 E	31,700	24,300 E	12,600 E	19,900 E	15,200 E	1,000 - 150,000	NS	
Chromium	157	54	44	10	17	15	11	<1.0 - 5.0	50	
Cobalt	ND	ND	ND	ND	ND	ND	ND	<10	NS	
Copper	ND	10 B	6.9 B	8.0 B	4.4 B	3.7 B	6.0 B	<1.0 - 30	200	
Iron	205	784	150	468	252	344	372	10 - 10,000	300 (m)	
Lead	ND N	ND N	ND N W	ND N W	ND N	ND N W	ND N W	<15	25	
Magnesium	54,300 E	21,800 E	19,200 E	20,700 E	13,100 E	16,300 E	14,500 E	1,000 - 50,000	35,000 GV	
Manganese	267 E	44 E	26 E	13 B E	12 B E	14 B E	4.9 B E	<1.0 - 1,000	300 (m)	
Mercury	ND N	ND N	ND N	ND N	ND N	ND N	ND N	<1.0	2.0	
Nickel	ND	ND	ND	ND	ND	ND	ND	<10 - 50	NS	
Potassium	35,300	6,760	6,310	9,510	10,200	11,100	11,700	1,000 - 10,000	NS	
Selenium	5.3 +	ND W	1.2 B W	ND	1.6 B W	1.6 B W	ND	<1.0 - 10	10	
Silver	ND	ND	ND	ND	ND	1.8 B	1.9 B	<5.0	50	
Sodium	12,600	68,400	69,000	77,800	78,900	81,600	77,000	500 - 120,000	20,000	
Thallium	ND R	11 R	20 R	14 R	ND R	ND R	ND R	N/A	4.0 GV	
Vanadium	3.0 B	ND	ND	ND	2.6 B	2.2 B	2.2 B	<1.0 - 10	NS	
Zinc	21	31	ND	9.7 B	ND	9.8 B	ND	<10 - 2,000	300	
Cyanide	NA	ND	NA	ND	NA	ND	NA	N/A	100	

- Note: Numbers in bold exceed standards.**
- + - Correlation coefficient for the MSA is <0.995.
  - (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.
  - (m) - Iron and manganese not to exceed 500 µg/l.
  - (n) - Dragun, J., The Soil Chemistry of Hazardous Materials.
  - B - Value is less than the contract-required detection limit but greater than the instrument detection limit.
  - E - Value estimated due to interference.
  - N - Spiked sample recovery is not within control limits.
  - R - Duplicate analysis not within control limits.
  - W - Post-digestion spike out of control limits; sample absorbance is less than 50% of spike absorbance.

- GV - Guidance value.
- ND - Not detected at analytical detection limit.
- NA - Not analyzed.
- N/A - Not available.
- DUP - Duplicate sample analysis.
- FIL - Filtered sample.

TABLE 3 -3 (Page 12 of 13)  
**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
 United Plating Site

PARAMETER	FIL		FIL		FIL		UPMW4	FIL UPMW4	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS(a)
	UPMW3A	UPMW3A	UPMW3B	UPMW3B	UPMW3C	UPMW3C				
<b>TAL METALS (µg/l)</b>										
Aluminum	2,900	211	496	40 B	17,500	497	364,000	♦	<5.0 - 1,000	NS
Antimony	ND N	<b>17 B N</b>	ND N	ND N	ND N	ND N	ND N	♦	N/A	3.0 GV
Arsenic	ND	ND	ND	ND	ND	ND	<b>210</b>	♦	<1.0 - 30	25
Barium	70 B	48 B	19 B	18 B	303	49 B	<b>2,510</b>	♦	10 - 500	1,000
Beryllium	ND	ND	ND	ND	1.2 B	ND	<b>20</b>	♦	<10	3.0 GV
Cadmium	1.6 B	ND	1.1 B	1.1 B	1.4 B	ND	<b>40</b>	♦	<1.0	10
Calcium	<b>222,000 E</b>	<b>208,000</b>	<b>37,900 E</b>	<b>42,100 E</b>	<b>9,460 E</b>	<b>1,670 E</b>	<b>1,251 E</b>	♦	1,000 - 150,000	NS
Chromium	14	7.3 B	3.0 B	1.7 B	33	3.2 B	<b>3,460</b>	♦	<1.0 - 5.0	50
Cobalt	5.6 B	6.7 B	ND	ND	11 B	ND	<b>548</b>	♦	<10	NS
Copper	13 B	ND	7.2 B	8.8 B	32	4.3 B	<b>2,130</b>	♦	<1.0 - 30	200
Iron	<b>6,300</b>	242	<b>1,130</b>	164	<b>32,300</b>	<b>404</b>	<b>986,000</b>	♦	10 - 10,000	300 (m)
Lead	6.0 N	ND N	3.1 N W	ND N	22 N	2.8 B N	<b>412 N</b>	♦	<15	25
Magnesium	<b>119,000 E</b>	<b>115,000 E</b>	<b>18,800 E</b>	<b>21,800 E</b>	<b>9,340 E</b>	<b>693 B E</b>	<b>341,000 E</b>	♦	1,000 - 50,000	35,000 GV
Manganese	<b>1,060 E</b>	<b>881 E</b>	76 E	74 E	<b>350 E</b>	14 B E	<b>16,900 E</b>	♦	<1.0 - 1,000	300 (m)
Mercury	ND N	0.26 N	ND N	ND N	ND N	ND N	ND N	♦	<1.0	2.0
Nickel	30 B	13 B	ND	ND	33 B	ND	<b>1,100</b>	♦	<10 - 50	NS
Potassium	60,100	56,900	3,730 B	4,390 B	5,960	2,670 B	<b>86,200</b>	♦	1,000 - 10,000	NS
Selenium	2.8 B W	2.7 B W	1.3 B W	1.6 B W	ND W	ND W	ND W	♦	<1.0 - 10	10
Silver	ND	ND	ND	ND	ND	ND	<b>13</b>	♦	<5.0	50
Sodium	<b>150,000</b>	<b>137,000</b>	<b>72,200</b>	<b>82,400</b>	<b>148,000</b>	<b>145,000</b>	<b>141,000</b>	♦	500 - 120,000	20,000
Thallium	ND R	ND R	<b>8.2 B R</b>	<b>16 R</b>	ND R	ND R	ND R W	♦	N/A	4.0 GV
Vanadium	7.2 B	2.2 B	ND	ND	31 B	ND	<b>637</b>	♦	<1.0 - 10	NS
Zinc	23	14 B	13 B	ND	61	ND	<b>2,720</b>	♦	<10 - 2,000	300
Cyanide	ND	NA	ND	NA	ND	NA	♦	♦	N/A	100

- Note: Numbers in bold exceed standards.
- ♦ - Not enough sample to run analysis.
  - (a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.
  - (m) - Iron and manganese not to exceed 500 µg/l.
  - (n) - Dragun, J., The Soil Chemistry of Hazardous Materials.
  - B - Value is less than the contract-required detection limit but greater than the instrument detection limit.
  - E - Value estimated due to interference.
  - N - Spiked sample recovery is not within control limits.
  - R - Duplicate analysis not within control limits.
  - W - Post-digestion spike out of control limits; sample absorbance is less than 50% of spike absorbance.
  - GV - Guidance value.
  - ND - Not detected at analytical detection limit.
  - NA - Not analyzed.
  - N/A - Not available.
  - FIL - Filtered sample.

TABLE 3-3 (Page 13 of 13)

**GROUNDWATER DATA SUMMARY (OCTOBER 1995)**  
United Plating Site

PARAMETER	FIL		FIL		UPFB12	FIL	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS (a)
	UPMW5	UPMW5	UPMW6	UPMW6	FIELD BLANK	FIELD BLANK		
<b>TAL METALS (µg/l)</b>								
Aluminum	1,860	257	770	290	123 B	32 B	<5.0 - 1,000	NS
Antimony	ND N	<b>17 B N</b>	<b>26 B N</b>	<b>42 B N</b>	ND N	ND N	N/A	3.0 GV
Arsenic	ND	ND	<b>84</b>	<b>86</b>	ND	ND	<1.0 - 30	25
Barium	59 B	52 B	27 B	25 B	ND	ND	10 - 500	1,000
Beryllium	ND	ND	ND	ND	ND	ND	<10	3.0 GV
Cadmium	1.4 B	ND	2.3 B	1.1 B	ND	ND	<1.0	10
Calcium	134,000 E	135,000 E	111,000 E	108,000 E	118 B E	129 B E	1,000 - 150,000	NS
Chromium	<b>1,610</b>	<b>1,680</b>	<b>46,600</b>	<b>45,000</b>	2.3 B	ND	<1.0 - 5.0	50
Cobalt	90	92	71	70	ND	ND	<10	NS
Copper	10 B	3.5 B	32	36	ND	5.9 B	<1.0 - 30	200
Iron	<b>2,800</b>	<b>492</b>	<b>1,350</b>	<b>417</b>	44 B	ND	10 - 10,000	300 (m)
Lead	ND N	ND N	4.1 N	ND N	ND N	ND N	<15	25
Magnesium	<b>62,100 E</b>	<b>63,300 E</b>	<b>11,400 E</b>	10,800 E	150 B E	39 B E	1,000 - 50,000	35,000 GV
Manganese	<b>331 E</b>	290 E	39 E	23 E	1.6 B E	5.5 B E	<1.0 - 1,000	300 (m)
Mercury	ND N	ND N	ND N	ND N	ND N	ND N	<1.0	2.0
Nickel	264	255	30 B	25 B	ND	ND	<10 - 50	NS
Potassium	9,480	8,930	13,700	13,700	125 B	49 B	1,000 - 10,000	NS
Selenium	ND	2.0 B	2.0 B W	2.6 B W	ND	ND	<1.0 - 10	10
Silver	2.5 B	ND	5.8 B	1.8 B	ND	ND	<5.0	50
Sodium	<b>382,000</b>	<b>349,000</b>	<b>151,000</b>	<b>142,000</b>	399 B	162 B	500 - 120,000	20,000
Thallium	ND R W	ND R W	ND R	ND R	ND R	11 R	N/A	4.0 GV
Vanadium	4.7 B	2.5 B	ND	ND	ND	ND	<1.0 - 10	NS
Zinc	10 B	ND	ND	ND	ND	ND	<10 - 2,000	300
Cyanide	<b>695</b>	NA	452	NA	ND	NA	N/A	100

Note: Numbers in bold exceed standards.

(a) - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Work Quality Standards and Guidance Values, October 1993.

(m) - Iron and manganese not to exceed 500 µg/l.

(n) - Dragun, J., The Soil Chemistry of Hazardous Materials.

B - Value is less than the contract-required detection limit but greater than the instrument detection limit.

E - Value estimated due to interference.

N - Spiked sample recovery is not within control limits.

R - Duplicate analysis not within control limits.

W - Post-digestion spike out of control limits; sample absorbance is less than 50% of spike absorbance.

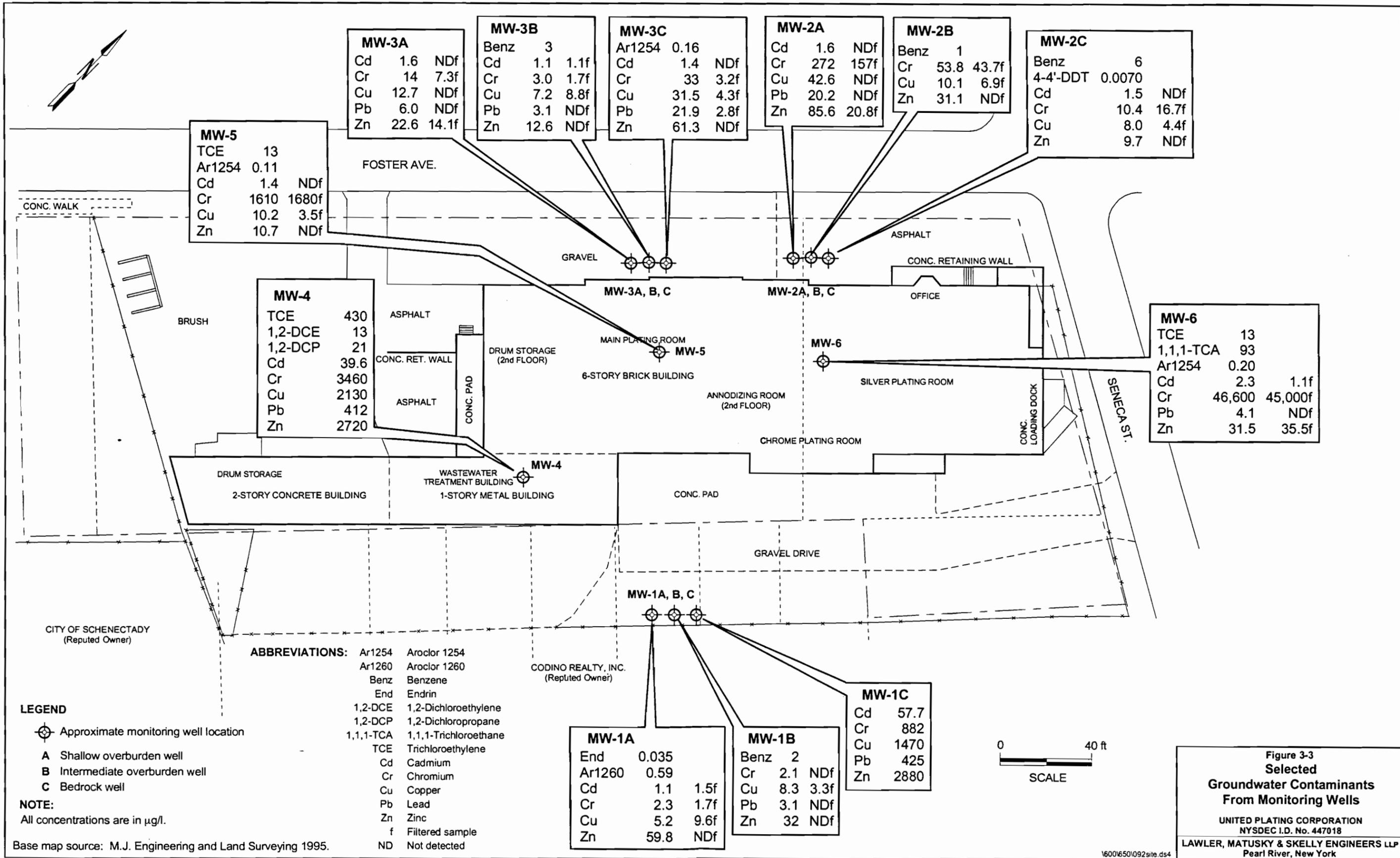
GV - Guidance value.

ND - Not detected at analytical detection limit.

NA - Not analyzed.

N/A - Not available.

FIL - Filtered sample.



**MW-5**

TCE	13
Ar1254	0.11
Cd	1.4 NDf
Cr	1610 1680f
Cu	10.2 3.5f
Zn	10.7 NDf

**MW-3A**

Cd	1.6 NDf
Cr	14 7.3f
Cu	12.7 NDf
Pb	6.0 NDf
Zn	22.6 14.1f

**MW-3B**

Benz	3
Cd	1.1 1.1f
Cr	3.0 1.7f
Cu	7.2 8.8f
Pb	3.1 NDf
Zn	12.6 NDf

**MW-3C**

Ar1254	0.16
Cd	1.4 NDf
Cr	33 3.2f
Cu	31.5 4.3f
Pb	21.9 2.8f
Zn	61.3 NDf

**MW-2A**

Cd	1.6 NDf
Cr	272 157f
Cu	42.6 NDf
Pb	20.2 NDf
Zn	85.6 20.8f

**MW-2B**

Benz	1
Cr	53.8 43.7f
Cu	10.1 6.9f
Zn	31.1 NDf

**MW-2C**

Benz	6
4-4'-DDT	0.0070
Cd	1.5 NDf
Cr	10.4 16.7f
Cu	8.0 4.4f
Zn	9.7 NDf

**MW-4**

TCE	430
1,2-DCE	13
1,2-DCP	21
Cd	39.6
Cr	3460
Cu	2130
Pb	412
Zn	2720

**MW-6**

TCE	13
1,1,1-TCA	93
Ar1254	0.20
Cd	2.3 1.1f
Cr	46,600 45,000f
Pb	4.1 NDf
Zn	31.5 35.5f

**MW-1A, B, C**

**MW-1A**

End	0.035
Ar1260	0.59
Cd	1.1 1.5f
Cr	2.3 1.7f
Cu	5.2 9.6f
Zn	59.8 NDf

**MW-1B**

Benz	2
Cr	2.1 NDf
Cu	8.3 3.3f
Pb	3.1 NDf
Zn	32 NDf

**MW-1C**

Cd	57.7
Cr	882
Cu	1470
Pb	425
Zn	2880

**ABBREVIATIONS:**

Ar1254	Aroclor 1254
Ar1260	Aroclor 1260
Benz	Benzene
End	Endrin
1,2-DCE	1,2-Dichloroethylene
1,2-DCP	1,2-Dichloropropane
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
Cd	Cadmium
Cr	Chromium
Cu	Copper
Pb	Lead
Zn	Zinc
f	Filtered sample
ND	Not detected

**LEGEND**

⊕ Approximate monitoring well location

**A** Shallow overburden well

**B** Intermediate overburden well

**C** Bedrock well

**NOTE:**

All concentrations are in µg/l.

Base map source: M.J. Engineering and Land Surveying 1995.



Figure 3-3  
Selected  
Groundwater Contaminants  
From Monitoring Wells

UNITED PLATING CORPORATION  
NYSDEC I.D. No. 447018

LAWLER, MATUSKY & SKELLY ENGINEERS LLP  
Pearl River, New York

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collected from all of the wells. Samples for filtered metals, cyanide, SVOCs, and pesticides/PCBs could not be collected from UPMW-1C and UPMW-4. The samples are summarized on Table 3-3 and shown graphically on Figure 3-3. The table also shows the NYSDEC Class GA standards (NYSDEC 1993) and the natural ambient groundwater ranges for metals (Dragun 1988). Results in bold exceed the groundwater standard. The laboratory analytical data sheets are contained in Appendix C. Although the data are scheduled to be validated, the report was not complete at the time of submission of this report.

#### 3.4.1 Volatile Organic Compounds (VOCs)

Benzene exceeded the NYSDEC Class GA groundwater standard of 0.7  $\mu\text{g/l}$  in the upgradient intermediate well (UPMW-1B), in the downgradient intermediate wells (UPMW-2B and -3B), and in the downgradient bedrock well (UPMW-2C). The concentrations ranged from 1  $\mu\text{g/l}$  in UPMW-2B to 9  $\mu\text{g/l}$  in the duplicate sample from UPMW-2C; all values were estimated. There are several gasoline stations situated upgradient of the site that are a potential source for the benzene in the groundwater.

The groundwater from monitoring well UPMW-4, located in the chrome plating room (Building 1), had elevated concentrations of TCE (430  $\mu\text{g/l}$ ), total 1,2-dichloroethylene (1,2-DCE) (13  $\mu\text{g/l}$ ), and 1,2-dichloropropane (1,2-DCP) (21  $\mu\text{g/l}$ ). The 1,2-DCE and 1,2-DCP concentrations were estimated values. The results were all above the NYSDEC Class BA groundwater standard of 5  $\mu\text{g/l}$ . Monitoring well UPMW-5, which is located in the main plating room, had 13  $\mu\text{g/l}$  of TCE in the groundwater, and monitoring well UPMW-6, located in the chrome plating room, also had 13  $\mu\text{g/l}$  of TCE. MW-6 also had 93  $\mu\text{g/l}$  of 1,1,1-trichloroethane (1,1,1-TCA) in the groundwater, which exceeded the GA standard of 5  $\mu\text{g/l}$ .

Other contaminants found included MC at estimated concentrations in UPMW-1A, UPMW-1C, UPMW-3A, and UPMW-4; chloroform at estimated concentrations in UPMW-1C and UPMW-4; 1,1,1-TCA at an estimated concentration in UPMW-2B; and toluene at an estimated concentration in UPMW-3B. No tentatively identified compounds (TICs) were found in any of the samples.

The groundwater beneath the building appears to be contaminated with chlorinated solvents, chiefly TCE, probably as a result of spills from the vapor degreasing operation located inside the main plating room, or other degreasing operations at the site.

### 3.4.2 Semivolatile Organic Compounds (SVOCs)

None of the three upgradient wells had SVOCs in excess of the NYSDEC Class GA groundwater standard; in fact, all compounds detected except for diethylphthalate (DEP) were also found in the associated blank, indicating laboratory contamination. DEP was detected at an estimated concentration in the reextracted sample from UPMW-1B. Several TICs were found in the UPMW-1A and UPMW-1B samples. SVOCs were not analyzed for in the bedrock well, UPMW-1C, as there was not enough sample volume to run the analysis.

Di-n-butyl phthalate (DNBP) was detected at concentrations above the Class GA groundwater standard of 50  $\mu\text{g/l}$  in monitoring wells UPMW-2B, UPMW-2C, and UPMW-3B. However, DNBP was also found in the associated blank, indicating possible laboratory contamination. Butylbenzylphthalate (BBP) and bis(2-ethylhexyl)phthalate (B2EHP) were detected at low levels in UPMW-2B, UPMW-2C, and UPMW-3A. These compounds, as well as DNBP and DEP, are known as PAEs and are generally associated with plastics and plasticizers.

4-Chloro-3-methylphenol (4C3MP) was detected at estimated concentrations in UPMW-2A and UPMW-3A; however, it was also found in the blank, indicating possible laboratory contamination. TICs were found in all samples; however, only UPMW-2A, the duplicate sample from UPMW-2C, and UPMW-3C had a TIC in excess of the groundwater standard of 50  $\mu\text{g/l}$ .

SVOCs were not run on UPMW-4 as there was not enough sample volume. UPMW-5 had low levels of 4C3MP and DNBP and UPMW-6 had no detectable SVOCs. TICs were found in both wells; however, only UPMW-5 had a TIC above the groundwater standard.

### 3.4.3 Pesticides/PCBs

The upgradient shallow well, UPMW-1A, had endrin at 0.035  $\mu\text{g/l}$ , which exceeded the NYSDEC Class GA groundwater standard of "none detected" (ND). The sample also had Aroclor 1260, a PCB, at 0.59  $\mu\text{g/l}$ , above the groundwater standard of 0.1  $\mu\text{g/l}$  for total PCBs. UPMW-1B had no detectable pesticides/PCBs, and there was not enough sample volume to run pesticides/PCBs on UPMW-1C.

UPMW-2C had 4,4'-DDT at 0.007  $\mu\text{g/l}$ , which was above the NYSDEC Class GA groundwater standard of ND. Aroclor 1254, a PCB, was detected at low levels in UPMW-2B, UPMW-2C, UPMW-3A, and UPMW-3B, and was found above the groundwater standard in UPMW-3C, UPMW-5, and UPMW-6. Aroclor 1254 was also detected in the field blank, which may

indicate that its presence in the samples is due to field or laboratory contamination. Pesticides/PCBs were not analyzed on UPMW-4 due to lack of sufficient sample volume.

#### 3.4.4 Metals and Cyanide

Unfiltered and filtered metals and cyanide were run on all groundwater samples except for UPMW-1C and UPMW-4, where there was not enough sample volume to run the analyses. The upgradient shallow well, UPMW-1A, had antimony, iron, magnesium, manganese, and sodium above the NYSDEC Class GA groundwater standards in both the filtered and unfiltered samples. The intermediate upgradient well, UPMW-1B, had antimony and sodium above the GA groundwater standards in both the filtered and unfiltered samples and iron above the groundwater standard in the unfiltered sample.

The bedrock upgradient well, UPMW-1C, had arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, magnesium, manganese, sodium, and zinc above the NYSDEC Class GA groundwater standard. The levels of the common contaminants, iron, magnesium, manganese, and sodium were significantly higher than the concentrations found in the other two upgradient wells and much higher than the natural ambient groundwater ranges for these metals. The levels of cadmium, copper, chromium, lead, and zinc suggest a site impact on the groundwater in this area. UPMW-1C exhibited a very poor recovery, although numerous fractures were seen in the cores. It is possible that the only water-bearing fractures are highly mineralized and potentially impacted by site activities. Additional static water level measurements and testing are needed to determine if this well is a viable upgradient bedrock monitoring well.

UPMW-5 has chromium, iron, magnesium, and sodium above the NYSDEC Class GA groundwater standard in both the filtered and unfiltered samples. Manganese was above the standard in the unfiltered sample and antimony in the filtered sample. The levels of chromium are similar and suggest a relation to site activities. UPMW-6 had antimony, arsenic, chromium, iron, magnesium, and sodium above the groundwater standard. The chromium was over 45,000  $\mu\text{g/l}$  in both the filtered and unfiltered sample, which was green in color. UPMW-6 is located in the Chrome Plating Room; the finding of such high chromium in the groundwater appears to indicate either a major spill or a direct discharge of untreated waste to the groundwater via one of the sumps in the room.

The downgradient shallow well, UPMW-2A, had chromium and magnesium above the NYSDEC Class GA groundwater standard in both the filtered and unfiltered samples; whereas iron, manganese, and sodium values exceeded the standard in only the unfiltered sample. The

other downgradient shallow well, UPMW-3A, had magnesium, manganese, and sodium in excess of the standard in both the filtered and unfiltered samples; iron exceeded the standard in the unfiltered sample and antimony exceeded the standard in the filtered sample.

The downgradient intermediate well, UPMW-2B, had chromium, iron, sodium, and thallium in excess of the Class GA standard in the unfiltered sample, with only sodium and thallium above the standard in the filtered sample. The other downgradient intermediate well, MW-3B, had only sodium and thallium in excess of the standard in both the filtered and unfiltered samples.

The downgradient bedrock well, UPMW-2C, had iron and sodium in excess of the NYSDEC Class GA standard in both the filtered and unfiltered samples (the filtered original sample was below the standard for iron; however, the duplicate filtered sample was over the standard). Thallium was in excess of the standard in the original unfiltered sample. The other downgradient bedrock well, UPMW-3C, had iron and sodium in excess of the standard in both the filtered and unfiltered samples and manganese above the standard in the unfiltered sample.

With the exception of the chromium found in UPMW-2A and UPMW-2B, none of the site-related metals were found above the groundwater standards in the downgradient wells. These wells are downgradient from UPMW-6, which had high chromium. UPMW-5, which is upgradient from the UPMW-3 wells, did not have as much chromium as either UPMW-4 or UPMW-6.

UPMW-5 and UPMW-6 had high levels (above the standard) of cyanide; none of the other wells contained any cyanide; however, cyanide was not run on UPMW-1C and UPMW-4 due to lack of sample.

## CHAPTER 4

### RECOMMENDATIONS

Due to the finding of elevated levels of chlorinated solvents, metals, and PCBs, LMS recommends that each monitoring well be resampled and analyzed for TCL VOCs, TCL PCBs, and the TAL suite of chemicals using NYSDEC ASP (December 1991). The VOCs will be analyzed using a low-level method (524.2). As there was not a significant difference in the filtered and unfiltered samples in the site-related metals, only unfiltered metals samples will be collected and analyzed.

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