

NEW YORK STATE SUPERFUND CONTRACT

Remedial Investigation Report

Volume I • Report

United Plating Site
Remedial Investigation/Feasibility Study

Site No. 447018

Work Assignment No. D002676-10.2

DATE: April 1999



Prepared for:

**New York State
Department of
Environmental Conservation**

50 Wolf Road, Albany, New York 12233
John Cahill, Commissioner

Division of Environmental Remediation
Michael J. O'Toole, Jr., P.E., Director

By:

Lawler, Matusky & Skelly Engineers LLP

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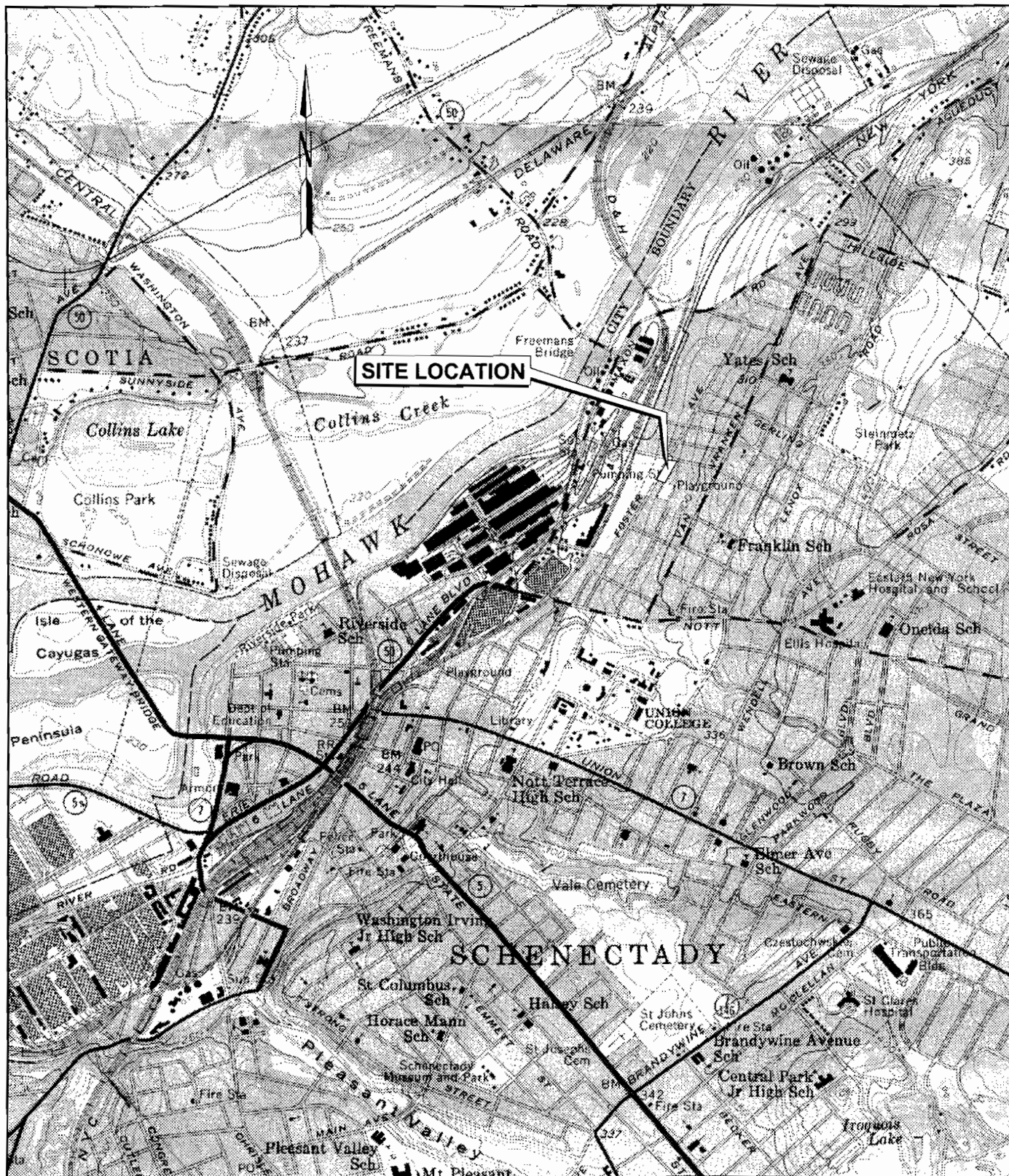
CHAPTER 1

EXECUTIVE SUMMARY

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, one-third of which is covered by the building footprint. 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 (see Figure 1-2). 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-strand barbed wire runs from the northeast corner of Building 1 along the entire eastern property line to 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: one six-story brick building (Building 1, or the main building) that housed the main plating facilities, storage rooms, and offices and a second, newer two-story structure (Building 2, or the wastewater treatment building) that housed the wastewater treatment equipment. The treatment system consisted of three separate systems: a cyanide tank to oxidize the cyanide; a chromium tank to reduce the hexavalent chromium to trivalent, which was then allowed to precipitate out, and an acid/alkaline destruct tank that was used to precipitate out the other metals. UP had a permit to discharge the effluent from the treatment system to the City of Schenectady sewer system.

Many inspections were conducted over the years and violations of the permit occurred frequently. The UP site was ordered to correct all violations or cease operations by the City of Schenectady in 1989. In 1989 the City of Schenectady sealed off the discharge pipe from the UP site to the sewer system, effectively shutting down the facility. In May 1990 the Schenectady County Grand Jury indicted UP, and in July 1990 the state obtained a court order closing the plant until the operation complied with all Environmental Conservation Laws (ECLs).



QUADRANGLE
LOCATION



0 2000 ft



SCALE
1 in. = 2000 ft

Figure 1-1

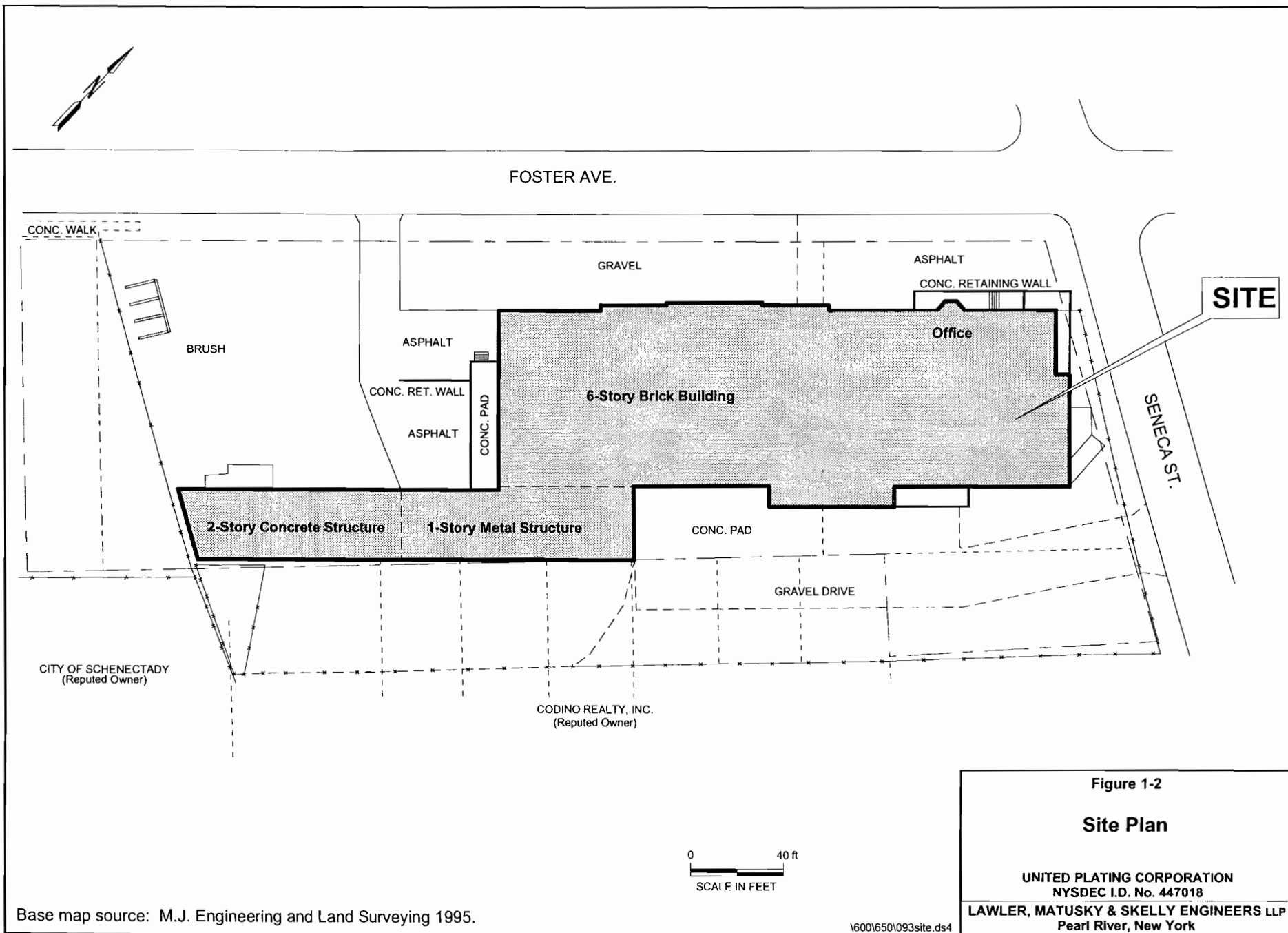
Site Location

UNITED PLATING CORPORATION
NYSDEC I.D. No. 447018

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

Map source: USGS 7.5 minute quadrangle map, Schenectady, NY, 1954.

10911USGS-LOC.d54



After UP declared bankruptcy in October 1990, the City of Schenectady requested that the New York State Department of Environmental Conservation (NYSDEC) clean up and remove all hazardous material from the UP site. NYSDEC requested that the U.S. Environmental Protection Agency (EPA) conduct a removal action to remove and dispose of the hazardous chemicals on site. During EPA's preliminary assessment (PA) conducted in November 1990 the quantity of hazardous materials and wastes on the site was inventoried. In 1991 EPA conducted a removal action, which stabilized, removed, and disposed of the hazardous materials on site.

On 30 October 1991 the UP site was added to the New York State Registry of Inactive Hazardous Waste Sites as a Class 2 site, a site that poses an immediate threat to human health and the environment. A Class 2 site requires that a remedial investigation/feasibility study (RI/FS) be conducted to determine the nature and extent of contamination and to develop and evaluate alternatives for remediation. In December 1994 NYSDEC contracted with Lawler, Matusky & Skelly Engineers LLP (LMS) to conduct the RI/FS of the UP site under terms of a Standby Contract.

LMS developed plans (field sampling plan [FSP], quality assurance project plan [QAPjP], and health and safety plan [HASp]) for conducting the RI/FS; the plans were approved by NYSDEC and field work began in May 1995. The field work was conducted under two tasks. In the Initial Site Characterization task, the contamination remaining inside the building on equipment and debris and on building interior surfaces was determined. This characterization was performed by collecting and analyzing 84 wipe samples from equipment/debris and building surfaces for target analyte list (TAL) metals and cyanide. The results indicated that much of the first four floors of the main building and the wastewater treatment building contained equipment/debris contaminated with site-related metals, i.e., cadmium, chromium, copper, lead, nickel, zinc, and cyanide. The contamination was associated with dirt/grime/dust on the surface of the equipment/debris and building interiors. This was evidenced by the removal of 75% of the contamination by thorough cleaning with a steam cleaner (10 pieces of equipment were decontaminated and a comparison was made of the pre- and postcleaning concentrations to develop the percent removal figure).

In addition to the wipe samples, 50 sweep samples were collected and analyzed for TAL metals and cyanide and toxicity characteristic leaching procedure (TCLP) metals; the samples consisted of dust and dirt taken from surfaces inside the building and within pieces of equipment such as vats from the various floors in the main and wastewater treatment

buildings. The results indicated that a high percentage of the samples contained cadmium, chromium, and/or lead in concentrations above the TCLP limit and had high levels of site-related metals and cyanide. The fact that the samples exceeded the TCLP limit indicated that the dust/grime/dirt is hazardous and has metals that may leach out and contaminate other surfaces and/or enter the groundwater.

The 20 concrete chip samples collected and analyzed for TAL metals and cyanide and TCLP metals verified that most of the contamination is associated with surficial dirt and dust and has not become impregnated into the building surfaces. Although results for two samples exceeded TCLP limits, the samples were collected in areas of known spills as evidenced by discoloration of the concrete floor. Most of the samples contained high levels of total metals and cyanide but no leachable metals. Sixteen wood chip samples were collected and analyzed for TAL metals and cyanide from ceiling beams on the first floor of the main building. TCLP metals were analyzed on half the samples, with two samples exceeding the TCLP limit for lead. The samples with high total metals and concentrations exceeding TCLP limits were from inside the silver plating room.

Twenty paint chip samples were collected and analyzed for total lead to determine whether the paint was lead based. Much of the paint on pieces of equipment and building walls is lead-based paint (LBP), which presents a disposal problem and a potential leaching problem.

Based on the results of the equipment/debris and building interior investigation, it was concluded that most of the contamination is surficial, found in dirt and dust. Several "hot spots" are found in the floor and ceiling beams where the contamination has absorbed into the material at high levels. A focused feasibility study (FFS) was prepared to evaluate alternatives for the equipment/debris and building surfaces. Based on the FFS a Record of Decision (ROD) covering operable Unit 1 (O.U.1) was prepared by NYSDEC. O.U.1 covered cleaning and removal of the contaminated debris inside the building and demolition and disposal of the building itself. The design is currently underway.

The second part of the Initial Site Characterization task consisted of collecting and analyzing 40 shallow soil samples for target compound list (TCL) organics and TAL metals and cyanide. NYSDEC soil cleanup guidance levels were used to evaluate the results. Most of the samples exceeded the cleanup level for benzo(a)pyrene, a polynuclear aromatic compound (PAH), with most of the contamination in the area between the southeastern fence and building and some in the adjacent vacant lot. The cleanup objectives for some other PAHs

were also exceeded in some of the samples. The cleanup objective was not exceeded for any volatile organic compounds (VOCs) or pesticides/polychlorinated biphenyls (PCBs).

The cleanup objective for most metals is either a set value or, if available, the local site background concentration. The UP site background concentrations for chromium, copper, nickel, and zinc were based on three samples collected by NYSDEC and seven samples collected by the New York State Department of Health (NYSDOH). The upper ranges of the eastern U.S. background soil concentrations were used for the other metals (unless the objective clearly stated that a background concentration could not be used). For lead, the guidance value of 400 mg/kg published by the EPA in July 1994 was used as the cleanup objective. The background soil and or cleanup objective concentrations were compared to the data collected in the RI to show areas of the site that potentially need to be remediated. The results showed that much of the shallow soil on the UP property and adjacent vacant lot are contaminated with concentrations of metals only slightly above background. The major contaminants include cadmium, chromium, copper, nickel, and zinc. One lead 'hot spot' was found in the area beneath the window where the lead smelter was located; this sample contained 6.45% lead.

A third portion of the Initial Site Characterization task consisted of collecting soil and groundwater samples from probes to determine the extent of subsurface soil and groundwater contamination. A total of 21 probes were drilled in the building and around the property, and 27 soil samples were taken for VOC analysis and 31 soil samples were taken for TAL metals and cyanide analysis. No VOCs were detected above the cleanup objective. For the metals the site background concentrations were used to determine whether cleanup objectives were exceeded. Most of the soil samples contained cadmium, chromium, copper, and nickel in concentrations above site background.

A total of 15 VOC, 11 filtered metal, and nine unfiltered metal samples were collected from 15 probe locations (no water was present in some locations). Chlorinated solvents were detected above the groundwater standard at three locations inside the main building and at two locations just downgradient of the main building. The presence of these compounds in the groundwater was expected as trichloroethylene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA) were probably used as degreasers. (In fact, a sign on the wall over a sump says "Trichloroethylene"). The unfiltered metals results contained significant quantities of metals because of soil particles in the sample, primarily as a result of the probe sampling technique. For these groundwater probe samples, the filtered metals results are more representative of

actual groundwater conditions. With the exception of the common nonsite-related metals (iron, magnesium, manganese, and sodium), chromium was the major metal found in concentrations above the groundwater standard. Chromium was found chiefly in the samples taken from inside the building and from just downgradient of the main building. Cyanide was detected above the groundwater standard in some of the samples from probes installed inside the building.

The fourth part of the Initial Characterization task consisted of collecting five surface water and 16 sediment samples from drains and sumps inside and outside the building. The surface water samples were analyzed for TAL metals and cyanide. High levels of cadmium, chromium, copper, lead, nickel, zinc, and cyanide were found in the surface water samples. The sediment samples were analyzed for TAL metals and cyanide and three of the samples were analyzed for TCLP metals. Two of the three samples contained metals in concentrations that exceeded the TCLP limit for chromium, indicating that the sediment is hazardous. Chromium, copper, lead, and zinc were found at fairly high levels in all samples. The sediment and water in the drains and sumps will have to be removed as part of the cleanup of the inside of the building, i.e., they will be removed simultaneously with the equipment and debris.

Field work for the Initial Site Characterization task was completed in early June 1995, and field work for the Detailed Site Characterization task began in August 1995. The Detailed Site Characterization task consisted of constructing and sampling test pits around the property to locate potential sources of contamination and to aid in the location, installation, and sampling of 12 monitoring wells in and around the building.

A total of 11 test pits were dug and seven samples were collected and analyzed for TCL VOCs and TAL metals and cyanide. None of the VOC results exceeded the soil cleanup objective. The site background concentrations for cadmium, chromium, copper, and nickel were exceeded in most samples. The test pit on the northwestern side of the building had the least amount of contamination; most of the contamination was found in the test pits on the southeastern side of the building.

Based on the results of the soil and groundwater probe samples and test pit investigation, 12 monitoring wells were installed in September 1995. At one upgradient and two downgradient locations triplicate wells (one shallow well in the weathered and basal till, one intermediate well in the basal till just above the bedrock interface, and one deep well in the bedrock) were

installed. Three shallow wells were installed inside the buildings in the overburden (fill/weathered till). At each of the six locations, one soil sample was collected and analyzed for TCL organics and TAL metals and cyanide. Only the sample from inside the wastewater treatment building contained VOCs above the cleanup objective. The sample had 15 mg/kg of TCE, well above the cleanup objective of 0.7 mg/kg. The same sample also had many PAHs, including benzo(a)pyrene, in concentrations above the cleanup objectives. The sample from the well inside the chrome plating room contained benzo(a)pyrene and dibenzo(a,h)anthracene above the cleanup objectives. Most of the samples had chromium, copper, and nickel above the site background concentrations, with some samples having cadmium and zinc above background.

Each of the monitoring wells were sampled twice. In the first round, which took place in October 1995, the samples were analyzed for TCL organics, filtered and unfiltered TAL metals, and cyanide. Due to a limited quantity of water in some of the wells, not all analyses could be performed for every well. In the VOC fraction the well inside the wastewater treatment building contained TCE at 430 µg/l, well above the groundwater standard of 5 µg/l. TCE was also above the standard in the well in the main plating room and in the well in the chrome plating room. The latter well also had 1,1,1-TCA above the groundwater standard. No semivolatile organic compounds (SVOCs) were detected in any of the samples. PCBs were detected in concentrations above the groundwater standard in some of the samples; however, their presence is suspect, possibly the result of cross contamination. In the metals fraction the unfiltered metals results appeared to be representative of the groundwater as most of the fines had been removed during development/purging of the wells. Other than the common metal contaminants, the upgradient shallow and intermediate wells had no site-related metals in concentrations above the groundwater standard. However, the upgradient bedrock well had cadmium, chromium, copper, lead, zinc, and cyanide above the groundwater standard. The well in the wastewater treatment building had similar concentrations of the same metals, indicating a possible fracture in the bedrock that permits the contamination to migrate to the upgradient bedrock well. The other two wells inside the building had chromium and cyanide above the standard, with the well in the chrome plating room containing over 46,000 µg/l of chromium. The downgradient bedrock wells and intermediate overburden wells had no site-related metals above the groundwater standard. The shallow overburden well downgradient of the chrome plating room had chromium in concentrations above the groundwater standard.

Based on the results from the first round, a second round of groundwater samples was recommended; the samples were analyzed for TCL VOCs (using a low-level method), PCBs, and unfiltered metals and cyanide. The sampling took place in December 1995; however, due to laboratory error, the VOC samples had to be recollected in January 1996. VOC results were similar to those of the first round. PCBs were detected in some of the samples in concentrations above the groundwater standard; however, their presence may be due to cross contamination. Metals results were similar to those of the first round, although concentrations were lower, probably due to the wet-weather conditions that occurred prior to the second round of sampling. In general, the second round samples verified the findings of the first round.

A habitat assessment was conducted and it was found that there are no significant habitats on the property and that no wildlife or vegetation would be impacted by any work done on the site.

Based on the results and conclusions of the RI, LMS recommended the following additional investigations:

- ***Groundwater Monitoring Wells*** - Most of the contaminated groundwater was found under the building; however, some contamination was found downgradient. The off-site extent of the contaminant plume needs to be investigated to determine the location and impact of this contaminated groundwater and the volume to be remediated.
- ***Ground-Penetrating Radar (GPR)*** - A GPR survey is recommended to help determine potential pathways of groundwater contamination.

As a result of LMS' recommendations, NYSDEC decided to conduct additional RI work and in 1997 requested that LMS prepare a work plan amendment to cover the additional work. The work plan amendment was submitted and approved in February 1997 and added Task 7, Additional RI, to the scope of work. The additional work included a GPR survey between Foster Avenue and the UP building to locate underground utilities and structures and the installation of 19 new monitoring wells (five shallow, seven intermediate, and seven deep) to monitor the groundwater beneath and downgradient of the site (LMS 1997). Following the geophysical investigation was complete the locations of some of the wells were changed. Due to the poor structural condition of the building it was also decided not to install any additional wells inside the building. The wells inside the building may be installed after the building is

demolished as part of the remedial design for the site. Therefore, a total of 14 new wells were installed as part of the Additional RI.

Because UPMW-1C, the existing deep background well, is contaminated, monitoring wells UPMW-7A, B, and C were installed in the playground upgradient of the site as a new upgradient monitoring well cluster. Monitoring wells UPMW-8A, B, and C were located on the corner of Foster Avenue and Seneca Street and monitoring well UPMW-12C was located near the bike path on the west side of Seneca Street. These wells monitor the groundwater downgradient of the site. Monitoring wells UPMW-9A, B, and C and UPMW-11A and B were installed in the utility trenches along Foster Avenue to determine whether contamination was entering the trenches from the site and flowing through the bedding. UPMW-10B and C were located to the north of the treatment building in the field to monitor any contamination moving from beneath the building.

Five soil samples were collected during the installation of four monitoring wells and analyzed for TCL VOCs and TAL metals and cyanide. No VOCs were found above cleanup objectives; however, beryllium, copper, and nickel were found above cleanup objectives (site background for copper and nickel) in all five samples. Chromium was detected above the site background in two samples. The results indicate that site-related metals may be contaminating the soil downgradient of the site.

One soil sample was collected from a test pit constructed in the vicinity of UPMW-11 after it was determined that an unmarked lateral from the city garage was damaged during drilling. The sample was analyzed for cadmium, chromium, copper, lead, nickel, zinc, and cyanide only and had chromium, copper, and nickel above site background levels. The results indicate that site-related metals may be impacting the soils in this area, probably through drains and/or pipes running from the building into the sewer in Foster Avenue.

After completion of the monitoring wells and development, the new wells plus all existing wells were sampled and analyzed for low-level VOCs, low-level PCBs, and total metals and cyanide. Due to very low recovery only VOCs were analyzed for UPMW-11B and only VOCs, metals, and cyanide were analyzed for UPMW-9A and -9B.

TCE was found above the groundwater standard, at 400 µg/l, in the well in the wastewater treatment building; cis-1,2-DCE was also detected above the standard in this well. TCE was also found above the standard in the other two wells inside the building but at much lower

concentrations. 1,1,1-TCA was found at 69 µg/l in the well in the chrome plating room. Benzene was detected in three downgradient wells above the standard, but benzene is not considered a site-related contaminant. No other wells had any VOCs above groundwater standards. PCBs were found above the standard in two wells; however, because one of the wells is upgradient of the site, PCBs are not considered to be a site-related problem.

Neither of the two upgradient shallow and intermediate wells nor the new deep well had any site-related metals above groundwater standards. The existing deep upgradient well had chromium, copper, lead, and zinc above standards. These results are similar to those found previously. The well downgradient of this location in the wastewater treatment building also had chromium, copper, lead, and zinc above the standards, indicating there may be a connection between the two wells. The other two wells inside the building had chromium and cyanide above standards; the well in the chrome plating room also had lead above the groundwater standard. Chromium was found in this well at 104,000 µg/l, the highest level detected to date in the groundwater. The intermediate and bedrock wells just outside the building on the downgradient side had no site-related metals above standards. The shallow well outside the chrome plating area had chromium above the standard, whereas the other shallow well had only low levels of chromium. The intermediate and deep wells installed on the property to the west of the building had no site-related metals above standards.

Five wells were installed in the utility bedding trench in Foster Avenue. Neither the shallow well nor the deep well installed at one location had any site-related metals above standards. The intermediate well downgradient of the main plating room had chromium, lead, and zinc above the standards, indicating that contaminated groundwater from the site is entering the utility trench, probably via drains or pipes from the building. There was insufficient water in the other intermediate well to sample for metals; however, the groundwater here may be contaminated as the soils from the test pit in the vicinity of this well are contaminated with site-related metals, and the groundwater travels to this location from the other contaminated intermediate well.

None of the wells installed downgradient of the utility trench had any site-related metals above standards indicating either that the contamination has not traveled this far as of yet or more likely, that the utility trench has trapped any contamination and the contaminated groundwater is flowing through the trench. The material surrounding the utility trench is more conducive to groundwater flow than the natural overburden material in the area.

The RI data were used to prepare the risk assessment (RA), which indicated that a significant increase in cancer risk to children and adults may occur due to the presence of benzo(a)pyrene and, to a lesser extent, chromium in the shallow soils. Both compounds were found above the cleanup objective/background levels throughout most of the site; however, the data used to develop the site background concentrations of the site-related metals fluctuated greatly. In addition, the levels of benzo(a)pyrene found at the sites are typical of urban soils and are probably not site related. The levels of metals found in the playground area may be site related, but they are also typical of urban settings as are the concentrations of metals found throughout the site (with the levels of metals within an order of magnitude of the cleanup objectives). Therefore, the only shallow soil area that requires remediation is the lead 'hot spot' outside of the smelter window. This area is estimated to be approximately 14,000 ft³. Groundwater sampling was not included in the RA as it is not used as a drinking water source; however, the groundwater beneath the building is contaminated with metals (chiefly chromium and cyanide) and TCE/1,1,1-TCA above the groundwater standards, which is the remedial action objective. The estimate of the quantity of contaminated water beneath the building is 1.7 million gal. The subsurface soils do not present a risk and were not evaluated as part of the RA. However, the soils potentially provide a continuous source of contamination to the groundwater. Data from the soil probes, test pits, and monitoring wells were evaluated to determine whether metals concentrations were high enough to possibly produce leachable levels of TCE, cadmium, chromium, and lead at hazardous concentrations (i.e., above the TCLP limit). The TCLP limit was multiplied by 20; if the calculated value was less than the total concentration of the compound and all the material present was assumed to be leachable, then the compound was considered present at leachable levels. The assessment showed that most of the contaminated soil lies beneath the building, at an estimated volume of 215,500 ft³.

CHAPTER 2

INTRODUCTION AND BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The 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, one-third of which is covered by the building footprint. 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 (see Figure 1-2). 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-strand 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 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 or other operations and offices and the second containing the treatment facility. The building footprint is approximately 26,195 ft². Building 1 is a six-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.

2.2 SITE BACKGROUND

UP operated as a metal plating facility from 1945 until 1990. The facility had a pretreatment system through which the generated wastes were processed prior to discharge to the City of Schenectady's Anthony Street Treatment Plant. According to the records, the pretreatment system consisted of cyanide, chromium, and acid/alkaline waste treatment systems (UP 1986).

In the cyanide system the waste was collected in a 500-gal sump tank and then pumped to the No. 1 treatment tank. The pH was maintained at 11 using sodium hydroxide, and sodium

hypochlorite was added to oxidize the cyanide. The waste was then discharged to tank No. 2, where the pH was lowered to 8 with sulfuric acid. Overflow was discharged into tank No. 5, where a polynucleolyte flocculant was added. The waste was discharged to a clarifier for settling and then discharged to the sewer (UP 1986).

The chromium treatment system consisted of a 500-gal sump tank from which waste was pumped to tank No. 3, where the pH was maintained at 2 with sulfuric acid. Sodium metabisulfite was added to convert the hexavalent chromium to trivalent chromium. The waste was discharged to tank No. 4, where the pH was raised to 8 with sodium hydroxide. The mixture was discharged to tank No. 5, where flocculant was added and then allowed to settle in the clarifier. From the clarifier the waste was discharged to the sewer (UP 1986).

The waste to the acid/alkaline destruct system did not contain either cyanide or chromium and was collected in a 500-gal sump tank. The waste was fed into the No. 5, tank where the pH was maintained at 8 and flocculant was added and then allowed to settle in the clarifier. From the clarifier the waste was discharged to the sewer (UP 1986).

Three hazardous waste manifests were found and reviewed. On 3 January 1989, 13,590 lb of F006 (wastewater treatment sludges from electroplating operations) in 11 burlap, plastic, or paper bags were picked up and delivered to WRC Processing Company in Pottsville, Pennsylvania. On 28 March 1989, 1076 lb of F006 waste in one burlap, plastic, or paper bag were delivered to the same facility. On 20 June 1989, 7252 lb of F006 waste in six burlap, plastic, or paper bags were also delivered to the same facility (UP 1989a).

The City of Schenectady issued a permit to UP for discharging their pretreated waste to the sewer system. From 1984 to 1989 either UP or the City of Schenectady analyzed samples of the discharge to the sewer; the results are discussed in Chapter 5 (City of Schenectady 1984- 1989).

On 26 October 1988 the City of Schenectady informed UP that any subsequent violations of the limits would be fined at the rate of \$1000 per violation; a hearing was set for 16 November 1988 (City of Schenectady 1988).

On 2 March 1989 a search warrant was issued and samples were collected by NYSDEC from various areas on the site. Two soil, one sludge, one ash, and seven liquid samples were collected and analyzed (NYSDEC 1989b). On the basis of this inspection, on 3 March 1989

the New York State Department of Law (NYSDOL) contacted UP's attorney, Whiteman, Osterman & Hanna (WOH), and requested that UP cease all untreated hazardous waste discharges, cease all surface discharges, identify all hazardous waste stored on the site, and contract for a complete facility environmental compliance audit (NYSDOL 1989). WOH responded on 7 March 1989 and indicated that Dr. William Carter had been retained by UP for auditing (WOH 1989).

On 13 September 1989 NYSDEC conducted an inspection of the site and collected one groundwater and one soil sample (NYSDEC 1989c).

On 22 September 1989 UP signed a Consent Order with the City of Schenectady. The Consent Order issued a temporary discharge permit and required extensive monitoring of the discharge by UP (City of Schenectady 1984-1989). On 29 September 1989 UP submitted a Baseline Monitoring Report to the City of Schenectady. The report described the operations at the site, production rates, and flow rates to the treatment system (UP 1989b). On 23 October 1989 the City of Schenectady rescinded the permit because UP did not comply with the Consent Order. UP was ordered to cease discharging to the sewer system (City of Schenectady 1989). Subsequently, the City of Schenectady sealed off the outfall pipe from UP to the city sewer. On 15 November 1989 NYSDEC conducted an inspection of the UP site after a reported spill. Samples of the spill were taken and analyzed (NYSDEC 1989d).

On 16 May 1990 NYSDOH collected seven surficial soil samples from the playground southeast of the site. The samples were analyzed for Hazardous Substance List (HSL) metals and cyanide (NYSDOH 1990).

On 7 June 1990 a fire occurred at the site (City of Schenectady 1990a); a subsequent inspection was conducted by NYSDEC (NYSDEC 1990a). On 19 June 1990 another inspection was performed by NYSDEC and City of Schenectady officials (NYSDEC 1990b). The inspection found unlabeled tanks and containers of hazardous waste, incompatible materials stored adjacent to each other, and haphazard storage of all containers. The inspection team stated that a drum removal action may be needed at the site and prepared papers for submission to add the site to the New York State Registry of Inactive Hazardous Waste Sites.

The Schenectady County Grand Jury indicted UP in May 1990, and in July 1990 the state obtained a court order closing the plant until the operation complied with all ECLs (NYSDEC 1990h).

On 3 July 1990 NYSDEC conducted an inspection of the site to inventory the material stored in the building. According to the inspection report the cyanide room contained over 7000 gal of mostly cyanide salts, over a dozen drums of unknowns, and 2000 gal of unknown materials in open-top tanks. The chromium room contained two drums of chromic acid, two drums of chromic acid fluoride, two 5-gal containers of dry chromic acid, one drum labeled "Old Chrome," two tanks containing chrome plating solutions, and six unlabeled tanks. The copper plating area had five open tanks, with one tank containing 350 gal of an unknown, one with 2000 gal of sludge/liquid, one with 1500 gal of cyanide, one with 1500 gal of acid, and one tank containing an unknown and no volume noted. The room also had four drums of hydrochloric acid, two drums of oil, one 25-gal carboy labeled "Corrosive," two drums of unknowns, 13 tanks used for copper plating operations, eight tanks used for other plating, one drum of 3% nitric acid, five drums of electroless nickel solution, one drum of ammonia, one drum of hydroacetic acid, one drum of chromic acid, and one 20-gal container of an unknown. Two other plating lines were observed - one with eight tanks and the other with four tanks. The waste treatment room contained wastewater stored in six tanks, 1 ft³ of sludge, another plating line for nickel, nine drums of sodium hydroxide, four drums of sulfuric acid, one drum of flocculant, and a container with 1 ft of sludge awaiting dewatering. A storage room off the waste treatment room contained 76 gal of hydrofluoric acid, 11 15-gal containers of chromic acid, 14 20-gal containers of acid, 19 containers of unknowns, 142 containers of varying sizes of a number of chemicals, and bottle of laboratory chemicals (NYSDEC 1990d).

The second floor contained the aluminum anodizing operation, which consisted of 11 tanks. The room also had several 5-gal carboys of hydrofluoric and glacial acetic acid. A storage room on the second floor contained 47 containers (~2000 gal) of various acids, eight drums of finishing agents, one drum of black dye, one drum of hydrogen peroxide, seven drums of chrome, four leaking drums of sodium hydroxide, and 80-lb bags of copper sulfate. On the third floor were 35 drums of alcohols, oils, solvents, rust preventatives, and 1,1,1-TCA. On the fourth floor were three 5-lb boxes of lead acetate and a small smelter (NYSDEC 1990d).

On 25 July 1990 the NYSDEC Division of Environmental Enforcement (DEE) conducted a sampling trip. According to the report, two samples were collected for extraction procedure (EP) toxicity metals, one sample was taken for EP toxicity metals and total cyanide, one sample was collected for identification, and one sample was collected for corrosivity analysis. The results were not available in the file (NYSDEC 1990c).

On 9 October 1990 the City of Schenectady requested that NYSDEC remove the drums containing hazardous waste from the site using state Superfund money (City of Schenectady 1990b). On 26 October 1990 NYSDEC responded to the request by the City of Schenectady by stating that all options were being considered for cleanup of the site (NYSDEC 1990e).

On 10 October 1990 UP advised NYSDEC that they no longer had funds to continue operating (UP 1990). Bankruptcy of UP was confirmed by the State Supreme Court on 1 November 1990 (NYSDEC 1990h).

On 7 November 1990 NYSDEC conducted an inspection of the site and found several hundred drums of acids, bases, cyanides, alcohols, solvents, and plating solutions (NYSDEC 1990f). On 15 November 1990 NYSDEC requested that EPA undertake a removal action (NYSDEC 1990g).

A PA was conducted by EPA on 17 November 1990. This inspection revealed approximately 30,000 gal of bulked liquids contained in various tanks and open plating baths. An estimated 750 drums and 2000 laboratory containers were stored haphazardly, without regard to their contents or condition. During EPA's PA the following hazardous substances were tentatively identified at the facility: copper cyanide, nickel cyanide, zinc cyanide, nitric acid, sulfuric acid, hydrochloric acid, trichloroethane, and hydrogen fluoride. The identification of these compounds was based on container, tank, and drum labels. Containers and drums were located throughout the facility (EPA 1992).

Phase I of the removal action consisted of site stabilization measures, which included segregating incompatibles, sampling containers, performing compatibility analyses, bulking small-quantity containers (< 25% full), transferring all vat liquids and solids into drums, and laboratory packing and disposing of all laboratory chemicals. Phase II activities included coordination of transport and disposal of all substances deemed to be hazardous as per the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA) (EPA 1992).

From early September 1991 through October 1991, 20 truckloads with approximately 70 drums per truck were shipped off-site to RCRA-permitted and CERCLA-approved treatment, storage, and disposal facilities (TSDFs). The last shipment was sent on 18 November 1991 (EPA 1992).

The following hazardous wastes were shipped and disposed of through wastewater treatment: oxidizing acid - 26 drums; acid cyanide - 3075 gal + 242 drums; oxidizing liquids - 27 drums; alkaline cyanide - 268 drums; oxidizing alkaline cyanide - 42 drums; reactive cyanide - 20 drums; cyanide liquids - 22 drums; cyanide solids - 16 drums; hazardous solids - 24 drums; alkaline solids - 134 drums; corrosive liquids - 22 drums; and acid solids - 34 drums. The following hazardous wastes were shipped and disposed of through fuel burning: base neutral liquids - 67 drums; flammable organic liquids - 46 drums; flammable liquids - two drums; and flammable solids - eight drums (EPA 1992).

Samples of dust from the floor inside the building taken on 27 February 1991 revealed high levels of total lead (EPA 1991).

On 17 September 1992 the owner of the site was sentenced to 1-3 years in prison for violation of the ECL, and the UP Corporation was fined \$150,000, also for violation of the ECL and for reckless endangerment (NYSDEC 1992a, 1992b).

On 14 April 1994 an inspection of the facility conducted by Clean Harbors, Inc., for NYSDEC confirmed that no hazardous wastes remained on the site (NYSDEC 1994b).

In December 1994 NYSDEC contracted with LMS to conduct an RI/FS of the UP site under terms of the Standby Contract. An amendment was prepared in February 1997 that included additional RI work.

2.3 REPORT ORGANIZATION

This report for the RI presents the results of the RI and the Additional RI work conducted for the UP site. Field investigation activities for the RI were conducted under two tasks: Task 2a - Initial Site Characterization and Task 2b - Detailed Site Characterization. Task 2a field activities, conducted in May and June 1995, included 22 soil borings using a probe and 14 piezometers. A total of 94 wipe, 50 sweep, 20 concrete chip, 16 wood chip, 20 paint chip,

40 shallow soil, 27 probe soil, 15 probe water, 16 sediment, and five surface water samples were collected.

Task 2b field activities were conducted between August and January 1996. Task 2b consisted of the installation of 12 monitoring wells, collection of a soil sample from each of six monitoring well locations, construction of 11 test pits, collection of soil samples from seven of the test pits, and two rounds of groundwater sampling.

Task 7 (Additional RI) field activities were conducted between August and December 1997. Task 7 consisted of the performance of a GPR and a metal detection survey between Foster Avenue and the UP building, the installation of 14 monitoring wells, collection of one test pit sample, collection of five soil samples from four of the monitoring wells, and collection of groundwater samples from all new and existing monitoring wells.

Chapter 3 includes the field investigation procedures employed during the RI and Additional RI work. The physical characteristics of the site identified during the field investigation are presented in Chapter 4. The nature and extent of site contamination as determined by the sampling and analyses conducted during the three tasks are discussed in Chapter 5.

In addition to the field investigation activities, a human health risk assessment and a habitat assessment were conducted as part of Task 2b. The health risk assessment is presented in Chapter 6 and the habitat assessment in Chapter 7. The RI conclusions are summarized in Chapter 8. Remedial action objectives as determined by the human health risk assessment, as well as estimated quantities of contaminated media requiring remediation based on these objectives, are also presented in Chapter 8.

CHAPTER 3

FIELD INVESTIGATION PROCEDURES

3.1 INTRODUCTION

The objectives of the Initial Site Characterization Task were to:

- Remove and dispose of the debris outside the building.
- Collect samples to characterize the contamination of the buildings and the equipment and debris inside the buildings.
- Determine the discharge locations of the drainlines and sumps within the buildings and characterize the material within the sumps.
- Characterize the contamination of the shallow and subsurface soils surrounding the site and groundwater beneath the site.
- Determine the groundwater flow and elevation at the site. The location of contamination as identified by the subsurface soil and groundwater samples and the water table elevations were used to locate the monitoring wells required under Task 2b.

The extent of building, equipment, and debris contamination was determined using a combination of wipe, sweep, concrete chip, wood chip, and paint chip samples. In addition, the ability to decontaminate the equipment and debris was assessed by collecting wipe samples before and after steam cleaning representative pieces of equipment. Shallow soil samples were collected at locations throughout the property and on the adjoining property. A probe was used throughout the property to collect subsurface soil and groundwater samples. At several locations, piezometers were installed and used to construct water table isopleth maps. Smoke testing was used to identify discharge locations of the drainlines and sumps. In addition, samples of water and sediment were collected from the sumps within and outside the building to characterize any contamination associated with the sumps.

The objectives of the Detailed Site Characterization Task were to characterize the groundwater quality upgradient and downgradient of the site and to locate and characterize the sump area in in the rear of the building. The chemical and water level data 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 to determine the placement of the monitoring wells needed to characterize the groundwater quality. Three clusters of triplicate wells were installed (one upgradient and two downgradient) to characterize the groundwater of the overburden, basal till/bedrock contact, and bedrock. Three overburden wells were installed inside the building to monitor the levels of contamination in the weathered till and fill material beneath the building.

3.2 DEBRIS REMOVAL

Three days of debris removal were conducted from 3 to 5 May 1995. The objective of this debris removal was to remove various scrap, plastic, wood, and former brewery kettles from the rear yard of the facility to clean the site and allow access for sampling and drilling equipment. The removal efforts were completed by Pollution Solutions of Vermont, Inc., under subcontract to LMS. The debris was sorted as to type - metallic and nonmetallic. Small items were placed directly into rolloffs with a backhoe, while larger items were crushed or cut into a manageable size. Four rolloffs of metallic debris were removed to a scrap dealer and approximately 5 tons of miscellaneous nonmetallic debris were sent off-site for landfilling. LMS originally estimated that the debris removal could be completed in one day using two rolloffs. It was quickly realized that a much larger volume and tonnage of debris had to be removed. With NYSDEC approval, the level of effort was expanded to ensure that enough debris was removed to adequately clean the site and to provide access for other field activities. The debris was removed from the site under the assumption that it was uncontaminated; during removal, no heavily stained items, metallic plating wastes, or process chemicals were found, with the exception of a small plating basket that appeared to contain metallic balls. This item was set aside and not removed from the site.

3.3 BUILDING AND ANCILLARY EQUIPMENT CONTAMINATION

To assess the contamination of the building and ancillary equipment, 200 samples were collected within the building. The samples consisted of wipes, sweeps, concrete chips, wood chips, and paint chips. The locations were selected based on the detailed site reconnaissance and approved by the NYSDEC project manager.

The wipe samples were collected throughout the building area from dirty or grime-covered equipment, floors, and walls. A total of 84 locations were sampled. Appendix A contains the

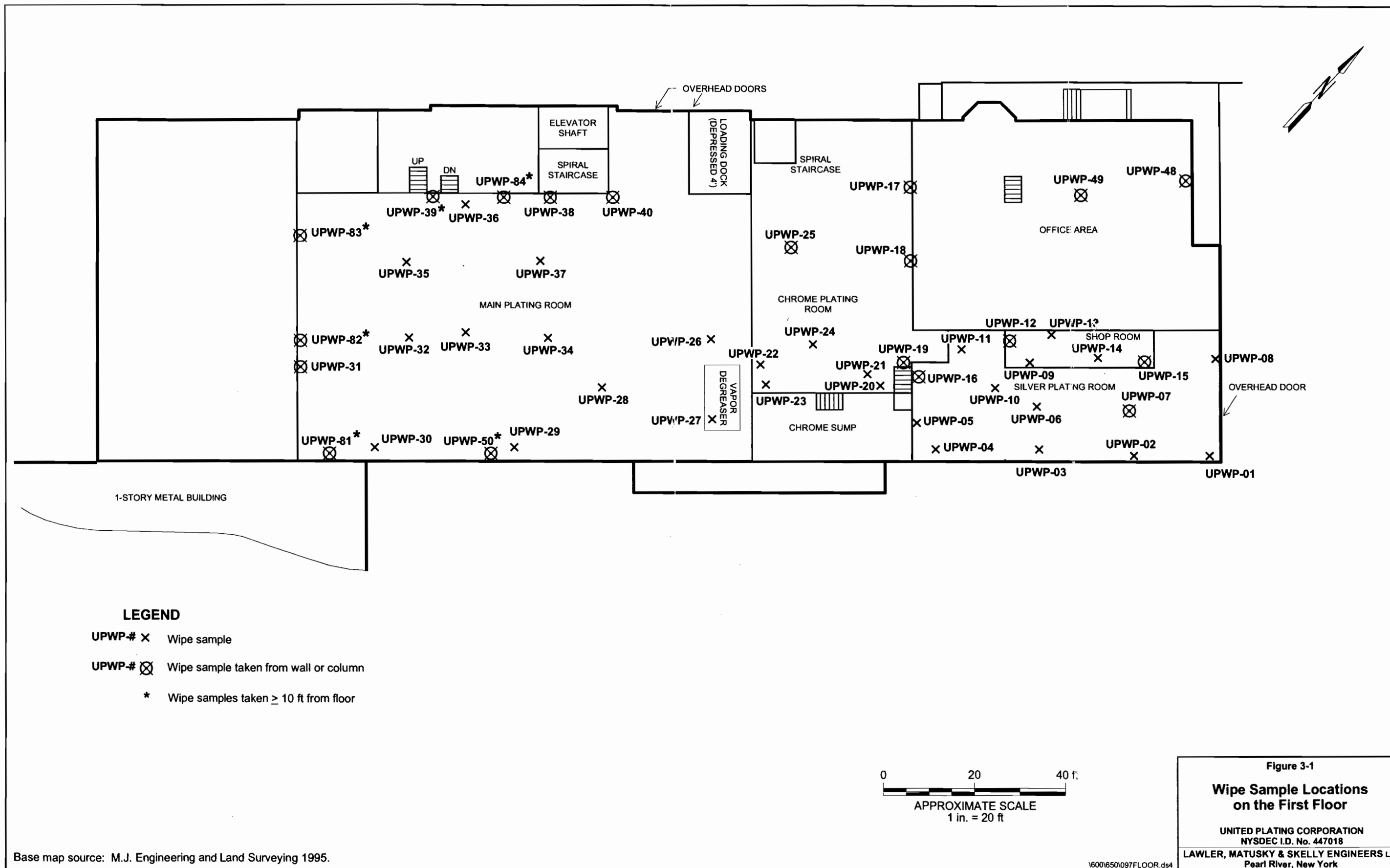
sampling logs describing the sampling locations in detail, and Figures 3-1 to 3-5 graphically depict the locations of the wipe samples.

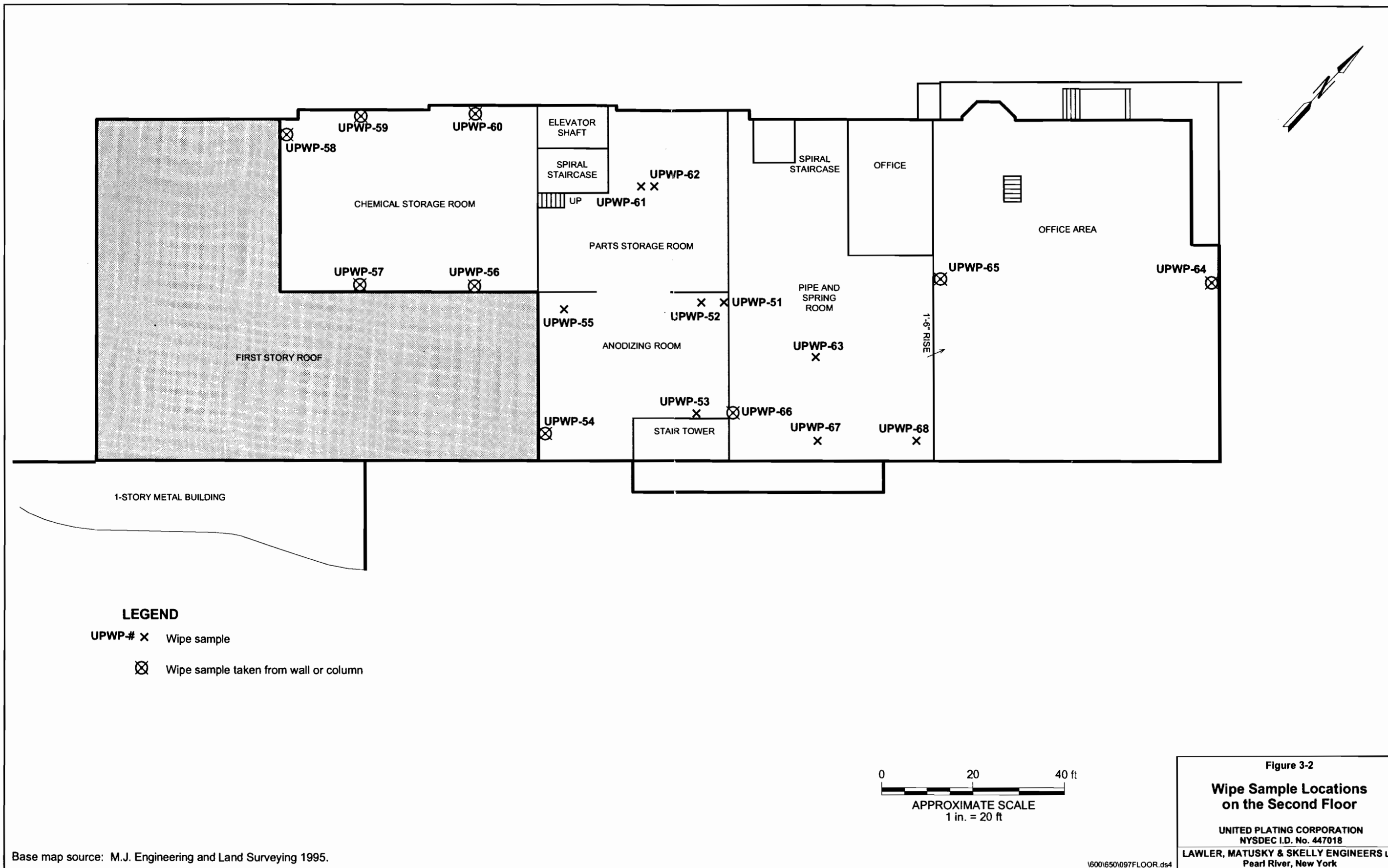
At each wipe location a laboratory-cleaned stainless steel template was first placed over the sampling location to ensure that the wiped area was 100 cm². A sterile gauze pad was then wet with distilled water and wiped with firm strokes over the entire 100-cm² area in one direction and then the other. The pad was then placed into ziplock plastic bags and labeled with the location, date, and time of sample collection. The samples were then submitted to E3I Laboratories for analysis for TAL metals and cyanide analysis using NYSDEC Analytical Services Protocol (ASP) (December 1991). Ten of the original pieces of equipment from which wipe samples were taken were removed from the building and steam cleaned until visibly clean. Another wipe sample was then taken to assess the effectiveness of steam cleaning.

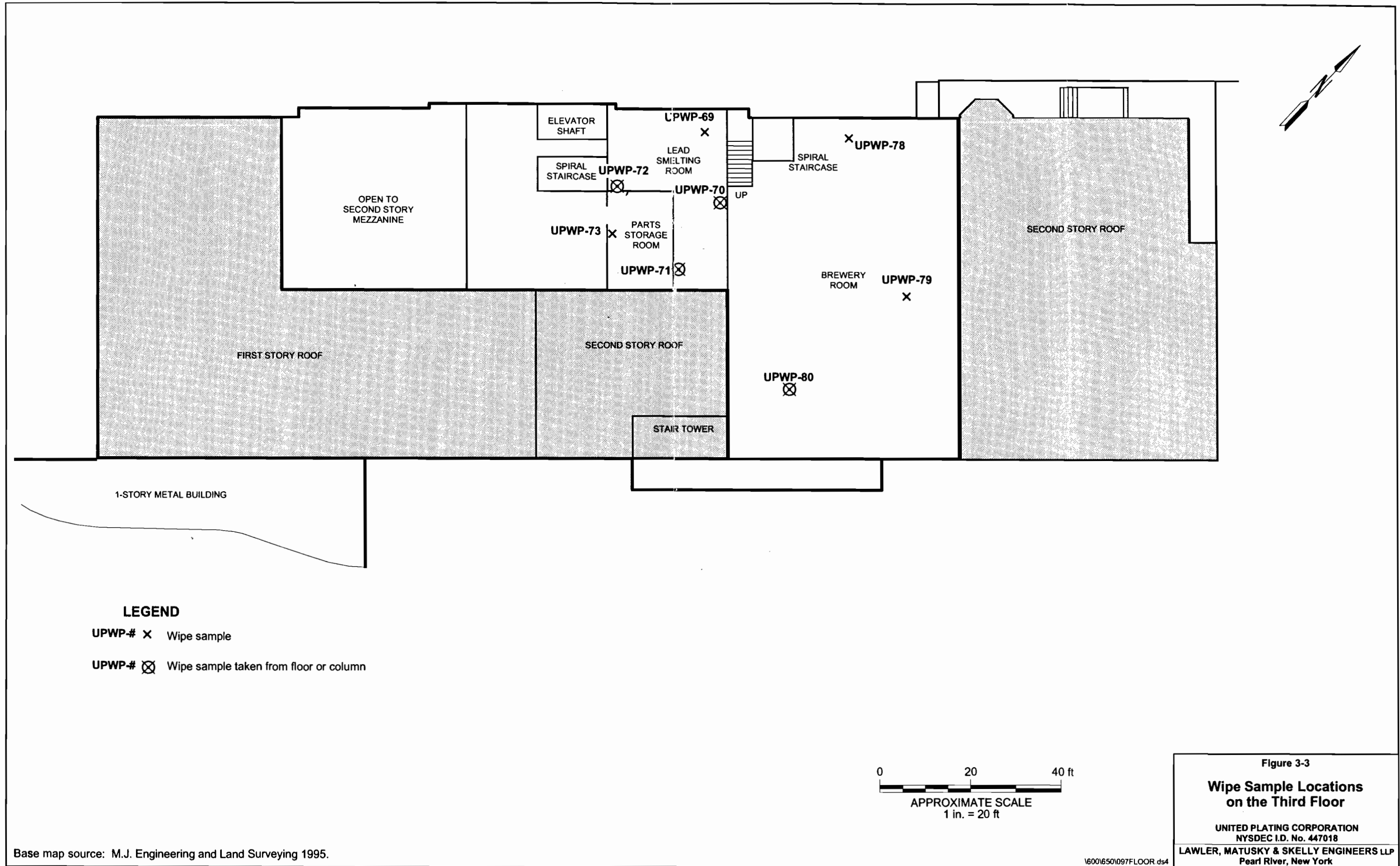
The sweep samples were collected throughout the building where sufficient quantities of dust, dirt, or residual process material were found. A total of 50 locations were sampled. Appendix A contains the sampling logs describing the sampling locations in detail and Figures 3-6 to 3-10 show the locations graphically. At each location the material was swept into a pile using a dedicated soft-bristle brush. The material was then transferred into the appropriate sample container with a dedicated foil-covered dustpan. At each location notable features, such as color, texture, and area swept, were recorded on the sampling logs. The samples were submitted to E3I Laboratories under chain-of-custody protocol for TAL metals and cyanide analysis and TCLP metals using NYSDEC ASP (December 1991).

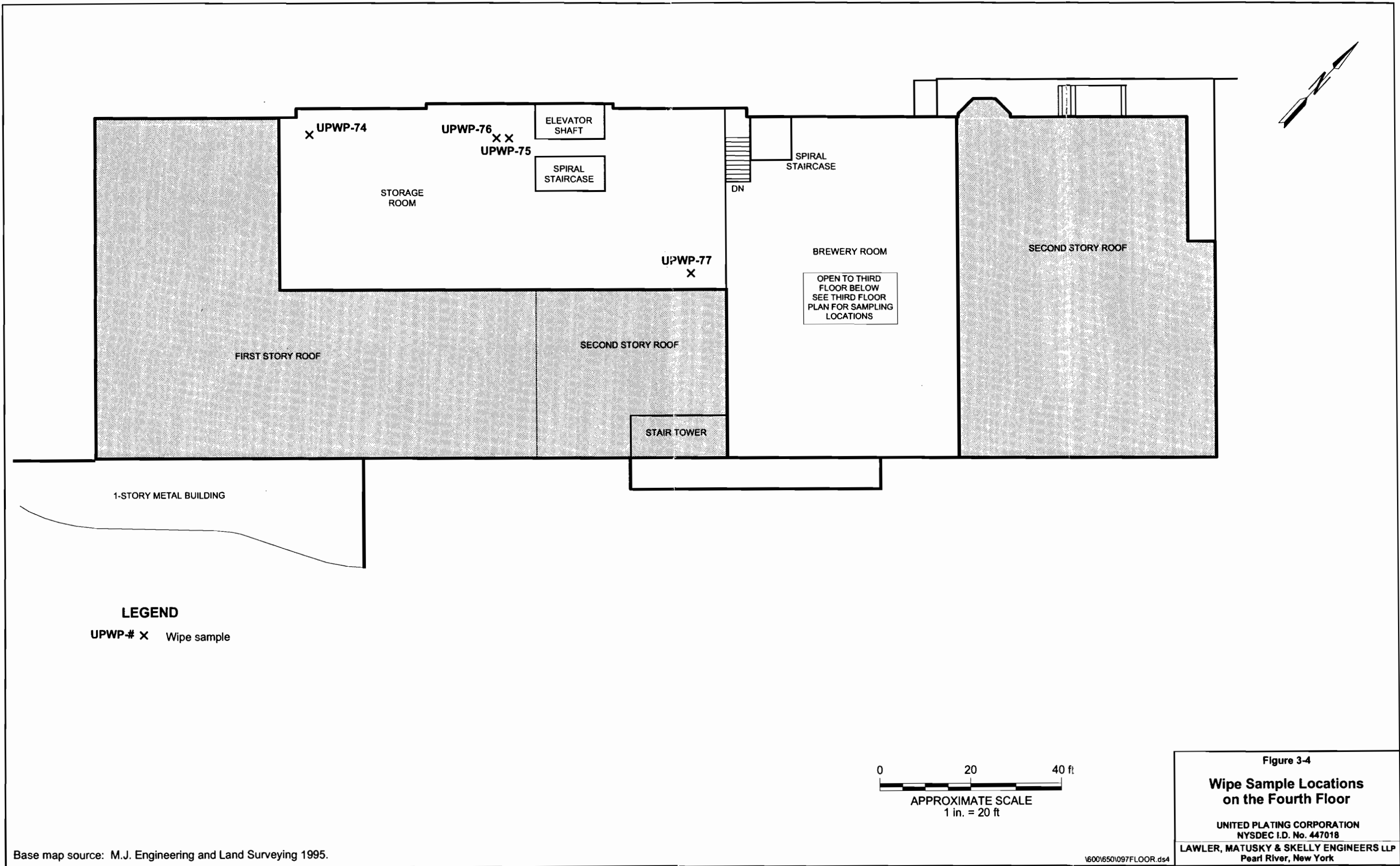
Three types of chip samples were collected - floor concrete chips, wood chips, and paint chips to assess the building contamination.

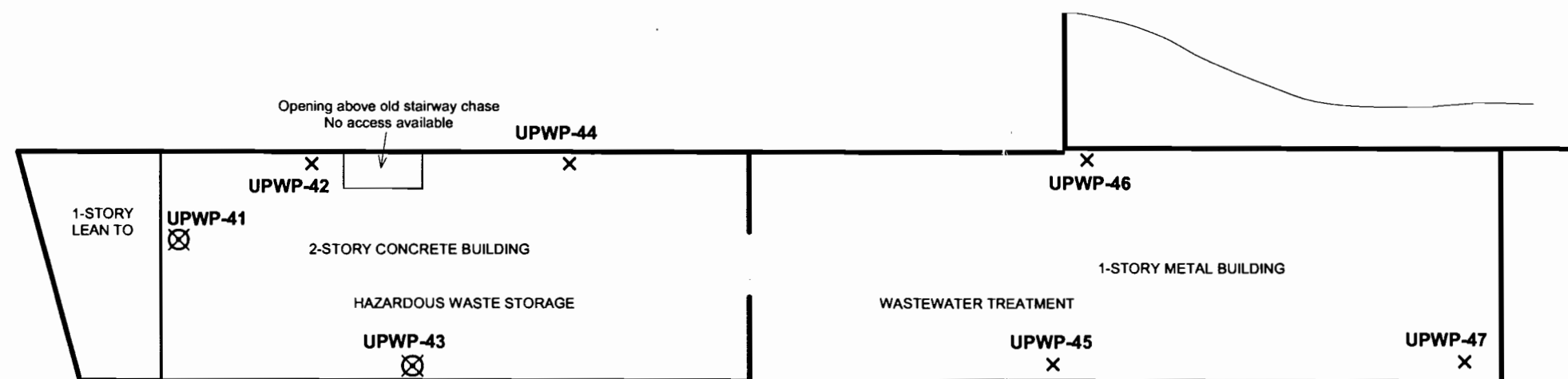
Floor chips were collected by using a hammer drill and a diamond bit. At each location, the drill was used to drill 2 to 5 mm into the concrete. The chips and dust were then manually swept into small piles and transferred to the laboratory-supplied sampling containers. Each location was noted on the sampling log and the bottles were appropriately labeled and shipped overnight via chain-of-custody protocols to E3I Laboratories for TAL metals and cyanide and TCLP metals analysis. A total of 20 concrete chip samples were collected. Appendix A contains the sampling logs describing the sampling locations in detail and Figures 3-6 to 3-10 show the concrete chip sample locations graphically.





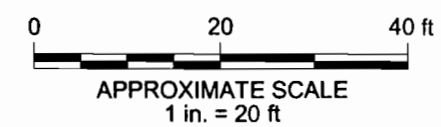






LEGEND

- UPWP-# X Wipe sample
- UPWP-# X Wipe sample collected from wall or column



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

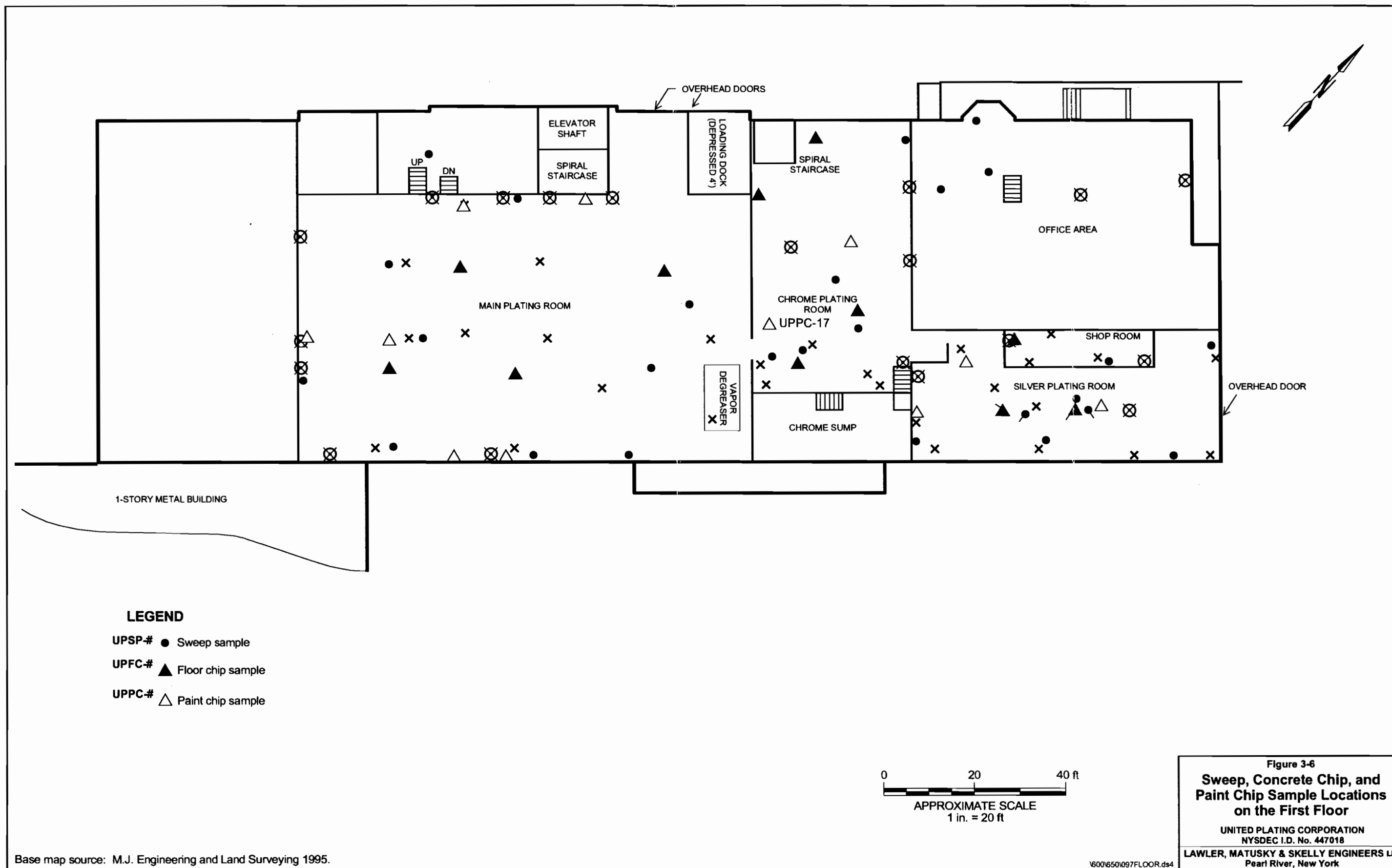
\\600\\650\\097\\ADDT.ds4

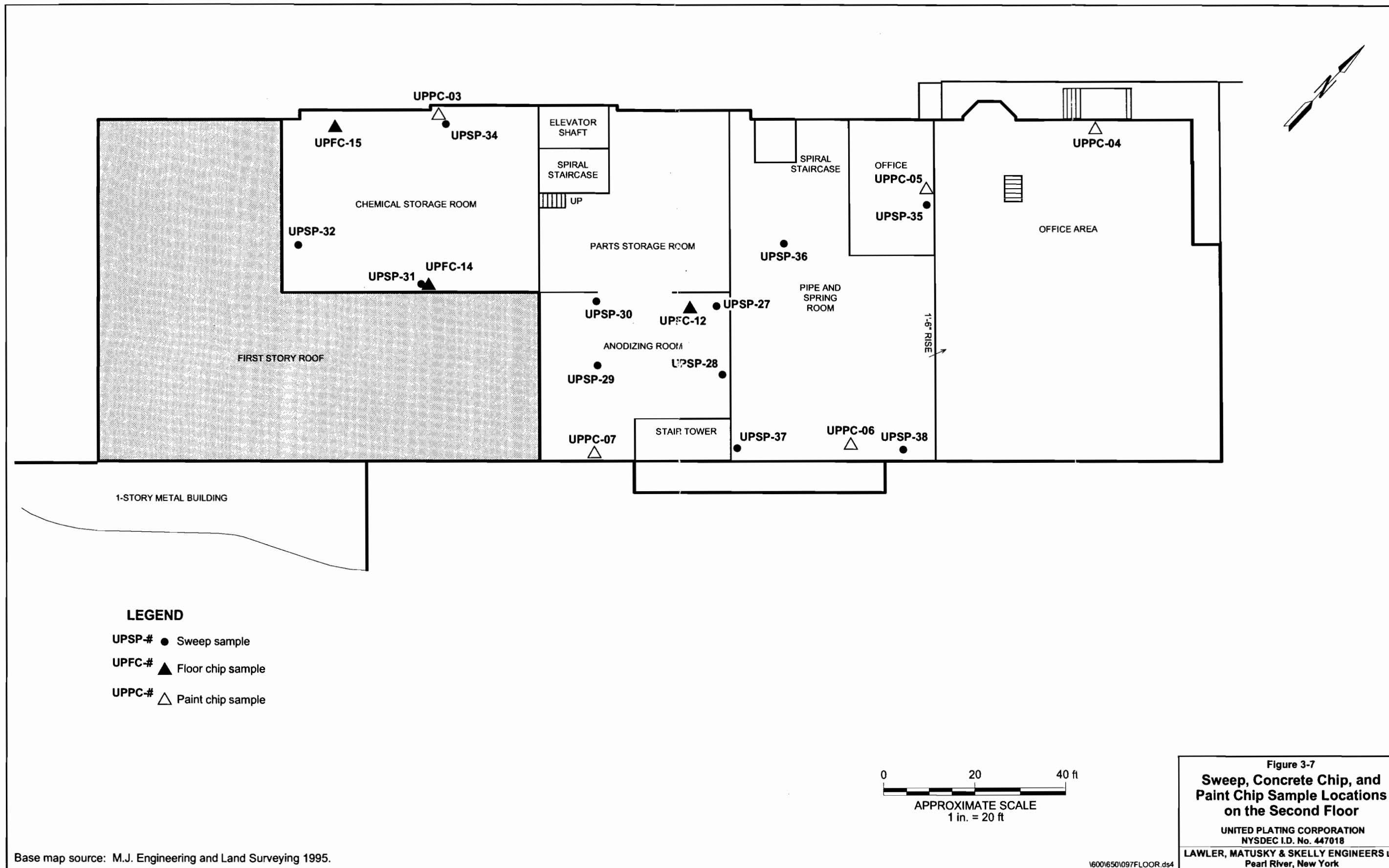
Figure 3-5

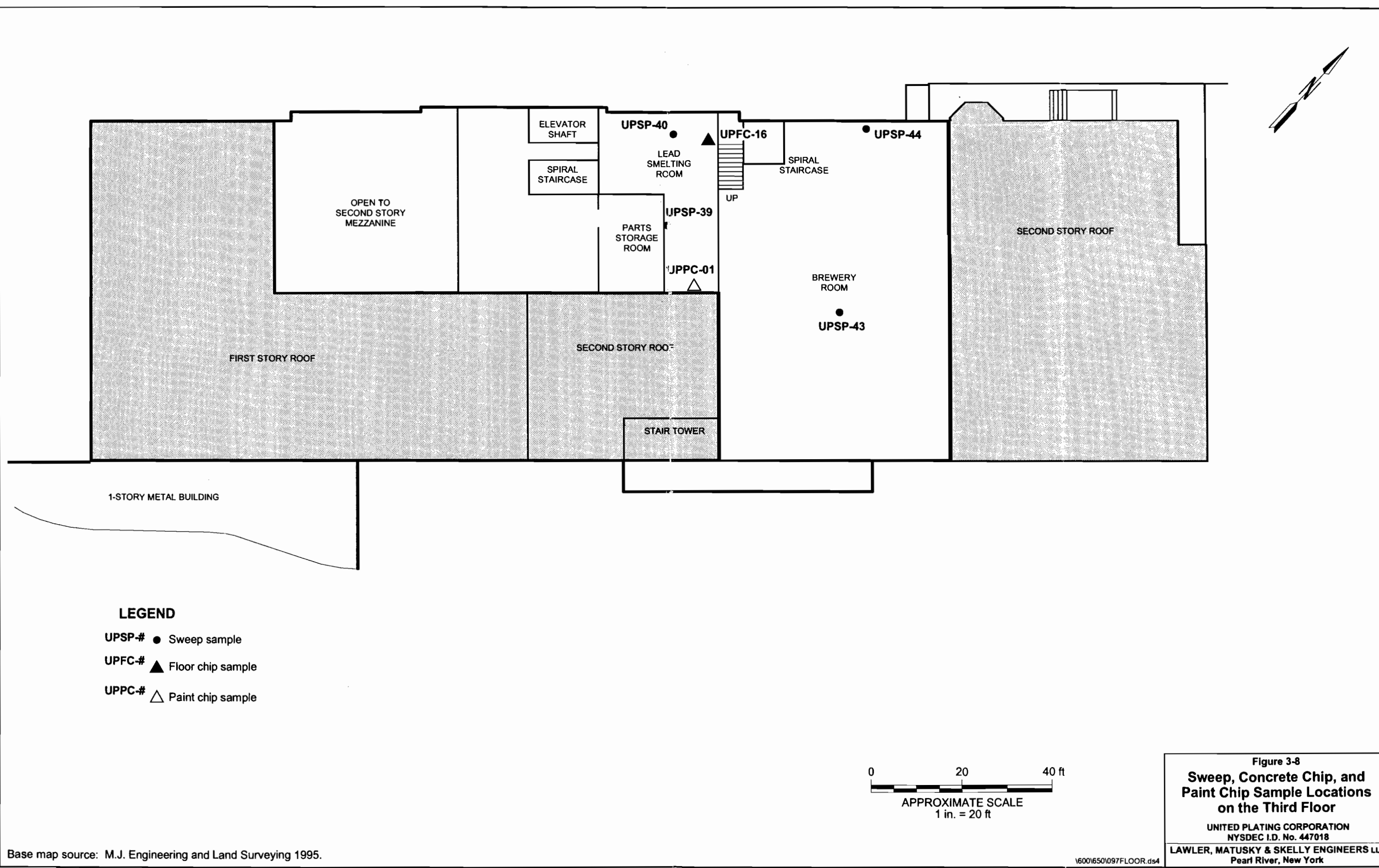
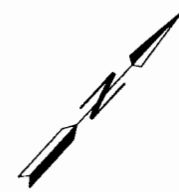
**Wipe Sample Locations
Wastewater Treatment Building**

UNITED PLATING CORPORATION
NYSDEC I.D. No. 447018

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







LEGEND

- UPSP-# ● Sweep sample
- UPFC-# ▲ Floor chip sample
- UPPC-# △ Paint chip sample

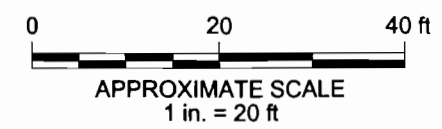
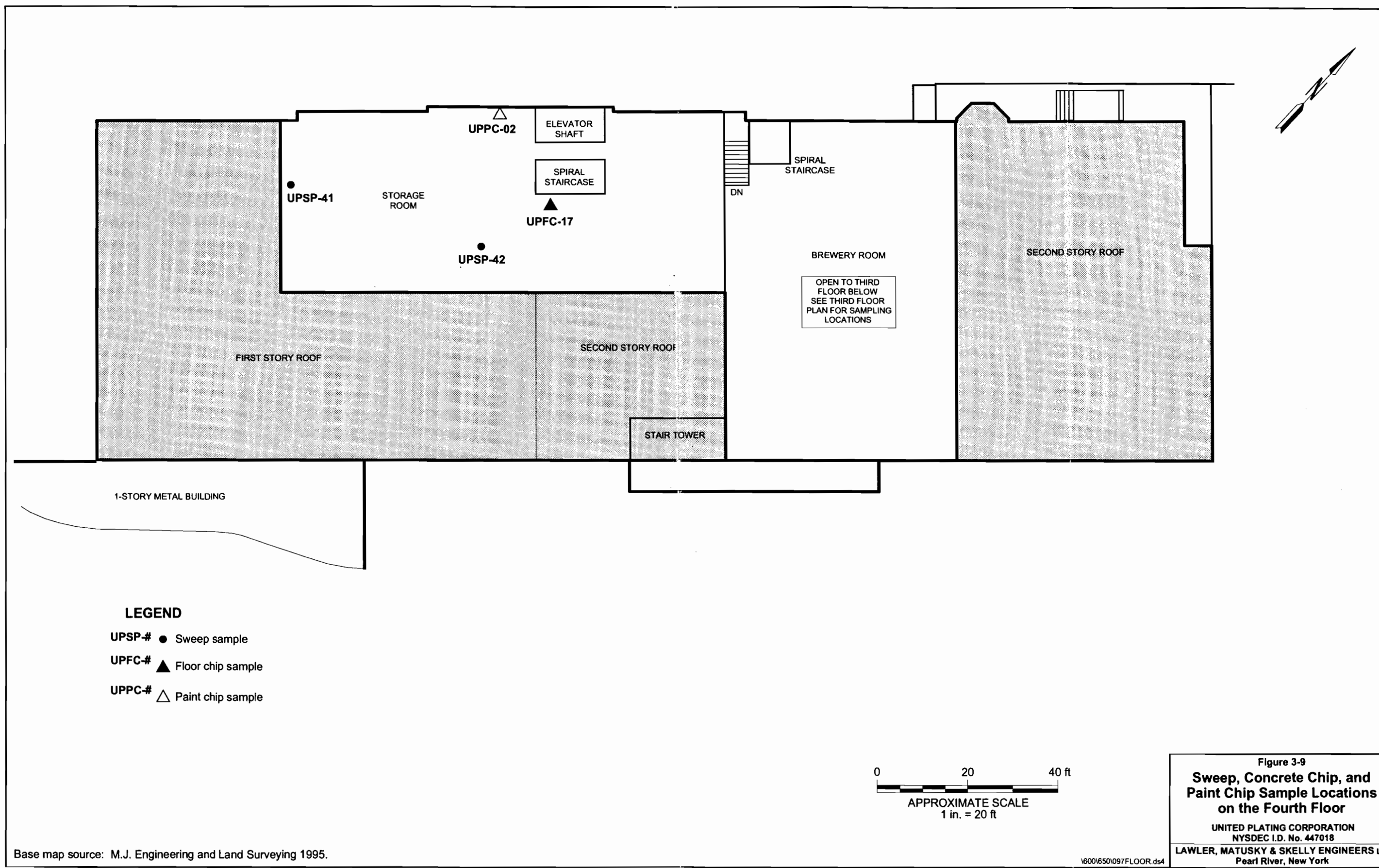
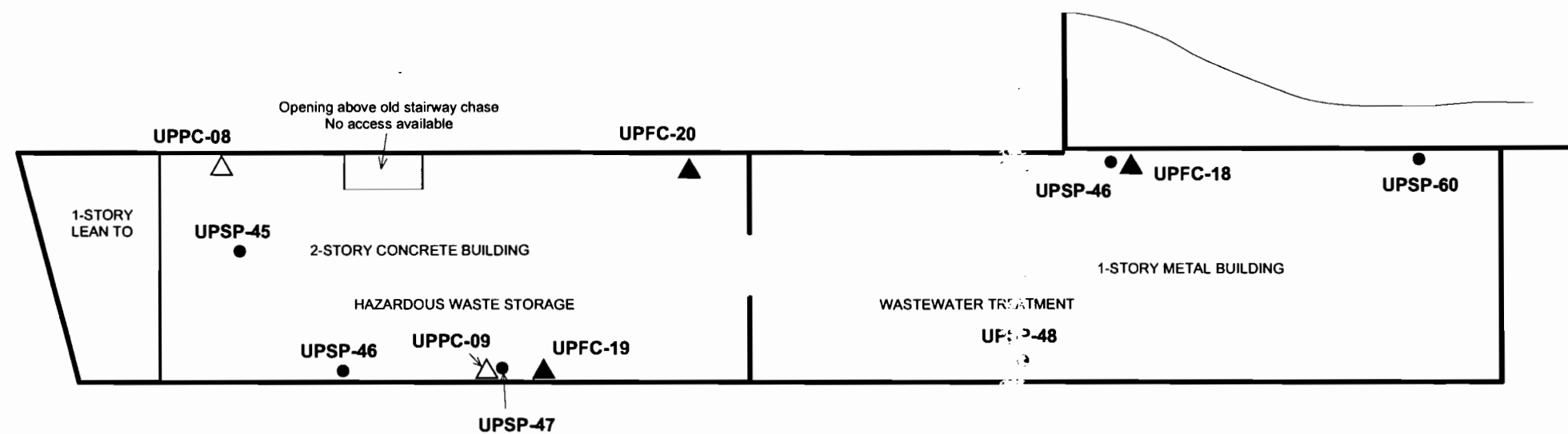


Figure 3-8
**Sweep, Concrete Chip, and
Paint Chip Sample Locations
on the Third Floor**
UNITED PLATING CORPORATION
NYSDEC I.D. No. 447018
LAWLER, MATUSKY & SKELLY ENGINEERS LLP
Pearl River, New York

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

160016501097FLOOR.dwg





LEGEND

- UPSP-# ● Sweep sample
- UPFC-# ▲ Floor chip sample
- UPPC-# △ Paint chip sample

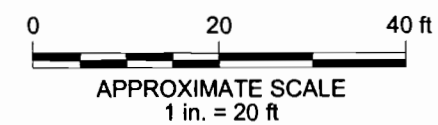


Figure 3-10
Sweep, Concrete Chip &
Paint Chip Sample Locations
Wastewater Treatment Building

UNITED PLATING CORPORATION
NYSDEC I.D. No. 447018

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

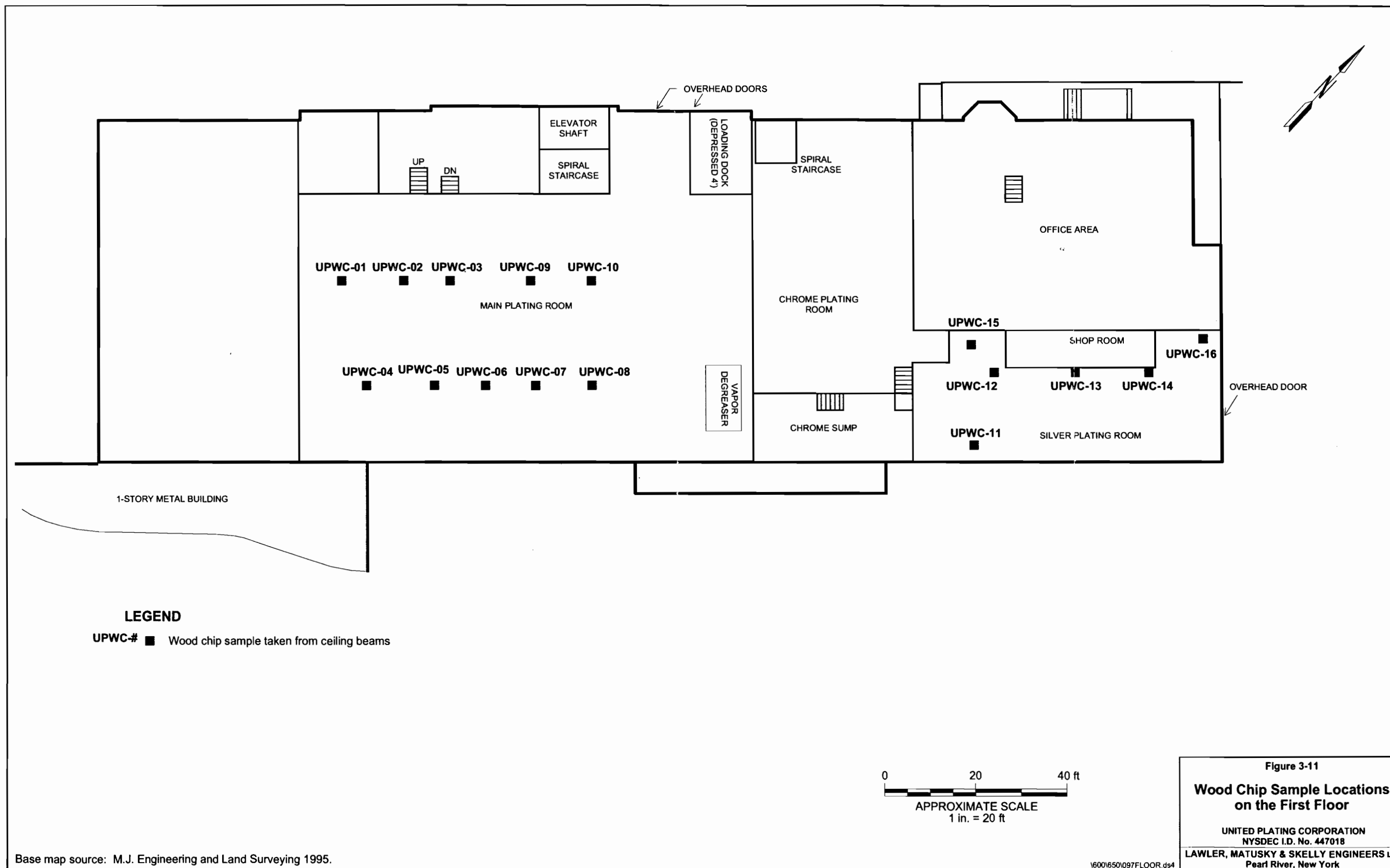
The wood chips were collected using hammers and chisels to gently chip away the top 2 to 3 mm of material. Many of the wood chip samples were taken from the ceiling of the main plating room. In these locations a battery-powered manlift was used to reach the sampling locations. In other areas a extension ladder was used. As the wood chips were taken they were allowed to fall onto dedicated foil-wrapped dustpans and then transferred to the laboratory-supplied sample containers. A total of 16 locations were sampled. Each location was noted on the sampling log (see Appendix A) and the bottles were appropriately labeled and shipped using chain-of-custody protocols to E3I Laboratories for TAL metals and cyanide analysis. TCLP metals were analyzed for eight of the samples. The wood chip sample locations are shown graphically on Figure 3-11.

The paint chips were collected using a metal paint scraper. A total of 20 samples were collected. At each location the scraper was used to scrape off a known area. As the chips were scraped off they were collected into dedicated foil-wrapped dustpans and transferred to the laboratory-supplied sample containers. The location and physical features (consisting of paint description and color) were noted on the sampling logs and the bottles were appropriately labeled and shipped overnight via chain-of-custody protocols to E3I Laboratories for total lead analysis. Appendix A contains the sampling log describing the locations in detail and Figures 3-6 to 3-10 graphically depict the locations of the paint chip samples.

3.4 PROBE SOIL SCREENING

Between 31 May and 13 June 1995 the soil probe sampling was completed (see Figure 3-12). This part of the field investigation consisted of a total of 22 probes, which were advanced at the site to determine background levels of contamination and to identify any possible on-site disposal areas. Three probes were installed inside Building 1 (P-12 to P-14) and one was placed inside Building 2 (P-11). Three probes were advanced in the field upgradient (east) of the site, and 15 were installed in close proximity to the building. During the collection of these probe samples the probehole, cuttings, and samples were scanned with a Photovac Microtip photoionization detector (PID) to determine whether vapors were emanating from the soils.

The soil probes were advanced by LMS using a Concord 9200 truck-mounted drill rig, which hydraulically pushes a sampler directly into the ground, generating few or no cuttings. Two types of samplers were used that were similar with the exception of size. The macro-core



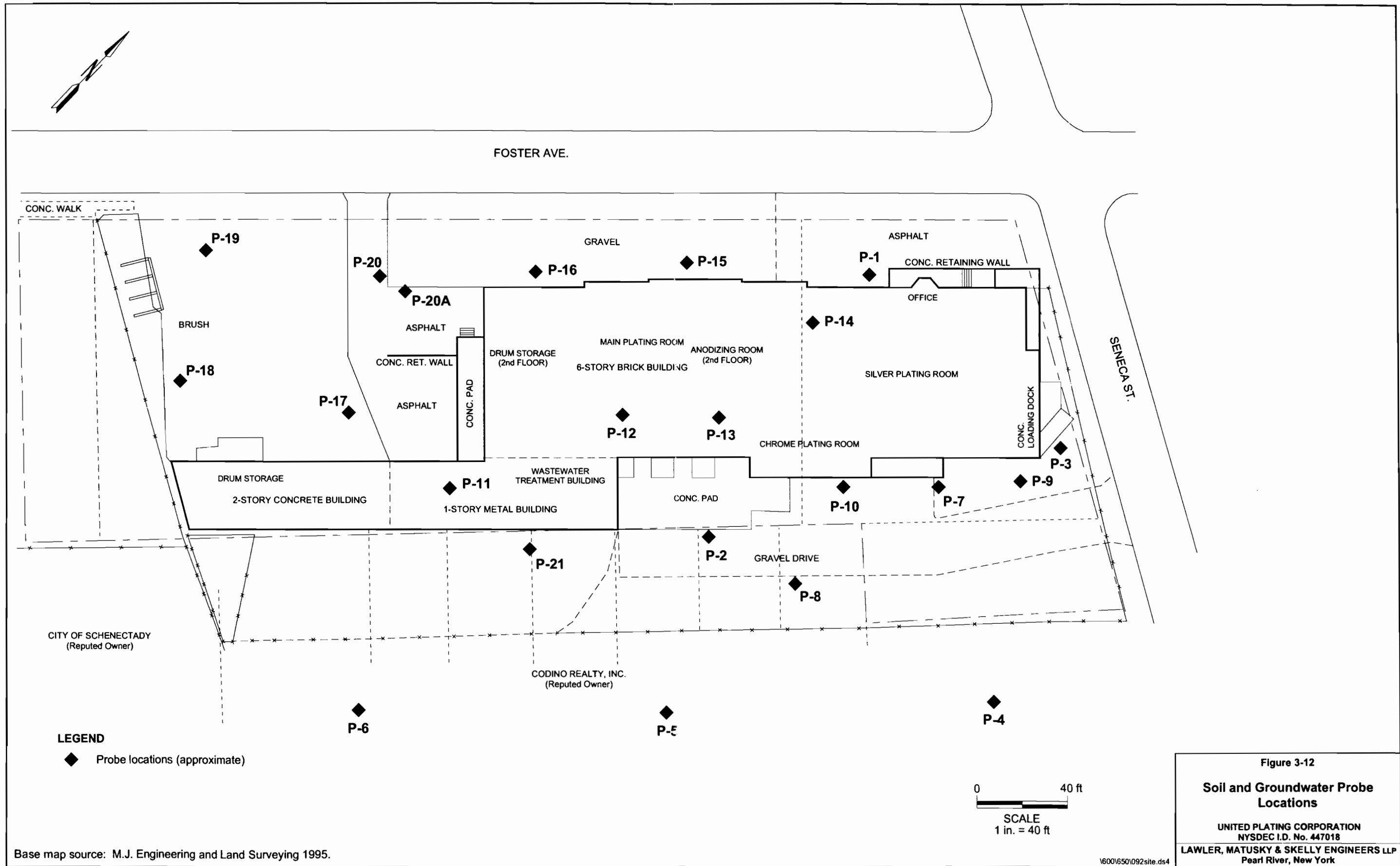


Figure 3-12

Soil and Groundwater Probe Locations

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 Pearl River, New York

sampler is 4 ft long with an inside diameter (I.D.) of about 1.5 in. and is generally used at shallow depths (see Figure 3-13). The large-bore sampler is 2 ft in length with a 1-in. I.D. and can typically be driven to greater depths than the macro-core sampler due to its smaller diameter. When the macro-core sampler met refusal, the boring was continued with the large-bore sampler until refusal was encountered again. The sampler is fitted with a disposable acetate liner, from which the samples are taken. After removal from the probe, both ends of the acetate liner were capped and holes were driven into the liner to facilitate scanning for organic vapors.

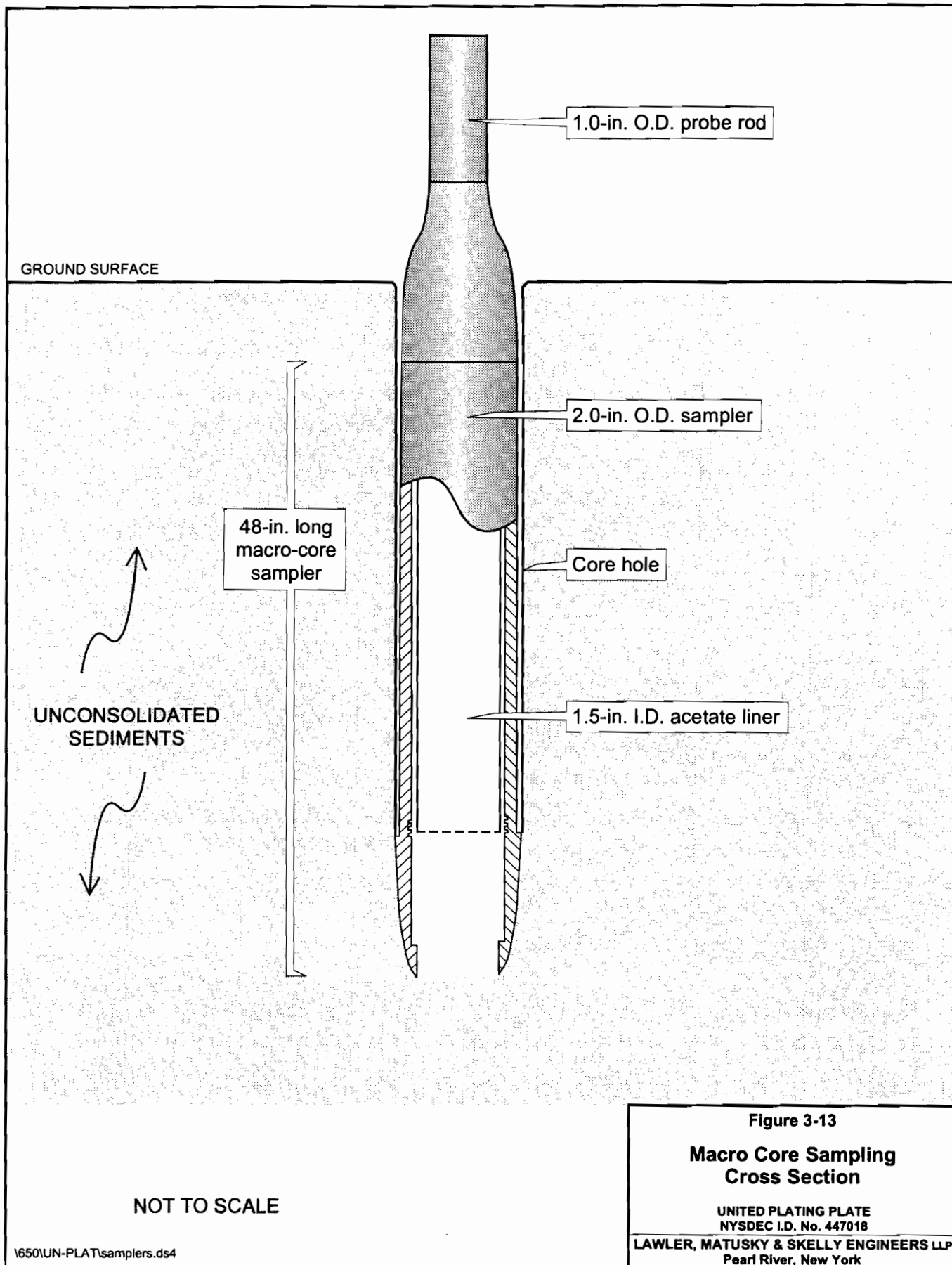
To prevent cross contamination of soil samples and soil sampling horizons, all equipment that came in contact with the soil was steam cleaned on the decontamination pad between samples. The equipment was then allowed to air dry before being advanced again.

The extremely dense composition of the till resulted in probe refusal at depths of about 12 ft or less. Only boring P-20, advanced to 26 ft, was driven past 12 ft before reaching refusal. The composition of the till is described in detail in Section 4.6.2.

At each probe, where the PID readings were highest a discrete sample was collected for full analysis of TCL VOCs. A grab sample was also collected at each boring for TAL metals plus cyanide analysis. As the amount of material recovered was minimal, no additional material could be collected to use for matrix spike/matrix spike duplicate (MS/MSD) and spike and spike duplicate analyses. All samples were placed in appropriate laboratory-supplied containers, labeled, and placed in coolers maintained at 4°C. The coolers were then shipped under chain-of-custody protocol to E3I Laboratories in Somerville, Massachusetts, via Federal Express.

3.5 PROBE WATER QUALITY SCREENING

At probe locations where groundwater was encountered, a mill slot was advanced to the sampling depth. A mill slot is a section of probe rod that has thin, vertically oriented slots that allow for the recovery of groundwater at a specific interval. Dedicated polyethylene tubing with a bottom check valve was inserted through the probe rods to recover the sample. For the collection of samples submitted for VOC analysis, the check valve was placed on the downhole end of the tubing and the groundwater was gently surged manually. Collection of groundwater for all other samples was done using a peristaltic pump. For the filtered samples, groundwater was collected in dedicated filtering vessels and passed through an in-



line filter. Due to the very low groundwater yields in the probes, it was necessary in some cases to retrieve some of the filtered and unfiltered metals samples from the piezometers installed within some of the probe holes.

Based on our observations of the test borings, the groundwater table was not clearly defined at the site. The till deposit that makes up most of the overburden contains fine sediments that are too consolidated to allow groundwater flow at a significant rate. At locations where sand lenses were discovered within the till groundwater was abundant, but the majority of borings yielded only small quantities of water, usually between 3 and 5 ft below grade. Samples taken from borings advanced in Building 1 and near Building 1 along Foster Avenue were greenish yellow, even after filtering.

At borings where there was enough groundwater, samples were collected for the analysis of TCL VOCs, TAL metals (unfiltered) and cyanide (unfiltered), and TAL metals (filtered) and cyanide (filtered). At borings that did not yield enough water for analysis of all five parameters, samples were collected in the order listed above. For quality assurance/quality control (QA/QC) purposes two MS/MSDs, one spike and spike duplicate, one field blank, and nine trip blanks were collected.

3.6 SHALLOW SOIL SAMPLING

On 31 May and 1 and 2 June 1995 LMS collected 40 shallow soil samples at the UP site. Thirty of the locations were situated on the UP property; the locations were based on a grid that covered the open areas surrounding the buildings. The remaining 10 locations were located in the vacant lot and playground areas to the east and southeast of the property. The sampling locations were discussed with and approved by NYSDEC oversight personnel prior to sample collection. All locations were chosen based on possible exposure through dermal contact, ingestion of contaminated soil, or inhalation of contaminated dust. The shallow soil sampling locations are shown on Figure 3-14.

Shallow soil samples were collected from the first 3 in. of soil at all locations. Where necessary, the locations were first cleared of grass, surface debris, or gravel before the 0- to 3-in. sample interval was collected. The sample locations were dug to the proper depth with a stainless steel spoon; the material was placed in a stainless steel bowl for homogenization and placed in the proper sample containers for analysis. In areas where the ground was hard packed a field-decontaminated steel shovel was used to dig out the hole to the appropriate

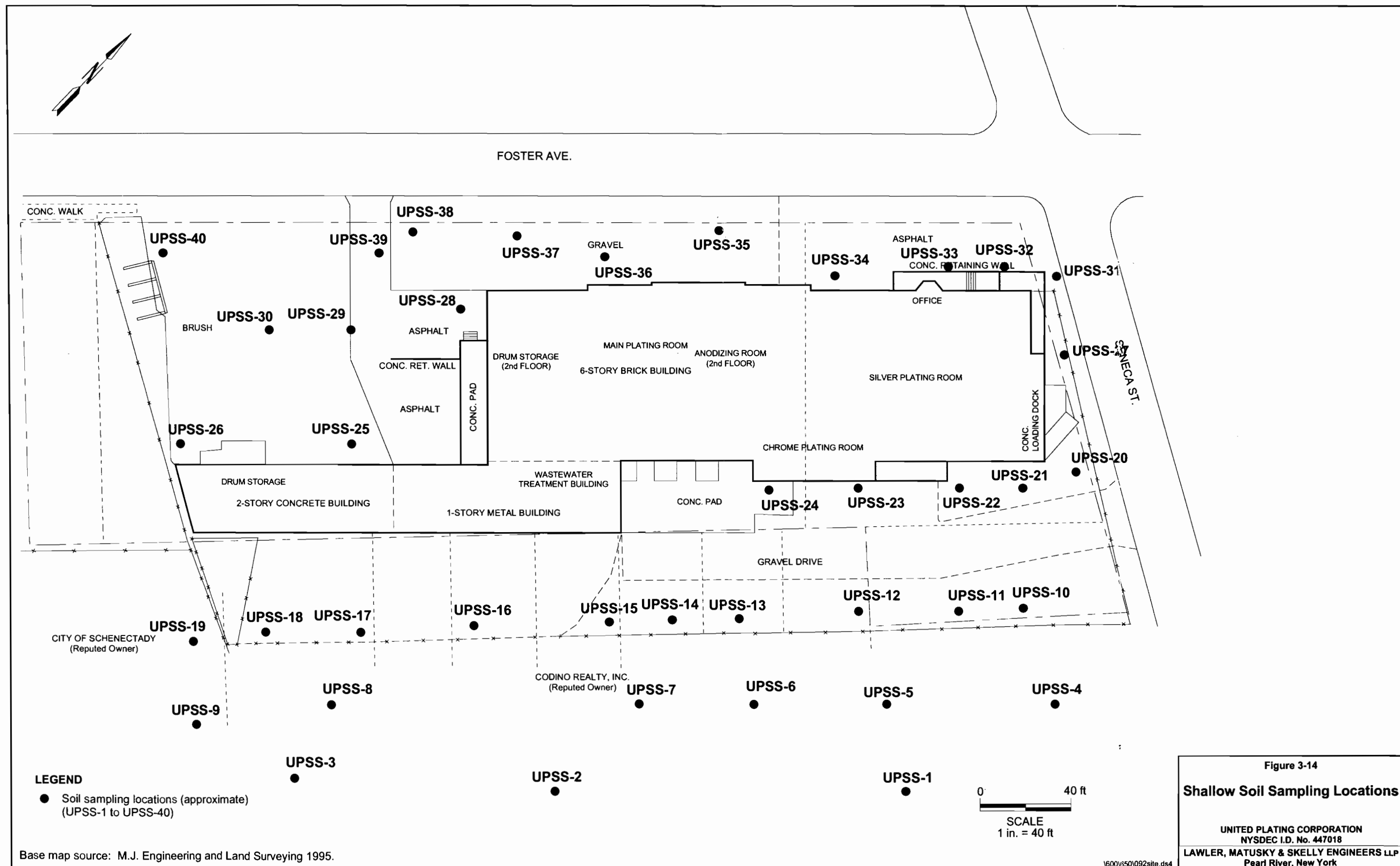
depth. A stainless steel spoon was used to collect the material into the bowl from the sides of the hole. The sample for VOC analysis was collected directly from the hole without homogenization. The sample bottles were labeled with the site name, job number, sample identification, date, time, and parameters for analysis. The sample containers were placed in iced coolers under chain-of-custody protocols for shipment to the analytical laboratory. The field sampling logs are provided in Appendix A.

Surface soil samples were analyzed by E3I for the full TCL organics and TAL inorganics using NYSDEC ASP (December 1991) methods. A field blank was performed on a set of the sampling equipment and analyzed to monitor 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.

3.7 SURFACE WATER/SEDIMENT SAMPLING

Surface water samples were taken from several locations inside the main plating building where there was standing water, i.e., drains and sumps. Laboratory-cleaned stainless steel ladles and spoons were used to transfer the samples to laboratory-cleaned bottles. Surface water was field analyzed for conductivity, pH, turbidity, and temperature. Sediment was collected from under floor drains and in sumps inside both the main plating building and the wastewater treatment building where there was sufficient material to sample. Long-handled, laboratory-cleaned stainless steel spoons and ladles were used to collect the sediment and place it in laboratory-cleaned sample bottles. Sample bottles were labeled with the site name, job number, sample identification, date, time, and parameters for analysis. Sample containers were placed in iced coolers under chain-of-custody protocols for shipment to the analytical laboratory. The field sampling logs are provided in Appendix A, and the surface water and sediment sampling locations are shown on Figure 3-15.

The surface water and sediment samples were analyzed for TAL metals plus cyanide. In addition, three of the sediment samples were analyzed for TCLP metals. The required analyses were completed by E3I. Several QA/QC samples were collected, including a field blank for the sediment and surface water sampling equipment and a spike and spike duplicate for the both the surface water and sediment samples.



3.8 PIEZOMETER INSTALLATION

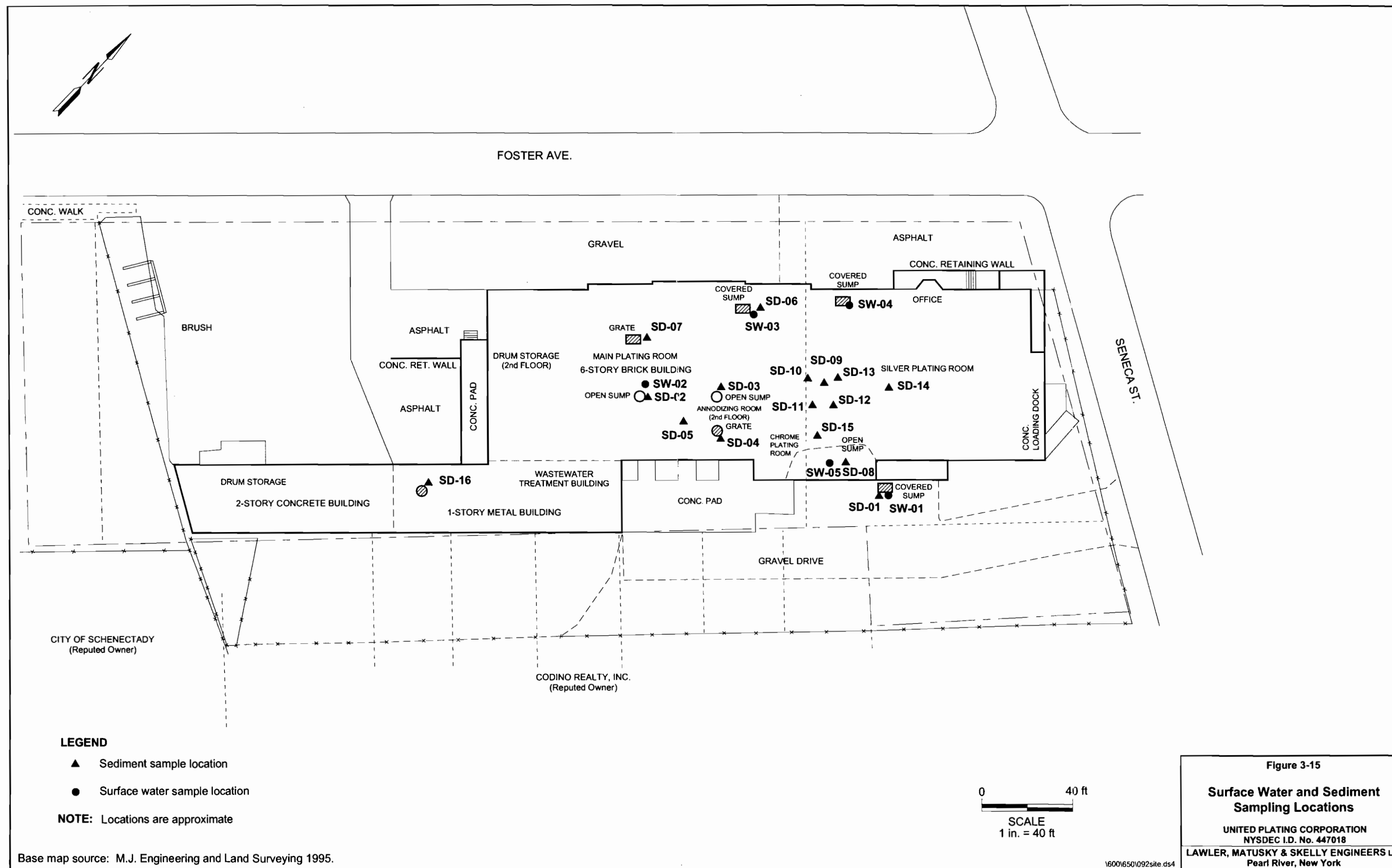
A total of 14 probe locations were converted into piezometers (see Figure 3-16). The piezometers were constructed from 2.5-ft lengths of 0.75-in. outside diameter (O.D.) schedule 40 PVC screen (slot width: 0.010 in.) coupled with an appropriate length of schedule 40 PVC riser. The annulus was filled with No. 1 Morie sand to a depth of 0.5 ft above the screen. Bentonite pellets were placed above the sand and hydrated to seal the screened interval. Piezometers located outdoors were flush-mounted to grade with curb boxes set in concrete. Piezometers located within the building were completed with flush-mounted curb boxes in trafficked areas or finished 6 in. above grade with a PVC end cap in nontrafficked areas.

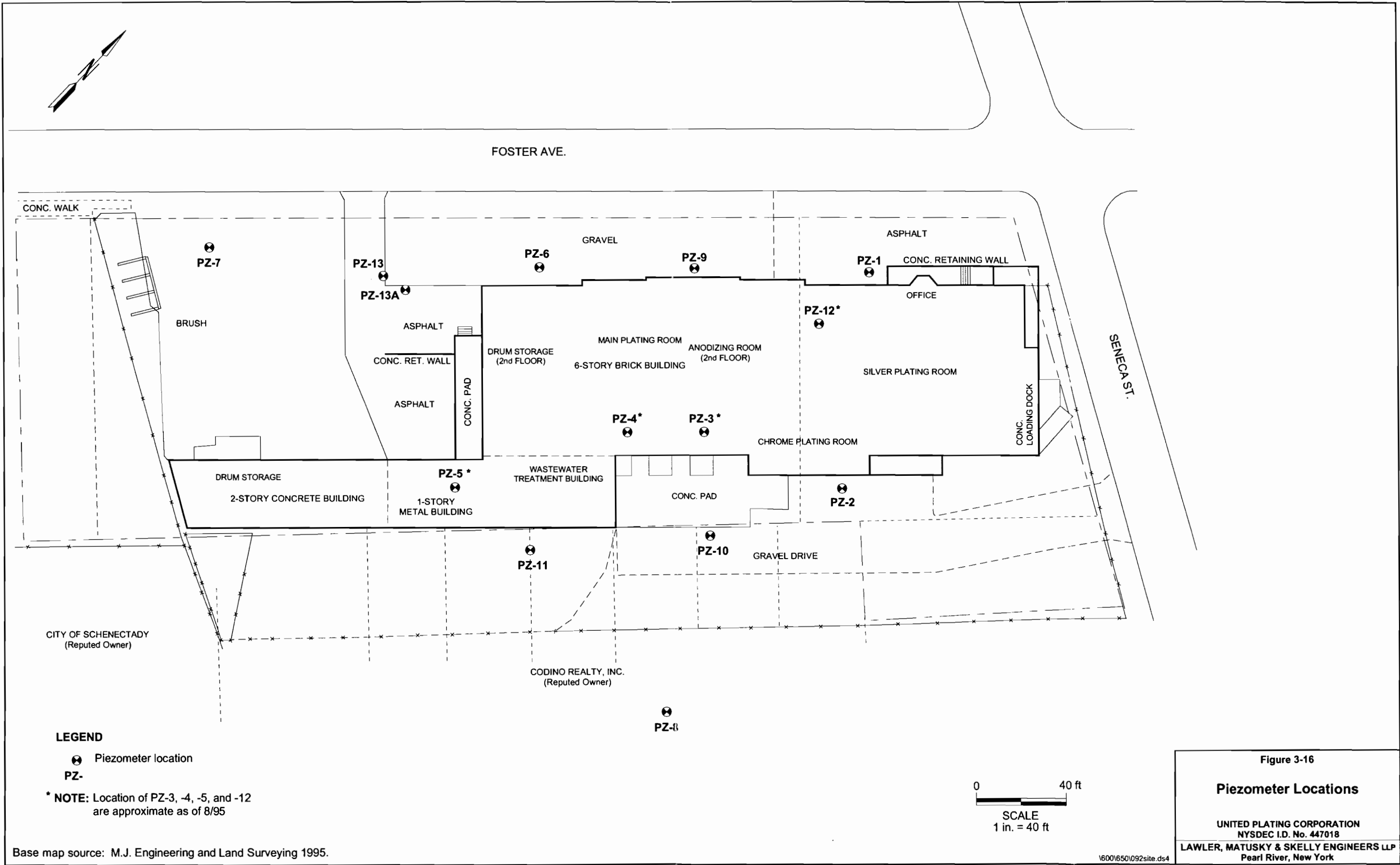
Once each piezometer was completed it was pumped dry and allowed to recover a minimum of two times. This was done to ensure that the screened section was not clogged and provided a true and accurate water level reading. Most of the piezometers had a minimal yield and were slow to recover. Water level readings on the piezometers were then taken, as described in Section 5.2.4.

3.9 INTERIOR SUBSURFACE DRAINLINE AND SUMP INVESTIGATION

The City of Schenectady was contacted on three occasions to provide any plans or sketches showing the building and the water and sewer lines. Based on their search of current and historical records, no specific plans of the building could be found. The city provided current maps for the sewers and water lines. In the absence of specific plans showing the various connections, smoke testing and visual reconnaissance of the existing piping was conducted.

Smoke tests were carried out at the site on 9 and 10 August 1995. Prior to conducting the smoke test, LMS notified city police, fire, and sewer departments. Local citizens were notified by the NYSDEC project manager. The smoke tests were carried out by lowering a commercial nontoxic smoke bomb on a short length of rope. Once ignited the smoke bombs produce large quantities of an aerosol smoke. At this point, a fan or manhole blower was used to push the smoke outward from the ignition point. All testing was done from known discharge locations or connections on-site. LMS and NYSDEC personnel were stationed at suspected connections and at the manholes along Foster Avenue to monitor for the presence of any smoke.





3.10 MONITORING WELL INSTALLATION

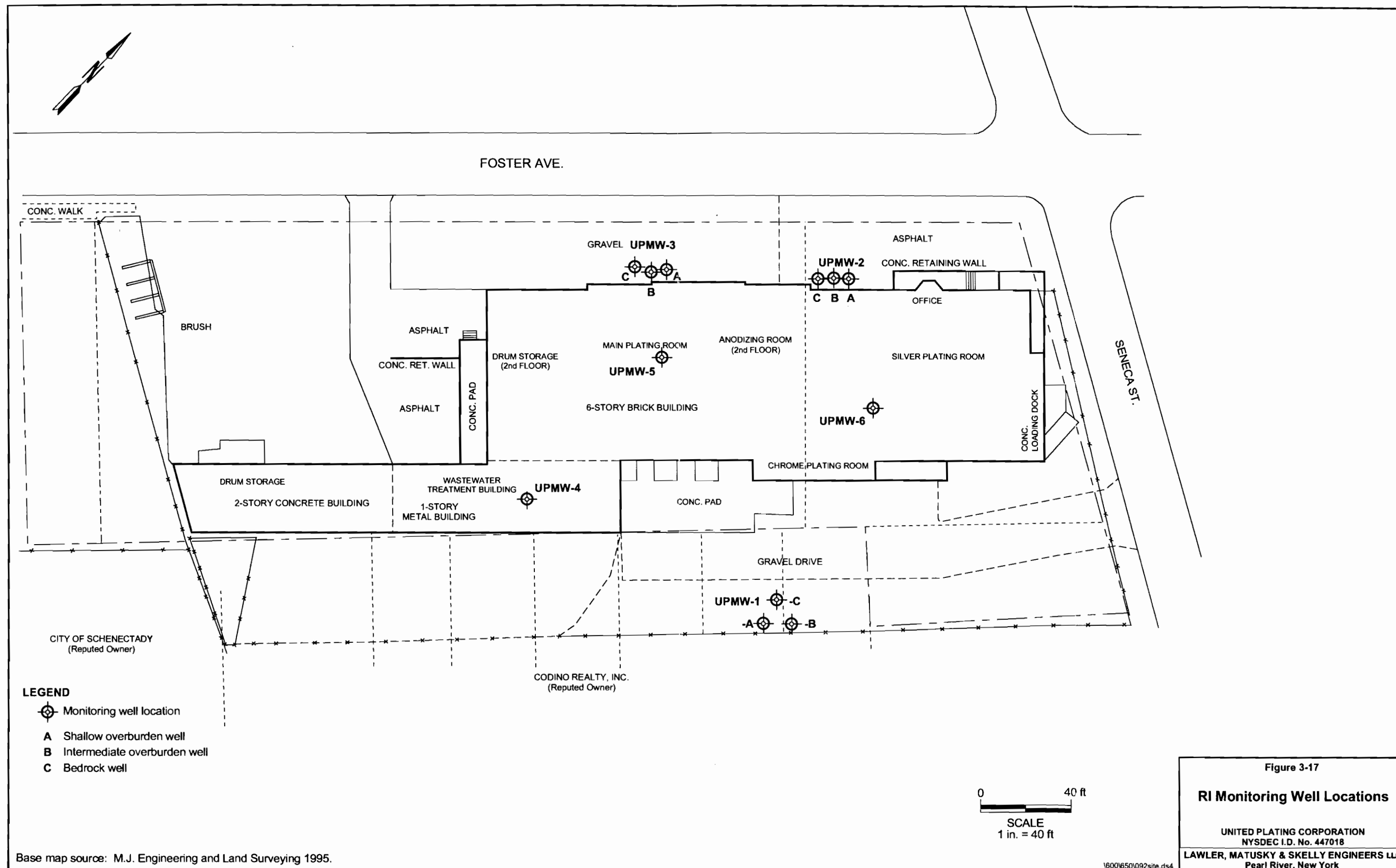
3.10.1 General Monitoring Well Details

Aquifer Drilling and Testing, Inc. (ADT), of Albany, New York, was subcontracted to install a total of 12 monitoring wells at the site (Figure 3-17). Three clusters of three wells each were installed outside the building, and three single wells were installed within the building. Each monitoring well cluster contained 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 employed a Mobile B-59 drill rig to install the well clusters 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. schedule 40 PVC casings and screens. The bedrock C wells were constructed by pressure grouting 4-in. schedule 80 PVC casing several feet into the bedrock. Additionally, 2-in. schedule 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. schedule 40 PVC. The UPMW-1 well cluster was located within the confines of the perimeter fence in a low-traffic area; therefore, those wells were finished with locking standpipes. All other wells were finished with curb boxes mounted at or very near surface grade.

3.10.2 Monitoring Well Soil Sampling

Soil sampling was conducted from 14 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. 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 16 to 19 ft down 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 more than 2 ft of HSA protruded 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 an 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 notations). Depth, blow counts, and sample recovery were also noted on the same log. The soil samples were scanned with an HNu PID immediately upon opening the split-spoon sampler to detect the presence of any VOCs. Details of the soil sample descriptions and monitoring well construction diagrams are documented in the boring logs, which are found in Appendix B.

Based on visual inspection and PID findings, soil samples were collected for analysis of VOCs, SVOCs, TAL metals/cyanide, and pesticides/PCBs. All soil samples were placed in laboratory-cleaned jars, maintained at 4°C, and shipped to E3I under appropriate chain-of-custody protocol. Soil samples not selected for analysis by the analytical laboratory were archived for potential testing at a later date.

Selected archived samples were sent to Empire Soils Laboratory for grain size, pH, and total organic carbon (TOC) analyses on 15 January 1996. The samples were selected from soil samples collected during monitoring well installation. The depths of the samples sent for analysis were based on the depth to the center of the monitoring well screen. To provide sufficient sample volume for all of the analyses, a jar of soil collected from the split spoon where the center of the well was placed was combined with soil from the nearest split spoon immediately above or below the first split spoon.

Samples were sent to Empire for all the wells installed in glacial till, with the exception of UPMW-4 and UPMW-6. These samples were not sent to Empire, as samples collected for

chemical analysis during the installation of the wells indicated that VOCs and/or metals were present at levels significantly higher than eastern U.S. regional background levels.

3.10.3 Specific Monitoring Well Details

3.10.3.1 UPMW-1 Cluster. Three wells were installed to the east of the building near the fence, which is believed to be upgradient (Figure 3-17). All three monitoring wells were completed with locking standpipes rising to a height of approximately 3 ft above grade. Weathered glacial till was found from grade surface down to a depth of 4 ft. Basal glacial till constituted the rest of the overburden, extending down to bedrock, which was found at 22 ft. Construction and development details are outlined below. Development logs are provided in Appendix D.

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. The sand pack, bentonite, and grout were installed according to NYSDEC guidelines.

UPMW-1A was developed from 28 September to 5 October 1995 using a dedicated Teflon bailer. It was necessary to develop this well over several days due to its slow rate of recharge; the well became dry after about 10 gal 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. A 5-ft length of 10-slot screen and an appropriate length of riser were used to construct the well. The sand pack, bentonite, and grout were installed according to NYSDEC guidelines.

UPMW-1B was developed from 28 September to 5 October 1995 using a dedicated Teflon bailer. Recharge at this well was slightly slower than at UPMW-1A, drying out after purging 5 to 10 gal. 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 was 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. A 4-in. schedule 80 PVC casing was pressure grouted several feet into the bedrock to seal off the overburden. An HQ wireline system was then used to core 30 ft into the bedrock. The filter pack, bentonite, and grout were installed 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 reentered the well. On 3 October 1995, 5 gal 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 to 0.8 ft of groundwater was recorded, and on 5 October 1995 only 1.0 to 1.3 ft of groundwater was found in the well.

3.10.3.2 UPMW-2 Cluster. Three wells were installed near the west edge of the building, which is believed to be downgradient (Figure 3-17). All three monitoring wells were completed with flush-mounted curb boxes. Fill was found from surface grade down to a depth of 6.4 ft. Basal glacial till constituted 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. The filter pack, bentonite, and grout were installed 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. The filter pack, bentonite, and grout were installed according to NYSDEC guidelines.

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

Monitoring Well UPMW-2C. Construction of this well began on 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. A 4-in. schedule 80 PVC casing was pressure grouted several feet into the bedrock to seal off the overburden. An HQ wireline system was then used to core 27 ft into the bedrock. The filter pack, bentonite, and grout were installed according to NYSDEC guidelines.

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

3.10.3.3 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 3-17). 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 ft. Basal glacial till constituted 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. The filter pack, bentonite, and grout were installed according to NYSDEC guidelines.

UPMW-3A was initially dry upon completion, although a piezometer located near 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 with a dedicated Teflon bailer. The next day the water level had risen by several feet, 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. The filter pack, bentonite, and grout were installed according to NYSDEC guidelines.

UPMW-3B was developed from 2 to 5 October 1995 using a dedicated Teflon bailer. This well appears to yield approximately 25 gal of water per day. Turbidity decreased during development from greater than 200 NTU to 113 NTU by the end of 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. A 4-in. schedule 80 PVC casing was pressure grouted several feet into the bedrock to seal off the overburden. An HQ wireline system was then used to core 27 ft into the bedrock. The filter pack, bentonite, and grout were installed according to NYSDEC guidelines.

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

3.10.3.4 Monitoring Well UPMW-4. Installation commenced on 28 September 1995 inside the wastewater treatment building (Figure 3-17). Approximately 1 ft of concrete was cored out of the floor. During the first attempt to install 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 is estimated down to a depth of 13 ft. The depth of fill is estimated due to poor sample recoveries in the split spoons. Basal till was discovered in the 15- to 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. The filter pack, bentonite, and grout were installed according to NYSDEC guidelines.

UPMW-4 was initially dry upon completion. On 3 October 1995 30 gal 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. After several sampling events, it appeared that UPMW-4 recharged very slowly and would take weeks or months to fully recover.

3.10.3.5 Monitoring Well UPMW-5. Installation commenced on 28 September 1995 in the main plating room of Building 1 (Figure 3-17). The concrete floor, about 1 ft 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- to 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. The filter pack, bentonite, and grout were installed according to NYSDEC guidelines.

UPMW-5 was developed with a dedicated Teflon bailer on 4 and 5 October 1995. This well recovered poorly, becoming dry after purging 1 to 2 gal. Turbidity remained above 200 NTU.

3.10.3.6 Monitoring Well UPMW-6. Installation commenced on 29 September 1995 in the chrome plating room (Figure 3-17). About 1 ft 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. The 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. The filter pack, bentonite, and grout were installed according to NYSDEC guidelines.

UPMW-6 was developed with a dedicated Teflon bailer from 3 to 5 October 1995. This well recovered poorly, becoming dry after purging about 10 gal. 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.

3.11 GROUNDWATER SAMPLING AND ANALYSIS

3.11.1 Round 1 Groundwater Sampling Protocol

Monitoring well sampling was initiated on 16 October 1995 by completing a full round of static water level (SWL) measurements. Based on the SWL and the total depth of each well, the purge volume was calculated. All the wells were then purged until dry using a dedicated Teflon bailer, with the exception of UPMW-2C, from which at least three well volumes were purged. All the wells exhibited reasonable water levels, with the exception of UPMW-4, UPMW-5, and UPMW-1C, which were very slow to recover. Monitoring well sampling logs are found in Appendix E.

During the purging process turbidity, temperature, pH, and conductance were measured at routine intervals to track the purging process and provide sampling chemistries (see Appendix E). Once the purging process was completed, the wells were allowed to recharge overnight. Only those wells that had recharged approximately 90% were sampled the next day (17 October 1995). If a well had not recharged to 90% by 19 October 1995, samples were collected in the order listed below. Samples were collected from the middepth for the water column where applicable using new dedicated Teflon bailers and rope. Sample chemistries, including temperature, turbidity, pH, and specific conductance, were taken if a 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, SVOCs, and pesticides/PCBs. Full sets of samples were collected from all the wells, with the exception of UPMW-1C and UPMW-4, which had sufficient volume for only VOCs and unfiltered metals.

3.11.2 Round 2 Groundwater Sampling Protocol

After the data from the first round of groundwater sampling of the monitoring wells were received and reviewed, a decision was made to conduct a second round of groundwater sampling for selected parameters. In the first round only VOCs, PCBs, metals, and cyanide were detected above the groundwater standards. Therefore, it was decided to resample the wells for only these parameters. As there was not a significant difference in concentrations between the filtered and unfiltered metals concentrations for the site metals, i.e., cadmium, chromium, copper, lead, nickel, and zinc, it was decided to run only total unfiltered metals on the second round. In addition, it was decided to run the VOC analysis using a low-level method to ascertain whether low levels of VOCs were present in the groundwater.

Monitoring well sampling was initiated on 18 December 1995 by completing a full round of SWL measurements. All the wells exhibited reasonable water levels; however, based on the Round 1 sampling some of the wells did not recover quickly after being purged. UPMW-1C, UPMW-4, and UPMW-5 have recharge rates significantly lower than the rest of the UPMW wells.

Based on the SWL and the total depth of the well, the volume of water in the well was calculated. All the wells were then purged three well volumes. If a well did not produce sufficient water to allow three well volumes to be purged, it was purged dry. Bedrock wells UPMW-2C and UPMW-3C were purged using a Grundfos submersible pump; all others were purged with disposal PVC bailers. Monitoring well sampling logs are found in Appendix E.

During the purging process turbidity, temperature, pH, and specific 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 that had recharged approximately 90% were sampled the next day. If a well had not recharged to 90% by 21 December 1995, or three days after purging, samples were taken in the order listed below. All samples were collected from the middepth of the water column (where applicable) using new dedicated Teflon bailers and rope. Sample chemistries, including temperature, turbidity, pH, and specific conductance, were taken if a 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, cyanide, and PCBs. Full sets of samples were collected from all the wells with the exception of UPMW-1C, which yielded enough water for collection of only VOCs, unfiltered metals, and cyanide samples.

3.11.2.1 *Resampling for Low-Level Volatile Organic Compounds.* On 9 January 1996 LMS was informed by the contract analytical laboratory that the samples collected on 21 December 1995 for VOC analysis had exceeded the holding times. The samples collected on 21 December consisted of groundwater samples from UPMW-1A, -1B, -1C, -2A, -3A, -4, and -5 and field blank FB-13. LMS personnel returned to the site on 16 January 1996 to resample the seven wells for VOCs. In addition, a PCB sample was collected at UPMW-1C as insufficient water was present during the initial sampling to collect the PCB sample. A field blank (FB-14) was also collected for VOC analysis.

The resampling was initiated by completing a full round of SWL measurements for all monitoring wells. Based on the SWL and the total depth of the well to be resampled, the volume of water in each well was calculated. An attempt was then made to purge at least three well volumes from each well using disposable PVC bailers. Only wells UPMW-1A and UPMW-1B produced sufficient water to purge three well volumes. If a well did not produce sufficient water (UPMW-1C, -2A, -3A, -4, and -5) to allow three well volumes to be purged, it was purged dry. Wells UPMW-2A, -3A, -4, and -5 were purged dry a second time the following day.

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. All samples were collected from the middepth of the water column (where applicable) using new rope and dedicated Teflon bailers. Sample chemistries, including turbidity, temperature, pH, and conductance, were taken if sufficient volume of water was available. Appendix E contains the monitoring well sampling logs.

3.12 HYDRAULIC CONDUCTIVITY TESTING

To determine the hydraulic characteristics of the water-bearing formations, bail-down tests were performed by LMS personnel on all the wells except UPMW-1A from 3 to 5 January

1996. A slug test was performed at UPMW-1A on 5 January 1996 rather than a bail-down test as it recovers relatively quickly. Bail-down tests were selected for most of the wells as they recover slowly and can be measured manually over extended periods of time with an SWL meter.

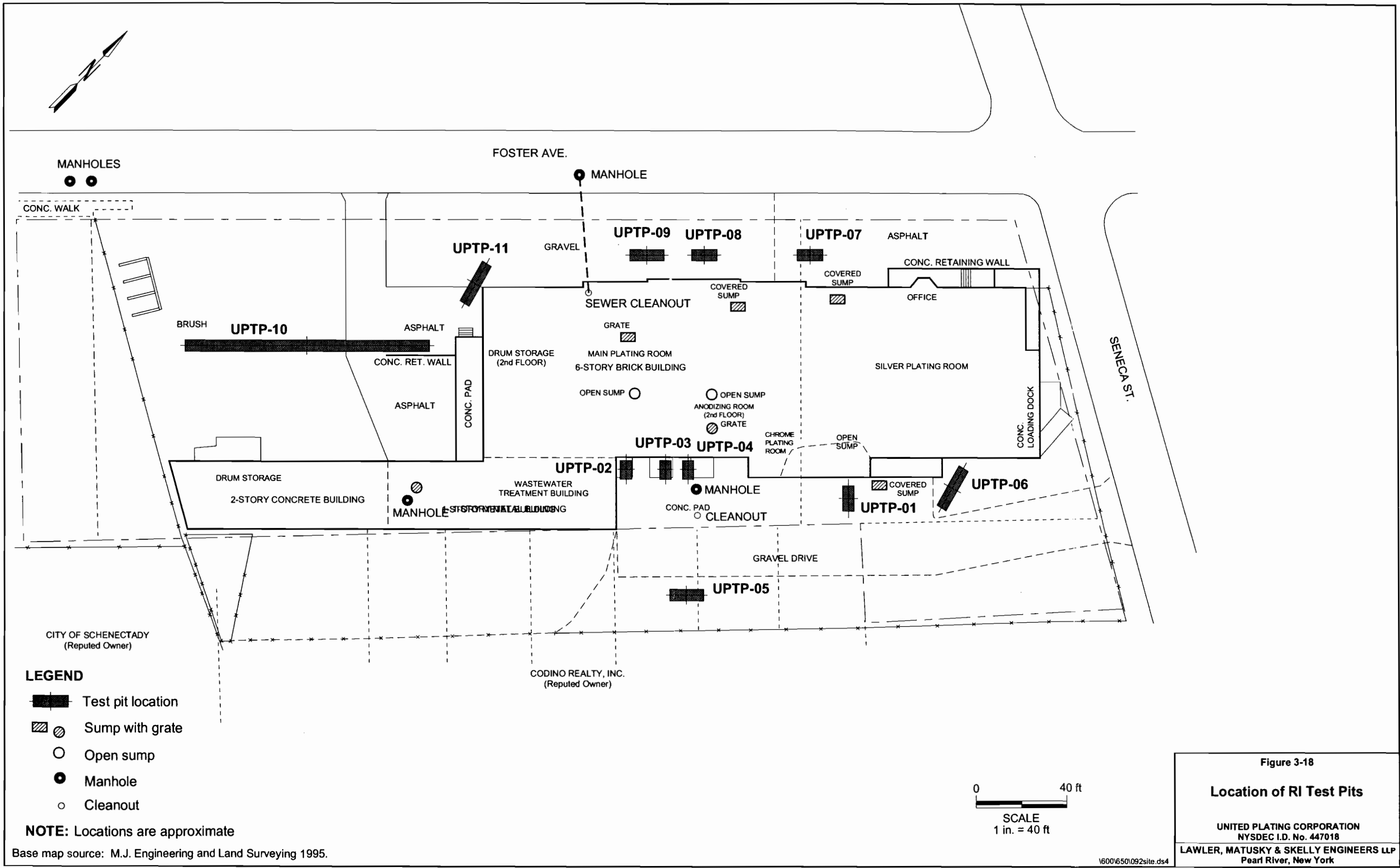
Bail-down tests were performed by lowering the water level several feet with a bailer and recording the recharge as a function of time. The slug test was conducted by quickly raising or lowering the SWL in the well using a clean, weighted stainless steel slug. Static level response with time was monitored using an in situ pressure transducer linked to a Hermit data logger. The Hermit was programmed to record hydraulic head data using a log time schedule, which allowed rapid collection of hydraulic head data. A faulty cable connecting the data logger to the transducer prevented the data from UPMW-1A from being properly recorded on the data logger. Because of the faulty connection, hydraulic characteristics could not be computed for UPMW-1A. The slug test will be repeated if the opportunity arises for LMS personnel to return to the site for other tasks.

The hydraulic head data recorded during each test were input into a computer program utilizing the Cooper et al. (1967) and Bouwer and Rice (1976) methods to calculate the hydraulic characteristics of the water-bearing formation where the wells were screened. The Bouwer and Rice method, developed to calculate hydraulic characteristics of partially penetrated, unconfined aquifers, was used to derive transmissivity values for the shallow wells screened in the weathered glacial till.

The Cooper et al. model was designed to calculate hydraulic characteristics for a confined aquifer. The Cooper et al. method was selected for the intermediate B wells as the dense, dry layer of basal till may act as a confining layer. The Cooper et al. method was also used to determine the hydraulic characteristics of the bedrock wells because the tightly consolidated basal till that constitutes much of the overburden is believed to act as a confining layer to the system of fractures that characterize the bedrock aquifer.

3.13 TEST PIT INVESTIGATION

A total of 11 test pits were excavated on 21 and 22 August 1995 to establish the location of drainlines exiting the UP buildings (see Figure 3-18). 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 observed by an LMS geologist.

Seven samples were collected from the test pits, with the location selection based on visual inspection and PID readings. 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 by E3I for TCL VOCs and TAL metals and cyanide using NYSDEC ASP (December 1991) methods. 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 G.

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.

3.14 GEOPHYSICAL INVESTIGATION

One of the recommendations contained in the Draft RI Report (LMS 1996) was to conduct a GPR survey between Foster Avenue and the UP building. The purpose of the GPR survey was to locate underground utilities and structures. The utility trenches may be providing a conduit for migration of contamination off the site. The placement of soil borings and monitoring wells in front of the building would be based on the results of the GPR.

The geophysical investigation was conducted on 18 August 1997 to locate buried underground sewer, water, and/or drainage lines at the site and to determine their depths. ERD Environmental (ERD), under subcontract to LMS, was retained to use both GPR and metal detection. All field activities were observed by an LMS geologist.

As per the geophysical report contained in Appendix N, during the survey ERD used a Subsurface Interface Radar (SIR-3) unit with a 500-MHz antenna (manufactured by

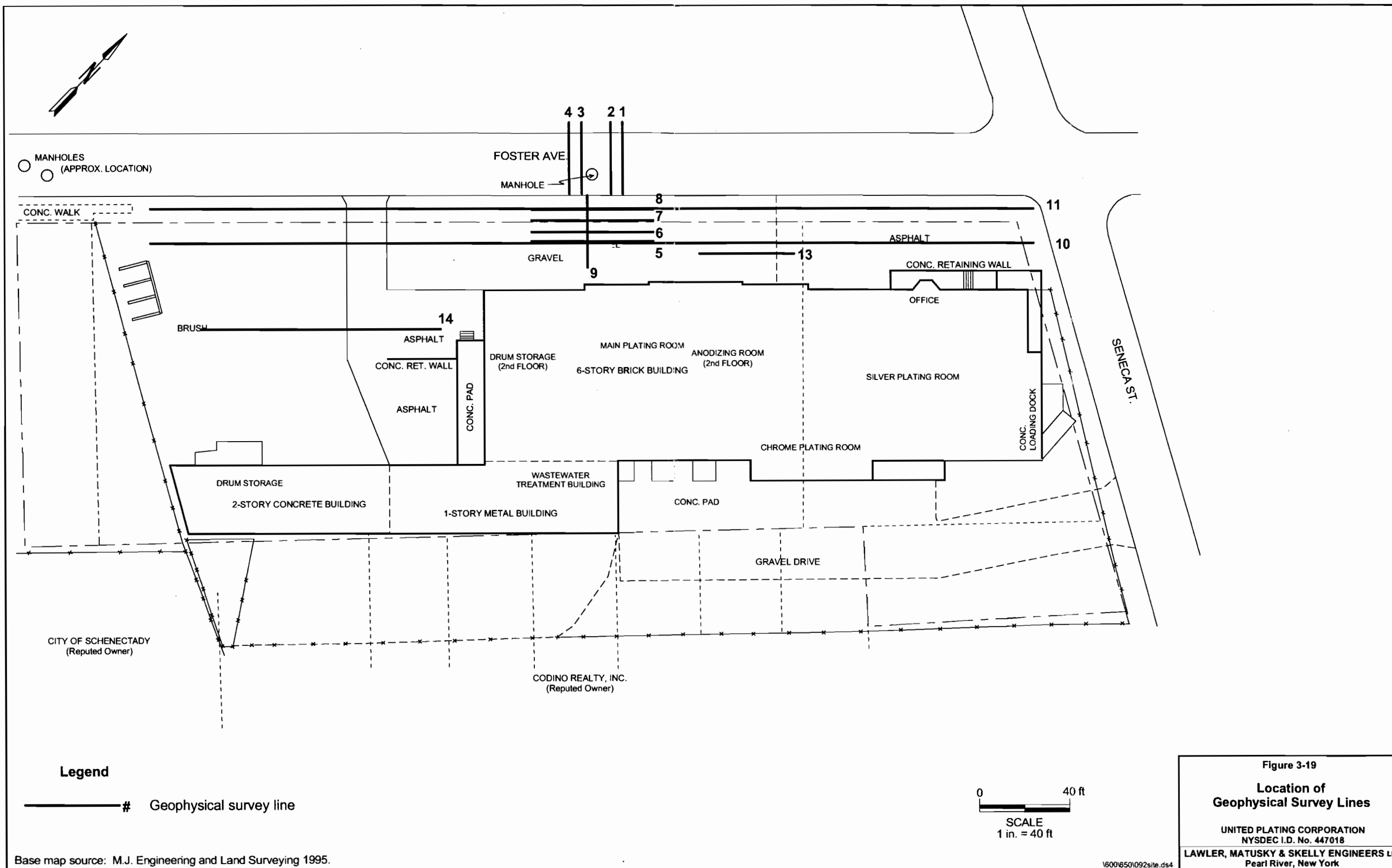
Geophysical Survey System, Inc.) with a model PR-8304 profiling chart recorder to record the radar images obtained at the site. A Fisher TW-6 metal detector was also used. A tape measure laid on the ground was used to establish transects using a 5-ft spacing.

Four 25-ft transects were conducted along Foster Avenue near a manhole. Two 25-ft transects were also positioned parallel to, and working away from, the road in the vicinity of the manhole. It was found that the fine-grained materials immediately below the ground surface limited the penetration range of the equipment. A third 25-ft transect parallel to the road and closer to the building yielded a possible finding. Two approximately 375-ft transects, one at 8 and one at 24 ft from the curb toward the building, yielded the possibility of five different lines (Figure 3-19). A third transect was positioned south of the main building to verify the angles of the two lines.

The metal detector was used after the SIR-3 to confirm results obtained in the south field and to help ascertain the angles of the two lines. Results of the survey (Appendix N) revealed five possible pipes leading from the building toward Foster Avenue (Figure 3-20).

3.15 MONITORING WELL INSTALLATION (ADDITIONAL RI)

Another recommendation contained in the Draft RI Report (LMS 1996) was to install 21 new monitoring wells on- and off-site to further define the extent of groundwater contamination throughout the site. The recommended wells consisted of two clusters of three wells (one shallow, one intermediate, and one deep) downgradient of the site, one cluster of three wells (one shallow, one intermediate, and one deep) to the west of the building, one deep well in the field to the northwest of the treatment building, three clusters of two wells (one intermediate and one deep) inside the building next to existing wells, one cluster of two wells (one shallow and one deep) inside the building, and one cluster of three wells (one shallow, one intermediate, and one deep) upgradient of the site. After the geophysical investigation was complete the locations of some of the wells were changed. Due to the poor structural condition of the building it was also decided not to install any additional wells inside the building. The wells inside the building may be installed after the building is demolished as part of the remedial design for the site. Therefore, a total of 14 new wells were installed as part of the Additional RI (Figure 3-21).



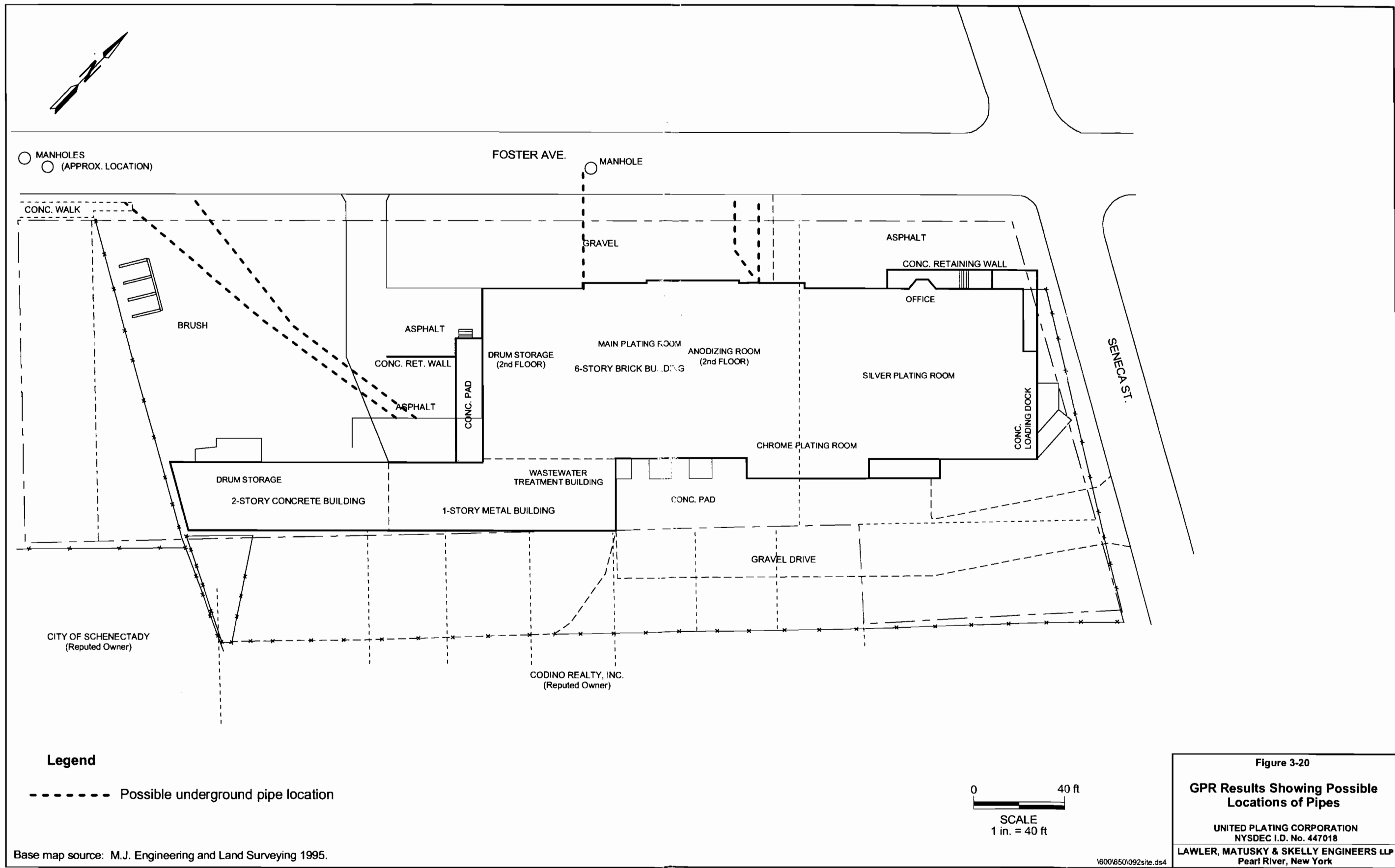


Figure 3-20
GPR Results Showing Possible Locations of Pipes
UNITED PLATING CORPORATION
NYSDEC I.D. No. 447018
LAWLER, MATUSKY & SKELLY ENGINEERS LLP
Pearl River, New York

16006501092site.ds4

Monitoring wells UPMW-7A, B, and C are located just outside the playground upgradient of the site as a new upgradient monitoring well cluster as UPMW-1C, the existing deep background well, is contaminated. Monitoring wells UPMW-8A, B, and C are located on the corner of Foster Avenue and Seneca Street, and monitoring well UPMW-12C is located near the bike path on the west side of Seneca Street. These wells monitor the groundwater downgradient of the site. Monitoring wells UPMW-9A, B, and C and UPMW-11A and B are installed in the utility trenches along Foster Avenue to determine whether contamination is entering the trenches from the site and flowing through the bedding. UPMW-10B and C are located to the west of the treatment building in the field to monitor any contamination moving from beneath the building.

3.15.1 General Monitoring Well Details

American Auger & Ditching Co., Inc. (AA), of Constantia, New York, was subcontracted to install 14 monitoring wells at the site (Figure 3-21). Three clusters of three wells, one cluster of two wells, and one single well were installed outside the site, and one cluster of two wells was installed on the site. 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 deeper well in the bedrock (designated with a C). AA used a Foremost truck-mounted drill rig to install the well clusters with 4.25-in. hollow-stem augers (HSA) and 4-in. spin casing. The bedrock wells were advanced using a 4-in. spin casing to penetrate the overburden and an NQ (2.75-in. outside diameter [O.D.]) wireline system to core through the bedrock. All drilling, well construction, installation, and logging were supervised by an LMS geologist.

The overburden A and B wells were constructed with 2-in. schedule 40 PVC casings and screens. The bedrock C wells were constructed by pressure grouting 3-in. schedule 80 PVC casing 5 ft into the bedrock. All wells were finished with curb boxes mounted at or very near grade.

3.15.2 Monitoring Well Soil Sampling

Soil sampling was conducted from 5 to 19 November 1997, according to the standard penetration test method (ASTM-D 1586). This procedure involves sampling the overburden

in 2-ft intervals with a 2-ft-long, 2-in. O.D. split-spoon sampler driven by a 140-lb hammer falling 30 in.

Soil samples of the overburden were taken in continuous intervals throughout the entire depth of the overburden. All the overburden sampling was conducted with a 2-in. O.D. split-spoon sampler using the standard penetration test method ASTM-D 1586. At UPMW-11A from 1 to 3 ft, a 3-in. O.D. split-spoon sampler was used so that enough recovery for an MS/MSD sample could be taken.

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 observations). 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 the opening of the split-spoon sampler in order to detect the presence of any VOCs. Boring logs can be found in Appendix B.

Overburden consists of artificial fill from grade to a depth of 2 to 8.5 ft. Below that is brown weathered glacial till to a depth of 5 to 11 ft, and beneath that is a gray basal glacial till deposit that extends downward to bedrock, which was encountered at 18 to 26.5 ft. Despite their difference in color, 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 extremely difficult to auger through. All bedrock 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 and monitoring well completion logs, which can be found in Appendix B. Soil sampling procedures are detailed in the next section.

Based on visual inspection and PID findings, soil samples were collected for the analysis of VOCs and TAL metals and cyanide. All soil samples were placed in laboratory-cleaned jars, maintained at 4°C, and shipped to Intertek Testing Services, Colchester, Vermont, under appropriate chain-of-custody protocol.

3.15.3 Specific Monitoring Well Details

Development logs are provided in Appendix D. It was necessary to develop many of these wells over a period of days due to their slow rates of recharge. Wells UPMW-8A, UPMW-8B, UPMW-9A, UPMW-9B, and UPMW-11B were either originally dry or dry after purging only a few gallons of water from them. Wells UPMW-7C, UPMW-9C, UPMW-10B, UPMW-10C, and UPMW-12C bailed dry after 12 to 28 gal were purged from them (Figure 3-21).

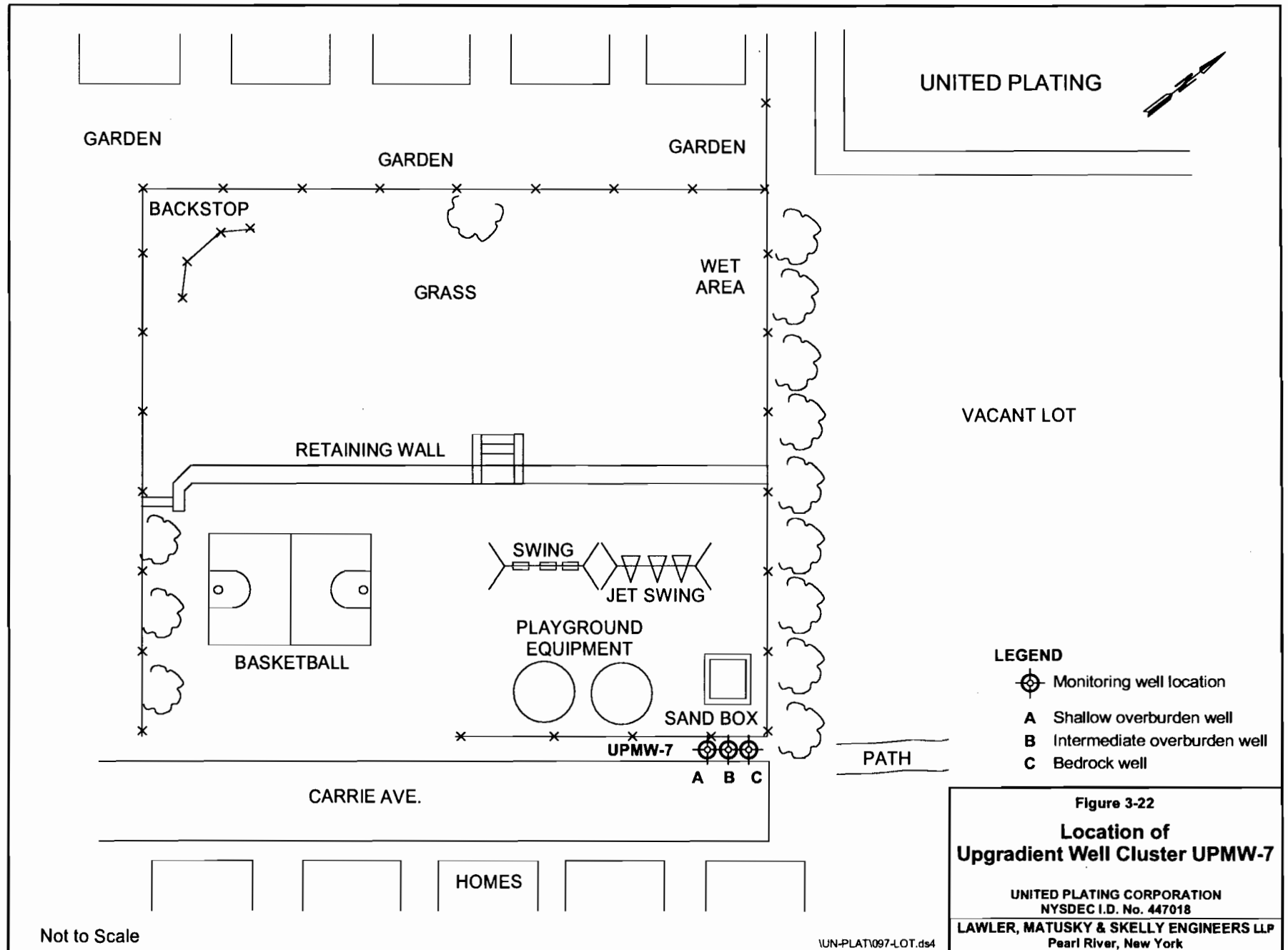
3.15.3.1 UPMW-7 Cluster. Three upgradient wells were installed to the south of the site near the playground (Figure 3-22). All three monitoring wells were completed with flush-mounted curb boxes. Artificial fill was encountered down to 8.5 ft. Some weathered glacial till was found in the 8- to 10-ft sample. Basal glacial till constituted the rest of the overburden, extending down to bedrock, which was found at 23 ft. Construction and development details are outlined as follows.

Monitoring Well UPMW-7A. This well was installed on 12 November 1997. The boring was advanced through the overburden using 4-in. spin casing, and the well was set to a final depth of 14.58 ft. Ten ft 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-7A was developed from 21 to 26 November 1997 using a dedicated Teflon bailer and a Whale pump. Beginning turbidity values were over 200 nephelometric turbidity units (NTU) and cleared to 65 NTU. UPMW-7A exhibited a fairly good recharge rate.

Monitoring Well UPMW-7B. Construction of this well began on 11 November 1997 using a 4-in. spin casing. Total depth of this well is 24.54 ft from top of casing. Ten ft 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-7B was developed from 21 to 25 November 1997 using a dedicated Teflon bailer and a Whale pump. Recharge at this well was somewhat better than at UPMW-7A. Turbidity stayed greater than 200 NTU throughout the development. An odor of sulphur was noticeable.



Monitoring Well UPMW-7C. Construction of this well began on 11 November 1997. Total depth of this well is 54.71 ft from top of casing. Four-in. spin casing was advanced to a depth of about 28 ft and 3-in. PVC casing was installed 5 ft into bedrock. Bedrock was intersected at approximately 23 ft. An NQ wireline system was then used to core 27 ft into the bedrock. Bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-7C was developed from 21 to 26 November 1997 using a dedicated Teflon bailer and a Whale pump. Recharge at this well was slow. An odor of sulphur was noticeable. Turbidity stayed greater than 200 NTU throughout the development.

3.15.3.2 UPMW-8 Cluster. Three downgradient wells were installed across Foster Street on the corner at the town garage, north of the site (Figure 3-21). All three monitoring wells were completed with flush-mounted curb boxes. Fill was found from grade surface down to 2 ft. Weathered glacial till was found from 2 ft down to a depth of 7 ft. Basal glacial till constituted the rest of the overburden, extending down to bedrock, which was found at 23 ft. Boulders were encountered at 15 ft. Construction and development details are outlined below.

Monitoring Well UPMW-8A. Drilling commenced on 4 November 1997 using a 4.25-in. HSA. The lead auger twisted off at 15 ft. The well was moved 2 ft to the west on 6 November 1997. The boring was advanced through the overburden and the well was set to a final depth of 14 ft from top of casing. Ten feet 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-8A was developed from 24 to 26 November 1997 using a dedicated Teflon bailer and a Whale pump. Recharge at this well was very poor. Turbidity stayed greater than 200 NTU throughout development.

Monitoring Well UPMW-8B. Drilling commenced on 4 November 1997. Total depth of this boring was 22.31 ft from top of casing. A 4.25-in. HSA was used on this well. Five ft 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-8B was developed from 21 to 26 November 1997 using a dedicated Teflon bailer and a Whale pump. Turbidity remained greater than 200 NTU throughout development. Recharge at this well was poor.

Monitoring Well UPMW-8C. Construction of this well began 5 November 1997. Total depth of this boring was 55.38 ft from top of casing. Four-inch spin casing was advanced to a depth of about 28 ft, going 5 ft into bedrock, and 3-in. PVC casing was installed through the overburden. An NQ wireline system was then used to core 27 ft into the bedrock. Bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-8C was developed from 20 to 26 November 1997 by using a Whale pump and a dedicated Teflon bailer. Recharge at this location was fair. Turbidity remained greater than 200 NTU throughout development. An odor of sulphur was noticeable.

3.15.3.3 UPMW-9 Cluster. Three downgradient wells were installed south of Seneca Street on Foster Avenue (Figure 3-21). These wells were installed within the bedding of utility trenches to monitor for the presence of water that may be preferentially flowing along the bedding. All three monitoring wells were completed with flush-mounted curb boxes. Blacktop and artificial fill were encountered to 3 ft below grade. Weathered glacial till was found from there to a depth of 5 ft. Basal glacial till constituted the rest of the overburden, extending down to bedrock, which was found at 23 ft. Construction and development details are outlined below.

Monitoring Well UPMW-9A. This well was installed on 18 November 1997. The boring was advanced through the overburden using a 4.25-in. HSA. The well was set to a final depth of 9.85 ft from top of casing. Eight ft 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-9A was initially dry upon completion. Twelve gallons of deionized water were added over three days, surged, and left to sit in the well, which was then surged again, before the water was removed with a dedicated Teflon bailer. The well did not recover during development.

Monitoring Well UPMW-9B. This well was installed on 18 November 1997. Total depth of this boring was 16.32 ft from top of casing. A 4.25-in. HSA was used to drill this well. Five ft 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-9B was developed from 19 to 25 November 1997. This well had a very low recharge rate. Eleven gallons of deionized water were added over two days, surged, and left to sit in the well. The well was then surged again and bailed with a dedicated Teflon bailer. Turbidity remained greater than 200 NTU during development.

Monitoring Well UPMW-9C. Construction of this well began on 17 November 1997. Total depth of this boring was 22.87 ft from top of casing. A 4-in. spin casing was used to drill this boring. Bedrock was intersected at approximately 23 ft. Five ft 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-9C was developed from 19 to 24 November 1997 using a dedicated Teflon bailer. Recharge at this location was fair, yielding 40 to 50 gal over the course of the day. Turbidity remained greater than 200 NTU.

3.15.3.4 UPMW-10 Cluster. Two wells were installed on site, in the field west of the main building (Figure 3-21). Both monitoring wells were completed with flush-mounted curb boxes. Artificial fill was encountered to 4 ft below grade. Weathered glacial till was found below the till to a depth of 8.5 ft. Basal glacial till constituted the rest of the overburden, extending down to bedrock, which was found at 26.5 ft. Construction and development details are outlined as follows.

Monitoring Well UPMW-10B. Construction of this well began 6 November 1997 using a 4.25-in. HSA. Total depth of this well reached 27.86 ft from top of casing. Five ft 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-10B was developed from 13 to 25 November 1997 using a dedicated Teflon bailer. Recharge here was fairly slow. Turbidity remained greater than 200 NTU.

Monitoring Well UPMW-10C. Construction of this well commenced on 7 November 1997. Total depth of this well was 54.55 ft from top of casing. Four-inch spin casing was advanced to a depth of about 31.5 ft and 3-in. PVC casing was installed 5 ft into bedrock. Bedrock was intersected at approximately 26.5 ft. An NQ wireline system was then used to core 28 ft into the bedrock. Bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-10C was developed on 20 November 1997 and 25 November 1997 using a dedicated Teflon bailer. Recharge at this well was fair. An odor of sulphur was noticed here. Turbidity remained greater than 200 NTU throughout the development.

3.15.3.5 UPMW-11 Cluster. Two downgradient wells were installed south of the UPMW-9 cluster on Foster Avenue (Figure 3-21). These wells were installed within the bedding of utility trenches, or just downgradient. Both monitoring wells were completed with flush-mounted curb boxes. Blacktop and artificial fill were encountered down to 3 ft. Weathered glacial till was found from there to a depth of 6.5 ft. Basal glacial till constituted the rest of the overburden, extending down to 20 ft. Construction and development details are outlined below.

Monitoring Well UPMW-11A. This well was constructed on 19 November 1997 using 4-in. spin casing. Total depth of this well reached 13.86 ft from top of casing. Five ft 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-11A was developed from 20 to 26 November 1997 using a dedicated Teflon bailer. Recharge here was very slow. Turbidity remained greater than 200 NTU.

Monitoring Well UPMW-11B. This well was constructed on 19 November 1997 using 4.25-in. HSA. Total depth of this well was 19.88 ft from top of casing. Five ft of 10 slot screen and an appropriate length of riser were used to construct the well. Sandpack, bentonite, and grout were put in place.

UPMW-11B was developed from 20 to 26 November 1997. On 20 November 1997 3-gal of deionized water were added to the well, surged, and left to sit and then bailed with a

dedicated Teflon bailer. Recharge at this well was very slow. An odor of sulphur was noticed here. Turbidity remained greater than 200 NTU throughout the development.

During drilling for UPMW-11B, an unmarked lateral from the city garage was damaged by the drilling operation. The damage was noted only after the well was completely installed. A contractor for the City of Schenectady repaired the lateral. During the excavation to repair the lateral, the monitoring well was not damaged, and after consultation with NYSDEC, the monitoring well was later sampled. The excavation to repair the lateral uncovered the main sewer along Foster Street, and a soil sample was collected for analysis.

3.15.3.6 UPMW-12C. This downgradient well is located west of the site, down Seneca Street near the bike path and adjacent to a town garage building (Figure 3-21). This monitoring well was completed with a flush-mounted curb box. Fill was found from grade surface down to 2 ft. Weathered glacial till was found from 2 ft down to a depth of 11 ft. Basal glacial till constituted the rest of the overburden, extending down to bedrock, which was found at 18 ft. Construction and development details are outlined below.

Monitoring Well UPMW-12C. Drilling commenced on 10 November 1997 using 4-in. spin casing. A strong odor of petroleum was noticed almost immediately after drilling began. After drilling down 8 ft, the boring was moved about 40 ft to the west to try to avoid the petroleum. A review of records showed a documented petroleum spill from the maintenance garage, which is the probable source of the petroleum found at this location. Total depth of this well was 54.19 ft from top of casing. Four-in. spin casing was advanced to a depth of about 28 ft and 3-in. PVC casing was installed 5 ft into bedrock. Bedrock was intersected at approximately 18 ft. An NQ wireline system was then used to core 26 ft into the bedrock. Bentonite and grout were put in place according to NYSDEC guidelines.

UPMW-12C was developed from 20 to 26 November 1997 using a dedicated Teflon bailer and a Grundfos pump. Recharge at this well was slow. An odor of sulphur was noticeable. Turbidity remained greater than 200 NTU throughout the development.

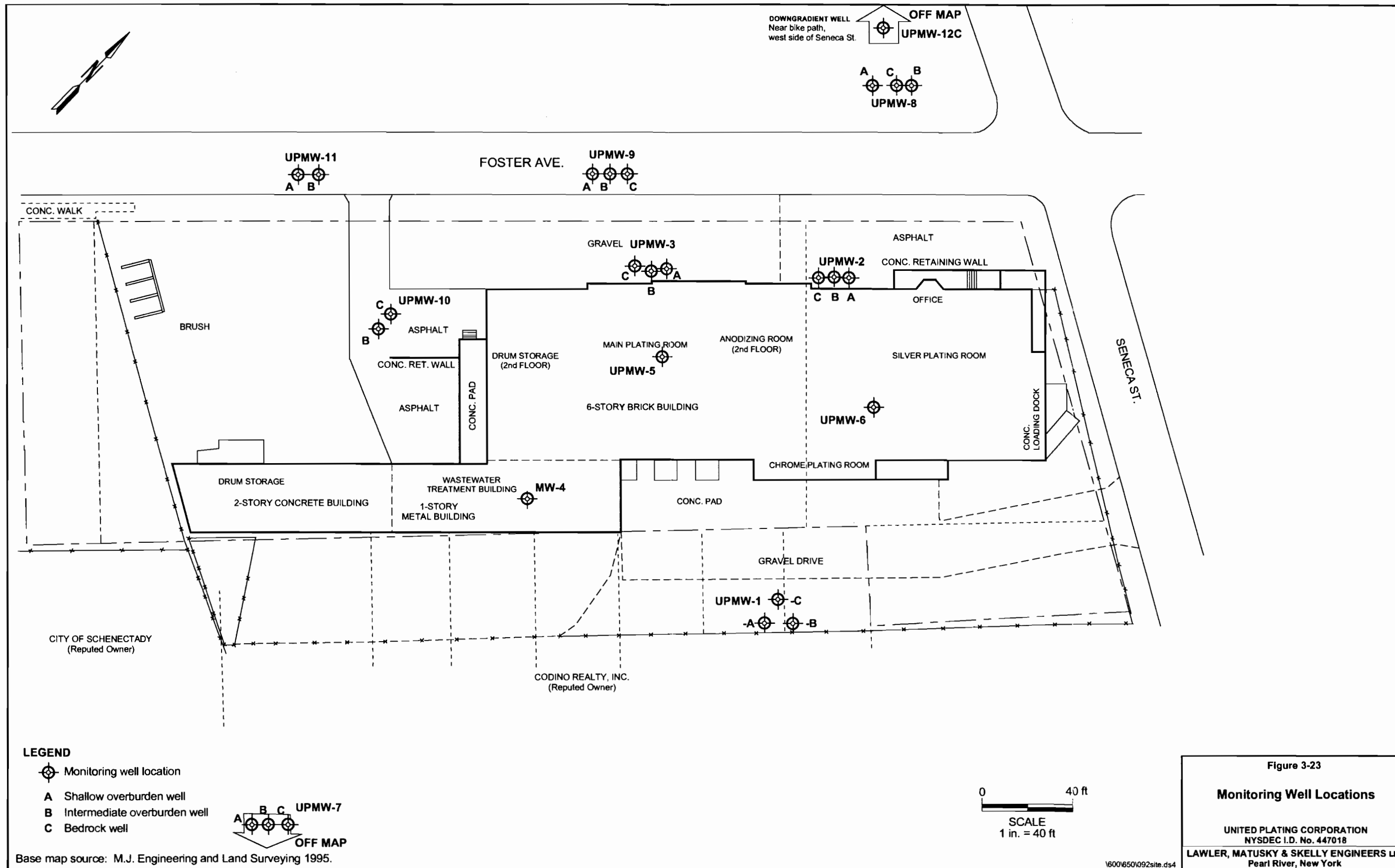
3.16 GROUNDWATER SAMPLING AND ANALYSIS (ADDITIONAL RI)

3.16.1 Groundwater Sampling Protocol

Monitoring well sampling of all existing and new wells began on 8 December 1997 and included a full round of static water levels (SWL). All of the wells (Figure 3-23), except UPMW-9B and UPMW-11B (which were almost dry), exhibited reasonable water levels. Some of the wells, however, were very slow to recover after being purged. UPMW-1C, UPMW-4, UPMW-5, UPMW-9A, and UPMW-9B had recharge rates noticeably lower than the rest of the UPMW wells. UPMW-3C and UPMW-10B returned to a higher level than when originally measured, possibly due to pressure being released when the well cap was taken off.

Based on the SWL and the total depth of the well, the volume of water in the well was calculated. All of the wells were purged three well volumes. If a well did not produce sufficient water to allow three well volumes to be purged, it was purged dry. Bedrock well UPMW-8C was purged using a Grundfos submersible pump. UPMW-2C, UPMW-3C, UPMW-7A, UPMW-7B, UPMW-7C, UPMW-10B, and UPMW-12C were purged with a Whale pump. UPMW-10C was purged with both a Whale pump and a dedicated Teflon bailer. All others were purged using dedicated Teflon bailers. Monitoring well sampling logs can be found in Appendix E.

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 complete, the wells were allowed to recharge overnight. Only those wells that had recharged to approximately 90% of their original SWL were sampled the next day. If a well had not recharged 90% within seven days, samples were taken in the order listed in the next paragraph. Only wells UPMW-1B, UPMW-2B, UPMW-3B, UPMW-7A, UPMW-7B, and UPMW-9C were sampled on the same day as they were purged; all others were allowed to recover overnight. All samples were collected from the top of the water column (where applicable) using new dedicated Teflon bailers and rope. Sample chemistries, including temperature, turbidity, pH, and specific conductance, were taken when sufficient volume of water was available.



Due to the slow recharge rate of several of the wells, the analysis parameters were prioritized as follows: low-level VOCs, TAL metals, cyanide, low-level PCBs. Full sets of samples were collected from all the wells, with the exception of UPMW-11B, which only yielded enough water for collection of VOC samples, and UPMW-9A and UPMW-9B, which yielded only enough water for collection of VOCs, metals, and cyanide samples.

CHAPTER 4

PHYSICAL CHARACTERISTICS

4.1 TOPOGRAPHY

The United Plating (UP) site is situated on a gentle slope of the Mohawk River Valley that averages about 3.5%. Ground surface elevations at the site range from 267 ft above msl in front of the building along Foster Avenue to 273.5 ft above mean sea level (msl) at the fence behind the building. The area behind the building is flat. The Mohawk River lies to the northwest, approximately 1500 ft downslope from the site. The elevation of the Mohawk River averages 218 ft above msl. The slope continues to rise for over 0.5 mile to the southeast, reaching elevations of over 400 ft above msl.

A small depression behind the wastewater treatment building has tall grasses growing in it. The front of the site has a slight slope away from the building toward Foster Avenue. There is a very slight change in elevation of perhaps 1 ft along the longitude of the building, with the higher elevation at the northwest corner, closest to Seneca Street.

4.2 SURFACE WATER

The surface water closest to the site is the Mohawk River, which flows from the southwest to the northeast 1500 ft northwest of the site. Standing water associated with the former barge canal is also found adjacent to the Mohawk River. In addition, two intermittent seeps were observed on the UP property. One seep was observed in front of the UP building between well clusters UPMW-2 and UPMW-3 after a heavy rain event; the flow from this seep had a greenish tint. Another seep was seen several times in the front of the building near the western corner of the main plating room. This seep was apparently affected by a test pit that was excavated upgradient as a seep emanates from the upgradient test pit, while no seep was observed from the original location. These seeps are described further in Section 4.8.2, Study Area Hydrogeology.

4.3 DEMOGRAPHY AND LAND USE

The UP site is located in the City of Schenectady, Schenectady County, New York, approximately 0.25 mile southwest of the Mohawk River. The 1990 population of the City

of Schenectady was 65,566, a 3.54 % decrease from the 1980 census population (NYSD&ED 1990). In 1987 approximately 6% of the employed labor force in Schenectady County worked in construction; 20% in manufacturing; 3% in transportation and utilities; 23% in retail and wholesale trade; 4% in finance, insurance, and real estate; 30% in services; and 13% in state and local government (Clements 1989).

The site is located in an area of mixed commercial and residential development. A railroad line runs southeast one block (500 ft) from the site. Approximately 4000 households and 14,000 people are within a 1-mile radius of the site.

4.4 ECOLOGY

Schenectady County is located in the eastern portion of the state and is mainly within the Ontario Plain and Finger Lakes land resource region. A small portion lies within the New England and Eastern New York Upland, Southern Part, land resource region. The land surface is dominated by the Mohawk Valley and an upland generally broken by ridges and isolated hills that range to 350 ft above the Mohawk River. The eastern two-thirds of the county has deep and acidic soils on glacial till over hilly terrain. Alluvial soils on valley bottoms extend through much of the northeastern sections of the county. In the far northwest, soils are shallow and acidic and are situated on glacial till over steep terrain. Northeastern and southwestern regions of the county have predominantly limestone bedrock, while most of the remainder of the county has predominately shale bedrock. In the east, soils are light unproductive sands, while in the west a clayey loam is underlain by till on the hills. The county's main forest types include northern hardwoods throughout the west and oak and northern hardwoods throughout the east. The western half of the county lies within the Mohawk Valley, which has stands of hemlocks in some of the ravines, with white pine and white cedar in some swamps and oak on the shale slopes. Nearly all the forest is on farms in this region, (Clements 1989).

The site itself is small and occupied mostly by the buildings. The southwestern portion of the site is a marshy area; the rest of the site is either paved or covered by grass. Directly to the east of the site is a vacant grassy field.

4.5 CLIMATOLOGY

Schenectady is within the New York Hudson Valley climatological region, with a primarily continental climate moderated somewhat by maritime influences. The climate is characterized by cold, snowy winters and warm, humid summers. Average annual temperature is 49°F, ranging from an average low of 14°F in January to an average high of 83°F in July. Average annual precipitation is 35 in. Average humidity is 79% at 7 a.m. and 68% at 7 p.m. Annual snowfall averages 62 in. Prevailing winds are from the northwest during the winter and from the south during the summer (Clements 1989).

4.6 GEOLOGY

4.6.1 Regional Geology

The Paleozoic rocks that underlie Schenectady County are covered by unconsolidated glacial drift material deposited during the Pleistocene. During the Pleistocene glaciers repeatedly advanced and retreated over the northeast United States, covering what is now Schenectady County with approximately 3000 ft of ice. The final stage of ice advance, called the Wisconsin Stage, is believed to have removed or reworked nearly all of the soils deposited by previous glacial stages, leaving behind deposits consisting largely of glacial till containing a high percentage of clay (Simpson 1952). Smaller deposits of unconsolidated material that may be found on the floodplains of the larger tributaries of the county were deposited after the last stage of glaciation. The scouring action of the glacier advances is evident in the form of linear depressions in the surface of the bedrock. These features, which are reflected in the local topography, indicate that ice movement was generally to the southwest.

4.6.1.1 Bedrock Geology. Underlying the entire City of Schenectady is the Schenectady formation, a series of alternating beds of shale and sandstone estimated to be about 2000 ft thick (Ruedemann 1930) dipping gently to the west and southwest. In most places, dip is from 1° to 2°, increasing to as much as 5° in some areas (Simpson 1952). These rocks were formed during the Ordovician period when the Taconic island arc collided with North America. The Taconic arc plowed deeply into the continental margin sediments and imbricated them into a rapidly growing thrust complex that separated the Taconic arc from the foreland basin. Because these continental margin sediments were the first to ride up onto the continental margin, they became rapidly uplifted and eroded, and the detritus was then deposited in the adjacent foreland basin, where they lithified (Garver 1995). Alternating

turbid and quiescent depositional environments in the foreland basin over a prolonged period of time eventually led to the thick sequence of interbedded sandstones and shales, respectively. Although the Schenectady formation has never been subjected to stresses sufficient to cause folding, it was found during the course of our investigation that the surface is broken by nearly vertical joints. These cracks range in width from about 0.01 to 0.20 in., spaced a few inches to a few feet apart. It is believed that joints and bedding plane openings in the Schenectady formation tend to disappear or become tightly closed beyond 200 to 300 ft (Simpson 1952).

4.6.1.2 Overburden Geology. During the final retreat of the last continental glacier from New York State, a number of recognizable ice margins and readvances occurred (Dineen 1986). The final readvance in this region is known as the Delmar readvance (which occurred 15,000 years ago), in which ice surged 20 miles south from Round Lake to South Bethlehem. This readvance reworked virtually the entire preexisting overburden, mantling the bedrock with a layer of glacial till. As the Delmar ice retreated, it formed a stable ice margin in the vicinity of Schenectady, with stagnant and melting ice left in front of the ice margin. When the glacial ice finally retreated from the region, a period characterized by a series of glacial lakes followed. These lakes include Lake Albany, Lake Quaker Springs, Lake Coville, and Lake Fort Ann, in decreasing order of size. During this period, the St. Lawrence lowland remained glaciated and drainage from the Lake Ontario Basin was directed toward the Hudson Valley from glacial Lake Iroquois along the Iromohawk River. The Iromohawk River generally followed the course of the present-day Mohawk River. Discharge estimates for the Iromohawk River are many times the discharge of the existing Mohawk River (Wall and Lafleur 1995). The high discharge estimates for the Iromohawk River would account for the very coarse sand and gravel deposits in the Scotia area.

This glacial and postglacial history resulted in a number of complex and variable depositional and erosional environments, which are directly reflected in the overburden deposits seen in the region today. In general, the overburden consists of interbedded strata or lenses of different types of material that can be grouped into three classes according to their mode of deposition: (1) till, which was deposited directly by glacier advances over the region; (2) lacustrine deposits, which were laid down in glacial lakes; and (3) outwash sand and gravel deposits, which were deposited from the Iromohawk and Mohawk rivers during Pleistocene and recent time, respectively. Additionally, recent-age deposits have been laid down over the Pleistocene outwash deposits within the flood plain of the present-day Mohawk River.

Till is a heterogeneous mixture of rock particles of all grain sizes deposited directly by glacial ice. Till mantles the bedrock surface over most of Schenectady County (Winslow et al. 1965) where the site is located. On hills and upland slopes, the thickness of the till deposit generally ranges from 10 to 30 ft. On the depressed, scoured surfaces of the bedrock, till may be more than 200 ft thick (Winslow et al. 1965). The unweathered till in this area is generally a gray to dark gray, dense, tough, stoney, silty and sandy clay, with cobbles and large boulders. The weathered till is brown as a result of the oxidation of iron. The matrix of the till in Schenectady County is rich in clay derived from the numerous shale outcrops north and northeast of Schenectady. Within the clay matrix are numerous clast sizes, including many cobble and boulder-sized glacial erratics of Adirondack provenance. Both basal till and ablation till are found in Schenectady County. The basal till was deposited under the weight of the glaciers as they advanced, which resulted in its compact, dense nature. Ablation till in Schenectady County is found only in isolated areas and is typically less compact, containing a higher percentage of sand than basal till. Ablation till is deposited as stagnant glacial ice melts away. Lenses of sand and/or gravel were incorporated into both the basal and ablation till during its deposition, and are scattered throughout these deposits in a sparse and random manner (Winslow et al. 1965).

During the period when glacial lakes existed in the Hudson Valley and the lower Mohawk Valley, a number of lake, or lacustrine, deposits were laid down in areas of stagnant or slow-moving water. Typically, these deposits are found at elevations less than 400 ft msl (valley bottoms) and are reported to range from 20 to 150 ft in thickness (Simpson 1952). These lacustrine deposits are fairly well stratified and consist of alternating beds that range in content from clay to sand and gravel.

Several areas of outwash sand and gravel were also deposited during this period. They range from sandy deltaic deposits to high-energy channel deposits of coarse sand and gravel. Generally, the finest outwash sands and gravels are found farther downstream as the Mohawk Valley opens into the Schenectady Basin. Most of the coarse-grained outwash sand and gravels are isolated in areas west of Scotia in the relatively constricted valley. These high-permeability deposits were probably laid down by the Iromohawk River, as the discharge was believed high enough to suspend the finer sediments. A drilling log of well Sn 220 near Lock 8 of the Mohawk River shows that the coarse-grained outwash sands and gravels can be up to 100 ft thick.

Recent-age floodplain deposits laid down by the present-day Mohawk River consist of silt and sand, with small amounts of clay and gravel. These deposits average 20 to 30 ft in thickness and are restricted to the Mohawk Valley between Hoffmans and Alplaus (Winslow et al. 1965).

4.6.2 Study Area Geology

The geology at the UP site is typical of much of the upland areas in the Mohawk River Valley. The Wisconsin Stage, the final stage of ice advance during the Pleistocene, was responsible for the formation of the existing site geology. The advance of the ice sheet removed and reworked deposits from previous stages of glaciation while scouring the bedrock. Thick till deposits resting unconformably on bedrock remained when the glacier retreated. Till forms the surficial deposits throughout the UP facility except for those areas that have been graded or filled during the development of the area.

Fill was encountered in most of the soil probes, soil borings, and test pits installed as part of the RI with the exception of UPP-2, UPP-5, UPP-7, UPP-19, UPTP-10, UPMW-1, and UPMW-3. Excluding those points, the depth of fill ranged from 0.4 ft at UPP-1 to an estimated 13 ft at UPMW-4 (Table 4-1). The depth of the fill at UPMW-4 is estimated based on drilling as soil recoveries during split-spoon sampling were poor. Fill at UPMW-4 may terminate at 11 ft or extend down as far as 15 ft below the ground surface. The average depth of fill based on all soil probes, soil borings, and test pits is 2.9 ft. Table 4-1 lists the depth to fill, weathered till, basal till, and bedrock for each soil probe, soil boring, and test pit.

The texture of the fill ranged from silt (UPP-6) to crushed stone (UPTP-1). Some of the fill materials appeared discolored, but in general were not process wastes or buried metallic sludges. Detailed descriptions of the soil lithologies are included on the probe and monitoring well logs in Appendix B and on the test pit logs in Appendix G. Soil probes UPP-6, UPP-12, UPP-14, UPP-14, UPP-17, and UPP-20 contained fragments of debris, including brick, wood, concrete, ash, asphalt, and/or stone. UPMW-4 contained small amounts of plastic, wood, and tar paper down to approximately 13 ft below grade.

All the test pits contained fill, with the exception of UPTP-10. A trench filled with crushed stone was exposed at the west end of UPTP-1. A perforated PVC pipe found in UPTP-5 might have led to one of the on-site manholes. UPTP-6 exposed what appeared to be a gravel-filled trench at 4 ft below grade. A gas supply line found in UPTP-10 went from

TABLE 4-1 (Page 2 of 2)

STUDY AREA SURFACE MATERIAL SUMMARY

United Plating Site

PROBE #	PIEZOMETER	FILL	WEATHERED TILL	BASAL TILL	BEDROCK
UPP- 1	(PZ-1)	0 - 0.4	0.4 - 4.0	4.0 - 6.0 +	
UPP- 2	(PZ-10)	-	0 - 4.0	4.0 - 7.0 +	
UPP- 3	*	0 - 1.0	1.0 - 4.0	4.0 - 5.0 +	
UPP- 4	*	0 - 1.2	1.2 - 8.0	8.0 - 10.0 +	
UPP- 5	(PZ-8)	-	0.0 - 5.0	5.0 - 7.0 +	
UPP- 6	*	0 - 2.8	2.8 - 9.0	9.0 - 10.0 +	
UPP- 7	*	-	-	0.0 - 4.0 +	
UPP- 8	*	0 - 5.0	-	5.0 - 6.0 +	
UPP- 9	*	0 - 0.8	0.8 - 3.5	3.5 - 4.5 +	
UPP- 10	(PZ-2)	0 - 4.0	-	4.0 - 8.0 +	
UPP- 11	(PZ-5)	0 - 6.4	6.4 - 7.6	7.6 - 8.0 +	
UPP- 12	(PZ-4)	0 - 4.8	4.8 - 6.0 +	-	
UPP- 13	(PZ-3)	0 - 4.0	4.0 - 5.0	5.0 - 8.0 +	
UPP- 14	(PZ-12)	0 - 4.0	-	-	
UPP- 15	(PZ-9)	0 - 4.0	-	4.0 - 8.0 +	
UPP- 16	(PZ-6)	0 - 2.0	2.0 - 4.0	4.0 - 9.0 +	
UPP- 17	*	0 - 2.0	-	2.0 - 11.0 +	
UPP- 18	*	0 - 4.0	4.0 - 7.5	7.5 - 9.5 +	
UPP- 19	(PZ-7)	-	0.0 - 4.0	4.0 - 7.0 +	
UPP- 20	(PZ-13)	0 - 7.0	-	7.0 - 26	26 +
UPP- 20A	(PZ-13A)	0 - 2.0	2.0 - 4.0 +	-	
UPP- 21	(PZ-11)	-	-	-	
UPTP- 1		0 - 3.0	3.0 - 5.5	5.5 - 6.5	
UPTP- 2		0 - 5.5	-	5.5 - 6.0	
UPTP- 3		0 - 5.0	-	5.0 - 6.5	
UPTP- 4		0 - 5.0	-	-	
UPTP- 5		0 - 1.5	1.5 - 6.4	-	
UPTP- 6		0 - 4.0	-	-	
UPTP- 7		0 - 3.4	3.4 - 5.0	5.0 - 6.0	
UPTP- 8		0 - 1.5	1.5 - 6.0	-	
UPTP- 9		0 - 1.1	1.1 - 5.8	5.8 - 6.1	
UPTP- 10		-	0 - 4.0	-	
UPTP- 11		0 - 2.4	2.4 - 6.5	6.5 - 8.5	

Note: Bold means refusal of probe.

- * - Piezometers not installed at this location.
- - Noted material absent at this location.
- + - Bottom of unit not found.

TABLE 4-1 (Page 1 of 2)

STUDY AREA SURFACE MATERIAL SUMMARY
United Plating Site

PROBE #	PIEZOMETER	FILL	WEATHERED TILL	BASAL TILL	BEDROCK
UPMW 1A		-	0.0 - 4.0	4.0 - 15.0	
UPMW 1B		NS	NS	16.0 - 22.0	22.0 +
UPMW 1C		NS	NS	NS	22.0 - 55.0 +
UPMW 2A		0 - 6.4	-	6.4 - 14.0	
UPMW 2B		NS	NS	19.0 - 25.5	25.5 +
UPMW 2C		NS	NS	-	25.5 - 55.0 +
UPMW 3A		-	0.0 - 6.0	6.0 - 15.0	
UPMW 3B		NS	NS	19.0 - 25.5	25.5 +
UPMW 3C		NS	NS	NS	25.5 - 55.0 +
UPMW 4		0 - 15.0 ?	-	15.0 - 17.0	
UPMW 5		0 - 3.0	3.0 - 11.0	11.0 - 15.0	
UPMW 6		0 - 3.0	3.0 - 7.0	7.0 - 14.0	
UPMW 7A		NS	NS	NS	
UPMW 7B		0 - 8.5	8.5 - 9	9 - 23	23+
UPMW 7C		NS	NS	NS	28 - 55+
UPMW 8A		0 - 2	2 - 7	7 - 13+	
UPMW 8B		NS	NS	13 - 23	23+
UPMW 8C		NS	NS	NS	28 - 55+
UPMW 9A		NS	NS	NS	
UPMW 9B		0 - 3	3 - 5	5 - 16+	
UPMW 9C		NS	NS	5 - 23	23+
UPMW 10B		0 - 4	4 - 8.5	8.5 - 26.5	26.5+
UPMW 10C		NS	NS	NS	31.5 - 55+
UPMW 11A		1 - 3	NS	NS	
UPMW 11B		2 - 3	3 - 6.5	6.5 - 20+	
UPMW 12C		0 - 2	2 - 11	11 - 18	25 - 55+

Note: Bold means refusal of probe.

- * - Piezometers not installed at this location.
- - Noted material absent at this location.
- + - Bottom of unit not found.
- NS - Samples not required.

Foster Avenue to the corner of the facility between the drum storage area and the wastewater treatment building.

UPTP-2, UPTP-3, and UPTP-4 were dug in what appears to be old sumps. UPTP-2 had blue-stained soils at 3 ft below grade. At 4 ft below grade a 12-in. concrete pad was encountered. Immediately below the concrete pad a 1-in. metal pipe was found. At 4.3 ft, a 10-in. masonry pipe with 4 in. of water was hit. Basal till was encountered at 5.5 ft below grade. Water was encountered above the concrete pad and perched on the basal till. UPTP-3 had a 1-in. metal pipe and a 10-in. masonry pipe (dry) at depths of 4 ft and 4.3 ft, respectively. The soil at 4 ft was oil stained black/green. Water was perched at 4 ft. UPTP-4 had a 1-in. metal pipe at 3.5 ft and a 10-in. masonry pipe (dry) at 4 ft below grade. The soil was stained black at 3 ft below grade and water was perched at 3 ft. The masonry pipe was connected to a manhole adjacent to UPTP-4, the location of the manhole is shown in Figure 3-18.

Some fill was encountered in the soil borings, drilled as part of the Additional RI work. The depth of fill ranged from 2 ft at monitoring wells UPMW-8B and -12C to an estimated depth of 8.5 ft at monitoring well UPMW-7B. Table 4-1 lists the depth to fill, weathered till, basal till, and bedrock for each soil boring. The average depth of fill based on the soil borings is 5 ft.

The texture of the fill from black silt and some ash to crushed stone and concrete. Some of the fill materials did appear discolored, but in general did not appear to be process wastes or buried metallic sludges. Detailed descriptions of the soil lithologies are included in the monitoring well logs located in Appendix B.

Below the fill, weathered till was generally encountered. The weathered till is absent at several locations where fill has been placed, but ranges up to 8 ft thick at UPMW-5 (Table 4-1). The weathered till is distinguishable from the basal till mainly by the color of the material which has been oxidized brown. The texture of the weathered till is predominantly very hard silt and fine sand, some clay, trace gravel, cobbles, and boulders, but ranges from silt and some clay (UPP-6) to silt and fine gravel (UPP-11).

Below the weathered till basal till extends down to and rests unconformably on bedrock. The borings that extended down to bedrock contained 6.5 to 19.5 ft of basal till, which is probably representative of the extent of the basal till throughout the site. Bedrock does not outcrop

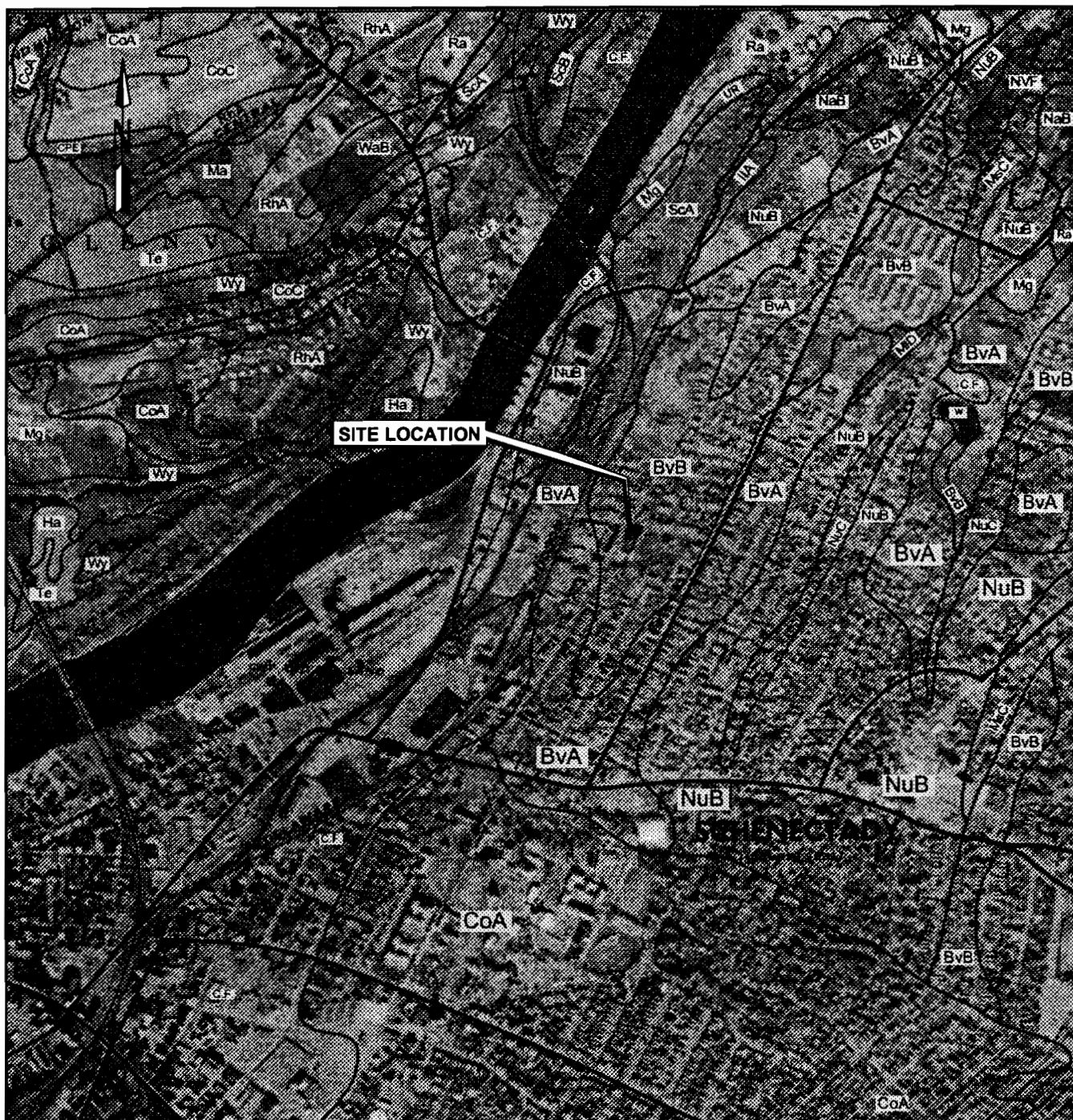
in the vicinity of the facility. The texture of the basal till is predominantly dark gray silt and fine sand, some clay, trace gravel, and trace cobbles, but ranges from silt and little very fine sand to silt and fine sand with some fine gravel. The samples recovered were very hard, compact, and coherent, particularly when they contained a small amount of moisture. Most of the basal till is dry and the recovery was generally crumbly and broken along the horizontal plane, giving it a slate-like appearance.

Soil borings for monitoring well clusters UPMW-1, UPMW-2, and UPMW-3 encountered bedrock at depths of 22, 25.5, and 25.5 ft, respectively (Table 4-1). The elevations of the bedrock surface are 251.5, 243.5, and 242.5 ft for UPMW-1, UPMW-2, and UPMW-3, respectively. Soil borings for monitoring well clusters UPMW-7, UPMW-8, and UPMW-9 encountered bedrock at 23.0 ft; UPMW-10 and UPMW-12 encountered bedrock at depths of 26.5 and 18.0 ft, respectively (Table 4-1). The elevations of the bedrock surface are 257.0, 245.2, 243.3, 242.6, and 234.7 ft for monitoring wells UPMW-7C, UPMW-8C, UPMW-9C, UPMW-10C, and UPMW-12C, respectively. These elevations show that the bedrock in the vicinity of the UP facility angles gently down toward the Mohawk River at an approximately 5% slope.

The bedrock below the UP site is part of the Schenectady formation. The bedrock was cored in 7- to 10-ft runs during the RI. Recovery was at least 97% on all core runs. The bedrock was cored in 5-ft runs during the Additional RI work. Recovery was at least 90% on all core runs, except for one that went through very fissile shale. The core recovered had excellent rock quality designations (RQDs). The Schenectady Formation at the site consists of grit and sandstone, alternating with black and gray argillaceous shale. Layers are generally several inches to several feet thick. Lensing of sandstone layers is common, as are very thin (1 mm) vertical fractures in the grit and sandstone. Some of the vertical fractures have been filled and closed by pyrite and/or calcite. There was no apparent spatial distribution of fracture zones based on elevation or compass direction.

4.7 SOILS

The soils in the vicinity of the UP Site were mapped (Figure 4-1) by the USDA (1978) as the Burdett and Scriba series, 3-8% slopes (BvB). The two series occur in such complex patterns that they are mapped together. These series were developed from two layers of glacial till consisting of an upper acid silty layer and a compact lower calcareous gravelly silty clay loam. The water table is typically within 8 in. of the surface during spring and extended wet periods.



SCALE IN MILES
(1:15,840)

Figure 4-1

Soil Types Map

UNITED PLATING CORPORATION
NYSDEC I.D. No. 447018

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

Map source: U.S. Department of Agriculture, Soils Conservation Service, 1978.

WIN-PLATSOILS.dwg

A typical soil profile consists of an A horizon consisting of 9 in. of channery silt loam. The subsoil (B horizon) has a 7-in. upper layer of friable, olive-brown mottled with yellowish-brown channery silt loam. The middle portion of the subsoil is 10 in. of firm, mottled, light brownish-gray, gravelly silty clay loam. The bottom part of the subsoil consist of firm, mottled, gray gravelly, clayey silt loam from 26 to 44 in. The substratum is firm calcareous grayish-brown and olive gray, gravelly, silty, clay loam (USDA 1978).

4.8 HYDROGEOLOGY

4.8.1 Regional Hydrogeology

The aquifer that serves as the primary source of water for residents and industry in eastern Schenectady County is a valley-fill aquifer underlying a 25-square-mile area along the Mohawk River (Brown et al. 1981) from Hoffmans downstream to Alplaus, along the Saratoga County line. The aquifer is recharged by infiltration from the Mohawk River and from precipitation within the drainage area. The aquifer consists primarily of overburden Pleistocene deposits of glacial, lacustrine and alluvial origin, with a minor amount of recent-age floodplain deposits. The bedrock aquifer also serves as an important source of drinking water in outlying areas. In general, yields are often low and only provide sufficient yield for residential use.

4.8.1.1 Overburden Hydrogeology. On a regional basis the overburden can be divided into two water-bearing or regional hydrostratigraphic units, including glacial till and valley-fill deposits. The deposits of the valley-fill unit collectively make up the Schenectady valley-fill aquifer. Glacial till is found at or near the surface in upland areas, and valley-fill deposits are found at or near the surface in the low-lying areas near the Mohawk River. Because of its low permeability, the glacial till unit is not included as a component of the valley-fill aquifer.

The glacial till unit is composed of various types of till, including basal (lodgement) till, ablation till, and weathered till. The low permeability of glacial till is attributed to its heterogeneous nature. Silt and clay particles fill the interstices between sand grains, inhibiting the flow of groundwater. Based on hydraulic conductivity tests performed on till samples from the Schenectady area, conductivity values ranged from 1.34×10^{-4} to 5.36×10^{-4} ft/day (Simpson 1952), which is approximately one order of magnitude less than typical hydraulic conductivity values for glacial till (Fetter 1988). Most water movement within the till is through small lenses of well-sorted sand. The lenses range in size from less than a square foot

to as much as several hundred square feet. Lens thicknesses range from a fraction of an inch to several feet. Recovery of a well in till is determined almost entirely by the number and properties of the lenses intersected (Winslow et al. 1965). The United Plating site is situated on an upland slope within an area of basal till.

The valley-fill unit is composed primarily of Pleistocene and recent deposits. Lacustrine and alluvial deposits are also included in the valley-fill unit, typically as minor deposits with hydrogeologic characteristics similar to the sand and gravel. Outwash sand and gravel deposits constitute what is perhaps the most important member of the valley-fill unit due to its high permeability. Almost all of the large-capacity wells in eastern Schenectady County are screened in outwash sand and gravel, including wells that supply water for the villages of Scotia and Rotterdam Junction. At the well field in Scotia, wells 250-358-1, 250-358-2, and 250-358-10 each yield 1100 gallons per minute (gpm) or more. Based on U.S. Geologic Survey (USGS) pump tests, the conductivity of the aquifer in the region of Scotia was calculated to be approximately 2700 ft/day. At Rotterdam Junction, it was calculated to be about four times higher, approximately 13,400 ft/day; however, an excellent hydraulic connection noted between the Mohawk River and the Rotterdam Junction water supply wells would account for the marked increase. Various other wells screened in the outwash sand and gravel deposits revealed conductivity values ranging from 200 to 4700 ft/day, typical of well-sorted glacial outwash deposits (Fetter 1988). The most productive supply wells are located several miles upstream, west of the United Plating site.

Lacustrine deposits also found in the valley-fill unit consist of interbedded sand deposits and silt and clay deposits. The lacustrine silt and clay deposits have low hydraulic conductivity values similar to that of glacial till, but, as a whole, the lacustrine deposits still allow for the flow of groundwater due to the more permeable layers of sand. The overall permeabilities of these deposits are low to moderate and, even though they are included within the valley-fill aquifer, they are considered a minor section of it (Brown 1981). For several wells installed in these deposits, conductivity values ranged from 2 ft/day up to 130 ft/day, depending on the size and water-bearing characteristics of the permeable lenses intersected. Recharge of the lacustrine deposits varies and is limited by the amount of silt and clay between the permeable sand and the ground surface.

Floodplain deposits of recent age overlie the Pleistocene outwash sand and gravel deposits. Wells have been constructed in floodplain deposits with various results, depending on the amount of silt and clay that is interspersed with the sand. Proximity to a stream also

influences the output of a well screened in a floodplain deposit as pumping may induce infiltration. Generally, the yield of wells drilled in floodplain deposits is between 20 and 100 gpm (Winslow et al. 1965). Yields of several wells installed by General Electric in these flood plain deposits ranged from 30 to 400 gpm (Simpson 1952). A pump test was conducted on a test well installed by the town of Niskayuna 50 ft from the Mohawk River; the conductivity was determined to be approximately 670 ft/day. Water levels in this well fluctuated with the level of the Mohawk River. The ease of infiltration results in higher than average conductivity values for deposits of this type.

4.8.1.2 Bedrock Hydrogeology. The Schenectady formation is believed to be 2000 ft thick and underlies 90% of Schenectady County, making it the most extensively used bedrock aquifer in the county. Other bedrock formations will not be discussed, as their depth and low development as a sources of groundwater make them hydrogeologically unimportant. All the bedrock formations, however, are low yielding and are suitable only for domestic wells. The shale and sandstone beds of the Schenectady formation contain interconnected openings along joints and bedding planes that allow the movement of groundwater. The rocks themselves are relatively impervious to water. Spacing between individual vertical joints within parallel sets ranges from several inches to several feet. Gaps between horizontal bedding planes vary with the thickness of individual beds, which range from a fraction of an inch up to as much as 15 ft. It has been shown in low-yielding wells that drilling deeper than about 200 ft into the Schenectady formation usually does not result in a higher yield. For this reason, it is believed that joints and gaps between bedding planes disappear or become tightly closed, and all recoverable groundwater is contained within the uppermost 200 ft of the formation (Simpson 1952). Yields of wells set in the Schenectady formation vary in accordance with the thickness and nature of the overburden. Because local precipitation is the primary source of recharge to the bedrock, wells set in bedrock underlying permeable deposits have a dramatically higher yield than wells set in bedrock underlying glacial till or clay. Bedrock wells installed where the overburden is thin (less than 10 ft) have a significantly lower yield than those located in areas of sandy overburden; however, they yield more than bedrock wells located in areas of till or clay overburden. A total of 29 bedrock wells installed in areas containing till or clay overburden yielded 1 to 6 gpm, with an average of 2.5 gpm. Ten bedrock wells located in areas with sand and gravel overburden average about 51 gpm; however, three wells yielded over 100 gpm while six wells had yields of 20 gpm or less. Nine bedrock wells screened in regions where overburden is thin or absent averaged 7.7 gpm. Of these nine wells, six yielded less than 7 gpm, two yielded 12 gpm, and one well had a yield

of 20 gpm. It is not uncommon for water obtained from this formation to contain hydrogen sulfide gas dissolved in it, giving it a rotten egg odor.

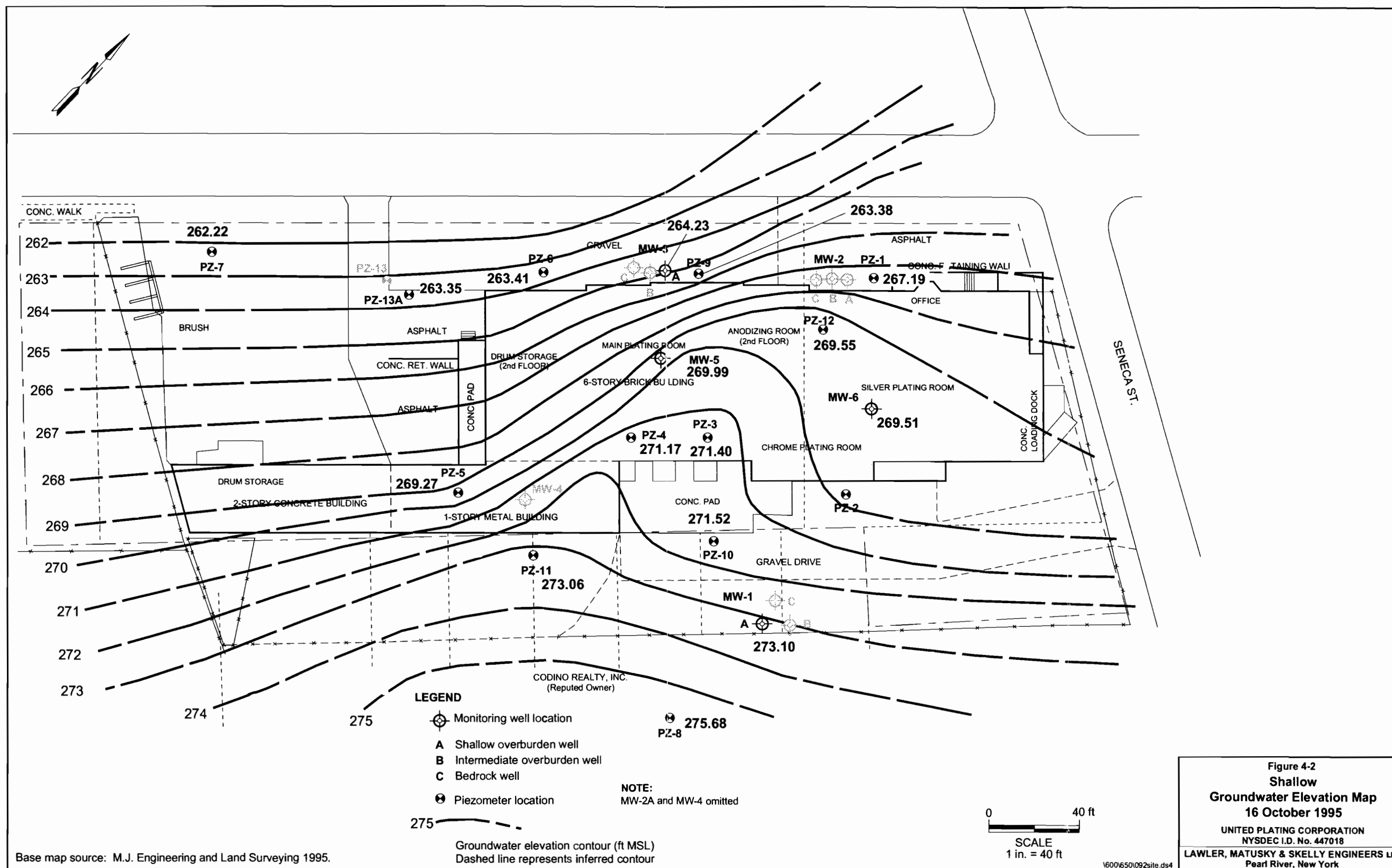
4.8.2 Study Area Hydrogeology

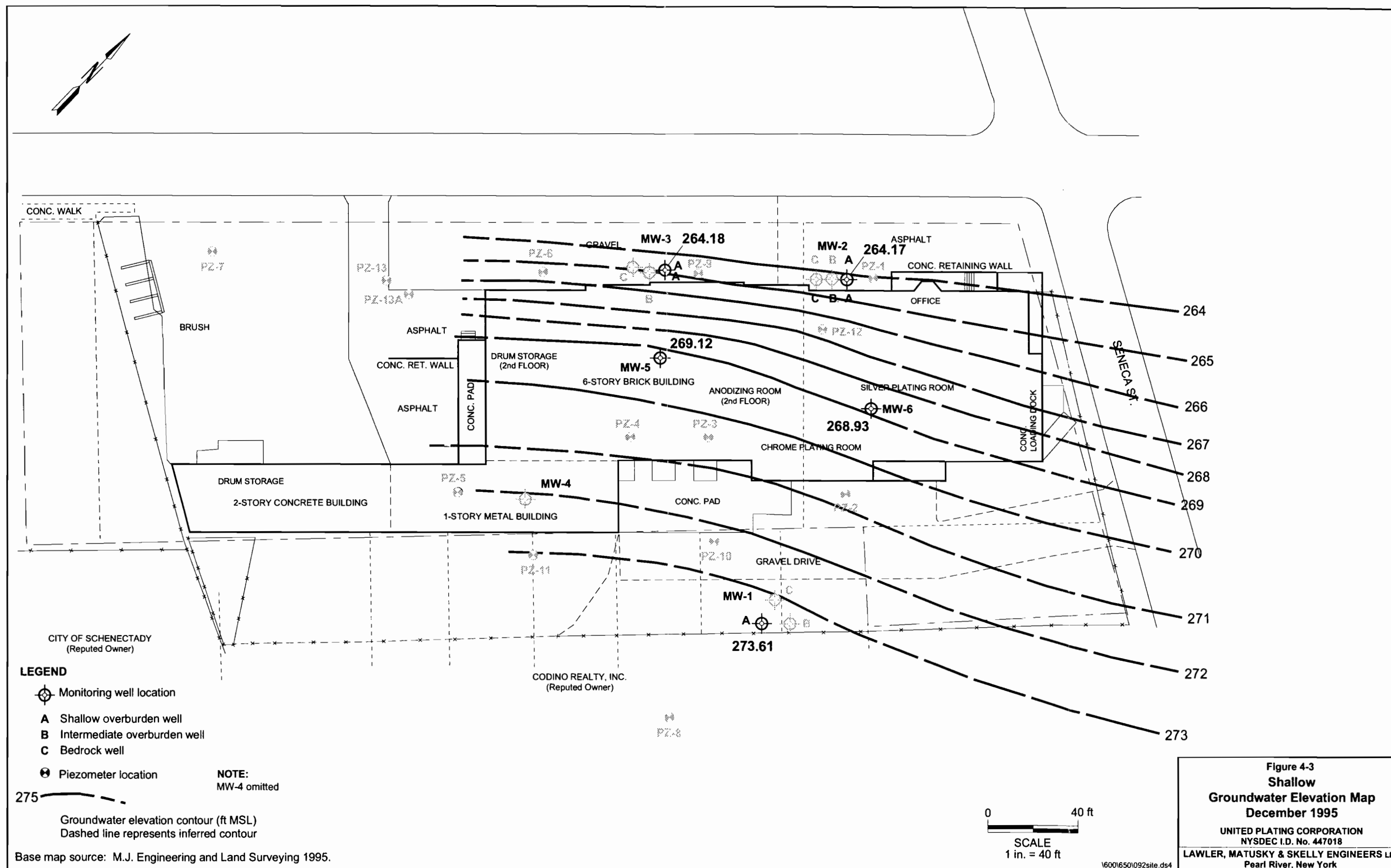
Several different water-bearing, or hydrostratigraphic, zones have been identified at the United Plating Site: a shallow flow zone, an intermediate flow zone, and a deep flow zone. Detailed descriptions of the units and their water-bearing characteristics are presented below.

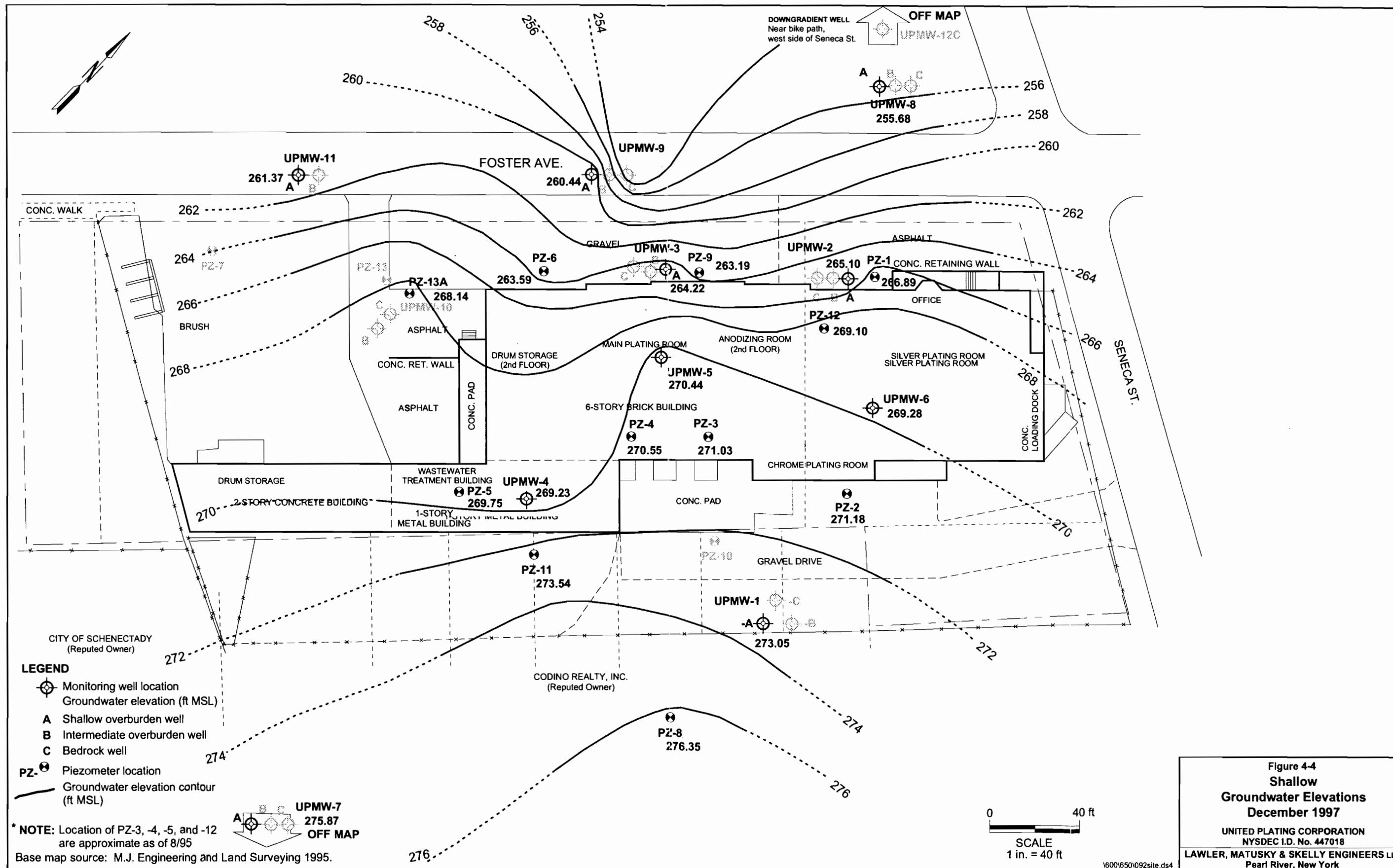
4.8.2.1 Shallow Flow Zone. The shallow flow zone is characterized by groundwater flow in the fill, weathered till, and upper basal till. Fill and weathered till were absent in UPP-7 and reached a maximum thickness of 9 ft at UPP-6 and UPMW-7BW. In general, saturated zones are found at depths less than 2 ft; in some instances these zones may be considered seasonally perched. The flux of water through this unit is variable, depending on precipitation. At certain times of the year this unit is likely fully saturated over a wide area.

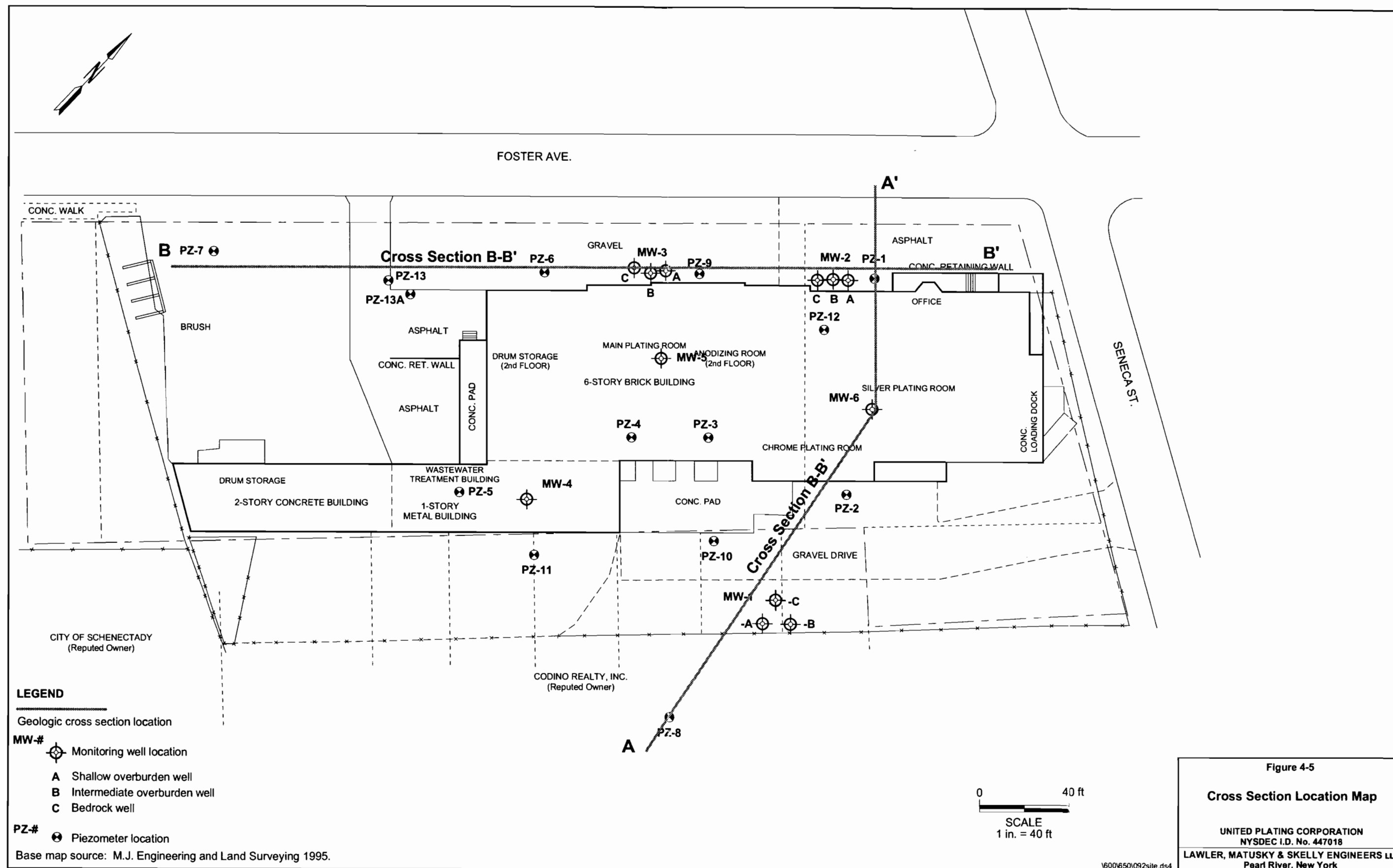
The building appears to play an important role in the groundwater flow patterns of the shallow flow zone. Based on visual observation and several rounds of water level measurements during the RI and Additional RI work (Appendix B) it appears that the building serves to mound groundwater in and around the footprint of the building (Figures 4-2, 4-3, and 4-4) within the fill, weathered till, and upper basal till. The site history indicates that the City of Schenectady blocked one of the main discharges from the building. This has resulted in water backing up in the building, even during small precipitation events. The current condition of the building is such that any precipitation event results in all roof drainage entering the interior of the building either through holes in the roof or leaking interior piping. Once the water reaches the first floor it ponds in the main plating room, chrome plating room, and waste-water building. This problem is especially pronounced in the main plating room. Over time this water infiltrates through the numerous floor drains, floor cracks, sumps, and buried discharge lines. Water that collects in the chrome room sump, outside sump, and the two metal covered sumps in the building appears to be reflective of groundwater levels except during and immediately after precipitation events (Figures 4-4, 4-5, 4-6, and 4-7).

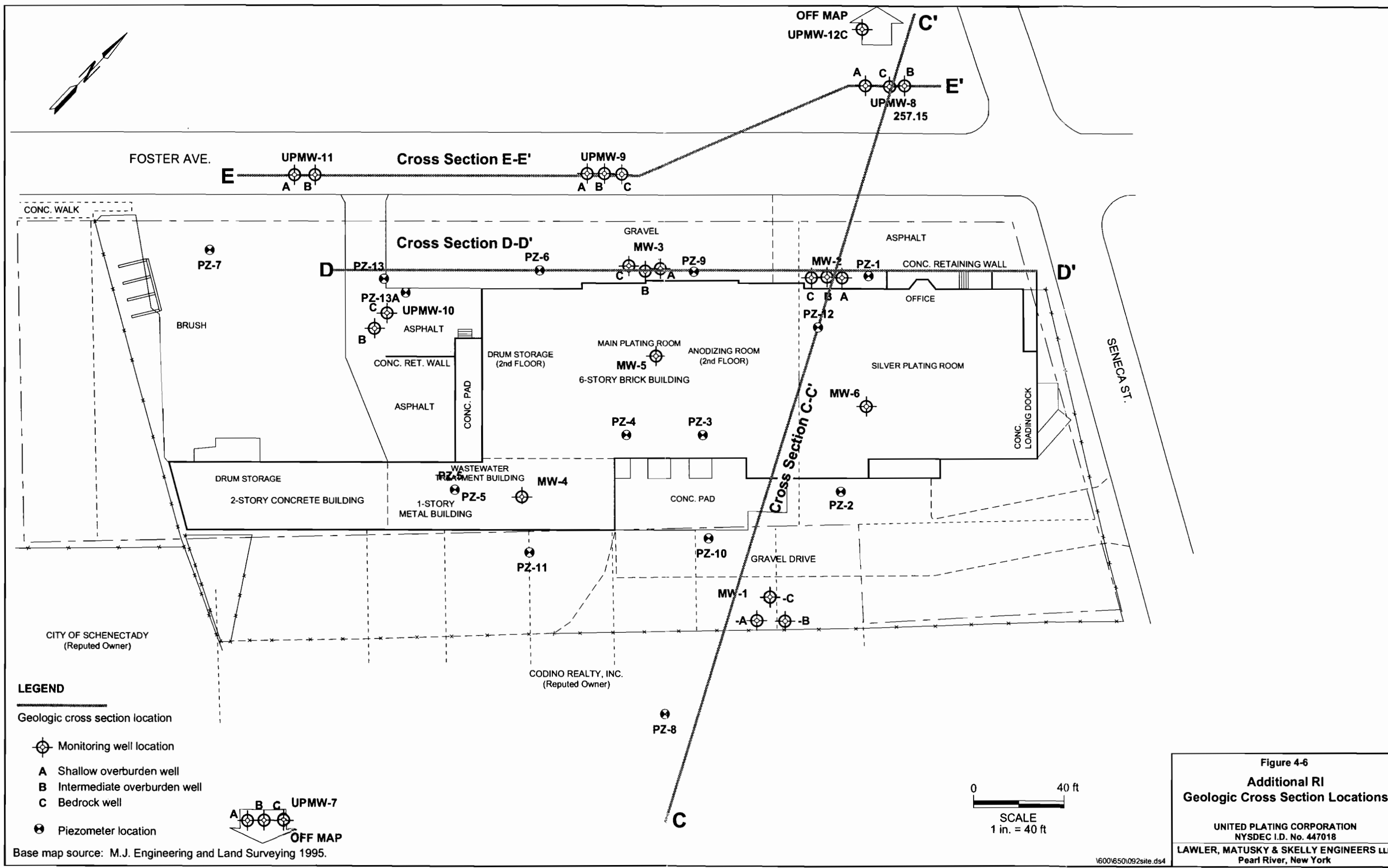
At certain times of the year discolored seeps reportedly emanate from along the Foster Avenue side of the building; this was verified on 6 October 1995 after a very heavy rainfall. Yellowish-green seeps were noted along the front of the building near the chrome plating room. Discolored water was also found in the protective cases of the UPMW-2 cluster. A

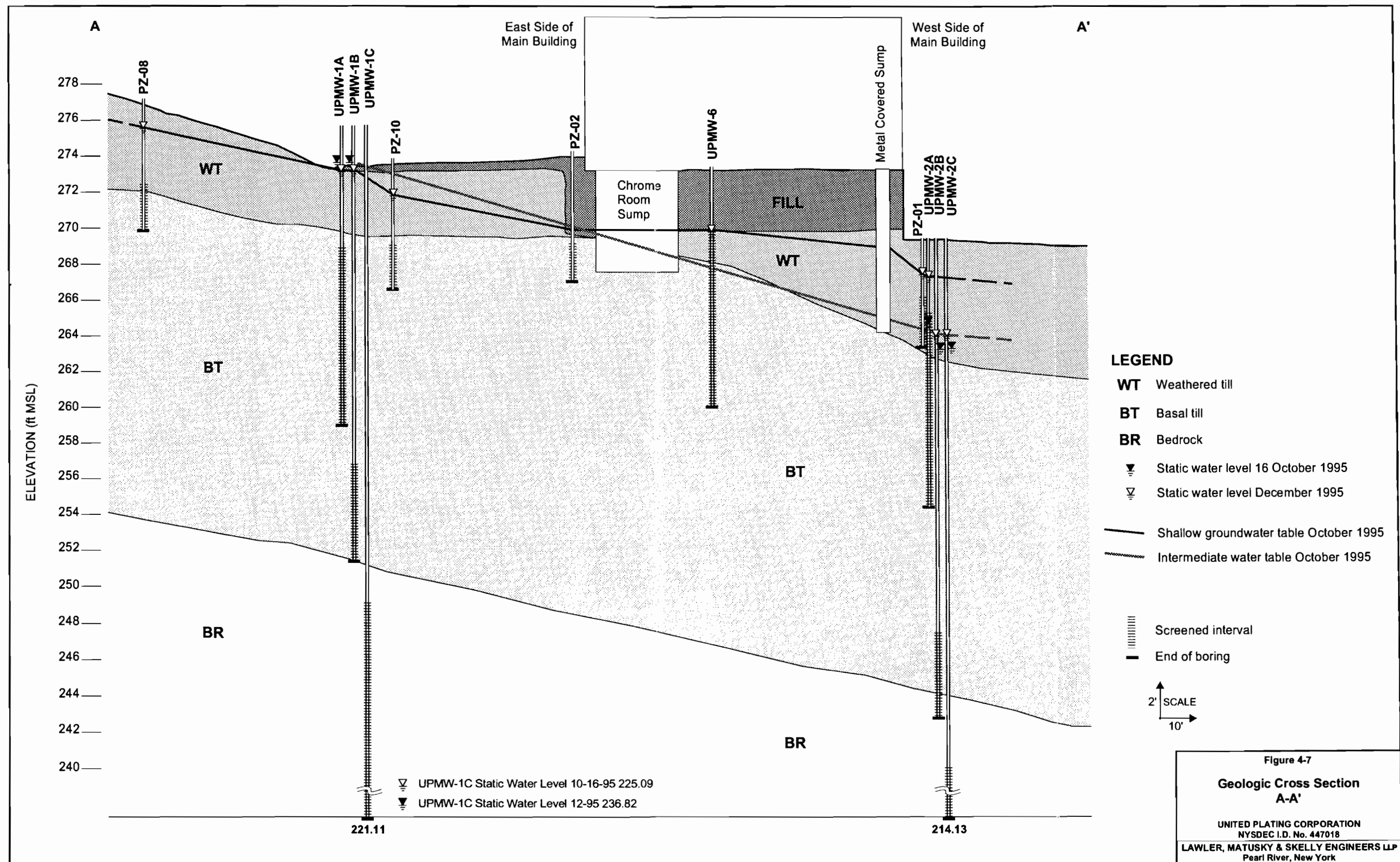












close examination of the elevations of the building, ground surface, and sumps in the area also shows that the groundwater is close to breaking out at the surface along the front of the building (Figures 4-5 through 4-11).

The seep occasionally seen on the Foster Avenue side of the building near the western corner of the main plating room is believed to be a discharge point from the now blocked interior piping. The water in this seep is apparently moving along a preferential pathway as the test pits did not identify any discharge lines in the vicinity of the seep. The construction of the test pits appears to have disturbed this pathway as the seep now appears to break out along the upgradient side of one of the test pits. Several attempts were made to sample this seep but it was dry during the several sampling events at the site. Examination of the city sewer and stormwater maps indicates only 18-in. storm and sewer lines leaving the building, one of which is blocked.

Using a set of water level measurements taken 8 and 9 December 1997, groundwater elevations at the site ranged from 275.87 ft in monitoring well UPMW-7A to 254.70 ft in UPMW-8A (Figure 4-4). UPMW-9B was almost dry. As it is in the utility bedding it was not included in the shallow groundwater contours. Isopleths based on shallow groundwater found in the fill and weathered till on 8 and 9 December 1997 indicated that the groundwater was flowing to the north-northwest toward the Mohawk River, with apparent groundwater mound in the vicinity of the building. The UPMW-1 monitoring well clusters appears to be in a localized shallow groundwater discharge zone as the measured water levels were found to be above the ground surface on several occasions in monitoring wells UPMW-1A and UPMW-1B.

There is a shallow water table slightly above the estimated depth of the utility line. The shallow portion of the watertable infiltrates into the utility bedding and migrates down the conduit.

Hydraulic conductivity testing conducted on the shallow flow zone indicates the hydraulic conductivity of these materials range from 2.00×10^{-4} to 6.34×10^{-2} ft/day. The material in which UPMW-4 was screened in was mostly artificial fill containing fine grained sediments that are not conducive to groundwater flow. As a result, hydraulic conductivity was low, close to values associated with the basal till (Table 4-2). UPMW-5 and UPMW-6 were screened in weathered and basal till. Conductivities associated with these wells varied by about one order of magnitude (Table 4-2). Both values are within the range of reported

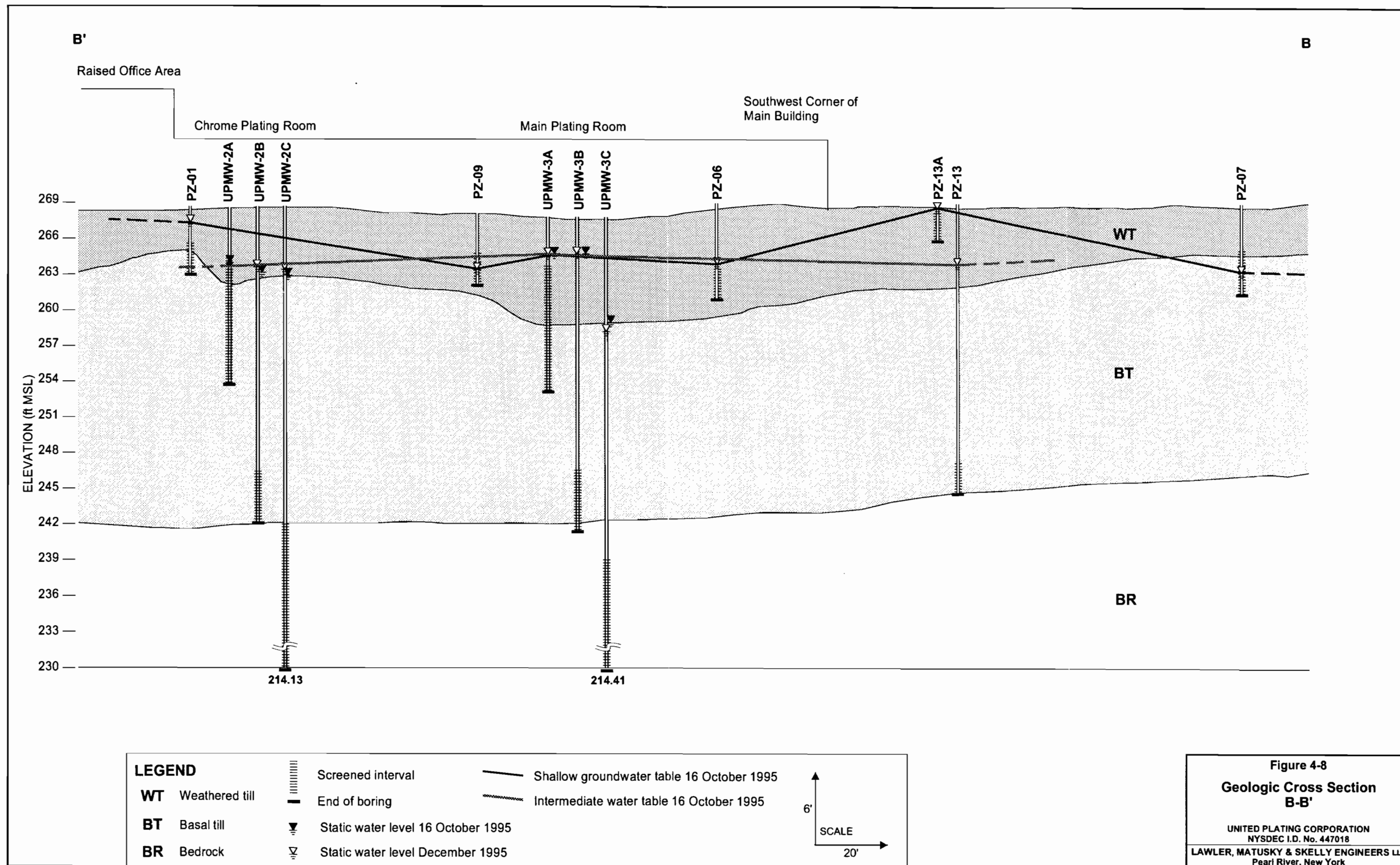


Figure 4-8
Geologic Cross Section
B-B'

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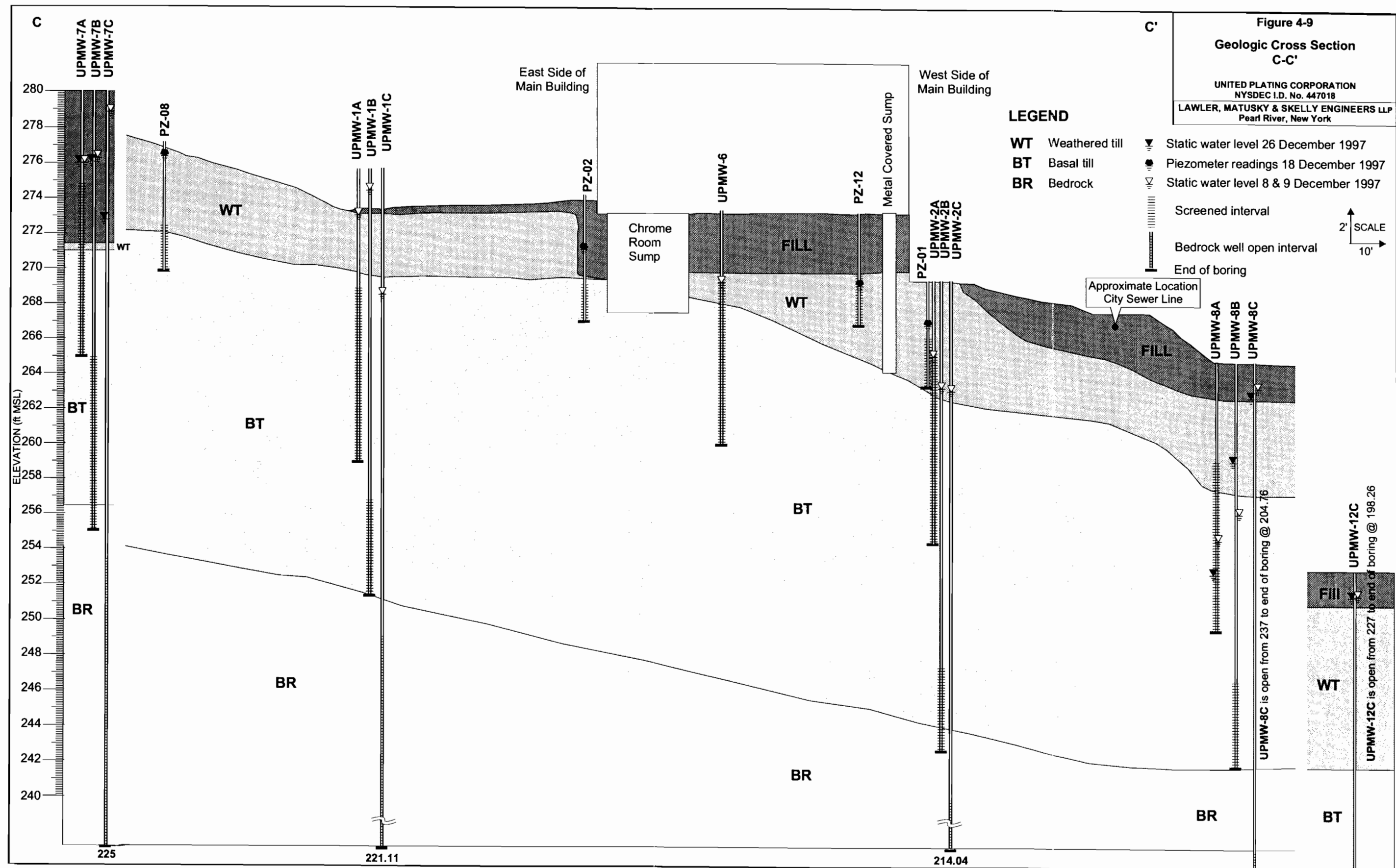
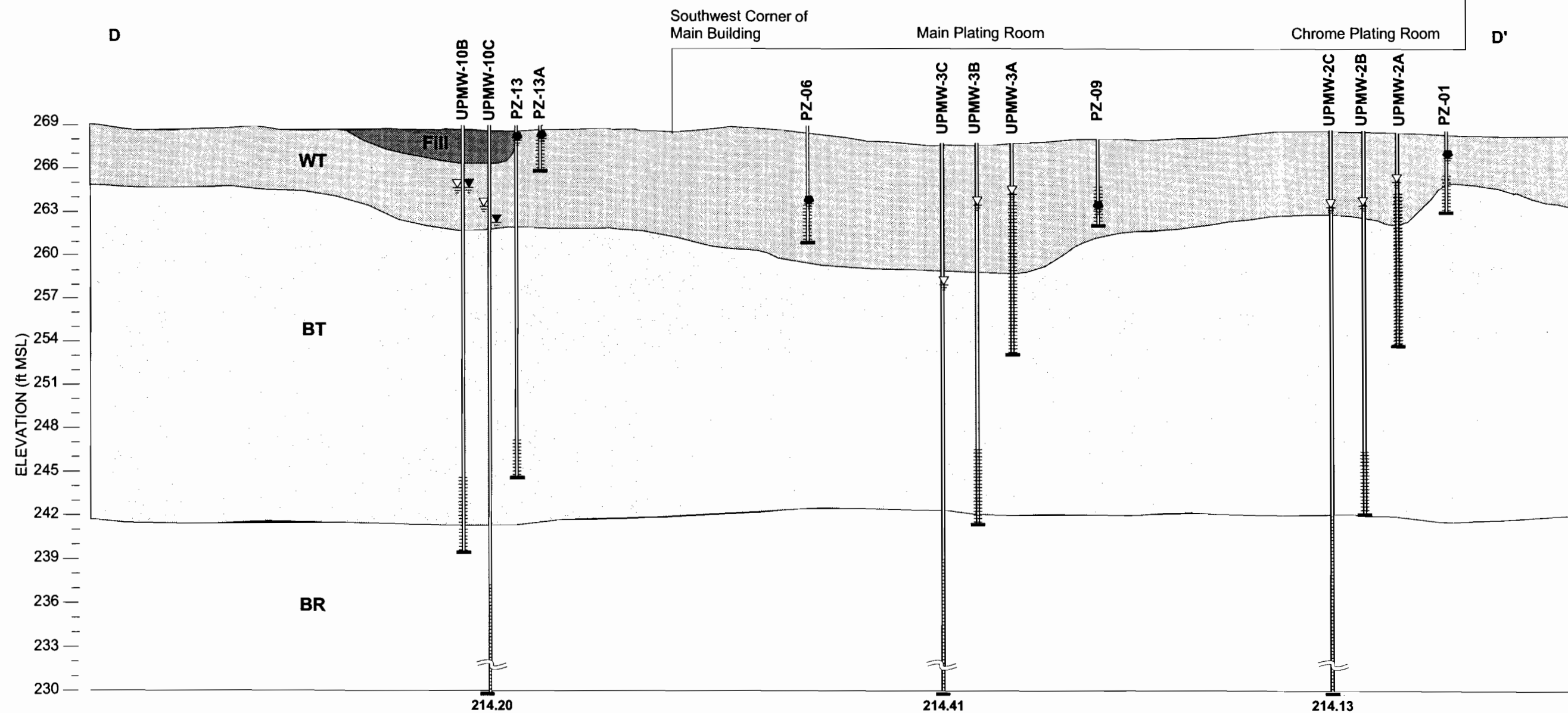


Figure 4-10
Geologic Cross Section
D-D'

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Pearl River, New York

Raised Office Area



LEGEND

WT Weathered till
BT Basal till
BR Bedrock

Screened interval
 Bedrock well open interval
 End of boring

Static water level 26 November 1997
 Static water level 8 & 9 December 1997
 Piezometer readings 8 & 9 December 1997

6'
SCALE
20'

Figure 4-11
Geologic Cross Section
E-E'

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Pearl River, New York

LEGEND

- WT Weathered till
- BT Basal till
- BR Bedrock
- Static water level 26 December 1997
- Static water level 8 & 9 December 1997
- Screened interval
- Bedrock well open interval
- End of boring

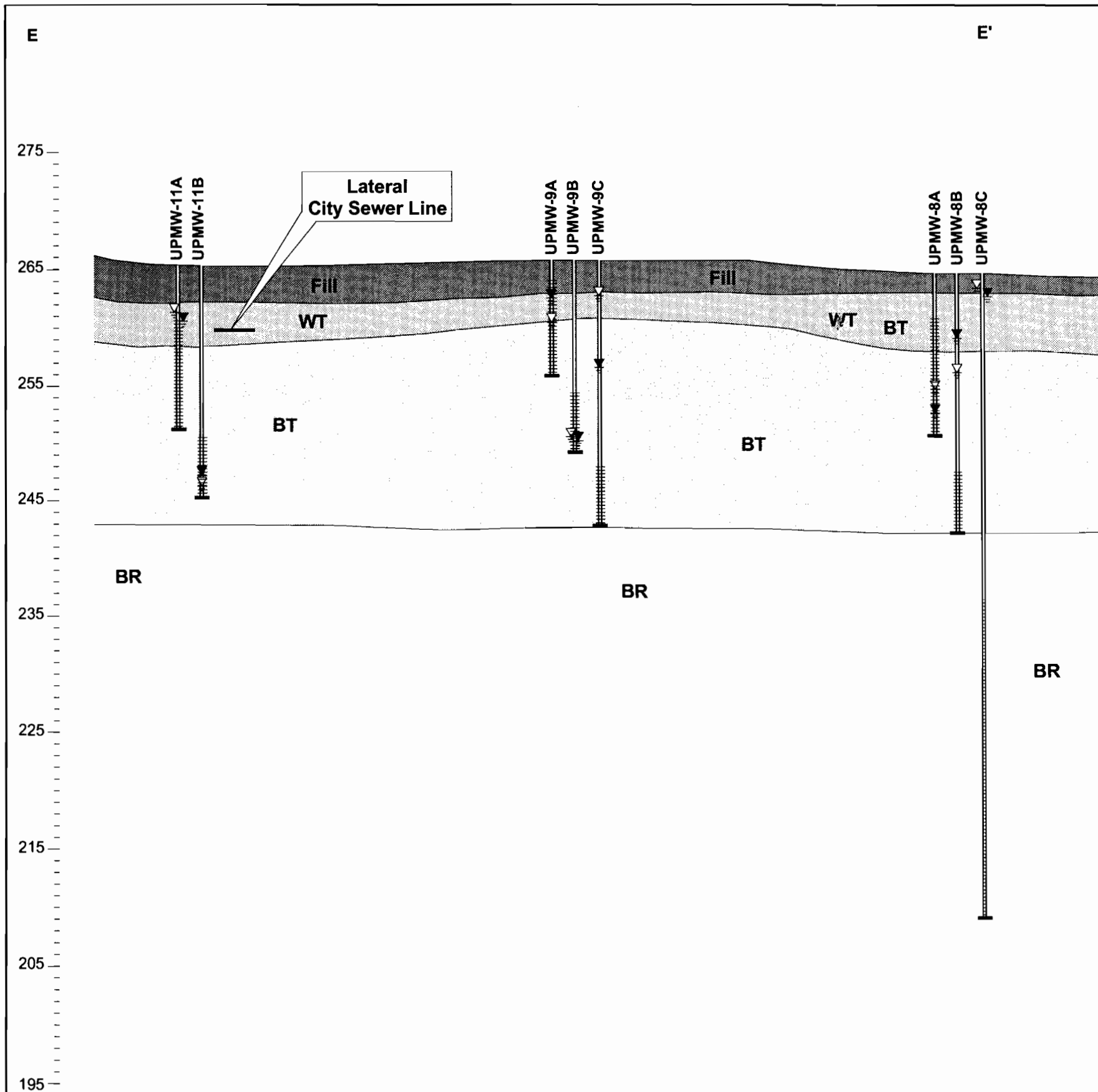
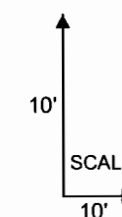


TABLE 4-2

HYDRAULIC CHARACTERISTICS
United Plating

MONITORING WELL DEPTH	MONITORING WELL NUMBER	BOUWER AND RICE				COOPER et al.		
		Conductivity		Transmissivity		Transmissivity		Storativity
		m/day	ft/day	m ² /day	ft ² /day	m ² /day	ft ² /day	
SHALLOW WELLS	UPMW-2A	0.0008888	0.00291	0.001037	0.011158			
	UPMW-3A	0.000159	0.00052	0.0000925	0.000995			
	UPMW-4	0.0000627	0.0002	0.0000328	0.000353			
	UPMW-5	0.0009197	0.003	0.002108	0.022682			
	UPMW-6	0.01932	0.0634	0.03293	0.354327			
INTERMEDIATE	UPMW-1B					0.0924	0.9942	0.0006801
	UPMW-2B					0.37	3.9952	0.0000252
	UPMW-3B					0.2092	2.25099	0.0001716
BEDROCK	UPMW-1C					0.0000678	0.00073	0.07303
	UPMW-2C					0.5578	6.0019	0.0000364
	UPMW-3C					0.01034	0.11126	0.003238

hydraulic conductivity values for glacial till (Fetter 1988). Wells UPMW-2A and UPMW-3A were screened entirely in basal till. Hydraulic conductivity of the till around UPMW-2A was just within the range of reported values (Fetter 1988), while the hydraulic conductivity of the till near UPMW-3A was about one order of magnitude lower (Table 4-2). Difficulties associated with the data logger prevented us from obtaining a hydraulic conductivity value of the soil in the vicinity of UPMW-1A; however, field observations found the overburden in this region to be more conductive than that found around UPMW-2A and UPMW-3A.

Using an average value of 1.4×10^{-2} ft/day for hydraulic conductivity, a gradient of 6.1×10^{-2} ft/ft, and an estimated value of 0.2 for porosity, the average linear groundwater velocity in the shallow flow zone was calculated to be approximately 4×10^{-3} ft/day.

4.8.2.2 Intermediate Flow Zone. The basal till at the site is approximately 15 to 20 ft thick and serves to confine the intermediate and deep flow zones. The till is a very tight, compact gray silt and clay containing various clast sizes, with occasional sand seams or lenses. The silt and clay matrix is believed to be of local provenance, while the clasts are of local and apparently Adirondack provenance. During construction of the test pits it was found this unit contained very little moisture and only occasional saturated sand seams or lenses. Water level observations collected during the well drilling, sampling events, and hydraulic testing suggest that upper portions of the basal till occasionally contain saturated zones. At depth the basal till becomes very hard and dry and is believed to confine the groundwater found at the bedrock contact (intermediate flow zone) and lower bedrock (deep flow zone).

The intermediate flow zone is believed to be very thin and perhaps absent in certain locations. It is recognized as a sandier zone with broken shale fragments just before competent bedrock is encountered; it produces an increase in monitoring well yields. Monitoring well yields in this zone approach 1 gpm, with good recovery rates. This zone also appears to be in direct hydraulic connection to the bedrock unit in certain areas of the site. During monitoring well development of the 2 cluster, when the bedrock well (UPMW-2C) was pumped the intermediate well (UPMW-2B) showed drawdown effects. This zone appears to be confined by the overlying basal till.

Groundwater flow direction in the intermediate flow zone was determined on several occasions during the RI (Figures 4-12 and 4-13) based on a limited number of monitoring points. The flow direction is predominately to the north-northwest toward the Mohawk

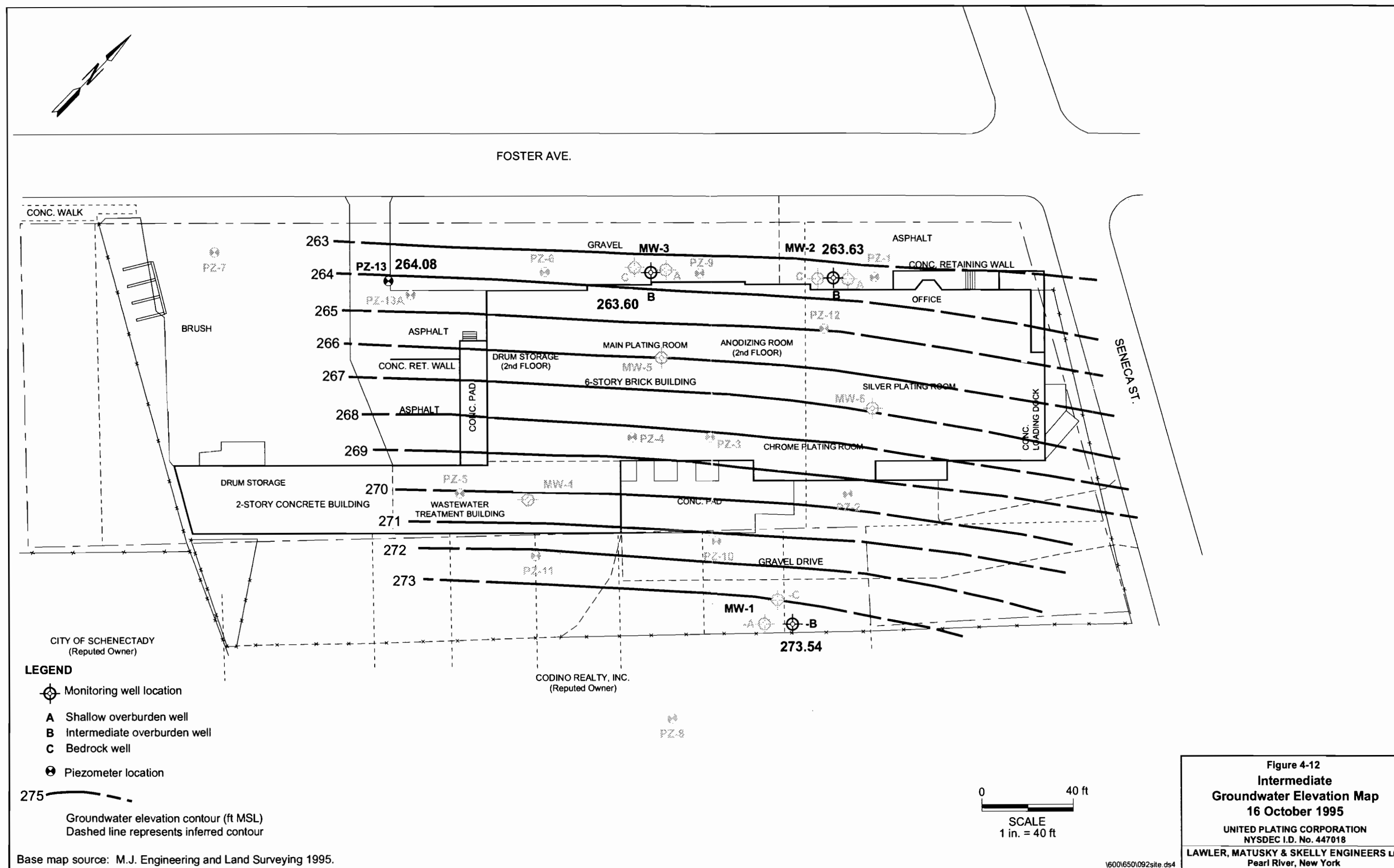
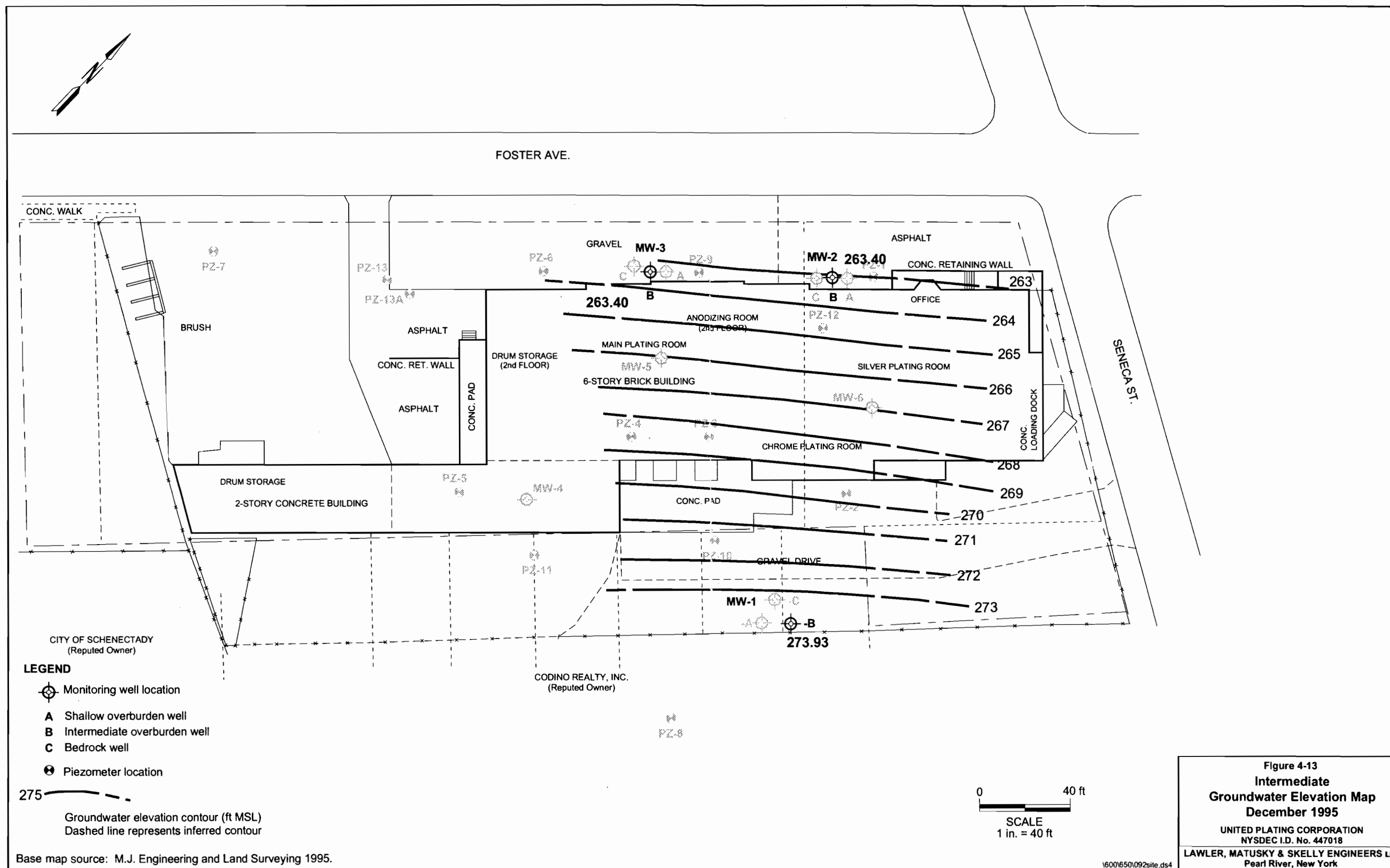
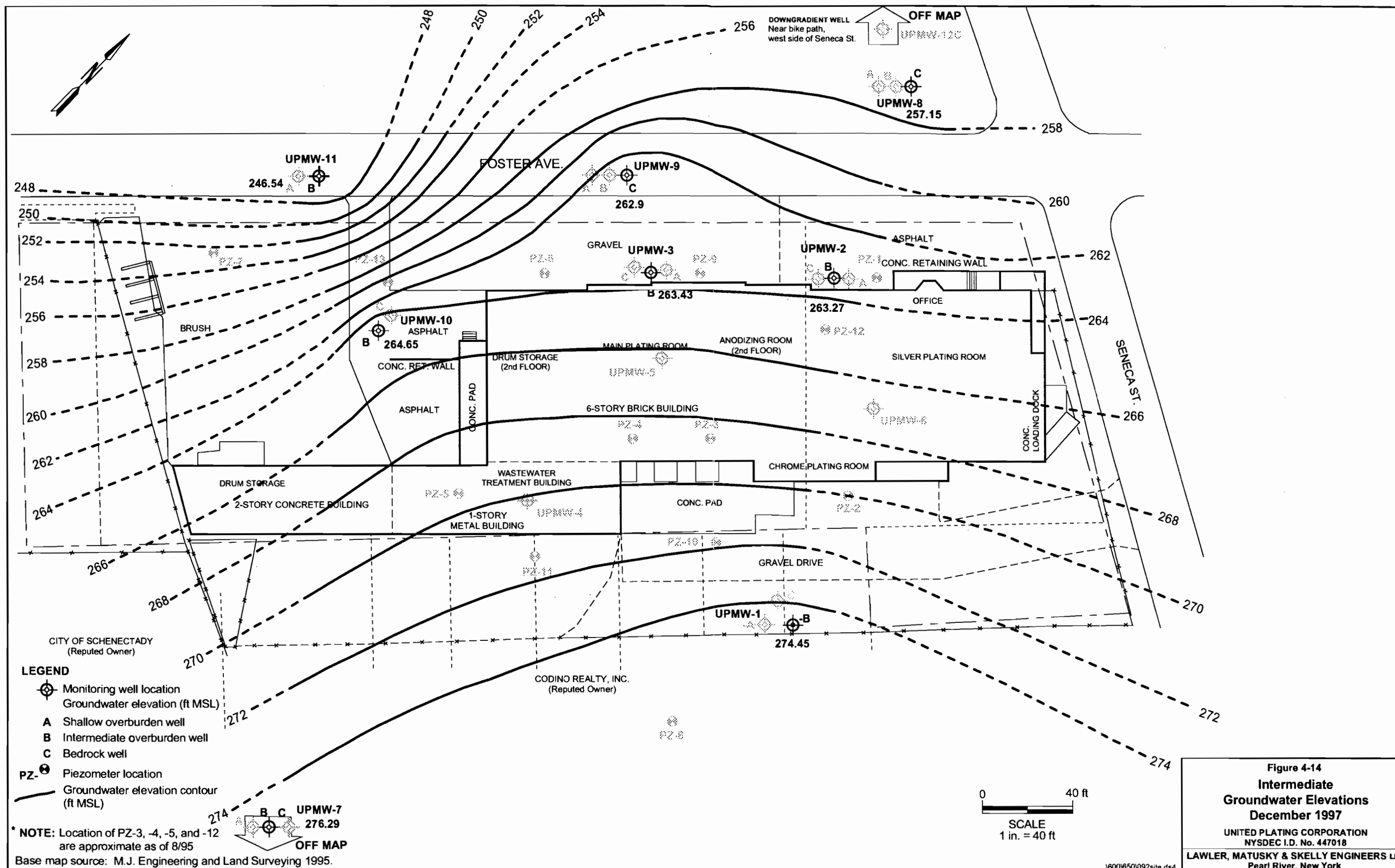


Figure 4-12
Intermediate
Groundwater Elevation Map
16 October 1995
UNITED PLATING CORPORATION
NYSDEC I.D. No. 447018
LAWLER, MATUSKY & SKELLY ENGINEERS LLP
Pearl River, New York





River. Vertical groundwater gradients for this unit appear to be downward into the bedrock at the UPMW-3 cluster.

Using a set of water level measurements taken 8 and 9 December 1997, groundwater elevations at the site ranged from 276.29 ft in monitoring well UPMW-7B to 246.54 ft in UPMW-11B (Figure 4-14). Isopleths based on intermediate groundwater found in the weathered till on 8 and 9 December 1997 indicated that the groundwater was flowing to the north-northwest toward the Mohawk River with apparent slight groundwater mounding in the vicinity of the building.

Hydraulic conductivity testing conducted on the three intermediate flow zone indicate the hydraulic conductivity of these materials range from 0.5 to 2 ft/day. The intermediate wells (UPMW-1B, -2B, and -3B) are recharged by groundwater from a sandy and weathered bedrock zone underlying the basal till. This zone is believed to be confined, and accordingly, the Cooper et al. method was used to determine its water-bearing properties. This method results in a transmissivity value, which must be divided by aquifer thickness to obtain a hydraulic conductivity value. A hydraulic conductivity value is necessary so that the water-bearing properties of the zone can be compared with those of the shallow and deep flow zones. Based on the boring logs and on field observations, the thickness of the confined zone was estimated at 2 ft. Dividing the transmissivity values (Table 4-2) of the soils in the vicinity of UPMW-1B, UPMW-2B and UPMW-3B by 2 results in hydraulic conductivity values of 5.0×10^{-1} , 2.0, and 1.13 ft/day, respectively. These values are consistent with published hydraulic conductivity values for silty sands (Freeze and Cherry 1979).

Using an average value of 1.2 ft/day for hydraulic conductivity, a gradient of 7.3×10^{-2} ft/ft, and a estimated value of 0.2 for porosity the average linear groundwater velocity in the intermediate flow zone was calculated to be approximately 0.44 ft/day.

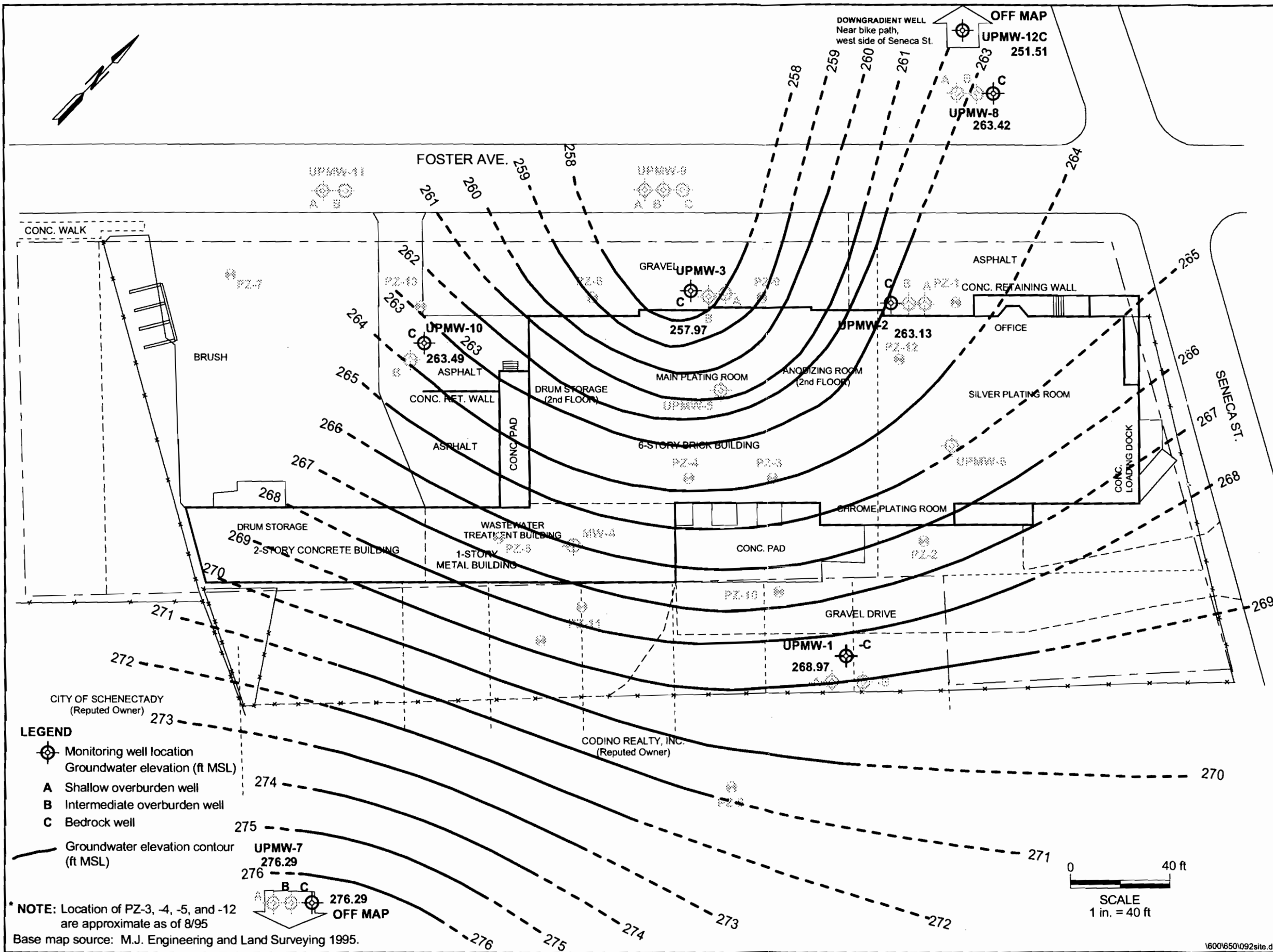
4.8.2.3 Deep Flow Zone. The deep flow zone is found within the bedrock which is composed of alternating layers of sandstone and siltstone of the Schenectady formation. The Schenectady formation is considered a aquifer capable of yielding sufficient quantities of water for domestic or farm use. In the immediate vicinity of the site it is not believed any wells tapping the bedrock unit are used as drinking water supplies. The areas in the vicinity of the site are serviced by public drinking water that predates any development at the site.

The yield in the deep flow zone to the on-site monitoring wells is highly variable and is unpredictable. Of the seven bedrock wells completed around the site, UPMW-1C had a very poor yield and extremely slow recovery rate (weeks to months); UPMW-8C had good recovery; UPMW-2C and UPMW-10C had fair recovery; and UPMW-3C UPMW-7C and UPMW-12C had poor recovery rates.

Using a set of water level measurements taken 8 and 9 December 1997 during Additional RI work, groundwater elevations at the site ranged from 251.51 ft in monitoring well UPMW-12C to 278.82 ft in UPMW-7C (Figure 4-15). Isopeths based on deep groundwater found in the bedrock on 8 and 9 December 1997 indicated that the groundwater was flowing to the north-northwest toward the Mohawk River.

Hydraulic conductivity testing conducted on three of the deep flow zone wells indicates the hydraulic conductivity of the bedrock range from 7.43×10^{-5} to 0.21 ft/day. The bedrock was considered to be confined under the basal till and, as such, the Cooper et al. method was used to determine its hydraulic properties. The screened interval of the bedrock was used as the aquifer thickness for the purpose of converting transmissivity (Table 4-2) to hydraulic conductivity. Values for the hydraulic conductivity of the bedrock in the vicinities of UPMW-1C, UPMW-2C, and UPMW-3C were 2.43×10^{-5} , 2.10×10^{-1} and 3.96×10^{-3} ft/day, respectively.

Using a average value of 7.1×10^{-2} ft/day for hydraulic conductivity, a regional gradient of 3.5×10^{-2} ft/ft, and a conservative value of 0.2 for porosity, the average linear groundwater velocity in the deep flow zone was calculated to be approximately 1.2×10^{-2} ft/day.



LEGEND

- Monitoring well location
- Groundwater elevation (ft MSL)
- A Shallow overburden well
- B Intermediate overburden well
- C Bedrock well
- Groundwater elevation contour (ft MSL)

*** NOTE:** Location of PZ-3, -4, -5, and -12 are approximate as of 8/95

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

Figure 4-15
Deep Groundwater Contour
 December 1997

UNITED PLATING CORPORATION
 NYSDEC I.D. No. 447018

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

CHAPTER 5

NATURE AND EXTENT OF CONTAMINATION

5.1 PREVIOUS INVESTIGATIONS

Aside from this RI, the EPA PA conducted on 17 November 1990 is the only hazardous waste investigation conducted at the UP site to date. Analyses of wastewater, soil, sludge, ash, groundwater, process liquids, and dust samples performed by others are discussed in the following paragraphs.

5.1.1 Wastewater

Table 5-1 presents the data collected from the discharge of the pretreatment system to the City of Schenectady from 1984 to 1989. The City of Schenectady imposed discharge limits as follows: cadmium - 0.2 mg/l; total chromium - 4.0 mg/l; hexavalent chromium - 0.2 mg/l; copper - 0.5 mg/l; cyanide - 1.6 mg/l; lead - 0.2 mg/l; mercury - 0.05 mg/l; nickel - 4 mg/l; silver - 0.2 mg/l; and zinc - 2.0 mg/l (City of Schenectady 1984-1989). Bold numbers on the table indicate where violations of the permit occurred. The cadmium limit was violated 16 times, with a maximum concentration of 8.5 mg/l; chromium 24 times, with a maximum concentration of 60 mg/l; copper 39 times, with a maximum concentration of 22 mg/l; lead seven times, with a maximum concentration of 0.87 mg/l; nickel two times, with a maximum concentration of 25 mg/l; silver once, with a maximum concentration of 2.3 mg/l; zinc 20 times, with a maximum concentration of 176 mg/l; cyanide 13 times, with a maximum concentration of 120 mg/l; and hexavalent chromium 17 times, with a maximum concentration of 52 mg/l. The wastewater treatment system often failed to meet the permit limits, and in most cases at least one violation of a metal occurred for each sample. Only five of the 61 effluent samples met the permit limit for all parameters.

5.1.2 Soil, Sludge, and Ash

On 2 March 1989 NYSDEC collected two soil samples and one sludge and one ash sample at the UP site; the results are shown on Table 5-2 (NYSDEC 1989b). The NYSDEC-recommended cleanup objectives for soil and the eastern U.S. background soil concentrations are also provided on the table (NYSDEC 1994a). The numbers in bold on the table indicate exceedances of the cleanup objectives; all the values were less than an order of magnitude

TABLE 5-1 (Page 1 of 9)

WASTEWATER DISCHARGES United Plating Site

PARAMETER SAMPLER	UNITS	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	DISCHARGE LIMITS
		6/13/84 CITY	7/11/84 CITY	9/30/85 UP	12/31/85 UP	3/13/86 CITY	4/11/86 UP	8/5/86 UP	
Cadmium	mg/l	0.82	1.5	0.03	0.48	0.91	0.03	0.01	0.40
Chromium	mg/l	4.2	2.63	20.5	2.19	7.00	0.15	0.03	4.0
Copper	mg/l	4.4	0.40	0.96	0.41	0.74	0.22	0.16	0.5
Iron	mg/l	5.9	29	2.14	3.82	1.76	3.2	0.97	NL
Lead	mg/l	0.16	0.50	0.54	0.79	<0.01	0.05	<0.03	0.20
Mercury	mg/l	<0.0005	<.0005	<0.0001	<0.0001	0.0004	<0.0002	<0.0001	0.05
Nickel	mg/l	1.5	0.75	0.17	0.12	2.00	25	1.3	4.0
Silver	mg/l	NR	NR	0.1	0.04	<0.01	0.02	<0.01	0.20
Zinc	mg/l	4.8	8.0	1.46	3.35	1.08	0.80	0.32	2.0
Hexavalent chromium	mg/l	NR	NR	NR	NR	NR	NR	NR	0.2
TOC	mg/l	12	17	NR	NR	NR	NR	NR	NL
pH	units	NR	2.5	7.6	7.6	7.31	NR	NR	NL
Total cyanide	mg/l	NR	0.44	1.8	0.52	3.8	0.096	0.008	1.6
Chloroform	µg/l	NR	NR	NR	4.7	NR	NR	NR	NL
1,1,1-Trichloroethane	µg/l	NR	NR	NR	3.4	NR	NR	NR	NL
Trichloroethylene	µg/l	NR	NR	NR	4.8	NR	NR	NR	NL
Bromodichloromethane	µg/l	NR	NR	NR	2.8	NR	NR	NR	NL
Phenol	µg/l	NR	0.4	NR	NR	NR	NR	NR	NL

NOTE: Numbers in bold exceed limits.

NL - No limit.

NR - Not run.

TABLE 5-1 (Page 2 of 9)

WASTEWATER DISCHARGES

United Plating Site

PARAMETER SAMPLER	UNITS	EFFLUENT 10/2/86 UP	EFFLUENT 10/15/86 UP	EFFLUENT 10/29/86 CITY	EFFLUENT 11/20/86 UP	EFFLUENT 12/29/86 CITY	EFFLUENT 2/3/87 UP	EFFLUENT 3/26/87 UP	DISCHARGE LIMITS
Cadmium	mg/l	0.01	0.04	0.027	0.33	0.13	4.8	<0.01	0.40
Chromium	mg/l	0.64	0.11	3.5	7.8	1.60	0.21	0.11	4.0
Copper	mg/l	0.12	0.45	0.40	1.6	0.24	0.33	0.29	0.5
Iron	mg/l	0.30	2.6	2.9	18	0.63	16	0.11	NL
Lead	mg/l	0.05	0.18	0.028	NR	0.07	<0.03	0.04	0.20
Mercury	mg/l	<0.0002	<0.0002	<0.0004	<0.0002	<0.0002	<0.0002	<0.0002	0.05
Nickel	mg/l	0.24	1.7	0.63	3.4	0.14	0.61	<0.03	4.0
Silver	mg/l	<0.01	<0.01	0.086	0.08	<0.01	<0.01	<0.01	0.20
Zinc	mg/l	NR	0.40	0.95	2.6	0.48	4.50	0.06	2.0
Hexavalent chromium	mg/l	0.18	NR	2.46	NR	1.0	<0.02	0.11	0.2
TOC	mg/l	NR	NR	NR	NR	NR	NR	NR	NL
pH	units	0.019	0.024	7.50	NR	7.5	7.2	6.6	NL
Total cyanide	mg/l	NR	NR	0.05	0.2	0.145	2.40	<0.005	1.6
Chloroform	µg/l	NR	NR	2.9	NR	NR	NR	NR	NL
1,1,1-Trichloroethane	µg/l	NR	NR	<1.0	NR	NR	NR	NR	NL
Trichloroethene	µg/l	NR	NR	3.5	NR	NR	NR	NR	NL
Trichloroethylene	µg/l	NR	NR	<1.0	NR	NR	NR	NR	NL
Bromodichloromethane	µg/l	NR	NR	NR	NR	NR	NR	NR	NL

NOTE: Numbers in bold exceed limits.

NL - No limit.

NR - Not run.

TABLE 5-1 (Page 3 of 9)

WASTEWATER DISCHARGES

United Plating Site

PARAMETER SAMPLER	UNITS	EFFLUENT 6/7/87 UP	EFFLUENT 6/8/87 UP	EFFLUENT 7/20/87 UP	EFFLUENT 7/30/87 UP	EFFLUENT 8/16/87 UP	EFFLUENT 10/2/87 CITY	EFFLUENT 3/14/88 UP	DISCHARGE LIMITS
Cadmium	mg/l	1.9	2.6	<0.01	0.78	0.21	0.62	0.069	0.40
Chromium	mg/l	0.05	<0.01	0.05	0.07	10.60	24	4.65	4.0
Copper	mg/l	0.12	0.61	0.04	0.28	2.99	22	3.32	0.5
Iron	mg/l	0.09	0.22	0.09	23	1.21	NR	1.0	NL
Lead	mg/l	0.06	<0.03	<0.03	<0.03	0.12	0.60	0.16	0.20
Mercury	mg/l	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	0.05
Nickel	mg/l	0.09	0.08	<0.03	0.05	0.61	0.43	0.07	4.0
Silver	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	2.3	<0.01	0.20
Zinc	mg/l	0.10	0.28	0.62	0.28	1.95	3.20	6.47	2.0
Hexavalent chromium	mg/l	<0.02	<0.02	0.04	<0.02	6.2	14	2.69	0.2
TOC	mg/l	NR	NR	NR	NR	NR	NR	NR	NL
pH	units	7.7	7.9	7.80	6.3	3.1	7.83	7.4	NL
Total cyanide	mg/l	2.67	4.0	0.005	5.83	0.107	2.80	2.5	1.6

NOTE: Numbers in bold exceed limits.

NL - No limit.

NR - Not run.

TABLE 5-1 (Page 4 of 9)

WASTEWATER DISCHARGES United Plating Site

PARAMETER SAMPLER	UNITS	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	DISCHARGE LIMITS
		3/17/88 CITY	5/5/88 UP	5/10/88 UP	6/16/88 UP	6/17/88 CITY	7/7/88 UP	8/30/88 UP	
Cadmium	mg/l	0.28	0.388	0.405	1.71	0.78	0.54	5.99	0.40
Chromium	mg/l	40	1.24	0.58	0.68	0.60	3.06	1.07	4.0
Copper	mg/l	8.1	0.95	3.78	1.53	1.8	0.96	3.16	0.5
Iron	mg/l	NR	0.25	0.04	0.15	0.1	0.52	3.7	NL
Lead	mg/l	0.87	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	0.20
Mercury	mg/l	0.0027	<0.0002	<0.0002	<0.0002	<0.0004	<0.0006	NR	0.05
Nickel	mg/l	0.86	0.05	0.55	0.26	4.4	0.03	0.43	4.0
Silver	mg/l	0.07	<0.01	<0.01	<0.01	<0.03	<0.01	<0.01	0.20
Zinc	mg/l	0.54	18.3	2.4	18.8	2.4	18	176	2.0
Hexavalent chromium	mg/l	28	0.49	<0.02	<0.02	NR	0.09	0.01	0.2
pH	units	8.62	7.2	7.50	7.7	8.26	7.1	7.0	NL
Total cyanide	mg/l	<0.01	0.2	<0.005	<0.005	<0.01	<0.005	<0.005	1.6

NOTE: Numbers in bold exceed limits.

NL - No limit.

NR - Not run.

TABLE 5-1 (Page 5 of 9)

WASTEWATER DISCHARGES
United Plating Site

PARAMETER SAMPLER	UNITS	EFFLUENT 9/30/88 CITY	EFFLUENT 10/6/88 UP	EFFLUENT 10/25/88 UP	EFFLUENT 11/12/88 UP	EFFLUENT 12/31/88 CITY	EFFLUENT 1/14/89 UP	DISCHARGE LIMITS
Cadmium	mg/l	0.309	8.5	0.009	0.07	0.027	1.14	0.40
Chromium	mg/l	5.15	0.88	0.13	3.61	6.97	1.47	4.0
Copper	mg/l	2.61	2.9	10.02	8.3	0.9	1.79	0.5
Iron	mg/l	1.29	NR	0.23	8.6	2.04	0.14	NL
Lead	mg/l	<0.03	<0.01	<0.03	0.07	0.1	0.05	0.20
Mercury	mg/l	NR	<0.0004	NR	NR	NR	NR	0.05
Nickel	mg/l	0.03	0.56	<0.03	<0.03	<0.03	0.1	4.0
Silver	mg/l	<0.01	0.008	<0.01	0.04	<0.01	0.02	0.20
Zinc	mg/l	15.7	1.0	0.05	4.74	6.44	93.3	2.0
Hexavalent chromium	mg/l	<0.02	<0.01	<0.2	0.57	<0.02	<0.02	0.2
pH	units	7.6	NR	8.6	9.3	7.6	5.7	NL
Total cyanide	mg/l	<0.05	0.0	18	<0.005	0.25	<0.005	1.6
Chloroform	µg/l	NR	NR	NR	NR	14	NR	NL

NOTE: Numbers in bold exceed limits.

NL - No limit.

NR - Not run.

TABLE 5-1 (Page 6 of 9)

WASTEWATER DISCHARGES

United Plating Site

PARAMETER SAMPLER	UNITS	EFFLUENT 2/5/89 UP	EFFLUENT 2/9/89 UP	EFFLUENT 2/28/89 UP	EFFLUENT 2/28/89 UP	EFFLUENT 3/9/89 UP	EFFLUENT 3/16/89 UP	EFFLUENT 3/24/89 UP	DISCHARGE LIMITS
Cadmium	mg/l	0.2	0.097	0.022	0.061	<0.03	0.02	0.039	0.40
Chromium	mg/l	5.28	2.43	0.6	0.46	0.49	2.77	0.12	4.0
Copper	mg/l	1.19	3.52	0.81	1.67	0.52	0.94	0.54	0.5
Iron	mg/l	2.43	1.18	0.16	0.37	0.05	0.37	0.27	NL
Lead	mg/l	<0.03	<0.03	<0.03	0.06	<0.03	0.07	0.08	0.20
Mercury	mg/l	NR	NR	NR	NR	NR	NR	NR	0.05
Nickel	mg/l	0.03	<0.03	<0.03	0.05	<0.03	0.05	1.56	4.0
Silver	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.20
Zinc	mg/l	NR	NR	NR	NR	0.5	1.17	0.33	2.0
Hexavalent chromium	mg/l	0.32	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	0.2
pH	units	7.5	7.6	7.4	7.6	6.3	8.5	7.8	NL
Total cyanide	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	NR	<0.005	1.6

NOTE: Numbers in bold exceed limits.

NL - No limit.

NR - Not run.

TABLE 5-1 (Page 7 of 9)

WASTEWATER DISCHARGES

United Plating Site

PARAMETER SAMPLER	UNITS	EFFLUENT 4/12/89 UP	EFFLUENT 6/2/89 UP	EFFLUENT 6/9/89 UP	EFFLUENT 6/29/89 CITY	EFFLUENT 8/2/89 CITY	EFFLUENT 8/8/89 CITY	EFFLUENT 8/17/89 CITY	DISCHARGE LIMITS
Cadmium	mg/l	0.455	0.1	0.644	0.77	0.03	<0.005	0.23	0.40
Chromium	mg/l	0.05	0.33	0.21	14	8.7	60	11	4.0
Copper	mg/l	0.83	4.64	0.91	6.6	0.83	21	12	0.5
Iron	mg/l	<0.04	0.27	0.5	NR	24	4.2	5.8	NL
Lead	mg/l	<0.03	0.13	0.1	0.56	0.11	0.05	0.43	0.20
Mercury	mg/l	NR	NR	NR	NR	NR	NR	NR	0.05
Nickel	mg/l	0.12	0.08	0.09	3.2	1.9	1.5	17	4.0
Silver	mg/l	<0.01	<0.01	<0.01	0.01	<0.005	0.04	0.02	0.20
Zinc	mg/l	4.95	5.64	3.81	32	0.46	0.33	0.82	2.0
Hexavalent chromium	mg/l	<0.02	<0.02	0.03	NR0.01	NR	52	7.4	0.2
pH	units	8.2	8.2	8.1	7	8.42	NR	6.76	NL
Total cyanide	mg/l	<0.005	11.6	<0.005	0.01	NR	12	120	1.6
1,1,1-Trichloroethane	µg/l	NR	NR	NR	NR	NR	NR	2.8, 3.7	NL
Trichloroethylene	µg/l	NR	NR	NR	NR	NR	NR	2.0, 2.5	NL
Bromodichloromethane	µg/l	NR	NR	NR	NR	NR	NR	1.7, 2.7	NL
Toluene	µg/l	NR	NR	NR	NR	NR	NR	1.7, 1.8	NL

NOTE: Numbers in bold exceed limits.

NL - No limit.

NR - Not run.

TABLE 5-1 (Page 8 of 9)

WASTEWATER DISCHARGES
United Plating Site

PARAMETER SAMPLER	UNITS	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	EFFLUENT	DISCHARGE LIMITS
		8/25/89 CITY	8/29/89 CITY	9/8/89 CITY	9/12/89 CITY	9/29/89 CITY	10/5/89 CITY	10/11/89 CITY	
Cadmium	mg/l	<0.005	0.02	0.038	0.018	0.02	0.009	0.01	0.40
Chromium	mg/l	2.4	31	7.8	6.4	1.7	1.0	25	4.0
Copper	mg/l	1.3	1.2	0.60	5.3	0.12	0.04	0.21	0.5
Iron	mg/l	0.23	0.43	1.7	0.38	0.41	0.03	0.12	NL
Lead	mg/l	<0.01	0.04	0.18	0.025	<0.01	<0.01	<0.01	0.20
Mercury	mg/l	NR	NR	NR	NR	NR	NR	NR	0.05
Nickel	mg/l	0.19	0.20	0.02	0.21	0.04	0.03	0.16	4.0
Silver	mg/l	<0.005	<0.005	<0.005	0.017	<0.005	<0.01	<0.01	0.20
Zinc	mg/l	0.04	0.12	0.20	0.08	0.22	0.04	0.34	2.0
Hexavalent chromium	mg/l	2.1	32	7.6	5.0	1.6	1.1	27	0.2
pH	units	8.64	NR	7.59	8.08	8.06	7.77	NR	NL
Total cyanide	mg/l	0.92	1.1	0.24	6.0	0.03	<0.01	<0.01	1.6

NOTE: Numbers in bold exceed limits.

NL - No limit.

NR - Not run.

TABLE 5-1 (Page 9 of 9)

WASTEWATER DISCHARGES

United Plating Site

PARAMETER SAMPLER	UNITS	EFFLUENT 10/18/89 CITY	EFFLUENT 10/18/89 CITY	EFFLUENT 10/19/89 CITY	EFFLUENT 10/24/89 CITY	EFFLUENT 10/25/89 CITY	EFFLUENT 10/25/89 CITY	EFFLUENT 10/30/89 CITY	DISCHARGE LIMITS
Cadmium	mg/l	0.02	0.05	0.01	0.06	0.05	0.06	<0.005	0.40
Chromium	mg/l	17	1.0	9.5	23	0.06	7.2	9.0	4.0
Copper	mg/l	0.30	0.09	0.14	0.08	0.09	0.07	X	0.5
Iron	mg/l	0.38	6.3	0.4	0.18	1.5	0.16	X	NL
Lead	mg/l	<0.01	0.14	3<0.01	0.01	<0.01	<0.01	<0.01	0.20
Mercury	mg/l	NR	NR	NR	NR	NR	NR	<0.0002	0.05
Nickel	mg/l	0.07	0.06	0.05	0.12	0.03	0.09	X	4.0
Silver	mg/l	<0.01	<0.005	<0.01	<0.01	<0.01	<0.01	X	0.20
Zinc	mg/l	0.27	0.65	0.12	0.12	0.11	0.08	X	2.0
Hexavalent chromium	mg/l	19	0.80	10	26	<0.01	8.8	9.1	0.2
pH	units	7.74	8.14	7.87	7.96	NR	8.07	NR	NL
Total cyanide	mg/l	0.094	0.07	0.055	NR	NR	NR	0.07	1.6

NOTE: Numbers in bold exceed limits.

X - Can't read data.

NL - No limit.

NR - Not run.

TABLE 5-2

NYSDEC SAMPLE COLLECTION (March 1989)
United Plating Site

PARAMETER	A30-01 SOIL (mg/kg) 150 ft east of building	A30-02 SOIL (mg/kg) Adjacent to building	A30-03 SLUDGE (mg/kg) Bin in building	A30-04 ASH (mg/kg) Bin 50 ft from building	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (c)	NYSDEC SOIL CLEANUP OBJECTIVES (c)
Antimony	<8.6	<4.6	<15.6	297	0.6 - 10(n)	SB
Arsenic	9.9	10.7	38	<1.1	3 - 12	7.5 or SB
Beryllium	0.72	0.66	<1.1	<0.34	0 - 1.75	0.16 or SB
Cadmium	2.7	4.5	2,060	117	0.1 - 1	1.0 or SB
Hexavalent chromium	-	-	-	-	-	-
Chromium	24.7	20	33,300	230	1.5 - 40	10 or SB
Copper	31.7	23.2	14,000	2,030	1 - 50	25 or SB
Lead	63.1	31.9	51.7	158	4 - 61 ^a - 200 - 500 ^b	SB
Mercury	0.08	0.10	<0.39	<0.04	0.001 - 0.2	0.1
Nickel	22.8	29.9	294	166	0.5 - 25	13 or SB
Silver	<1.2	2.4	<5.1	1.7	0.1 - 5.0(n)	SB
Zinc	115	660	29,000	828	9 - 50	20 or SB
Total cyanide	23	0.63	1,280	-	N/A	-
pH units	-	-	-	-	-	-

NOTE: Bold numbers exceed maximum background concentrations (Eastern USA).

- - Depends on pH.

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

a - Rural area.

b - Metropolitan area.

N/A - Not available.

SB - Site background.

greater than the objective. No criteria or guidance exist to compare the sludge and ash sample concentrations. However, the sludge sample contained 3.3% chromium, 1.4% copper, and 3% zinc; these numbers strongly suggest that the sludge is hazardous.

On 13 September 1989 NYSDEC took one soil sample from the UP property. The results are shown on Table 5-3 (NYSDEC 1989c). Again, the NYSDEC cleanup objectives are provided on the table; numbers in bold show exceedances of the criteria. The cadmium concentration was roughly seven times higher than the previous results and much higher than the objective. Chromium and nickel were twice as high and copper was almost four times higher than previously observed. Arsenic was an order of magnitude lower than the previous sample. Iron was more than four times higher than the objective.

On 16 May 1990 NYSDOH took six samples from the playground northeast of the UP site and one sample from the vacant yard adjacent to the site. The results are shown on Table 5-4 along with the cleanup objectives and background soil concentrations (NYSDOH 1990). The locations are provided on Figure 5-1. The sample (No. 3) in the vacant lot adjacent to the site just to the southeast is from the same area as the samples collected during the RI/FS. The sample contained cadmium, magnesium, mercury, nickel, and zinc in concentrations above the eastern U.S. background or cleanup objective. The samples from the sand box (No. 1), the jet swing (No. 2), and the end of the court (No. 5) contained no parameters in concentrations above the eastern U.S. background or cleanup objective. The sample from beneath the blue swing (No. 4) had cadmium, magnesium, and zinc in concentrations above the eastern U.S. background, and the samples from the ballfield area (Nos. 6 and 7) had cadmium, magnesium, mercury, and zinc at levels above the eastern U.S. background and soil cleanup objective.

5.1.3 Groundwater

Table 5-5 presents data collected by NYSDEC on 13 September 1989 from one groundwater sample; the groundwater standards are also shown (NYSDEC 1989c), as well as the natural ambient groundwater ranges (Dragun 1988). The cadmium, lead, and zinc values all exceeded the standard (NYSDEC 1993); however, the lead and zinc values were within the natural ambient groundwater range. The cadmium, copper, and nickel values were outside the background groundwater range.

TABLE 5-3

NYSDEC SOIL SAMPLING (September 1989)
United Plating Site

Area: 75 Feet East of Building

PARAMETER	RESULTS (mg/kg)	EASTERN USA BACKGROUND(c)	NYSDEC CLEANUP OBJECTIVES(c)
METALS (µg/l)			
Aluminum	124	33,000	SB
Antimony	9.0 B	0.6 - 10(n)	SB
Arsenic	0.89 B	3 - 12	7.5 - or SB
Barium	5.9 B	15 - 600	300 or SB
Cadmium	36.2	0.1 - 1	1.0 or SB
Calcium	854 B	130 - 35,000	SB
Chromium	45.3	1.5 - 40	10 or SB
Cobalt	9.2 B	2.5 - 60	30 or SB
Copper	115	1 - 50	25 or SB
Iron	8,940	2,000 - 550,000	2,000 or SB
Lead	715	4 - 61 ^a 200 - 500 ^b	SB
Magnesium	133 B	100 - 5,000	SB
Manganese	106	50 - 5,000	SB
Nickel	61.9	0.5 - 25	13 or SB
Silver	8.2	0.1 - 5.0(n)	SB
Sodium	195 B	6,000 - 8,000	SB
Vanadium	0.84 B	1 - 300	150 or SB
Zinc	102	9 - 50	20 or SB

NOTE: Numbers in bold exceed maximum background concentrations (Eastern USA).

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

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

a - Rural area.

b - Metropolitan area.

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

SB - Site background.

TABLE 5-4

NYSDOH SHALLOW SOIL SAMPLES (May 1990)
United Plating Site

	SS #1	SS #2	SS #3	SS #4	SS #5	SS #6	SS #7	EASTERN USA BACKGROUND(C)	NYSDEC SOIL CLEANUP OBJECTIVES(C)
PARAMETER	SAND BOX	JET SWING	LOT PATH	BLUE SWING	END OF COURT	HOME PLATE			
METALS (mg/kg)									
Aluminum	2,700	4,460	15,600	14,300	5,860	13,700	14,000	33,000	SB
Arsenic	<1	1.3	5.1	3.3	1.4	4.4	5.5	3 - 12	7.5 or SB
Barium	11	18	123	94	20	122	114	15 - 600	300 or SB
Beryllium	<0.4	<0.4	0.6	0.4	<0.4	0.4	0.5	0 - 1.75	0.16 or SB
Cadmium	<2.0	<2.0	4.0	2.9	<2.0	2.6	2.1	0.1 - 1	1.0 or SB
Calcium	4,470	19,100	14,700	10,400	8,310	8,490	10,800	130 - 25,000	SB
Chromium	3.3	6.0	30	21	7.0	26	29	1.5 - 40	10 or SB
Cobalt	<2.0	<2.0	8.6	7.8	2.3	8.6	8.8	2.5 - 60	30 - SB
Copper	<2.0	4.6	39	17	5.9	31	34	1 - 50	25 - SB
Iron	6,990	10,700	27,900	30,200	11,500	27,300	27,000	2,000 - 550,000	2,000 or SB
Lead	4.6	2.6	102	75	8.0	162	123	4.0 - 61 ^a 200 - 500 ^b	SB
Magnesium	1,730	3,420	6,120	5,460	2,070	5,640	6,780	100 - 5,000	SB
Manganese	82	171	502	468	180	463	526	50 - 5,000	SB
Mercury	<0.04	<0.04	0.17	0.1	<0.04	0.17	0.18	0.001 - 0.2	0.1
Nickel	2.4	5.2	28	18	6.6	23	22	0.5 - 25	13 - SB
Potassium	450	960	8,080	3,120	790	2,710	2,850	8,500 - 43,000	SB
Strontium	<20	45	54	28	23	22	30	-	-
Titanium	177	169	68	310	124	193	148	-	-
Vanadium	8.6	14	32	44	15	37	35	1 - 300	150 or SB
Zinc	16	46	137	257	30	222	128	9.0 - 50	20 or SB
Cyanide	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	N/A	-

NOTE: Numbers in bold exceed cleanup objectives.

- - Depends on pH.

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

a - Rural area.

b - Metropolitan area.

SB - Site background.

N/A - Not available.

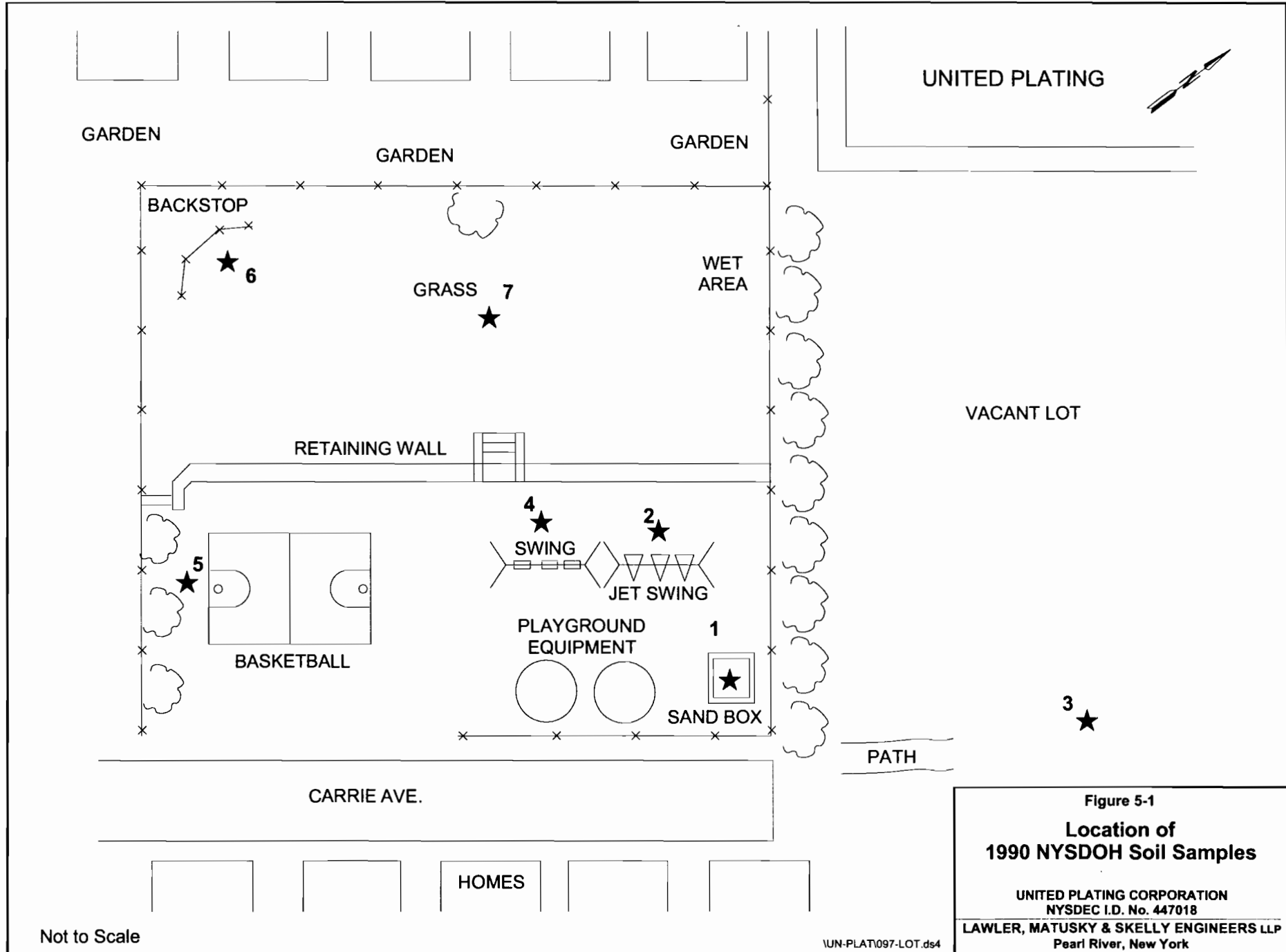


Figure 5-1
Location of
1990 NYSDOH Soil Samples

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

Not to Scale

UN-PLAT097-LOT.dwg

TABLE 5-5

NYSDEC GROUNDWATER SAMPLING (September 1989)

United Plating Site

Area: Looking From Footing Hole Adjacent and South of East Entrance Ramp

PARAMETER	RESULTS	NYSDEC GROUNDWATER STANDARDS	NATURAL AMBIENT GROUNDWATER RANGES (n)
METALS (µg/l)			
Antimony	< 25.5	3 GV	N/A
Arsenic	4.5 B	25	< 1.0 - 30
Beryllium	< 0.30	3 GV	< 10
Cadmium	17.5	1.0	< 1.0
Chromium	23.1	50	< 1.0 - 5.0
Copper	140	200	< 1.0 - 30
Lead	495	25	10 - -10,000
Mercury	< 1.0	2	< 1.0
Nickel	62.8	NS	< 10 - 50
Selenium	0.90 B	10	< 1.0 - 10
Silver	4.0 B	50	< 5.0
Thallium	0.90 B	4 GV	N/A
Zinc	354	300	< 10 - 2,000

NOTE: Bold numbers exceed groundwater standards.

(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.

GV - Guidance value.

N/A - Not available.

NS - No standard.

5.1.4 Process Liquids

Tables 5-6 and 5-7 present data collected from various tanks, drums, and drains on the site and from a spill that occurred in November 1989, respectively. The tank, drum, and drain samples were collected by NYSDEC on 2 March 1989 (NYSDEC 1989b). One floor drain had 27% chromium and 12% hexavalent chromium; it is unknown where the floor drain discharged. The other two floor drains had high levels of chromium, copper, lead, and zinc. An open pit adjacent to the building had high levels of chromium, copper, and zinc. Drum No. 1 had high levels of total cyanide, chromium, and copper, whereas drum No. 2 had high levels of hexavalent chromium and zinc. A tank in the building had 5000 µg/l of hexavalent chromium.

On 14 November 1989, during construction of a trench at the UP site, a spill of liquid was observed. NYSDEC took samples on 14 and 15 November 1989 (NYSDEC 1989d). A sample of the liquid in the trench had 14 mg/l of chromium and 16 mg/l of hexavalent chromium. A sump sample had 3.5 mg/l of chromium and a sample from the truck containing the spilled material had 200 mg/l of chromium and 230 mg/l of hexavalent chromium. Water in the ditch had low levels of cyanide, whereas water from the sump had 33 mg/l of cyanide. This spill and the results of sampling from the floor drains indicate past discharges of process material with high levels of contaminants to the sewer system and possibly to the groundwater at the UP site.

5.1.5 Dust Samples

NYSDOH collected four dust samples from inside the building on 27 February 1991 and analyzed the samples for total lead (NYSDOH 1991). The results are shown on Table 5-8. The lead content of the dust was high in all samples, ranging from 9360 to 43,800 mg/kg.

5.2 REMEDIAL INVESTIGATION ANALYTICAL RESULTS

The following sections describe the results of the chemical analyses performed on soil, sediment, surface water, groundwater, test pits, building surfaces, and debris collected from May 1995 through January 1996 as part of the RI of the UP site. With the exception of the low-level volatile analysis used for the second round of groundwater samples and the TCLP used on some building structures, ancillary equipment, and sediment samples, all samples were analyzed by Contract Laboratory Protocol (CLP) in accordance with the December 1991

TABLE 5-6

NYSDEC SAMPLE COLLECTION (March 1989)
United Plating Site

PARAMETER	A30-05 LIQUID (µg/l) Open pit adjacent to building	A30-06 LIQUID (µg/l) Floor drain in building	A30-07 LIQUID (µg/l) Drain in 1st. floor of building	A30-08 LIQUID (mg/l) Floor drain in chrome plating room	A30-09 LIQUID (µg/l) Drum "DEC#1"	A30-10 LIQUID (µg/l) Drum "DEC#2"	A33-1 LIQUID (µg/l) Tank in building
Antimony	< 60	< 60	< 60		< 1,640	< 3,280	
Arsenic	15.2	< 10	34.1		< 444	629	
Beryllium	< 5.0	< 5	< 5		< 124	< 248	
Cadmium	45.9	28.3	182		< 124	< 134	
Chromium	15,400	18,600	666	270,000	33,200	979	
Hexvalent chromium	-	-	-	120,000	-	5,880	5,000
Copper	1,600	1,950	1,060		133,000	-	
Lead	61.6	20.4	1,750		627	< 134	
Mercury	< 0.2	< 0.2	< 0.2		< 5.1	< 5.0	
Nickel	71.6	< 40	384		< 993	< 1,990	
Silver	< 10	< 10	11.6		< 444	< 243	
Zinc	1,080	386	2,820		638	170,000	
Total cyanide	-	< 10	90		6,400	-	
pH units	-	-	-	0.3	12.6	13.3	5.9

TABLE 5-7

NYSDEC TRENCH SAMPLING (November 1989)
United Plating Site

PARAMETER	TRUCK	EXCAVATION	SUMP	WATER FROM DITCH	WATER FROM SUMP	DITCH WATER	NYSDEC GROUNDWATER STANDARDS
Chromium	200	14	3.5	-	-	-	0.05
Silver	1.4	<0.05	<0.05	-	-	-	0.025
Lead	0.77	<0.1	0.90	-	-	-	0.025
Hexavalent chromium	230	16	<0.02	-	-	-	0.05
Cyanide	0.25	-	-	0.25	33	0.2	0.2
Cadmium	<0.05	<0.05	0.12	-	-	-	0.01

NOTE: Bold numbers exceed groundwater standards.
All results in mg/l.

TABLE 5-8

NYSDOH DUST SAMPLES (February 1991)
United Plating Site

SAMPLE NUMBER	TOTAL LEAD (mg/kg)
1	13,000
2	43,800
3	20,600
4	9,360

(with September 1993 updates) Analytical Services Protocol (ASP). The low-level VOC analysis was performed using EPA Method 524.2 and the TCLP extraction was done in accordance with EPA SW-846, Method 1311. With the exception of the probe soil and water samples and building structure and ancillary equipment samples, all data were submitted to an independent data validator for ASP compliance review.

5.2.1 Task 2a - Building Structure and Ancillary Equipment Contamination Data

Under this subtask wipe, sweep, concrete chip, wood chip, and paint chip samples were collected from equipment and debris inside the building and from various surfaces within the building. The laboratory analytical data sheets are contained in Appendix H. None of the samples were validated.

5.2.1.1 Wipe Samples. Eighty-four wipe samples were taken inside the building, with 49 samples taken from equipment and debris and 35 samples taken from building walls and support columns. In addition, 10 wipes were taken after 10 pieces of equipment and debris had been decontaminated. All wipe samples were analyzed for TAL metals and cyanide. The results of the wipe sampling are provided on Table 5-9. The 10 wipe samples, which were taken after steam cleaning, are shown on Table 5-9 as well as the wipe sample taken prior to cleaning. The samples are indicated by the letter "D" after the sample number. The percent removal of the major contaminants of concern (COCs) at the site, i.e., cadmium, chromium, copper, lead, and zinc was calculated to be ~75%. Thus, it can be expected that steam cleaning the equipment and debris will remove approximately 75% of the surface contamination.

The U.S. Department of Housing and Urban Development (HUD) postabatement residual dusts clearance criteria for LBP is also listed in Table 5-9. These clearance criteria are used to determine whether the levels of residual dust remaining after abatement are acceptable for reoccupancy of residential units. Although the clearance criteria were developed to assess abatement and postabatement cleaning, these criteria were used by EPA in the development of its Guidance on Residential Lead-Based Paint, Lead Contaminated Dust, and Lead Contaminated Soil (EPA 1994). As no other criteria or guidance exist regarding allowable levels of metals in buildings or on equipment, these criteria were used in evaluating the data. Three criteria exist: floor - 200 $\mu\text{g}/\text{ft}^2$, window sill - 500 $\mu\text{g}/\text{ft}^2$, and window well - 800 $\mu\text{g}/\text{ft}^2$. The most appropriate criterion to use on the UP site is the floor criterion. As the laboratory data were reported in terms to $\mu\text{g}/100\text{ cm}^2$, the floor criterion was converted to

TABLE 5-9 (Page 1 of 10)

WIPE SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPWP01	UPWP02	UPWP03	UPWP04	UPWP05	UPWP06	UPWP07	UPWP08
TAL METALS (µg/100 cm²)								
Aluminum	434 E	1,130 E	210 E	1,320 E	3,230 E	12,100 E	156 B E	1,320 E
Antimony	ND N	ND N	ND N	12 B N	74 N	ND N	ND N	ND N
Arsenic	ND	21	82	6.5 B	5.4 B	ND	ND	4.0 B
Barium	142 B	52 B	74 B	62 B	145 B	9.0 B	23 B	300
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	18	34	23	35	29	39	3.7 B	12
Calcium	2,580 B E	4,500 E	5,730 E	4,310 E	3,200 B E	2,120 B E	889 B E	4,220 E
Chromium	1,070 E	2,640 E	347 E	6,640 E	4,710 E	66 E	280 E	1,490 E
Cobalt	38 B	62	10 B	627	4,080	ND	ND	67
Copper	257	1,890	2,330	357	346	2,080	266	539
Iron	19,000 E	172,000 E	277,000 E	47,200 E	11,000 E	2,210 E	1,010 E	4,720 E
Lead ^a	140	355	48	379	1,460	80	226	371
Magnesium	590 B	1,660 B	990 B	926 B	1,110 B	324 B	289 B	567 B
Manganese	99 E	773 E	3,190 E	297 E	67 E	34 E	7.1 B E	50 E
Mercury	0.25 N	0.58 N	0.55 N	0.13 N	0.17 N	ND N	ND N	0.37 N
Nickel	860	81	169	170	907	19 B	11 B	40
Potassium	435 B E	874 B E	859 B E	520 B E	750 B E	9,680 E	128 B E	460 B E
Selenium	ND	ND	ND	ND	ND	3.2 B	2.9 B	ND
Silver	138 E	461 E	854 E	113 E	306 E	714 E	53 E	106 E
Sodium	3,200 B E	3,470 B E	3,210 B E	3,720 B E	4,960 E	96,900 E	2,410 B E	3,110 B E
Thallium	ND	ND	ND	ND	12	ND	ND	ND
Vanadium	ND	9.4 B	13 B	3.9 B	2.9 B	ND	ND	ND
Zinc	418	1,310	361	714	827	301	153	1,690
Cyanide	477 N	562 N	602 N	118 N	143 N	2,900 N	147 N	1,130 N

NOTE: Bold numbers exceed lead dust criteria (21.5 µg/100 cm²).

a - USEPA Guidance on Residential Lead-Based Paint, Lead-Contaminated Dust, and Lead-Contaminated Soil, 1994.

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.

ND - Not detected at analytical detection limit.

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WIPE SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPWP09	UPWP10	UPWP10D	UPWP11	UPWP12	UPWP13	UPWP14	UPWP15	UPWP16
TAL METALS (µg/100 cm²)									
Aluminum	1,840 E	398 E	218	1,560 E	ND E	671 E	252 E	246 E	17 B E
Antimony	6.9 B N	ND N	ND	ND N	ND N	ND N	ND N	24 B N	ND N
Arsenic	ND	ND	ND	10	ND	9.5	ND	ND	3.7 B
Barium	122	12 B	9.7 B	2,240	4.3 B	626	21 B	73 B	2.0
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	26	3.8 B	ND	1,130	1.9 B	38	7.6	54	ND
Calcium	2,120 B E	1,030 B E	1,200 B	5,140 E	741 B E	2,250 B E	1,310 B E	1,810 B E	1,460 B E
Chromium	1,640 E	1,800 E	99	ND E	29 E	806 E	ND E	130 E	739 E
Cobalt	352	929	149	39 B	6.8 B	35 B	32 B	9.7 B	ND
Copper	451	71	11 B	3,310	8.7 B	270	152	5,090	32
Iron	5,800 E	12,200 E	2,460	23,000 E	ND E	378,000 E	4,120 E	8,890 E	270 E
Lead ^a	710	40	10	5,150	7.5	2,300	145	311	75
Magnesium	433 B	234 B	259 B	1,440 B	ND	737 B	ND	305 B	ND
Manganese	33 E	25 E	12 B	2,080 E	2.2 B E	1,500 E	12 B E	54 E	1.6 B E
Mercury	0.18 N	ND N	ND	0.14 N	ND N	0.75 N	ND N	ND N	ND N
Nickel	195	158	18 B	256	ND	1,630	27 B	246	ND
Potassium	475 B E	ND E	132 B	14,600 E	ND E	216 B E	127 B E	6,110 E	179 B E
Selenium	ND	ND	ND	ND	3.2 B	ND	ND	ND	ND
Silver	28 E	4.3 B E	2.0 B	894 E	42 E	33 E	29 E	1,240 E	4.2 B E
Sodium	23,700 E	1,500 B E	1,260 B	106,000 E	1,820 B E	6,600 E	2,040 B E	21,900 E	1,740 B E
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	ND	ND	ND	13 B	ND	12 B	ND	ND	ND
Zinc	568	91	38	9,170	26	1,120	131	433	15 B
Cyanide	214 N	49 N	ND	1,250 N	22 N	100 N	180 N	751 N	17 N

NOTE: Bold numbers exceed lead dust criteria (21.5 µg/100 cm²).

- a - USEPA Guidance on Residential Lead-Based Paint, Lead-Contaminated Dust, and Lead-Contaminated Soil, 1994.
 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.
 ND - Not detected at analytical detection limit.

TABLE 5-9 (Page 3 of 10)

WIPE SAMPLE DATA SUMMARY (May 1995)

United Plating Site

PARAMETER	UPWP17	UPWP18	UPWP19	UPWP20	UPWP21	UPWP21D	UPWP22	UPWP23	UPWP24
TAL METALS ($\mu\text{g}/100 \text{ cm}^2$)									
Aluminum	206 E	3,610 E	385 E	100 B E	146 B E	130 B	73 B E	ND E	1,360 E
Antimony	ND N	ND N	6.1 B N	101 N	10,500 N	1,280	7.4 B N	ND N	47 B N
Arsenic	21	16	ND	13	5.4 B	ND	ND	ND	7.0 B
Barium	44 B	4.4 B	11 B	1,930	39 B	5.1 B	6.7 B	9.5 B	622
Beryllium	ND	ND	ND	ND	7.1	ND	ND	ND	ND
Cadmium	2.5 B	9.4	2.4 B	ND	1.8 B	ND	2.1 B	ND	57
Calcium	236 B E	737 B E	902 B E	755 B E	719 B E	685 B	472 B E	479 B E	21,700 E
Chromium	157 E	424 E	1,450 E	7,130 E	ND E	16	788 E	721 E	1,240 E
Cobalt	5.4 B	29 B	ND	ND	6.4 B	ND	ND	ND	7.9 B
Copper	24	359	86	28	16 B	4.8 B	74.0	70	3,100
Iron	265 E	329,000 E	2,250 E	612 E	3,270 E	107	429 E	281 E	32,300 E
Lead ^a	26	215	919	3,760	16,000	1,550	217	427	3,330
Magnesium	ND	432 B	ND	ND	263 B	193 B	ND	ND	2,100 B
Manganese	7.4 B E	2,240 E	14 E	8.6 B E	46 E	3.4 B	5.0 E	4.6 B E	630 E
Mercury	ND N	0.12 N	ND N	ND N	ND N	ND	ND N	ND N	ND N
Nickel	ND	41	ND	ND	14 B	ND	ND	ND	101
Potassium	99 B E	140 B E	119 B E	96 B E	860 B E	116 B	ND E	99 B E	277 B E
Selenium	19	ND	ND	ND	ND	ND	ND	ND	ND
Silver	3.7 B E	2.5 B E	3.7 B E	39 E	9.2 E	2.5 B	58 E	166 E	17 E
Sodium	1,920 B E	1,610 B E	1,900 B E	1,920 B E	47,500 E	3,190 B	1,580 B E	1,430 E	29,200 E
Thallium	22 B	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	3.0 B	12 B	ND	ND	2.7 B	ND	ND	ND	ND
Zinc	33	74	40.2	7.2 B	ND	21	16,300	72	1,050
Cyanide	23 N	14 N	14 N	9.3 N	9.6 N	ND	2.5 N	4.4 N	42 N

NOTE: Bold numbers exceed lead dust criteria ($21.5 \mu\text{g}/100 \text{ cm}^2$).

a - USEPA Guidance on Residential Lead-Based Paint, Lead-Contaminated Dust, and Lead-Contaminated Soil, 1994.

E - Value estimated due to interference.

N - Spiked sample recovery is not within control limits.

ND - Not detected at analytical detection limit.

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WIPE SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPWP25	UPWP26	UPWP27	UPWP28	UPWP29	UPWP30	UPWP30D	UPWP31	UPWP32
TAL METALS ($\mu\text{g}/100 \text{ cm}^2$)									
Aluminum	2,060 E	2,600 E	868 E	272 E	ND E	ND E	115 B	ND E	24,500 E
Antimony	12 B N	9.4 B N	18 B N	ND N	ND N	52 N	5.6 B	ND N	ND N
Arsenic	ND	52	4.6 B	ND	3.6 B	22	ND	ND	59
Barium	118 B	13 B	74 B	9.4 B	51 B	596	14 B	80 B	1,240
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	1.7 B
Cadmium	9.0	140	94	29	196	2,620	19	14	508
Calcium	1,410 B E	1,790 B E	2,770 B E	2,660 B E	18,700 E	57,900 E	684 B	4,470 E	76,500 E
Chromium	748 E	11,100 E	1,030 E	104 E	73 E	2,940 E	36	203 E	1,150 E
Cobalt	7.2 B	74	18 B	ND	8.8 B	40 B	ND	ND	25 B
Copper	114	1,810	1,090	79	673	12,100	27	43	12,400
Iron	24,700 E	503,000 E	24,900 E	2,240 E	21,600 E	113,000 E	688	5,000 E	347,000 E
Lead ^a	21,600	1,380	2,010	286	161	6,410	43	309	1,650
Magnesium	226 B	1,390 B	1,010 B	196 B	6,830	12,500	237 B	701	25,500
Manganese	119 E	2,210 E	121 E	17 E	294 E	934 E	6.1 B	13 E	3,630 E
Mercury	2.9 N	0.71 N	0.13 N	ND N	0.15 N	0.56 N	ND	0.23 N	0.28 N
Nickel	13 B	1,930	70	42	1,880	4,210	12 B	25 B	180
Potassium	224 B E	504 B E	389 B E	140 B E	155 B E	3,340 B E	ND	347 B E	52,100 E
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	32 E	9.6 E	296 E	1.9 B E	ND E	116 E	ND	1.9 B E	9.5 E
Sodium	1,920 B E	5,140 E	2,320 B E	1,310 B E	2,110 B E	46,700 E	1,110 B	1,850 E	24,700 E
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	2.8 B	30 B	7.6 B	ND	9.7 B	29 B	ND	3.1 B	79
Zinc	128	505	668	226	1,120	15,100	145	95	3,210
Cyanide	8.5 N	18 N	140 N	16 N	20 N	205 N	12	158 N	1,360 N

NOTE: Bold numbers exceed lead dust criteria ($21.5 \mu\text{g}/100 \text{ cm}^2$).

- a - USEPA Guidance on Residential Lead-Based Paint, Lead-Contaminated Dust, and Lead-Contaminated Soil, 1994.
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TABLE 5-9 (Page 5 of 10)

WIPE SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPWP33	UPWP34	UPWP35	UPWP36	UPWP36D	UPWP37	UPWP37D	UPWP38	UPWP39	UPWP40	UPFB01
TAL METALS (µg/100 cm²)											
Aluminum	8,940 E	3,320 E	12,500 E	11,200 E	174	25,400 E	193	875 E	3,880 E	128 B E	ND E
Antimony	ND N	ND N	271 N	ND N	ND	ND N	ND	ND N	6.7 B N	ND N	ND N
Arsenic	21	9.5	163	48	5.5 B	43	ND	ND	ND	ND	ND
Barium	1,080	221	21 B	28 B	5.9 B	314	4.1 B	20 B	126 B	6.2 B	2.7 B
Beryllium	0.62 B	ND	0.51 B	ND	ND	1.5 B	ND	ND	0.58 B	ND	ND
Cadmium	9,620	245	28,100	56,200	4,080	4,570	74	19	6.5	5.5	ND
Calcium	291,000 E	28,500 E	5,450 E	15,100 E	1,120 B	82,900 E	958 B	855 B E	1,190 B E	1,650 B E	411 B E
Chromium	1,030 E	653 E	ND E	2,500 E	124	46,200 E	805	431 E	108 E	17 E	3.9 B E
Cobalt	5.9 B	15 B	9.8 B	31 B	ND	24 B	ND	ND	ND	ND	ND
Copper	7,370	966	9,430	7,900	620	2,380	174	80	32	16 B	ND
Iron	321,000 E	211,000 E	32,300 E	467,000 E	33,500	90,600 E	1,080	3,570 E	1,410 E	638 E	73 B E
Lead ^a	1,510	2,480	1,230	2,280	2,530	1,200	24	113	130	56	24
Magnesium	13,000	3,330 B	8,500	2,170 B	345 B	15,800	296 B	48 B	391 B	360 B	68.7 B
Manganese	1,360 E	1,040 E	1,390 E	1,590 E	157	809 E	10 B	7.6 B E	8.4 B E	7.1 B E	2.0 B E
Mercury	0.24 N	0.31 N	2.6 N	0.27 N	ND	0.74 N	ND	ND N	ND N	0.5 N	ND N
Nickel	118	149	457	19,200	746	590	25.9 B	70	15 B	6.8 B	ND
Potassium	5,230 E	ND E	7,650 E	1,160 B E	118 B	7,170 E	ND	184 B E	256 B E	306 B E	ND E
Selenium	32	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	14 E	5.5 B E	245 E	36 E	36	16 E	ND	1.5 B E	1.6 B E	35 E	ND E
Sodium	4,790 E	ND E	10,100 E	85,300 E	2,320 B	23,300 E	1,130 B	1,910 B E	1,780 B E	1,740 B E	1,730 B E
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	178	ND	ND
Vanadium	48	23 B	99	12 B	ND	92	2.9 B	ND	ND	6.3 B	ND
Zinc	1,740	652	ND	3,020	311	918	37	487	132	ND	13 B
Cyanide	362 N	253 N	431 N	4,650 N	230	1,320 N	39	188 N	208 N	189 N	ND N

NOTE: Bold numbers exceed lead dust criteria (21.5 µg/100 cm²).

- a - USEPA Guidance on Residential Lead-Based Paint, Lead-Contaminated Dust, and Lead-Contaminated Soil, 1994.
 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.
 ND - Not detected at analytical detection limit.

TABLE 5-9 (Page 6 of 10)

WIPE SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPWP41	UPWP42	UPWP43	UPWP44	UPWP45	UPWP45D	UPWP46	UPWP47	UPWP48	UPWP49	UPWP50	UPWP51
TAL METALS (µg/100 cm²)												
Aluminum	246	259	1,660	561	1,670	833	237	15,700	53 B	67 B	120 B	10,400
Antimony	ND N	ND N	38 B N	15 B N	838 N	466	ND N	196 N	ND N	ND N	ND N	ND N
Arsenic	ND	ND	20	ND	ND	ND	ND	57	ND	ND	ND	5.0 B
Barium	1,290	17 B	2,500	55 B	57 B	29 B	104 B	36 B	2.2 B	6.9 B	11 B	2.7 B
Beryllium	ND	ND	ND	0.49 B	ND	ND	1.2 B	1.1 B	ND	ND	ND	ND
Cadmium	1.8 B	888	61	11	155	28	11,500	103	6.8	1.8 B	ND	2.1 B
Calcium	2,680 B	3,400 B	20,300	2,250 B	3,140 B	2,620 B	20,900	28,600	452 B	543 B	1,370 B	637 B
Chromium	14	156	1,380	157	1,630	2,690	110	62,300	44	9.3	23	25
Cobalt	ND	ND	123	ND	223	49	ND	21 B	ND	ND	ND	ND
Copper	5.9 B	473	499	46	777	195	27	1,800	20 B	3.5 B	7.4 B	14 B
Iron	547E	2,950 E	5,240 E	9,600 E	201,000 E	66,900	2,120 E	136,000 E	57 B E	ND E	ND E	ND E
Lead ^a	30 N	67 N	8,450 N	254 N	3,240 N	608	80 N	31,800 N	19 N	5.9 N	9.9 N	18 N
Magnesium	197 B	575 B	2,210 B	262 B	1,700 B	670 B	415 B	8,630	177 B	196 B	251 B	191 B
Manganese	7.5 B	48	149	62	508	30	60	1,090	2.5	3.1 B	4.1 B	6.3 B
Mercury	ND	ND	0.62	ND	0.55	ND	ND	0.58	ND	ND	ND	ND
Nickel	ND	960	163	51	248	63	44	174	ND	4.8 B	7.3 B	ND
Potassium	185 B	335 B	943 B	162 B	824 B	970 B	118 B	4,650	ND	ND	152 B	188 B
Selenium	ND	3.6 B	ND	ND	ND	ND	2.5 B	ND	ND	ND	ND	ND
Silver	ND	2.2 B	17	2.4 B	8.3	1.4 B	ND	17	ND	ND	ND	ND
Sodium	1,570 B	2,620 B	3,280 B	2,140 B	1,590 B	2,330 B	4,870	43,400	1,380 B	2,200 B	2,500 B	151,000
Thallium	ND	ND	ND	ND	ND	4.9 B	ND	9.7 B	ND	ND	ND	ND
Vanadium	ND	ND	14 B	3.7 B	17 B	6.2 B	ND	43	ND	ND	ND	ND
Zinc	599	21,600	11,300	230	10,200	4,230	133	3,370	12 B	17	38	42
Cyanide	3 N	825 N	34 N	25N	5.4 N	ND	374 N	95 B N	ND N	ND N	14 N	8.6 N

NOTE: Bold numbers exceed lead dust criteria (21.5 µg/100 cm²).

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WIPE SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPWP52	UPWP53	UPWP54	UPWP55	UPWP56	UPWP57	UPWP58	UPWP59	UPWP60	UPWP61	UPWP62	UPWP62D
TAL METALS (µg/100 cm²)												
Aluminum	1,940	262	206	5,680	125 B	328	1,790	129	1,250	846	ND	335
Antimony	99 N	ND N	ND N	17 B N	ND N	ND N	188 N	ND N	ND N	ND N	12 B N	ND
Arsenic	49	ND	ND	ND	ND	ND	22	ND	ND	ND	38	ND
Barium	22 B	4.6 B	4.7 B	240	5.2 B	57 B	134 B	9.4 B	53 B	9.2 B	36 B	4.4 B
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	13	2.0 B	1.5 B	55	1.0 B	ND	23	ND	1.3 B	9.2	33	4.9
Calcium	20,200	714 B	2,470 B	25,400	4,480	6,050	115,000	7,670	108,000	1,120 B	3750 B	854 B
Chromium	100	54	21	919	20	22	1,920	16	28	73	2,760	667
Cobalt	11 B	ND	ND	16 B	ND	ND	ND	ND	ND	ND	34 B	12 B
Copper	639	24	56	3,260	13 B	3.7 B	25	3.5 B	25	56	1,570	309
Iron	391,000 E	13,500 E	198 E	22,000 E	224 E	483 E	4,830 E	164E	5,780 E	53,400 E	8,300 E	1,450
Lead ^a	414 N	312 N	13 N	676 N	18 N	29 N	8,520 N	32 N	88 N	78 N	290 N	28
Magnesium	5,350	224 B	350 B	2,760 B	505 B	3,550 B	3,720 B	1,260 B	4,660	405 B	746 B	233 B
Manganese	470	25	3.6 B	160	4.2 B	5.0 B	106	5.2 B	85	186	53	10.2 B
Mercury	0.24	ND	ND	0.44	ND	0.14	ND	ND	ND	ND	0.32	ND
Nickel	63	ND	ND	143	5.3 B	ND	7.4 B	ND	6.5 B	17 B	5,380	1,720
Potassium	594 B	100 B	97 B	1,010	ND	943 B	1,020 B	ND	423 B	166 B	ND	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	411	2.1 B	ND	21	ND	ND	4.5 B	ND	ND	ND	71	13
Sodium	12,700	2,200 B	1,770 B	4,840	1,170 B	3,010 B	2,800 B	1,520 B	1,600 B	2,090 B	ND	1,560 B
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	14 B	ND	ND	22 B	ND	7.1 B	59	3.0 B	3.1 B	ND	5.4 B	2.6 B
Zinc	54	21	23	1,870	14 B	9.1 B	253	9.9 B	107	53	704	164
Cyanide	17 N	2.8 N	2.9 N	26 N	2.1 N	ND N	105 N	2.2 N	4.3 N	2.6 N	824 N	320

NOTE: Bold numbers exceed lead dust criteria (21.5 µg/100 cm²).

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WIPE SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPWP63	UPWP63D	UPWP64	UPWP65	UPWP66	UPWP67	UPWP68	UPWP69	UPWP70	UPWP71	UPWP72	UPWP73
TAL METALS (µg/100 cm²)												
Aluminum	374	165	62 B	93 B	884	1,330	25,200	13,400	157 B	1,860	1,290	351
Antimony	17 B N	9.2 B	ND N	ND N	ND N	32 B N	12 B N	12 B N	7.1 B N	ND N	14 B N	12 B N
Arsenic	23	7.4 B	ND	ND	ND	51	37	ND	ND	4.7 B	ND	39
Barium	31 B	6.5 B	2.3 B	2.2 B	31 B	125 B	614	101 B	5.6 B	26 B	20	27,100
Beryllium	ND	ND	ND	ND	ND	ND	1.9 B	ND	ND	ND	ND	ND
Cadmium	23	5.8	ND	ND	7.3	46	64	19	ND	1.1 B	2.8 B	11
Calcium	1,940 B	972 B	1,160 B	568 B	236,000	6,220	111,000	17,800	7,560	162,000	49,200	21,700
Chromium	25,500	6,380	35	13	899	60,900	15,400	204	13	206	413	23
Cobalt	22 B	6.3 B	ND	ND	ND	42	57	ND	ND	ND	ND	10 B
Copper	758	300	5.9 B	5.9 B	756	286,000	8,570	250	30	67	79	26
Iron	151,000 E	26,600	124 E	99 E	962 E	12,700 E	62,600 E	46,900 E	331 E	2,850 E	2,480 E	1,400 E
Lead ^a	327 N	61.4	2.6 N	3.1 N	109 N	3,230 N	6,240 N	300 N	14 N	42 N	1,260 N	9,580 N
Magnesium	722 B	336 B	242 B	192 B	1,640 B	1,790 B	18,700	2,220 B	394 B	4,080	3,400 B	1,100 B
Manganese	523	113	2.3 B	2.2 B	102	100	742	263	5.9 B	96	77	43
Mercury	0.15	ND	ND	ND	0.080 B	1.0	0.31	0.33	ND	0.09	ND	ND
Nickel	161	27 B	ND	ND	18 B	18,900	611	60	ND	9.6 B	13 B	5.1 B
Potassium	334 B	130 B	ND	ND	1,030 B	988 B	12,600	470 B	110 B	923 B	1,030 B	292 B
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	20	16	ND	ND	ND	56	29	55	ND	ND	ND	ND
Sodium	1,470 B	1,130 B	1,450 B	1,360 B	2,140 B	5,700	10,400	1,580 B	1,100 B	2,680 B	3,810 B	1,650 B
Thallium	ND	ND	ND	ND	ND	14	ND	ND	ND	ND	ND	ND
Vanadium	8.1 B	2.7 B	ND	ND	39 B	11 B	59	37 B	ND	68	20 B	ND
Zinc	184	77	12 B	28	192	1,070	1,880	414	34	140	198	30,700
Cyanide	7.6 N	5.3	86 N	41 N	9.8 N	5,510 N	189 N	25 N	2.4 N	6.6 N	4.6 N	ND N

NOTE: Bold numbers exceed lead dust criteria (21.5 µg/100 cm²).

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WIPE SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPWP74	UPWP75	UPWP75D	UPWP76	UPWP76D	UPWP77	UPWP78	UPWP79	UPWP80	UPWP81	UPWP82	UPWP83	UPWP84
TAL METALS (µg/100 cm²)													
Aluminum	4,650	4,100	203	230	189	79 B	429	100 B	6,300	114 B	90 B	532	7,900
Antimony	ND N	21 B N	ND	ND N	ND	ND N	ND N	ND N	ND N	ND N	18 B N	66 N	ND N
Arsenic	15	12	ND	ND	ND	ND	ND	ND	3.9 B	ND	ND	ND	3.5 B
Barium	212	417	6.0 B	130 B	21 B	7.4 B	18 B	16 B	103 B	16,300	104 B	53 B	41 B
Beryllium	0.81 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	209	306	8.0	894	107	8.6	6.0	2.1 B	2.2 B	23	4.8	24	37
Calcium	18,200	25,600	852 B	3,930 B	1,060 B	2,970	2,650 B	1,220 B	906 B	1,900 B	920 B	7,700	59,100
Chromium	1,340	5,440	250	140	58	299	438	ND	26	124	35	317	1,760
Cobalt	74	9.5 B	ND	ND	ND	5.4 B	ND	ND	ND	ND	ND	ND	6.4 B
Copper	1,050	1,720	80	188	65	4,930	271	27	12 B	14 B	56	335	354
Iron	714,000 E	46,600 E	400	15,800 E	11,900	38,400 E	1,870 E	16,500 E	1,130 E	350 E	954 E	4,060 E	8,830 E
Lead ^a	4,150 N	1,950 N	42	106 N	45	37 N	174 N	111 N	2,620 N	88 N	1,490 N	3,980 N	245 N
Magnesium	4,800	9,720	296 B	406 B	308 B	529 B	909 B	270 B	233 B	389 B	240 B	1,510 B	12,400
Manganese	2,540	409	9.9 B	78	57	110	20	62	57	6.2 B	9.9 B	65	73
Mercury	1.2	2.1	ND	0.22	ND	ND	ND	ND	ND	0.10	ND	0.09	0.81
Nickel	452	263	22 B	54	10 B	13 B	22 B	7.2 B	26 B	ND	12 B	64	843
Potassium	1,800 B	1,800 B	105 B	278 B	114 B	107 B	331 B	100 B	1,590 B	112 B	117 B	580 B	1,340 B
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	34	81	ND	2.6 B	ND	ND	8.1	ND	ND	ND	ND	48	8.7
Sodium	3,990 B	3,450 B	1,110 B	2,610 B	1,240 B	8,990	1,920 B	1,580 B	4,130	1,560 B	1,600 B	2,560 B	7,890
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	56	55	ND	2.0 B	ND	ND	3.6 B	ND	ND	ND	ND	4.2 B	11 B
Zinc	2,020	2,200	105	200	93	12,300	6,560	83	83	6,490	38	204	422
Cyanide	111 N	300 N	20	232 N	21	262 N	19 N	4.1 N	80 N	11 N	9.3 N	22 N	287 N

NOTE: Bold numbers exceed lead dust criteria (21.5 µg/100 cm²).

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TABLE 5-9 (Page 10 of 10)

WIPE SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	GAUZE1	GAUZE2	BLANK
TAL METALS ($\mu\text{g}/100\text{ cm}^2$)			
Aluminum	17 B	43	92 B
Antimony	ND N	ND N	ND
Arsenic	ND	ND	ND
Barium	ND	2.0	2.70 B
Beryllium	0.41 B	ND	ND
Cadmium	ND	ND	ND
Calcium	524 B	365	436 B
Chromium	ND	ND	ND
Cobalt	ND	ND	ND
Copper	ND	ND	ND
Iron	ND E	16 B E	91
Lead ^a	ND N	2.5 B N	ND
Magnesium	179 B	ND	149 B
Manganese	2.4 B	1.5 B	1.7 B
Mercury	ND	ND	ND
Nickel	ND	ND	ND
Potassium	ND	ND	ND
Selenium	3.2 B	ND	ND
Silver	ND	ND	ND
Sodium	2,510 B	2,330	1,800 B
Thallium	ND	ND	ND
Vanadium	ND	ND	ND
Zinc	ND	ND	9.5 B
Cyanide	ND N	ND N	ND

NOTE: Bold numbers exceed lead dust criteria ($21.5\text{ }\mu\text{g}/100\text{ cm}^2$).

a - USEPA Guidance on Residential Lead-Based Paint, Lead-Contaminated Dust, and Lead-Contaminated Soil, 1994.

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

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N - Spiked sample recovery is not within control limits.

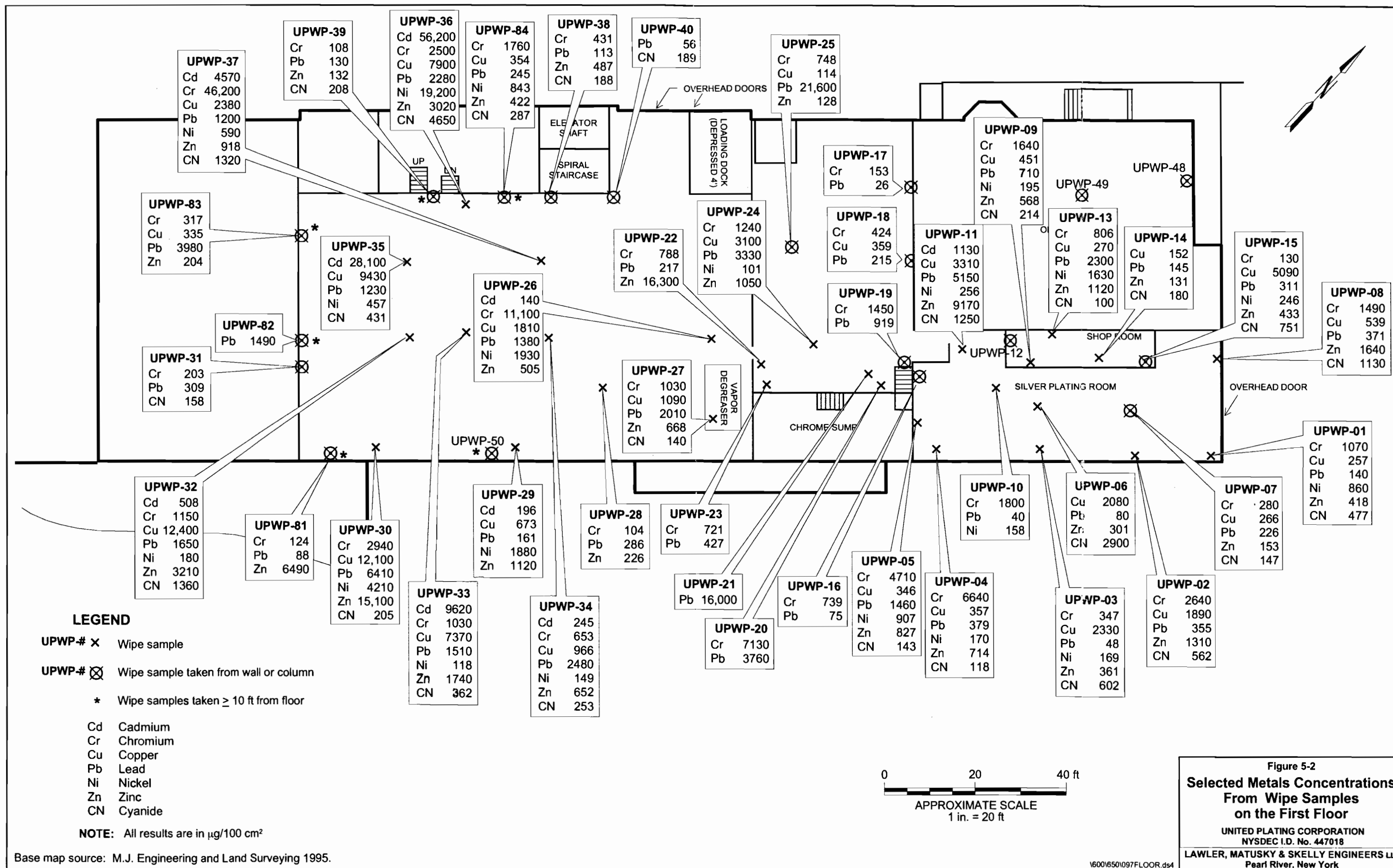
ND - Not detected at analytical detection limit.

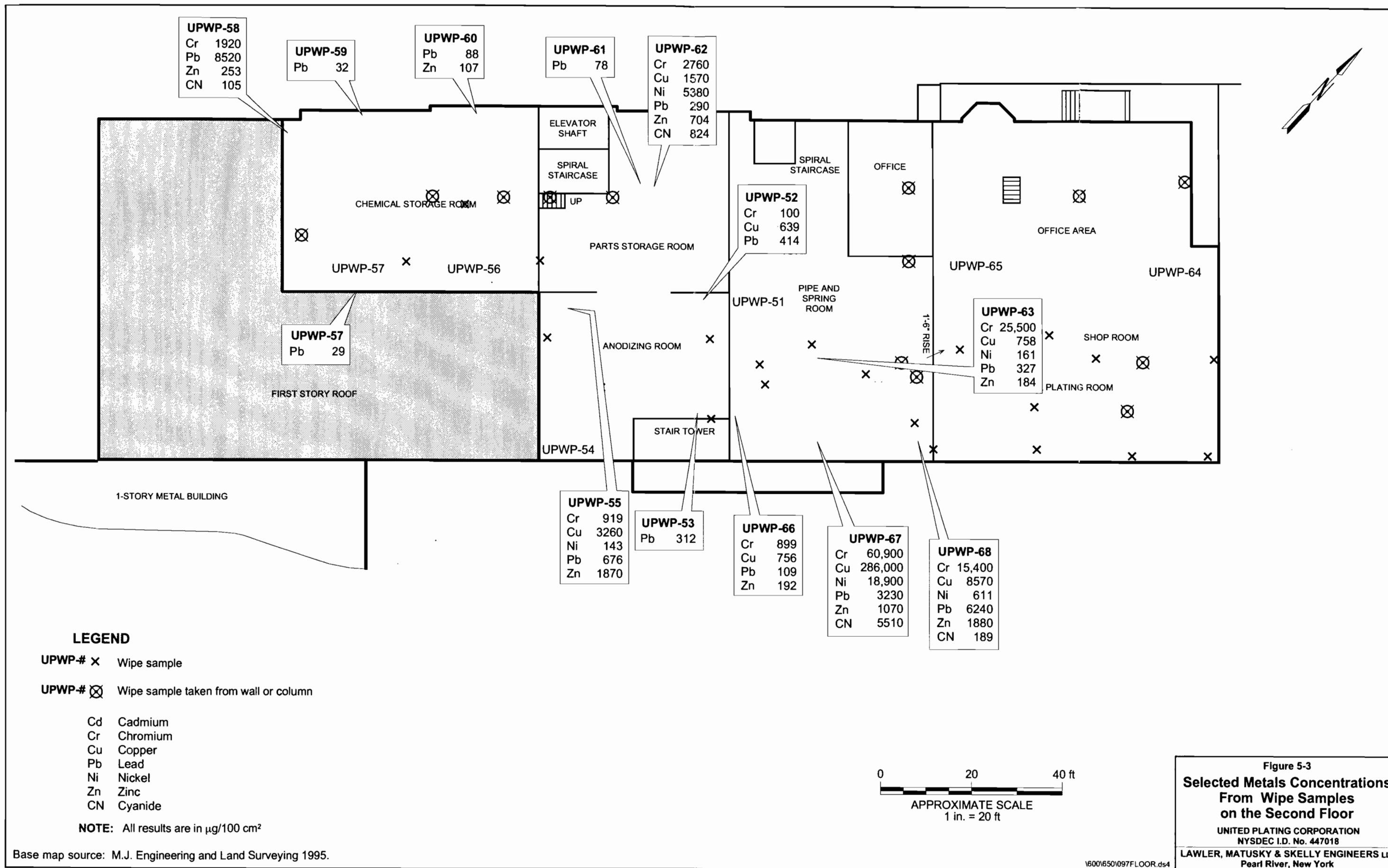
the same units, resulting in a value of 21.5 $\mu\text{g}/100\text{ cm}^2$. This value has been included on the table of wipe sample data; any lead values exceeding this limit are in boldface type. Aside from the samples that exceeded the above lead criteria, Figures 5-2 to 5-6 show the wipe sample results above 100 $\mu\text{g}/100\text{ cm}^2$ for the metals of concern at the site: cadmium, chromium, copper, lead, nickel, zinc, and cyanide. All but 10 samples exceeded the clearance criterion for lead, i.e., 88% of the wipe samples collected exceeded the criterion.

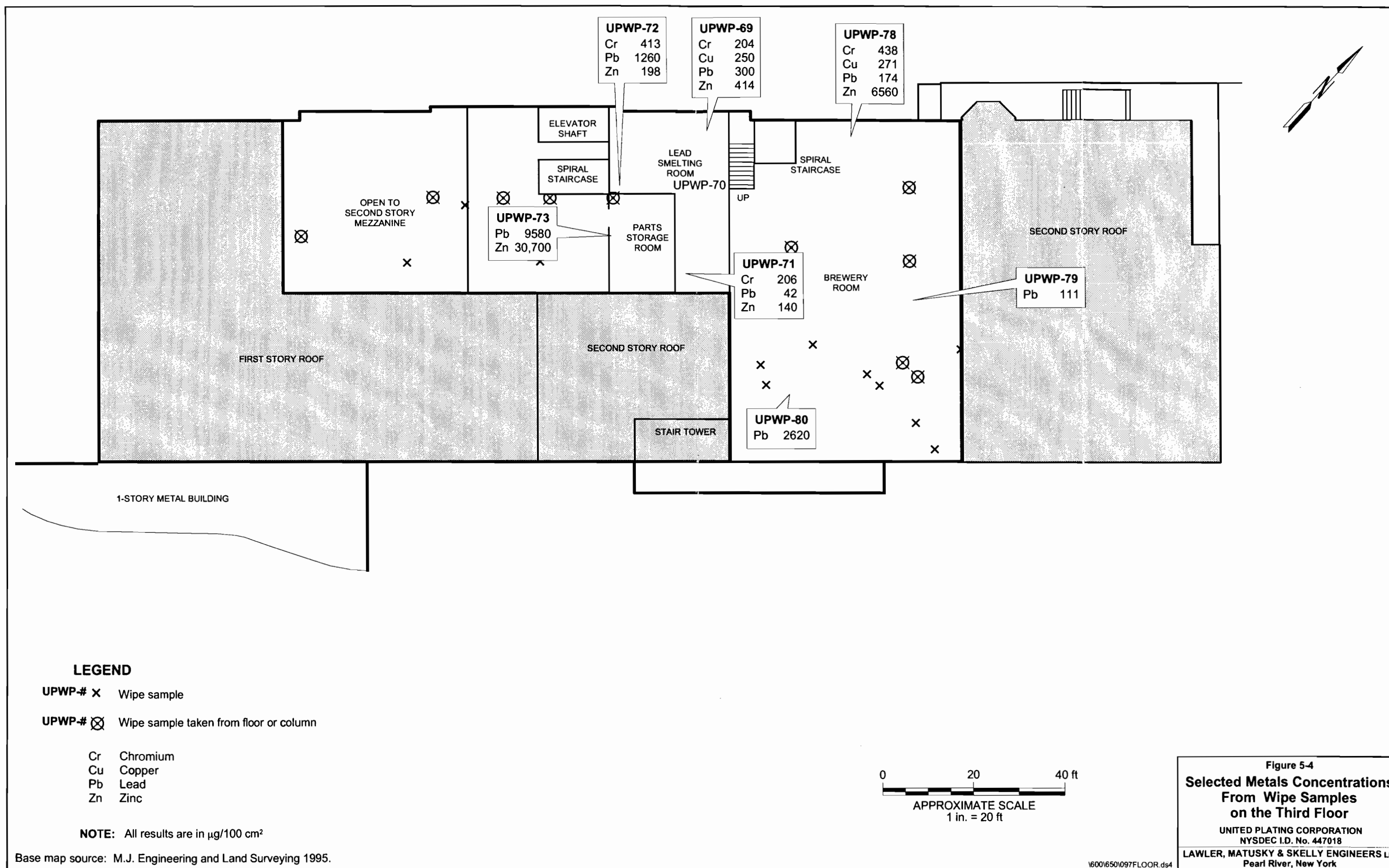
The wipe samples have been separated into equipment/debris or wall/column samples. This separation was made to allow the removable debris and equipment to be evaluated separately from the structural portions of the building that would require demolition for removal. The number in parentheses below indicates the number of samples in which that particular analyte was detected above 100 $\mu\text{g}/100\text{ cm}^2$ for the other metals of concern.

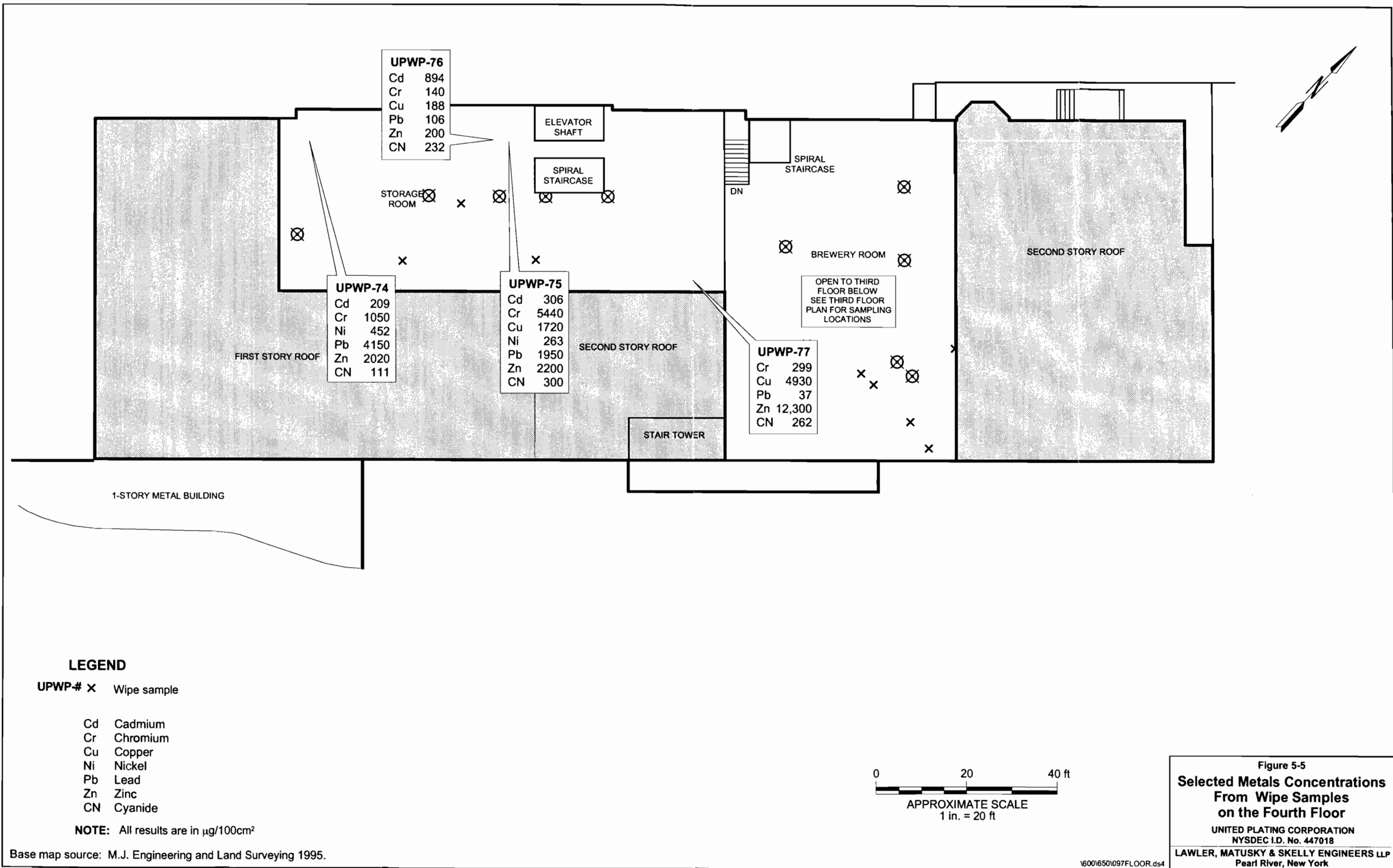
First Floor Wipe Samples. A total of 47 wipe samples were collected on the first floor of the main building (Figure 5-2), 19 of which were collected from building walls or support columns. The remaining 28 samples were taken from debris, equipment, and other objects within the building. Sixteen samples (12 equipment/debris and four wall/column) were collected in the silver plating room. The walls and/or columns were contaminated with chromium (three), copper (two), lead (three), nickel (one), zinc (two), and/or cyanide (two), with the results ranging as follows: chromium from 130 to 739 $\mu\text{g}/100\text{ cm}^2$, copper from 266 to 5090 $\mu\text{g}/100\text{ cm}^2$, lead from 75 to 311 $\mu\text{g}/100\text{ cm}^2$, nickel at 246 $\mu\text{g}/100\text{ cm}^2$, zinc at 153 and 433 $\mu\text{g}/100\text{ cm}^2$, and cyanide at 147 and 751 $\mu\text{g}/100\text{ cm}^2$. UPWP-12, taken from the yellow wall above the work bench in the silver plating room, was relatively clean. The 12 debris and equipment locations in the silver plating room were contaminated with cadmium (one), chromium (nine), copper (11), lead (12), nickel (eight), zinc (11), and cyanide (11), with the results ranging as follows: cadmium at 1130 $\mu\text{g}/100\text{ cm}^2$, chromium from 347 to 6640 $\mu\text{g}/100\text{ cm}^2$, copper from 152 to 3310 $\mu\text{g}/100\text{ cm}^2$, lead from 40 to 5150 $\mu\text{g}/100\text{ cm}^2$, nickel from 158 to 1630 $\mu\text{g}/100\text{ cm}^2$, zinc from 131 to 9170 $\mu\text{g}/100\text{ cm}^2$, and cyanide from 100 to 2900 $\mu\text{g}/100\text{ cm}^2$.

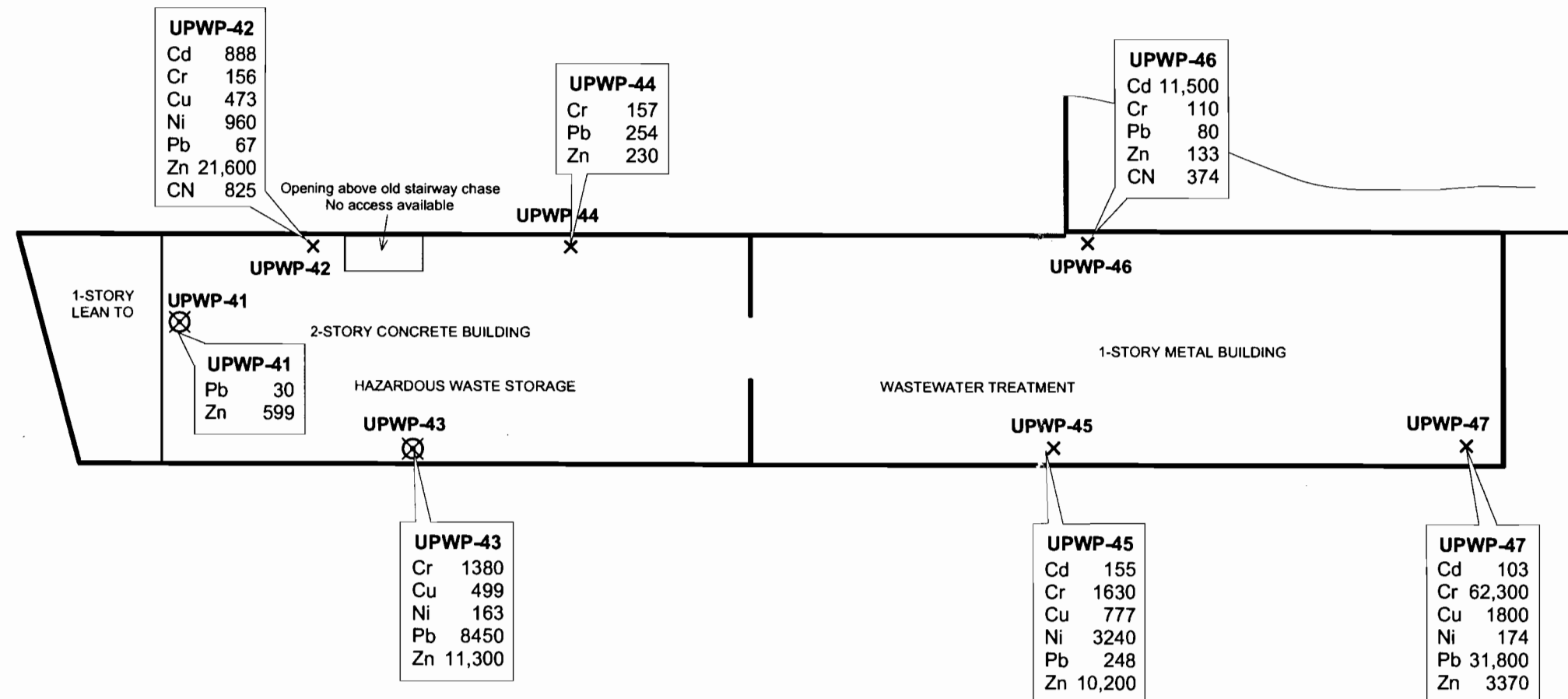
Nine samples (five equipment/debris and four wall/column) were collected in the chrome plating room. The walls and/or columns were contaminated with chromium (four), copper (two), lead (four), and/or zinc (one), with the results ranging as follows: chromium from 153 to 1450 $\mu\text{g}/100\text{ cm}^2$, copper at 114 and 359 $\mu\text{g}/100\text{ cm}^2$, lead from 26 to 21,600 $\mu\text{g}/100\text{ cm}^2$, and zinc at 128 $\mu\text{g}/100\text{ cm}^2$. The five debris and equipment locations in the chrome plating











LEGEND

- UPWP-# X Wipe sample
UPWP-# ⊗ Wipe sample taken from wall or column

Cd Cadmium
Cr Chromium
Cu Copper
Ni Nickel
Pb Lead
Zn Zinc
CN Cyanide

NOTE: All results are in µg/100 cm²

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

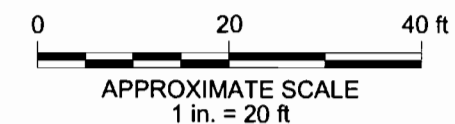


Figure 5-6
**Selected Metals Concentrations
From Wipe Samples From the
Wastewater Treatment Building**
UNITED PLATING CORPORATION
NYSDEC I.D. No. 447018
LAWLER, MATUSKY & SKELLY ENGINEERS LLP
Pearl River, New York

160016501097wrtb.ds4

room were contaminated with chromium (four), copper (one), lead (five), nickel (one), and zinc (two), with the results ranging as follows: chromium from 721 to 7130 $\mu\text{g}/100\text{ cm}^2$, copper at 3100 $\mu\text{g}/100\text{ cm}^2$, lead from 217 to 16,000 $\mu\text{g}/100\text{ cm}^2$, nickel at 101 $\mu\text{g}/100\text{ cm}^2$, and zinc at 1050 and 16,300 $\mu\text{g}/100\text{ cm}^2$. Two samples were collected from walls in the office area, both of which showed low levels of contamination, i.e., $< 100\text{ }\mu\text{g}/100\text{ cm}^2$.

Twenty samples (11 equipment/debris and nine wall/column) were collected in the main plating room. The walls and/or columns were contaminated with chromium (six), copper (two), lead (eight), nickel (one), zinc (five), and/or cyanide (five), with the results ranging as follows: chromium from 108 to 1760 $\mu\text{g}/100\text{ cm}^2$, copper at 335 and 354 $\mu\text{g}/100\text{ cm}^2$, lead from 56 to 3980 $\mu\text{g}/100\text{ cm}^2$, nickel at 843 $\mu\text{g}/100\text{ cm}^2$, zinc from 132 to 6490 $\mu\text{g}/100\text{ cm}^2$, and cyanide from 158 to 287 $\mu\text{g}/100\text{ cm}^2$. UPWP-50 showed low levels of contamination, i.e., $< 100\text{ }\mu\text{g}/100\text{ cm}^2$. The 11 debris and equipment locations in the main plating room were contaminated with cadmium (eight), chromium (eight), copper (10), lead (11), nickel (nine), zinc (10), and cyanide (eight), with the results ranging as follows: cadmium from 140 to 56,200 $\mu\text{g}/100\text{ cm}^2$, chromium from 104 to 46,200 $\mu\text{g}/100\text{ cm}^2$, copper from 673 to 12,400 $\mu\text{g}/100\text{ cm}^2$, lead from 161 to 6410 $\mu\text{g}/100\text{ cm}^2$, nickel from 118 to 19,200 $\mu\text{g}/100\text{ cm}^2$, zinc from 226 to 15,100 $\mu\text{g}/100\text{ cm}^2$, and cyanide from 140 to 4650 $\mu\text{g}/100\text{ cm}^2$. The main plating room appears to be more contaminated than the other rooms on the first floor, and it is the only room on the first floor with significant cadmium contamination. The most contamination appears to be associated with small vats in the main plating room.

Second Floor Wipe Samples. A total of 17 wipe samples were collected on the second floor of the main building (Figure 5-3), nine of which were collected from building walls or support columns. The remaining 12 samples were taken from debris, equipment, and other objects within the building. Five samples (four equipment/debris and one wall/column) were collected in the anodizing room. Wall/column location UPWP-54 exhibited a low level of contamination, i.e., $< 100\text{ }\mu\text{g}/100\text{ cm}^2$. Three of the debris and equipment locations in the anodizing room were contaminated with chromium (two), copper (two), lead (three), nickel (one), and zinc (one), with the results ranging as follows: chromium at 100 and 919 $\mu\text{g}/100\text{ cm}^2$, copper at 639 and 3260 $\mu\text{g}/100\text{ cm}^2$, lead from 312 to 676 $\mu\text{g}/100\text{ cm}^2$, nickel at 143 $\mu\text{g}/100\text{ cm}^2$, and zinc at 1870 $\mu\text{g}/100\text{ cm}^2$. Equipment/debris location UPWP-51 exhibited a low level of contamination, i.e., $< 100\text{ }\mu\text{g}/100\text{ cm}^2$.

Four samples (three equipment/debris and one wall/column) were collected in the pipe and spring room. The wall and/or column was contaminated with chromium, copper, lead, and zinc with the results as follows: chromium at 899 $\mu\text{g}/100\text{ cm}^2$, copper at 756 $\mu\text{g}/100\text{ cm}^2$, lead at 109, and zinc at 192 $\mu\text{g}/100\text{ cm}^2$. The three debris and equipment locations in the anodizing room were contaminated with chromium (three), copper (three), lead (three), nickel (three), zinc (three), and cyanide (two), with the results ranging as follows: chromium from 15,400 to 60,900 $\mu\text{g}/100\text{ cm}^2$, copper from 758 to 286,000 $\mu\text{g}/100\text{ cm}^2$, lead from 327 to 6240 $\mu\text{g}/100\text{ cm}^2$, nickel from 161 to 18,900 $\mu\text{g}/100\text{ cm}^2$, zinc from 184 to 1880 $\mu\text{g}/100\text{ cm}^2$, and cyanide at 189 and 5510 $\mu\text{g}/100\text{ cm}^2$.

Two samples (one equipment/debris and one wall/column) were collected in the parts storage room. The wall/column location was contaminated with chromium, copper, lead, nickel, zinc, and cyanide, with results as follows: chromium at 2760 $\mu\text{g}/100\text{ cm}^2$, copper at 1570 $\mu\text{g}/100\text{ cm}^2$, lead at 290 $\mu\text{g}/100\text{ cm}^2$, nickel at 5380 $\mu\text{g}/100\text{ cm}^2$, zinc at 704 $\mu\text{g}/100\text{ cm}^2$, and cyanide at 824 $\mu\text{g}/100\text{ cm}^2$. The equipment/debris location was contaminated with lead at a concentration of 78 $\mu\text{g}/100\text{ cm}^2$.

Five wall/column samples were collected in the chemical storage room. The wall or column locations were contaminated with chromium (one), lead (five), zinc (two), and cyanide (one), with the results ranging as follows: chromium at 1920 $\mu\text{g}/100\text{ cm}^2$, lead from 29 to 8520 $\mu\text{g}/100\text{ cm}^2$, zinc at 107 and 253 $\mu\text{g}/100\text{ cm}^2$, and cyanide at 105 $\mu\text{g}/100\text{ cm}^2$. Two wall/column samples were collected in the second floor office area. The two sample locations in the office area exhibited low levels of contamination, i.e., $< 100\text{ }\mu\text{g}/100\text{ cm}^2$.

Third Floor Wipe Samples. A total of eight wipe samples were collected on the third floor of the main building (Figure 5-4), four of which were collected from building walls or support columns. The remaining four samples were taken from debris, equipment, and other objects within the building. Four samples (one equipment/debris and three wall/column) were collected in the lead smelting room. The walls and/or columns were contaminated with chromium (two), lead (two), and/or zinc (two), with the results ranging as follows: chromium at 206 and 413 $\mu\text{g}/100\text{ cm}^2$, lead at 42 and 1260 $\mu\text{g}/100\text{ cm}^2$, and zinc at 140 and 198 $\mu\text{g}/100\text{ cm}^2$. Wall/column location UPWP-70 exhibited a low level of contamination, i.e., $< 100\text{ }\mu\text{g}/100\text{ cm}^2$. One sample taken from the smelter oven bottom was contaminated with chromium, copper, lead, and zinc, with results as follows: chromium at 204 $\mu\text{g}/100\text{ cm}^2$, copper at 250 $\mu\text{g}/100\text{ cm}^2$, lead at 300 $\mu\text{g}/100\text{ cm}^2$, and zinc at 414 $\mu\text{g}/100\text{ cm}^2$.

Three samples (two equipment/debris and one wall/column) were collected in the brewery room. The wall and/or column was contaminated with lead with a concentration of 2620 $\mu\text{g}/100\text{ cm}^2$. The two debris and equipment locations in the brewery room were contaminated with chromium (one), copper (one), lead (two), and zinc (one), with the results ranging as follows: chromium at 438 $\mu\text{g}/100\text{ cm}^2$, copper at 271 $\mu\text{g}/100\text{ cm}^2$, lead at 111 and 174 $\mu\text{g}/100\text{ cm}^2$, and zinc at 6560 $\mu\text{g}/100\text{ cm}^2$. An equipment/debris sample location in the third floor parts storage room was contaminated with lead at 9580 $\mu\text{g}/100\text{ cm}^2$, and zinc at 30,700 $\mu\text{g}/100\text{ cm}^2$.

Fourth Floor Wipe Samples. A total of four wipe samples (equipment/debris) were collected in the fourth floor storage room of the main building (Figure 5-5). The four debris and equipment locations in the fourth floor storage room were contaminated with cadmium (three), chromium (four), copper (three), lead (four), nickel (two), zinc (four), and cyanide (four), with the results ranging as follows: cadmium from 209 to 894 $\mu\text{g}/100\text{ cm}^2$, chromium from 140 to 5440 $\mu\text{g}/100\text{ cm}^2$, copper from 188 to 4930 $\mu\text{g}/100\text{ cm}^2$, lead from 37 to 4150 $\mu\text{g}/100\text{ cm}^2$, nickel at 263 and 452 $\mu\text{g}/100\text{ cm}^2$, zinc from 200 to 12,300 $\mu\text{g}/100\text{ cm}^2$, and cyanide from 111 to 300 $\mu\text{g}/100\text{ cm}^2$.

Wastewater Treatment Building Wipe Samples. A total of seven wipe samples were collected from the wastewater treatment building (Figure 5-6), two of which were collected from building walls or support columns. The remaining five samples were taken from debris, equipment, and other objects within the building. The walls and/or columns were contaminated with chromium (one), copper (one), lead (two), nickel (one), and zinc (two), with the results ranging as follows: chromium at 1380 $\mu\text{g}/100\text{ cm}^2$, copper at 499 $\mu\text{g}/100\text{ cm}^2$, lead at 30 and 8450 $\mu\text{g}/100\text{ cm}^2$, nickel at 163 $\mu\text{g}/100\text{ cm}^2$, and zinc at 599 and 11,300 $\mu\text{g}/100\text{ cm}^2$. The five debris and equipment locations in the wastewater treatment building were contaminated with cadmium (four), chromium (five), copper (three), lead (five), nickel (three), zinc (five), and cyanide (two), with the results ranging as follows: cadmium from 103 to 11,500 $\mu\text{g}/100\text{ cm}^2$, chromium from 110 to 62,300 $\mu\text{g}/100\text{ cm}^2$, copper from 473 to 1800 $\mu\text{g}/100\text{ cm}^2$, lead from 67 to 31,800 $\mu\text{g}/100\text{ cm}^2$, nickel from 174 to 3240 $\mu\text{g}/100\text{ cm}^2$, zinc from 133 to 21,600 $\mu\text{g}/100\text{ cm}^2$, and cyanide at 374 and 825 $\mu\text{g}/100\text{ cm}^2$.

5.2.1.2 Sweep Samples. Fifty sweep samples were collected inside the building and analyzed for TAL metals and cyanide and TCLP metals. The results are shown on Table 5-10. The values in bold face type exceed the TCLP limits. Thirty-three out of the 50 samples collected

TABLE 5-10 (Page 1 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP1	UPSP2	UPSP3	UPSP4	UPSP5	UPSP6	UPSP7	UPSP8	UPSP09
TAL METALS (mg/kg)									
Aluminum	4,630 E	10,200 E	6,130 E	5,000 E	224 E	9,070 E	4,610 E	12,300 E	6,150 E
Antimony	6.8 B N	59 N	246 N	55,000 N	20 N	87 N	ND N	32 N	6.1 B N
Arsenic	ND	ND	5.3	84	ND	ND	ND	ND	24 N
Barium	460 N	175 N	138 N	1,450 N	284 N	1,190 N	62 N	661 N	1,970 E N
Beryllium	0.31 B	0.64 B	0.80 B	0.22 B	ND	0.5 B	0.35 B	0.82 B	0.40 B
Cadmium	133 E	163 E	1,050 E	80 E	16 E	195 E	588 E	197 E	129 N
Calcium	15,900 E	17,000 E	13,900 E	26,500 E	5,300 E	37,600 E	4,970 E	20,800 E	24 B
Chromium	3,030	3,100	717	5,670	50,500	23,200	268	1,930	45 E N
Cobalt	30	193	32	253	3.4 B	16,900	17	199	31 N
Copper	934 E	885 E	701 E	3,770 E	64 E	907 E	440 E	1,550 E	895 E
Iron	240,000 E	90,700 E	49,100 E	161,000 E	639 E	39,500 E	346,000 E	71,000 E	27,700 E
Lead	728	7,470	1,810	2,750	243	6,900	569	4,170	367 E N
Magnesium	3,410 E	6,200 E	3,900 E	2,270 E	529 B E	5,180 E	3,420 E	7,620 E	4,290 E
Manganese	851 N	688 N	526 N	609 N	15 N	325 N	1,000 N	479 N	1.3 E N
Mercury	1.3 N	0.35 N	0.30 N	0.89 N	0.18 N	1.8 N	0.19 N	0.2 B N	0.69
Nickel	95 N	210 N	121 N	394 N	93 N	1,400 N	101 N	255 N	241 N
Potassium	2,880 E	5,850 E	3,680 E	2,590 E	150 B E	5,580 E	1,610 E	10,500 E	4,230 E
Selenium	ND N	ND N	ND N	ND N	1.2 N	ND N	2.8 N	ND N	1.2 B N
Silver	74 E	239 E	185 E	221 E	22 E	258 E	80 E	320 E	ND
Sodium	15,400 E	72,600 E	4,220 E	5,090 E	591 B E	32,800 E	84,000 E	69,900 E	22,400 E
Thallium	ND	ND	ND	ND	ND	71	ND	ND	ND N
Vanadium	32	33	17	22	4.7 B	22	20	33	53 N
Zinc	8,360 E	3,940 E	61,900 E	7,960 E	168 E	17,100 E	25,400 E	2,250 E	7,650 E
Cyanide	792	478	433	776	ND	1,970	634	544	96 B

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.

ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 2 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP10	UPSP11	UPSP12	UPSP13	UPSP14	UPSP15	UPSP16	UPSP17	UPSP18
TAL METALS (mg/kg)									
Aluminum	2,690 E	7,710 E	2,850 E	16,200 E	8,550 E	28,400 E	2,740 E	659 E	6,380 E
Antimony	ND N	326 N	5.9 B N	111 N	968 N	19 N	1,520 N	186 N	27 N
Arsenic	5.3	7.7	ND	1.4 B	22	ND	13	81	4.5
Barium	321 N	443 N	917 N	164 N	345 N	295 N	373 N	51 N	308 N
Beryllium	ND	0.52 B	0.10 B	2.6	0.80	1.8	0.17 B	ND	0.39 B
Cadmium	20 E	656 E	258 E	132 E	367 E	57 E	303 E	77 E	156 E
Calcium	63,900 E	23,100 E	24,400 E	16,200 E	26,500 E	7,520 E	14,400 E	9,200 E	34,800 E
Chromium	133	8,720	2,120	31,700	13,100	5,900	26,300	3,030	1,910
Cobalt	11	220	231	43	176	17	47	22	23
Copper	134 E	6,820 E	625 E	1,270 E	2,950 E	306 E	7,010 E	33,300 E	593 E
Iron	63,000 E	67,000 E	46,900 E	36,100 E	77,700 E	19,500 E	89,300 E	ND E	48,800 E
Lead	4,280	45,500	1,290	14,700	53,700	1,180	69,000	2,810	5,860
Magnesium	3,130 E	7,400 E	3,170 E	10,300 E	6,000 E	13,700 E	1,620 E	3,350 E	3,450 E
Manganese	443 N	729 N	457 N	373 N	743 N	417 N	807 N	1,740 N	342 N
Mercury	3.3 N	1.1 N	0.31 N	0.42 N	1.8 N	ND N	0.86 N	0.49 N	1.9 N
Nickel	48 N	997 N	132 N	361 N	591 N	211 N	1,680 N	298 N	931 N
Potassium	898 B E	2,870 E	2,040 E	2,880 E	2,140 E	3,900 E	1,000 E	329 B E	2,730 E
Selenium	ND N	ND N	0.85 B N	ND N	ND N	2.5 N	ND N	ND N	1.3 N
Silver	4.4 E	136 E	233 E	353 E	175 E	185 E	182 E	36 E	35 E
Sodium	970 E	5,490 E	3,110 E	541 B E	595 B E	2,980 E	1,280 E	6,270 E	1,340 E
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	16	27	14	58	37	67	19	16	22
Zinc	7,440 E	2,650 E	979 E	3,280 E	2,970 E	269 E	1,970 E	405 E	1,780 E
Cyanide	70	175	47	103	50	118	96	27	61

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.

ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 3 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP19	UPSP20	UPSP21	UPSP22	UPSP23	UPSP24	UPSP25	UPSP26	UPSP27
TAL METALS (mg/kg)									
Aluminum	11,400 E	5,140 E	5,850 E	4,340 E	11,700 E	7,440 E	7,380 E	6,520 E	18,900 E
Antimony	1.3 B N	52 N	78 N	48 N	ND N	ND N	37 N	127 N	ND N
Arsenic	8.2	6.6	4.7	8.2	1.1 B	ND	4.5	5.1	ND
Barium	172 N	256 N	3,210 N	1.8 B N	769 N	421 N	1,180 N	888 N	0.22 B N
Beryllium	0.66 B	0.43 B	0.21 B	ND	1.0	0.81 B	0.43 B	0.34 B	2.1
Cadmium	165 E	520 E	2,640 E	618 E	46 E	523 E	1,190 E	484 E	26 E
Calcium	56,500 E	24,100 E	26,200 E	628 B E	38,600 E	20,600 E	30,900 E	32,900 E	79,900 E
Chromium	580	2,500	4,790	2,310	435	826	15,000	5,100	956
Cobalt	17	45	171	15	5.7 B	9.2 B	56	38	21
Copper	954 E	2,470 E	4,850 E	3,900 E	29,900 E	2,110 E	7,560 E	82,100 E	660 E
Iron	48,900 E	86,100 E	197,000 E	622 E	34,300 E	21,300 E	83,700 E	159,000 E	89,100 E
Lead	1,340	8,330	8,860	1,400	196	836	11,900	20,800	268
Magnesium	6,270 E	6,270 E	5,370 E	39 B E	16,000 E	9,930 E	4,800 E	5,840 E	31 B E
Manganese	443 N	664 N	957 N	3.3 N	818 N	411 N	841 N	963 N	6.1 N
Mercury	1.3 N	2.8 N	3.0 N	1.9 N	5.4 N	0.92 N	1.4 N	1.5 N	1.3 N
Nickel	620 N	10,400 N	3,290 N	1,510 N	49 N	370 N	14,000 N	689 N	52 N
Potassium	3,120 E	2,800 E	2,900 E	2,820 E	58,600 E	3,450 E	2,040 E	3,100 E	981 E
Selenium	ND N	ND N	ND N	ND N	6.1 N	1.6 N	ND N	ND N	14 N
Silver	12 E	145 E	63 E	0.98 B E	26 E	12 E	43 E	59 E	4.3 E
Sodium	602 B E	2,910 E	21,900 E	1,390 E	33,700 E	137,000 E	3,560 E	3,290 E	1,280 E
Thallium	ND	ND	ND	ND	ND	11	ND	ND	ND
Vanadium	44	34	27	ND	47	35	32	26	22
Zinc	3,320 E	2,610 E	19,400 E	2,140 E	1,110 E	2,050 E	4,720 E	5,460 E	1,360 E
Cyanide	49	224	230	206	2,750	37	609	207	8.7

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.

ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 4 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP28	UPSP29	UPSP30	UPSP31	UPSP32	UPSP33	UPSP34	UPSP35	UPSP36
TAL METALS (mg/kg)									
Aluminum	19,000 E	8,750 E	7,630 E	9,040 E	9,030 E	4,770 E	7,420 E	3,860 E	9,660 E
Antimony	ND N	7.6 B N	51 N	736 N	8.1 B N	38 N	14 N	ND N	ND N
Arsenic	ND	7.7	9.3	87	6.7	ND	5.4	4.0 N	21 N E
Barium	0.38 B N	545 N	1,160 N	433 N	568 N	241 N	258 N	608 E N	535 E N
Beryllium	ND	0.18 B	0.25 B	0.75 B	0.63 B	0.62 B	0.44 B	0.22 B	0.59
Cadmium	20 E	156 E	319 E	97 E	69 E	83 E	80 E	20 N	307 N
Calcium	117,000 E	143,000 E	42,500 E	53,400 E	48,700 E	31,800 E	48,900 E	88,200	54,200
Chromium	589	1,750	1,800	13,600	11,300	145,000	45,100	1,160 E N	1,060 E N
Cobalt	3.6 B	12	32	22	18	15	16	7.5 N	21 N
Copper	1,610 E	5,520 E	1,130 E	2,670 E	326 E	3,150 E	337 E	589 E	1,800 E
Iron	46,200 E	51,200 E	153,000 E	63,400 E	47,200 E	30,000 E	29,700 E	12,900 E	175,000 E
Lead	1,030	2,480	16,300	3,050	2,170	11,600	3,940	7,340 E N	10,300 E N
Magnesium	94,700 E	6,540 E	4,030 E	7,890 E	9,790 E	4,430 E	4,770 E	3,990 E	7,000 E
Manganese	1.1 B N	450 N	755 N	426 N	573 N	229 N	271 N	189 E N	910 E N
Mercury	0.55 N	3.2 N	0.89 N	0.22 N	0.35 N	0.10 N	0.28 N	2.3	0.23
Nickel	87 N	237 N	341 N	2,870 N	401 N	491 N	973 N	42 N	212 N
Potassium	1,520 E	1,600 E	2,020 E	8,720 E	10,300 E	18,900 E	4,760 E	1,690 E	3,000 E
Selenium	8.0 N	1.1 N	ND N	ND N	15 N	ND N	1.2 N	ND N	ND N E
Silver	0.46 B E	192 E	225 E	16 E	35 E	12 E	13 E	4.0	32
Sodium	1,020 E	718 B E	1,360 E	13,300 E	5,810 E	20,800 E	15,400 E	1,380 E	796 B E
Thallium	ND	ND	ND	ND	ND	ND	ND	ND N	ND N
Vanadium	1.9 B	37	34	37	51	22	29	27 N	23 N E
Zinc	516 E	2,340 E	4,510 E	1,060 E	874 E	1,200 E	13,500 E	477 E	2,300 E
Cyanide	449	202	100	104	51	47	41	0.49 B	25

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.

ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 5 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP37	UPSP38	UPSP39	UPSP40	UPSP41	UPSP42	UPSP43	UPSP44	UPSP45
TAL METALS (mg/kg)									
Aluminum	6,730 E	8,720 E	9,670 E	8,270 E	270 E	9,090 E	789 E	5,410 E	8,790 E
Antimony	1,060 N	84 N	1.5 B N	ND N	16 N	ND N	ND N E	13 N	1.4 B N
Arsenic	84 N	10 N	2.1 N	12 N	ND N E	11 N	ND N E	18 N	6.9 N
Barium	64 E N	818 E N	610 E N	771 E N	26 B E N	474 E N	185 E N	267 E N	457 E N
Beryllium	1.1 B	0.52 B	0.40 B	0.37 B	ND	0.55 B	ND	0.50 B	0.54 B
Cadmium	2.9 N E	81 N	306 N	40 N	ND N E	2,200 N	52 N	92 N	1,120 N
Calcium	4,570	101,000	32,200	83,200	1,090 B	63,400	5,470	37,300	29,200
Chromium	270,000 E N	4,820 E N	333 E N	896 E N	281 E N	194 E N	458 E N	59,800 E N	12,900 E N
Cobalt	9.3 B N	13 N	9.4 N	11 N	127 N	9.8 N	14 N	8.8 B N	202 N
Copper	2,550 E	4,940 E	418 E	509 E	150 E	5,100 E	197 E	1,290 E	3,660 E
Iron	28,300 E	37,000 E	54,000 E	44,600 E	2,340 E	49,500 E	725,000 E	62,400 E	51,400 E
Lead	154 E N	6,420 E N	1,820 E N	1,420 E N	ND E N	894 E N	2,500 E N	1,020 E N	2,580 E N
Magnesium	4,330 E	6,030 E	4,800 E	8,030 E	1,500 E	7,520 E	1,760 E	6,370 E	7,670 E
Manganese	405 E N	366 E N	346 E N	404 E N	14 E N	385 E N	1,750 E N	400 E N	393 E N
Mercury	0.11	3.0	0.23	0.77	0.87	0.45	0.19	ND	0.20
Nickel	195 N	220 N	91 N	105 N	177,000 N	400 N	87 N	108 N	3,440 N
Potassium	3,290 E	5,980 E	3,510 E	8,610 E	507 B E	6,060 E	403 B E	1,500 E	3,120 E
Selenium	ND N E	ND N E	ND N	ND N E	ND N E	ND N E	ND N E	ND N	ND N E
Silver	3.8	9.0	219	128	0.72 B	8.6	3.4	22	56
Sodium	1,560 E	13,600 E	2,220 E	7,480 E	2,100 E	17,000 E	1,100 B E	792 B E	2,530 E
Thallium	9.5 N E	ND N E	ND N	ND N	ND N E	ND N E	2.5 B E N	ND N E	ND N E
Vanadium	66 N	18 N	30 N	44 N	2.0 B N	19 N	31 N	23 N	25 N
Zinc	ND E	900 E	638 E	794 E	147 E	729 E	856 E	392 E	4,690 E
Cyanide	ND	33	88 B	76	56 B	170	ND	41	737

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.

ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 6 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP46	UPSP47	UPSP48	UPSP49	UPSP50	UPFBO4 (µg/l)
TAL METALS (mg/kg)						
Aluminum	3,290 E	5,290 E	11,800 E	6,300 E	5,930 E	21 B
Antimony	2.7 B N	18 N	ND N	ND N E	ND N	11 B
Arsenic	17 N	46 N	ND N	21 N E	0.89 B N	ND
Barium	2,340 E N	1,940 E N	189 E N	1,220 E N	464 E N	ND
Beryllium	0.35 B	0.39 B	1.1 B	0.29 B	0.20 B	ND
Cadmium	41 N	209 N	2,750 N	6,140 N	1,080 N	ND
Calcium	85,000	62,600	6,220	15,400	20,000	1,100
Chromium	257 E N	1,550 E N	165 E N	618 E N	2,900 E N	15
Cobalt	12 N	47 N	ND N	47 N	31 N	ND
Copper	135 E	334 E	40 E	558 E	1,460 E	ND
Iron	9,350 E	58,400 E	78,300 E	412,000 E	95,000 E	60 B
Lead	4,370 E N	13,200 E N	278 E N	1,330 E N	2,870 E N	ND
Magnesium	2,920 E	4,530 E	10,000 E	3,780 E	5,270 E	ND
Manganese	177 E N	334 E N	619 E N	1,300 E N	1,990 E N	ND
Mercury	1.5	1.9	ND	0.27	0.10	ND
Nickel	61 N	377 N	10 N	495 N	479 N	ND
Potassium	6,210 E	2,440 E	2,720 E	4,780 E	1,940 E	ND
Selenium	ND N	ND N	ND N E	ND N E	ND N E	ND
Silver	14	17	71	6.7	5.1	ND
Sodium	3,460 E	6,910 E	73,200 E	15,900 E	14,500 E	238 B
Thallium	ND N	ND N	4.6 N E	ND N E	ND N E	ND
Vanadium	68 N	94 N	27 N	43 N	26 N	ND
Zinc	4,190 E	15,600 E	68,300 E	5,940 E	2,580 E	13 B
Cyanide	41	79	3,920	189	56	20 B

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.

ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 7 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP1	UPSP2	UPSP3	UPSP4	UPSP5	UPSP6	UPSP7	UPSP8	UPSP9	TCLP STANDARDS
TCLP METALS (mg/l)										
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	0.068 B N	5.0
Barium	0.21 B E	0.20 B E	0.43 B E	0.11 B E	0.54 B E	0.13 B E	0.25 B E	0.17 B E	ND	100
Cadmium	0.77 E	0.12 E	5.7 E	0.38 E	0.76 E	2.1 E	0.024 B E	0.066 E	ND	1.0
Chromium	1.8 E	14 E	0.069 B E	49 E	2,336 E	4.3 E	0.083 B E	2.7 E	4.7	5.0
Lead	0.034	1.8	0.035	ND	ND	1.1	ND	0.51	ND E	5.0
Mercury	0.017 N	0.0093 N	0.0055 N	0.020 N	0.0031 N	0.018 N	ND N	0.0036 N	0.0011	0.2
Selenium	ND	ND	ND	ND	ND	ND	0.037 B	0.052	ND	1.0
Silver	1.4 N E	3.1 N E	1.2 N E	1.4 N E	0.16 N E	0.94 N E	0.062 B N E	3.4 N E	ND	5.0

NOTE: Numbers in bold exceed TCLP standards.

- 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.
 ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 8 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP10	UPSP11	UPSP12	UPSP13	UPSP14	UPSP15	UPSP16	UPSP17	UPSP18	TCLP STANDARDS
TCLP METALS (mg/l)										
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.0
Barium	0.53 B E	0.83 B E	ND E	0.62 B E	1.6 B E	0.39 B E	0.56 B E	0.33 B E	0.14 B E	100
Cadmium	0.15 E	16 E	4.8 E	2.0 E	4.4 E	1.7 E	7.1 E	1.3 E	0.55 E	1.0
Chromium	0.097 B E	4.2 E	0.88 E	0.78 E	ND E	138 E	1.5 E	0.18 E	0.15 E	5.0
Lead	9.7	18	0.78	55	5.8	20	144	4.4	0.21	5.0
Mercury	ND N	0.00059 N	0.00092 N	ND N	0.00020 B N	0.0013 N	0.0011 N	0.00054 N	0.00021 N	0.2
Selenium	ND	ND	ND	ND	0.22	ND	ND	0.032 B	ND	1.0
Silver	ND N E	ND N E	0.44 N E	ND N E	ND N E	0.32 N E	0.026 B N E	ND N E	ND N E	5.0

NOTE: Numbers in bold exceed TCLP standards.

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E - Value estimated due to interference.

N - Spiked sample recovery is not within control limits.

ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 9 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP19	UPSP20	UPSP21	UPSP22	UPSP23	UPSP24	UPSP25	UPSP26	UPSP27	TCLP STANDARDS
TCLP METALS (mg/l)										
Arsenic	ND	0.14	ND	ND	ND	ND	ND	ND	ND	5.0
Barium	0.35 B E	ND E	0.11 B E	1.7 B E	0.41 B E	0.21 B E	ND E	0.15 B E	0.25 B E	100
Cadmium	2.4 E	ND E	17 E	3.1 E	ND E	5.3 E	7.1 E	20 E	0.032 B E	1.0
Chromium	0.044 B E	0.56 E	2.0 E	0.44 E	0.52 E	0.59 E	13 E	1.3 E	ND E	5.0
Lead	0.47	0.073 B	0.75	0.59	0.075	0.69	ND	26	ND	5.0
Mercury	0.0015 N	0.0026 N	0.0060 N	0.0082 N	0.00071 N	0.0017 N	0.011 N	0.0094 N	0.0085 N	0.2
Selenium	ND	ND	ND	ND	0.11	ND	ND	ND	ND	1.0
Silver	ND N E	0.017 B N E	ND N E	0.21 N E	0.29 N E	0.14 N E	0.39 N E	ND N E	ND N E	5.0

NOTE: Numbers in bold exceed TCLP standards.

- 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.
ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 10 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP28	UPSP29	UPSP30	UPSP31	UPSP32	UPSP33	UPSP34	UPSP35	UPSP36	TCLP STANDARDS
TCLP METALS (mg/l)										
Arsenic	ND	ND	ND	ND	ND	ND	0.36	ND N	ND N	5.0
Barium	0.16 B E	0.093 B E	0.24 B E	0.22 B E	0.079 B E	0.079 B E	0.13 B E	0.22 B	0.38 B	100
Cadmium	0.17 E	0.92 E	3.7 E	1.2 E	0.44 E	0.90 E	1.5 E	0.090	1.1	1.0
Chromium	0.060 B E	0.087 E	0.91 E	56 E	36 E	164 E	11 E	2.0	0.030 B	5.0
Lead	0.73	0.65	11	2.9	0.082	0.61	ND	0.91 E	2.2 E	5.0
Mercury	0.0088 N	0.0089 N	0.0056 N	0.00043 N	0.0014 N	0.00038 B N	0.00095 N	ND	ND	0.2
Selenium	ND	ND	ND	ND	ND	ND	0.38	ND	ND	1.0
Silver	ND N E	ND N E	0.45 N E	ND N E	ND N E	0.023 B N E	0.018 B N E	ND	ND	5.0

NOTE: Numbers in bold exceed TCLP standards.

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.

ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 11 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP37	UPSP38	UPSP39	UPSP40	UPSP41	UPSP42	UPSP43	UPSP44	UPSP45	TCLP STANDARDS
TCLP METALS (mg/l)										
Arsenic	ND N	ND N	ND N	ND N	ND N	ND N	ND N	ND N	ND N	5.0
Barium	0.081 B	0.083 B	ND	0.47 B	0.30 B	0.26 B	0.33 B	0.17 B	0.11 B	100
Cadmium	0.38	1.0	ND	6.1	1.2	6.2	1.1	7.1	0.53	1.0
Chromium	5,082	0.98	0.85	3.8	1.2	0.24	0.025 B	108	2.2	5.0
Lead	ND E	0.67 E	ND E	0.23 E	54 E	ND E	55 E	0.065 E	2.7 E	5.0
Mercury	0.0024	0.0060	0.0017	0.00094	0.0037	0.0038	ND	ND	0.0016	0.2
Selenium	ND	ND	0.52	ND	ND	0.61	ND	ND	ND	1.0
Silver	0.035 B	ND	ND	0.032 B	ND	0.031 B	ND	0.15	ND	5.0

NOTE: Numbers in bold exceed TCLP standards.

- 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.
 ND - Not detected at analytical detection limit.

TABLE 5-10 (Page 12 of 12)

SWEEP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSP46	UPSP47	UPSP48	UPSP49	UPSP50	TCLP STANDARDS
TCLP METALS (mg/l)						
Arsenic	0.071 B N	0.045 N	ND N	ND N	ND N	5.0
Barium	0.0093 B	0.14 B	0.16	0.091 B	0.84 B	100
Cadmium	0.035 B	1.1	14	0.75	0.94	1.0
Chromium	0.17	0.80	0.22	0.21	0.28	5.0
Lead	ND E	2.1 E	ND E	ND E	1.5 E	5.0
Mercury	ND	0.00063 B	ND	0.00026 B	ND	0.2
Selenium	ND	ND	ND	ND	ND	1.0
Silver	ND	ND	ND	ND	ND	5.0

NOTE: Numbers in bold exceed TCLP standards.

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.

ND - Not detected at analytical detection limit.

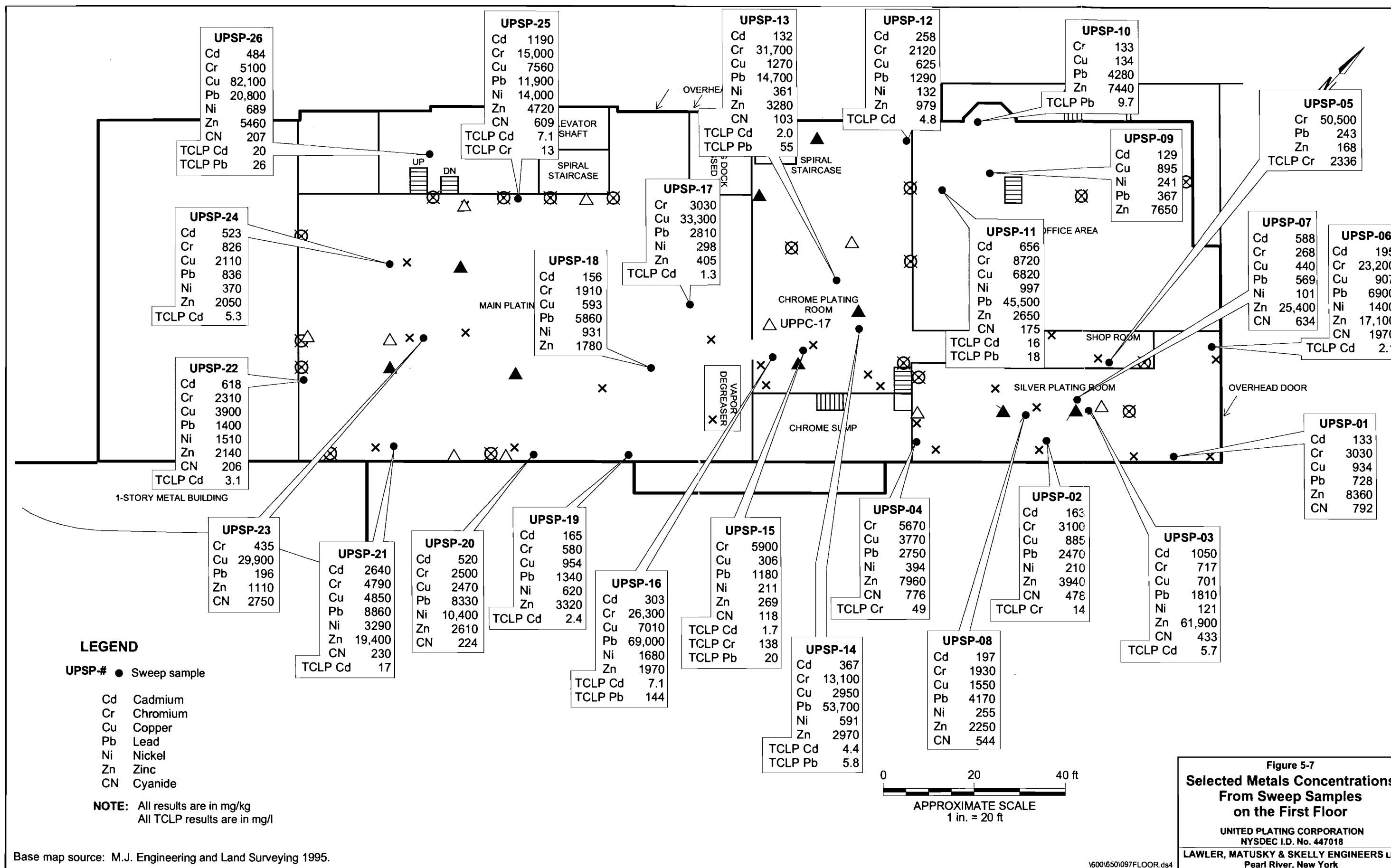
were hazardous (exceeded TCLP limits for either cadmium, chromium, or lead). The TCLP limits for cadmium, chromium, and lead were exceeded in 26, 11, and 10 samples, respectively, with chromium exceeding the limit in one sample by three orders of magnitude (the sample contained 27% chromium). Figures 5-7 to 5-11 graphically depict the sweep samples on each of the building floors.

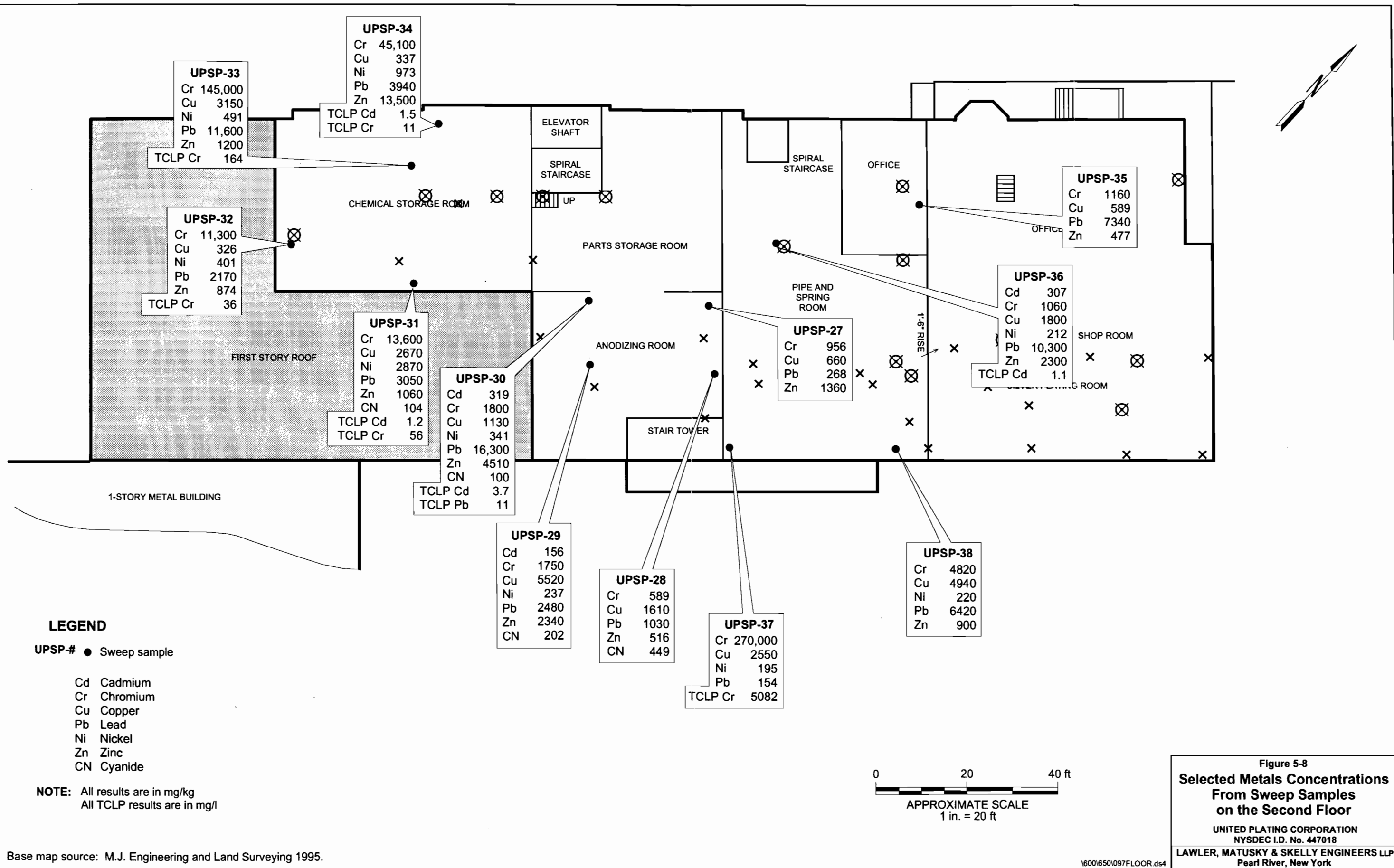
Figure 5-7 shows the first-floor sweep sample results (26 sweep samples were taken). The figure shows the cadmium, chromium, copper, lead, nickel, zinc, and cyanide concentrations greater than 100 mg/kg and any metals that exceeded a TCLP limit. Three sweep samples taken from the office were contaminated, with two of the samples exceeding the TCLP limit for lead and one for cadmium. Eight sweep samples were taken from the silver plating room; all were contaminated with chromium, lead, and zinc. Six of the samples also had cadmium, copper, and cyanide, and six of the samples also had nickel. The highest concentration of each metal is as follows: cadmium - 1050 mg/kg, chromium - 23,200 mg/kg, copper - 3770 mg/kg, lead - 6900 mg/kg, nickel - 1400 mg/kg, zinc - 61,900 mg/kg, and cyanide - 1970 mg/kg. The TCLP limit for chromium was exceeded in three samples and the TCLP limit for cadmium was exceeded in two samples.

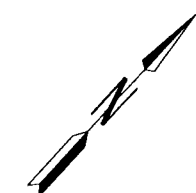
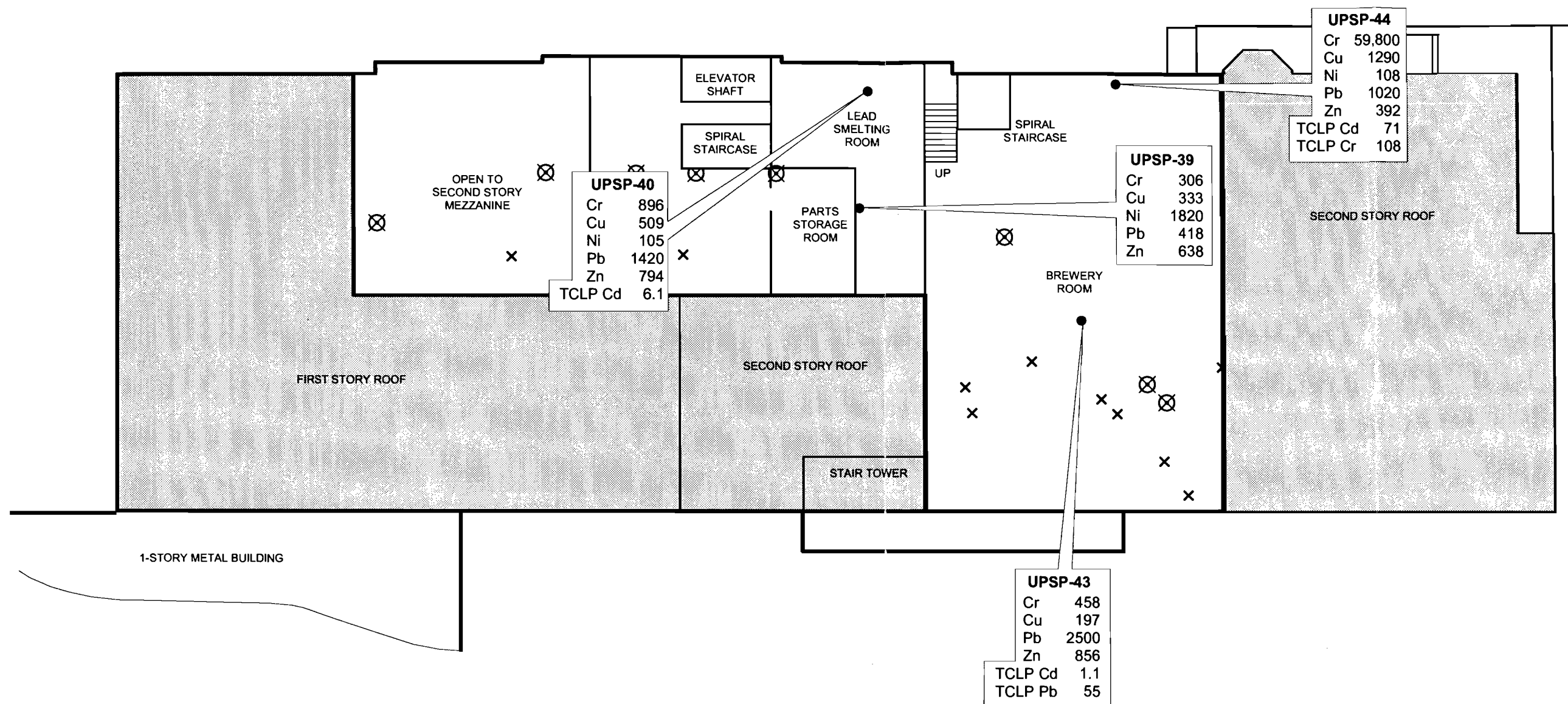
Five sweep samples were taken within the chrome plating room. The samples were contaminated with all the site-related metals, with the highest concentration of each chemical as follows: cadmium - 367 mg/kg, chromium - 31,700 mg/kg, copper - 7010 mg/kg, lead - 69,000 mg/kg, nickel - 1680 mg/kg, zinc - 3280 mg/kg, and cyanide - 118 mg/kg. All five samples had one or more metal that exceeded a TCLP metal limit. Four samples had cadmium and lead and one had chromium above the TCLP limit. One sample had a TCLP chromium concentration of 138 mg/l and another had a lead TCLP concentration of 144 mg/l.

Ten sweep samples were collected from the main plating room, with the concentrations ranging as follows: cadmium-156 to 2640 mg/kg, chromium-435 to 15,000 mg/kg, copper-573 to 82,100 mg/kg, lead-196 to 20,800 mg/kg, nickel-298 to 14,000 mg/kg, zinc-405 to 19,400 mg/kg, and cyanide-206 to 2750 mg/kg. The TCLP limit for cadmium was exceeded in seven samples, lead in one sample, and chromium in one sample.

A total of 12 sweep samples were collected on the second floor; the results are shown on Figure 5-8. One sample collected in the office had chromium, copper, lead, and zinc all above 100 mg/kg. Three samples were collected in the pipe and spring room and had chromium, copper, lead, and nickel above 100 mg/kg. One sample had cadmium and two samples had







LEGEND

UPSP-# ● Sweep sample

Cr Chromium
 Cu Copper
 Ni Nickel
 Pb Lead
 Zn Zinc

NOTE: All results are in mg/kg
 All TCLP results are in mg/l

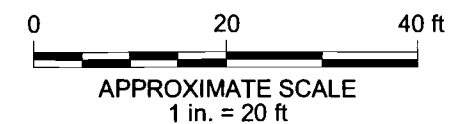
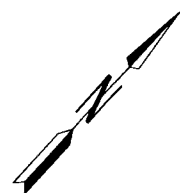
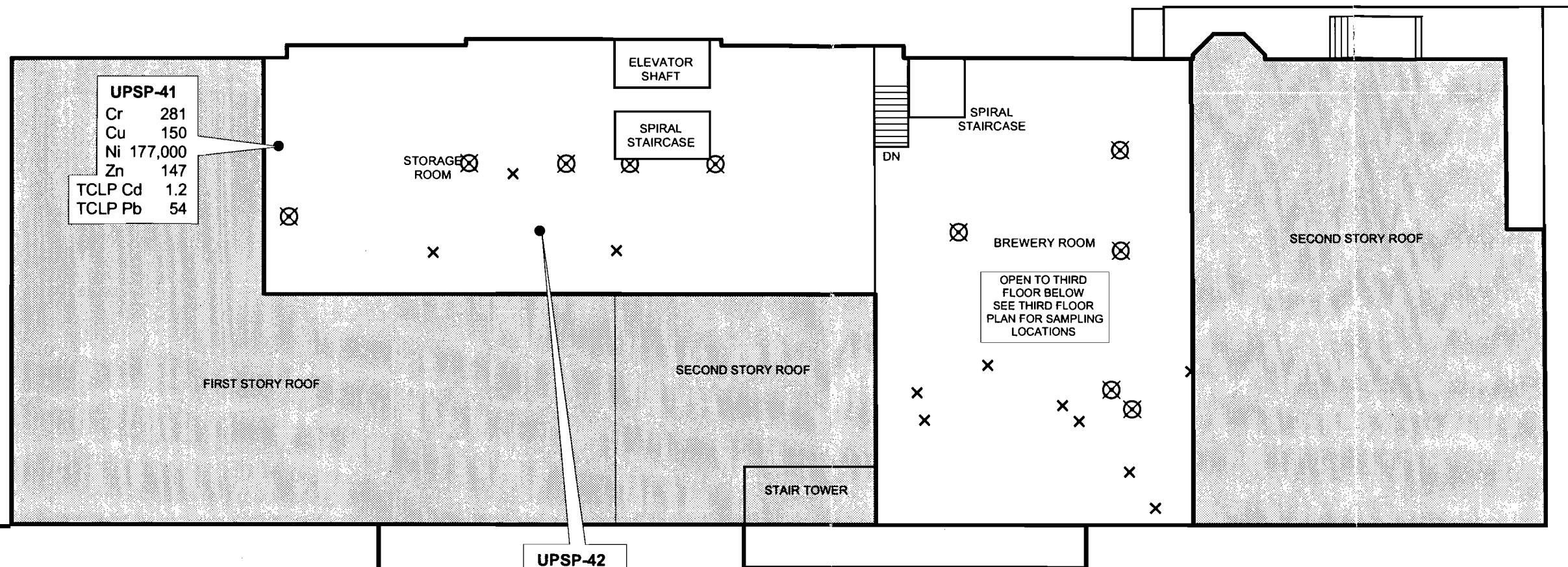


Figure 5-9
**Selected Metals Concentrations
 From Sweep Samples
 on the Third Floor**

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



LEGEND

UPSP-# ● Sweep sample

Cd Cadmium
 Cr Chromium
 Cu Copper
 Pb Lead
 Ni Nickel
 Zn Zinc
 CN Cyanide

NOTE: All results are in $\mu\text{g}/100\text{ cm}^2$

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

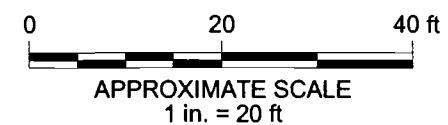
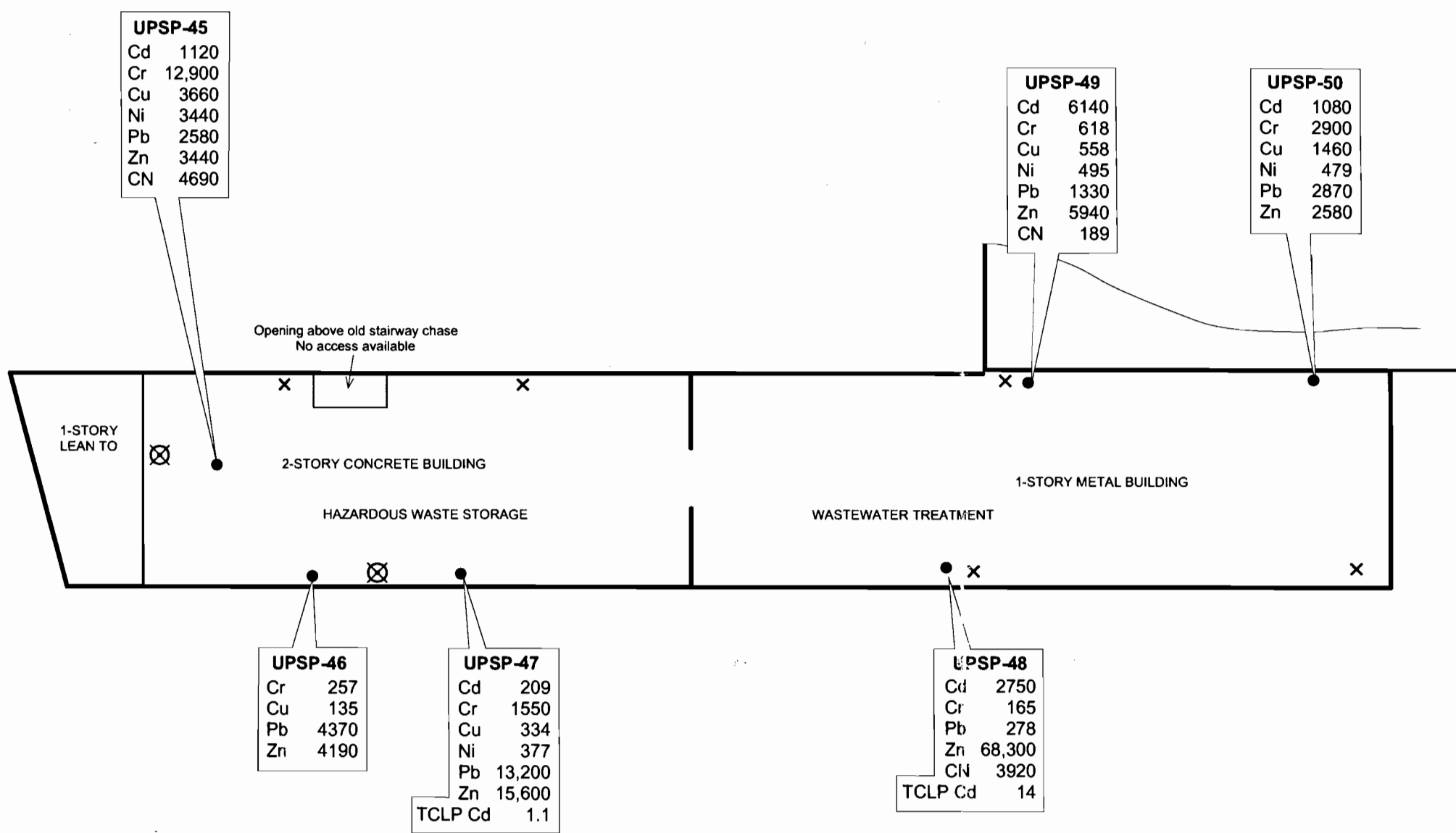
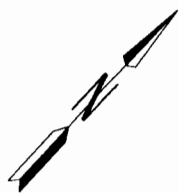


Figure 5-10
Selected Metals Concentrations
From Sweep Samples
on the Fourth Floor

UNITED PLATING CORPORATION
 NYSDEC I.D. No. 447018

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

160016501097FLOOR.ds4



LEGEND

UPSP-# ● Sweep sample

Cd Cadmium
Cr Chromium
Cu Copper
Ni Nickel
Pb Lead
Zn Zinc
CN Cyanide

NOTE: All results are in $\mu\text{g}/100\text{ cm}^2$

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

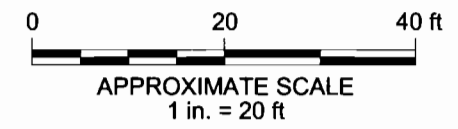


Figure 5-11
**Selected Metals Concentrations
From Sweep Samples From the
Wastewater Treatment Building**

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

160016501097wwtb.ds4

zinc in concentrations over 100 mg/kg. One sample exceeded the TCLP limit for cadmium and one sample exceeded the limit for chromium. The TCLP chromium concentration was 5082 mg/kg and the chromium concentration was 270,000 mg/kg.

Four sweep samples were collected in the anodizing room, with all four samples having over 100 mg/kg of chromium, copper, lead, and zinc; three samples having cyanide over 100 mg/kg; and two samples having nickel and cadmium above 100 mg/kg. One of the samples (UPSP-30) had cadmium and lead in excess of the TCLP limit; in that sample the lead concentration was 16,300 mg/kg and the cadmium concentration was 319 mg/kg.

Four sweep samples were taken from the chemical storage room; all four samples had chromium, copper, lead, nickel, and zinc over 100 mg/kg. All four samples also had chromium in excess of the TCLP limit and two of the samples also had cadmium in excess of the limit. The chromium concentration in one sample (UPSP-33) was 145,000 mg/kg and the TCLP concentration was 164 mg/l; this sample also contained 11,600 mg/kg of lead.

Four sweep samples were collected on the third floor and the results are shown on Figure 5-9. Two samples (UPSP-43, UPSP-44) were collected in the brewery room, with both samples having chromium, copper, lead, and zinc over 100 mg/kg and one sample (UPSP-44) having nickel over 100 mg/kg. The TCLP limit for cadmium was exceeded in both samples and the lead and cadmium TCLP limits were exceeded in one sample (UPSP-43). Two samples (UPSP-39, UPSP-40) collected in the lead smelting room had chromium, copper, lead, and zinc above 100 mg/kg and nickel and cadmium over 100 mg/kg in one sample. The TCLP limit for cadmium was exceeded in one sample (UPSP-40).

Figure 5-10 shows the sweep sample results for the fourth floor. The two samples (UPSP-41, UPSP-42) had chromium, copper, nickel, and zinc over 100 mg/kg and cadmium, lead, and cyanide in one sample over 100 mg/kg. The TCLP limit for cadmium was exceeded in both samples, and the TCLP limit for lead was exceeded in one sample. The nickel concentration in one sample (UPSP-41) was 177,000 mg/kg.

A total of six sweep samples were collected in the wastewater treatment building; Figure 5-11 shows the results. Three sweep samples were taken in the hazardous waste storage area. Chromium, copper, lead, and zinc were present in all three samples and cadmium and nickel in two of the samples over 100 mg/kg. The TCLP for cadmium was exceeded in one sample (UPSP-47). Three samples were collected in the zinc plating room, with all samples

exceeding 100 mg/kg for cadmium, chromium, lead, and zinc and two samples having copper, nickel, and cyanide over 100 mg/kg. One sample (UPSP-48) exceeded the TCLP for cadmium with a concentration of 14 mg/l. That sample had 2750 mg/kg of cadmium and 68,300 mg/kg of zinc.

5.2.1.3 Concrete Chip Samples. Twenty concrete chip samples were collected and analyzed for TAL metals and cyanide and TCLP metals. The results are provided on Table 5-11. The values in bold face type indicate exceedances of the TCLP limits. One sample, UPFC-15, exceeded TCLP limits for chromium and one sample, UPFC-20, exceeded the TCLP limits for cadmium. Figures 5-12 to 5-16 show the concrete chip data for each of the building floors.

Figure 5-12 shows the concentrations greater than 100 mg/kg for cadmium, chromium, copper, lead, nickel, zinc, and cyanide on the first floor of the main building. A total of 10 concrete floor chip samples were collected on the first floor. Three samples were collected in the silver plating room; all three samples had chromium, copper, and zinc in excess of 100 mg/kg and two samples had lead, nickel, and cyanide in excess of 100 mg/kg. Four samples were taken in the chrome plating room and had chromium, copper, lead, and zinc in all four samples; nickel and cyanide in two samples; and cadmium in one sample over 100 mg/kg. Four samples were collected in the main plating room, with the results showing chromium, copper, lead, nickel, and zinc over 100 mg/kg in all samples; cadmium exceeded 100 mg/kg in two samples. None of the samples exceeded any TCLP limits.

Figure 5-13 shows the cadmium, chromium, copper, lead, nickel, zinc, and cyanide results over 100 mg/kg for the second floor; also shown are any results above any TCLP limits for metals. Two samples (UPFC-13, UPFC-12) collected in the anodizing room had chromium, copper, lead, and zinc above 100 mg/kg. Two samples (UPFC-14, UPFC-15) were also collected in the chemical storage room and had chromium and zinc in excess of 100 mg/kg and one sample (UPFC-14) also had lead over 100 mg/kg. That same sample had TCLP chromium at 27 mg/l and a chromium concentration of 1340 mg/kg.

Figure 5-14 shows the one concrete sample taken on the third floor in the lead smelting room, which had lead and zinc at 102 and 1750 mg/kg, respectively. Figure 5-15 shows the concrete chip sample taken on the fourth floor (UPFC-17). It had chromium, copper, lead, and zinc over 100 mg/kg. Three concrete chip samples were collected in the wastewater treatment building and those results are shown on Figure 5-16. One sample (UPFC-18) taken

CONCRETE CHIP DATA SUMMARY (MAY 1995)

United Plating Site

PARAMETER	UPFC01	UPFC02	UPFC03	UPFC04	UPFC05	UPFC06	UPFC07	UPFC08	UPFC09	UPFC10
TAL METALS (mg/kg)										
Aluminum	6,600 E	6,770 E	6,270 E	6,350 E	6,980 E	8,120 E	6,930 E	8,740 E	10,000 E	9,200 E
Antimony	ND N	ND N	ND N	ND N	242 N	75 N	8.2 B N	ND N	ND N	5.5 B N
Arsenic	3.1 B	5.3	5.7	3.9	5.1	3.5 B	3.7	3.0	7.6	1.1 B
Barium	108 E	94 E	2,080 E	121 E	462 E	258 E	127 E	105 E	121 E	183 E
Beryllium	0.64 B	0.42 B	0.36 B	0.30 B	0.44 B	0.37 B	0.41 B	0.41 B	0.63 B	0.36 B
Cadmium	12	14	17	97	244	169	355	84	840	162
Calcium	122,000 E	148,000 E	108,000 E	123,000 E	51,400 E	106,000 E	114,000 E	112,000 E	171,000 E	71,300 E
Chromium	272 E	183 E	206 E	433 E	27,400 E	4,820 E	1,110 E	411 E	1,230 E	662 E
Cobalt	21	7.8 B	24	14	88	22	17	10	12	12
Copper	378 E	620 E	483 E	530 E	1,890 E	4,730 E	990 E	1,200 E	1,400 E	5,910 E
Iron	133,000	15,000	13,000	12,700	50,100	26,200	22,000	14,600	44,600	20,700
Lead	87 E	116 E	212 E	314 E	26,500 E	8,720 E	3,510 E	800 E	1,680 E	2,270 E
Magnesium	12,900 E	11,400 E	6,980 E	7,610 E	6,710 E	7,990 E	9,270 E	6,500 E	7,410 E	4,440 E
Manganese	855 E	283 E	263 E	262 E	456 E	382 E	347 E	288 E	455 E	286 E
Mercury	ND N	ND N	ND N	0.11 N	0.60 N	0.19 N	0.37 N	0.46 N	0.52 N	0.21 N
Nickel	152 E	21 E	1,960 E	43 E	409 E	177 E	338 E	156 E	9,460 E	1,140 E
Potassium	3,450 E	4,650 E	3,290 E	3,320 E	1,390 E	2,980 E	3,310 E	4,210 E	1,290 E	3,280 E
Selenium	ND	2.2	ND	ND	ND	ND	ND	ND	ND	ND
Silver	169 E	221 E	64 E	16 E	47 E	44 E	52 E	27 E	50 E	9.6 E
Sodium	3,410	5,780	3,000	7,700	822 B	3,890	2,540	10,500	1,190	546 B
Thallium	ND	ND	ND	ND	ND	2.2	ND	ND	ND	ND
Vanadium	30 E	24 E	19 E	17 E	35 E	20 E	20 E	15 E	27 E	14 E
Zinc	332 E	158 E	1,040 E	2,160 E	1,360 E	1,230 E	1,640 E	1,830 E	7,800 E	951 E
Cyanide	97	438	316	48	41	110	198	151	1,150	366

- 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.
 ND - Not detected at analytical detection limit.

CONCRETE CHIP DATA SUMMARY (MAY 1995)

United Plating Site

PARAMETER	UPFC11	UPFC12	UPFC13	UPFC14	UPFC15	UPFC16	UPFC17	UPFC18	UPFC19	UPFC20	UPFB03
TAL METALS (mg/kg)											
Aluminum	7,740 E	3,210 E	4,330 E	10,800 E	10,900 E	11,500 E	9,120 E	7,410 E	5,990 E	6,780 E	17 B
Antimony	39 N	ND N	ND N	ND N	ND N	ND N E	ND N	ND N	ND N	ND N	ND
Arsenic	ND	3.1	2.4	ND	ND	4.2 N	2.7 N	3.6 N	3.5 N	2.0 N	ND
Barium	213 E	89 E	72 E	225 E	209 E	76 E N	159 E N	62 E N	89 E N	72 E N	ND
Beryllium	0.30 B	0.16 B	0.20 B	0.37 B	0.35 B	0.42 B	0.35 B	0.41 B	0.31 B	0.16 B	ND
Cadmium	1,190	13	5.8	3.0	14	2.4 N	14 N	87 N	7.1 N	18 N	ND
Calcium	58,000 E	271,000 E	226,000 E	122,000 E	115,000 E	155,000	104,000	264,000	109,000	75,800	1120 B
Chromium	2,090 E	103 E	376 E	266 E	1,390 E	24 E N	278 E N	1,620 E N	142 E N	429 E N	2.0 B
Cobalt	9.0 B	3.7 B	2.4 B	5.7 B	6.7 B	4.9 B N	5.0 B N	30 N	19 N	75 N	ND
Copper	1,520 E	185 E	291 E	24 E	51 E	32 E	118 E	764 E	60 E	88 E	ND
Iron	45,600	7,490	13,400	12,500	13,100	10,800 E	11,200 E	13,600 E	11,100 E	18,400 E	22 B
Lead	1,610 E	339 E	190 E	90 E	2,590 E	102 E N	892 E N	40 E N	202 E N	136 E N	ND
Magnesium	3,920 E	11,900 E	7,990 E	6,510 E	6,020 E	9,690 E	4,600 E	10,300 E	10,300 E	3,990 E	ND
Manganese	417 E	101 E	98 E	291 E	294 E	239 E N	218 E N	260 E N	227 E N	122 E N	ND
Mercury	0.19 N	0.12 N	0.20 N	ND N	ND N	ND	0.39	ND	0.26	ND	ND
Nickel	357 E	32 E	39 E	15 E	16 E	9.3 N	45 N	70 N	61 N	105 N	ND
Potassium	3,670 E	1,410 E	1,440 E	6,050 E	7,570 E	6,580 E	4,740 E	3,660 E	3,650 E	4,480 E	658 B
Selenium	ND	ND	0.63 B	ND	ND	ND N	ND N	ND N	ND N	ND N	ND
Silver	55 E	12 E	18 E	3.4 E	3.4 E	8.0	2.7	1.7 B	2.3	27	ND
Sodium	1,020	9,830	1,180	4,180	4,750	3,620 E	4,590 E	3,090 E	10,000 E	6,470 E	276 B
Thallium	1.6 B	ND	ND	ND	ND	ND N E	ND N	ND N	ND N E	ND N E	ND
Vanadium	19 E	39 E	50 E	15 E	15 E	14 N	13 N	17 N	15 N	13 N	ND
Zinc	2,860 E	119 E	103 E	103 E	239 E	1,750 E	225 E	217 E	654 E	596 E	ND
Cyanide	41	0.52	7.8	1.8 B	7.5	1.5	11	22	46	57	ND

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.

ND - Not detected at analytical detection limit.

TABLE 5-11 (Page 3 of 3)

CONCRETE CHIP SAMPLE DATA SUMMARY (May 1995)

United Plating Site

PARAMETER	UPFC01	UPFC02	UPFC03	UPFC04	UPFC05	UPFC06	UPFC07	UPFC08	UPFC09	UPFC10	TCLP STANDARDS
TCLP METALS (mg/l)											
Arsenic	ND	0.18	ND	ND	ND	ND	ND	ND	ND	0.050 B	5.0
Barium	0.49 B E	ND E	0.11 B E	0.29 B E	0.38 B E	0.21 B E	0.24 B E	0.30 B E	0.16 B E	0.084 B E	100
Cadmium	ND	ND	ND	ND	0.015 B	0.35	0.36	0.33	0.19	0.14	1.0
Chromium	ND	0.76	0.15	2.2	1.6	1.2	1.6	1.9	1.3	1.5	5.0
Lead	ND	ND	ND	ND	ND	ND	0.16	0.23	ND	ND	5.0
Mercury	ND	0.0028	0.00054 B	0.00095	0.0026	0.0016	0.00088 B	0.0049	ND	0.00024	0.2
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.0
Silver	ND	0.028 B	ND	3.6	0.63	0.11	0.099 B	0.079 B	0.15	0.17	5.0

PARAMETER	UPFC11	UPFC12	UPFC13	UPFC14	UPFC15	UPFC16	UPFC17	UPFC18	UPFC19	UPFC20	TCLP STANDARDS
TCLP METALS (mg/l)											
Arsenic	ND	ND	ND	ND	ND	ND N	0.019 N	0.012 N	ND N	ND N	5.0
Barium	0.44 B E	0.42 B E	0.17 B E	0.06 B E	0.070 B E	0.092 B	0.13 B	0.18 B	0.068 B	0.15 B	100
Cadmium	ND	ND	ND	0.051	0.014 B	ND	0.042 B	ND	0.057	1.1	1.0
Chromium	5.0	0.15	0.022 B	4.0	27	ND	ND	1.1	3.6	0.10	5.0
Lead	ND	ND	ND	0.035	ND	ND E	ND E	ND E	ND E	2.1 E	5.0
Mercury	ND	ND	ND	0.00025	ND	ND	ND	ND	ND	0.00036 B	0.2
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.0
Silver	0.29	0.099	0.099	ND	ND	ND	ND	ND	ND	ND	5.0

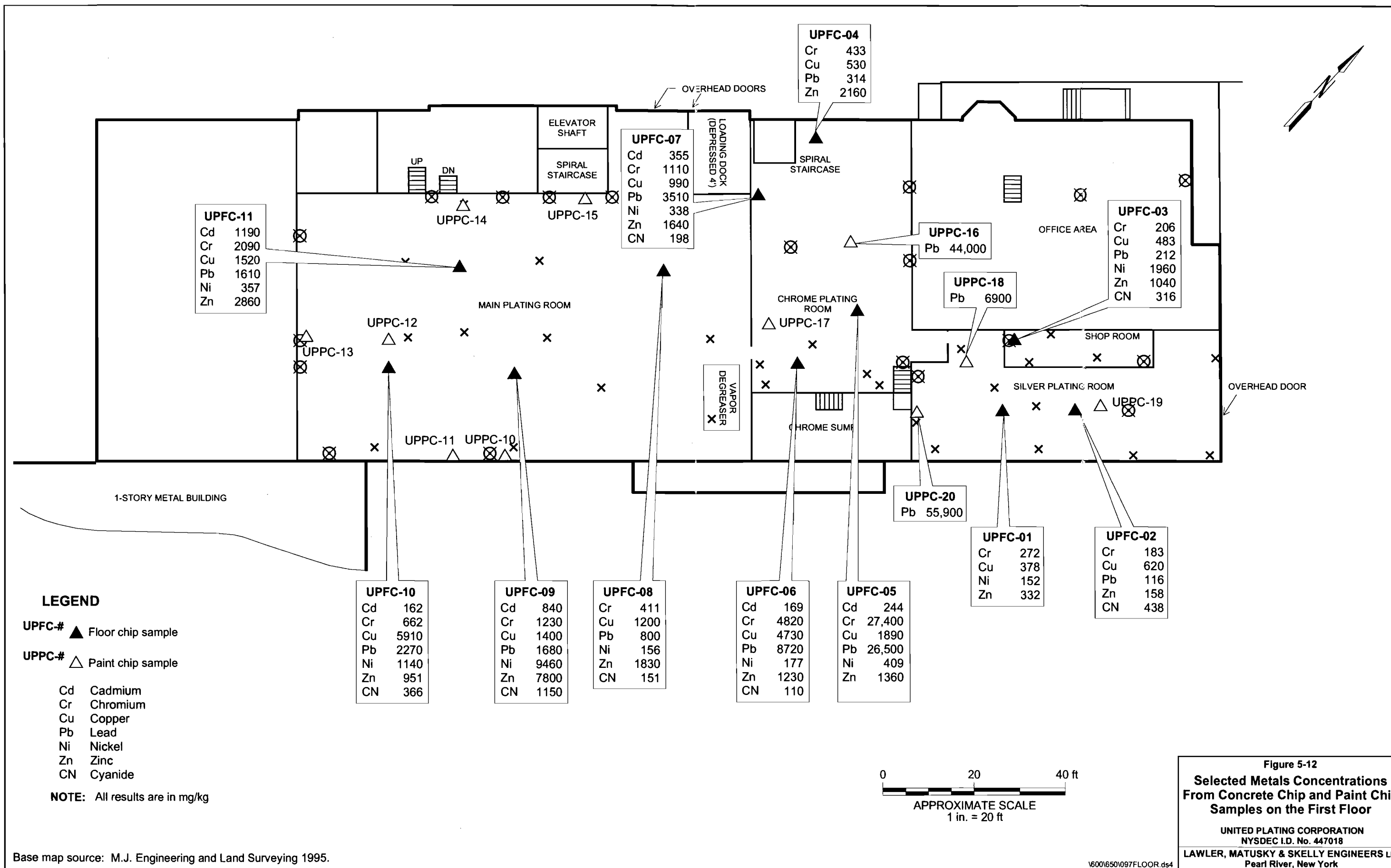
NOTE: Numbers in bold exceed TCLP standards.

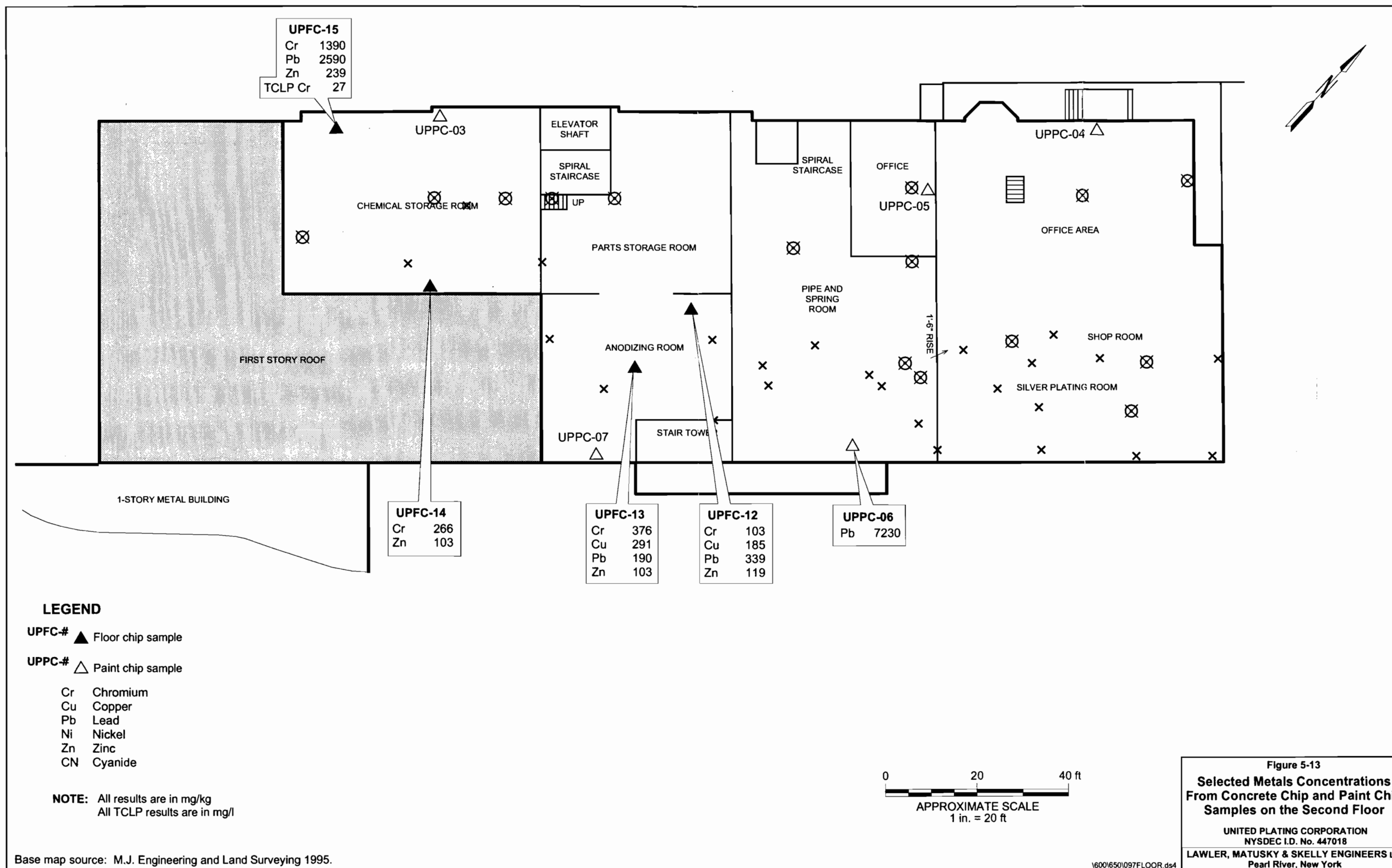
B - Value is less than the contract-required detection limit but greater than the instrument detection limit.

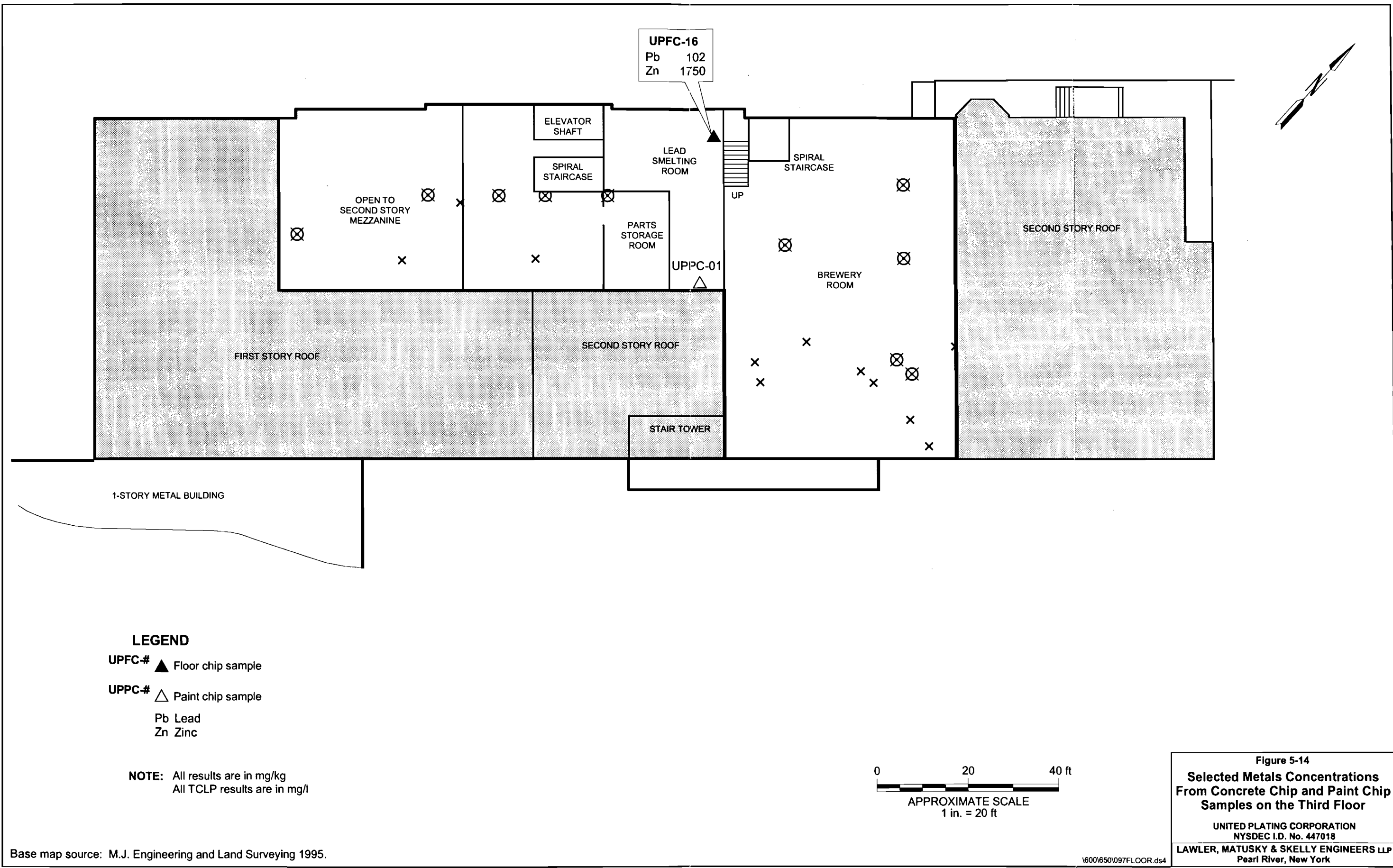
E - Value estimated due to interference.

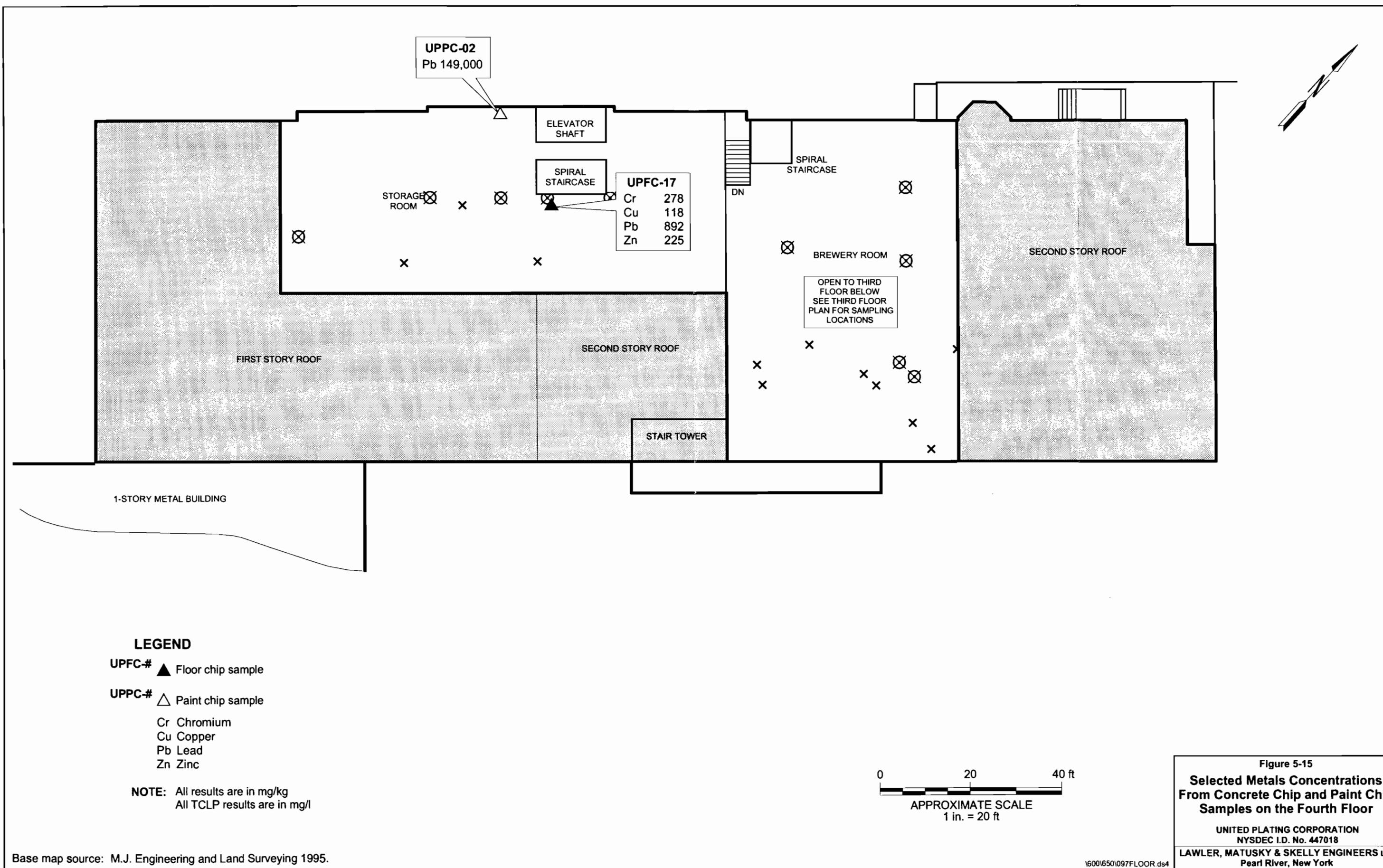
N - Spiked sample recovery is not within control limits.

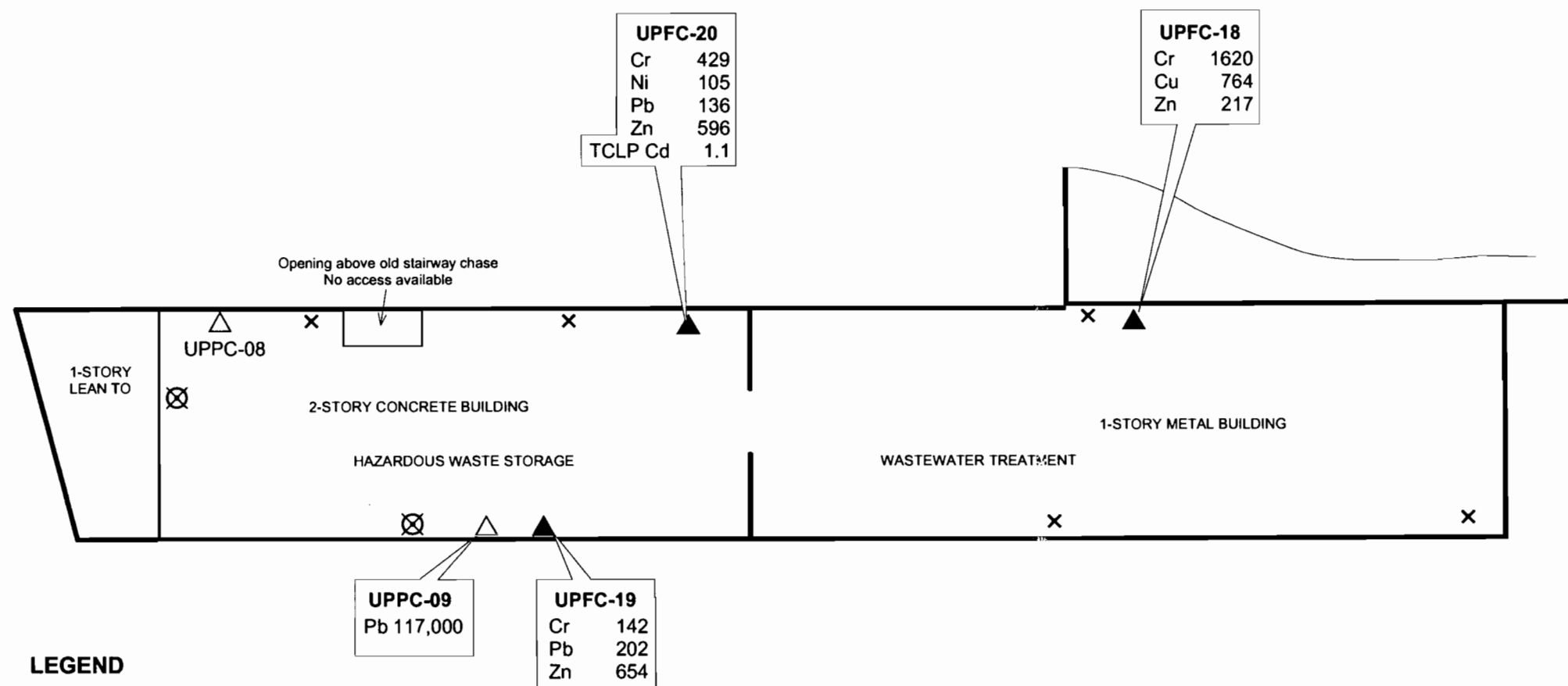
ND - Not detected at analytical detection limit.











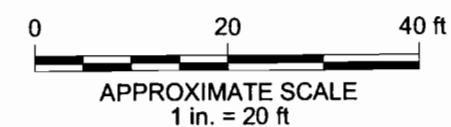
LEGEND

UPFC-# ▲ Floor chip sample

UPPC-# △ Paint chip sample

Cr Chromium
Cu Copper
Ni Nickel
Pb Lead
Zn Zinc

NOTE: All results are in mg/kg



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

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Figure 5-16
Selected Metals Samples in
Concrete Chip and Paint Chip Samples
Wastewater Treatment Building

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

in the zinc plating area had chromium, copper, and zinc over 100 mg/kg and two samples (UPFC-19, UPFC-20) in the hazardous waste storage area had chromium, lead, and zinc above 100 mg/kg. One sample (UPFC-20) had nickel over 100 mg/kg. That same sample had TCLP cadmium at 1.1 mg/kg; the cadmium concentration was under 100 mg/kg.

5.2.1.4 Wood Chip Samples. Sixteen wood chip samples were collected and analyzed for TAL metals and cyanide. In addition, eight of these samples were analyzed for TCLP metals. All the wood chips were taken in the ceiling in the first floor. The results are provided on Table 5-12. The values in bold face type indicate exceedances of the TCLP limits. Figure 5-17 shows concentrations over 100 mg/kg for cadmium, chromium, copper, lead, nickel, zinc, and cyanide as well as any samples exceeding the TCLP limit. Only one sample in the main plating room had zinc over 100 mg/kg and none of the other metals over 100 mg/kg. All six samples taken in the silver plating room had lead and zinc in excess of 100 mg/kg, three samples had chromium over 100 mg/kg, and one sample with cadmium over 100 mg/kg. Two samples, UPWC-13 and UPWC-14, exceeded the TCLP limits for chromium. In addition, the TCLP limit for selenium was exceeded in sample UPWC-14. The lead TCLP results ranged from 97 to 125 mg/l, with lead ranging from 16,000 to 36,800 mg/kg.

5.2.1.5 Paint Chip Samples. Twenty paint chip samples were collected and analyzed for total lead. The results are shown on Table 5-13 along with the definition of LBP (5000 mg/kg, or 0.5% lead). The values exceeding this limit are in bold face type. Six of the samples exceeded the limit and thus are considered LBP. Two of the samples contained over 11% lead, two of the samples had over 4.4% lead, and two of the samples had 0.69% lead. Figure 5-12 shows the paint chip samples over 5000 mg/kg on the first floor. A total of 11 paint chips were taken on the first floor. Eight of the samples did not have lead in excess of 5000 mg/kg. The three samples that did were located in the silver plating room, chrome sump, and chrome plating room. None of the samples in the main plating room had lead in excess of 5000 mg/kg. Four samples were collected on the second floor and the results are shown on Figure 5-13. Only one of the samples had lead in excess of 5000 mg/kg. One sample was collected on the third floor as shown on Figure 5-14. The sample had lead < 5000 mg/kg. One sample was collected on the fourth floor (Figure 5-15) and had lead at 149,000 mg/kg, or 14.9 % lead. Two samples were taken from the wastewater treatment building (Figure 5-16) and only one sample had lead over 5000 mg/kg; its concentration was 117,000 mg/kg, or 11.7 % lead.

WOOD CHIP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPWC01	UPWC02	UPWC03	UPWC04	UPWC05	UPWC06	UPWC07	UPWC08	UPWC09	UPWC10
TAL METALS (mg/kg)										
Aluminum	750	6,440	3,000	1,130	4,650	2,910	1,940	4,080	3,460	2,500
Antimony	ND N	ND N	ND N	ND N	ND N	ND N	ND N	ND N	ND N	ND N
Arsenic	2.1	3.7	2.0 B	1.7 B	ND	1.0 B	1.2 B	0.93 B	3.6	1.9 B
Barium	11 B	11 B	14 B	5.5 B	20 B	22 B	14 B	6.5 B	7.8 B	9.0 B
Beryllium	0.55 B	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	0.74 B	ND	0.26 B	ND	0.3 B	4.7	0.3 B	0.86 B	ND	ND
Calcium	30,500	40,800	78,300	720 B	487 B	16,600	8,830	15,900	18,000	25,100
Chromium	17 N	5.7 N	9.0 N	1.1 B N	3.6 N	30 N	6.0 N	16 N	3.4 N	4.3 N
Cobalt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	16	4.7	5.6	3.7 B	4.1 B	24	3.8 B	9.2	3.9 B	2.8 B
Iron	218 E	177 E	211 E	46 E	173 E	289 E	130 E	205 E	138 E	109 E
Lead	31 E N	13 E N	8.7 E N	3.8 E N	2.7 E N	80 E N	83 E N	9.4 E N	0.77 E N	4.2 E N
Magnesium	6,560 E	17,800 E	40,600 E	201 B E	208 B E	4,330 E	1,790 E	7,710 E	4,170 E	9,620 E
Manganese	228 N	93 N	133 N	127 N	116 N	266 N	72 N	66 N	65 N	124 N
Mercury	0.32 N	3.0 N	ND N	ND N	ND N	6.5 N	4.8 N	2.2 N	0.12 N	0.77 N
Nickel	25	1.0 B	ND	20	2.6 B	15	1.8 B	2.5 B	ND	ND
Potassium	1,150 E	2,390 E	976 E	904 B E	688 B E	535 B E	1,030 E	1,310 E	1,550 E	1,400 E
Selenium	ND	0.94	ND	0.7 B	ND	ND	0.85 B	ND	0.91 B	ND
Silver	0.85 B	0.48 B	ND	1.1 B	ND	1.3 B	ND	0.73 B	ND	ND
Sodium	2,590 E	6,810 E	8,030 E	5,240 E	6,420 E	1,430 E	2,880 E	5,630 E	7,220 E	7,220 E
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	1.8 B	5.7 B	3.1 B	1.3 B	4.0 B	3.7 B	2.1 B	4.1 B	4.2 B	2.7 B
Zinc	66 E	15 E	18 E	ND E	ND E	146 E	19 E	23 E	15 E	18 E
Cyanide	1.4	3.3	5.4	6.1	8.5	7.0	8.4	7.0	7.6	6.1

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.

ND - Not detected at analytical detection limit.

WOOD CHIP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPWC11	UPWC12	UPWC13	UPWC14	UPWC15	UPWC16	UPFB2
TAL METALS (mg/kg)							
Aluminum	51	34 B	2,210	367	60	589	17 B
Antimony	7.2 B N	4.3 B N	9.6 B N	24 N	6.6 B N	33 N	ND
Arsenic	20	7.6	14	38	23	79	ND
Barium	5,280	3,100	5,950	6,620	5,860	3,400	14 B
Beryllium	ND	ND	ND	0.21 B	ND	0.41 B	ND
Cadmium	26	13	21	56	32	110	ND
Calcium	1,900	1,120	1,880	2,620	1,490	2,450	ND
Chromium	27 N	42 N	125 N	314 N	24 N	309 N	2.8 B
Cobalt	1.4 B	ND	2.7 B	2.2 B	4.4 B	3.8 B	ND
Copper	3.1 B	3.1 B	12	8.2	5.7	11	ND
Iron	473 E	341 E	546 E	2,000 E	592 E	2,130 E	27 B
Lead	7,460 E N	6,790 E N	16,000 E N	36,800 E N	7,390 E N	41,600 E N	55
Magnesium	367 B E	213 B E	306 B E	1,410 E	291 B E	466 B E	ND
Manganese	312 N	99 N	135 N	261 N	212 N	402 N	ND
Mercury	ND N	ND N	0.11 N	0.37 N	ND N	0.36 N	ND
Nickel	ND	ND	1.3 B	1.4 B	10	2.0 B	ND
Potassium	463 B E	184 B E	358 B E	755 B E	428 B E	783 B E	ND
Selenium	0.89 B	0.94 B	1.6	1.3	2.2	1.8	ND
Silver	0.79 B	0.6 B	1.2 B	2.1	1.2 B	4.8	ND
Sodium	68 B E	83 B E	567 B E	925 B E	647 B E	208 B E	179 B
Thallium	ND	ND	ND	ND	ND	ND	ND
Vanadium	ND	ND	0.9 B	1.2 B	0.47 B	1.6 B	ND
Zinc	7,610 E	4,170 E	13,600 E	30,300 E	7,420 E	43,500 E	74
Cyanide	6.2	15	ND	ND	ND	ND	ND

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.
ND - Not detected at analytical detection limit.

TABLE 5-12 (Page 3 of 3)

WOOD CHIP SAMPLE DATA SUMMARY (May 1995)
United Plating Site

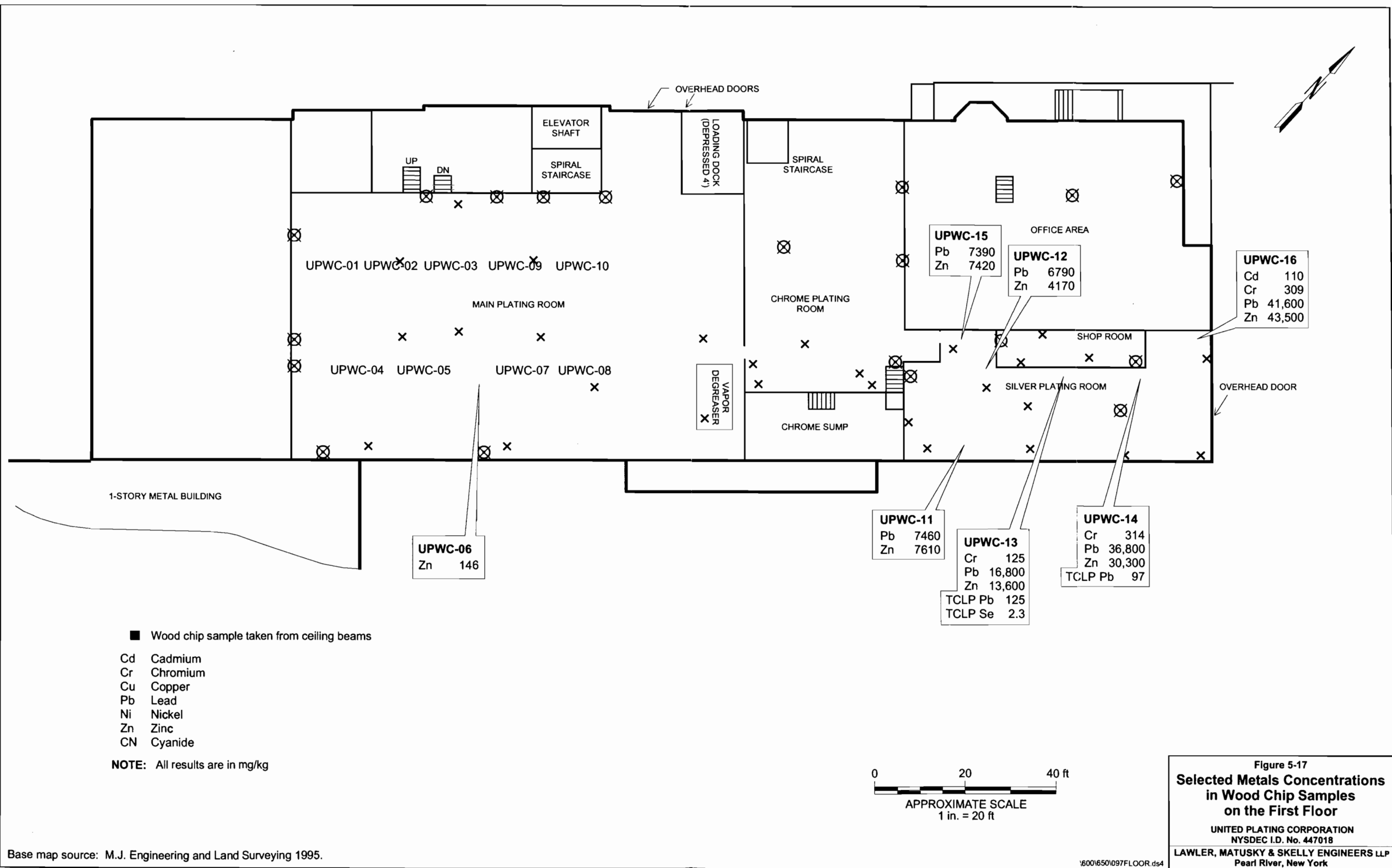
PARAMETER	UPWC01	UPWC02	UPWC06	UPWC08	UPWC09	UPWC11	UPWC13	UPWC14	TCLP STANDARDS
TCLP METALS (mg/l)									
Arsenic	0.055 B N	0.058 B N	ND N	ND N	ND N	0.14 N	0.063 B N	0.071 B N	5.0
Barium	0.46	0.41 B	0.52 B	0.44 B	0.32 B	0.70 B	0.35 B	0.44	100
Cadmium	0.055	ND	0.027 B	0.015 B	ND	ND	0.44	0.56	1.0
Chromium	1.2	0.11	0.21	0.29	0.046 B	ND	0.10	0.20	5.0
Lead	0.89	0.057	0.57	0.13	0.031	0.29	125	97	5.0
Mercury	0.00055	0.0014	0.0047	0.0020	0.00064	ND	ND	ND	0.2
Selenium	ND	0.039 B	0.030 B	0.042 B	0.030 B	0.48	2.3	ND	1.0
Silver	ND	ND	ND	ND	ND	ND	0.055 B	ND	5.0

NOTE: Numbers in bold exceed TCLP standards.

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

N - Spiked sample recovery is not within control limits.

ND - Not detected at analytical detection limit.



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

\\600\\650\\097FLOOR.ds4

TABLE 5-13

PAINT CHIP DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPPC1	UPPC2	UPPC3	UPPC4	UPPC5	UPPC6	UPPC7	LEAD-BASED PAINT DEFINITION
Lead (mg/kg)	145 E N	149,000 E N	263 E N	1,580 E N	55 E N	7,230 E N	107 E N	5,000

PARAMETER	UPPC8	UPPC9	UPPC10	UPPC11	UPPC12	UPPC13	UPPC14	LEAD-BASED PAINT DEFINITION
Lead (mg/kg)	119 E N	117,000 E N	314 E N	223 E N	478 E N	585 E N	95 E N	5,000

PARAMETER	UPPC15	UPPC16	UPPC17	UPPC18	UPPC19	UPPC20	UPFB05	LEAD-BASED PAINT DEFINITION
Lead (mg/kg)	61 E N	44,000 E N	348 E N	6,900 E N	1,230 E N	55,900 E N	ND	5,000

NOTE: Numbers in bold exceed lead-based paint definition.

E - Value estimated due to interference.

N - Spiked sample recovery is not within control limits.

ND - Not detected at analytical detection limit.

5.2.2 Task 2a - Shallow Soil Sampling Data

5.2.2.1 *Background Soil Concentrations.* The major COCs at the UP site are metals, primarily those used in the plating industry. Poor controls and haphazard disposal practices during the UP operation resulted in contamination of soils with metals.

To determine the degree of contamination, the soil metals data are compared to a number of guidelines: background soil concentrations found in eastern U.S., NYSDEC Soil Cleanup Objectives for Hazardous Sites (NYSDEC 1994a), and actual site background concentrations. Site background, or better defined as local site background, is critical as the NYSDEC cleanup objectives are listed as concentrations based on other criteria or site background. Although eastern U.S. background data provide a range, they also cover a large area and often do not account for local irregularities, particularly in urban areas such as the area around the UP site.

The RI work scope included the collection of surface soil samples from the vacant lot adjacent to and southeast of the site and from the soil borings drilled to construct the upgradient monitoring well. The results of these samples (LMS 1995a and 1995b) showed that some metals concentrations were considerably higher than the eastern U.S. background range, indicating that the UP operation had impacted these soils. An impact on the adjacent property is suspected because during the UP operation no fence existed and the boundary between the properties was indistinguishable; disposal of metal-contaminated wastes on this property was probable. Likewise, the upgradient monitoring well (MW-1) revealed some contamination in the groundwater and, as it was closer to the UP building than the surface soil samples, the sample may also have been contaminated by the site conditions.

Because the soil samples from the vacant lot and upgradient soil boring collected during the RI appear to have been impacted by the site, LMS reviewed two other sources of local site background:

- *NYSDOH Data* - In 1990 NYSDOH collected surface soil samples in the playground south of the site. Seven samples were collected and analyzed; the results, discussed in Section 5.1.2 and provided on Table 5-4, indicated that some of the playground areas may be slightly contaminated with metals.
- *NYSDEC Data* - After LMS informed NYSDEC of the need for additional background data, NYSDEC collected and analyzed three surface soil samples from

background locations surrounding the site. The results of these samples, provided on Table 5-14, showed a wide range in the metal concentrations, from not detected (ND) to significantly above the expected background concentration.

Based on the background soil results, the area surrounding the UP site has a very wide range of metal concentrations, resulting from natural soils, urban impacts, or other site impacts. As it is not possible to filter out all the other influences on the samples collected and because these samples represent the local site background, it was decided to use all the samples collected out of the immediate influence of the site (NYSDOH and NYSDEC data) as indicators of background conditions. The soils in the adjacent lot and upgradient well area have likely been impacted by the site. Statistical tests conducted on the sample results indicate (Table 5-15) that although there is a wide range in the concentrations, the results are normally distributed, with means that are near the medians. The tests were rerun, removing the highest and lowest concentrations for each metal; however, the normality of the data did not improve, and therefore it was decided to use all 10 samples. For cadmium, no average or statistics were performed because: (1) many of the samples had analytical detection limits that were significantly higher than the eastern U.S. range (1 mg/kg), and (2) cadmium is not known to naturally occur in eastern U.S. soils. Therefore, the upper range of eastern U.S. background was used for the cadmium background. For lead the U.S. Environmental Protection Agency (EPA) guidance value of 400 mg/kg for lead in residential soils was used as the cleanup criteria. According to EPA, residential areas with soil lead below 400 mg/kg generally require no further action (EPA 1994). The following are the background metals concentrations or cleanup levels used to evaluate the RI soil samples:

Cadmium	-	1 mg/kg
Chromium	-	16 mg/kg
Copper	-	22.5 mg/kg
Lead		400 mg/kg
Nickel	-	14.5 mg/kg
Zinc	-	112 mg/kg

5.2.2.2 RI Shallow Soil Samples. Shallow soil samples were collected from a total of 40 locations and analyzed for TCL organics and TAL metals and cyanide. Table 5-16 shows the results and Figure 5-18 graphically summarizes the results above site background levels. The table also shows eastern U.S. background soil metals concentrations, NYSDEC soil cleanup objectives (NYSDEC 1994a), and site background concentrations as determined using the method described in Section 5.2.2.1. Results in bold face type indicate exceedances of the

TABLE 5-14

NYSDEC BACKGROUND SOIL SAMPLES (1995)
United Plating Site

FIELD ID	LOCATION	METALS (mg/kg)					
		Cd	Cr	Cu	Pb	Ni	Zn
BK-1	Corner Cresse Avenue/Oakland Avenue, adjacent to wood area in open area; Steinmetz park 3,500 ft east of site	ND	5	ND	ND	ND	ND
BK-2	End of Clarendan Street, adjacent to access road, 500 ft north of site	3 j	19	15	220	15	120
BK-3	Nott Street, access from Ramada and Plaza, adjacent to RR tracks 3,000 ft southeast of site	4 j	24	20	260	20	160

j - Estimated concentration; compound present below quantitation limit.
 ND - not detected at analytical detection limit.

TABLE 5-15

STATISTICAL SUMMARY OF BACKGROUND SOIL SAMPLES¹
United Plating Site

STATISTICAL PARAMETER	Cr	Cu	Pb	Ni	Zn
Mean (mg/kg)	16.1	22.4	96.2	14.5	112.1
Standard Deviation	10.8	20.1	94.8	9.1	87.0
Standard Error of Mean	3.4	6.4	30.0	2.9	27.5
Normality Test Value (Reject if > 1.431)	1.012	1.162	1.048	1.284	1.047
Median	15.5	18.5	88.5	16.5	124.0

1 - 10 surface samples - NYSDOH 1990 samples, and NYSDEC 1995 samples.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS01	RE UPSS01	UPSS02	RE UPSS02	UPSS03	RE UPSS03	UPSS04	UPSS05	RE UPSS05	NYSDEC SOIL CLEANUP OBJECTIVES ^a
VOLATILE ORGANICS (mg/kg)										
1,1,1-Trichloroethane	0.0070 j	0.0040 g j	ND	ND	ND	0.0050 j	ND	0.010 j	ND	0.8
Trichloroethylene	0.0060 j	0.0070 g j	ND	ND	0.0020 j	0.0050 j	0.0020 j	0.0040 j	0.0020 j	0.7
Tetrachloroethylene	0.0030 j	0.0040 g j	ND	ND	ND	0.0030 j	0.0020 j	0.0030 j	0.0020 g j	1.4
Toluene	ND	ND	ND	ND	ND	0.0020 j	ND	ND	ND	1.5
Styrene	ND	ND	ND	ND	ND	0.0010 j	ND	ND	ND	N/A

- a - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
g - Value considered estimated based on data validator's report (Appendix I).
j - Estimated concentration; compound present below quantitation limit.
N/A - Not available.
ND - Not detected at analytical detection limit.
RE - Reanalysis.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS06	UPSS07	UPSS08	UPSS09	UPSS10	UPSS11	UPSS12	UPSS13	RE UPSS13	NYSDEC SOIL CLEANUP OBJECTIVES ^a
VOLATILE ORGANICS (mg/kg)										
1,2-Dichloroethane	ND	ND	ND	0.0020 j	ND	ND	ND	ND	ND	0.1
1,1,1-Trichloroethane	ND	ND	0.0070 j	0.012	ND	ND	ND	ND	ND	0.8
Trichloroethylene	ND	0.0020 g j	0.0030 j	0.026	0.0030 j	0.0020 j	ND	ND	ND	0.7
Tetrachloroethylene	ND	0.0020 g j	0.0020 j	0.015	0.0020 j	ND	ND	ND	ND	1.4
Toluene	ND	ND	ND	0.0030 j	ND	ND	ND	ND	ND	1.5
Chlorobenzene	ND	ND	ND	0.0060 j	ND	ND	ND	ND	ND	1.7
Ethylbenzene	ND	ND	ND	0.0060 j	ND	ND	ND	ND	ND	5.5
Styrene	ND	ND	ND	0.0070 j	ND	ND	ND	ND	ND	N/A
Xylene (total)	ND	ND	ND	0.0030 j	ND	ND	ND	ND	ND	1.2

- a - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
g - Value considered estimated based on data validator's report (Appendix I).
j - Estimated concentration; compound present below quantitation limit.
N/A - Not available.
ND - Not detected at analytical detection limit.
RE - Reanalysis.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS14	UPSS15	UPSS16	UPSS17	UPSS18	UPSS19	RE	UPSS20	UPSS21	UPSS22	NYSDEC SOIL CLEANUP OBJECTIVES ^a
							UPSS19				
VOLATILE ORGANICS (mg/kg)											
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.023 g	N/A
1,1,1-Trichloroethane	ND	ND	ND	ND	0.0080 j	0.0090 j	ND	0.0050 j	ND	ND	0.8
Trichloroethylene	ND	ND	ND	ND	0.0080 j	0.0050 j	0.0010 j	0.0090 j	0.0080 j	0.0070 j	0.7
Tetrachloroethylene	ND	ND	ND	ND	0.0030 j	0.0030 g j	ND	0.0070 j	0.0040 j	0.0040 j	1.4
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	0.0010 j	ND	1.5
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	0.0020 j	0.0010 j	ND	1.7
Styrene	ND	ND	ND	ND	ND	ND	ND	0.0020 j	0.0010 j	ND	N/A

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

g - Value considered estimated based on data validator's report (Appendix I).

j - Estimated concentration; compound present below quantitation limit.

N/A - Not available.

ND - Not detected at analytical detection limit.

RE - Reanalysis.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS23	UPSS24	UPSS25	UPSS26	RE UPSS26	UPSS27	UPSS28	UPSS29	NYSDEC SOIL CLEANUP OBJECTIVES ^a
VOLATILE ORGANICS (mg/kg)									
Chloromethane	0.013 g	ND	ND	ND	ND	ND	ND	ND	N/A
1,2-Dichloroethane	ND	ND	ND	ND	ND	0.0010 j	ND	ND	0.1
1,1,1-Trichloroethane	ND	ND	ND	0.0030 j	ND	0.0080 j	0.0040 j	0.0030 j	0.8
Trichloroethylene	0.0020 j	0.0070 j	0.0010 j	0.0050 j	0.0050 j	0.019	0.0030 j	0.0070 j	0.7
Tetrachloroethylene	ND	0.0040 j	ND	0.0030 j	0.0030 j	0.012	0.0020 j	0.0030 j	1.4
Toluene	ND	ND	ND	ND	ND	0.0010 j	ND	ND	1.5
Chlorobenzene	ND	0.0010 j	ND	ND	ND	0.0040 j	ND	0.0010 j	1.7
Styrene	ND	ND	ND	ND	ND	0.0010 j	ND	0.0010 j	N/A

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

j - Estimated concentration; compound present below quantitation limit.

g - Value considered estimated based on data validator's report (Appendix I).

N/A - Not available.

ND - Not detected at analytical detection limit.

RE - Reanalysis.

TABLE 5-16 (Page 5 of 22)

SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS30	RE UPSS30	UPSS31	RE UPSS31	UPSS32	UPSS33	RE UPSS33	NYSDEC SOIL CLEANUP OBJECTIVES ^a
VOLATILE ORGANICS (mg/kg)								
1,1,1-Trichloroethane	ND	0.0040 j	0.0050 j	0.0040 j	0.010 j	ND	ND	0.8
Trichloroethylene	ND	0.0040 j	0.0040 j	0.0040 j	0.012	0.0030 j	0.0020 j	0.7
Tetrachloroethylene	ND	0.0030 j	0.0030 g j	0.0030 g j	0.0070 j	0.0020 j	0.0020 j	1.4
Chlorobenzene	ND	ND	ND	ND	0.0020 j	ND	ND	1.7

- a - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
g - Value considered estimated based on data validator's report (Appendix I).
j - Estimated concentration; compound present below quantitation limit.
ND - Not detected at analytical detection limit.
RE - Reanalysis.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS34	UPSS35	UPSS36	UPSS37	UPSS38	UPSS39	UPSS40	UPFB06 (µg/l)	UPTB03 (µg/l)	NYSDEC SOIL CLEANUP OBJECTIVES ^a
VOLATILE ORGANICS (mg/kg)										
1,1,1-Trichloroethane	0.0070 j	ND	ND	ND	ND	ND	0.0030 j	ND	ND	0.8
Trichloroethylene	0.0070 j	0.013	0.011	0.0080 j	0.0080 j	0.0020 j	0.0040 j	ND	ND	0.7
Tetrachloroethylene	0.0020 j	0.0080 j	0.0060 j	0.0030 j	0.0030 j	ND	0.0020 j	ND	ND	1.4
Toluene	ND	0.0040 j	ND	0.0020 j	ND	ND	ND	ND	ND	1.5
Chlorobenzene	ND	0.0020 j	0.0020 j	0.00090 j	0.0020 j	ND	ND	ND	ND	1.7
Ethylbenzene	ND	0.0030 j	ND	0.00090 j	ND	ND	ND	ND	ND	5.5
Styrene	ND	0.0060 j	0.0020 j	0.0020 j	0.0030 j	ND	ND	ND	ND	N/A
Xylene (total)	ND	0.0020 j	ND	ND	ND	ND	ND	ND	ND	1.2

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

j - Estimated concentration; compound present below quantitation limit.

N/A - Not available.

ND - Not detected at analytical detection limit.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER											NYSDEC SOIL CLEANUP OBJECTIVES ^a
	UPSS01	UPSS02	UPSS03	UPSS04	UPSS05	UPSS06	UPSS07	UPSS08	UPSS09	UPSS10	
SEMIVOLATILE ORGANICS (mg/kg)											
Naphthalene	ND	0.18 j	0.31 j	ND	ND	0.79 j	0.12 j	ND	ND	ND	13.0
2-Methylnaphthalene	ND	0.13 j	0.29	ND	ND	0.26 j	0.094 j	ND	ND	ND	38.4
Acenaphthylene	ND	ND	0.35 j	0.045 j	ND	0.63 j	0.21 j	1.1 j	ND	0.057 j	41.0
Acenaphthene	0.027 j	0.64 j	0.99 j	0.034 j	0.030 j	0.20 j	0.38 j	0.57 j	ND	0.036 j	50.0 ***
Dibenzofuran	ND	0.26 j	0.59 j	ND	ND	0.53 j	0.26 j	0.41 j	ND	0.028 j	8.2
Fluorene	0.029 j	0.70 j	1.2 j	0.043 j	0.041 j	0.96	0.58 j	1.0 j	ND	0.066 j	50.0 ***
Phenanthrene	0.38 j	4.5	7.8	0.59	0.38 j	6.1	3.6	8.7	0.049 j	0.73 j	50.0 ***
Anthracene	0.068 j	0.90	2.1	0.14 j	0.067 j	1.0	0.78 j	2.8 j	ND	0.12 j	50.0 ***
Carbazole	0.060 j	0.41 g j	1.7 j	0.13 j	0.069 j	0.93 g	0.71 j	1.2 g j	ND	0.071 j	50.0 ***
Fluoranthene	0.57	3.6	8.6	1.3	0.45	5.1	4.5	16	0.098 j	0.94	50.0 ***
Pyrene	0.50	3.4	7.6	1.1	0.40 j	4.2	4.1	13	0.081 j	0.82	50.0 ***
Benzo(a)anthracene	0.32 j	1.9	5.0	0.89	0.23 j	2.5	2.8	7.8	0.046 j	0.44	0.224 or MDL
Chrysene	0.30 j	1.7	4.0	0.66	0.24 j	2.4	2.2	7.8	0.055 j	0.45	0.40
Benzo(b)fluoranthene	0.26 j	1.0	3.9	0.8	0.20 j	1.4	2.0	7.8	0.047 j	0.35 j	1.1
Benzo(k)fluoranthene	0.25 j	1.2	2.9	0.40	0.15 j	1.6	2.2	4.4	0.046 j	0.29 j	1.1
Benzo(a)pyrene	0.31 j	1.3	4.1	0.68	0.21 j	1.8	2.2	7.7	0.046 j	0.34 j	0.061 or MDL
Indeno(1,2,3-c,d)pyrene	0.21 j	0.80 j	2.8	0.47	0.13 j	1.1	1.2	5.1	0.032 j	0.18 j	3.2
Dibenzo(a,h)anthracene	0.091 j	0.37 j	1.1 j	0.20 j	0.053 j	0.49 j	0.50 j	2.0 j	ND	0.078 j	0.014 or MDL
Benzo(g,h,i)perylene	0.19 j	0.81 j	2.4	0.33 j	0.12 j	0.67 j	0.79 j	4.7	0.023 j	0.14 j	50.0 ***

NOTE: Bold numbers exceed cleanup objectives.

*** - As per TAGM #4046, total VOCs < 10 ppm, total Semi-VOCs < 500 ppm, and individual Semi-VOCs < 50 ppm.

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

g - Value considered estimated based on data validator's report (Appendix I).

j - Estimated concentration; compound present below quantitation limit.

ND - Not detected at analytical detection limit.

MDL - Method detection limit.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS11	UPSS12	RE UPSS12	UPSS13	UPSS14	RE UPSS15	UPSS16	NYSDEC SOIL CLEANUP OBJECTIVES ^a
SEMIVOLATILE ORGANICS (mg/kg)								
Naphthalene	ND	ND	ND	ND	0.13 j	0.27 g j	0.46 j	13.0
2-Methylnaphthalene	ND	ND	ND	ND	0.072 j	0.26 g j	0.45 j	36.4
Acenaphthylene	ND	ND	ND	ND	0.18 j	1.1 g j	1.7 j	41.0
Acenaphthene	ND	ND	ND	ND	0.27 j	ND	ND	50.0 ***
Dibenzofuran	ND	ND	ND	ND	0.28 j	0.63 g j	1.1 j	6.2
Fluorene	ND	ND	ND	ND	0.48 j	1.3 g j	2.1 j	50.0 ***
Phenanthrene	0.047 j	ND	0.039 g j	0.15 j	3.4	11 g	13	50.0 ***
Anthracene	ND	ND	ND	ND	0.94	2.1 g j	3.5	50.0 ***
Carbazole	ND	ND	ND	ND	0.59 j	4.7 g	2.7 j	50.0 ***
Fluoranthene	0.068 j	ND	0.054 g j	0.21 j	4.0	12 g	12	50.0 ***
Pyrene	0.062 j	ND	0.078 g j	0.30 j	3.0	10 g	10	50.0 ***
Benzo(a)anthracene	0.033 j	ND	0.040 g j	ND	2.0	6.6 g	5.7	0.224 or MDL
Chrysene	0.039 j	ND	0.028 g j	ND	1.5	6.0 g	6.0	0.4
Benzo(b)fluoranthene	ND	ND	ND	ND	1.6	5.5 g	4.7	1.1
Benzo(k)fluoranthene	ND	ND	ND	ND	1.4	4.0 g	4.2	1.1
Benzo(a)pyrene	0.027 j	ND	0.027 g j	ND	1.5	5.1 g	5.0	0.061 or MDL
Indeno(1,2,3-c,d)pyrene	ND	ND	0.025 g j	0.15 j	1.0	2.7 g	2.9 j	3.2
Dibenzo(a,h)anthracene	ND	ND	ND	ND	0.47 j	1.3 g j	1.3 j	0.014 or MDL
Benzo(g,h,i)perylene	ND	ND	0.024 g j	0.29 j	0.84	2.2 g j	2.5 j	50.0 ***

NOTE: Bold numbers exceed cleanup objectives.

*** - As per TAGM #4046, total VOCs < 10 ppm, total Semi-VOCs < 500 ppm, and individual Semi-VOCs < 50 ppm.
a - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.

g - Value considered estimated based on data validator's report (Appendix I).
j - Estimated concentration; compound present below quantitation limit.
ND - Not detected at analytical detection limit.
RE - Reanalysis.
MDL - Method detection limit.

TABLE 5-16 (Page 9 of 22)

SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	DL UPSS17	DL ¹ UPSS17	UPSS18	UPSS19	UPSS20	UPSS21	UPSS22	UPSS23	NYSDEC SOIL CLEANUP OBJECTIVES ^a
[DL: 50:1]									
SEMIVOLATILE ORGANICS (mg/kg)									
Naphthalene	2.8 j	1.6 g j	ND	0.071 j	ND	ND	ND	ND	13.0
2-Methylnaphthalene	2.4 j	ND	ND	0.056 j	ND	ND	ND	ND	36.4
Acenaphthylene	12 j	3.8 g j	0.097 j	0.043 j	ND	ND	ND	ND	50.0 ***
Acenaphthene	ND	ND	0.044 j	0.082 j	ND	ND	0.036 j	ND	6.2
Dibenzofuran	8.9 j	2.6 g j	ND	0.062 j	ND	ND	ND	ND	50.0 ***
Fluorene	17 j	4.7 g j	0.067 j	0.11 j	0.027 j	ND	0.043 j	ND	50.0 ***
Phenanthrene	93	42	0.50	0.86	0.44	0.16 j	0.45	0.12 j	50.0 ***
Anthracene	28	8.9 g j	0.19 j	0.23 j	0.10 j	0.046 j	0.11 j	0.030 j	50.0 ***
Carbazole	25	15 g	0.14 j	0.18 j	0.086 j	0.033 j	0.11 j	ND	50.0 ***
Fluoranthene	89	41	0.80	1.2	1.1	0.32 j	0.53	0.14 j	50.0 ***
Pyrene	71	35	0.81	1.0	1.2	0.33 j	0.56	0.18 j	50.0 ***
Benzo(a)anthracene	43	20	0.63	0.72	0.85	0.20 j	0.31 j	0.097 j	0.224 or MDL
Chrysene	47	18	0.51	0.69	0.89	0.22 j	0.32 j	0.12 j	0.4
Benzo(b)fluoranthene	30	13 j	0.60	0.64	0.75	0.18 j	0.27 j	0.083 j	1.1
Benzo(k)fluoranthene	36	16	0.59	0.54	0.78	0.18 j	0.20 j	0.095 j	1.1
Benzo(a)pyrene	37	17	0.58	0.62	0.77	0.20 j	0.26 j	0.11 j	0.061 or MDL
Indeno(1,2,3-c,d)pyrene	22 j	10 j	0.17 j	0.36 j	0.32 j	0.097 j	0.11 j	0.058 j	3.2
Dibenzo(a,h)anthracene	9.3 j	4.7 j	0.073 j	0.15 j	0.17 j	0.040 j	0.054 j	0.024 j	0.014 or MDL
Benzo(g,h,i)perylene	20 j	9.2 j	0.11 j	0.23 j	0.22 j	0.078 j	0.085 j	0.055 j	50.0 ***

NOTE: Bold numbers exceed cleanup objectives.

- *** - As per TAGM #4046, total VOCs < 10 ppm, total Semi-VOCs < 500 ppm, and individual Semi-VOCs < 50 ppm.
a - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.

- g - Value considered estimated based on data validator's report (Appendix I).
j - Estimated concentration; compound present below quantitation limit.
DL - Method diluted sample analysis.
DL - Diluted sample analysis.
ND - Not detected at analytical detection limit.
MDL - Method detection limit.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS24	UPSS25	UPSS26	UPSS27	UPSS28	UPSS29	UPSS30	UPSS31	UPSS32	NYSDEC SOIL CLEANUP OBJECTIVES*
SEMIVOLATILE ORGANICS (mg/kg)										
2,4-Dimethylphenol	0.099 j	ND	ND	ND	ND	ND	ND	ND	ND	50.0 ***
Naphthalene	0.040 j	ND	ND	0.037 j	ND	ND	ND	ND	0.19 j	13.0
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	0.088 j	36.4
Acenaphthylene	ND	ND	ND	ND	0.041 j	ND	ND	0.067 j	ND	41.0
Acenaphthene	0.030 j	ND	0.056 j	ND	0.055 j	ND	0.096 j	0.15 j	0.45 j	50.0 ***
Dibenzofuran	ND	ND	0.036 j	ND	0.028 j	ND	0.040 j	0.094 j	0.23 j	6.2
Fluorene	0.034 j	ND	0.065 j	ND	0.054 j	ND	0.092 j	0.23 j	0.49 j	50.0 ***
Phenanthrene	0.32 j	0.14 j	0.67	0.21 j	0.79	0.33 j	1.0	2.2	3.9	50.0 ***
Anthracene	0.089 j	ND	0.16 j	0.068 j	0.13 j	0.062 j	0.21 j	0.59 j	1.0	50.0 ***
Carbazole	0.084 j	0.042 g j	0.21 g j	0.053 j	0.28 j	0.066 g j	0.26 g j	0.67 g j	1.0	50.0 ***
Fluoranthene	0.43	0.27 j	0.88	0.39	1.3	0.54	1.2	3.9	3.2	50.0 ***
Pyrene	0.44	0.23 j	0.75	0.40	1.4	0.47	1.4	3.3	3.3	50.0 ***
Benzo(a)anthracene	0.26 j	0.16 j	0.47	0.20 j	0.80	ND	0.74	2.4	1.8	0.224 or MDL
Chrysene	0.28 j	0.14 j	0.39	0.23 j	0.69	0.28 j	0.71	2.0	1.7	0.4
Di-n-octylphthalate	ND	ND	ND	ND	0.030 j	ND	ND	ND	ND	50.0 ***
Benzo(b)fluoranthene	0.22 j	0.13 j	0.38	0.21 j	0.86	0.22 j	0.61	2.8	1.5	1.1
Benzo(k)fluoranthene	0.18 j	0.16 j	0.35 j	0.14 j	0.49	0.24 j	0.47	2.4	0.83	1.1
Benzo(a)pyrene	0.23 j	0.12 j	0.38 j	0.19 j	0.69	0.22 j	0.59	2.5	1.5	0.061 or MDL
Indeno(1,2,3-c,d)pyrene	0.11 j	0.085 j	0.23 j	0.074 j	0.18 j	0.15 j	0.13 j	0.82	0.88	3.2
Dibenzo(a,h)anthracene	0.047 j	0.035 j	0.11 j	0.030 j	0.069 j	0.055 j	0.057 j	0.47 j	0.33 j	0.014 or MDL
Benzo(g,h,i)perylene	0.091 j	0.10 j	0.21 j	0.058 j	0.090 j	0.15 j	0.092 j	0.71 j	0.92	50.0 ***

NOTE: Bold numbers exceed cleanup objectives.

*** - As per TAGM #4046, total VOCs < 10 ppm, total Semi-VOCs < 500 ppm,
and individual Semi-VOCs < 50 ppm.

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

g - Value considered estimated based on data validator's report (Appendix I).
ND - Not detected at analytical detection limit.
MDL - Method detection limit.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS33	UPSS34	UPSS35	UPSS36	UPSS37	UPSS38	UPSS39	UPSS40	UPFB06 (µg/l)	NYSDEC SOIL CLEANUP OBJECTIVES ^a
SEMIVOLATILE ORGANICS (mg/kg)										
Naphthalene	0.14 j	ND	0.037 j	ND	ND	ND	ND	ND	ND	13
2-Methylnaphthalene	0.089 j	ND	ND	ND	ND	ND	ND	ND	ND	36.4
Acenaphthylene	0.18 j	ND	ND	ND	ND	ND	ND	ND	ND	41
Acenaphthene	0.38 j	ND	ND	ND	ND	ND	ND	ND	ND	50.0 ***
Dibenzofuran	0.18 j	ND	ND	ND	ND	ND	ND	ND	ND	6.2
Fluorene	0.42 j	ND	ND	ND	ND	ND	ND	ND	ND	50.0 ***
Phenanthrene	4.5	0.040 j	0.24 j	0.18 j	0.13 j	0.047 j	0.27 j	0.19 j	ND	50.0 ***
Anthracene	0.72 j	ND	0.040 j	0.026 j	ND	ND	0.052 j	0.029 j	ND	50.0 ***
Carbazole	0.90	0.040 j	0.060 j	0.047 j	0.041 j	ND	0.059 j	0.048 j	ND	50.0 ***
Fluoranthene	4.5	0.045 j	0.46	0.31 j	0.18 j	0.093 j	0.39	0.27 j	ND	50.0 ***
Pyrene	5.0 g	0.057 j	0.51	0.28 j	0.14 j	0.079 j	0.40	0.29 j	ND	50.0 ***
Benzo(a)anthracene	2.9	0.041 j	0.28 j	0.15 j	0.082 j	0.043 j	0.21 j	0.16 j	ND	0.224 or MDL
Chrysene	2.4	0.045 j	0.29 j	0.18 j	0.096 j	0.057 j	0.22 j	0.18 j	ND	0.4
Benzo(b)fluoranthene	2.2	0.038 j	0.16 j	0.18 j	0.093 j	0.061 j	0.15 j	0.14 j	ND	1.1
Benzo(k)fluoranthene	1.2	0.045 j	0.27 j	0.15 j	0.064 j	0.045 j	0.17 j	0.13 j	ND	1.1
Benzo(a)pyrene	2.1	0.040 j	0.26 j	0.17 j	0.079 j	0.050 j	0.18 j	0.15 j	ND	0.061 or MDL
Indeno(1,2,3-c,d)pyrene	1.2	ND	0.13 j	0.10 j	0.051 j	0.035 j	0.076 j	0.035 j	ND	3.2
Dibenzo(a,h)anthracene	0.55 j	ND	0.053 j	0.036 j	0.017 j	ND	0.033 j	ND	ND	0.014 or MDL
Benzo(g,h,i)perylene	1.1	0.018 j	0.11 j	0.087 j	0.046 j	0.032 j	0.061 j	0.027 j	ND	50.0 ***

NOTE: Bold numbers exceed cleanup objectives.

*** - As per TAGM #4046, total VOCs < 10 ppm, total Semi-VOCs < 500 ppm, and individual Semi-VOCs < 50 ppm.

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

g - Value considered estimated based on data validator's report (Appendix I).

j - Estimated concentration; compound present below quantitation limit.

ND - Not detected at analytical detection limit.

MDL - Method detection limit.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS01	UPSS02	UPSS03	UPSS04	UPSS05	UPSS06	UPSS07	UPSS08	UPSS09	NYSDEC SOIL CLEANUP OBJECTIVES ^a
PESTICIDES/PCBs (mg/kg)										
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	0.00050 j p r	ND	0.11
gamma-BHC (Lindane)	0.00074 j r	ND	ND	ND	ND	ND	ND	ND	ND	0.2
Aldrin	0.00054 j p r	0.0016 j p r	ND	0.00057 j p r	ND	0.00053 j p r	0.0018 j p r	ND	ND	0.041
Heptachlor epoxide	0.00087 j p r	0.0042	0.0017 j p r	0.0021	ND	ND	0.0025 p r	0.0043 p r	ND	0.02
Endosulfan I	0.0013 j p r	0.0035 p r	0.0023 p r	0.00055 j p r	ND	0.0016 j p r	0.0022 p r	0.0025 p r	ND	0.9
Dieldrin	0.0033 j p r	0.0098 p	0.0056 p r	0.0045 p r	0.00077 j p r	0.0014 j p r	0.0078 p r	ND	ND	0.044
4,4'-DDE	0.0027 j p r	ND	0.00090 j p r	ND	ND	ND	0.0017 j	ND	0.068 r	2.1
Endrin	ND	0.029 p g	0.013 p r g	0.0088 p r g	0.0013 j p r g	0.005 p n g	0.010 p n g	0.024 p r g	ND	0.10
Endosulfan II	0.0026 j p r	0.0076 p r	0.005 p r	0.0019 j p r	0.0023 j p n	ND	0.0053 p n	0.0094 p r	ND	0.9
4,4'-DDD	0.0019 j n p	0.0017 j p r	0.0037 j	0.0026 j	ND	ND	0.0017 j p	0.0036 j p r	0.0034 j p r	2.9
4,4'-DDT	D	D	D	D	D	D	D	0.010 p g	0.059 g r	2.1
Methoxychlor	0.0048 j p r	0.016 j p r	0.015 j p r	0.0039 j p r	ND	ND	0.015 j p r	0.021 p r	ND	***
gamma-Chlordane	0.00058 j p r	0.0015 j p n	ND	ND	ND	0.00074 j	ND	ND	ND	0.54
Aroclor 1242	ND	ND	0.045 j n p	ND	ND	ND	ND	ND	ND	1.0 f
Aroclor 1248	ND	ND	ND	ND	ND	ND	0.055 p	ND	ND	1.0 f
Aroclor 1254	0.064	ND	ND	ND	ND	ND	ND	ND	ND	1.0 f

*** - As per TAGM #4046, total pesticides <10 ppm.

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

f - Total surface PCBs = 1.0 mg/kg.

g - Value considered estimated based on data validator's report (Appendix I).

j - Estimated concentration; compound present below quantitation limit.

n - Tentative identification.

p - Pesticide/Aroclor target analyte has >25% difference for the detected concentrations between the two GC columns.

r - Value rejected by data validator but usable to show magnitude of contaminated level (Appendix I).

D - Value rejected by data validator and found unusable (Appendix I).

ND - Not detected at analytical detection limit.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS10	UPSS11	UPSS12	UPSS13	UPSS14	UPSS15	UPSS16	NYSDEC SOIL CLEANUP OBJECTIVES ^a
PESTICIDES/PCBs (mg/kg)								
alpha-BHC	ND	ND	ND	ND	ND	0.0014 j p r	ND	0.11
Aldrin	0.00053 j p r	ND	ND	ND	0.00082 j p r	ND	0.0025 j p r	0.041
Heptachlor epoxide	ND	0.0035 p r	ND	ND	0.00049 j p r	0.014 p	0.0059 p r	0.02
Endosulfan I	ND	ND	ND	ND	0.0011 j p r	0.0071 p r	0.0015 j p r	0.9
Dieldrin	0.0017 j p r	ND	0.0010 j p r	0.00090 j p r	0.0012 j p r	0.037 p r	ND	0.044
4,4'-DDE	ND	ND	0.00045 j	0.00075 j p	ND	0.012 p r	ND	2.1
Endrin	ND	ND	ND	ND	0.0018 g j p n	0.083 g p r	0.022 g p r	0.1
Endosulfan II	ND	ND	ND	ND	0.0018 j p n	0.022 p r	0.0034 j p r	0.9
4,4'-DDD	0.00056 j p r	ND	ND	ND	ND	ND	0.0082 p r	2.9
Methoxychlor	ND	ND	ND	0.0038 j p	0.0016 j p r	0.036 p r	0.0062 j p r	***
alpha-Chlordane	ND	ND	ND	ND	0.00055 j p n	ND	ND	0.54
gamma-Chlordane	ND	0.00063 j	ND	ND	0.00054 j p r	ND	ND	0.54
Aroclor 1254	ND	ND	0.014 j	0.014 j	ND	0.075	ND	1.0 f

*** - As per TAGM #4046, total pesticides <10 ppm.

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

f - Total surface PCBs = 1.0 mg/kg.

g - Value considered estimated based on data validator's report (Appendix I).

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.

n - Tentative identification.

r - Value rejected by data validator but usable to show magnitude of contaminated level (Appendix I).

ND - Not detected at analytical detection limit.

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SURFACE SOIL DATA SUMMARY (May 1995)

United Plating Site

PARAMETER	UPSS17	UPSS18	UPSS19	UPSS20	UPSS21	UPSS22	NYSDEC SOIL CLEANUP OBJECTIVES ^a
PESTICIDES/PCBs (mg/kg)							
alpha-BHC	0.00045 j p r	ND	ND	ND	ND	ND	0.11
delta-BHC	ND	0.0012 j p r	0.0018 j p r	ND	ND	ND	0.2
gamma-BHC (Lindane)	0.0055 p r	ND	ND	ND	0.0013 j p	ND	0.06
Aldrin	ND	0.00031 j p r	0.00056 j p r	0.0011 j p r	0.0016 j p	ND	0.041
Heptachlor epoxide	0.011 p r	0.0016 j r	0.00099 j p r	ND	ND	ND	0.02
Endosulfan I	ND	ND	0.00066 j p r	0.00099 j p r	0.00080 j p	0.0013 j p r	0.09
Dieldrin	0.025 p r	0.016 r	0.002 j p r	0.0057 p r	0.0028 j p	0.0028 j p r	0.044
4,4'-DDE	0.0029 j r	ND	0.0014 j p r	ND	0.00083 j p	ND	2.1
Endrin	ND	0.010 g p r	0.0032 g j p r	0.0059 g p	0.0029 j p	0.0075 g p r	0.10
Endosulfan II	0.022 p r	ND	0.0025 j p	ND	ND	0.0025 j p r	0.9
4,4'-DDD	0.011 p r	0.0050 r	ND	ND	0.0013 j p	ND	2.9
4,4'-DDT	ND	0.0074 g p r	0.0090 g	0.0052 g n p	0.0027 g j p r	0.0026 g j p r	2.1
Methoxychlor	0.040 p r	0.0064 j p r	0.0049 j p	0.0037 j p r	0.0032 j p	0.0054 j p r	***
alpha-Chlordane	ND	0.00056 j p r	ND	0.00039 j p r	ND	ND	0.54
gamma-Chlordane	ND	ND	ND	0.0020 p	0.00089 j p	ND	0.54
Aroclor 1242	ND	ND	ND	ND	ND	ND	1.0 f
Aroclor 1260	ND	0.012 j	ND	ND	0.018 j n p	ND	1.0 f

*** - As per TAGM #4046, total pesticides <10 ppm.

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

f - Total surface PCBs = 1.0 mg/kg.

g - Value considered estimated based on data validator's report (Appendix I).

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.

r - Value rejected by data validator but usable to show magnitude of contaminated level (Appendix I).

ND - Not detected at analytical detection limit.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS23	UPSS24	UPSS25	UPSS26	UPSS27	UPSS28	NYSDEC SOIL CLEANUP OBJECTIVES ^a
PESTICIDES/PCBs (mg/kg)							
Heptachlor	ND	ND	0.00068 g j	0.00044 g j p r	ND	ND	0.1
Aldrin	0.0013 j p r	0.0015 j p r	0.00094 g j p r	ND	ND	ND	0.041
Heptachlor epoxide	ND	ND	ND	0.0015 g j p r	ND	ND	0.02
Dieldrin	ND	0.0022 j p r	0.0024 g j p r	ND	ND	0.020 g n p	0.044
4,4'-DDE	0.00070 j p r	0.0011 j p	ND	0.0091 g p	ND	0.041 g	2.1
Endrin	ND	ND	0.0028 g j p r	0.0072 g n p	ND	0.010 j g n p	0.10
Endosulfan II	0.0017 j n p	0.00077 j p r	0.0065 g p r	0.0055 g p r	0.0013 j p r	0.004 j g n p	0.9
4,4'-DDD	ND	0.00045 j p r	0.0017 g j p r	0.0025 g j p r	ND	0.025 g p r	2.9
Endosulfan sulfate	ND	ND	0.0035 g j p	0.010 g p	ND	0.030 g p	1.0
4,4'-DDT	ND	D	ND	ND	D	0.17 g r	2.1
Methoxychlor	ND	0.0011 j p r	0.0027 g j p r	0.0077 g j p r	0.00048 j p r	0.0049 j g p r	***
Endrin aldehyde	0.0046 p r	0.00074 j p r	ND	ND	ND	ND	***
alpha-Chlordane	ND	ND	ND	ND	0.0016 j p r	0.0016 j g p r	0.54
gamma-Chlordane	ND	0.00061 j p r	ND	0.0020 g p r	ND	ND	0.54
Aroclor 1254	ND	ND	ND	ND	ND	0.060 j	1.0 f
Aroclor 1260	ND	0.026 j	0.24	0.11 p	ND	ND	1.0 f

*** - As per TAGM #4046, total pesticides <10 ppm.

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

f - Total surface PCBs = 1.0 mg/kg.

g - Value considered estimated based on data validator's report (Appendix I).

j - Estimated concentration; compound present below quantitation limit.

n - Tentative identification.

p - Pesticide/Aroclor target analyte has >25% difference for the detected concentrations between the two GC columns.

r - Value rejected by data validator but usable to show magnitude of contaminated level (Appendix I).

D - Value rejected by data validator and found unusable (Appendix I).

ND - Not detected at analytical detection limit.

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SURFACE SOIL DATA SUMMARY (May 1995)

United Plating Site

PARAMETER	UPSS29	UPSS30	UPSS31	UPSS32	UPSS33	UPSS34	NYSDEC SOIL CLEANUP OBJECTIVES ^a
PESTICIDES/PCBs (mg/kg)							
Heptachlor	0.00030 g j p r	0.00094 g j n p	0.0017 g j	ND	ND	ND	0.1
Aldrin	0.00054 g j p r	0.0015 g j p r	0.00077 g j p r	ND	0.0038 j p r	ND	0.041
Heptachlor epoxide	ND	ND	0.00050 g j p r	0.0024 j	0.0051 j p	ND	0.02
Endosulfan I	ND	ND	ND	ND	ND	ND	0.09
Dieldrin	ND	ND	0.0031 g j p r	0.0051 j p r	0.024 p r	ND	0.044
4,4'-DDE	ND	0.014 g	0.00056 g j p r	0.015 j p	0.045 p	ND	2.1
Endrin	0.0016 g j p r	0.0053 g p r	0.021 g	0.010 g j p	0.038 g	ND	0.10
Endosulfan II	0.00065 g j p r	0.0034 g j p n	0.0024 g j p r	0.0052 j	0.0096 j p r	0.00049 j p r	0.9
4,4'-DDD	0.00085 g j p r	0.0052 g p r	0.0048 g p n	0.014	0.015	0.00061 j p r	2.9
Endosulfan sulfate	ND	0.0022 g j p r	ND	ND	ND	0.00040 j p r	1.0
4,4'-DDT	D	0.039 g	0.014 g p n	0.083 g p	0.11 g p	ND	2.1
Methoxychlor	0.0046 g j p r	0.0053 g j p r	0.0049 g j p r	0.0073 j p r	0.012 j p r	0.0027 j p	***
Endrin aldehyde	ND	ND	ND	ND	ND	ND	***
alpha-Chlordane	ND	ND	0.00049 g j	ND	ND	ND	0.54
gamma-Chlordane	ND	ND	0.00068 g j p r	ND	ND	ND	0.54
Aroclor 1254	ND	ND	ND	ND	ND	ND	1.0 f
Aroclor 1260	ND	0.035 j	0.015 j p	ND	ND	ND	1.0 f

*** - As per TAGM #4046, total pesticides <10 ppm.

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

f - Total surface PCBs = 1.0 mg/kg.

g - Value considered estimated based on data validator's report (Appendix I).

j - Estimated concentration; compound present below quantitation limit.

n - Tentative identification.

p - Pesticide/Aroclor target analyte has >25% difference for the detected concentrations between the two GC columns.

r - Value rejected by data validator but usable to show magnitude of contaminated level (Appendix I).

D - Value rejected by data validator and found unusable (Appendix I).

ND - Not detected at analytical detection limit.

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SURFACE SOIL DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPSS35	UPSS36	UPSS37	UPSS38	UPSS39	UPSS40	UPFB06 FIELD BLANK (µg/l)	NYSDEC SOIL CLEANUP OBJECTIVES ^a
PESTICIDES/PCBs (mg/kg)								
Heptachlor	ND	ND	ND	0.00057 g j n p	ND	ND	ND	0.1
Aldrin	ND	0.00033 j p r	0.00047 j p r	0.00072 g j p r	0.00072 g j p r	0.00054 g j p r	0.018 g j p	0.041
Heptachlor epoxide	ND	ND	ND	ND	ND	ND	ND	0.02
Endosulfan I	0.00095 j p r	0.00016 j p r	ND	ND	ND	ND	ND	0.09
Dieldrin	0.0030 j p r	0.0030 j p	0.0017 j p r	ND	ND	ND	ND	0.044
4,4'-DDE	0.0057 p	ND	0.00085 j p	ND	0.0013 g j n p	0.0073 g	ND	2.1
Endrin	ND	ND	0.00068 g j p r	0.0041 g p	0.0018 g j p	0.0025 g j p	ND	0.10
Endosulfan II	0.0035	0.0013 j p r	0.0011 j	0.00065 g j p r	0.00047 g j p r	ND	ND	0.9
4,4'-DDD	ND	ND	0.0011 j p r	0.0014 g j p r	ND	0.0013 g j p r	ND	2.9
Endosulfan sulfate	ND	ND	ND	ND	ND	ND	ND	1.0
4,4'-DDT	D	D	D	D	ND	0.015 g	D	2.1
Methoxychlor	0.0019 j p r	ND	0.0019 j p r	0.0028 g j n p	ND	0.0045 g j n p	ND	***
Endrin aldehyde	0.0020 j p r	ND	ND	ND	ND	ND	ND	***
alpha-Chlordane	ND	ND	ND	ND	0.00048 g j p r	ND	ND	0.54
gamma-Chlordane	0.0011 j p r	0.0010 j n p	0.00066 j p r	ND	0.00067 g j p	ND	ND	0.54
Aroclor 1254	0.15 p	ND	0.012 j n p	ND	ND	ND	ND	1.0 f
Aroclor 1260	ND	0.018 j	ND	0.0081 p	ND	0.0068 j p	ND	1.0 f

*** - As per TAGM #4046, total pesticides <10 ppm.

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

f - Total surface PCBs = 1.0 mg/kg.

g - Concentration based on QC evaluation.

j - Estimated concentration; compound present below quantitation limit.

n - Tentative identification.

p - Pesticide/Aroclor target analyte has >25% difference for the detected concentrations between the two GC columns.

r - Value rejected by data validator but usable to show magnitude of contaminated level (Appendix I).

D - Value rejected by data validator and found unusable (Appendix I).

ND - Not detected at analytical detection limit.

SURFACE SOIL DATA SUMMARY (May 1995)

United Plating Site

PARAMETER	UPSS01	UPSS02	UPSS03	UPSS04	UPSS05	UPSS06	UPSS07	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
TAL METALS (mg/kg)										
Aluminum	11,600	17,300	14,500	11,500 g	23,300 g	11,400 g	10,200 g	33,000	SB	-
Antimony	ND N	ND N	ND N	ND N	ND N	ND N	ND N	0.6 - 10 (n)	SB	-
Arsenic	4.9	5.9	9.1	8.2	ND	6.2	15	3.0 - 12.0 æ	7.5 or SB	-
Barium	88	135	179	82	140	254	141	15 - 600	300 or SB	-
Beryllium	0.65 B	0.83 B	0.69 B	0.55 B	1.1 B	0.60	0.57 B	0 - 1.75	0.16 or SB	-
Cadmium	2.9	2.3	2.8	3.0	1.3	4.1	4.3	0.1 - 1.0	1 or SB	1.0
Calcium	D	D	D	D	D	D	D	130 - 35,000 æ	SB	-
Chromium	25 g	25 g	37 g	29 g	31 g	21 g	34 g	1.5 - 40.0 æ	10 or SB	16
Cobalt	8.8 B	10 B	10 B	8.2 B	11	19	11 B	2.5 - 60.0 æ	30 or SB	-
Copper	47	39	87	60	30	45	55	1.0 - 50.0	25 or SB	22.5
Iron	25,300	28,900	38,500	24,400 g	38,000 g	31,800 g	26,900 g	2,000 - 550,000	2,000 or SB	-
Lead	100 g E	82 g E	227 g E	67 g E	0.68 g B E	55 g E	156 g E	4.0 - 61 or 200 - 500*	400(d)	-
Magnesium	4,200	7,330	3,770	4,650	5,010	9,330	3,720	100 - 5,000	SB	-
Manganese	457	743	427	370	737	5,900	513	50 - 5,000	SB	-
Mercury	0.14 g B	ND	0.16 g	ND	ND	0.20 g	0.18 g	0.001 - 0.2	0.1	-
Nickel	22	26	303	24	22	35	36	0.5 - 25	13 or SB	14.5
Potassium	D	D	D	D	D	D	D	8,500 - 43,000 æ	SB	-
Selenium	0.69 g B	D	D	D	D	2.8 g	D	0.1 - 3.9	2 or SB	-
Silver	1.7 B	1.0 B	1.9 B	1.7 B	ND	2.0 B	3.2	0.1 - 5.0 (n)	SB	-
Sodium	137 B	143 B	107 B	68 B	102 B	226 B	129	6,000 - 8,000	SB	-
Thallium	ND	ND	ND	ND	14 g	ND	ND	0.1 - 0.8 (q)	SB	-
Vanadium	28	35	35	30	54	29	27	1.0 - 300	150 or SB	-
Zinc	193 g E	162 g E	308 g E	137 g E	116 g E	124 g E	232 g E	9.0 - 50	20 or SB	112
Cyanide	1.1 B	ND	ND	0.64 B	ND	0.92 g B	ND	N/A	**	-

NOTE: Bold numbers exceed cleanup objectives/background concentrations.

- * - 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), 1/9
- (c) - See Section 5.2.2.1 of text.
- (d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

- (n) - Dragun, J., The Soil Chemistry of Hazardous Materials.
- (q) - Bowan, H.J., Environmental Chemistry of the Elements.
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- N - Spiked sample recovery is not within control limits.
- ND - Not detected at analytical detection limit.
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- SB - Site background.

SURFACE SOIL DATA SUMMARY (May 1995)

United Plating Site

PARAMETER	UPSS08	UPSS09	UPSS10	UPSS11	UPSS12	UPSS13	UPSS14	UPSS15	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
TAL METALS (mg/kg)											
Aluminum	10,600 g	4,570 g	10,600 g	12,400 g	10,300 g	8,560 g	8,120 g	14,100 g E	33,000	SB	-
Antimony	ND N	ND N	ND N	2.8 g B N	ND N	ND N	4.7 g B N	ND	0.6 - 10 (n)	SB	-
Arsenic	ND	ND	6.5	3.9	6.1	2.3	ND	5.4	3.0 - 12.0 æ	7.5 or SB	-
Barium	146	29	64	70	67	50	55	104 g E	15 - 600	300 or SB	-
Beryllium	0.58 B	0.27 B	0.59 B	0.7	0.56 B	0.4 B	0.44 B	0.62 B	0 - 1.75	0.16 or SB	-
Cadmium	3.0	0.81 B	3.7	1.9	3.3	11	ND	7.3	0.1 - 1.0	1 or SB	1.0
Calcium	D	D	D	D	D	D	D	D	130 - 35,000 æ	SB	-
Chromium	35 g	7.0 g	24 g	22 g	23 g	55 g	20 g	72	1.5 - 40.0 æ	10 or SB	16
Cobalt	8.9 B	3.9 B	14 g	13 g	17 g	78 g	11 g	8.7 B	2.5 - 60.0 æ	30 or SB	-
Copper	82	14	43	37	45	58	42	39 g E	1.0 - 50.0	25 or SB	22.5
Iron	38,800 g	12,600 g	30,300 g	29,000 g	31,000 g	24,800 g	21,500 g	20,000 g	2,000 - 550,000	2,000 or SB	-
Lead	161 g E	23 g E	74 g E	18 g E	26 g E	131 g E	81 g E	164 g E	4.0 - 61 or 200 - 500*	400(d)	-
Magnesium	4,610	2,130	6,060	4,590	7,060	5,050	8,360	3,710 g E	100 - 5,000	SB	-
Manganese	430	247	654	324	666	440	575	328	50 - 5,000	SB	-
Mercury	0.15 g	ND	ND	0.10 g	0.09 g B	0.13 g	ND	ND N	0.001 - 0.2	0.1	-
Nickel	34	9.3	29	29	35	33	ND	23	0.5 - 25	13 or SB	14.5
Potassium	D	D	D	D	D	D	D	D	8,500 - 43,000 æ	SB	-
Selenium	D	0.91 g B	ND	ND	ND	ND	ND	ND	0.1 - 3.9	2 or SB	-
Silver	1.9 B	ND	0.59 B	ND	1.1 B	3.0	5.0	2.5 B	0.1 - 5.0 (n)	SB	-
Sodium	101 B	31 B	80 B	101 B	102 B	133 B	151 B	289 B	6,000 - 8,000	SB	-
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	0.1 - 0.8 (q)	SB	-
Vanadium	28	16	26	26	21	17	18	26 g	1.0 - 300	150 or SB	-
Zinc	271 g E	132 g E	159 g E	122 g E	194 g E	183 g E	109 g E	280 g N	9.0 - 50	20 or SB	112
Cyanide	ND	ND	ND	ND	0.65 g	1.1 g	ND	ND N	N/A	**	-

NOTE: Bold numbers exceed cleanup objectives/background concentrations.

- * - 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) - NYSDC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
- (c) - See Section 5.2.2.1 of text.
- (d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

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SURFACE SOIL DATA SUMMARY (May 1995)

United Plating Site

PARAMETER	UPSS16	UPSS17	UPSS18	UPSS19	UPSS20	UPSS21	UPSS22	UPSS23	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
TAL METALS (mg/kg)											
Aluminum	15,600 g E	11,400 g E	6,470 g E	7,540	5,100 g E	5,520 g E	6,650 g E	14,800 g E	33,000	SB	-
Antimony	ND	ND	ND	ND N	ND	ND	ND	ND	0.6 - 10 (n)	SB	-
Arsenic	4.8	4.3	ND	4.8	2.5	7.8	5.6	4.4	3.0 - 12.0 æ	7.5 or SB	-
Barium	120 g E	103 g E	36 g B E	123 g	45 g E	60 g E	71 g E	138 g E	15 - 600	300 or SB	-
Beryllium	0.69 B	0.55 B	0.33 B	0.49 B	0.34 B	0.39 B	0.42 B	0.70	0 - 1.75	0.16 or SB	-
Cadmium	7.2	2.4	3.5	1.3	ND	2.5	6.8	10	0.1 - 1.0	1 or SB	1.0
Calcium	D	D	D	D	104,000 g	99,900 g	D	D	130 - 35,000 æ	SB	-
Chromium	62	24	18	25 g	62	42	30	34	1.5 - 40.0 æ	10 or SB	16
Cobalt	11 B	7.7 B	5.4 B	ND	5.4 B	6.1 B	17	15	2.5 - 60.0 æ	30 or SB	-
Copper	47 g E	39 g E	17 g E	54 g	33 g E	62 g E	63 g E	51 g E	1.0 - 50.0	25 or SB	22.5
Iron	28,500 g	22,200 g	10,800 g	27,100 g	14,000 g	14,000 g	16,100 g	29,200 g	2,000 - 550,000	2,000 or SB	-
Lead	183 g E	218 g E	140 g E	116 g E	236 g E	41 g E	53 g E	54 g E	4.0 - 61 or 200 - 500*	400(d)	-
Magnesium	3,250 g E	2,360 g E	1,810 g E	3,460	49,600 g E	45,700 g E	31,600 g E	11,700 g E	100 - 5,000	SB	-
Manganese	291	330	342	400	340	382	390	666	50 - 5,000	SB	-
Mercury	ND N	ND N	ND N	0.22 g	ND N	ND N	ND N	ND N	0.001 - 0.2	0.1	-
Nickel	26	39	16	34	14	17	23	37	0.5 - 25	13 or SB	14.5
Potassium	D	D	D	D	1,680	2,310	D	D	8,500 - 43,000 æ	SB	-
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	0.1 - 3.9	2 or SB	-
Silver	5.7	1.9 B	0.5 B	ND	0.39 B	1.7 B	1.8 B	1.2 B	0.1 - 5.0 (n)	SB	-
Sodium	306 B	203 B	113 B	55 B	506 B	157 B	118 B	92 B	6,000 - 8,000	SB	-
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	0.1 - 0.6 (q)	SB	-
Vanadium	30 g	24 g	12 g	25 g	15 g	13 g	15 g	26 g	1.0 - 300	150 or SB	-
Zinc	272 g N	241 g N	248 g N	136 g E	61 g N	71 g N	138 g N	125 g N	9.0 - 50	20 or SB	112
Cyanide	ND N	ND N	ND N	ND	ND N	2.1 g N	1.7 g N	0.69 g N	N/A	**	-

NOTE: Bold numbers exceed cleanup objectives/background concentrations.

* - 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/

(c) - See Section 5.2.2.1 of text.

(d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

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

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

g - Value considered estimated based on data validator's report (Appendix I).

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

D - Value rejected by data validator and found unusable (Appendix I).

E - Value estimated due to interference.

N - Spiked sample recovery is not within control limits.

ND - Not detected at analytical detection limit.

N/A - Not available.

SB - Site background.

SURFACE SOIL DATA SUMMARY (May 1995) **United Plating Site**

PARAMETER	UPSS24	UPSS25	UPSS26	UPSS27	UPSS28	UPSS29	UPSS30	UPSS31	UPSS32	EASTERN USA	RECOMMENDED	SITE
										BACKGROUND SOIL	SOIL CLEANUP	
										CONCENTRATIONS (b)	OBJECTIVE (b)	BACKGROUND (c)
TAL METALS (mg/kg)												
Aluminum	11,600 g E	9,680 g E	4,300 g E	8,840 g E	5,150 g E	11,500 g E	10,300 g E	7,090 g E	9,120 g E	33,000	SB	-
Antimony	ND	ND N	ND N	ND	ND N	ND N	ND N	ND N	ND	0.6 - 10 (n)	SB	-
Arsenic	3.7	3.8 R	3.1 R	3.1	2.8 R	1.8 B R	1.9 B R	1.6 B R	2.9	3.0 - 12.0 æ	7.5 or SB	-
Barium	96 g E	73 g E	68 g E	49 g E	55 g E	92 g E	82 g E	48 g E	64 g E	15 - 600	300 or SB	-
Beryllium	0.71	0.89 B	0.41 B	0.42 B	0.35 B	0.87 B	0.70 B	0.46 B	0.44 B	0 - 1.75	0.16 or SB	-
Cadmium	49	2.0 g N R	2.2 g N R	1.2 B	4.5 g N R	1.0 g N R	2.2 g N R	2.1 g N R	1.7	0.1 - 1.0	1 or SB	1.0
Calcium	D	D	D	D	D	D	D	D	D	130 - 35,000 æ	SB	-
Chromium	54	22	13	17	17	19	21	20	20	1.5 - 40.0 æ	10 or SB	16
Cobalt	16	9.8	4.7 B	11	5.0 B	9.4 B	9.0 B	6.6 B	11	2.5 - 60.0 æ	30 or SB	-
Copper	75 g E	34 R	27 R	29 g E	45 R	27 R	37 R	34 R	31 g E	1.0 - 50.0	25 or SB	22.5
Iron	25,400 g	25,000 g E	11,500 g E	20,500 g	15,500 g E	22,800 g E	21,800 g E	19,400 g E	18,100 g	2,000 - 550,000	2,000 or SB	-
Lead	140 g E	68 g E N	198 g E N	61 g E	215 g E N	38 g E N	87 g E N	162 g E N	215 g E	4.0 - 61 or 200 - 500*	400(d)	-
Magnesium	12,900 g E	7,770 g E	15,300 g E	8,980 g E	15,400 g E	5,850 g E	6,220 g E	13,200 g E	8,610 g E	100 - 5,000	SB	-
Manganese	522	413 g E N	247 g E N	479	239 g E N	449 g E N	399 g E N	396 g E N	435	50 - 5,000	SB	-
Mercury	ND N	ND N	0.12 g N	ND N	0.10 g N	ND N	ND N	ND N	ND N	0.001 - 0.2	0.1	-
Nickel	38	22	13	22	16	20	22	17	21	0.5 - 25	13 or SB	14.5
Potassium	D	D	D	D	D	D	D	D	D	8,500 - 43,000 æ	SB	-
Selenium	ND	D	D	ND	D	D	D	D	ND	0.1 - 3.9	2 or SB	-
Silver	2.3	0.51 B	0.98 B	0.99 B	2.2	ND	0.93 B	1.0 B	0.84 B	0.1 - 5.0 (n)	SB	-
Sodium	89 B	91 B	97 B	220 B	147 B	110 B	89 B	237 B	95 B	6,000 - 8,000	SB	-
Thallium	ND	1.9 g B	1.3 g B	ND	1.6 g B	ND	1.5 g B	ND	ND	0.1 - 0.8 (q)	SB	-
Vanadium	21 g	22 g	17 g	19 g	19 g	25 g	26 g	21	20 g	1.0 - 300	150 or SB	-
Zinc	149 g N	83 g E	119 g E	98 g N	127 g E	69 g E	104 g E	134 g E	166 g N	9.0 - 50	20 or SB	112
Cyanide	4.1 g N	1.2	ND	ND N	ND	ND	ND	ND	ND N	N/A	**	-

NOTE: Bold numbers exceed cleanup objectives/background concentrations.

- * - 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.
- (c) - See Section 5.2.2.1 of text.
- (n) - Dragun, J., The Soil Chemistry of Hazardous Materials.
- (d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

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- R - Duplicate analysis not within control limits.
- ND - Not detected at analytical detection limit.
- N/A - Not available.
- SB - Site background.

SURFACE SOIL DATA SUMMARY (May 1995)

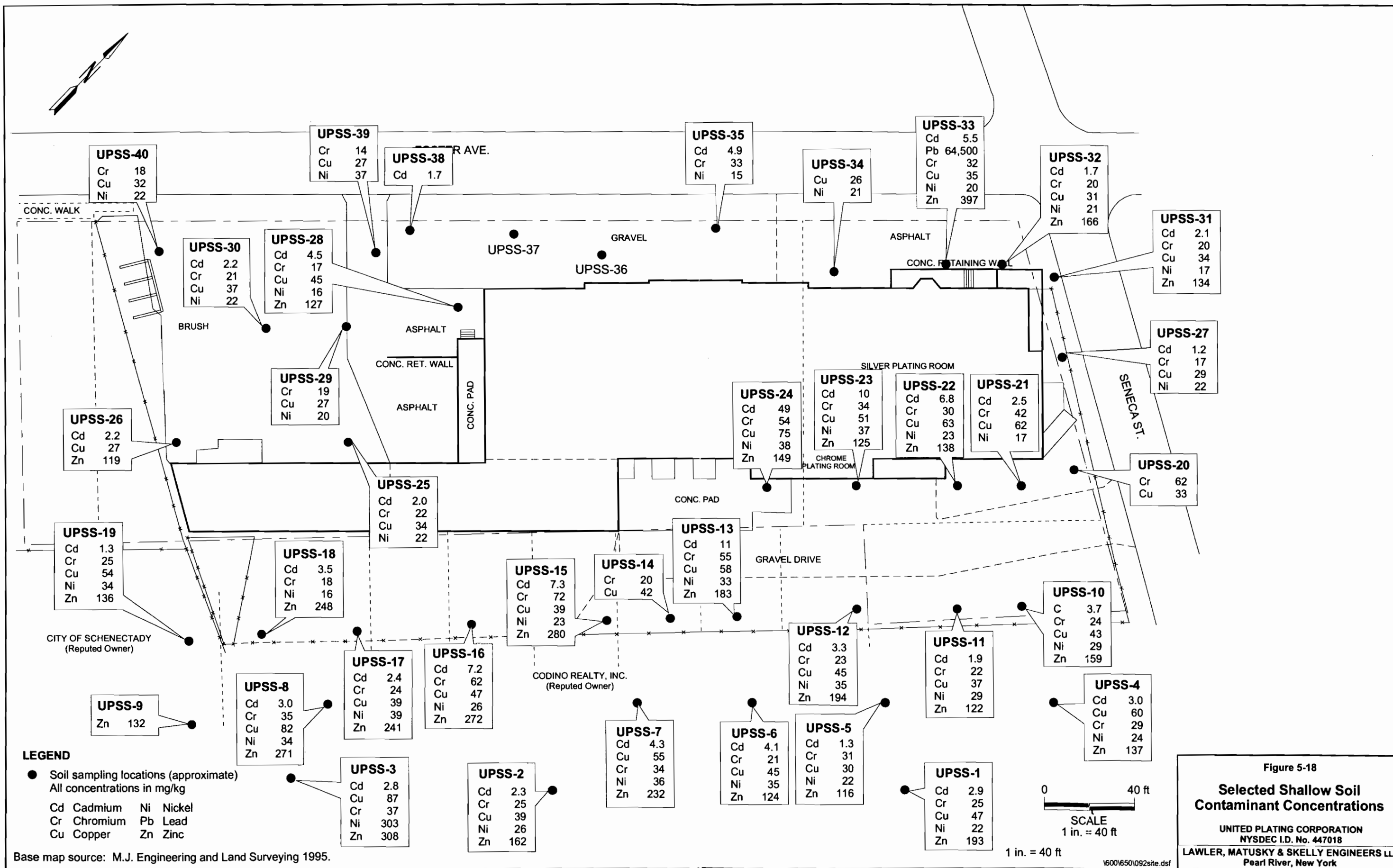
United Plating Site

PARAMETER	UPSS33	UPSS34	UPSS35	UPSS36	UPSS37	UPSS38	UPSS39	UPSS40	UPFB06 (µg/l)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
TAL METALS (mg/kg)												
Aluminum	13,000 g E	7,970 E	2,630 g E	2,270 g E	1,860 g E	2,200 g E	9,730 g E	10,300 g E	ND	33,000	SB	-
Antimony	690	ND	ND	ND	ND	ND N	ND N	ND N	D	0.6 - 10 (n)	SB	-
Arsenic	3.4	1.5 B	7.9	7.6	2.7	6.0 R	1.2 R	4.7 R	5.0 B	3.0 - 12.0 æ	7.5 or SB	-
Barium	79 g E	37 g E	48 g E	40 g E	30 B g E	49 g E	57 g E	66 g E	43 B g E	15 - 600	300 or SB	-
Beryllium	0.52 B	0.42 B	0.25 B	0.25 B	0.19 B	0.32 B	0.58 B	0.72 B	ND	0 - 1.75	0.16 or SB	-
Cadmium	5.5	0.64 B	4.9	ND	ND	1.7 g N R	1.0 g N R	1.0 g N R	ND	0.1 - 1.0	1 or SB	1.0
Calcium	D	D	105,000 g	111,000 g	101,000 g	164,000 g E	D	D	D	130 - 35,000 æ	SB	-
Chromium	32	15	33	13	10	11	19	18	ND	1.5 - 40.0 æ	10 or SB	16
Cobalt	10	8.1 B	4.8 B	4.6 B	3.1 B	4.4 B	9.3	12	ND	2.5 - 60.0 æ	30 or SB	-
Copper	35 g E	26 g E	22 g E	15 g E	16 g E	15 R	27 R	32 R	3.6 B	1.0 - 50.0	25 or SB	22.5
Iron	19,000 g	22,100 g	11,400 g	11,500 g	8,590 g	11,400 g E	22,600 g E	23,200 g E	132 g	2,000 - 550,000	2,000 or SB	-
Lead	64,500 g E	15 g E	376 g E	74 g E	68 g E	27 g E N	25 g E N	33 g E N	ND	4.0 - 61 or 200 - 500*	400(d)	-
Magnesium	4,420 g E	7,510 g E	52,300 g E	51,300 g E	44,100 g E	52,200 g E	11,500 g E	7,280 g E	ND	100 - 5,000	SB	-
Manganese	385	488	213	227	190	243 g E N	539 g E N	473 g E N	D	50 - 5,000	SB	-
Mercury	ND N	ND N	ND N	0.11 g B N	ND N	ND N	ND N	ND N	ND	0.001 - 0.2	0.1	-
Nickel	20	21	15	12	7.5	13	37	22	ND	0.5 - 25	13 or SB	14.5
Potassium	D	D	1,530	1,280	987	1,260	D	D	D	8,500 - 43,000 æ	SB	-
Selenium	ND	ND	ND	ND	ND	D	D	D	D	0.1 - 3.9	2 or SB	-
Silver	1.7 B	ND	2.4	1.6 B	3.7	ND	ND	ND	ND	0.1 - 5.0 (n)	SB	-
Sodium	87 B	201 B	1,690	231 B	222 B	204 B	279 B	83 B	ND	6,000 - 8,000	SB	-
Thallium	ND	ND	ND	ND	ND	1.7 g B	ND	ND	6.1 g B	0.1 - 0.8 (q)	SB	-
Vanadium	26 g	20 g	11 g	9.1 g B	7.5 g B	9.0 g	22 g	27 g	ND	1.0 - 300	150 or SB	-
Zinc	397 g N	71 g N	49 g N	44 g N	25 g N	43 g E	75 g E	73 g E	5.0 g B	9.0 - 50	20 or SB	112
Cyanide	0.60 g B N	ND N	ND N	ND N	ND N	0.99	0.63	ND	ND	N/A	**	-

NOTE: Bold numbers exceed cleanup objectives/background concentrations.

- * - 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) - NYSDC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
- (n) - Dragun, J., The Soil Chemistry of Hazardous Materials.
- (c) - See Section 5.2.2.1 of text.
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cleanup objectives/background levels. Laboratory analytical data sheets are contained in Appendix H and the data validation and usability report is contained in Appendix I. The results from the analysis for tentatively identified compounds (TICs) are also found in Appendix H.

None of the samples had VOC or pesticide/PCB concentrations exceeding the NYSDEC cleanup objectives. However, several semivolatile organic compounds SVOCs were found above the cleanup objective: benzo(a)- and dibenzo(a,h)anthracene, benzo(a)pyrene, benzo(b)- and benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene. In addition, phenanthrene, fluoranthene, and pyrene were detected in UPSS-17 above the 50- mg/kg cleanup objective for individual SVOCs. The cleanup objective for total SVOCs is 500 mg/kg; sample UPSS-17 exceeded this limit, with a total concentration of TCL SVOCs of 596.5 mg/kg.

Zinc exceeded the site background level in 26 samples, cadmium in 31 samples, nickel in 33 samples, copper in 34 samples, lead in 18 samples, and chromium in 33 samples. A lead concentration of 64,500 mg/kg was found at UPSS-33, which was taken outside the room containing the lead smelter. Mercury in UPSS-06 and UPSS-19, cobalt in UPSS-13, arsenic in UPSS-07, and silver in UPSS-16 exceeded the eastern U.S. background levels.

5.2.3 Task 2a Probe Soil Screening Data

A total of 27 VOC and 31 metal samples were collected from 20 locations. The soil sample data are summarized on Table 5-17 and shown graphically on Figure 5-19. The figure shows those concentrations above the site background levels. The table also shows eastern U.S. background soil concentrations for metals, NYSDEC soil cleanup objectives (NYSDEC 1994a), and site background concentrations as determined using the method describe in Section 5.2.2.1. Results in bold face type indicate exceedances of the cleanup objectives/background levels. Laboratory analytical data sheets are contained in Appendix H, as are results from the analysis for TICs are also found in Appendix H. None of the probe soil screening samples were validated.

None of the VOC results exceeded the NYSDEC cleanup objective/background levels. Zinc exceeded the site background level in three [UPP-10 (3 to 4 ft), UPP-14 (1 to 2.5 ft), and (4 to 5 ft)] of the 31 metals samples. Nickel exceeded site background levels in 30 samples, cadmium in 11 samples, chromium in 20 samples, and copper in 30 samples. Mercury

TABLE 5-17 (Page 1 of 8)

PROBE SOIL SAMPLING DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP01 (3 - 3.5 ft)	UPP02 (3 - 3.5 ft)	UPP02 (6.5 - 7 ft)	RE UPP02 (6.5 - 7 ft)	UPP03 (2.5 - 3 ft)	UPP04 (2 - 4 ft)	UPP04 (4 - 6 ft)	UPP05 (5 - 5.5 ft)	NYSDEC SOIL CLEANUP OBJECTIVES (a)
VOLATILE ORGANICS (mg/kg)									
Methylene chloride	ND	0.0020 b j	ND	ND	0.0050 b j	ND	ND	ND	0.1
Acetone	ND	0.0090 j	0.010 b j	ND	0.012 b	0.0070 b j	0.0060 b j	ND	0.2
Carbon disulfide	ND	ND	0.0020 j	0.0010 j	ND	ND	ND	ND	2.7
Carbon tetrachloride	ND	ND	ND	ND	0.013	ND	ND	ND	0.6
Chlorobenzene	ND	ND	ND	ND	0.0030 j	ND	ND	ND	1.7
Chloroform	ND	ND	ND	ND	0.015	ND	ND	ND	0.3
Ethylbenzene	ND	ND	ND	ND	0.0020 j	ND	ND	ND	5.5
Styrene	ND	ND	ND	ND	0.0050 j	ND	0.0010 j	ND	NS
1,2-Dichloroethane	ND	ND	ND	ND	0.0020 j	ND	ND	ND	0.1
1,1,1-Trichloroethane	ND	ND	ND	ND	0.0040 j	ND	ND	ND	0.8
Trichloroethylene	ND	ND	0.0030 j	0.0020 j	0.015	0.0010 j	0.0020 j	ND	0.7
Tetrachloroethylene	ND	ND	ND	ND	0.0050 j	ND	ND	ND	1.4
Toluene	ND	ND	0.0030 j	0.0020 j	0.0040 j	ND	ND	ND	1.5
Xylene (total)	ND	ND	ND	ND	0.0010 j	ND	ND	ND	1.2

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

b - Found in associated blanks.

j - Estimated concentration; compound present below quantitation limit.

ND - Not detected at analytical detection limit.

NS - No standard.

RE - Reanalysis.

TABLE 5-17 (Page 2 of 8)

PROBE SOIL SAMPLING DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP06 (4 - 5 ft)	UPP06 (6 - 6.5 ft)	UPP07 (3 - 4 ft)	UPP08 (3.5 - 4 ft)	UPP08 (5 - 6 ft)	RE UPP08 (5 - 6 ft)	UPP09 (2 - 2.3 ft)	NYSDEC SOIL CLEANUP OBJECTIVES (a)
VOLATILE ORGANICS (mg/kg)								
Chloromethane	ND	ND	ND	ND	ND	ND	0.0030 b j	NS
Methylene chloride	ND	0.0010 j	0.0030 b j	0.0030 b j	ND	ND	0.0040 b j	0.1
Acetone	0.010 b j	0.011 b j	0.011 b j	0.017 b	0.011 b j	0.0090 b j	ND	0.2
Carbon disulfide	ND	ND	0.0010 j	ND	0.0040 j	ND	ND	2.7
Chloroform	ND	ND	ND	ND	ND	ND	ND	0.3
2-Butanone	ND	ND	ND	ND	ND	0.0030 b j	ND	0.3
Styrene	0.0020 j	0.0020 j	0.0020 j	ND	ND	ND	0.0020 j	NS
1,1,1-Trichloroethane	ND	ND	ND	ND	0.027	0.011 j	ND	0.8
Trichloroethylene	0.0030 j	0.0030 j	0.0040 j	0.0020 j	0.022	0.010 j	0.0060 b j	0.7
Tetrachloroethylene	0.0010 j	ND	ND	ND	0.0070 j	0.0040 j	0.0020 j	1.4
Toluene	0.0010 j	ND	ND	ND	0.013	0.0060 j	0.0020 j	1.5

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

b - Found in associated blanks.

j - Estimated concentration; compound present below quantitation limit.

ND - Not detected at analytical detection limit.

NS - No standard.

RE - Reanalysis.

TABLE 5-17 (Page 3 of 8)

PROBE SOIL SAMPLING DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP09 (3.8 - 4.2 ft)	UPP10 (3 - 4 ft)	RE UPP10 (3 - 4 ft)	UPP10 (5 - 7 ft)	RE UPP10 (5 - 7 ft)	UPP11 (3 - 3.5 ft)	UPP12 (4 - 4.5 ft)	UPP13 (4 - 4.5 ft)	UPP14 (3 - 4 ft)	NYSDEC SOIL CLEANUP OBJECTIVES (a)
VOLATILE ORGANICS (mg/kg)										
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS
Chlorobenzene	0.0020 j	ND	0.0020 j	ND	ND	ND	ND	ND	ND	1.7
Methylene chloride	0.0020 j	0.0080 j	0.0030 j	0.0050 b j	0.0050 b j	ND	ND	ND	0.0020 j	0.1
Acetone	0.010 b j	0.011 j	0.0060 b j	0.021 b	0.018 b	0.0060 j	0.0090 b j	ND	0.024 b	0.2
Ethylbenzene	0.0020 j	ND	0.0010 j	ND	ND	ND	ND	ND	ND	5.5
2-Butanone	ND	ND	ND	ND	ND	ND	0.0030 b j	ND	0.0040 b j	0.3
1,1,1-Trichloroethane	0.0020 j	0.012	0.0050 b j	0.0090 b j	0.0090 j	ND	ND	ND	0.0090 j	0.8
1,2-Dichloroethane	0.0020 j	ND	0.0020 b j	ND	ND	ND	ND	ND	ND	0.1
Trichloroethylene	0.0090 j	0.026	0.017	0.0040 j	0.010 j	ND	0.013	0.067	0.033	0.7
Tetrachloroethylene	0.0030 j	0.0060 j	0.0040 j	ND	0.0040 j	ND	0.0010 j	ND	ND	1.4
Toluene	0.0020 j	0.0050 j	0.0030 j	0.0010 j	0.0040 j	ND	ND	ND	0.0020 j	1.5
Ethylbenzene	ND	0.0020 j	ND	ND	ND	ND	ND	ND	0.0070 j	5.5
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND	0.0060 j	1.2
Styrene	0.0060 j	0.0030 j	0.0030 j	ND	0.002 j	ND	0.0020 j	ND	ND	NS

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

b - Found in associated blanks.

j - Estimated concentration; compound present below quantitation limit.

ND - Not detected at analytical detection limit.

NS - No standard.

RE - Reanalysis.

TABLE 5-17 (Page 4 of 8)

PROBE SOIL SAMPLING DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP15 (2.5 - 3.5 ft)	UPP16 (2.5 - 3 ft)	UPP17 (6.5 - 7 ft)	UPP18 (3.5 - 4 ft)	UPP19 (4 - 4.5 ft)	UPP20 (4 - 4.5 ft)	UPP20 (10 - 10.5 ft)	RE UPP20 (10 - 10.5 ft)	NYSDEC SOIL CLEANUP OBJECTIVES (a)
VOLATILE ORGANICS (mg/kg)									
Chloromethane	ND	ND	ND	ND	ND	ND	0.012	ND	NS
Methylene chloride	0.0020 b j	ND	0.0020 b j	0.0030 b j	ND	0.0010 j	0.0040 b j	ND	0.1
Acetone	0.0090 b j	0.0050 b j	0.0090 b j	0.011 b j	0.0060 b j	0.010 b j	0.018 b	0.011 b j	0.2
2-Butanone	ND	0.0010 b j	ND	ND	0.0010 b j	ND	ND	ND	0.3
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	0.0020 j	ND	ND	0.8
Trichloroethylene	0.0010 j	0.0020 b j	ND	ND	ND	0.0030 j	ND	ND	0.7
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	1.5
Ethylbenzene	ND	ND	ND	ND	ND	0.028	ND	ND	5.5
Xylene (total)	ND	ND	ND	ND	ND	0.021	ND	ND	1.2

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

b - Found in associated blanks.

j - Estimated concentration; compound present below quantitation limit.

ND - Not detected at analytical detection limit.

NS - No standard.

RE - Reanalysis.

PROBE SOIL SAMPLING DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP01 (2.5 - 3 ft)	UPP02 (2.5 - 3 ft)	UPP02 (4.5 - 5.5 ft)	UPP03 (2.5 - 3 ft)	UPP04 (2 - 4 ft)	UPP04 (4 - 6 ft)	UPP05 (4 - 4.5 ft)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
TAL METALS (mg/kg)										
Aluminum	9,950	8,810	11,100	8,060	7,670	5,940	8,250	33,000	SB	-
Antimony	ND	ND	ND	ND N	ND N	ND N	ND	0.6 - 10 (n)	SB	-
Arsenic	4.9	3.0	ND	6.5	5.7	2.7	7.9	3.0 - 12.0 ^{ae}	7.5 or SB	-
Barium	78	61	82	50	49	34	65	15 - 600	300 or SB	-
Beryllium	0.64 B	0.55 B	0.64 B	0.49 B	0.38 B	0.34 B	0.58 B	0 - 1.75	0.16 or SB	-
Cadmium	0.74 B	0.65 B	0.52 B	0.66 B	0.57 B	0.65 B	0.72 B	0.1 - 1.0	1 or SB	1.0
Calcium	43,100	33,400	34,900	27,700	27,300	27,400	2,800	130 - 35,000 ^{ae}	SB	-
Chromium	37	14	18	14	12	11	3.8	1.5 - 40.0 ^{ae}	10 or SB	16
Cobalt	15	10	10	15	12	9.7 B	15	2.5 - 60.0 ^{ae}	30 or SB	-
Copper	31 E	33 E	32 E	36	26	26	36 E	1.0 - 50.0	25 or SB	22.5
Iron	24,300 E	21,400	24,200	23,800 E	20,500 E	20,100 E	24,500 E	2,000 - 550,000	2,000 or SB	-
Lead	12	12	11	11	8.8	9.5	14	4.0 - 61 or 200 - 500*	400(d)	-
Magnesium	10700 E	9,500	11,700	8,890 E	9,140 E	8,570 E	4,670 E	100 - 5,000	SB	-
Manganese	675	385	480	711 E	624 E	448 E	679 E	50 - 5,000	SB	-
Mercury	ND	ND	ND	ND N	0.12 N	ND N	ND	0.001 - 0.2	0.1	-
Nickel	28	23	23	29	23	21	31	0.5 - 25	13 or SB	14.5
Potassium	2,800	1,460 E	3,260 E	1,620 E	1,640 E	1,170 E	1,290	8,500 - 43,000 ^{ae}	SB	-
Selenium	ND	ND	ND	ND	ND	ND	ND	0.1 - 3.9	2 or SB	-
Silver	ND	0.35 B	ND	0.41 B	0.51 B	50	ND	0.1 - 5.0 (n)	SB	-
Sodium	185 B	81 B	133 B	173 B	89 B	85 B	112 B	6,000 - 8,000	SB	-
Thallium	ND	1.6 B	ND	ND	ND	ND	ND	0.1 - 0.8 (q)	SB	-
Vanadium	ND	19	23	17	16	13	20	1.0 - 300	150 or SB	-
Zinc	73	59	70	76 E	60 E	60 E	80	9.0 - 50	20 or SB	112
Cyanide	ND N	ND	ND	ND	ND	ND	ND N	N/A	**	-

NOTE: Numbers in bold exceed soil cleanup objectives/background concentrations.

* - The rate of the corrosivity of steel at 131°F as determined by the NACE test.

** - NYSDEC Draft Cleanup Policy and Guidelines, 10/91.

^{ae} - New York State background concentration.

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

(c) - See Section 5.2.2.1 of text.

(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.

(d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

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.

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.

CN - 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.

PROBE SOIL SAMPLING DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP6 (4 - 5 ft)	UPP6 (6 - 6.5 ft)	UPP7 (3 - 4 ft)	UPP8 (3 - 4 ft)	UPP8 (4 - 5 ft)	UPP9 (1.6 - 2 ft)	UPP9 (4 - 4.5 ft)	UPP10 (3 - 4 ft)	UPP10 (5 - 7 ft)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
TAL METALS (mg/kg)												
Aluminum	7,040	6,880	2,810	8,640	7,830	3,000	5,620	15,900	7,870	33,000	SB	-
Antimony	ND N	ND N	ND N	ND	ND	ND N	ND N	ND N	ND N	0.6 - 10 (n)	SB	-
Arsenic	ND	3.9 B	3.6 B	3.6	3.0	6.5	6.5	12	3.3	3.0 - 12.0 æ	7.5 or SB	-
Barium	59	35 B	36	61	66	40	58	216	57	15 - 600	300 or SB	-
Beryllium	0.43 B	0.35 B	0.22 B	0.65 B	0.49 B	0.28 B	0.34 B	0.74 B	0.39 B	0 - 1.75	0.16 or SB	-
Cadmium	1.1 B	0.76 B	5.1	0.75 B	4.9	6.8	3.1	3.2	0.63 B	0.1 - 1.0	1 or SB	1.0
Calcium	2,000	29,000	132,000	46,000	45,500	139,000	108,000	16,800	37,800	130 - 35,000 æ	SB	-
Chromium	11	12	29	13	23	145	249	27	12	1.5 - 40.0 æ	10 or SB	16
Cobalt	7.5 B	11	4.0 B	12	9.2 B	6.2 B	8.5 B	22	10	2.5 - 60.0 æ	30 or SB	-
Copper	9.8	31	44	29 E	51 E	312	221	53	25	1.0 - 50.0	25 or SB	22.5
Iron	16,700 E	20,900 E	8,530 E	20,600	20,700	8,050 E	15,700 E	36,500 E	20,500 E	2,000 - 550,000	2,000 or SB	-
Lead	7.1	11	28	12	28	82	16	35	8.7	4.0 - 61 or 200 - 500*	400(d)	-
Magnesium	2,510 E	8,120 E	58,600 E	14,500	17,600	63,300 E	29,200 E	13,700 E	14,600 E	100 - 5,000	SB	-
Manganese	558 E	695 E	292 E	518	389	213 E	430 E	931 E	470 E	50 - 5,000	SB	-
Mercury	ND N	ND N	ND N	ND	ND	ND N	ND N	ND N	ND N	0.001 - 0.2	0.1	-
Nickel	15	22	9.8	23	41	15	42	42	21	0.5 - 25	13 or SB	14.5
Potassium	696 B E	1,310 E	1,220 E	1,890 E	1,690 E	1,060 E	2,030 E	2,700 E	1,990 E	8,500 - 43,000 æ	SB	-
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1 - 3.9	2 or SB	-
Silver	0.35 B	0.38 B	1.4 B	ND	0.79 B	2.4	0.8 B	0.42 B	0.66 B	0.1 - 5.0 (n)	SB	-
Sodium	54 B	68 B	157	111 B	107 B	155 B	133 B	85 B	120 B	6,000 - 8,000	SB	-
Thallium	ND	ND	ND	1.1 B	ND	ND	ND	ND	ND	0.1 - 0.8 (q)	SB	-
Vanadium	21	15	9.0	21	16	8.8	14	29	16	1.0 - 300	150 or SB	-
Zinc	35 E	75 E	46 E	58	103	88 E	62 E	129 E	47 E	9.0 - 50	20 or SB	112.0
Cyanide	ND	ND	1.2 B	ND	ND	1.5	1.0	ND	ND	N/A	**	-

NOTE: Numbers in bold exceed soil cleanup objectives/background concentrations.

* - The rate of the corrosivity of steel at 131°F as determined by the NACE test.

** - NYSDEC Draft Cleanup Policy and Guidelines, 10/91.

æ - New York State background concentration.

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

(c) - See Section 5.2.2.1 of text.

(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 the instrument detection limit.

E - Value estimated due to interference.

(d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

N - Spiked sample recovery is not within control limits.

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N/A - Not available.

ND - Not detected at analytical detection limit.

SB - Site background.

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.

CN - 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.

PROBE SOIL SAMPLING DATA SUMMARY (May 1995)

United Plating Site

PARAMETER	UPP11 (3.5 - 4 ft)	UPP11 (4.5 - 5 ft)	UPP12 (2 - 3 ft)	UPP12 (5 - 6 ft)	UPP13 (3 - 4 ft)	UPP13 (4.5 - 5 ft)	UPP14 (1 - 2.5 ft)	UPP14 (4 - 5 ft)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
TAL METALS (mg/kg)											
Aluminum	9,100	9,330	10,100	9,420	8,800	11,000	11,300	8,460	33,000	SB	-
Antimony	ND	ND	ND	ND	ND	ND	ND	ND	0.6 - 10 (n)	SB	-
Arsenic	6.0	3.8	2.0	1.6 B	5.0	3.3	4.4	5.3	3.0 - 12.0 ae	7.5 or SB	-
Barium	60	63	68	84	144	102	70	48	15 - 600	300 or SB	-
Beryllium	0.58 B	0.59 B	0.61 B	0.59 B	0.54 B	0.60 B	0.69 B	0.74 B	0 - 1.75	0.16 or SB	-
Cadmium	0.68 B	0.65 B	158	0.91 B	0.76 B	0.82 B	10	20	0.1 - 1.0	1 or SB	1.0
Calcium	29,900	34,100	35,100	30,100	324,600	38,100	9,360	56,400	130 - 35,000 ae	SB	-
Chromium	18	19	135	30	31	29	27	253	1.5 - 40.0 ae	10 or SB	16
Cobalt	16	11	9.2 B	14	14	9.6 B	12	6.6 B	2.5 - 60.0 ae	30 or SB	-
Copper	33 E	30 E	33	32	32	32	34	37	1.0 - 50.0	25 or SB	22.5
Iron	26,300 E	23,800 E	24,300	24,400	23,300	25,300	24,100	11,400	2,000 - 550,000	2,000 or SB	-
Lead	13	12	11	12	15	12	25	61	4.0 - 61 or 200 - 500*	400(d)	-
Magnesium	8,690 E	11,000 E	9,030	8,790	10,600	9,750	4,940	3,740	100 - 5,000	SB	-
Manganese	761	503	683	604	638	432	505	243	50 - 5,000	SB	-
Mercury	ND	ND	0.69	0.42	0.77	0.78	ND	ND	0.001 - 0.2	0.1	-
Nickel	36	23	23	26	34	21	25	33	0.5 - 25	13 or SB	14.5
Potassium	1,620	2,630	2,500	2,350	1,970	2,440	2,040	1,400	8,500 - 43,000 ae	SB	-
Selenium	ND	ND	ND	ND	ND	ND	1.2	ND	0.1 - 3.9	2 or SB	-
Silver	ND	ND	0.51 B	ND	0.98 B	ND	1.2 B	3.1	0.1 - 5.0 (n)	SB	-
Sodium	123 B	142 B	232 B	212 B	249 B	297 B	275 B	716 B	6,000 - 8,000	SB	-
Thallium	ND	ND	ND	ND	ND	ND	2.3	ND	0.1 - 0.8 (q)	SB	-
Vanadium	20	ND	23	23	22	25	26	22	1.0 - 300	150 or SB	-
Zinc	77	65	102	73	67	65	119	163	9.0 - 50	20 or SB	112
Cyanide	ND N	ND N	5.5	ND	ND	1.7	1.9	23	N/A	**	-

NOTE: Numbers in bold exceed soil cleanup objectives/background concentrations.

* - The rate of the corrosivity of steel at 131°F as determined by the NACE test.

** - NYSDEC Draft Cleanup Policy and Guidelines, 10/91.

ae - New York State background concentration.

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

(c) - See Section 5.2.2.1 of text.

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

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PROBE SOIL SAMPLING DATA SUMMARY (May 1995)

United Plating Site

PARAMETER	UPP15 (5 - 6 ft)	UPP16 (5.8 - 6.2)	UPP17 (9 - 10 ft)	UPP18 (7.5 - 8 ft)	UPP19 (6 - 7 ft)	UPP20 (3.5 - 4 ft)	UPP20 (10.5 - 11 ft)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
TAL METALS (mg/kg)										
Aluminum	10,800	8,280	10,700	8,770	9,660	11,200	10,500	33,000	SB	-
Antimony	ND	ND	ND	ND	ND	ND	ND	0.6 - 10 (n)	SB	-
Arsenic	ND	ND	ND	15	ND	2.7	7.1	3.0 - 12.0 æ	7.5 or SB	-
Barium	45	58	82	59	67	81	49	15 - 600	300 or SB	-
Beryllium	0.50 B	0.53 B	0.52 B	0.55 B	0.59 B	1.2	1.2	0 - 1.75	0.16 or SB	-
Cadmium	0.82 B	0.76 B	0.71 B	0.54 B	0.64 B	1.3	1.4	0.1 - 1.0	1 or SB	1.0
Calcium	25,700	32,700	45,800	33,300	38,300	13,700	33,500	130 - 35,000 æ	SB	-
Chromium	27	34	17	15	16	24	19	1.5 - 40.0 æ	10 or SB	16
Cobalt	10 B	13	12	11	13	12	16	2.5 - 60.0 æ	30 or SB	-
Copper	25	30	26	28 E	30 E	35 E	44 E	1.0 - 50.0	25 or SB	22.5
Iron	23,800	24,400	22,200	22,300	23,200	27,400	29,300	2,000 - 550,000	2,000 or SB	-
Lead	14	13	11	9.4	12	23	19	4.0 - 61 or 200 - 500*	400(d)	-
Magnesium	7,760	13,000	14,600	11,800	9,100	6,550	9,980	100 - 5,000	SB	-
Manganese	378	511	413	474	560	576	541	50 - 5,000	SB	-
Mercury	ND	ND	ND	ND	0.41	ND	ND	0.001 - 0.2	0.1	-
Nickel	21	26	24	22	26	42	37	0.5 - 25	13 or SB	14.5
Potassium	1,660	1,570	3,540	1,950 E	2,220 E	1,870 E	2,340 E	8,500 - 43,000 æ	SB	-
Selenium	ND	ND	1.4	ND	3.2	ND	ND	0.1 - 3.9	2 or SB	-
Silver	ND	ND	0.46 B	ND	ND	0.76 B	1.3 B	0.1 - 5.0 (n)	SB	-
Sodium	187 B	109 B	158 B	101 B	106 B	132 B	105 B	6,000 - 8,000	SB	-
Thallium	ND	1.3 B	2.6	ND	1.7 B	3.1	1.1 B	0.1 - 0.8 (q)	SB	-
Vanadium	21	19	23	18	20	24	20	1.0 - 300	150 or SB	-
Zinc	60	62	54	58	63	87	72	9.0 - 50	20 or SB	112
Cyanide	ND	ND	ND	ND	ND	ND	ND	N/A	**	-

NOTE: Numbers in bold exceed soil cleanup objectives/background concentration

* - The rate of the corrosivity of steel at 131°F as determined by the NACE test.

** - NYSDEC Draft Cleanup Policy and Guidelines, 10/91.

æ - New York State background concentration.

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

(c) - See Section 5.2.2.1 of text.

(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.

(d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

E - Value estimated due to interference.

N - Spiked sample recovery is not within control limits.

R - Duplicate analysis not within control limits.

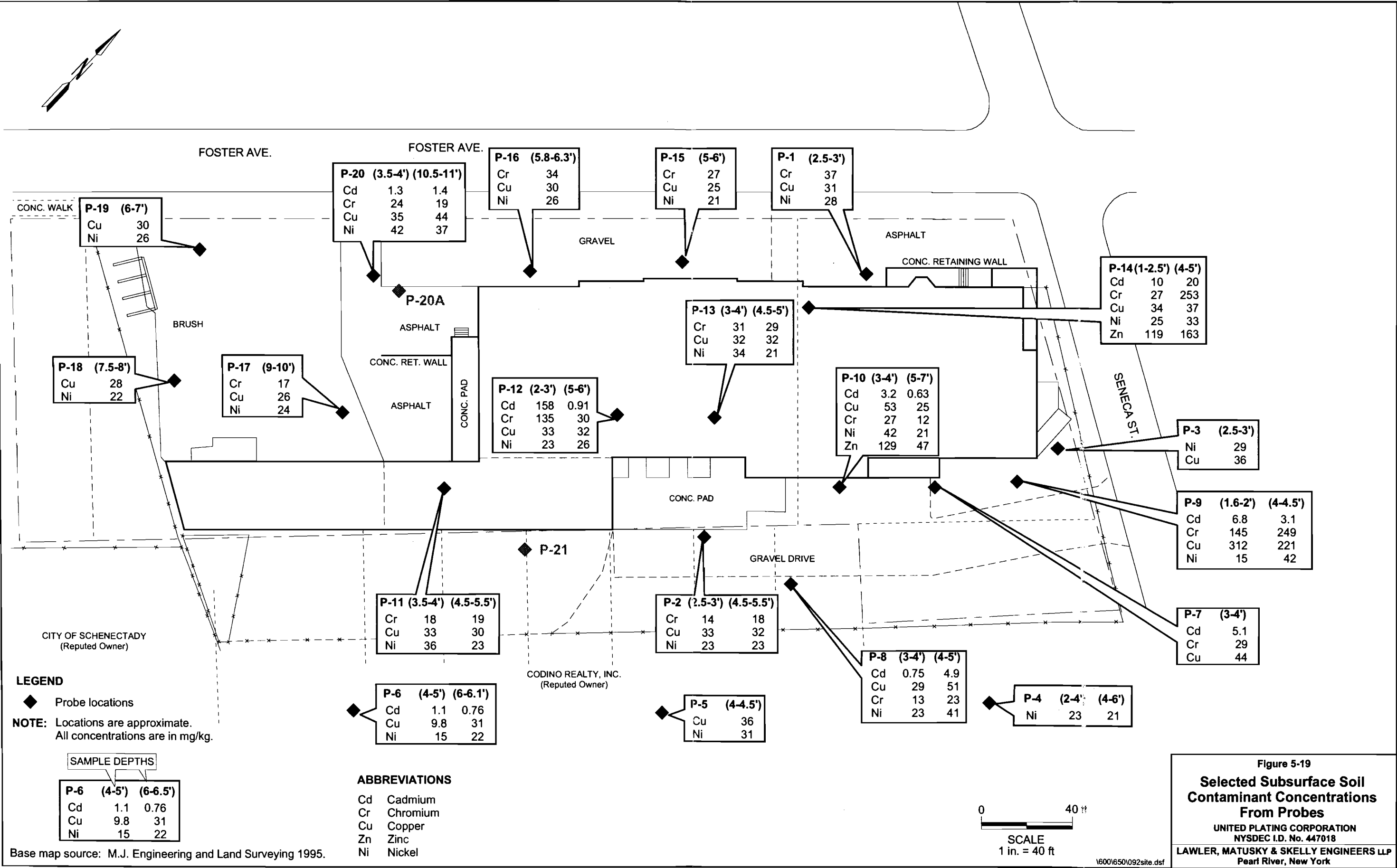
N/A - Not available.

ND - Not detected at analytical detection limit.

SB - Site background.

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.

CN - 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.



exceeded the eastern U.S. background levels in UPP-12, UPP-13, and UPP-19; thallium in UPP-02; and arsenic in UPP-10 and UPP-16. The highest levels of contamination appeared to be on the east and southeast sides of the building. Nickel and copper were found above the limits in the highest concentrations.

5.2.4 Task 2a - Probe Water Quality Screening Data

A total of 15 VOC, 11 filtered metal, and 12 unfiltered metal samples were collected from 15 locations. No water was present at the completion depth of the probes at six locations; therefore, no sample could be collected. The water sample data collected are summarized on Table 5-18 and the filtered metals results are shown graphically on Figure 5-20. With the exception of iron, magnesium, manganese, and sodium, which are common groundwater contaminants and not site related, the figure shows those compounds that exceeded the groundwater standard. The table also shows the NYSDEC groundwater standards (NYSDEC 1993) and the natural ambient groundwater range (Dragun 1988); results in bold face type indicate exceedances of the groundwater standard. The laboratory analytical data sheets are contained in Appendix H, as are the results from the analysis for TICs. None of the probe water samples were validated.

TCE exceeded the groundwater standard in five samples, with the sample at UPP-15 having a concentration of 140 µg/l, 28 times the standard of 5 µg/l. The groundwater standard for 1,1,1-TCA was exceeded in three samples, with the highest concentration of 340 µg/l found at UPP-15. Carbon tetrachloride was found above the groundwater standard at only one location, UPP-14. The standard for 1,1,1-TCA and carbon tetrachloride is 5 µg/l. The samples with VOCs above the groundwater standard were located inside the building and just outside the downgradient northwestern side of the building, with the highest levels found outside the building.

In the filtered metal samples, chromium in six samples (standard of 50 µg/l), iron in five samples (standard of 300 µg/l), manganese in three samples (standard of 300 µg/l), sodium in 10 samples (standard of 20,000 µg/l), and cyanide in three samples (standard of 100 µg/l) exceeded the groundwater standard. Magnesium in five samples (guidance value of 35,000 µg/l), antimony in two samples (guidance value of 3 µg/l), and thallium in three samples (guidance value of 4 µg/l) exceeded the groundwater guidance value. The highest chromium value found was 38,100 µg/l in UPP-13, located inside the building. The unfiltered metal

TABLE 5-18 (Page 1 of 6)

PROBE WATER QUALITY DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP01	UPP02	UPP04	UPP05	UPP06	UPP09	UPP10	UPP12	UPP13	UPP14	UPP15	DL		UPP16	UPP19	NYSDEC CLASS GA STANDARDS (a)
												UPP15	UPP16			
												[DL: 5:1]				
VOLATILE ORGANICS (µg/l)																
Methylene chloride	ND	2.0 b j	ND	ND	ND	ND	ND	ND	ND	ND	1.0 b j	ND	2.0 b j	1.0 b j		5
Acetone	ND	49	ND	8.0 j	ND	1.7	ND	ND	11	ND	ND	ND	ND	ND		50 GV
2-Butanone	ND	ND	ND	ND	ND	4.0 j	ND	ND	ND	ND	ND	ND	ND	ND		5
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	72	340 e	260	130	ND		5
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	ND	ND	ND	ND		5
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND	6.0 j	30	52	140	98	24	ND		5

Note: Bold numbers exceed standards.

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

b - Found in associated blanks.

j - Estimated concentration; compound present below quantitation limit.

e - Estimated concentration; exceeds GC/MS calibration range.

GV - Guidance value.

DL - Diluted sample analysis.

ND - Not detected at analytical detection limit.

TABLE 5-18 (Page 2 of 6)

PROBE WATER QUALITY DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP20	UPP20A	UPTB01	UPTB02	UPTB04	UPTB05	UPTB06	UPTB07	UPTB08	UPTB09	UPFB07	NYSDEC CLASS GA STANDARDS(a)
VOLATILE ORGANICS (µg/l)												
Methylene chloride	1.0 b j	ND	ND	ND	1.0 b j	2.0 b j	1.0 b j	ND	ND	ND	1.0 j	5
Acetone	19	ND	ND	ND	ND	ND	ND	ND	5.0 b j	ND	ND	50 GV
Styrene	2.0 j	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5

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

b - Found in associated blanks.

j - Estimated concentration; compound present below quantitation limit.

GV - Guidance value.

ND - Not detected at analytical detection limit.

PROBE WATER QUALITY DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP02 [Unfiltered]	UPP02 [Filtered]	UPP05 [Unfiltered]	UPP05 [Filtered]	UPP06 [Unfiltered]	UPP06 [Filtered]	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS
TAL METALS (µg/l)								
Aluminum	83,700	531 E N R	117,000 E N R	1,140 E N R	40,900 E	918 E	<5.0 - 1,000	NS
Antimony	ND	ND	ND	ND	ND N	ND N	N/A	3.0 GV
Arsenic	67	ND	84	ND	ND	ND	<1.0 - 30	25
Barium	812	23 B E	929 E	65 B E	224 E	52 B E	10 - 500	1,000
Beryllium	4.5 B	ND	7.3	ND	2.2 B	ND	<10	3.0 GV
Cadmium	491	ND	12	ND	12	1.9 B	<1.0	10
Calcium	472,000	65,200 E	484,000 E	172,000 E	126,000 E	130,000 E	1,000 - 150,000	NS
Chromium	885	6.6 B	324	ND	53	ND	<1.0 - 5.0	50
Cobalt	215	ND	177	ND	54	11 B	<10	NS
Copper	1,140	9.6 B	508	4.3 B	131	4.3 B	<1.0 - 30	200
Iron	261,000 E	134 N R	303,000 N R	454 N R	66,100 E	188 E	10 - 10,000	300 (m)
Lead	1,790	ND	226	ND	99	ND	<15	25
Magnesium	109,000	48,400 E	184,000 E	50,300 E	54,800 E	39,400 E	1,000 - 50,000	35,000 GV
Manganese	5,610	557 E	11,000 E	571 E	2,830 E	1,670 E	<1.0 - 1,000	300 (m)
Mercury	ND N	ND	1.0	0.27	ND N R	ND N R	<1.0	2.0
Nickel	1,860	33 B E	2,070 E	508 E	406 E N	898 E N	<10 - 50	NS
Potassium	30,300	11,400	23,600	3,490 B	6,280	2,080 B	1,000 - 10,000	NS
Selenium	ND	ND	ND	ND	ND	ND	<1.0 - 10	10
Silver	26	ND	2.2 B	ND	4.5 B	ND	<5.0	50
Sodium	43,200	44,900	104,000 E	104,000 E	27,800 E	30,400 E	500 - 120,000	20,000
Thallium	8.3 B	ND	6.5 B	ND	ND	ND	N/A	4.0 GV
Vanadium	165	ND	238	ND	59	ND	<1.0 - 10	NS
Zinc	2,280	ND	1,110	ND	350 E N	5.6 B E N	<10 - 2,000	300
Cyanide	748 N	♦	ND N	ND N	ND N	ND N	N/A	100

Note: Bold numbers exceed standards.

- ♦ - Not analyzed.
(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.
GV - Guidance value.
ND - Not detected at analytical detection limit.
N/A - Not available.
NS - No standard.

TABLE 5-18 (Page 4 of 6)

PROBE WATER QUALITY DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP09 [Unfiltered]	UPP09 [Filtered]	UPP10 [Unfiltered]	UPP10 [Filtered]	UPP12 [Unfiltered]	UPP12 [Filtered]	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS
TAL METALS (µg/l)								
Aluminum	406,000	573	642,000	482 E N R	418,000	687 E N R	<5.0 - 1,000	NS
Antimony	ND	ND	ND	ND	ND	ND	N/A	3.0 GV
Arsenic	589	ND	371	ND	127	ND	<1.0 - 30	25
Barium	5,180	44 B	3,150	38 B E	2,670	29 B E	10 - 500	1,000
Beryllium	21	ND	27	ND	20	ND	<10	3.0 GV
Cadmium	570	ND	685	7.4	101	ND	<1.0	10
Calcium	4,829,000	101,000	3,979,000	78,200 E	1,851,000	176,000 E	1,000 - 150,000	NS
Chromium	106,000	94	3,240	7.0 B	2,590	2,030	<1.0 - 5.0	50
Cobalt	777	ND	1,110	ND	670	171	<10	NS
Copper	109,000	55	4,140	20 B	1,660	7.2 B	<1.0 - 30	200
Iron	852,000 E	154 E	1,936,000 E	146 N R	1,294,000	1,350 N R	10 - 10,000	300 (m)
Lead	2,810	ND	2,630	ND	548	ND	<15	25
Magnesium	1,607,000	20,500	1,281,000	21,300 E	438,000	60,600 E	1,000 - 50,000	35,000 GV
Manganese	24,000	34	26,400	120 E	25,600	284 E	<1.0 - 1,000	300 (m)
Mercury	1.1 N	ND N	ND N	ND	2.0	ND	<1.0	2.0
Nickel	4,650	ND	4,780	13 B E	3,650	135 E	<10 - 50	NS
Potassium	88,000	7,290	119,000	3,810 B	81,500	8,090	1,000 - 10,000	NS
Selenium	ND	ND	ND	ND	ND	ND	<1.0 - 10	10
Silver	216	ND	28	ND	55	2.1 B	<5.0	50
Sodium	88,000	42,600	53,500	12,200 E	241,000	223,000 E	500 - 120,000	20,000
Thallium	16	10	242	ND	33	ND	N/A	4.0 GV
Vanadium	717	ND	952	ND	700	ND	<1.0 - 10	NS
Zinc	7,420	6.0 B	5,910	ND	2,780	ND	<10 - 2,000	300
Cyanide	15	ND	18 N	18 N	1,020 N	2,160 N	N/A	100

Note: Bold numbers exceed standards.

(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.

GV - Guidance value.

ND - Not detected at analytical detection limit.

N/A - Not available.

NS - No standard.

TABLE 5-18 (Page 5 of 6)

PROBE WATER QUALITY DATA SUMMARY (May 1995)

United Plating Site

PARAMETER	UPP13 [Unfiltered]	UPP13 [Filtered]	UPP14 [Unfiltered]	UPP14 [Filtered]	UPP15 [Unfiltered]	UPP15 [Filtered]	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS
TAL METALS (µg/l)								
Aluminum	144,000	1,020	2,060	487	16,600	570 E	<5.0 - 1,000	NS
Antimony	ND	ND	ND	6.9 B	ND	9.9 B	N/A	3.0 GV
Arsenic	77	4.9 B	4.8 B	ND	27	5.6 B	<1.0 - 30	25
Barium	1,340	36 B	19 B	9.7 B	179 B E	28 B E	10 - 500	1,000
Beryllium	8.0	ND	ND	ND	1.2 B	ND	<10	3.0 GV
Cadmium	26	ND	5.1	3.2 B	18	6.8	<1.0	10
Calcium	654,000	123,000	59,200	55,700	205,000	84,900	1,000 - 150,000	NS
Chromium	34,700	38,100	10,000	8,330	16,600 E	12,100 E	<1.0 - 5.0	50
Cobalt	204	18 B	12 B	12B	42 B	18 B	<10	NS
Copper	926	15 B	43	27	116	21 B	<1.0 - 30	200
Iron	476,000	1,610	3,410	469	41,800	519	10 - 10,000	300 (m)
Lead	258	ND	18	ND	162	ND	<15	25
Magnesium	180,000	45,200	6,410	5,940	59,300	11,800	1,000 - 50,000	35,000 GV
Manganese	8,390	86	54	11 B	909 E	29 E	<1.0 - 1,000	300 (m)
Mercury	0.92	ND	ND	ND	0.27	ND	<1.0	2.0
Nickel	1,590	97	19 B	14 B	242	38 B	<10 - 50	NS
Potassium	36,700	11,100	13,400	12,900	28,400 E	22,500 E	1,000 - 10,000	NS
Selenium	ND	3.0 B	ND	ND	ND	3.1 B	<1.0 - 10	10
Silver	17	ND	7.5 B	3.2 B	7.2 B	ND	<5.0	50
Sodium	242,000	233,000	48,600	47,900	100,000	91,200	500 - 120,000	20,000
Thallium	14	ND	ND	ND	ND	6.9 B	N/A	4.0 GV
Vanadium	288	ND	22 B	14 B	38	2.7 B	<1.0 - 10	NS
Zinc	1,270	8.8 B	60	24	216	69	<10 - 2,000	300
Cyanide	122 N R	185 N	163 N R	192 N R	139	96	N/A	100

Note: Bold numbers exceed standards.

(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.

GV - Guidance value.

ND - Not detected at analytical detection limit.

N/A - Not available.

NS - No standard.

TABLE 5-18 (Page 6 of 6)

PROBE WATER QUALITY DATA SUMMARY (May 1995)
United Plating Site

PARAMETER	UPP16 [Unfiltered]	UPP16 [Filtered]	UPP19 [Unfiltered]	UPP20A [Unfiltered]	UPP20A [Filtered]	UPFB07	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS
TAL METALS (µg/l)								
Aluminum	616,000 E	619 E	87,900	35,800 E N R	680 E N R	ND	<5.0 - 1,000	NS
Antimony	ND	ND	ND	ND	ND	ND	N/A	3.0 GV
Arsenic	102	5.7 B	70	24	ND	ND	<1.0 - 30	25
Barium	3,620 E	43 B E	627 E	268 E	37 B E	3.4 B	10 - 500	1,000
Beryllium	29	ND	5.1	2.3 B	ND	ND	<10	3.0 GV
Cadmium	136	ND	8.0	6.2	ND	ND	<1.0	10
Calcium	1,649,000	106,000	435,000	184,000 E	106,000 E	1,240 B	1,000 - 150,000	NS
Chromium	10,100 E	5,960 E	207 E	79	4.7 B	8.7 B	<1.0 - 5.0	50
Cobalt	648	13 B	132	115	ND	ND	<10	NS
Copper	2,910	12 B	323	195	8.1 B	16 B	<1.0 - 30	200
Iron	1,577,000	368	228,000	94,800 N R	407 N R	748 E	10 - 10,000	300 (m)
Lead	1,450	ND	131	104	ND	3.3	<15	25
Magnesium	447,000	22,600	107,000	49,600 E	27,100 E	180 B	1,000 - 50,000	35,000 GV
Manganese	26,200 E	126 E	5,750 E	5,420 E	20 E	13 B	<1.0 - 1,000	300 (m)
Mercury	3.6	ND	0.25	0.75	0.27	ND N	<1.0	2.0
Nickel	4,730	37 B	462	286 E	42 E	ND	<10 - 50	NS
Potassium	86,100 E	10,600 E	21,800 E	11,200	3,780 B	ND	1,000 - 10,000	NS
Selenium	ND	ND	ND	ND	ND	ND	<1.0 - 10	10
Silver	25	ND	ND	ND	ND	ND	<5.0	50
Sodium	104,000	83,300	95,400	71,200 E	64,600 E	ND	500 - 120,000	20,000
Thallium	153	7.6 B	ND	ND	ND	11	N/A	4.0 GV
Vanadium	898	ND	171	75	ND	ND	<1.0 - 10	NS
Zinc	4,310	7.3 B	693	538	ND	169	<10 - 2,000	300
Cyanide	412	80	ND	26 N	♦	ND	N/A	100

Note: Bold numbers exceed standards.

♦ - Not analyzed.

(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.

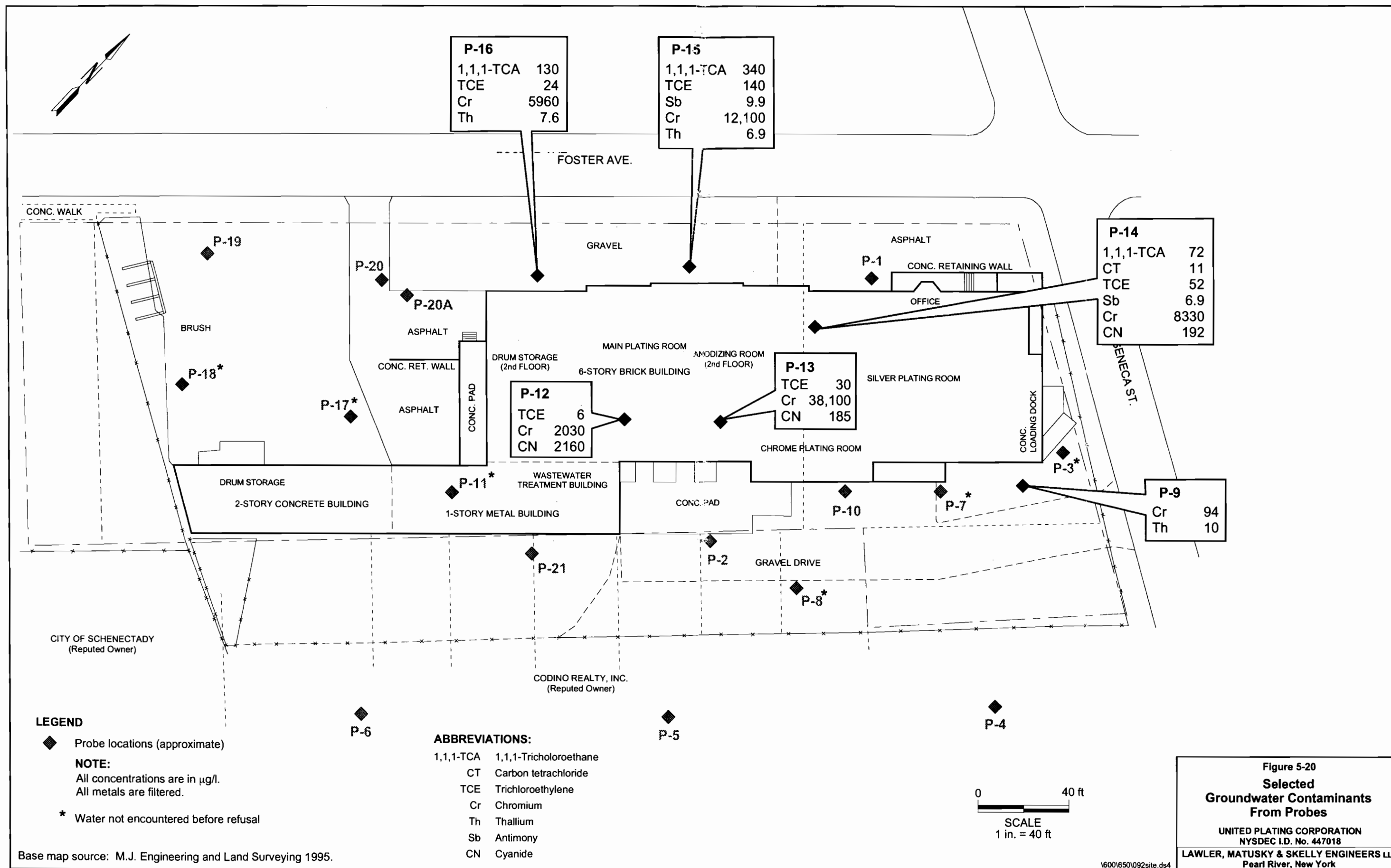
R - Duplicate analysis not within control limits.

GV - Guidance value.

ND - Not detected at analytical detection limit.

N/A - Not available.

NS - No standard.



P-16	
1,1,1-TCA	130
TCE	24
Cr	5960
Th	7.6

P-15	
1,1,1-TCA	340
TCE	140
Sb	9.9
Cr	12,100
Th	6.9

P-14	
1,1,1-TCA	72
CT	11
TCE	52
Sb	6.9
Cr	8330
CN	192

P-12	
TCE	6
Cr	2030
CN	2160

P-13	
TCE	30
Cr	38,100
CN	185

P-9	
Cr	94
Th	10

samples had generally higher levels of metals and more exceedances than the filtered samples, indicating that the metals may be associated with the suspended solids in the sample (most of the probe water samples were very turbid). The highest levels of metals were found inside the building and downgradient of the northwestern side of the building.

Also in the filtered metals analysis, the following metals, with the number of samples in parenthesis, were outside the range of natural ambient groundwater (Dragun 1988): aluminum (two), cadmium (four), calcium (two), chromium (seven), cobalt (five), copper (one), magnesium (two), manganese (one), nickel (four), potassium (four), sodium (two), and vanadium (one).

5.2.5 Task 2a Surface Water Sampling Data

Surface (sump) water samples were collected from a total of five locations and analyzed for TAL metals and cyanide. Table 5-19 summarizes the results and Figure 5-21 graphically presents the data. There are no limits, standards, or guidelines with which to compare these data. The laboratory analytical data sheets are contained in Appendix H and the data validation and usability report is contained in Appendix I.

All five surface water samples had elevated concentrations of cadmium, chromium, copper, mercury, and zinc. In addition, lead and cyanide were found in four samples at elevated levels.

5.2.6 Task 2a - Sediment Sampling Data

Sediment samples were collected from a total of 16 locations and analyzed for TAL metals and cyanide; TCLP metals were analyzed at three locations. Table 5-20 summarizes the total metals and TCLP metals data. The TCLP limit is also shown on Table 5-20, with results exceeding the limit highlighted in bold face type. Figure 5-22 shows the results for the metals of concern at the site (cadmium, chromium, nickel, copper, lead, zinc, and cyanide). The laboratory analytical data sheets are contained in Appendix H and the data validation and usability report is contained in Appendix I.

The TCLP limit for chromium was exceeded at two locations, UPSD-3 and -8, with the sample at UPSD-3 having a concentration 40 times greater than the standard. Cadmium and lead also exceeded the TCLP limit at UPSD-3. The sample at UPSD-1 had no metals above

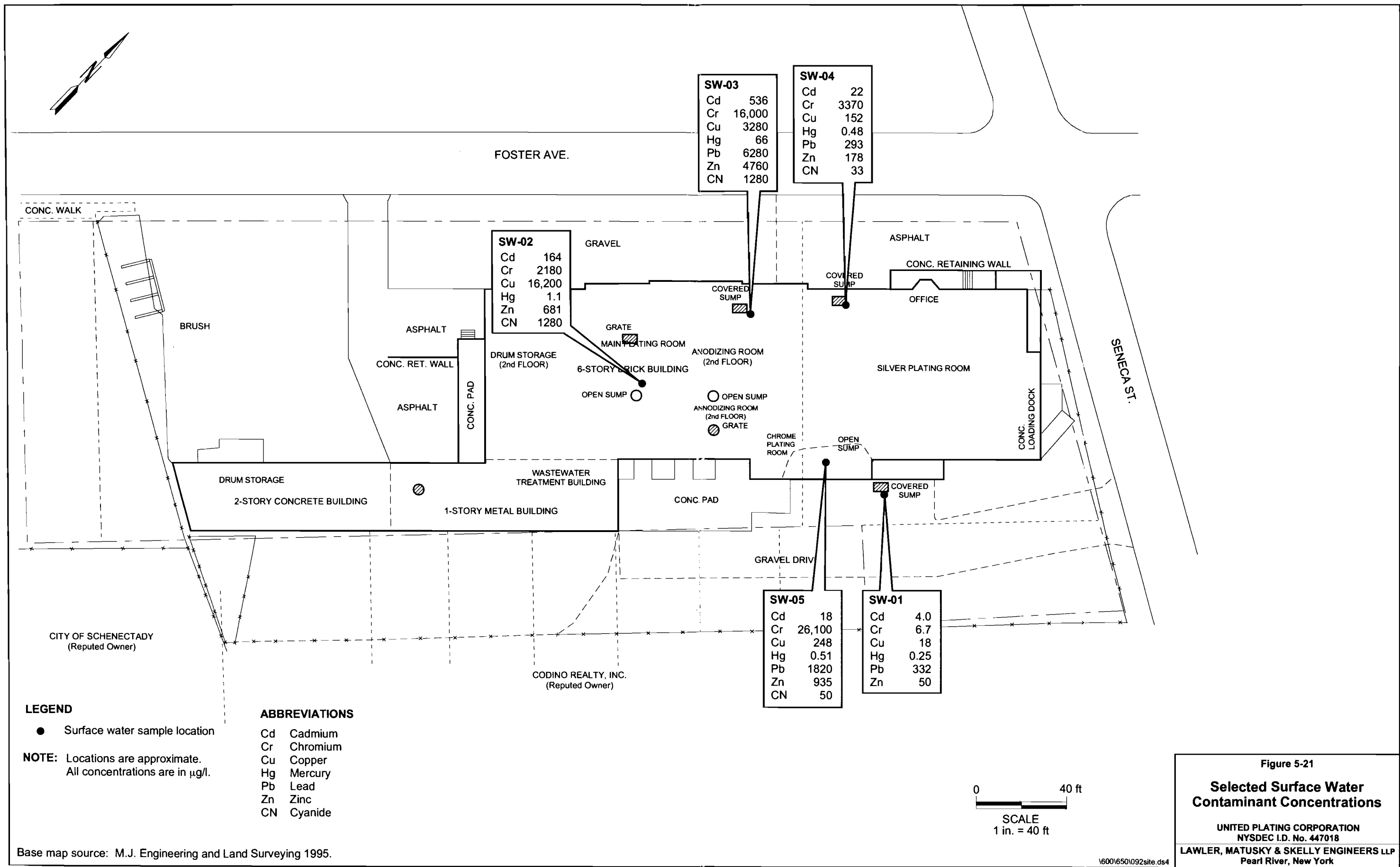
TABLE 5-19

SURFACE WATER DATA SUMMARY (June 1995)
United Plating Site

	UPSW01	UPSW02	UPSW03	UPSW04	UPSW05	UPFB08
METALS (µg/l)						
Aluminum	ND N	ND N	7,750 N	601 N	912 N	208 N
Antimony	ND N	45 B N	66 N	ND N	54 g B N	ND N
Arsenic	D	63 g R	12 R	D	D	D
Barium	19 B	38 B	366	43 B	41 B	ND
Beryllium	ND	ND	0.87 B	ND	ND	ND
Cadmium	4.0 g B E	164 g E	536 g E	22 g E	18 g E	ND E
Calcium	36000 g	16, 900 g	171000 g	41900 g	80300 g	ND
Chromium	6.7 g B E	2,180 g E	16,000 g E	3,370 g E	26,100 g E	D
Cobalt	3.7 g B	17 g B	110 g	7.3 g B	32 g B	ND
Copper	18 g B E	16,200 E	3,280 E	152 g E	248 g E	D
Iron	272 g r E N	5,720 g E N	58,700 E N	1,360 g E N	14,800 E N	124 g E N
Lead	332 g N	ND	6,280 g N	293 g N	1,820 g N	ND
Magnesium	8,350	5,430	24,500	4,080 B	9,380	ND
Manganese	14 g B E	68 g E	668 g E	24 g E	58 g E	ND E
Mercury	0.25 r	1.1 r	66 r	0.48	0.51	0.24
Nickel	7.6 g B E	631 g E	963 g E	28 g B E	102 g E	D
Potassium	3,350 g B E	180,000 g E	68,300 g E	6,670 g E	6,940 E	ND E
Selenium	D	D	D	D	D	D
Silver	2.1 B	33	159	8.2 B	43	1.6 B
Sodium	7,500 g E	137000 g E	181,000 g E	16,700 g E	34,200 g E	ND E
Thallium	ND R	ND R	9.3 g B R	D	11 g R	8.2 B R
Vanadium	ND	5.3 B	33 g B	14 g B	ND g	ND
Zinc	50 g r E	681 g E	4,760 g E	178 g E	935 g E	43 E
Cyanide	ND	1,280	1,280	33	50	ND

g - Value considered estimated based on data validator's report (Appendix I).
r - Value rejected by data validator but usable to show magnitude of contaminated level (Appendix I).
B - Value is less than the contract-required detection limit but greater than the instrument detection limit.

D - Value rejected by data validator and found unusable (Appendix I).
E - Value estimated due to interference.
N - Spiked sample recovery is not within control limits.
R - Duplicate analysis not within control limits.
ND - Not detected at analytical detection limit.



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

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TABLE 5-20 (Page 1 of 3)

SEDIMENT DATA SUMMARY (June 1995)
United Plating Site

PARAMETER	UPSD01	UPSD02	UPSD03	UPSD04	UPSD05	UPSD06	UPSD07	UPSD08
TAL METALS (mg/kg)								
Aluminum	12,100 g s E	3,460 g E	3,030 g s E	4,500 g E	3,020 g E	5,710 g E	13,000 g s E	8,480 g E
Antimony	D	13 g B N	64 g s N	44 g N	22 N	ND N	212 s N	444 N
Arsenic	14 g s	8.4 g	18 g s	24 g	8.8 g	D	8.6 g s	71
Barium	207 g s E	104 g E	509 g s E	140 g E	187 g E	210 g E	434 g s E	2,270 g E
Beryllium	0.71 s B	ND	ND	0.32 B	ND	0.40 B	0.40 s B	0.42 B
Cadmium	164 g s E N R	343 g E N R	86 g s E N R	277 g E N R	821 g E N R	451 g E N R	423 g s E N R	33 g E N R
Calcium	59,400 g s E R	16,500 g E R	20,100 g s E R	4,870 g E R	7,070 g E R	31,000 g E R	4,640 g s E R	11,100 g E R
Chromium	870 g s	5,870 g	22,300 g s	24,400 g	16,100	1,680	5,870 s	73,400
Cobalt	180 g s	16 g	5.8 g s B	16 g	16	48	14 s B	34
Copper	629 g s E	26,500 g E	920 g s E	1,700 g E	3,870 g E	1,470 g E	8,000 g s E	1,400 g E
Iron	88,000 g s E	69,700 g E	21,600 g s E	117,000 g E	171,000 g E	114,000 g E	142,000 g s E	31,100 g E
Lead	880 g s E R	6,580 g E R	16,300 g s E R	4,200 g E R	ND g E R	2,460 g E R	14,400 g s E R	156,000 g E R
Magnesium	24,200 g s E	3,050 g E	1,250 g s B E	2,450 g E	1,300 g B E	3,080 g E	6,320 g s E	2,940 g E
Manganese	402 g s E N	513 g E N	111 g s E N	413 g E N	532 g E N	650 g E N	245 g s E N	123 g E N
Mercury	0.76 r	0.35 r	0.51 r	1.6 r	1.3 r	12	1.7 r	0.44 r
Nickel	153 g s E N	3,010 g E N	123 g s E N	1,130 g E N	2,070 g E N	878 g E N	458 g s E N	333 g E N
Potassium	3,770 g s B E	5,270 g E	2,210 g s E	2,240 g E	3,060 g E	2,980 g E	3,980 g s E	3,420 g E
Selenium	ND	ND	ND	ND	D	D	D	D
Silver	28 g s E	70 g E	64 g s E	76 g E	35 g E	62 g E	100 g s E	378 g E
Sodium	381 s B	1,800	1,320 s B	768 B	1,370 B	1,150 B	859 s B	294 B
Thallium	D	D	3.8 g s B	4.2 g	8.6 g	ND	7.9 g s	8.5 g
Vanadium	39 g s E	9.5 g B E	14 g s B E	26 g E	20 g E	23 g E	49 g s E	19 g E
Zinc	1,410 g s E N	2,890 g E N	395 g s E N	3,150 g E N	32,900 g E N	11,800 g E N	3,100 g s E N	1,910 g E N
Cyanide	ND	65	79 s	65	57	103	120 s	479

g - Value considered estimated based on data validator's report (Appendix I).
r - Value rejected by data validator but usable to show magnitude of contaminated level (Appendix I).
s - Value estimated; solids content below 50%.
B - Value is less than the contract-required detection limit but greater than the instrument detection limit.

D - Value rejected by data validator and found unusable (Appendix I).
E - Value estimated due to interference.
N - Spiked sample recovery is not within control limits.
R - Duplicate analysis not within control limits.
ND - Not detected at analytical detection limit.

TABLE 5-20 (Page 2 of 3)

SEDIMENT DATA SUMMARY (June 1995)
United Plating Site

PARAMETER	UPSD09	UPSD10	UPSD11	UPSD12	UPSD13	UPSD14	UPSD15	UPSD16	UPFB09
TAL METALS (mg/kg)									
Aluminum	6,280 g E	4,160 g E	4,170 g E	1,490 g E	7,220 g E	9,360 g E	2,120 g E	5,260 g E	ND N
Antimony	4,770 N	1,890 N	2,540 N	264 N	566 N	ND N	3,840 N	ND N	ND N
Arsenic	253	39	77	19	22	5.9	80	23	D
Barium	13,600 g E	236 g E	1,150 g E	381 g E	595 g E	104 g E	4,120 g E	408 g E	ND
Beryllium	3.5	ND	0.23 B	ND	0.29 B	0.41 B	0.18 B	0.26 B	ND
Cadmium	981 g E N R	493 g E N R	184 g E N R	52 g E N R	519 g E N R	18 g E N R	142 g E N R	78 g E N R	ND E
Calcium	94,800 g E R	18,000 g E R	9,640 g E R	3,240 g E R	15,300 g E R	25,100 g E R	6,420 g E R	42,400 g E R	ND
Chromium	20,600	7,040	30,800	16,900	26,000	428	56,100	2,110	D
Cobalt	659	71	57	19	147	25	47	219	ND
Copper	1,560 g E	18,000 g E	7,390 g E	454 g E	3,440 g E	157 g E	1,810 g E	682 g E	ND g E
Iron	98,100 g E	100,000 g E	69,500 g E	27,300 g E	58,400 g E	33,900 g E	68,600 g E	115,000 g E	40 B g E N
Lead	36,900 g E R	98,000 g E R	143,000 g E R	35 g E R	32,800 g E R	206 g E R	191,000 g E R	39 g E R	8.9 g
Magnesium	46,700 g E	3,480 g E	1,840 g E	927 B g E	3,650 g E	5,580 g E	1,180 g E	6,020 g E	ND
Manganese	4,050 g E N	738 g E N	438 g E N	159 g E N	494 g E N	470 g E N	394 g E N	701 g E N	ND E
Mercury	1.2 r	2.4	1.2 r	0.86 r	1.8	0.87 r	0.59 r	5.8	0.41 r
Nickel	2,990 g E N	346 g E N	1,560 g E N	76 g E N	1,360 g E N	103 g E N	233 g E N	674 g E N	D
Potassium	13,900 g E	873 g B E	1,360 g E	475 g B E	1,690 g E	2,050 g E	648 g B E	1,480 g E	74 g B E
Selenium	D	D	ND	D	D	D	D	D	D
Silver	2,830 g E	80 g E	83 g E	19 g E	137 g E	11 g E	88 g E	37 g E	ND
Sodium	1,370	168 B	554 B	46 B	323 B	2,100	155 B	279 B	ND E
Thallium	ND	ND	6.2 g	7.2 g	5.5 g	ND	9.5 g	9.2 g	ND R
Vanadium	352 g E	17 g E	14 g E	14 g E	34 g E	25 g E	12 g E	26 g E	ND
Zinc	10,400 g E N	1,900 g E N	1,640 g E N	476 g E N	3,490 g E N	228 g E N	863 g E N	9,810 g E N	7.6 g B E
Cyanide	52 g	55	55	22	86	39	38	30	ND

g - Value considered estimated based on data validator's report (Appendix I).
r - Value rejected by data validator but usable to show magnitude of contaminated level (Appendix I).
B - Value is less than the contract-required detection limit but greater than the instrument detection limit.

D - Value rejected by data validator and found unusable (Appendix I).
E - Value estimated due to interference.
N - Spiked sample recovery is not within control limits.
R - Duplicate analysis not within control limits.
ND - Not detected at analytical detection limit.

TABLE 5-20 (Page 3 of 3)

SEDIMENT TCLP DATA SUMMARY (June 1995)
United Plating Site

	UPSD01	UPSD03	UPSD08	TCLP STANDARDS
TCLP METALS (mg/l)				
Arsenic	D	0.072 g B	D	5.0
Barium	0.52 g B E	0.14 g B E	0.58 g B E	100
Cadmium	0.024 g B R	1.6 R	0.17 R	1.0
Chromium	0.68 g E R	201 g E R	31 g E R	5.0
Lead	ND R	9.5 r R	0.078 g B R	5.0
Mercury	0.00034	0.00068	0.00043	0.2
Selenium	ND R	0.050 g R	ND R	1.0
Silver	0.019 g B R	0.030 g B R	0.11 g R	5.0

Note: Bold numbers exceed TCLP Standards.

- g - Value considered estimated based on data validator's report (Appendix I).
- r - Value rejected by data validator but usable to show magnitude of contaminated level (Appendix I).
- B - Value is less than the contract-required detection limit but greater than the instrument detection limit.
- D - Value rejected by data validator and found unusable (Appendix I).
- E - Value estimated due to interference.
- R - Duplicate analysis not within control limits.
- ND - Not detected at analytical detection limit.



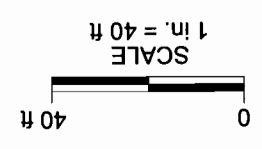
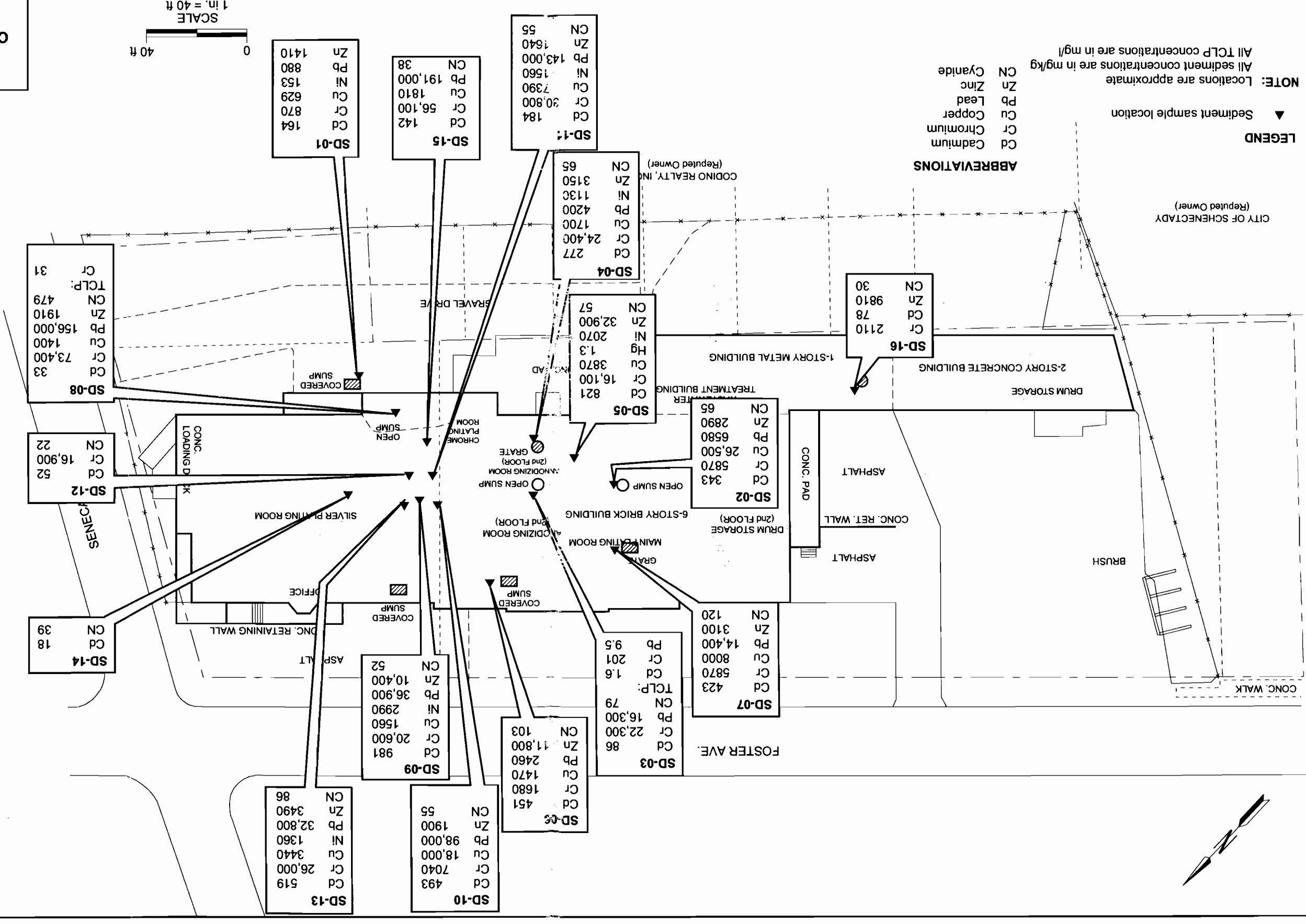
LEGEND

▲ Sediment sample location

NOTE: Locations are approximate
All sediment concentrations are in mg/kg
All TCLP concentrations are in mg/kg

ABBREVIATIONS

Cd Cadmium
Cr Chromium
Cu Copper
Pb Lead
Zn Zinc
CN Cyanide



Selected Sediment Contaminant Concentrations

Figure S-22

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

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

the TCLP limit. Metals detected at high levels in most of the sediment samples include cadmium, chromium, copper, lead, mercury, and zinc. Mercury was detected in all the sediment samples at concentrations ranging from 0.35 mg/kg at UPSD-03 to 12 mg/kg at UPSD-06. Barium was detected at elevated levels in four samples, with a maximum concentration of 13,600 mg/kg at UPSD-09. Antimony was at elevated levels at four locations, with a maximum concentration of 4770 mg/kg at UPSD-09 and silver in one sample at a concentration of 2830 mg/kg at UPSD-09. Cyanide was detected at high levels at all but one location. The samples with the lowest concentration of contaminants were UPSD-01 (the covered sump located outside, east of the chrome plating room) and UPSD-14 (inside the building).

5.2.7 Task 2b - Monitoring Well Soil Boring Sampling Data

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 and analyzed for TCL organics and TAL metals and cyanide. The samples are summarized on Table 5-21 and shown graphically on Figure 5-23. The figure shows those metals exceeding the site background levels as well as organics exceeding the NYSDEC soil cleanup objectives. The table also shows eastern U.S. background soil concentrations for metals, NYSDEC-recommended soil cleanup objectives (NYSDEC 1994a), and site background concentrations, as discussed in Section 5.2.2.1. Results in bold face type indicate exceedances of the cleanup objectives/background levels. Laboratory analytical data sheets are contained in Appendix H, and the data validation and usability report is contained in Appendix I. The results from the analysis for TICs are also found in Appendix H.

Samples were submitted for grain-size, pH, and TOC analyses. Method SW-846-9045A was used to measure the pH of solids in water. TOC was measured using the Lamotte method (5020). The results of the grain-size, pH, and TOC analyses are listed in Table 5-22. The laboratory results are presented in Appendix C.

All the samples submitted for grain-size analysis were poorly sorted with high uniformity coefficient values. The Burmeister system was used to describe the soil as Atterberg limits were not performed on the samples for describing the soils according to the Unified Soil Classification System. The field descriptions of soils recorded on the boring logs (Appendix

TABLE 5-21 (Page 1 of 4)

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)	
VOLATILE ORGANICS (mg/kg)										
Carbon disulfide	ND	ND	ND	ND	ND	ND	ND	ND	7.0 j	2.7
2-Butanone	ND	ND	ND	ND	0.005 j x	ND	0.003 j	ND	ND	0.3
1,1,1-Trichloroethane	0.009 j	0.013 x	0.018 x	ND	0.002 j x	ND	ND	0.004 j	ND	0.8
1,2-Dichloropropane	ND	ND	ND	ND	0.060	ND	ND	ND	ND	NS
Trichloroethylene	0.009 j	0.009 j	0.009 j	0.012	1.1 e	15	ND	0.18	ND	0.7
Tetrachloroethylene	ND	ND	ND	ND	0.002 j x	ND	ND	ND	ND	1.4
Toluene	0.006 j	0.007 j	0.007 j	0.006 j	0.002 j x	ND	0.001 j	ND	ND	1.5
Xylene (total)	ND	ND	ND	ND	0.002 j x	ND	ND	ND	ND	12

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.

x - Estimated due to QC issues.

ND - Not detected at analytical detection limit.

NS - No standard.

RE - Reanalysis.

TABLE 5-21 (Page 2 of 4)

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 FIELD BLANK (µg/l)	NYSDEC SOIL CLEANUP OBJECTIVES (a)
[DL: 500:1]								
SEMIVOLATILE ORGANICS (mg/kg)								
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 x	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***
Fluoranthene	ND	0.36 j	ND	490 x	ND	0.50	ND	50.0***
Pyrene	ND	0.40 j	ND	370 x	ND	0.47	ND	50.0***
Benzo(a)anthracene	ND	ND	ND	290 x	ND	0.25 j	ND	0.224 or MDL
Chrysene	ND	ND	ND	320 x	ND	0.33 j	ND	0.4
Benzo(b)fluoranthene	ND	ND	ND	190 x	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.
j - Estimated concentration; compound present below quantitation limit.
x - Estimated due to QC issues.

DL - Diluted sample analysis.
ND - Not detected at analytical detection limit.
MDL - Method detection limit.

TABLE 5-21 (Page 3 of 4)

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 FIELD BLANK (µg/l)	NYSDEC SOIL CLEANUP OBJECTIVES (a)
PESTICIDES/PCBs (mg/kg)				[DL: 2:1]				
Dieldrin	ND	0.0007 j p	ND	ND	ND	ND	ND	0.044
4,4'-DDE	ND	ND	ND	ND	0.0004 j	ND	ND	2.1
Endrin	ND	ND	ND	ND	ND	0.0034 j p	ND	0.10
Endosulfan II	ND	ND	ND	0.037 j p	ND	ND	ND	0.9
4,4'-DDT	ND	ND	ND	ND	ND	0.0018 j	ND	2.1
Methoxychlor	ND	0.0031 j p	ND	ND	ND	ND	ND	***
Aroclor 1254	ND	ND	ND	0.71	ND	0.0087 j	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.

ND - Not detected at analytical detection limit.

TABLE 5-21 (Page 4 of 4)

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 FIELD BLANK (µg/l)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
TAL METALS (mg/kg)										
Aluminum	8,840 x	8,340 x	7,660	7,120	10,100	8,790	ND	33,000	SB	-
Antimony	5.8 B N x	D	D	D	D	D	D	0.6 - 10 (n)	SB	-
Arsenic	3.5	3.9	4.5	7.6 R	5.5 R	6.4 R x	ND	3.0 - 12.0 æ	7.5 or SB	-
Barium	60	64	90	60	78	80	0.90 B	15 - 600	300 or SB	-
Beryllium	0.47 B	0.52 B	0.50 B	0.51 B x	0.66 B x	0.66 B x	ND	0 - 1.75	0.16 or SB	-
Cadmium	0.45 B	0.58 B	0.64 B	19 E	5.7 E	11 E	ND	0.1 - 1.0	1 or SB	1.0
Calcium	33,400	33,400	35,800	24,000	12,600	4,940	181 B	130 - 35,000 æ	SB	-
Chromium	17	20	16	733 N R	26 N R	73 N R	ND	1.5 - 40.0 æ	10 or SB	16
Cobalt	8.2 B	9.1 B	12	14 x	19 x	13 x	ND	2.5 - 60.0 æ	30 or SB	-
Copper	32 E	33 E	33 E	176 R	50 R	31 R	ND	1.0 - 50.0	25 or SB	22.5
Iron	23,800	25,800	22,900	22,900	27,300	22,800	91 B	2,000 - 550,000	2,000 or SB	-
Lead	13	14.5	14	33 E R	25 E R	34 E R	ND	4.0 - 61 or 200 - 500*	400(d)	-
Magnesium	11,300	10,700	11,200	12,800 E	5,510 E	4,430 E	ND	100 - 5,000	SB	-
Manganese	537	492	793	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 x	ND	0.001 - 0.2	0.1	-
Nickel	25	27	33	78	44	25	ND	0.5 - 25	13 or SB	14.5
Potassium	1,790 E	2,040 E	1,610 E	1,270	1,340	906 B	ND	8,500 - 43,000 æ	SB	-
Selenium	D	D	D	D	D	D	D	0.1 - 3.9	2 or SB	-
Silver	ND	ND	ND	5.5 x	1.1 B x	2.4 x	ND	0.1 - 5.0 (n)	SB	-
Sodium	124 B	131 B	128 B	860 B	219 B	93 B	118 B	6,000 - 8,000	SB	-
Thallium	D	D	D	D	D	D	D	0.1 - 0.8 (q)	SB	-
Vanadium	17	23	20	20 x	24 x	21 x	ND	1.0 - 300	150 or SB	-
Zinc	62	63	70	628	95	756	34	9.0 - 50	20 or SB	112
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 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.

(c) - See Section 5.2.2.1 of text.

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

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

(d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

x - Estimated due to QC issues.

D - Value rejected by data validator and found unusable (Appendix I).

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.

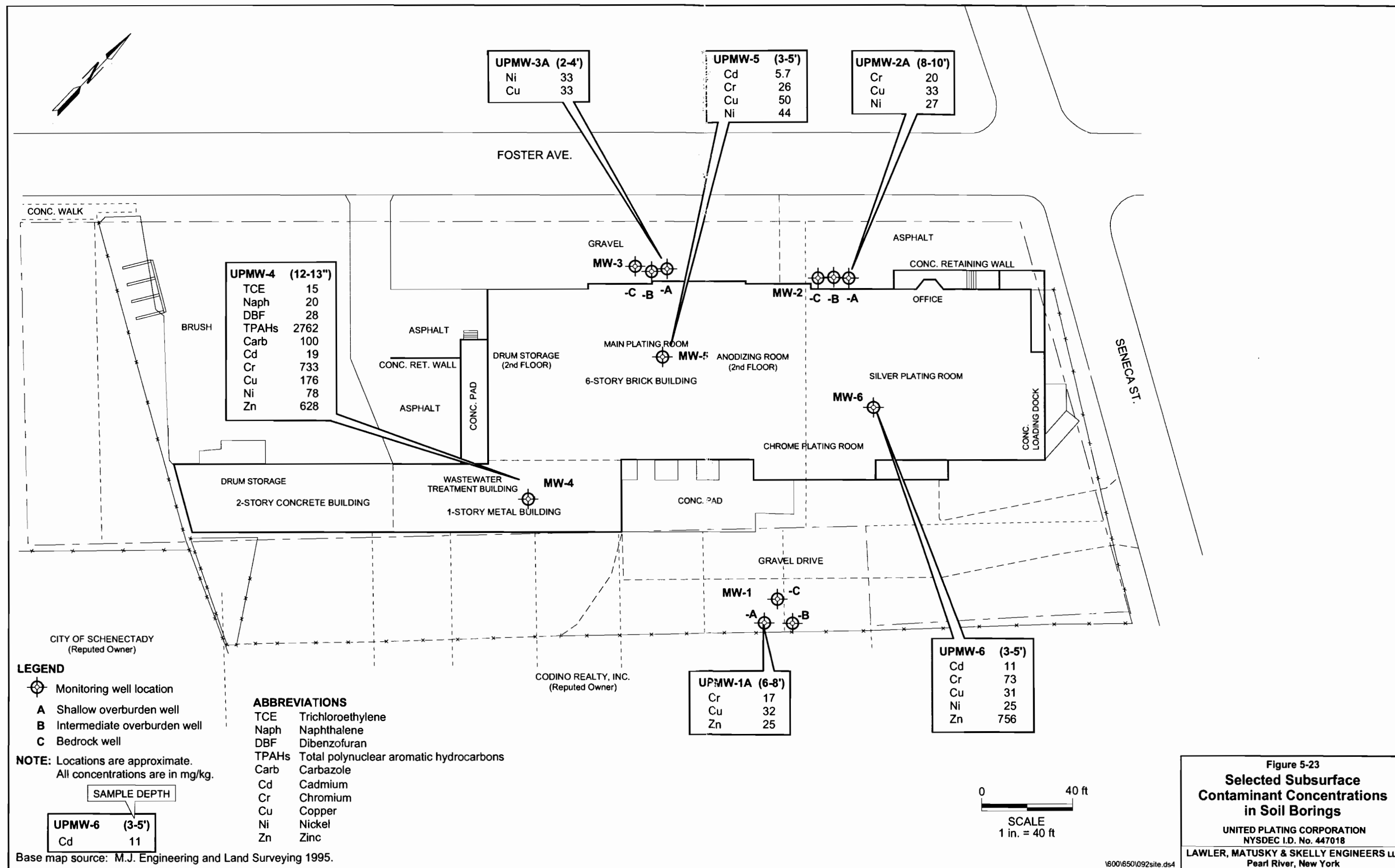


Figure 5-23
**Selected Subsurface
 Contaminant Concentrations
 in Soil Borings**
 UNITED PLATING CORPORATION
 NYSDEC I.D. No. 447018
 LAWLER, MATUSKY & SKELLY ENGINEERS LLP
 Pearl River, New York

TABLE 5-22

GRAIN SIZE ANALYSIS RESULTS (January 1996)
United Plating Site

WELL #	SOIL DESCRIPTION (BURMISTER METHOD)	pH	TOC (%)
UPMW-1A	Gray cmf sand, some silt, some clay trace mf gravel	7.9	1.0
UPMW-1B	Gray cmf sand, some (-) clay, some (-) silt, some (-) mf gravel	8.0	0.1
UPMW-2A	Gray cmf sand some clay, some silt, little mf gravel	7.8	0.8
UPMW-2B	Gray cmf sand, some clay, some (-) silt, little mf gravel	8.0	0.5
UPMW-3A	Gray cmf sand, some clay, some (-) silt some (-) mf	7.8	2.0
UPMW-3B	Gray clay, some (+) cmf sand, little mf gravel, little silt	7.9	0.3
UPMW-5	Gray cmf sand, some (+) clay some (-) silt, trace mf gravel	8.6	0.3

Samples were submitted for grain size, pH, and TOC analysis. pH was measured for solids in water using method SW-846 9045A. TOC was measure using the Lamotte method (5020). The laboratory results of the grain size, pH, and TOC analysis are presented in Appendix C.

B) closely resemble the results of the grain-size analysis. The results of the grain-size, pH, and TOC analyses are provided in Appendix C.

5.2.7.1 Volatile Organic Compounds. With the exception of sample UPMW-4, none of the samples exceeded the NYSDEC recommended cleanup objective. The reanalyzed sample from UPMW-4 had 15 mg/kg of TCE, which exceeded the cleanup guidance level of 0.7 mg/kg. The sample was collected from a monitoring well installed inside the building in the wastewater treatment building. 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 15 mg/kg in MW-4 also exceeded the total allowable concentration of VOCs of 10 mg/kg.

5.2.7.2 Semivolatile Organic Compounds. The 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 silver plating room. 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 44 mg/kg). These compounds are all PAHs and are generally associated with fuel oil contamination. The total concentration of SVOCs, 2910 mg/kg, also exceeded the total allowable concentration of SVOCs, 500 mg/kg. The sample from UPMW-2 had very low levels of PAHs.

5.2.7.3 Pesticides/PCBs. Very low levels of pesticides, i.e., < 0.04 mg/kg, were detected in UPMW-2A, -4, -5, and -6. These pesticides were dieldrin, 4,4'-DDE, endrin, endosulfan II, 4,4'-DDT, and methoxychlor. Aroclor 1254, a PCB, was detected at a concentration of 0.71 mg/kg in UPMW-4 and 0.0085 mg/kg in UPMW-6.

5.2.7.4 Metals and Cyanide. The upgradient sample, UPMW-1A, had concentrations of chromium, copper, and nickel in excess of the background levels. The levels of copper and nickel exceeded the site background levels in UPMW-2A and -3A; chromium was also in

excess of the background levels in UPMW-2A. Mercury in UPMW-1A exceeded the eastern U.S. background soil concentrations.

UPMW-4 had levels of cadmium, chromium, copper, nickel, and zinc that far exceeded the site background levels, indicating that these contaminants are site related. Silver also exceeded the eastern U.S. background levels in UPMW-4. Although no cleanup level or background concentration is provided for cyanide, the cyanide concentration of 126 mg/kg in UPMW-4 appears to be site related.

UPMW-5 and UPMW-6 contained cadmium, chromium, copper, and nickel in excess of the site background levels. Zinc was also found at 756 mg/kg in UPMW-06 in excess of site background.

5.2.8 Task 2b First-Round Groundwater Sampling Data

Groundwater samples were collected in October 1995 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 collected on all samples. 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 5-23 and shown graphically on Figure 5-24. The figure shows only the unfiltered metals results that exceed the groundwater standard and does not include the common groundwater contaminants iron, magnesium, manganese, and sodium. The table also shows the NYSDEC Class GA standards (NYSDEC 1993) and the natural ambient groundwater ranges for metals (Dragun 1988). Results in bold face type indicate exceedances of the groundwater standard. Laboratory analytical data sheets are contained in Appendix H, and the data validation and usability report is contained in Appendix I. The results from the analysis for TICs are also found in Appendix H.

5.2.8.1 Volatile Organic Compounds. Benzene exceeded the groundwater standard of 0.7 µg/l in the downgradient bedrock well (UPMW-2C), with an estimated concentration of 6 µg/l (9 µg/l in the duplicate sample). The presence of benzene is not believed to be site

TABLE 5-23 (Page 1 of 9)

GROUNDWATER DATA SUMMARY (October 1995)
United Plating Site

PARAMETER	UPMW-1A	UPMW-1B	UPMW-1C	UPMW-2A	UPMW-2B	UPMW-2C	NYSDEC CLASS GA STANDARDS (a)
VOLATILE ORGANICS (µg/l)							
Chloroform	ND	ND	7 j	ND	1 j	ND	7
Benzene	ND	ND ¹	ND	ND	ND ¹	6 j	0.7

Note: Numbers in bold exceed standards.

1 - Not detected at CRDL.

(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 5-23 (Page 2 of 9)

GROUNDWATER DATA SUMMARY (October 1995)
United Plating Site

PARAMETER	BLIND DUPLICATE						NYSDEC CLASS GA STANDARDS (a)
	UPMW-2C	UPMW-3A	UPMW-3B	UPMW-3C	UPMW-4	UPMW-5	
VOLATILE ORGANICS (µg/l)							
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	5
Benzene	9 j	ND	ND ¹	ND	ND	ND	0.7
1,2-Dichloroethylene (total)	ND	ND	ND	ND	10 j	ND	5
Chloroform	ND	ND	ND	ND	1 j	ND	7
1,2-Dichloropropane	ND	ND	ND	ND	17	ND	5
Trichloroethylene	ND	ND	ND	ND	430 d	13	5

Note: Numbers in bold exceed standards.

1 - Not detected at CRDL.

(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.

j - Estimated concentration; compound present below quantitation limit.

ND - Not detected at analytical detection limit.

TABLE 5-23 (Page 3 of 9)

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)
VOLATILE ORGANICS (µg/l)					
1,1,1-Trichloroethane	93	ND	ND	ND	5
Trichloroethylene	13	ND	ND	ND	5

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.

ND - Not detected at analytical detection limit.

TABLE 5-23 (Page 4 of 9)

GROUNDWATER DATA SUMMARY (October 1995)
United Plating Site

PARAMETER	UPMW-1A	UPMW-1B	UPMW-1C	UPMW-2A	UPMW-2B	UPMW-2C	BLIND DUPLICATE UPMW-2C	NYSDEC CLASS GA STANDARDS (a)
SEMIVOLATILE ORGANICS (µg/l)	ND	ND	♦	ND	ND	ND	ND	NS
PARAMETER	UPMW-3A	UPMW-3B	UPMW-3C	UPMW4	UPMW-5	UPMW-6	UPFB-12 FIELD BLANK	NYSDEC CLASS GA STANDARDS (a)
SEMIVOLATILE ORGANICS (µg/l)	ND	ND	ND	♦	ND	ND	ND	NS

♦ 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.

ND - Not detected at analytical detection limit.

NS - No standard.

TABLE 5-23 (Page 5 of 9)

GROUNDWATER DATA SUMMARY (October 1995)
United Plating Site

PARAMETER	UPMW1A	UPMW1B	UPMW1C	UPMW2A	UPMW2B	UPMW2C	BLIND DUPLICATE UPMW2C	NYSDEC CLASS GA STANDARDS (a)
PESTICIDES/PCBs (µg/l)								
Aroclor 1254	ND	ND	♦	ND	0.074 j p z	0.030 j z	ND	0.1*
Aroclor 1260	0.59 j p z	ND	♦	ND	ND	ND	ND	0.1*

PARAMETER	UPMW3A	UPMW3B	UPMW3C	UPMW4	UPMW5	UPMW6	UPFB12 FIELD BLANK	NYSDEC CLASS GA STANDARDS (a)
PESTICIDES/PCBs (µg/l)								
Aroclor 1254	0.10 j z	0.035 j p z	0.06 j p z	♦	0.11 j z	0.20 j z	0.11 j p z	0.1*
Aroclor 1260	ND	ND	ND	♦	ND	ND	ND	0.1*

Note: Numbers in bold exceed standards.

* - Total PCBs = 0.1 µg/l.

♦ - 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.

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.

z - Values are suspect, possibly the result of cross contamination.

ND - Not detected at analytical detection limit.

TABLE 5-23 (Page 6 of 9)

GROUNDWATER SUMMARY (October 1995)
United Plating Site

PARAMETER	UPMW1A	FIL UPMW1A	UPMW1B	FIL UPMW1B	UPMW1C	FIL UPMW1C	UPMW2A	NATURAL AMBIEN GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS(a)
TAL METALS (µg/l)									
Aluminum	385	141 B	899	90 B	348,000	♦	16,300	<5.0 - 1,000	NS
Antimony	19 B N x	28 B N x	17 B N x	17 B N x	ND N	♦	ND N	N/A	3.0 GV
Arsenic	5.6 B	ND	8.4 B	ND	228	♦	9.1 B	<1.0 - 30	25
Barium	70 B	71 B	53 B	41 B	1,720	♦	147 B	10 - 500	1,000
Beryllium	ND	ND	ND	ND	17	♦	1.1 B	<10	3.0 GV
Cadmium	1.1 B	1.5 B	ND	ND	58	♦	1.6 B	<1.0	10
Calcium	140,000 E	134,000 E x	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	882	♦	272	<1.0 - 5.0	50
Cobalt	ND	ND	ND	ND	332	♦	19 B	<10	NS
Copper	5.2 B	9.6 B	8.3 B	3.3 B	1,470	♦	43	<1.0 - 30	200
Iron	931	338	1,740	206	851,000	♦	33,000	10 - 10,000	300 (m)
Lead	ND N	ND N	3.1 N x	ND N	425 N x	♦	20 N	<15	25
Magnesium	56,500 E	53,600 E x	18,200 E	16,400 E	266,000 E	♦	64,900 E	1,000 - 50,000	35,000 GV
Manganese	464 E	446 E x	103 E	70 E	18,800 E	♦	897 E	<1.0 - 1,000	300 (m)
Mercury	ND N	ND N	ND N	ND N	0.58 N x	♦	ND N	<1.0	2.0
Nickel	ND	ND	ND	ND	682	♦	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 x	ND	ND	ND W	♦	2.1 B W x	<1.0 - 10	10
Silver	ND	2.4 B	ND	ND	5.9 B	♦	ND	<5.0	50
Sodium	134,000	129,000	134,000	127,000	857,000	♦	96,800	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	654	♦	32 B	<1.0 - 10	NS
Zinc	60	ND	32	ND	2,880	♦	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.
- x - Estimated due to QC issues.
- 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 5-23 (Page 7 of 9)

GROUNDWATER DATA SUMMARY (October 1995)
United Plating Site

PARAMETER	FIL UPMW2A	UPMW2B	FIL UPMW2B	UPMW2C	FIL UPMW2C	BLIND DUPLICAT UPMW2C	FIL DUPLICATE UPMW2C	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS (a)
TAL METALS (µg/l)									
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	D	D	<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 x	17 x	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 + x	ND W	1.2 B W x	ND	1.6 B W x	1.6 B W x	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	D	D	D	D	D	D	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.
- x - Estimated due to QC issues.
- D - Value rejected by data validator and found unusable (Appendix I).
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- N - Spiked sample recovery is not within control limits.
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- GV - Guidance value.
- ND - Not detected at analytical detection limit.
- NA - Not analyzed.
- NS - No standard.
- N/A - Not available.
- FIL - Filtered sample.

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GROUNDWATER DATA SUMMARY (October 1995)
 United Plating Site

PARAMETER	FIL		FIL		FIL		FIL	FIL	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS(a)
	UPMW3A	UPMW3A	UPMW3B	UPMW3B	UPMW3C	UPMW3C				
TAL METALS (µg/l)										
Aluminum	2,900	211	496	40 B	17,500	497	364,000	♦	<5.0 - 1,000	NS
Antimony	ND N	17 B N x	ND N	ND N	ND N	ND N	ND N	♦	N/A	3.0 GV
Arsenic	ND	ND	ND	ND	ND	ND	210	♦	<1.0 - 30	25
Barium	70 B	48 B	19 B	18 B	303	49 B	2,510	♦	10 - 500	1,000
Beryllium	ND	ND	ND	ND	1.2 B	ND	20	♦	<10	3.0 GV
Cadmium	1.6 B	ND	1.1 B	1.1 B	1.4 B	ND	40	♦	<1.0	10
Calcium	222,000 E	208,000	37,900 E x	2,100 E x	9,460 E	1,670 E	1,251 E	♦	1,000 - 150,000	NS
Chromium	14	7.3 B	3.0 B x	1.7 B x	33	3.2 B	3,460	♦	<1.0 - 5.0	50
Cobalt	5.6 B	6.7 B	ND	ND	11 B	ND	548	♦	<10	NS
Copper	13 B	ND	7.2 B	8.8 B	32	4.3 B	2,130	♦	<1.0 - 30	200
Iron	6,300	242	1,130	164	32,300	404	986,000	♦	10 - 10,000	300 (m)
Lead	6.0 N x	ND N	3.1 N W x	ND N	22 N x	2.8 B N x	412 N x	♦	<15	25
Magnesium	119,000 E	115,000 E	18,800 E	21,800 E	9,340 E	693 B E	341,000 E	♦	1,000 - 50,000	35,000 GV
Manganese	1,060 E	881 E	76 E	74 E	350 E	14 B E	16,900 E	♦	<1.0 - 1,000	300 (m)
Mercury	ND N	0.26 N x	ND N	ND N	ND N	ND N	ND N	♦	<1.0	2.0
Nickel	30 B	13 B	ND	ND	33 B	ND	1,100	♦	<10 - 50	NS
Potassium	60,100	56,900	3,730 B	4,390 B	5,960	2,670 B	86,200	♦	1,000 - 10,000	NS
Selenium	2.8 B W x	2.7 B W x	1.3 B W x	1.6 B W x	ND W	ND W	ND W	♦	<1.0 - 10	10
Silver	ND	ND	ND	ND	ND	ND	13	♦	<5.0	50
Sodium	150,000	137,000	72,200	82,400	148,000	145,000	141,000	♦	500 - 120,000	20,000
Thallium	ND R	ND R	D	D	D	D	ND R W	♦	N/A	4.0 GV
Vanadium	7.2 B	2.2 B	ND	ND	31 B	ND	637	♦	<1.0 - 10	NS
Zinc	23	14 B	13 B	ND	61	ND	2,720	♦	<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.
- x - Estimated due to QC issues.
- D - Value rejected by data validator and found unusable (Appendix I).
- 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.
- NS - No standard.
- N/A - Not available.
- FIL - Filtered sample.

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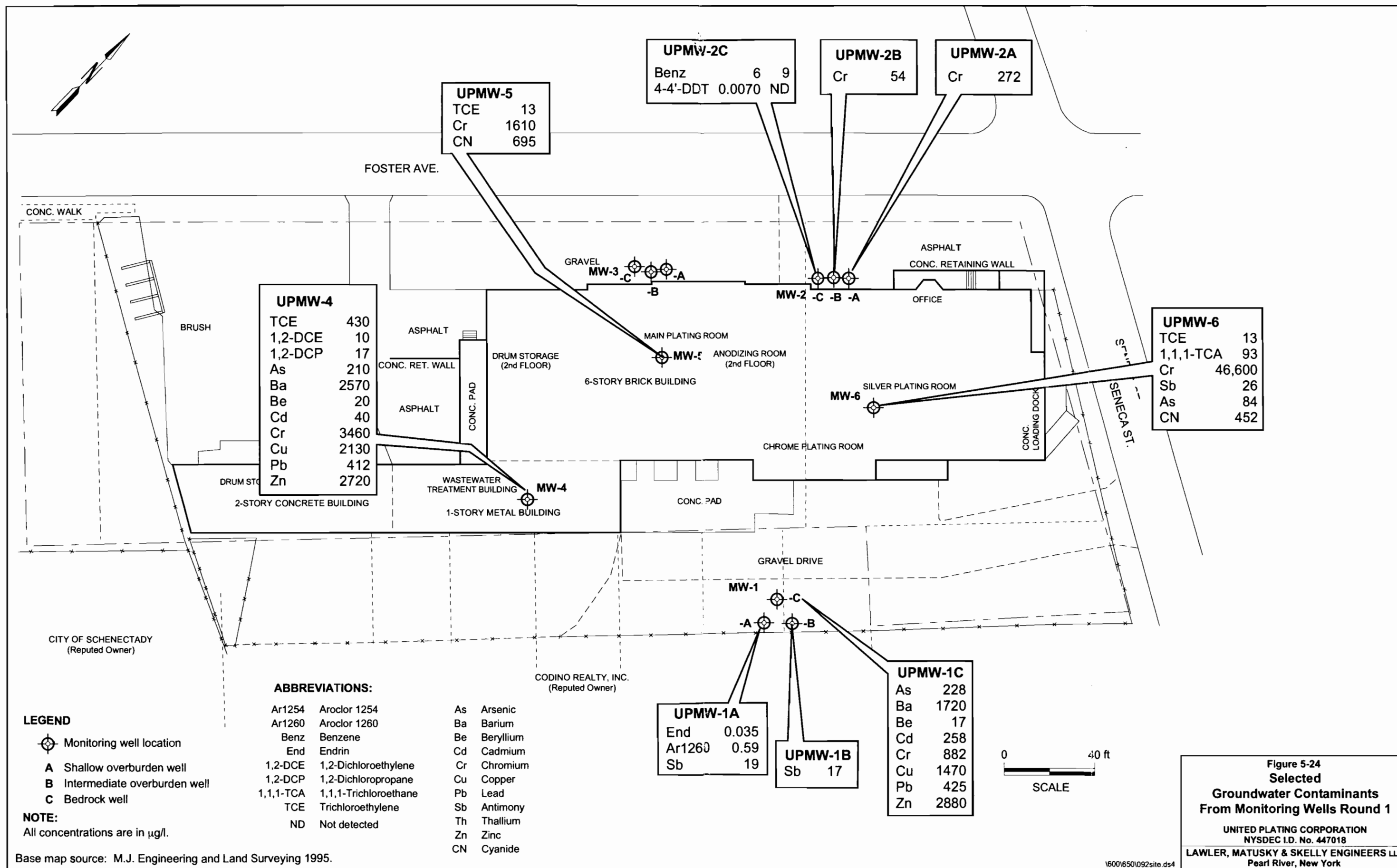
GROUNDWATER DATA SUMMARY (October 1995)
United Plating Site

PARAMETER	UPMW5	FIL UPMW5	UPMW6	FIL UPMW6	UPFB12 FIELD BLANK	FIL UPFB12 FIELD BLANK	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS (a)
TAL METALS (µg/l)								
Aluminum	1,860	257	770	290	123 B	32 B	<5.0 - 1,000	NS
Antimony	ND N	17 B N x	26 B N x	42 B N x	ND N	ND N	N/A	3.0 GV
Arsenic	ND	ND	84	86	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	1,610	1,680	46,600	45,000	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	2,800	492	1,350	417	44 B	ND	10 - 10,000	300 (m)
Lead	ND N	ND N	4.1 N x	ND N	ND N	ND N	<15	25
Magnesium	62,100 E	63,300 E	11,400 E	10,800 E	150 B E	39 B E	1,000 - 50,000	35,000 GV
Manganese	331 E	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 x	2.6 B W x	ND	ND	<1.0 - 10	10
Silver	2.5 B	ND	5.8 B	1.8 B	ND	ND	<5.0	50
Sodium	382,000	349,000	151,000	142,000	399 B	162 B	500 - 120,000	20,000
Thallium	ND R W	ND R W	ND R	ND R	D	D	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	695	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.
x - Estimated due to QC issues.
D - Value rejected by data validator and found unusable (Appendix I).
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.
NS - No standard.
N/A - Not available.
FIL - Filtered sample.



related. Several gasoline stations situated upgradient of the site are possible sources of the benzene in the groundwater.

Groundwater from monitoring well UPMW-4, located in the wastewater treatment building, had elevated concentrations of TCE (430 µg/l), total 1,2-DCE (10 µg/l), and 1,2-DCP (17 µg/l). The 1,2-DCE and 1,2-DCP concentrations are estimated values. The results were all above the groundwater standard of 5 µg/l. Monitoring well UPMW-5, which is located in the main plating room, had 13 µg/l of TCE in the groundwater, as did monitoring well UPMW-6, located in the chrome plating room. UPMW-6 also had 93 µg/l of 1,1,1-TCA in the groundwater, which exceeded the standard of 5 µg/l. Chloroform was found at an estimated concentration in UPMW-1C.

Groundwater beneath the building appears to be contaminated with chlorinated solvents, chiefly TCE, probably as a result of spills from the TCE vapor degreaser tank located inside the building.

5.2.8.2 Semivolatile Organic Compounds. None of the wells had SVOCs in excess of the groundwater standards. SVOCs were not analyzed for in the bedrock well, UPMW-1C, and the wastewater treatment building well, UPMW-4, as there was not enough sample volume to run the analysis.

5.2.8.3 Pesticides/PCBs. Aroclor 1254, a PCB, was detected at low levels in UPMW-2B, -2C, -3A, -3B, -3C, -5, and -6. Aroclor 1254 was also detected in the field blank at concentrations similar to those found in the samples. The presence of Aroclor 1254 in these samples is suspect; it is considered the result of cross contamination and not site related. The upgradient shallow well, UPMW-1A, had Aroclor 1260, a PCB, at 0.59 µg/l, above the groundwater standard of 0.1 µg/l for total PCBs. The finding of Aroclor 1260 in the groundwater at this location is questionable in light of the presence of Aroclor 1254 in the associated field blank. For a more detailed explanation, see the data usability and validation report contained in Appendix I. Pesticides/PCBs were not analyzed on UPMW-1C and UPMW-4 due to lack of sufficient sample volume. None of the other samples had any detectable pesticides/PCBs.

5.2.8.4 Metals and Cyanide. Unfiltered and filtered metals and cyanide analyses were run on all samples except for UPMW-1C and UPMW-4, where there was not enough sample

volume to run the filtered metals analysis and cyanide analysis. The upgradient shallow well, UPMW-1A, had antimony, iron, magnesium, manganese, and sodium above the groundwater standard in both the filtered and unfiltered samples. The intermediate overburden upgradient well, UPMW-1B, had antimony and sodium above the groundwater standard in both the filtered and unfiltered samples and iron above the groundwater standard in the unfiltered sample. With the exception of antimony, these are all common groundwater metal contaminants.

The bedrock upgradient well, UPMW-1C, had arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, magnesium, manganese, sodium, and zinc above the 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 has a very low yield and it is possible that the only water-bearing fractures in this well are hydraulically connected to a zone of site-related contamination in the overburden or bedrock.

UPMW-5 has chromium, iron, magnesium, and sodium above the groundwater standard in both the filtered and unfiltered samples. Manganese was above the standard in the unfiltered sample and antimony in the filtered sample. Cyanide was above the groundwater standard in the unfiltered sample. The levels of chromium are similar and suggest a relation to site activities. UPMW-6 had antimony, arsenic, chromium, iron, and sodium above the groundwater standard in both the filtered and unfiltered samples. Magnesium and cyanide were above the standard in the unfiltered sample. The chromium was over 45,000 µg/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 groundwater standard in both the filtered and unfiltered samples; 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 overburden well, UPMW-2B, had chromium, iron, and sodium in excess of the standard in the unfiltered sample, with only sodium above the standard in the filtered sample. The other downgradient intermediate overburden well, UPMW-3B, had only sodium 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 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). 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 of 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 analysis was not run on UPMW-1C and UPMW-4 due to lack of sample.

5.2.9 Task 2b Second-Round Groundwater Sampling Data

After the data from the first round were reviewed, LMS recommended that a second round of groundwater samples be collected. Based on the finding of VOCs, metals, and cyanide above the groundwater standard in the first round it was recommended that these analyses be done on the second round. It was further recommended that the VOCs be analyzed by low-level method 524.2 and that only unfiltered metals and cyanide be analyzed. There was not a significant difference in concentration between the filtered and unfiltered primary site metals in the first round of monitoring well sampling; therefore, it was not deemed necessary to analyze for filtered metals. In addition, as PCBs were detected in the groundwater above the standard, it was decided to run PCBs on the second round of samples. The second round of sampling took place in December 1995, with samples analyzed for all parameters except PCBs in UPMW-1C; due to the poor recovery of UPMW-1C, insufficient sample volume was

collected to perform this analysis. The VOC samples were sent to Aquatec and the metals and PCBs to E3I. In January 1996 Aquatec informed LMS that the paper work had been lost on the VOC samples and, therefore, the samples had to be recollected. In January 1996 LMS recollected the VOC samples, at Aquatec's cost, and also collected the remaining PCB sample from UPMW-1C.

Results for the second round are provided on Table 5-24 and summarized graphically on Figure 5-25. The figure shows the concentrations exceeding the groundwater standards with the exception of the common metal contaminants iron, magnesium, manganese, and sodium. 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 standards. Laboratory analytical data sheets are contained in Appendix H, and the data validation and usability report is contained in Appendix I. The results from the analysis for TICs are also found in Appendix H.

5.2.9.1 Volatile Organic Compounds. No VOCs were detected in the upgradient shallow overburden well, UPMW-1A. Benzene was detected in the upgradient intermediate overburden well, UPMW-1B, at a concentration of 1 µg/l, above the groundwater standard of 0.7 µg/l. No TICs were detected in either of these samples. Acetone and chloroform were detected at 32 and 4 µg/l, respectively, in UPMW-1C, the upgradient bedrock well. No standard exists for either of these compounds.

1,1,1-TCA was detected at a concentration of 2 µg/l in UPMW-2A, one of the downgradient shallow wells; the concentration was below the groundwater standard of 5 µg/l. None of the remaining downgradient wells (UPMW-2B, -2C, -3A, -3B, and -3C) had any detectable VOCs.

In UPMW-4 cis-1,2-DCE was found at a concentration of 24 µg/l, well above the groundwater standard of 5 µg/l. TCE was detected at a concentration of 170 µg/l in this sample, significantly above the standard of 5 µg/l. A concentration of 6 µg/l was found in UPMW-5, the well in the main plating room. 1,1,1-TCA was found at a concentration of 62 µg/l in both the sample and blind duplicate at UPMW-6, the well in the chrome plating room. TCE was detected at 11 µg/l in both the sample and blind duplicate of UPMW-6. Both the TCE and 1,1,1-TCA results were above the groundwater standards.

TABLE 5-24 (Page 1 of 5)

GROUNDWATER DATA SUMMARY (December 1995)
United Plating Site

PARAMETER	UPMW1A	UPMW1B	UPMW1C	UPMW2A	UPMW2B	UPMW2C	UPMW3A	UPMW3B	NYSDEC CLASS GA STANDARDS (a)
VOLATILE ORGANICS (µg/l)									
Benzene	ND	1.0	ND	ND	ND	ND	ND	ND	0.7
Acetone	ND	ND	32	ND	ND	ND	ND	ND	50 GV
Chloroform	ND	ND	4.0	ND	ND	ND	ND	ND	7
1,1,1-Trichloroethane	ND	ND	ND	2.0	ND	ND	ND	ND	5

Note: Numbers in bold exceed standards.

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

GV - Guidance value.

ND - Not detected at analytical detection limit.

TABLE 5-24 (Page 2 of 5)

GROUNDWATER DATA SUMMARY (December 1995)
United Plating Site

PARAMETER	UPMW3C	UPMW4	UPMW5	UPMW6	UPMW6A	UPTB-12	UPTB-13	UPTB-15	UPFB-14	NYSDEC CLASS GA STANDARDS (a)
VOLATILE ORGANICS (µg/l)										
1,1,1-Trichloroethane	ND	ND	ND	62	62	ND	ND	ND	ND	5
cis-1,2-Dichloroethene	ND	24	ND	ND	ND	ND	ND	ND	ND	5
Trichloroethene	ND	170	6.0	11	11	ND	ND	ND	ND	5
Tentatively Identified Compounds (µg/l)	ND	ND	ND	ND	ND	ND	ND	ND	ND	-

Note: Numbers in bold exceed standards.

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

ND - Not detected at analytical detection limit.

TABLE 5-24 (Page 3 of 5)

GROUNDWATER DATA SUMMARY (December 1995)
United Plating Site

PARAMETER	UPMW-1A	UPMW-1B	UPMW-1C	UPMW-2A	UPMW-2B	UPMW-2C	UPMW-3A	NYSDEC CLASS GA STANDARDS (a)
PCBs (µg/l)								
Aroclor 1242	ND	ND	ND	ND	ND	ND	ND	0.1*
Aroclor 1254	ND	ND	ND	ND	ND	ND	ND	0.1*

PARAMETER	UPMW-3B	UPMW-3C	UPMW-4	UPMW-5	UPMW-6	DUPLICATE UPMW-6	UFB-13	NYSDEC CLASS GA STANDARDS (a)
PCBs (µg/l)								
Aroclor 1242	ND	ND	0.082 j z	ND	0.10 z	0.093 z	ND	0.1*
Aroclor 1254	ND	ND	0.044 j z	ND	0.089 j z	0.097 z	ND	0.1*

NOTE: Numbers in bold exceed limits.

* - Total PCBs = 0.1 µg/l.

(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.

z - Value is suspect, possibly the result of cross-contamination.

ND - Not detected at analytical detection limit.

TABLE 5-24 (Page 4 of 5)

GROUNDWATER DATA SUMMARY (December 1995)
United Plating Site

	UPMW-1A	UPMW-1B	UPMW-1C	UPMW-2A	UPMW-2B	UPMW-2C	UPMW-3A	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS (a)
METALS (µg/l)									
Aluminum	2,210	1,100	47,300	8,330	945	672	7,270	<5.0 - 1,000	NS
Antimony	20 B N x	ND N x	19 B N x	ND N x	ND N x	ND N x	18 B N x	N/A	3.0 GV
Arsenic	ND x	ND x	63 x	ND x	8.1 B	15	ND x	<1.0 - 30	25
Barium	62 B	60 B	293	77 B	19 B	37 B	81 B	10 - 500	1,000
Beryllium	ND	ND	2.3 B	ND	ND	ND	ND	<10	3.0 GV
Cadmium	ND	ND	4.8 B	1.0 B	ND	ND	1.3 B	<1.0	10
Calcium	126,000	36,900	130,000	114,000	49,000	27,800	217,000	1,000 - 150,000	NS
Chromium	2.1 B E x	2.7 B E x	176 E x	26 E x	6.2 B E x	191 E x	13 E x	<1.0 - 5.0	50
Cobalt	ND	3.8 B	48 B	17 B	5.8 B	ND	6.7 B	<10	NS
Copper	5.1 B	ND	173	23 B	ND	3.8 B	17 B	<1.0 - 30	200
Iron	2,820	1,380	97,700	16,100	594	488	12,700	10 - 10,000	300 (m)
Lead	4.2 R x	ND R x	50 R x	7.7 R x	ND R x	ND R x	5.9 R x	<15	25
Magnesium	55,000	20,300	35,000	65,700	26,500	21,800	137,000	1,000 - 50,000	35,000 GV
Manganese	182	101	2,280	446	73	9.4 B	835	<1.0 - 1,000	300 (m)
Mercury	ND	ND	ND	0.55	ND	ND	ND	<1.0	2.0
Nickel	10 B	ND	96	16 B	ND	ND	18 B	<10 - 50	NS
Potassium	5,830 E x	3,720 B E x	13,100 E x	26,300 E x	3,400 B E x	5,190 E x	41,000 E x	1,000 - 10,000	NS
Selenium	D	D	D	D	D	D	D	<1.0 - 10	10
Silver	ND	ND	ND	2.1 B	ND	ND	ND	<5.0	50
Sodium	77,900 E x	97,700 E x	248,000 E x	72,300 E x	65,600 E x	72,200 E x	118,000 E x	500 - 120,000	20,000
Thallium	ND N x	1.3 B N x	ND N x	1.1 B N W x	0.96 B N W x	ND N W x	ND N W x	N/A	4.0 GV
Vanadium	5.3 B	ND	253	16 B	ND	2.4 B	9.1 B	<1.0 - 10	NS
Zinc	10 B	10 B	392	52	15 B	ND	45	<10 - 2,000	300
Cyanide	ND x	ND x	ND x	ND x	ND x	ND x	ND x	N/A	100

NOTE: Numbers in bold exceed limits.

- (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.
x - Value estimated due to QC issues
(See Data Usability Report, Appendix I).
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.
D - Value rejected by data validator and found unusable (Appendix I).
GV - Guidance value.
ND - Not detected at analytical detection limit.
NS - No standard.
N/A - Not available.

TABLE 5-24 (Page 5 of 5)

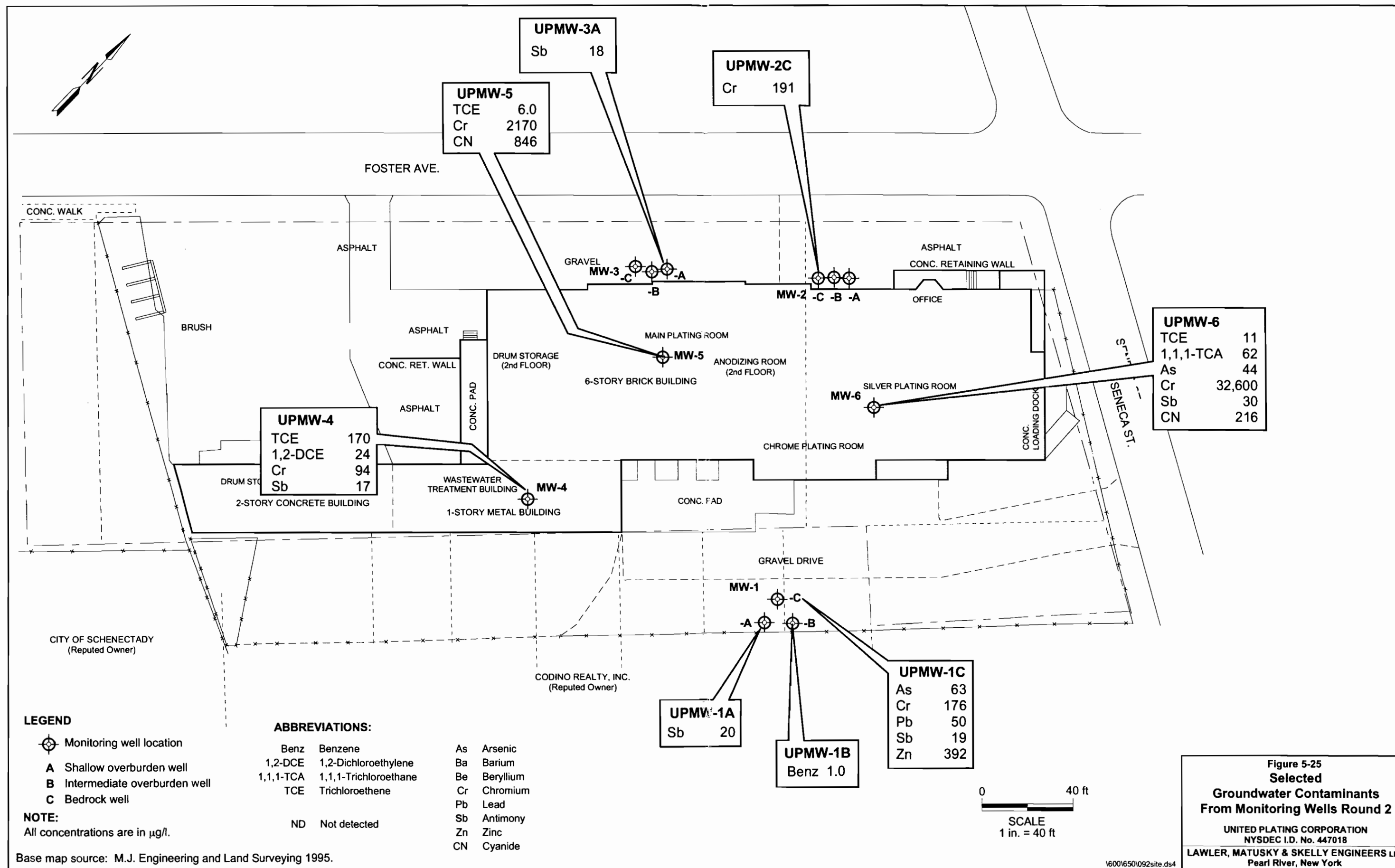
GROUNDWATER DATA SUMMARY (December 1995)
United Plating Site

	UPMW-3B	UPMW-3C	UPMW-4	UPMW-5	UPMW-6	DUPLICATE UPMW-6	UPFB-13	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS (a)
METALS (µg/l)									
Aluminum	871	8,410	11,800	1,430	2,050	2,400	ND	<5.0 - 1,000	NS
Antimony	ND N x	ND N x	17 B N x	ND N x	30 B N x	28 B N x	16 B N x	N/A	3.0 GV
Arsenic	ND x	ND x	ND x	10 x	44 x	44 x	ND x	<1.0 - 30	25
Barium	21 B	158 B	131 B	49 B	30 B	32 B	3.1 B	10 - 500	1,000
Beryllium	ND	ND	ND	ND	ND	ND	ND	<10	3.0 GV
Cadmium	ND	ND	0.95 B	ND	1.3 B	1.1 B	ND	<1.0	10
Calcium	44,400	4,320 B	150,000	127,000	93,300	90,100	177 B	1,000 - 150,000	NS
Chromium	22 E x	25 E x	94 E x	2,170 E x	32,600 E x	32,300 E x	1.9 B E x	<1.0 - 5.0	50
Cobalt	3.2 B	11 B	24 B	92	66	65	3.7 B	<10	NS
Copper	4.1 B	14 B	58	8.2 B	33	35	4.6 B	<1.0 - 30	200
Iron	669	12,700	24,800	1,100	2,270	2,600	29 B	10 - 10,000	300 (m)
Lead	2.9 B R x	7.8 R x	11 R x	ND R x	3.6 R x	7.9 R x	ND R x	<15	25
Magnesium	24,300	5,400	77,700	63,600	10,700	10,800	37 B	1,000 - 50,000	35,000 GV
Manganese	86	134	1,370	263	50	55	1.4 B	<1.0 - 1,000	300 (m)
Mercury	ND	ND	ND	ND	ND	ND	ND	<1.0	2.0
Nickel	8.4 B	14 B	49	267	18 B	30 B	ND	<10 - 50	NS
Potassium	3,380 B E x	4,410 B E x	18,400 E x	8,340 E x	9,270 E x	4,380 B E x	87 B E x	1,000 - 10,000	NS
Selenium	D	D	D	D	D	D	D	<1.0 - 10	10
Silver	ND	ND	2.1 B	ND	4.2 B	3.7 B	ND	<5.0	50
Sodium	82,000 E x	159,000 E x	129,000 E x	246,000 E x	91300 E x	86,600 E x	299 B E x	500 - 120,000	20,000
Thallium	ND N x	ND N x	ND N W x	ND N E x	ND N W x	1.4 B N x	ND N x	N/A	4.0 GV
Vanadium	ND	17 B	21 B	ND	ND	2.9 B	ND	<1.0 - 10	NS
Zinc	14 B	40	101	ND	ND	13 B	19 B	<10 - 2,000	300
Cyanide	ND x	ND x	ND x	846 x	216	225	ND	N/A	100

NOTE: Numbers in bold exceed limits.

- (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.
 x - Value estimated due to QC issues
 (See Data Usability Report, Appendix I).
 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.
 D - Value rejected by data validator and found unusable (Appendix I).
 GV - Guidance value.
 ND - Not detected at analytical detection limit.
 NS - No standard.
 N/A - Not available.



5.2.9.2 **PCBs.** Two samples (UPMW-4 and -6) exceeded the groundwater standard of 0.1 µg/l for total PCBs. The presence of PCBs in the groundwater is questionable as the data validator raised several QC issues in regard to the analysis. In addition, the finding of Aroclor 1254 in the field blank during the first round appears to indicate the potential for crosscontamination and, therefore, the finding of PCBs in the groundwater during the second round is suspect and probably not site related. Aroclor 1260 was not detected in the second round but was detected in the first round in UPMW-1A, which provides further evidence of the possibility of cross contamination. (See the data usability and validation report in Appendix I for a further explanation.)

5.2.9.3 **Metals and Cyanide.** The selenium results for all samples and the zinc results from one sample were deemed unusable (see the data usability report in Appendix I). The laboratory was requested to reanalyze the UPMW-1C sample for silver and zinc as there was a significant variation in the QC duplicate results. The reanalyzed results are provided on Table 5-23. The upgradient shallow monitoring well, UPMW-1A, had antimony, iron, magnesium, and sodium above the standards, whereas the deeper overburden well had only iron and sodium above the standards. The levels are similar to those found in the first round. The upgradient bedrock well, UPMW-1C, had antimony, arsenic, chromium, iron, lead, manganese, sodium, and zinc above the groundwater standards. Although the levels are lower than those found in the first round, the finding of lead, chromium, and zinc above the standards verifies that these wells are affected by the site.

The two downgradient shallow wells, UPMW-2A and -3A, had iron, magnesium, manganese, and sodium in excess of the groundwater standard. Antimony was also above the standard in UPMW-3A. The deeper overburden wells, UPMW-2B and -3B, had iron and sodium above the groundwater standard. Although slightly lower, the results were similar to those found in the first round. The downgradient bedrock wells, UPMW-2C and -3C, had iron and sodium above the groundwater standards and UPMW-2C had chromium above the standard. The results are similar to those found in the first round.

UPMW-4 is located in the treatment plant building. It had antimony, chromium, iron, magnesium, manganese, and sodium above the groundwater standard. The results were significantly lower than the first round samples. UPMW-5, in the main plating room, had chromium, iron, magnesium, sodium, and cyanide above the standards. The results were similar to those found during the first round. UPMW-6, in the chrome plating room, had antimony, arsenic, chromium, iron, sodium, and cyanide above the standards and only slightly

lower than was found during the first round. The chromium was at 32,600 µg/l (32,300 µg/l in the duplicate).

Although the results were lower than during the first round, probably due to the wet weather (significant rainfall in the fall occurred, causing infiltration and dilution of the concentrations of chemicals in the groundwater), the results indicate that a significant groundwater problem exists beneath the buildings.

5.2.10 Test Pit Sampling Data

A total of seven samples were collected from 11 test pits constructed during the test pit investigation. The samples are summarized on Table 5-25 and shown graphically on Figure 5-26. The figure shows the results that exceed the site background levels. The table also shows eastern U.S. background soil concentrations for metals, NYSDEC soil cleanup objectives (NYSDEC 1994a), and site background levels. Results in bold face type exceed the cleanup objectives/background levels. Laboratory analytical data sheets are contained in Appendix H, and the data validation and usability report is contained in Appendix I. The results from the analysis for TICs are also found in Appendix H.

None of the VOC results exceeded the NYSDEC cleanup objective. Chromium and copper exceeded the site background level in all seven samples. Cadmium and nickel exceeded the site background level in six samples and zinc in three samples. Mercury exceeded the eastern U.S. background level 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).

During drilling for UPMW-11B, as part of the Additional RI work, an unmarked lateral from the city garage was damaged by the drilling operation. The damage was noted only after the well was completely installed. One sample was taken (Figure 5-27) and analyzed for cadmium, chromium, copper, lead, nickel, zinc, and cyanide. The sample is summarized on Table 5-26 and shown graphically on Figure 5-27. The figure shows those metals exceeding the site background levels. The table also shows eastern U.S. background soil concentrations for metals, NYSDEC-recommended soil cleanup objectives (NYSDEC 1994a), and site background concentrations as discussed in Section 5.2.2.1. Chromium, copper, and nickel exceeded site background and NYSDEC-recommended soil cleanup objectives. As these are site-related metals, the contamination found in the soil may be from releases from the site.

TABLE 5-25 (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)	
VOLATILE ORGANICS (mg/kg)									
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

(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.

TEST PIT SAMPLE DATA SUMMARY (AUGUST 1995)

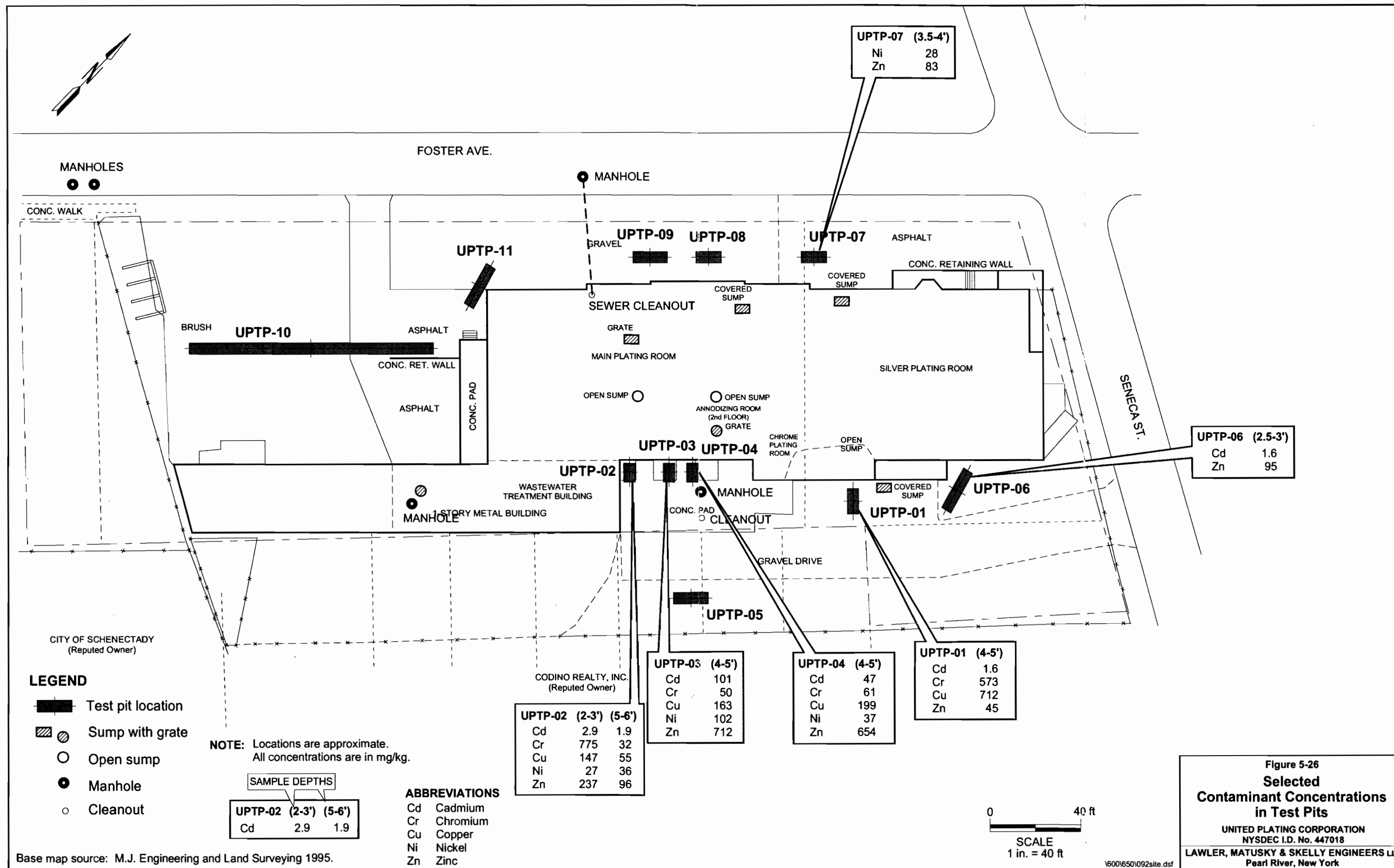
United Plating Site

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 FIELD BLANK (µg/l)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
TAL METALS (mg/kg)											
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	0.8 - 10 (n)	SB	-
Arsenic	4.9	9.2	5.0	3.2	4.8	10	7.7	ND	3.0 - 12.0 ae	7.5 or SB	-
Barium	54 E	728 E	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	1.6	2.9	1.9	101	47	1.6	0.73 B	ND	0.1 - 1.0	1 or SB	1.0
Calcium	162,000	10,200	30,100	62,500	22,300	42,600	2,550	519 B	130 - 35,000 ae	SB	-
Chromium	573 R	775 R	32 R	50 R	61 R	22 R	21 R	ND	1.5 - 40.0 ae	10 or SB	16
Cobalt	4.0 B	6.8 B	10 B	9.5 B	5.8 B	11 B	12	ND	2.5 - 60.0 ae	30 or SB	-
Copper	712	147 R	55 R	163 R	199 R	46 R	44 R	3.4 B	1.0 - 50.0	25 or SB	22.5
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*	400(d)	-
Magnesium	70,000 E	4,440 E	9,490 E	26,300 E	7,310 E	7,310 E	5,120 E	121 B	100 - 5,000	SB	-
Manganese	188	281	452	250	280	461	441	2.2 B	50 - 5,000	SB	-
Mercury	D	D	D	D	D	D	D	0.64	0.001 - 0.2	0.1	-
Nickel	9.3	27	36	102	37	23	28	ND	0.5 - 25	13 or SB	14.5
Potassium	848 B E	1,710 E	1,510 E	1,270 E	900 B E	1,750 E	1,870 E	ND	8,500 - 43,000 ae	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	39	0.99 B	4.6	10.4	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	1.4 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	45 E N	237 E N	96 E N	712 E N	654 E N	95 E N	83 E N	5.1 B	9.0 - 50	20 or SB	112
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.
- ae - New York State background concentration.
- (b) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
- (c) - See Section 5.2.2.1 of text.
- (n) - Dragun, J., The Soil Chemistry of Hazardous Materials.
- (q) - Bowan, H.J., Environmental Chemistry of the Elements.
- D - Value rejected by data validator and found unusable (Appendix I).
- (d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

- 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.



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

TABLE 5-26

TEST PIT BORING DATA SUMMARY (November 1997)
United Plating Site

PARAMETER	UPTP-20 (4-ft)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND (c)
Metals (mg/kg)				
Cadium	0.21 B	0.1 - 1.0	1 or SB	1.0
Chromium	26	1.5 - 40.0 æ	10 or SB	16
Copper	40	1.0 - 50.0	25 or SB	22.5
Lead	19	4.0 - 61 or 200 - 500*	400 (d)	-
Nickel	24	0.5 - 50	20 or SB	14.5
Zinc	92 E	9.0 - 50	14 or SB	112
Cyanide	ND	N/A	**	

NOTE: Numbers in bold exceed limits.

- * - 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.
- ** - 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.
- c - See Section 5.2.2.1 of text.
- B - Value is less than the contract-required detection limit but greater than the instrument detection limit.
- E - Value estimated due to interference.
- SB - Site background.
- N/A - Not available.
- ND - Not detected at analytical detection limit.
- (d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

5.2.11 Task 7 - Additional RI Monitoring Well Soil Boring Sampling Data

A total of five samples were collected from four monitoring wells constructed during the investigation. Samples were analyzed for TCL VOCs and TAL metals and cyanide. The samples are summarized on Table 5-27 and shown graphically on Figure 5-28. The figure shows those metals exceeding the site background levels as well as organics exceeding the NYSDEC-recommended soil cleanup objectives. The table also shows eastern U.S. background soil concentrations for metals, NYSDEC-recommended soil cleanup objectives (NYSDEC 1994a), and site background concentrations as discussed in Section 5.2.2.1. Results in bold face type indicate exceedances of the cleanup objectives/background levels. Laboratory analytical data sheets are contained in Appendix H, and the data validation and usability report is contained in Appendix I.

5.2.11.1 Volatile Organic Compounds. None of the samples exceeded the NYSDEC-recommended cleanup objectives for VOCs.

5.2.11.2 Metals and Cyanide. All five samples had levels of copper and nickel in excess of the background levels; and beryllium and iron in excess of NYSDEC recommended soil cleanup objectives. Chromium exceeded site background in samples UPMW-10B (8-10 ft) and UPMW-12C (6-8 ft). Calcium was in excess of eastern U.S. background soil concentrations in samples UPMW-9B (4-6 ft) and UPMW-10B (8-10 ft); magnesium also exceeded eastern U.S. background soil concentrations levels in samples UPMW-9B (4-6 ft), UPMW-9B (6-8 ft), UPMW-10B (8-10 ft), and UPMW-12C (6-8 ft). The levels found are similar to those found in borings constructed during the RI. The levels found in UPMW-11A are similar to those found in the test pit constructed in this vicinity. It appears that site-related metals may have contaminated the subsurface soil downgradient of the site as far as UPMW-12C.

5.2.12 Task 7 - Additional RI Groundwater Sampling Data

Groundwater samples were collected from a total of 26 wells (12 existing, 14 new). Low-level TCL VOCs, unfiltered TAL metals and cyanide using NYSDEC ASP (12/91), and low-level polychlorinated biphenyls (PCBs) were to be analyzed on each sample. Poor recoveries in some of the wells, however, resulted in insufficient sample volumes to perform all the required analyses. A priority was established to determine the order in which samples were collected. VOCs were collected first, followed by unfiltered metals and cyanide, and finally

TABLE 5-27 (Page 1 of 2)

SOIL BORING DATA SUMMARY (NOVEMBER 1997)
United Plating Site No. 447018

PARAMETER	UPMW-9B (4-6 ft)	UPMW-9B (6-8 ft)	UPMW-10B RE (8-10 ft)	UPMW-11A (1-3 ft)	UPMW-12C (6-8 ft)	FB-21 (µg/l)	NYSDEC SOIL CLEANUP OBJECTIVES (a)
VOLATILE ORGANICS (mg/kg)							
Methylene chloride	ND	0.001 j	ND	ND	ND	ND	0.1
Acetone	0.010 j	0.005 j	0.005 j	0.063	0.032	ND	0.2

- (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.

TABLE 5-27 (Page 2 of 2)

SOIL BORING DATA SUMMARY (November 1997)
United Plating Site No. 447018

PARAMETER	UPMW-9B (4-6 ft)	UPMW-9B (6-8 ft)	UPMW-10B (8-10 ft)	UPMW-11A (1-3 ft)	UPMW-12C (6-8 ft)	FB-21 (µg/l)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)	SITE BACKGROUND
TAL METALS (mg/kg)									
Aluminum	8,970 E g	8,660 E g	10,200 E g	9,820 E g	11,600	749	33,000	SB	
Antimony	ND N g	ND N g	ND N g	ND N g	ND N	ND g	0.6 - 10 (n)	SB	
Arsenic	6.9	5.1	5.9	4.9	6.7	ND	3.0 - 12.0 ^{ae}	7.5 or SB	
Barium	49 E g	85 E g	61 E g	48 E g	65 E	7.2 B	15 - 600	300 or SB	
Beryllium	0.33 B	0.30 B	0.25 B	0.40 B	0.46 B	ND	0 - 1.75	0.16 or SB	
Cadmium	ND	ND	ND	ND	ND	ND	0.1 - 1.0	1 or SB	1.0
Calcium	36,700	32,100	42,000	7,710	23,800	1,230 B	130 - 35,000 ^{ae}	SB	
Chromium	ND g	ND g	17 E g	ND g	17 E	14	1.5 - 40.0 ^{ae}	10 or SB	16
Cobalt	12 E	11 E	11 E	9.1 B E	13 E	ND	2.5 - 60.0 ^{ae}	30 or SB	
Copper	30 E	29 E	33 E	27 E	33 E g	2.5 B	1.0 - 50.0	25 or SB	22.5
Iron	26,000 E g	23,300 E g	27,200 E g	24,500 E g	27,700 E	3,470 E	2,000 - 550,000	2,000 or SB	
Lead	11	9.7	11	13	13	ND	4.0 - 61 or 200 - 500*	400 (d)	
Magnesium	10,200 E g	9,560 E g	11,500 E g	4,540 E g	7,750 E	396 B	100 - 5,000	SB	
Manganese	572 E g	493 E g	679 E g	306 E g	544 E	28 E	50 - 5,000	SB	
Mercury	ND	ND	ND	0.05 B	ND	ND	0.001 - 0.2	0.1	
Nickel	27 E	21 E	25 E	22 E	29 E	2.6 B	0.5 - 25	13 or SB	14.5
Potassium	1,420	1,410	2,030	1,220	2,350	ND	8,500 - 43,000 ^{ae}	SB	
Selenium	ND N g	ND N g	0.98 N g	ND N g	0.80 B N g	ND g	0.1 - 3.9	2 or SB	
Silver	ND	ND	ND	ND	ND	ND	0.1 - 5.0 (n)	SB	
Sodium	1,310	726 B	93 B	1,890	564 B	ND	6,000 - 8,000	SB	
Thallium	ND	ND	ND	ND	ND	ND	0.1 - 0.8 (q)	SB	
Vanadium	17	17	20	18	22	ND	1.0 - 300	150 or SB	
Zinc	69 E N g	59 E N g	71 E N g	68 E N g	83 E N g	11 B g	9.0 - 50	20 or SB	112
Cyanide	ND	ND	ND	ND	ND	ND	N/A	**	

NOTE: Numbers in bold exceed limits.

- * - 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.
- ** - 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.
- ^{ae} - 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.
- c - See Section 5.2.2.1 of text.
- (d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

- g - Value considered estimated based on data validator's report (Appendix I).
- (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.
- D - Value rejected by data validator and found unusable (Appendix I).
- E - Value estimated due to interference.
- N - Spiked sample recovery is not within control limits.
- SB - Site background.
- N/A - Not available.
- ND - Not detected at analytical detection limit.

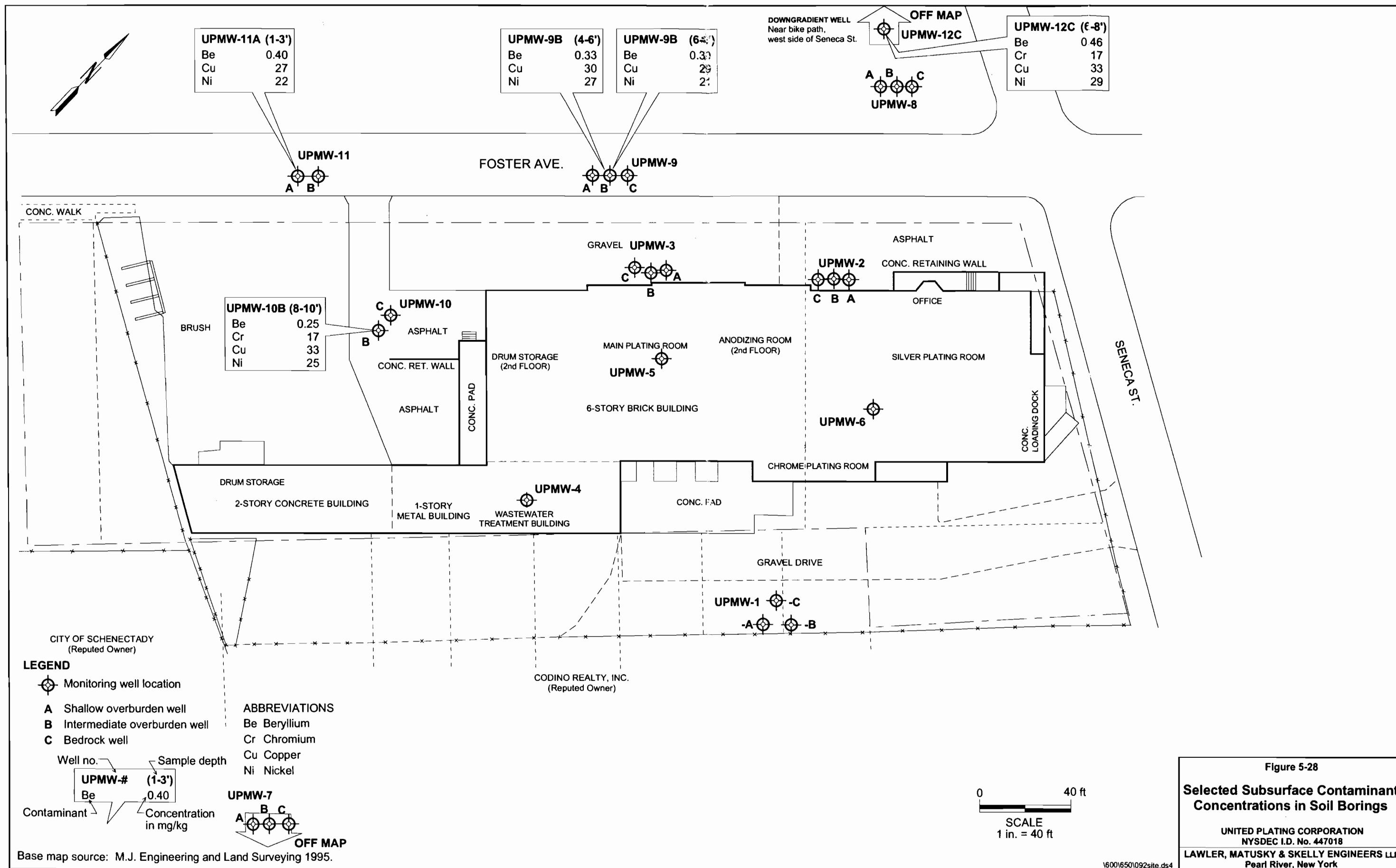


Figure 5-28

Selected Subsurface Contaminant Concentrations in Soil Borings

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

160016501092site.ds4

pesticides/PCBs. VOCs were collected on all samples. Samples for PCBs could not be collected from UPMW-9A, UPMW-9B, and UPMW-11B; and TAL metals and cyanide were not collected at UPMW-11B due to low recovery. The samples are summarized on Table 5-28 and shown graphically on Figure 5-29. The figure shows the concentrations exceeding the groundwater standards, with the exception of the common metal contaminants iron, magnesium, manganese, and sodium. 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 standards. Laboratory analytical data sheets are contained in Appendix H, and the data validation and usability report is contained in Appendix I.

5.2.12.1 Volatile Organic Compounds. Of VOCs in the upgradient well clusters, UPMW-1 and -7, only methyl-t-butyl ether (MTBE), acetone, and chloroform are detected. Standards exist for none of these, or else they show up below guidance values.

In the downgradient monitoring well UPMW-12C and the UPMW-8 cluster, only benzene was detected above the standard in only the deep bedrock well, UPMW-8C, at 1.1 µg/l. Limits for benzene are set at 0.7 µg/l.

For the on-site downgradient well clusters UPMW-2, -3, and -10, VOCs were either not detected, below standards, or did not have standards, except at UPMW-10D (the blind duplicate of UPMW-10C), where benzene was detected at 0.88 µg/l, above the standard of 0.7 µg/l. In the well clusters located in the utility trench, UPMW-9 and -11, only benzene at 1.0 µg/l in UPMW-9A exceeded the standard of 0.7 µg/l.

The monitoring well in the wastewater treatment building, UPMW-4, had levels of cis-1,2-dichloroethylene and TCE at levels above the standard of 5 µg/l for each, at 48 µg/l and 400 µg/l, respectively.

In the main plating room, 1,1,1-TCA was detected at 40 µg/l in UPMW-5. Limits for 1,1,1-TCA are set at 5 µg/l.

1,1,1-TCA was found at a concentration of 69 µg/l in UPMW-6, the well in the chrome plating room, well above the groundwater standard of 5 µg/l. TCE was also detected above

TABLE 5-28 (Page 1 of 6)

GROUNDWATER DATA SUMMARY (DECEMBER 1997)
United Plating Site No. 447018

PARAMETER	UPMW-1A	UPMW-1B	UPMW-1C	UPMW-2A	UPMW-2B	UPMW-2C	[Blind Duplicate of UPMW-2C]	UPMW-3A	UPMW-3B	UPMW-3C	UPMW-4	UPMW-5	UPMW-6	UPMW-7A	NYSDEC CLASS GA
							UPMW-2D								
[DL:22.0] [DL:2.2] [DL:3.2]															
VOLATILE															
ORGANICS (µg/l)															
Methylene chloride	ND	ND	0.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Methyl-t-butyl ether	3.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.42 j	NS
Acetone	ND	ND	26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50 GV
Carbon disulfide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Chloroform	ND	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	0.90 j d	ND	ND	7 GV
1,1,1-Trichloroethane	ND	ND	ND	ND	1.0	4.0	4.2	ND	ND	ND	ND	1.0 j d	69 d	ND	5
cis-1,2-Dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	48 d	0.67 j d	ND	ND	5
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	400 d	40 d	10 d	ND	5
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.56	ND	ND	ND	ND	0.7
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.62	ND	ND	ND	ND	5
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.26 j	ND	ND	ND	ND	5

Note: Numbers in bold exceed standards.

- a - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values, October 1993.
d - Concentration recovered from diluted sample.
j - Estimated concentration; compound present below quantitation limit.
GV - Guidance value.
ND - Not detected at analytical detection limit.
NS - No standard.

TABLE 5-28 (Page 2 of 6)

GROUNDWATER DATA SUMMARY (DECEMBER 1997)
United Plating Site No. 447018

3/19/98

PARAMETER	UPMW-7B	UPMW-7C	UPMW-8A	UPMW-8B	UPMW-8C	UPMW-9A	UPMW-9B	UPMW-9C	UPMW-10B	UPMW-10C	[Blind Duplicate of UPMW-10C]	UPMW-11A	UPMW-11B	UPMW-12C	FB-1	FB-2	NYSDEC CLASS GA STANDARDS (a)
VOLATILE ORGANICS (µg/l)																	
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Methyl-t-Butyl Ether	0.60	ND	ND	ND	ND	0.22 j	ND	ND	ND	ND	ND	ND	0.52	ND	ND	ND	NS
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	60 GV
Carbon disulfide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.38 j	0.67	ND	ND	ND	7 GV
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
cis-1,2-Dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5
Benzene	ND	ND	ND	0.26 j	1.1	1.0	0.22 j	ND	ND	0.54	0.88	0.40 j	ND	ND	ND	ND	0.7
Xylene (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.24 j	ND	ND	ND	ND	5
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5

Note: Numbers in bold exceed standards.

- a - NYSDEC Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values, October 1993.
j - Estimated concentration; compound present below quantitation limit.
GV - Guidance value.

ND - Not detected at analytical detection limit.
NS - No standard.

TABLE 5-28 (Page 3 of 6)

GROUNDWATER DATA SUMMARY (DECEMBER 1997)

United Plating Site No. 447018

PARAMETER	UPMW-1A	UPMW-1B	UPMW-1C	UPMW-2A	UPMW-2B	UPMW-2C	[Blind Duplicate of UPMW-2C] UPMW-2D	UPMW-3A	UPMW-3B	NYSDEC CLASS GA STANDARDS (a)
PCBs (µg/l)										
Aroclor 1242	ND	ND	ND	ND g	ND	ND	ND	ND g	ND g	0.1
Aroclor 1254	ND	ND	ND	ND g	ND	ND	ND	ND g	ND g	0.1
Aroclor 1260	ND	ND	ND	ND g	ND	ND	ND	ND g	ND g	0.1

PARAMETER	UPMW-3C	UPMW-4	UPMW-5	UPMW-6	UPMW-7A	UPMW-7B	UPMW-7C	UPMW-8A	UPMW-8B	NYSDEC CLASS GA STANDARDS (a)
PCBs (µg/l)										
Aroclor 1242	ND	ND	ND	0.43 g	ND	ND	ND	ND	ND	0.1
Aroclor 1254	ND	ND	ND	0.76 g	ND	ND	ND	ND	ND	0.1
Aroclor 1260	ND	ND	ND	0.19 p g	ND	0.37 p g	ND	ND	ND	0.1

PARAMETER	UPMW-8C	UPMW-9C	UPMW-10B	UPMW-10C	[Blind Duplicate of UPMW-10C] UPMW-10D	UPMW-11A	UPMW-12C	FB-1	FB-2	NYSDEC CLASS GA STANDARDS (a)
PCBs (µg/l)										
Aroclor 1242	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1
Aroclor 1254	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1
Aroclor 1260	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1

Note: Numbers in bold exceed standards.

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

g - Value considered estimated based on data validator's report (Appendix I).

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.

TABLE 5-28 (Page 4 of 6)

GROUNDWATER DATA SUMMARY (DECEMBER 1997)

United Plating Site No. 447018

PARAMETER	UPMW-1A	UPMW-1B	UPMW-1C	UPMW-2A	UPMW-2B	UPMW-2C	[Blind Duplicate of UPMW-2C] UPMW-2D	UPMW-3A	UPMW-3B	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS (a)
METALS (µg/l)											
Aluminum	952	1,270	89,000	20,600	79 B	213	240	4,510	800	<5.0 - 1,000	NS
Antimony	ND	ND	13 B	ND	ND	ND	ND	ND	ND	N/A	3.0 GV
Arsenic	ND	ND	117	5.4 B	11.8	11	12.0	3.4 B	7.5 B	<1.0 - 30	25
Barium	61 B	65 B	1,190	173 B	24 B	59 B	63 B	59 B	24 B	10 - 500	1,000
Beryllium	ND	ND	3.1 B	0.70 B	ND	ND	ND	ND	ND	<10	3.0 GV
Cadmium	1.4 B	1.1 B	ND	ND	1.1 B	1.6 B	2.1 B	0.73 B	2.5 B	<1.0	10
Calcium	146,000	47,600	194,000	137,000	58,500	51,100	54,700	264,000	52,100	1,000 - 150,000	NS
Chromium	1.3 B	1.5 B	144	73	7.7 B	33	37	6.5 B	ND	<1.0 - 5.0	50
Cobalt	1.5 B	ND	68.6	16 B	ND	ND	ND	6.0 B	ND	<10	NS
Copper	3.3 B	2.6 B	260	41	2.6 B	2.1 B	4.1 B	9.2 B	3.6 B	<1.0 - 30	200
Iron	1,510	1,910	157,000	32,100	217	318	394	7,390	1,360	10 - 10,000	300 (m)
Lead	ND	ND	93	13	ND	ND	ND	ND	ND	<15	25
Magnesium	57,400	24,600	52,700	71,800	28,900	21,700	22,200	142,000	26,100	1,000 - 50,000	35,000 GV
Manganese	152	129	3,680	682	64	37.0	40.0	458	138	<1.0 - 1,000	300 (m)
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	ND	<1.0	2.0
Nickel	8.5 B	2.9 B	160	38 B	2.0 B	1.5 B	2.5 B	17 B	3.4 B	<10 - 50	NS
Potassium	4,950 B	4,480 B	17,500	15,800	4,570 B	4,660 B	4,800 B	18,900	4,340 B	1,000 - 10,000	NS
Selenium	ND N	ND N	13 N g	4.9 B N g	ND N	ND N	ND N	ND N	ND N	<1.0 - 10	10
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5.0	50
Sodium	81,200	108,000	325,000	72,000	83,300	98,300	98,800	120,000	93,900	500 - 120,000	20,000
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	4.0 GV
Vanadium	1.7 B	1.7 B	209	38 B	ND	ND	1.6 B	7.7 B	ND	<1.0 - 10	NS
Zinc	17 B	23	623	94	14 B	19 B	22	34	82	<10 - 2,000	300
Cyanide	ND	ND	9.6	ND	ND	ND	ND	ND	ND	N/A	100

NOTE: Numbers in bold exceed limits.

- (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.
 g - Value considered estimated based on data validator's report (Appendix I).

- B - Value is less than the contract-required detection limit but greater than the instrument detection limit.
 N - Spiked sample recovery is not within control limits.
 N/A - Not available.
 ND - Not detected at analytical detection limit.
 NS - No standard.
 GV - Guidance value.

TABLE 5-28 (Page 5 of 6)

GROUNDWATER DATA SUMMARY (DECEMBER 1997)

United Plating Site No. 447018

PARAMETER	UPMW-3C	UPMW-4	UPMW-5	UPMW-6	UPMW-7A	UPMW-7B	UPMW-7C	UPMW-8A	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS (a)
METALS (µg/l)										
Aluminum	7,860	78,100	620	971	5,980	7,230	3,350	28,200	<5.0 - 1,000	NS
Antimony	ND	9.5 B	26 B	238	ND	2.9 B	3.4 B	4.8 B	N/A	3.0 GV
Arsenic	4.0 B	38.0	ND	2.8 B	2.7 B	ND	ND	16	<1.0 - 30	25
Barium	108 B	584	36 B	24 B	76 B	115 B	106 B	338	10 - 500	1,000
Beryllium	0.53 B	2.4 B	ND	0.14 B	0.15 B	0.40 B	0.29 B	0.31 B	<10	3.0 GV
Cadmium	2.1 B	2.0 B	0.47 B	2.8 B	ND	ND	0.85 B	3.2 B	<1.0	10
Calcium	9,100	290,000	125,000	62,600	73,700	16,100	1,680 B	474,000	1,000 - 150,000	NS
Chromium	12.1	856	3,680	104,000	7.5 B	11	5.8 B	46	<1.0 - 5.0	50
Cobalt	3.9 B	90	56	20.0 B	8.8 B	5.1 B	2.6 B	39.0 B	<10	NS
Copper	15 B	356	4.0 B	38	13 B	12 B	4.5 B	53	<1.0 - 30	200
Iron	9,830	137,000	1,120	1,390	6,810	9,100	3,470	50,000	10 - 10,000	300 (m)
Lead	4.8	65	ND	36	4.9	7.3	ND	16	<15	25
Magnesium	5,060	123,000	51,800	8,140	19,700	7,160	1,240 B	249,000	1,000 - 50,000	35,000 GV
Manganese	115	2,910	235	29	340	260	38.0	2,510	<1.0 - 1,000	300 (m)
Mercury	ND	0.20	ND	0.10 B	ND	ND	ND	ND	<1.0	2.0
Nickel	13 B	216	215	16 B	11 B	13 B	5.7 B	85	<10 - 50	NS
Potassium	6,230	25,600	5,190	7,850	2,790 B	5,130	3,910 B	69,300	1,000 - 10,000	NS
Selenium	ND N	6.2 g	ND N	ND N	ND N	ND N	ND N	25 N g	<1.0 - 10	10
Silver	ND	1.4 B	ND	ND	ND	ND	ND	ND	<5.0	50
Sodium	134,000	290,000	276,000	68,600	198,000	210,000	227,000	788,000	500 - 120,000	20,000
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	N/A	4.0 GV
Vanadium	19 B	146	1.3 B	3.5 B	10 B	14 B	6.9 B	54	<1.0 - 10	NS
Zinc	66	616	13 B	72	38	42	24.2	144	<10 - 2,000	300
Cyanide	ND	25	545	116	ND	ND	ND	ND	N/A	100

NOTE: Numbers in bold exceed limits.

- (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.
N - Spiked sample recovery is not within control limits.

- N/A - Not available.
ND - Not detected at analytical detection limit.
NS - No standard.
GV - Guidance value.
g - Value considered estimated based on data validator's report (Appendix I).

TABLE 5-28 (Page 6 of 6)

GROUNDWATER DATA SUMMARY (DECEMBER 1997)

United Plating Site No. 447018

PARAMETER	UPMW-8B	UPMW-8C	UPMW-9A	UPMW-9B	UPMW-9C	UPMW-10B	UPMW-10C	[Blind Duplicate of UPMW-10C] UPMW-10D	UPMW-11A	UPMW-12C	FB-1	FB-2	NATURAL AMBIENT GROUNDWATER RANGES (n)	NYSDEC CLASS GA STANDARDS (a)
METALS (µg/l)														
Aluminum	450	196 B	878	105,000	1,230	320	2,260	2,690	6,960	5,170	ND	ND	<5.0 - 1,000	NS
Antimony	ND	ND	ND	7.9 B	ND	3.3 B	ND	ND	ND	ND	ND	ND	N/A	3.0 GV
Arsenic	ND	2.6 B	ND	44	4.6 B	4.2 B	ND	ND	6.4 B	ND	ND	ND	<1.0 - 30	25
Barium	28.0 B	38 B	187 B	847	29 B	28 B	51 B	55 B	144 B	104 B	ND	ND	10 - 500	1,000
Beryllium	ND	ND	ND	4.0 B	0.13 B	ND	0.10 B	0.18 B	ND	0.26 B	ND	ND	<10	3.0 GV
Cadmium	9.2	ND	2.2 B	1.4 B	6.7	0.62 B	ND	ND	3.1 B	ND	ND	ND	<1.0	10
Calcium	19,100	31,300	258,000	226,000	52,800	66,000	2,640 B	2,900 B	238,000	2,470 B	ND	ND	1,000 - 150,000	NS
Chromium	3.4 B	ND	2.4 B	188	1.4 B	ND	2.1 B	4.4 B	10.2	6.8 B	ND	ND	<1.0 - 5.0	50
Cobalt	ND	ND	1.9 B	73	ND	ND	ND	2.1 B	7.2 B	2.0 B	ND	ND	<10	NS
Copper	4.5 B	2.4 B	3.7 B	175	3.4 B	1.8 B	2.4 B	6.3 B	16 B	3.2 B	ND	ND	<1.0 - 30	200
Iron	805	429	1,710	186,000	1,970	556	3,620	3,750	9,990	6,780	ND	ND	10 - 10,000	300 (m)
Lead	ND	ND	ND	66	ND	ND	2.0 B	ND	3.1	ND	ND	ND	<15	25
Magnesium	38,300	12,700	108,000	91,000	25,900	39,100	1,220 B	1,300 B	35,700	2,420 B	ND	ND	1,000 - 50,000	35,000 GV
Manganese	22	94	435	2,830	110	93	38	40	1,100	68	ND	ND	<1.0 - 1,000	300 (m)
Mercury	ND	ND	ND	0.18 B	ND	ND	ND	ND	ND	ND	ND	ND	<1.0	2.0
Nickel	2.4 B	ND	5.2 B	176	2.8 B	2.1 B	3.7 B	5.3 B	16 B	7.2 B	ND	ND	<10 - 50	NS
Potassium	71,100	6,280	23,800	40,600	4,590 B	3,880 B	3,040 B	3,390 B	10,200	3,490 B	ND	ND	1,000 - 10,000	NS
Selenium	ND N	ND N	11 N g	13 N g	ND N	ND N	ND N	ND N	5.1 N g	ND N	ND N	ND N	<1.0 - 10	10
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5.0	50
Sodium	160,000	124,000	687,000	74,100	97,300	73,500	188,000	191,000	181,000	180,000	ND	ND	500 - 120,000	20,000
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	4.0 GV
Vanadium	ND	ND	1.9 B	198	ND	ND	2.1 B	4.7 B	13 B	8.6 B	ND	ND	<1.0 - 10	NS
Zinc	13 B	5.5 B	24	419	36	20 B	15 B	20 B	51	22	3.5 B	5.2 B	<10 - 2,000	300
Cyanide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	100

NOTE: Numbers in bold exceed limits.

- (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.
 N - Spiked sample recovery is not within control limits.

- N/A - Not available.
 ND - Not detected at analytical detection limit.
 NS - No standard.
 GV - Guidance value.
 g - Value considered estimated based on data validator's report (Appendix I).

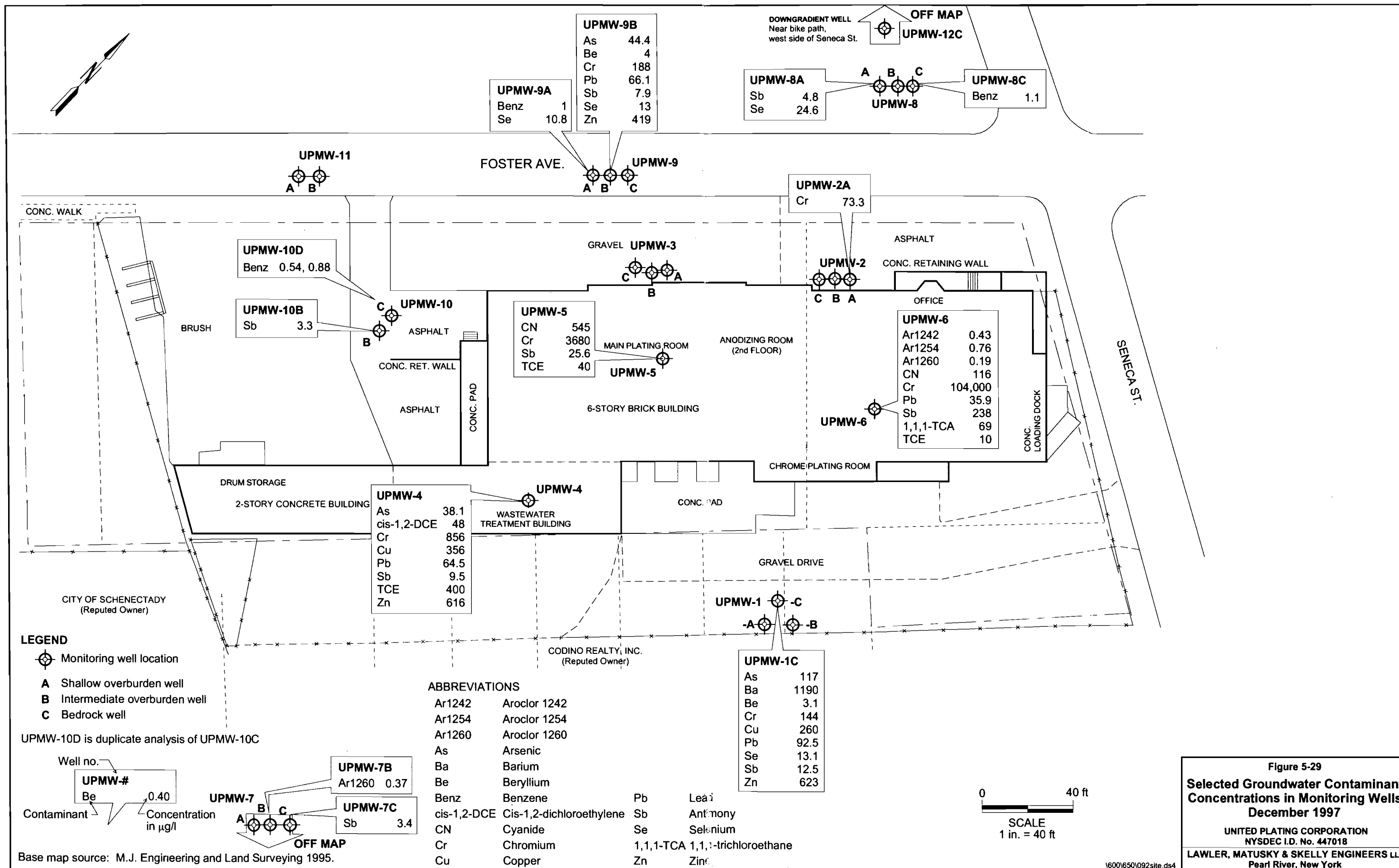


Figure 5-29
Selected Groundwater Contaminant
Concentrations in Monitoring Wells
December 1997
UNITED PLATING CORPORATION
NYSDEC I.D. No. 447018
LAWLER, MATUSKY & SKELLY ENGINEERS LLP
Pearl River, New York

the standard of 5 µg/l at 10 µg/l. The VOC results for the existing wells were similar to those found during the previous two sampling rounds in 1995 and 1996.

5.2.12.2 PCBs. Two samples (UPMW-6 and -7B) exceeded the groundwater standard for total PCBs of 0.1 µg/l. PCBs were detected previously, although they were not considered a site-related problem. The fact that PCBs are detected in background upgradient well UPMW-7B lends further credence to the conclusion that PCBs are not site related.

5.2.12.3 Metals and Cyanide. The upgradient well cluster UPMW-7 had iron and sodium in all three wells above standards. The shallow well, UPMW-7A, also had 340 µg/l of manganese, 40 µg/l above the standard of 300 µg/l. The deep well, UPMW-7C, had antimony above the guidance value. With the exception of antimony, these are all common groundwater contaminants.

Upgradient on-site well cluster UPMW-1 had iron and sodium above standards in all three wells. The shallow well, UPMW-1A, also had magnesium above the standard. The deep bedrock well, UPMW-1C, had levels of antimony, arsenic, chromium, lead, magnesium, manganese, selenium, and zinc well above standards, although barium, beryllium, and copper were also found above the standard. These results are similar to those found in the previous two sampling events.

Downgradient well UPMW-12C and well cluster UPMW-8 had iron and sodium above standards in all wells. UPMW-8B, an intermediate well, had magnesium just above the standard. The shallow well, UPMW-8A, had antimony, magnesium, manganese, and selenium above standards also.

The on-site downgradient well clusters UPMW-2, -3, and -10 had sodium above standards in all wells, and iron above standards in all wells except UPMW-2B. The shallow wells (UPMW-2A and -3A) had levels of magnesium and manganese above standards, while UPMW-2A also had chromium above standards. The chromium finding in UPMW-2A is similar to that found during the first round. The two well clusters in the utility trenches on Foster Avenue, UPMW-9 and -11, had iron and sodium above the standard in all samples and antimony, arsenic, berythium, chromium, lead, and zinc above the limit in UPMW-9B only; magnesium and manganese were above the limit in UPMW-9A, -9B, and -11A and selenium was above the standard in UPMW-9A and -9B.

The finding of chromium, lead, and zinc in UPMW-9B above standards indicates that contamination has entered the groundwater in the utility trench area, possibly through drain pipes from the building.

UPMW-4 in the wastewater treatment building had antimony, arsenic, and zinc above standards, with chromium, copper, iron, lead, magnesium, manganese, and sodium well above limits. Although not as high as in the first round, the results are higher than those found during the second round.

UPMW-5 in the main plating room had antimony iron, and magnesium, above standards with chromium, sodium, and cyanide well above standards. The results are similar to those of the two previous rounds.

UPMW-6 in the chrome plating room had lead, sodium, iron, and cyanide, above standards, with antimony, and chromium well above standards. Chromium results at 104,000 $\mu\text{g/l}$ are more than double those found during previous rounds.

Limits for cyanide are set at 100 $\mu\text{g/l}$. Cyanide was detected at 9.6 $\mu\text{g/l}$ in UPMW-1C, well below the standard. It was detected above the standard, however, in wells UPMW-4 and -5.

CHAPTER 6

HEALTH RISK ASSESSMENT

6.1 INTRODUCTION

A health risk assessment was conducted for the UP site to evaluate baseline risks to human health from environmental contamination at the site. The risk assessment was completed in accordance with EPA's Risk Assessment Guidance for Superfund - Volume I: Human Health Evaluation Manual (EPA 1989a). Results of the health risk assessment are used to determine the need for remedial action at the site and to select site remedial action objectives.

The risk assessment procedure involves the following steps:

- Collection of available environmental monitoring data and identification of COCs for the site to be evaluated in the quantitative risk assessment.
- Performance of an exposure assessment for the site: identifying pathways for human exposure to site contaminants, determining exposure concentrations, and calculating chemical intakes at the exposure points.
- Obtaining current toxicity information on the COCs, including reference doses and slope factors, to evaluate noncarcinogenic and carcinogenic health effects.
- Characterization of the health risks posed to human receptors: for carcinogens, cancer risks are calculated from slope factors and chemical intakes; for noncarcinogens, hazard quotients are calculated from reference doses and chemical intakes.

These steps are described in detail in the following sections. A qualitative evaluation of the uncertainty involved in the risk assessment procedure is also included in this chapter. Documentation of all risk assessment calculations is included in Appendix J.

6.2 DATA COLLECTION AND EVALUATION

6.2.1 Collection of Relevant Site Data

All available analytical data from the RI for site soils, groundwater, surface water, sediments, and building construction materials and debris, as included in Chapter 5, were evaluated for

use in the health risk assessment. The data from the Additional RI were not used to revise the risk assessment as the results would not impact the risk assessment calculations. In accordance with EPA guidance (EPA 1989a), only positive sample results were used in the risk assessment. As a result, all TICs were eliminated from further consideration as these compounds have not been positively identified. In general, the TICs detected at the site were present in low concentrations (i.e., below the compound quantitation limit), were generally present in only one or two samples per matrix, and were therefore not assumed to pose a significant health risk to humans.

To appropriately focus the health risk assessment, a subset of the contaminants detected at the site, referred to as COCs, was selected for further evaluation. COCs are those compounds that pose the greatest potential public health risk at a particular site based on the concentrations detected and the relative toxicity of the compounds. Sections 6.2.2 and 6.2.3 discuss the identification and selection of COCs for the UP site.

Surface and subsurface soils were considered separately for the purposes of this health risk assessment. Tables 6-1 through 6-3 summarize the surface soil data from samples collected at the site in May 1995. Surface soil data were separated by location of sample collection (off-site in the adjacent empty lot, on-site outside the existing fence, and on-site within the existing fence) as the exposure scenarios vary based on the location of the contaminated soils (see Section 6.3.3.2). The off-site soil data summary includes samples UPSS-1 through UPSS-9 and UPSS-19; the on-site soil data summary for soils outside the fence includes samples UPSS-25 through UPSS-40; and the on-site soil data summary for soils within the fence includes samples UPSS-10 through UPSS-18 and UPSS-20 through UPSS-24. The frequency of compound detection, the range of detected concentrations, NYSDEC-recommended soil cleanup objectives, and site background levels for inorganics are included in Tables 6-1 through 6-3.

Table 6-4 summarizes the subsurface soil data by frequency of contaminant detection, range of detected concentrations, NYSDEC-recommended soil cleanup objectives, and site background levels for inorganics. The subsurface soil data summary includes the analytical results for the 20 probe soil samples collected in May 1995, six test pit samples collected in August 1995, and six soil boring samples collected in September 1995.

The groundwater analytical data from the RI are summarized in Tables 6-5 through 6-7. Table 6-5 includes data for the shallow groundwater, Table 6-6 includes intermediate groundwater

TABLE 6-1 (Page 1 of 3)

SURFACE SOIL DATA SUMMARY**Off-Site Samples****United Plating Site**

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)
VOLATILE ORGANICS (mg/kg)				
1,2-Dichloroethane	1/10	0.002 j	No	0.1
1,1,1-Trichloroethane	5/10	0.004 g j - 0.012	Yes	0.8
Trichloroethylene	8/10	0.002 j - 0.026	Yes	0.7
Tetrachloroethylene	8/10	0.002 j - 0.015	Yes	1.4
Toluene	2/10	0.002 j - 0.003 j	No	1.5
Chlorobenzene	1/10	0.006 j	No	1.7
Ethylbenzene	1/10	0.006 j	No	5.5
Styrene	2/10	0.001 j - 0.007 j	No	NA
Xylene (total)	1/10	0.003 j	No	1.2
SEMIVOLATILE ORGANICS (µg/l)				
Naphthalene	5/10	0.071 j - 0.79 j	Yes	13
2-Methylnaphthalene	5/10	0.056 j - 0.29	Yes	36.4
Acenaphthylene	6/10	0.043 j - 1.1 j	Yes	41
Acenaphthene	9/10	0.027 j - 0.99 j	Yes	50*
Dibenzofuran	6/10	0.062 j - 0.59 j	Yes	6.2
Fluorene	9/10	0.029 j - 1.2 j	Yes	50*
Phenanthrene	10/10	0.049 j - 8.7	Yes	50*
Anthracene	9/10	0.067 j - 2.8 j	Yes	50*
Carbazole	9/10	0.06 j - 1.7 j	Yes	50*
Fluoranthene	10/10	0.45 - 16	Yes	50*
Pyrene	10/10	0.40 j - 13	Yes	50*
Benzo(a)anthracene	10/10	0.046 j - 7.8	Yes	0.224 or MDL
Chrysene	10/10	0.055 j - 7.8	Yes	0.4
Benzo(b)fluoranthene	10/10	0.047 j - 7.8	Yes	1.1
Benzo(k)fluoranthene	10/10	0.046 j - 4.4	Yes	1.1
Benzo(a)pyrene	10/10	0.046 j - 7.7	Yes	0.061 or MDL
Indeno(1,2,3-c,d)pyrene	10/10	0.032 j - 5.1	Yes	3.2
Dibenzo(a,h)anthracene	9/10	0.053 j - 2.0 j	Yes	0.014 or MDL
Benzo(g,h,i)perylene	10/10	0.023 j - 4.7	Yes	50*

* - Soil cleanup objective is 50 ppm for individual SVOCs unless a specific value is provided (NYSDEC 1994).

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

j - Estimated concentration; compound present below quantitation limit.

NA - Not available.

MDL - Method detection limit.

TABLE 6-1 (Page 2 of 3)

SURFACE SOIL DATA SUMMARY
Off-Site Samples
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)
PESTICIDES/PCBs (mg/kg)				
alpha-BHC	1/10	0.0005 j p r	No	0.11
delta-BHC	1/10	0.0018 j p r	No	0.2
gamma-BHC (lindane)	1/10	0.00074 j r	No	0.06
Aldrin	6/10	0.00053 j p r - 0.0018 j p r	Yes	0.041
Heptachlor epoxide	7/10	0.00087 j p r - 0.0043 p r	Yes	0.02
Endosulfan I	8/10	0.00055 j p r - 0.0035 p r	Yes	0.9
Dieldrin	8/10	0.00077 j p r - 0.0098 p	Yes	0.044
4,4'-DDE	5/10	0.0009 j p r - 0.068 r	Yes	2.1
Endrin	8/10	0.0013 j p r g - 0.029 p g	Yes	0.1
Endosulfan II	8/10	0.0019 j p r - 0.0094 p r	Yes	0.9
4,4'-DDD	7/10	0.0017 j p - 0.0037 j	Yes	2.9
4,4'-DDT	3/3	0.009 g - 0.059 g r	Yes	2.1
Methoxychlor	7/10	0.0039 j p r - 0.021 p r	Yes	10**
gamma-Chlordane	3/10	0.00058 j p r - 0.0015 j p n	No	0.54
Aroclor 1242	1/10	0.045 j p n	No	1.0 f
Aroclor 1248	1/10	0.055 p	No	1.0 f
Aroclor 1254	1/10	0.064	No	1.0 f

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

** - Soil cleanup objective for total pesticides is < 10ppm (NYSDEC 1994).

f - Soil cleanup objective for total PCBs in surface soils is 1.0 mg/kg (NYSDEC 1994).

j - Estimated concentration; compound present below quantitation limit.

n - Tentative identification.

p - Pesticide/Aroclor target analyte has >25% difference for the detected concentrations between the two GC columns.

r - Value rejected by data validator but usable to show magnitude of contaminant level.

g - Value considered estimated based on data validator's report.

TABLE 6-1 (Page 3 of 3)

SURFACE SOIL DATA SUMMARY
Off-Site Samples
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)	SITE BACKGROUND (a)
TAL METALS (mg/kg)					
Aluminum	10/10	4,570 - 23,300 g	No	SB	33,000
Antimony	0/10	-	No	SB	0.6 - 10
Arsenic	7/10	4.8 - 15	Yes	7.5 or SB	3.0 - 12
Barium	10/10	29 - 254	No	300 or SB	15 - 600
Beryllium	10/10	0.27 B - 1.1 B	No	0.16 or SB	0 - 1.75
Cadmium	10/10	0.81 B - 4.3	Yes	1 or SB	0.1 - 1.0
Calcium	D	-	No	SB	130 - 35,000
Chromium	10/10	7.0 - 37 g	Yes	10 or SB	16 ^c
Cobalt	9/10	3.9 B - 19	No	30 or SB	2.5 - 60
Copper	10/10	14 - 87	Yes	25 or SB	22.5 ^c
Iron	10/10	12,600 g - 38,800 g	No	2000 or SB	2,000 - 550,000 ^{b,c}
Lead	10/10	0.68 g B E - 227 g E	Yes	400(d)	4-61/200-500/96
Magnesium	10/10	2,130 - 9,330	No	SB	100 - 5,000
Manganese	10/10	247 - 5,900	No	SB	50 - 5,000
Mercury	6/10	0.14 g B - 0.22 g	Yes	0.1	0.001 - 0.2
Nickel	10/10	9.3 - 303	Yes	13 or SB	14.5 ^c
Potassium	D	-	No	SB	8,500 - 43,000
Selenium	3/4	0.69 g B - 2.8 g	No	2 or SB	0.1 - 3.9
Silver	7/10	1.0 B - 3.2	No	SB	0.1 - 5
Sodium	10/10	31 B - 226 B	No	SB	6,000 - 8,000
Thallium	1/10	14 g	No	SB	0.1 - 0.8
Vanadium	10/10	16-54	No	150 or SB	1.0 - 300
Zinc	10/10	116 g E - 308 g E	Yes	20 or SB	112 ^c
Cyanide	3/10	0.64 B - 1.1 B	No	2000**	NA

** - NYSDEC Draft Cleanup Policy and Guidelines, 10/91.

(a) - Eastern US background soil concentration ranges unless otherwise noted.

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

c - Site background based on New York State Department of Health shallow soil samples collected May 1990 and from NYSDEC background soil samples collected in 1995.

g - Value considered estimated based on data validator's report.

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

E - Value estimated due to interference.

D - Value rejected by data validator and found unusable.

NA - Not available.

SB - Site background.

(d) - U.S.EPA Revised Interim Soil Lead Guidance for CERCLA Sites and Rcrs Corrective Action Facilities. 14 July 1994.

TABLE 6-2 (Page 1 of 3)

SURFACE SOIL DATA SUMMARY
On-Site Samples Outside Fence
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)
VOLATILE ORGANICS (mg/kg)				
1,2-Dichloroethane	1/16	0.001 j	No	0.1
Trichloroethylene	16/16	0.001 j - 0.019	Yes	0.7
Tetrachloroethylene	14/14	0.002 j - 0.012	Yes	1.4
Toluene	3/16	0.001 j - 0.004 j	No	1.5
Chlorobenzene	7/16	0.0009 j - 0.004 j	No	1.7
Ethylbenzene	2/16	0.0009 j - 0.003 j	No	5.5
Styrene	6/16	0.001 j - 0.006 j	No	NA
Xylene (total)	1/16	0.002 j	No	1.2
1,1,1,-Trichloroethane	8/16	0.003 j - 0.01 j	Yes	0.8
SEMIVOLATILE ORGANICS (mg/kg)				
Naphthalene	4/16	0.037 j - 0.19 j	No	13
2-Methylnaphthalene	2/16	0.088 j - 0.089 j	No	36.4
Acenaphthylene	3/16	0.041 j - 0.18 j	No	41
Acenaphthene	6/16	0.055 j - 0.45 j	No	50*
Dibenzofuran	6/16	0.028 j - 0.23 j	No	6.2
Fluorene	6/16	0.054 j - 0.49 j	No	50*
Phenanthrene	16/16	0.04 j - 4.5	Yes	50*
Anthracene	12/16	0.026 j - 1.0	Yes	50*
Carbazole	15/16	0.04 j - 1.0	Yes	50*
Di-n-octylphthalate	1/16	0.03 j	No	50*
Fluoranthene	16/16	0.045 j - 4.5	Yes	50*
Pyrene	16/16	0.057 j - 5.0 g	Yes	50*
Benzo(a)anthracene	15/16	0.041 j - 2.9	Yes	0.224 or MDL
Chrysene	16/16	0.045 j - 2.4	Yes	0.4
Benzo(b)fluoranthene	16/16	0.038 j - 2.8	Yes	1.1
Benzo(k)fluoranthene	16/16	0.045 j - 2.4	Yes	1.1
Benzo(a)pyrene	16/16	0.04 j - 2.5	Yes	0.061 or MDL
Indeno(1,2,3-c,d)pyrene	15/16	0.035 j - 1.2	Yes	3.2
Dibenzo(a,h)anthracene	13/16	0.030 j - 0.55 j	Yes	0.014 or MDL
Benzo(g,h,i)perylene	16/16	0.018 j - 1.1	Yes	50*

* - Soil cleanup objective is 50 ppm for individual SVOCs unless a specific value is provided (NYSDEC 1994).

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

g - Value considered estimated based on data validator's report.

j - Estimated concentration; compound present below quantitation limit.

NA - Not available.

MDL - Method detection limit.

TABLE 6-2 (Page 2 of 3)

SURFACE SOIL DATA SUMMARY
On-Site Samples Outside Fence
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)
PESTICIDES/PCBs (mg/kg)				
Heptachlor	6/16	0.0003 g j p r - 0.0017 g j	No	0.1
Aldrin	10/16	0.00033 g j p r - 0.0038 g j p r	Yes	0.041
Heptachlor epoxide	4/16	0.00050 g j p r - 0.0054 j p	No	0.02
Endosulfan I	2/16	0.00016 j p r - 0.00095 j p r	No	0.9
Dieldrin	8/16	0.0017 j p r - 0.024 p r	Yes	0.044
4,4'-DDE	10/16	0.00056 g j p r - 0.045 p	Yes	2.1
Endrin	12/16	0.00068 g j p r - 0.038 g	Yes	0.1
Endosulfan II	15/16	0.00047 j p r - 0.0065 g p r	Yes	0.9
4,4'-DDD	12/16	0.00061 j p r - 0.025 g p r	Yes	2.9
Endosulfan sulfate	5/16	0.0004 j p r - 0.03 g p	No	1
4,4'-DDT	6/11	0.014 g p n - 0.11 g p	Yes	2.1
Methoxychlor	14/16	0.00048 j p r - 0.012 j p r	Yes	10**
Endrin aldehyde	1/16	0.002 j p r	No	10**
alpha-Chlordane	4/16	0.00048 g j p r - 0.0016 j p r	No	0.54
gamma-Chlordane	6/16	0.00066 j p r - 0.002 g p r	No	0.54
Aroclor 1254	3/16	0.012 j n p - 0.15 p	No	1.0 f
Aroclor 1260	7/16	0.0068 j p - 0.24	No	1.0 f

- (a) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
 ** - Soil cleanup objective for total pesticides is < 10 ppm (NYSDEC).
 f - Soil cleanup objective for total PCBs in surface soils is 1.0 mg/kg (NYSDEC 1994).
 g - Value considered estimated based on data validator's report.
 j - Estimated concentration; compound present below quantitation limit.
 n - Tentative identification.
 p - Pesticide/Aroclor target analyte has >25% difference for the detected concentrations between the two GC columns.
 r - Value rejected by data validator but usable to show magnitude of contaminant level.

TABLE 6-2 (Page 3 of 3)

SURFACE SOIL DATA SUMMARY
On-Site Samples Outside Fence
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)	SITE BACKGROUND (a)
TAL METALS (mg/kg)					
Aluminum	16/16	1,860 g E - 13,000 g E	No	SB	33,000
Antimony	1/16	690	No	SB	0.6 - 10
Arsenic	16/16	1.2 R - 7.9	Yes	7.5 or SB	3.0 - 12
Barium	16/16	30 B g E - 92 g E	No	300 or SB	15 - 600
Beryllium	16/16	0.19 B - 0.89 B	No	0.16 or SB	0 - 1.75
Cadmium	14/16	0.64 B - 5.5	Yes	1 or SB	0.1 - 1.0
Calcium	4/4	101,000 g - 164,000 g E	No	SB	130 - 35,000
Chromium	16/16	10 - 33	Yes	10 or SB	16 ^c
Cobalt	16/16	3.1 B - 12	No	30 or SB	2.5 - 60
Copper	16/16	15 g E - 45 R	Yes	25 or SB	22.5 ^c
Iron	16/16	8,590 g - 25,000 g E	No	2000 or SB	2,000 - 550,000
Lead	16/16	15 g E - 64,500 g E	Yes	400(d)	4-61/200-500 ^b
Magnesium	16/16	4,420 g E - 52,300 g E	No	SB	100 - 5,000
Manganese	16/16	190 - 539 g E N	No	SB	50 - 5,000
Mercury	3/16	0.10 g N - 0.12 g N	No	0.1	0.001 - 0.2
Nickel	16/16	7.5 - 37	Yes	13 or SB	14.5 ^c
Potassium	4/4	987 - 1,530	No	SB	8,500 - 43,000
Selenium	0/7	-	No	2 or SB	0.1 - 3.9
Silver	11/16	0.51 B - 3.7	No	SB	0.1 - 5
Sodium	16/16	83 B - 1,690	No	SB	6,000 - 8,000
Thallium	5/16	1.3 g B - 1.9 g B	No	SB	0.1 - 0.8
Vanadium	16/16	7.5 g B - 27 g	No	150 or SB	1.0 - 300
Zinc	16/16	25 g N - 397 g N	Yes	20 OR SB	112 ^c
Cyanide	4/16	0.6 g B N - 1.2	No	2000**	NA

** - NYSDEC Draft Cleanup Policy and Guidelines, 10/91.

(a) - Eastern US background soil concentration ranges unless otherwise noted.

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

c - Site background based on New York State Department of Health shallow soil samples collected May 1990 and from NYSDEC background soil samples collected in 1995.

g - Value considered estimated based on data validator's report.

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.

NA - Not available.

SB - Site background.

(d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

TABLE 6-3 (Page 1 of 3)

SURFACE SOIL DATA SUMMARY
Off-Site Samples Within Fence
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)
VOLATILE ORGANICS (mg/kg)				
Chlorobenzene	3/14	0.001 j - 0.002 j	No	1.7
Chloromethane	2/14	0.013 g - 0.023 g	No	NA
Styrene	2/14	0.001 j - 0.002 j	No	NA
Tetrachloroethylene	6/14	0.002 j - 0.007 j	Yes	1.4
1,1,1-Trichloroethane	2/14	0.005 j - 0.008 j	No	0.8
Trichloroethylene	8/14	0.002 j - 0.009 j	Yes	0.7
Toluene	1/14	0.001 j	No	1.5
SEMIVOLATILE ORGANICS (µg/l)				
Naphthalene	5/14	0.04 j - 2.8 j	Yes	13
2-Methylnaphthalene	4/14	0.072 j - 2.4 j	Yes	36.4
Acenaphthylene	6/14	0.057 j - 12 j	Yes	41
Acenaphthene	5/14	0.03 j - 0.27 j	Yes	50*
Dibenzofuran	5/14	0.028 j - 8.9 j	Yes	6.2
Fluorene	9/14	0.027 j - 17 j	Yes	50*
Phenanthrene	14/14	0.039 j g - 93	Yes	50*
Anthracene	11/14	0.03 j - 28	Yes	50*
Carbazole	10/14	0.014 j - 25	Yes	50*
Fluoranthene	14/14	0.054 g j - 89	Yes	50*
Pyrene	14/14	0.062 j - 71	Yes	50*
Benzo(a)anthracene	13/14	0.04 g j - 43	Yes	0.224 or MDL
Chrysene	13/14	0.028 g j - 47	Yes	0.4
Benzo(b)fluoranthene	11/14	0.083 j - 30	Yes	1.1
Benzo(k)fluoranthene	11/14	0.095 j - 36	Yes	1.1
Benzo(a)pyrene	13/14	0.027 g j - 37	Yes	0.061 or MDL
Indeno(1,2,3-c,d)pyrene	13/14	0.025 g j - 22 j	Yes	3.2
Dibenzo(a,h)anthracene	11/14	0.024 j - 9.3 j	Yes	0.014 or MDL
Benzo(g,h,i)perylene	13/14	0.024 g j - 20 j	Yes	50*
2,4-Dimethylphenol	1/14	0.099 j	No	50*

- * - Soil cleanup objective is 50 ppm for individual SVOCs unless a specific value is provided (NYSDEC 1994).
(a) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
g - Value considered estimated based on data validator's report.
j - Estimated concentration; compound present below quantitation limit.
NA - Not available.
MDL - Method detection limit.

TABLE 6-3 (Page 2 of 3)

SURFACE SOIL DATA SUMMARY
On-Site Samples Within Fence
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)
PESTICIDES/PCBs (mg/kg)				
alpha-BHC	2/14	0.00045 j p r - 0.0014 j p r	No	0.11
delta-BHC	1/14	0.0012 j p r	No	0.2
gamma-BHC (lindane)	2/14	0.0013 j p - 0.0055 p r	No	0.06
Aldrin	8/14	0.00031 j p r - 0.0025 j p r	Yes	0.041
Heptachlor epoxide	6/14	0.00049 j p r - 0.014 p	Yes	0.02
Endosulfan I	6/14	0.0008 j p - 0.0071 p r	No	0.9
Dieldrin	11/14	0.0009 j p r - 0.037 p r	Yes	0.044
4,4'-DDE	7/14	0.00045 j - 0.0029 j r	Yes	2.1
Endrin	7/14	0.0018 g j p n - 0.083 g p r	Yes	0.1
Endrin aldehyde	2/14	0.00074 j p r - 0.0046 p r	No	10**
4,4'-DDD	6/14	0.00045 j p r - 0.011 p r	No	2.9
4,4'-DDT	10/13	0.0026 g j p r - 0.0074 g p r	Yes	2.1
Methoxychlor	10/14	0.0011 j p r - 0.040 p r	Yes	10**
alpha-Chlordane	3/14	0.00039 j p r - 0.00056 j p r	No	0.54
gamma-Chlordane	5/14	0.00054 j p r - 0.002 p	No	0.54
Aroclor 1254	3/14	0.014 j - 0.075	No	1.0 f
Aroclor 1260	3/14	0.012 j - 0.026 j	No	1.0 f

- (a) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
 ** - Soil cleanup objective for total pesticides is < 10 ppm (NYSDEC).
 f - Soil cleanup objective for total PCBs in surface soils is 1.0 mg/kg (NYSDEC 1994).
 g - Value considered estimated based on data validator's report.
 j - Estimated concentration; compound present below quantitation limit.
 n - Tentative identification.
 p - Pesticide/Aroclor target analyte has >25% difference for the detected concentrations between the two GC columns.
 r - Value rejected by data validator but usable to show magnitude of contaminant level.

TABLE 6-3 (Page 3 of 3)

SURFACE SOIL DATA SUMMARY
On-Site Samples Within Fence
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)	SITE BACKGROUND (a)
TAL METALS (mg/kg)					
Aluminum	14/14	5,100 g E - 15,600 g E	No	SB	33,000
Antimony	2/14	2.8 g B N - 4.7 g B N	No	SB	0.6 - 10
Arsenic	12/14	2.3 - 7.8	Yes	7.5 or SB	3.0 - 12
Barium	14/14	36 g B E - 138 g E	No	300 or SB	15 - 600
Beryllium	14/14	0.33 B - 0.71	No	0.16 or SB	0 - 1.75
Cadmium	12/14	1.9 - 49	Yes	1 or SB	0.1 - 1.0
Calcium	2/2	99,900 g - 104,000 g	No	SB	130 - 35,000
Chromium	14/14	18-72	Yes	10 or SB	16 ^c
Cobalt	14/14	5.4 B - 78 g	No	30 or SB	2.5 - 60
Copper	14/14	17 g E - 75 g E	Yes	25 or SB	22.5 ^c
Iron	14/14	10,800 g - 31,000 g	No	2000 or SB	2,000 - 550,000
Lead	14/14	18 g E - 236 g E	Yes	400(d)	4-61/200-500 ^b
Magnesium	14/14	1,810 g E - 49,600 g E	No	SB	100 - 5,000
Manganese	14/14	291 - 666	No	SB	50 - 5,000
Mercury	3/14	0.09 g B - 0.13 g	No	0.1	0.001 - 0.2
Nickel	13/14	14 - 39	Yes	13 or SB	14.5 ^c
Potassium	2/2	1,680 - 2,130	No	SB	8,500 - 43,000
Selenium	0/14	-	No	2 or SB	0.1 - 3.9
Silver	13/14	0.39 B - 5.7	No	SB	0.1 - 5
Sodium	14/14	80 B - 506 B	No	SB	6,000 - 8,000
Thallium	0/14	-	No	SB	0.1 - 0.8
Vanadium	14/14	12 g - 30 g	No	150 or SB	1.0 - 300
Zinc	14/14	61 g N - 280 g N	No	20 or SB	112 ^c
Cyanide	6/14	0.65 g - 4.1 g N	No	2000**	NA

** - NYSDEC Draft Cleanup Policy and Guidelines, 10/91.

(a) - Eastern US background soil concentration ranges unless otherwise noted.

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

c - Site background based on New York State Department of Health shallow soil samples collected May 1990 and from NYSDEC background soil samples collected in 1995.

g - Value considered estimated based on data validator's report.

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

E - Value estimated due to interference.

N - Tentative identification.

NA - Not available.

SB - Site background.

(d) - U.S. EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

TABLE 6-4 (Page 1 of 2)

SUBSURFACE SOIL DATA SUMMARY

United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)
VOLATILE ORGANICS (mg/kg)				
Chloromethane	1/40	0.003 b j	No	NA
Methylene chloride	14/40	0.001 j - 0.005 b j	No	0.1
Acetone	22/40	0.005 b j - 0.018 b	No	0.2
Carbon disulfide	1/40	0.001 j	No	2.7
1,2-Dichloroethylene (total)	2/40	0.017 - 0.070	No	0.3
Chloroform	1/40	0.015	No	0.3
1,2-Dichloroethane	3/40	0.002 j	No	0.1
2-Butanone	7/40	0.001 b j - 0.012 j	No	0.3
1,1,1-Trichloroethane	9/40	0.0020 j - 0.018	Yes	0.8
Carbon tetrachloride	1/40	0.013	No	0.6
Trichloroethylene	29/40	0.001 j - 15	Yes	0.7
Tetrachloroethylene	8/40	0.001 j - 0.005 j	Yes	1.4
Toluene	14/40	0.0010 j - 0.007 j	No	1.5
Chlorobenzene	3/40	0.002 j - 0.003 j	No	1.7
Ethylbenzene	4/40	0.001 j - 0.028	No	5.5
Styrene	10/40	0.001 j - 0.006 j	No	NA
Xylene (total)	3/40	0.001 j - 0.021 j	No	1.2
SEMI-VOLATILE ORGANICS (mg/kg)				
Naphthalene	1/6	20 j	No	13
Acenaphthene	2/6	0.44 j - 69 j	Yes	50*
Dibenzofuran	1/6	28 j	No	6.2
Fluorene	2/6	0.043 j - 69 j	Yes	50*
Phenanthrene	3/6	0.036 j - 390 x	Yes	50*
Anthracene	2/6	0.082 j - 120 j	Yes	50*
Carbazole	2/6	0.054 j - 100 j	Yes	50*
Fluoranthene	3/6	0.36 j - 490 x	Yes	50*
Pyrene	3/6	0.40 j - 370 x	Yes	50*
Benzo(a)anthracene	2/6	0.25 j - 290 x	Yes	0.224 or MDL
Chrysene	2/6	0.33 j - 320 x	Yes	0.4
Benzo(b)fluoranthene	2/6	0.21 j - 190 x	Yes	1.1
Benzo(k)fluoranthene	2/6	0.19 j - 110 j	Yes	1.1
Benzo(a)pyrene	2/6	0.21 j - 150 j	Yes	0.061 or MDL
Indeno(1,2,3-c,d)pyrene	2/6	0.11 j - 76 j	Yes	3.2
Dibenzo(a,h)anthracene	2/6	0.053 j - 44 j	Yes	0.014 or MDL
Benzo(g,h,i)perylene	2/6	0.13 j - 74 j	Yes	50*
PESTICIDES/PCBs (mg/kg)				
Dieldrin	1/6	0.0007 j p	No	0.044
4,4'-DDE	1/6	0.00040 j	No	2.1
Endrin	1/6	0.00034 j	No	0.1
Endosulfan II	1/6	0.0037 j p	No	0.9
4,4'-DDT	1/6	0.0018 j	No	2.1
Methoxychlor	1/6	0.0031 j p	No	10*
Aroclor 1254	2/6	0.0087 j - 0.71	No	10 f

- * - Soil cleanup objective is 50 ppm for individual SVOCs unless a specific value is provided (NYSDEC 1994).
(a) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
b - Found in associated blanks.
f - Soil cleanup objective for total PCBs in surface soils is 1.0 mg/kg (NYSDEC 1994).
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.
x - Estimated due to QC issues.
NA - Not available.
MDL - Method detection limit.

TABLE 6-4 (Page 2 of 2)

SUBSURFACE SOIL DATA SUMMARY

United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	SOIL CLEANUP OBJECTIVES (a)	SITE BACKGROUND (a)
TAL METALS (mg/kg)					
Aluminum	44/44	1,450 - 15,900	No	SB	33,000
Antimony	1/39	5.8 B N X	No	SB	0.6 - 10
Arsenic	38/44	1.6 B - 15	Yes	7.5 or SB	3.0 - 12
Barium	44/44	34 - 728 E	No	300 or SB	15 - 600
Beryllium	44/44	0.22 B - 1.2	No	0.16 or SB	0 - 1.75
Cadmium	44/44	0.45 B - 158	Yes	1 or SB	0.1 - 1.0
Calcium	44/44	2,000 - 324,600	No	SB	130 - 35,000
Chromium	44/44	3.8 - 775 R	Yes	10 or SB	16 ^c
Cobalt	44/44	4.0 B - 22	No	30 or SB	2.5 - 60
Copper	44/44	9.8 - 712	Yes	25 or SB	22.5 ^c
Iron	44/44	6,300 - 29,700	No	2000 or SB	2,000 - 550,000
Lead	44/44	7.1 - 344 E	Yes	400 (d)	4-61/200-500/96 ^{b,c}
Magnesium	44/44	2,510 E - 70,000 E	No	SB	100 - 5,000
Manganese	44/44	188 - 937	No	SB	50 - 5,000
Mercury	10/37	0.12 R - 0.78	No	0.1	0.001 - 0.2
Nickel	44/44	9.3 - 102	Yes	13 or SB	14.5 ^c
Potassium	44/44	696 B E - 3,540	No	SB	8,500 - 43,000
Selenium	5/38	0.30 B N W - 3.2	No	2 or SB	0.1 - 3.9
Silver	28/44	0.35 B - 50	Yes	SB	0.1 - 5
Sodium	44/44	54 B - 860 B	No	SB	6,000 - 8,000
Thallium	9/38	1.1 B - 2.6	No	SB	0.1 - 0.8
Vanadium	42/44	7.2 B - 29	No	150 or SB	1.0 - 300
Zinc	44/44	35 E - 756	Yes	20 or SB	112 ^c
Cyanide	11/44	1.0 - 126	No	2000***	NA

*** - NYSDEC Draft Cleanup Policy and Guidelines, 10/91.

(a) - Eastern US background soil concentration ranges unless otherwise noted.

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

c - Site background based on New York State Department of Health shallow soil samples collected May 1990 and from NYSDEC background soil samples collected in 1995.

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.

X - Estimated due to QC issues.

NA - Not available.

SB - Site background.

(d) - U.S.EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. 14 July 1994.

TABLE 6-5 (Page 1 of 2)

GROUNDWATER DATA SUMMARY
Shallow Groundwater
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	GROUNDWATER STANDARD
VOLATILE ORGANICS (µg/l)				
Acetone	5/21	1.7 - 49	No	50 GV
2- Butanone	1/21	4.0 j	No	5
Carbon tetrachloride	1/21	11	No	5
1,2-Dichloroethylene (total)	1/21	10 j	No	5
1,2-Dichloropropane	1/21	17	No	5
Methylene chloride	4/21	1.0 b j - 2.0 b j	No	5
Styrene	1/21	2.0 j	No	5
1,1,1-Trichloroethane	4/21	72 - 260	Yes	5
Trichloroethylene	8/21	6.0 j - 430 d	Yes	5
PESTICIDES/PCBs (µg/l)				
Aroclor 1260	1/5	0.59 j p	No	0.1 ^a

a - Standard for total PCBs is 0.1 µg/l.

b - Found in associated blanks.

d - Concentration recovered from diluted sample.

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.

GV - Guidance value.

TABLE 6-5 (Page 2 of 2)

GROUNDWATER DATA SUMMARY
Shallow Groundwater
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	GROUNDWATER STANDARD	NATURAL AMBIENT GROUNDWATER RANGES
TAL METALS (µg/l)					
Aluminum	18/18	385 - 642,000	No	NS	<5.0 - 1000
Antimony	2/12	19 B N X - 26 B N X	No	3.0 GV	NA
Arsenic	15/18	4.8 B - 589	Yes	25	<1.0 - 30
Barium	18/18	19 B - 5,180	No	1,000	10 - 500
Beryllium	13/18	1.1 B - 29	Yes	3.0 GV	<10
Cadmium	18/18	1.1 B - 685	Yes	10	<1.0
Calcium	18/18	1,251 E - 4,829,000	No	NS	1000 - 150,000
Chromium	18/18	2.3 B - 106,000	Yes	50	<1.0 - 5.0
Cobalt	17/18	5.6B - 1,110	No	NS	<10
Copper	18/18	5.2 B - 109,000	Yes	200	<1.0 - 30
Iron	18/18	931 - 1,936,000 E	No	300 ^b	10 - 10,000
Lead	16/18	4.1 N - 2,810	Yes	25	<15
Magnesium	18/18	2,510 E - 70,000 E	No	SB	100 - 5,000
Manganese	18/18	6,410 - 1,607,000	No	35,000 GV	1000 - 50,000
Mercury	8/18	39 E - 26,400 E	No	300 ^b	<1.0 - 1000
Nickel	17/18	19 B - 4,780	Yes	NS	<10 - 50
Potassium	18/18	6,28 - 119,000	No	NS	1000 - 10,000
Selenium	3/18	2.0 B W X - 2.8 B W X	No	10	<1.0 - 10
Silver	13/18	2.2 B - 216	Yes	50	<5.0
Sodium	18/18	48,600 - 382,000	No	20,000	500 - 120,000
Thallium	7/18	6.5 B - 242	No	4.0 GV	NA
Vanadium	16/18	4.7 B - 952	No	NS	<1.0 - 10
Zinc	17/18	10 B - 7,420	Yes	300	<10 - 2000
Cyanide	11/17	15 - 1,020 N	Yes	100	NA

- b - Standard for iron and manganese combined is 500 µg/l.
 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.
 X - Estimated due to QC issues.
 GV - Guidance value.
 NA - Not available.

TABLE 6-6

GROUNDWATER DATA SUMMARY**Intermediate Groundwater****United Plating Site**

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	GROUNDWATER STANDARD	NATURAL AMBIENT GROUNDWATER RANGES
TAL METALS (µg/l)					
Aluminum	3/3	317 - 899	No	NS	<5.0 - 1000
Antimony	1/3	17 B N X	No	3.0 GV	NA
Arsenic	1/3	8.4 B	No	25	<1.0 - 30
Barium	3/3	19 B - 53 B	No	1,000	10 - 500
Beryllium	0/3	-	No	3.0 GV	<10
Cadmium	1/3	1.1 B	No	10	<1.0
Calcium	3/3	34,500 E - 37,900 E X	No	NS	1000 - 150,000
Chromium	3/3	2.1 B - 54	Yes	50	<1.0 - 5.0
Cobalt	0/3	-	No	NS	<10
Copper	3/3	7.2 B - 10 B	No	200	<1.0 - 30
Iron	3/3	784 - 1,740	No	300 ^b	10 - 10,000
Lead	2/3	3.1 N X	No	25	<15
Magnesium	3/3	18,200 E - 21,800 E	No	SB	100 - 5,000
Manganese	3/3	44 E - 103 E	No	35,000 GV	1000 - 50,000
Mercury	0/3	-	No	300 ^b	<1.0 - 1000
Nickel	0/3	-	No	NS	<10 - 50
Potassium	3/3	3,730 B - 6,760	No	NS	1000 - 10,000
Selenium	1/3	1.3 B W X	No	10	<1.0 - 10
Silver	0/3	-	No	50	<5.0
Sodium	3/3	68,400 - 134,000	No	20,000	500 - 120,000
Thallium	1/3	11 R	No	4.0 GV	NA
Vanadium	1/3	3.1 B	No	NS	<1.0 - 10
Zinc	3/3	13 B - 32	No	300	<10 - 2000
Cyanide	0/3	-	No	100	NA

b - Standard for iron and manganese combined is 500 µg/l.

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.

X - Estimated due to QC issues.

GV - Guidance value.

NA - Not available.

TABLE 6-7 (1 of 2)

GROUNDWATER DATA SUMMARY
Bedrock Groundwater
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	GROUNDWATER STANDARD
VOLATILE ORGANICS (µg/l)				
Benzene	1/3	6 j	No	0.7
Chloroform	1/3	7 j	No	7

j - Estimated concentration; compound present below quantitation limit.

TABLE 6-7 (2 of 2)

GROUNDWATER DATA SUMMARY
Bedrock Groundwater
United Plating Site

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC	GROUNDWATER STANDARD	NATURAL AMBIENT GROUNDWATER RANGES
TAL METALS (µg/l)					
Aluminum	3/3	158 B - 348,000	No	NS	<5.0 - 1000
Antimony	0/3	-	No	3.0 GV	NA
Arsenic	1/3	228	Yes	25	<1.0 - 30
Barium	3/3	40 B - 1,720	No	1,000	10 - 500
Beryllium	2/3	1.2 B - 17	No	3.0 GV	<10
Cadmium	3/3	1.4 B - 58	Yes	10	<1.0
Calcium	3/3	9,460 E - 1,396,000 E	No	NS	1000 - 150,000
Chromium	3/3	10 X - 882	Yes	50	<1.0 - 5.0
Cobalt	2/3	11 B - 332	No	NS	<10
Copper	3/3	8.0 B - 1,470	Yes	200	<1.0 - 30
Iron	3/3	468 - 851,000	No	300 ^b	10 - 10,000
Lead	2/3	22 N X - 425 N X	Yes	25	<15
Magnesium	3/3	9,340 E - 266,000 E	No	SB	100 - 5,000
Manganese	3/3	13 B E - 18,800 E	No	35,000 GV	1000 - 50,000
Mercury	1/3	0.58 N X	No	300 ^b	<1.0 - 1000
Nickel	2/3	33 B - 682	Yes	NS	<10 - 50
Potassium	3/3	5,960 - 65,900	No	NS	1000 - 10,000
Selenium	0/3	-	No	10	<1.0 - 10
Silver	1/3	5.9 B	No	50	<5.0
Sodium	3/3	77,800 - 857,000	No	20,000	500 - 120,000
Thallium	0/1	-	No	4.0 GV	NA
Vanadium	2/3	31 B - 654	No	NS	<1.0 - 10
Zinc	3/3	9.7 B - 2,880	Yes	300	<10 - 2000
Cyanide	0/2	-	No	100	NA

- b - Standard for iron and manganese combined is 500 µg/l.
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.
X - Estimated due to QC issues.
GV - Guidance value.
NA - Not available.
NS - No standard.

data, and Table 6-7 includes data for the bedrock groundwater at the site. The groundwater data summaries include the probe water quality data obtained in May 1995 and the monitoring well data collected in October 1995. NYSDEC Class GA groundwater standards and natural ambient groundwater ranges for inorganic compounds are also included in the groundwater data summary tables.

Surface water and sediment data collected in June 1995 are summarized in Tables 6-8 and 6-9, respectively, including frequency of contaminant detection and range of detected concentrations. These data, labeled surface water and sediment for this site, are from samples actually collected from drains and sumps within or adjacent to the UP building; therefore, surface water standards and sediment criteria were not included on the tables as the samples were not obtained from an actual surface water body.

Tables 6-10 through 6-13 summarize the data obtained from the May 1995 sampling of the building interior, including building construction materials and existing debris. The data from the wipe, sweep, concrete chip, and wood chip samples were summarized separately, including frequency of analyte detection and range of detected concentrations. Only data on total metal concentrations for the building interior samples were included in the data summaries as TCLP data are not generally used for assessing human health risks.

6.2.2 Identification of Potential COCs

Potential COCs were identified by comparing positive sample results for each sample matrix with site background or applicable New York State standards. Contaminants that were present at levels exceeding either background levels or applicable standards were listed as potential COCs for specific environmental matrices. Information on contaminants possibly associated with site activities, including those contaminants present at elevated levels in wastewaters from the site or known to have been used or stored at the site, was also used to identify potential COCs for matrices without appropriate cleanup criteria or site background levels for comparison with the data.

6.2.2.1 Shallow Soil Data. The shallow soil data were compared to site background levels for site-related constituents (cadmium, chromium, copper, lead, nickel, and zinc) and to eastern United States native soil concentration ranges (NYSDEC 1994) for the remaining inorganic constituents. New York State-recommended soil cleanup objectives were also used

TABLE 6-8

SURFACE WATER DATA SUMMARY
United Plating Site

ANALYTE	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC
METALS (µg/l)			
Aluminum	3/5	601 N - 7,750 N	No
Antimony	3/5	45 B N - 66 N	No
Arsenic	2/2	12 R - 63 g R	No
Barium	5/5	19 B - 366	No
Beryllium	1/5	0.87 B	No
Cadmium	5/5	4.0 g B E - 536 g E	Yes
Calcium	5/5	16,900 g - 171,000 g	No
Chromium	5/5	6.7 g B E - 26,100 g E	Yes
Cobalt	5/5	3.7 g B - 110 g	No
Copper	5/5	18 g B E - 16,200 E	Yes
Iron	5/5	272 g r E N - 58,700 E N	No
Lead	4/5	293 g N - 6,280 g N	Yes
Magnesium	5/5	4,080 B - 24,500	No
Manganese	5/5	14 g B E - 668 g E	No
Mercury	5/5	0.25 r - 66 r	No
Nickel	5/5	7.6 g B E - 963 g E	Yes
Potassium	5/5	3,350 g B E - 180,000 g E	No
Selenium	D	-	No
Silver	5/5	2.1 B - 159	Yes
Sodium	5/5	7,500 g E - 181,000 g E	No
Thallium	2/4	9.3 g B R - 11 g R	No
Vanadium	3/5	5.3 B - 33 g B	No
Zinc	5/5	50 g r E - 4,760 g E	Yes
Cyanide	4/5	33 - 1,280	Yes

- g - Value considered estimated based on the data validator's report.
r - Value rejected by data validator but usable to show magnitude of contaminant level.
B - Value is less than the contract-required detection limit but greater than the instrument detection limit.
D - Value rejected by data validator and found unusable.
E - Value estimated due to interference.
N - Spiked sample recovery is not within control limits.
R - Duplicate analysis not within control limits.

TABLE 6-9

SEDIMENT DATA SUMMARY
United Plating Site

ANALYTE	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC
METALS (mg/kg)			
Aluminum	16/16	1,490 g E - 13,000 g s E	No
Antimony	12/15	13 g B N - 4,770 N	No
Arsenic	15/15	5.9 - 253	No
Barium	16/16	104 g E - 13,600 g E	No
Beryllium	11/16	0.18 b - 3.5	No
Cadmium	16/16	18 g E N R - 981 g E N R	Yes
Calcium	16/16	3,240 g E R - 94,800 g E R	No
Chromium	16/16	428 - 73,400	Yes
Cobalt	16/16	5.8 g s B - 659	No
Copper	16/16	157 g E - 26,500 g E	Yes
Iron	16/16	21,600 g s E - 171,000 g E	No
Lead	15/16	35 g E R - 191,000 g E R	Yes
Magnesium	16/16	927 B g E - 46,700 g E	No
Manganese	16/16	111 g s E N - 4,050 g E N	No
Mercury	16/16	0.35 r - 12	No
Nickel	16/16	76 g E N - 3,010 g E N	Yes
Potassium	16/16	475 g B E - 13,900 g E	No
Selenium	0/5	-	No
Silver	16/16	11 g E - 2,830 g E	Yes
Sodium	16/16	46 B - 2,100	No
Thallium	10/14	3.8 g s B - 9.5 g	No
Vanadium	16/16	9.5 g B E - 352 g E	No
Zinc	16/16	228 g E N - 32,900 g E N	Yes
Cyanide	15/16	22 - 479	Yes

- g - Value considered estimated based on the data validator's report.
r - Value rejected by data validator but usable to show magnitude of contaminant level.
s - Value estimated; solids content below 50%.
B - Value is less than the contract-required detection limit but greater than the instrument detection limit.
D - Value rejected by data validator and found unusable.
E - Value estimated due to interference.
N - Spiked sample recovery is not within control limits.
R - Duplicate analysis not within control limits.

TABLE 6-10

BUILDING INTERIOR DATA SUMMARY**Wipe Samples
United Plating Site**

ANALYTE	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC
METALS ($\mu\text{g}/100 \text{ cm}^2$)			
Aluminum	78/84	17 B E - 25,400 E	No
Antimony	33/84	6.1 B N - 10,500 N	No
Arsenic	38/84	3.5 B - 163	No
Barium	84/84	2.0 - 27,100	No
Beryllium	11/84	0.49 - 7.1	No
Cadmium	75/84	1.0 B - 56,200	Yes
Calcium	84/84	236 B E - 291,000 E	No
Chromium	79/84	9.3 - 62,300 E	Yes
Cobalt	42/84	5.4 B - 4,080	No
Copper	84/84	3.5 B - 286,000	Yes
Iron	81/84	99 E - 714,000 E	No
Lead	84/84	2.6 N - 31,800 N	Yes
Magnesium	77/84	48 B - 25,500	No
Manganese	84/84	1.6 B E - 3,630 E	No
Mercury	42/84	0.080 B N - 2.9 N	No
Nickel	66/84	4.8 B - 19,200	Yes
Potassium	73/84	96 B E - 52,100 E	No
Selenium	7/84	2.5 B - 32	No
Silver	59/84	1.5 B E - 1,240 E	Yes
Sodium	82/84	1,100 - 151,000	No
Thallium	5/84	9.7 B - 178	No
Vanadium	46/84	2.0 B - 99	No
Zinc	81/84	7.2 B - 30,700	Yes
Cyanide	80/84	2.1 N - 5,510 N	Yes

- 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.

TABLE 6-11

BUILDING INTERIOR DATA SUMMARY

Sweep Sample
United Plating Site

ANALYTE	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC
METALS (mg/kg)			
Aluminum	50/50	224 E - 28,400 E	No
Antimony	36/50	1.3 B N - 55,000 N	No
Arsenic	35/50	0.89 B N - 84	No
Barium	50/50	0.22 B N - 3,210 N	No
Beryllium	43/50	0.10 B - 2.6	No
Cadmium	49/50	2.9 N E - 6,140 N	Yes
Calcium	50/50	24 B - 143,000 E	No
Chromium	50/50	45 E N - 270,000 E N	Yes
Cobalt	49/50	3.4 B - 16,900	No
Copper	50/50	40 E - 82,100 E	Yes
Iron	49/50	639 E - 725,000 E	No
Lead	49/50	54 E N - 69,000	Yes
Magnesium	50/50	31 B E - 94,700	No
Manganese	50/50	1.1 B N - 1,990 E N	No
Mercury	47/50	0.10 N - 5.4 N	No
Nickel	50/50	10 N - 177,000 N	Yes
Potassium	50/50	150 B E - 58,600 E	No
Selenium	13/50	0.85 B N - 15 N	No
Silver	49/50	0.46 B E - 353 E	Yes
Sodium	50/50	541 B E - 137,000 E	No
Thallium	5/50	2.5 B E - 71	No
Vanadium	49/50	1.9 B - 94 N	No
Zinc	49/50	147 - 68,300 E	Yes
Cyanide	47/50	0.49 B - 2,750	Yes

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.

TABLE 6-12

BUILDING INTERIOR DATA SUMMARY
Concrete Chip Samples
United Plating Site

ANALYTE	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC
METALS (mg/kg)			
Aluminum	20/20	3,210 - 11,500 E	No
Antimony	5/20	5.5 B N - 242 N	No
Arsenic	17/20	1.1 - 7.6	No
Barium	20/20	62 E N - 2,080 E	No
Beryllium	20/20	0.16 B - 0.64 B	No
Cadmium	20/20	3 - 1,190	Yes
Calcium	20/20	51,400 - 271,000	No
Chromium	20/20	24 E N - 27,400	Yes
Cobalt	20/20	2.4 B - 88	No
Copper	20/20	24 E - 5910 E	Yes
Iron	20/20	7,490 - 133,000	No
Lead	20/20	40 E N - 26,500 E	Yes
Magnesium	20/20	3,920 E - 12,900 E	No
Manganese	20/20	98 E - 855 E	No
Mercury	12/20	0.11 N - 0.60 N	No
Nickel	20/20	9.3 E - 9,460 E	Yes
Potassium	20/20	1,290 E - 7,570 E	No
Selenium	2/20	0.63 B - 2.2	No
Silver	20/20	1.7 B - 221 E	Yes
Sodium	20/20	546 B - 10,500	No
Thallium	2/20	1.6 B - 2.2	No
Vanadium	20/20	13 N - 50 E	No
Zinc	20/20	103 E - 7,800 E	Yes
Cyanide	20/20	0.52 - 1,150	Yes

- 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.

TABLE 6-13

BUILDING INTERIOR DATA SUMMARY
Wood Chip Samples
United Plating Site

ANALYTE	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	POTENTIAL COC
METALS (mg/kg)			
Aluminum	16/16	34 B - 6,440	No
Antimony	6/16	4.3 B N - 33 N	No
Arsenic	15/16	0.93 B - 79	No
Barium	16/16	5.5 B - 6,620	No
Beryllium	3/16	0.21 B - 0.55 B	No
Cadmium	12/16	0.26 B - 110	Yes
Calcium	16/16	487 B - 78,300	No
Chromium	16/16	1.1 B N - 314 N	Yes
Cobalt	5/16	1.4 B - 4.4 B	No
Copper	16/16	3.1 B - 16	Yes
Iron	16/16	46 E - 2,130 E	No
Lead	16/16	0.77 E N - 41,600 E N	Yes
Magnesium	16/16	201 B N - 40,600 E	No
Manganese	16/16	65 N - 402 N	No
Mercury	10/16	0.11 N - 6.5 N	No
Nickel	11/16	1.0 B - 25	Yes
Potassium	16/16	184 - 1,550 E	No
Selenium	10/16	0.7 - 2.2	No
Silver	11/16	0.48 B - 4.8	Yes
Sodium	16/16	68 B E - 8,030 E	No
Thallium	0/16	-	No
Vanadium	14/16	0.47 B - 5.7 B	No
Zinc	14/16	15 E - 43,500 E	Yes
Cyanide	12/16	1.4 - 15	Yes

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.

to identify potential COCs for both organic and inorganic constituents. Potential shallow soil COCs are identified in Tables 6-1 through 6-3.

Of the VOCs detected in shallow soils, tetrachloroethylene (PCE), 1,1,1-TCA, and TCE were detected in half or more of the samples collected and were therefore retained as potential COCs. The remaining VOCs were generally detected in only one or two samples at concentrations several orders of magnitude below the recommended soil cleanup objectives for these compounds and were therefore not retained as COCs.

Many of the SVOCs in surface soils were detected in a majority of the soil samples collected and were retained as potential COCs. Several of the SVOCs were present at concentrations approaching or exceeding the recommended soil cleanup objectives for those compounds and were also retained as potential COCs. Similarly, pesticides and PCBs detected in half or more of the samples collected were retained as potential COCs, as well as any compounds detected at levels approaching the recommended soil cleanup objectives for those compounds; this eliminated all PCBs as COCs and retained selected pesticides as potential COCs.

For the inorganics in surface soils, aluminum, barium, beryllium, cobalt, manganese, selenium, silver, and vanadium were eliminated as potential COCs as these metals were generally present at levels within the eastern United States native soil concentration ranges and were not known to have been associated with site processes. Metals that are essential nutrients, i.e., calcium, potassium, iron, magnesium, and sodium, were also eliminated as potential COCs as these metals are generally toxic only at high concentrations and are generally not included in a health risk assessment (EPA 1989a). Antimony, thallium, and cyanide were generally not detected in the shallow soil samples; these metals were also eliminated as potential COCs. Arsenic, cadmium, chromium, copper, lead, mercury (for off-site soils), nickel, and zinc were retained for further evaluation as potential COCs. These metals were all present at concentrations exceeding site background levels; in addition, cadmium, chromium, copper, lead, nickel, and zinc were present in site wastewaters at elevated levels and were known to have been used at the site.

6.2.2.2 Subsurface Soil Data. The subsurface soil data were compared to background levels, either site-specific levels for cadmium, chromium, copper, lead, nickel, and zinc, or eastern United States native soil concentration ranges (NYSDEC 1994a) for other inorganics, to identify potential COCs, as indicated in Table 6-4. Organic constituents were compared to NYSDEC-recommended soil cleanup objectives to assist in selecting potential COCs.

TCE, TCA, and PCE were the only VOCs retained as potential COCs based on their frequency of detection, levels detected, and their presence in other site media (i.e., surface soils and groundwater) at elevated levels. The majority of the remaining VOCs detected were present in only one to four of the 40 samples analyzed, with the exception of acetone, 2-butanone, methylene chloride, styrene, and toluene. Acetone and methylene chloride were eliminated as potential COCs because they are common laboratory contaminants and were also detected in associated blank samples. 2-Butanone was detected in seven of the 40 samples; however, the detected concentrations were all estimated as the compound was present below the quantitation limit; the detected concentrations were also one to three orders of magnitude below the recommended soil cleanup objective for this compound. Similarly, styrene and toluene, which were detected in 10 and 14 of the 40 samples, respectively, were present at concentrations below the compound quantitation limits and at concentrations several orders of magnitude below the recommended soil cleanup objective for toluene. Therefore, 2-butanone, styrene, and toluene were also eliminated as potential COCs.

A number of SVOCs were detected in two or more of the six subsurface samples analyzed for SVOCs, with maximum detected concentrations exceeding the recommended soil cleanup objectives. Those compounds were therefore retained as potential COCs. As none of the pesticides or PCBs detected in the subsurface soil samples were present in more than one sample, they were not retained as potential COCs.

Aluminum, antimony, barium, beryllium, cobalt, manganese, mercury, selenium, thallium, and vanadium were eliminated as potential COCs as these metals were generally present at levels within the eastern United States native soil concentration ranges. Metals that are essential nutrients, i.e., calcium, potassium, iron, magnesium, and sodium, were also eliminated as potential COCs as these metals are generally toxic only at high concentrations. Cyanide was detected in 11 of the 44 samples at concentrations below the NYSDEC recommended soil cleanup objective and was therefore eliminated as a potential COC. Arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc were all present at levels exceeding site background concentrations; in addition, cadmium, chromium, copper, lead, nickel, and zinc are known to have been used at the site. These eight metals were retained as potential COCs.

6.2.2.3 Groundwater. The groundwater data were compared to the NYSDEC Class GA groundwater standards and the natural ambient groundwater ranges for inorganics to identify potential COCs, as indicated on Tables 6-5 through 6-7 for the shallow, intermediate, and bedrock groundwater, respectively.

Of the VOCs detected in groundwater, TCA and TCE were retained as potential COCs as they were detected in more than one sample and at concentrations exceeding the Class GA groundwater standards for these compounds. Acetone and methylene chloride were also detected in five and four of the 21 shallow groundwater samples collected, respectively, but were not included as potential COCs as these compounds are common laboratory contaminants and were detected in associated blank samples. The remaining VOCs detected in groundwater were present at low concentrations (i.e., below the contract-required quantitation limit) in only one sample each and were therefore not retained as potential COCs.

PCBs were detected in only one of the five shallow groundwater samples collected; this sample was collected from the upgradient well (UPMW-1A) and the source of the PCBs is unknown. PCBs were therefore not included as potential COCs for groundwater.

For the shallow groundwater (Table 6-5), arsenic, beryllium, cadmium, chromium, copper, lead, nickel, silver, zinc, and cyanide were retained as potential COCs as these inorganics were present at concentrations exceeding the Class GA standards. Metals that are essential nutrients, i.e., calcium, potassium, iron, manganese, and sodium, were eliminated as potential COCs as these metals are generally toxic only at high concentrations and are not generally included in health risk assessments (EPA 1989a). Aluminum, barium, cobalt, magnesium, mercury, and vanadium were also eliminated as potential COCs as these metals were detected at concentrations generally within natural ambient groundwater ranges and are not associated with site processes. Antimony, selenium, and thallium were detected in only two, three, and seven of the 18 shallow groundwater samples, respectively, and were therefore not retained as potential COCs.

Chromium was the only inorganic retained as a potential COC for the intermediate groundwater (Table 6-6) as it was the only site-related contaminant present at concentrations exceeding the Class GA groundwater standard. The remaining inorganics were either not detected, detected in only one of the three samples collected, or present in concentrations below the Class GA standards or within natural ambient groundwater ranges for metals without standards.

For the bedrock groundwater (Table 6-7), arsenic, cadmium, chromium, copper, lead, nickel, and zinc were retained as potential COCs as these metals were present at concentrations exceeding the Class GA groundwater standards and are known to have been used at the site. Antimony, selenium, thallium, and cyanide were not detected in bedrock groundwater, while

mercury and silver were detected in only one sample each at concentrations below the Class GA groundwater standards and were not retained as potential COCs. Aluminum, barium, beryllium, calcium, cobalt, iron, magnesium, manganese, potassium, sodium, and vanadium were also eliminated as potential COCs as these metals have not been associated with site processes.

6.2.2.4 Surface Water, Sediments, and Building Interior. As discussed in Section 6.2.1, the surface water and sediment samples collected at the site were obtained from drains and sumps within or immediately adjacent to the UP building; therefore, there are no cleanup standards or criteria appropriate for comparison with the data. Similarly, no cleanup standards are available for comparison with the wipe, sweep, concrete chip, and wood chip samples collected from the building interior, with the exception of criteria for lead in wipe samples (EPA 1994a) intended for use in determining acceptable levels for reoccupancy of residential units following LBP abatement. These matrices were analyzed for metals only; potential COCs for surface water, sediments, and building interior were selected based on those metals associated with site processes through known use at the site or presence in site wastewaters. The potential COCs retained for further evaluation included cadmium, chromium, copper, lead, nickel, silver, zinc, and cyanide.

6.2.3 Concentration-Toxicity Screening

A concentration-toxicity screening of the preliminary list of COCs was conducted in accordance with EPA guidance to develop a final list of contaminants to be evaluated in the quantitative risk assessment. This screening procedure identifies those contaminants in each matrix that are most likely to substantially contribute to the human health risk resulting from exposure to that matrix. This assessment is conducted by calculating a chemical score (R_i) for each potential COC in each matrix according to the following equations:

- Noncarcinogenic effects:

$$R_f = \text{Maximum contaminant concentration} \times 1/\text{reference dose (RfD)}$$

- Carcinogenic effects:

$$R_i = \text{Maximum contaminant concentration} \times \text{slope factor}$$

The maximum contaminant concentration used in these equations is the maximum detected concentration for each COC in a particular matrix, as shown in Tables 6-1 through 6-13. The slope factors and RfDs used in these equations were obtained from EPA's Integrated Risk Information System (IRIS) on-line database (accessed January 1996) or the Health Effects Assessment Summary Table (HEAST) Report (EPA 1995). The oral RfD for the contaminant was used to calculate the chemical score unless the inhalation value (reference concentration [RfC]) was more conservative (i.e., smaller than the oral value). The inhalation slope factor for carcinogenic effects was used unless no inhalation value was available or the oral slope factor was more conservative (i.e., larger than the inhalation slope factor).

Following calculation of chemical scores for both noncarcinogenic and carcinogenic effects for each potential COC in a matrix, the chemical scores for that matrix were summed (R_i). Chemical scores for noncarcinogenic and carcinogenic effects were summed separately. A relative risk for each contaminant was then calculated by dividing the contaminant's chemical score by the total of the noncarcinogenic or carcinogenic chemical scores (as appropriate) for that matrix as follows:

- $$\text{Relative risk} = \frac{R_i}{R_t}$$

This calculated relative risk is not a quantitative assessment of the risk posed by a particular contaminant and was used only for comparative purposes in the concentration-toxicity screening. The concentration-toxicity screening calculations for each matrix are included in Tables J-1 through J-14 in Appendix J.

Based on the calculated relative risks (R_i) for each matrix, those contaminants that did not contribute substantially to the overall human health risk from exposure to that matrix (i.e., relative risk equal to or greater than 0.01, or 1% of the total risk) were eliminated (EPA 1989a). Tables 6-14 through 6-18 summarize the final carcinogenic and noncarcinogenic COCs for each matrix that were retained for further evaluation in this health risk assessment.

Although lead was identified as a potential COC for each of the site matrices evaluated, it was not included as a sitewide COC. A substantial amount of information on the health effects of lead is available and, by comparison to most other environmental toxicants, the degree of uncertainty about the health effects resulting from lead exposures is low (EPA 1996). EPA recommends the use of the Integrated Exposure Uptake Biokinetic (IEUBK) model for

TABLE 6-14

**CONTAMINANTS OF CONCERN FOR INCLUSION
IN HEALTH RISK ASSESSMENT -
SURFACE SOILS
United Plating Site**

SITE LOCATION	NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Off-Site Soils	Arsenic Cadmium Chromium Mercury Nickel Zinc	Arsenic Cadmium Chromium Nickel Benzo(a)pyrene
On-Site Soils	Arsenic Cadmium Chromium Copper Nickel Dibenzofuran Fluoranthene Pyrene	Arsenic Cadmium Chromium Benzo(a)pyrene Dibenzo(a,h)anthracene
On-Site Soils - Outside Fence	Arsenic Cadmium Chromium Copper Nickel Zinc	Arsenic Cadmium Chromium Nickel Benzo(a)pyrene
On-Site Soils - Within Fence	Arsenic Cadmium Chromium Copper Nickel Dibenzofuran Fluoranthene Pyrene	Arsenic Cadmium Chromium Benzo(a)pyrene Dibenzo(a,h)anthracene

TABLE 6-15

**CONTAMINANTS OF CONCERN FOR INCLUSION
IN HEALTH RISK ASSESSMENT -
SUBSURFACE SOILS**
United Plating Site

SITE LOCATION	NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Subsurface soils	Arsenic Cadmium Chromium Copper Silver Fluoranthene Pyrene	Cadmium Chromium Benzo(a)pyrene

TABLE 6-16

**CONTAMINANTS OF CONCERN FOR INCLUSION
IN HEALTH RISK ASSESSMENT -
GROUNDWATER
United Plating Site**

SITE LOCATION	NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Shallow groundwater	Arsenic Cadmium Chromium Copper	Trichloroethylene
Intermediated groundwater	Chromium	-
Deep groundwater	Arsenic Cadmium Chromium Copper Nickel	-

TABLE 6-17

**CONTAMINANTS OF CONCERN FOR INCLUSION
IN HEALTH RISK ASSESSMENT -
SURFACE WATER AND SEDIMENTS**

United Plating Site

SITE LOCATION	NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Surface water	Cadmium Chromium Copper	-
Sediments	Cadmium Chromium Copper Silver	-

TABLE 6-18

**CONTAMINANTS OF CONCERN FOR INCLUSION
IN HEALTH RISK ASSESSMENT -
BUILDING INTERIOR
United Plating Site**

SITE LOCATION	NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Wipe samples	Cadmium Chromium Copper	Cadmium Chromium
Sweep samples	Cadmium Chromium Copper Nickel	Chromium Nickel
Concrete chip samples	Cadmium Chromium Copper Nickel	Chromium
Wood chips	Cadmium Chromium Zinc	Cadmium Chromium

quantification of risks associated with lead exposures and therefore considers the use of RfDs or slope factors inappropriate for lead. The IEUBK model estimates distributions of potential risk based on the biokinetic uptake of lead and the resulting blood lead levels. However, EPA has also issued the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (EPA 1994), which includes a 400-ppm screening level for lead in residential soils, which has been calculated using the default parameters in the IEUBK model.

The lead concentrations detected in the surface soil samples from the UP site are all below the 400-ppm screening level, with the exception of one sample (UPSS-33). These concentrations suggest that lead exposures at the site are unlikely to pose adverse health effects to exposed populations under the most conservative assumptions (i.e., residential use). Sample UPSS-33, with a lead concentration of 64,500 mg/kg, or 6.5% lead, was collected under the window of the lead smelter that was present at the site. Therefore, high soil lead concentrations as indicated by this sample are expected to be confined to the vicinity of the former lead smelter location. Remediation of the site should include addressing this highly contaminated soil as a localized hot spot of contamination.

6.2.4 Applicable or Relevant and Appropriate Requirements

This section identifies the chemical-specific applicable or relevant and appropriate requirements (ARARs) for the COCs at the UP site. *Applicable* requirements are defined as those promulgated Federal or state requirements (e.g., cleanup standards, standards of control) that specifically address a hazardous substance, pollutant, or contaminant found at a CERCLA site. *Relevant and appropriate* requirements are those promulgated Federal or state requirements that, while not applicable, address problems sufficiently similar to those encountered at CERCLA sites where their use is appropriate.

In addition to ARARs, other Federal, state, and local criteria, advisories, or guidances may also apply to the conditions found at the site. These are referred to as *to-be-considered* (TBC) items. TBCs are not legally binding but may be useful within the context of assessing site risks and determining site cleanup goals.

The chemical-specific ARARs and TBCs that have been identified for the UP site are summarized in Table 6-19. Chemical-specific ARARs provide guidance on acceptable or

TABLE 6-19 (Page 1 of 3)

**CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
AND OTHER FEDERAL AND STATE STANDARDS, CRITERIA, AND ADVISORIES**
United Plating

	ARSENIC	CADIUM	CHROMIUM ^d	COPPER	MERCURY
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS:					
<u>NYS Class GA Groundwater Standards (µg/l)</u>	25	10	50	200	2.0
<u>Federal Drinking Water Standards-MCL/MCLG (µg/l)</u>	50/50	5/5	100/100	NS/1,300	2/2
<u>National Ambient Air Quality Standards (mg/m³)</u>	N/A	N/A	N/A	N/A	N/A
OTHER FEDERAL AND STATE STANDARDS, CRITERIA, AND ADVISORIES:					
<u>NYS Recommended Soil Cleanup Objectives (mg/kg)</u>	7.5 or SB	1 or SB	10 or SB	25 or SB	0.1
<u>Federal Ambient Water Quality Criteria, Human Health (µg/l)</u>	0.0022	10	50	N/A	0.144
<u>EPA Drinking Water Health Advisory-DWEL (µg/l)</u>	N/A	18	170	N/A	10
<u>NIOSH IDLH (mg/m³)</u>	5 ^a	9 ^a	250	100	10
<u>OSHA PEL-TWA (mg/m³)</u>	0.01	0.005	1	1	0.1 ^e
<u>ACGIH REL-TWA (mg/m³)</u>	0.002 ^b	N/A ^c	0.5	1	0.05 ^f

- a - IDLH based on noncarcinogenic effects only.
 b - Carcinogenic compound; value given is 15-min ceiling value.
 c - Carcinogenic compound; occupational exposures should be limited to lowest feasible concentration.
 d - Chromium values based on total chromium.
 e - Ceiling value.
 f - Value for mercury vapor.
 N/A - Not available.
 NS - No standard.
 SB - Site background.

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**CHEMICAL - SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
AND OTHER FEDERAL AND STATE STANDARDS, CRITERIA, AND ADVISORIES**
United Plating

	NICKEL	SILVER	ZINC	BENZO (a) PYRENE	DIBENZO (a, h) ANTHRACENE
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS:					
<u>NYS Class GA Groundwater Standards (µg/l)</u>	NS	50	300.0	ND	N/A
<u>Federal Drinking Water Standards-MCL/MCLG (µg/l)</u>	100/100	100 ^g	5,000 ^g	0.2/0	0.2/0
<u>National Ambient Air Quality Standards (mg/m³)</u>	N/A	N/A	N/A	N/A	N/A
OTHER FEDERAL AND STATE STANDARDS, CRITERIA, AND ADVISORIES:					
<u>NYS Recommended Soil Cleanup Objectives (mg/kg)</u>	13 or SB	SB	20 or SB	.061 or MD	0.014 or MDL
<u>Federal Ambient Water Quality Criteria, Human Health (µg/l)</u>	13.4	50	N/A	0.0028	0.0028
<u>EPA Drinking Water Health Advisory-DWEL (µg/l)</u>	580	N/A	N/A	N/A	N/A
<u>NIOSH IDHL (mg/m³)</u>	10 ^a	10	N/A	80 ^{a,h}	80 ^{a,h}
<u>OSHA PEL-TWA (mg/m³)</u>	1	0.01	N/A	0.2 ^h	0.2 ^h
<u>ACGIH REL-TWA (mg/m³)</u>	0.015 ^c	0.01	N/A	0.1 ^{c,h}	0.1 ^{c,h}

a - IDHL based on noncarcinogenic effects only.

c - Carcinogenic compound; occupational exposures should be limited to lowest feasible concentration.

g - Secondary maximum contaminant level (SMCL) for drinking water-non-enforceable limit.

h - Value for coal tar pitch volatiles.

N/A - Not available.

ND - A non-detectable concentration by the approved analytical method.

NS - No standard.

SB - Site background.

MDL - Method detection limit.

TABLE 6-19 (Page 3 of 3)

**CHEMICAL - SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
AND OTHER FEDERAL AND STATE STANDARDS, CRITERIA, AND ADVISORIES**
United Plating

	DIBENZOFURAN	FLUORANTHENE	PYRENE
<u>APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS:</u>			
<u>NYS Class GA Groundwater Standards (µg/l)</u>	N/A	50 GV	50 GV
<u>Federal Drinking Water Standards-MCL/MCLG (µg/l)</u>	N/A	N/A	N/A
<u>National Ambient Air Quality Standards (mg/m³)</u>	N/A	N/A	N/A
<u>OTHER FEDERAL AND STATE STANDARDS, CRITERIA, AND ADVISORIES:</u>			
<u>NYS Recommended Soil Cleanup Objectives (mg/kg)</u>	50 ⁱ	50 ⁱ	50 ⁱ
<u>Federal Ambient Water Quality Criteria, Human Health (µg/l)</u>	N/A	42	0.0028
<u>EPA Drinking Water Health Advisory-DWEL (µg/l)</u>	N/A	N/A	N/A
<u>NIOSH IDHL (mg/m³)</u>	N/A	80 ^{a,h}	80 ^{a,h}
<u>OSHA PEL-TWA (mg/m³)</u>	N/A	0.2 ^h	0.2 ^h
<u>ACGIH REL-TWA (mg/m³)</u>	N/A	0.1 ^{c,h}	0.1 ^{c,h}

- a - IDHL based on noncarcinogenic effects only.
 c - Carcinogenic compound; occupational exposures should be limited to lowest feasible concentration.
 h - Value for coal tar pitch volatiles.
 i - Recommended soil cleanup objective for individual SVOCs is 50 ppm.

GV - Guidance value.
 N/A - Not Available.

permissible concentrations of contaminants in soil, air, and water. The origin and definition of each of the ARARs and TBCs are presented below.

6.2.4.1 *ARARs.*

New York State Groundwater Standards have been promulgated by NYSDEC for the protection of human health and/or aquatic life and are legally enforceable. The groundwater at the UP site has been designated as a Class GA groundwater, which is defined as follows: "The best usage of Class GA waters is as a source of potable water supply. Class GA waters are fresh groundwater found in the saturated zone of unconsolidated deposits and consolidated rock or bedrock." Therefore, the Class GA groundwater standards are intended for protection of human health through use of the groundwater as a drinking water.

The Safe Drinking Water Act (SDWA) promulgated National Primary Drinking Water Standards (40 CFR Part 141) for the regulation of contaminants in all surface or groundwaters utilized as potable water supplies. The primary standards include both maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs). MCLs are enforceable standards for specific contaminants based on human health factors as well as the technical and economic feasibility of removing the contaminant from the water supply. MCLGs are unenforceable standards that do not consider the feasibility of contaminant removal. The SDWA also includes secondary MCLs (40 CFR Part 143) that are unenforceable guidelines for those contaminants that may adversely affect the aesthetic quality of drinking water, such as taste, odor, color, and appearance.

The Clean Air Act (CAA) passed in 1977 governs air emissions resulting from remedial actions at CERCLA sites. National Ambient Air Quality Standards (40 CFR Part 50) have been promulgated under the CAA for six criteria pollutants, including airborne particulates. No specific air quality standards for the COCs at this site have been promulgated, however.

6.2.4.2 *TBCs.*

New York State Recommended Soil Cleanup Objectives have been established by NYSDEC in a Technical and Administrative Guidance Memorandum (TAGM) (NYSDEC 1994a). This TBC guidance outlines the basis and procedure for determining soil cleanup levels at a state Superfund site. The document includes recommended soil cleanup objectives as well as eastern United States native soil concentration ranges for metals.

Federal Ambient Water Quality Criteria (AWQC) have been developed by EPA for 64 pollutants. AWQCs are not legally enforceable, but may be referenced by states when developing enforceable water quality standards. AWQCs are available for both the protection of human health from exposure to contaminants in drinking water and for the protection of aquatic life. Only those standards applicable for the protection of human health have been included in Table 6-19.

Drinking Water Health Advisories are unenforceable guidelines developed by EPA for chemicals that may be encountered in drinking water. EPA has prepared long-term (several years to lifetime) health advisories for chronic effects of contaminants. A drinking water equivalent level (DWEL) is calculated as a lifetime health advisory based on 2-l/day water consumption for a 70-kg adult.

National Institute for Occupational Safety and Health (NIOSH) has developed concentrations of contaminants in air that are immediately dangerous to life or health (IDLH) for individuals in occupational settings. The IDLH is the maximum concentration that, in the event of respiratory failure, could be tolerated for 30 min without experiencing any escape-impairment or irreversible health effects. IDLHs are appropriate only for subchronic exposures to noncarcinogenic compounds or effects of compounds in air. These values are not directly applicable to CERCLA sites; however, they may provide guidance concerning the upper bound of safe inhalation exposures to contaminants for on-site workers.

Occupational Safety and Health Administration (OSHA) has promulgated permissible exposure limits (PELs) for a variety of contaminants in air (29 CFR 1910, Subpart Z). PELs are based on time-weighted average (TWA) concentrations to which workers may be exposed over an 8-hr exposure period without adverse health effects. PEL-TWAs are intended for adult workers exposed in an occupational setting and are not directly applicable to CERCLA sites. The PEL-TWAs may be used as guidance values to determine whether long-term exposures to contaminants in air may pose a human health risk.

American Conference of Governmental Industrial Hygienists (ACGIH) has developed threshold limit values (TLVs) for contaminants in air. TLVs are recommendations only and are not legally enforceable. They are intended for use in industrial settings but have been included here as guidance values for determining levels of contaminants in air that may pose a threat to human health. The TLVs presented in Table 6-19 are time-weighted averages

(TLV-TWAs), i.e., concentrations of contaminants in air to which adult workers may be exposed for an 8-hr day over a long period of time without risk of adverse health effects.

6.3 EXPOSURE ASSESSMENT

The purpose of the exposure assessment step in the risk assessment procedure is to identify the exposure pathways by which humans may contact the site COCs, and to estimate the exposure concentrations and chemical intakes for each of the pathways and contaminants. The following sections discuss the identification and screening of potential exposure pathways for the UP site, the calculation of exposure concentrations for the COCs, and the estimation of chemical intakes for the retained exposure pathways.

6.3.1 Identification and Screening of Exposure Pathways

An exposure pathway consists of a source and mechanism of contaminant release, a receiving/transport matrix, a point of potential human contact with the contaminated matrix (i.e., exposure point), and an exposure route (i.e., ingestion, dermal contact, or inhalation). If an exposure pathway is not complete because it does not include a receiving matrix, a point of potential human contact, or an exposure route, then there can be no risk. Potential exposure pathways for the UP site have been identified and screened for the current land use scenario as shown in Table 6-20. The current land use scenario assumes that the site and the adjacent lot will remain in their currently existing state (i.e., vacant), with the exception of the building and its contents. It was assumed for the purposes of this risk assessment that the building and interior debris will be addressed (e.g., through completion of an IRM to remove existing contamination) to eliminate any potential exposure pathways associated with the building. Exposure pathways for potential future land uses of the site, including residential and commercial/industrial use, were also identified and screened as shown in Table 6-21.

The pathways identified in Tables 6-20 and 6-21 have been arranged according to the receiving matrices, i.e., air, surface soils, subsurface soils, groundwater, surface water, sediments, and building interior, that were determined to be contaminated based on the environmental monitoring conducted at the site. The release source and mechanism by which the receiving matrix became contaminated are identified, followed by the exposure points and routes by which humans may realistically encounter the COCs in the receiving media. The potential exposure pathways were then evaluated to identify complete pathways to be included in the quantitative risk assessment. Complete pathways are those for which there

TABLE 6-20 (Page 1 of 3)

SCREENING OF POTENTIAL EXPOSURE PATHWAYS
CURRENT LAND USE SCENARIO
 United Plating Site

RECEIVING MATRIX	RELEASE MECHANISM	RELEASE SOURCE	EXPOSURE POINT	EXPOSURE ROUTE	PATHWAY RETAINED?	SCREENING COMMENTS
Air	Volatilization	Contaminated surface soils	On site within fence	Inhalation	No	Contaminants of concern in surface soils are not volatile.
			On site outside fence	Inhalation	No	Same as above.
			Off site	Inhalation	No	Same as above.
	Fugitive dust generation	Contaminated surface soils	On site within fence	Inhalation	Yes	May be a potential exposure pathway for children trespassing on-site.
			On site outside fence	Inhalation	Yes	Same as above.
			Off site	Inhalation	No	Off-site area is vegetated; generation of fugitive dusts is expected to be minimal.

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**SCREENING OF POTENTIAL EXPOSURE PATHWAYS
CURRENT LAND USE SCENARIO
United Plating Site**

RECEIVING MATRIX	RELEASE MECHANISM	RELEASE SOURCE	EXPOSURE POINT	EXPOSURE ROUTE	PATHWAY RETAINED?	SCREENING COMMENTS
Surface Soils	Spills/tracking	Wastewaters/ drummed wastes previously present at site	On site within fence	Ingestion, dermal contact	Yes	May be a potential exposure pathway for children trespassing on-site.
			On site outside fence	Ingestion, dermal contact	Yes	Same as above.
			Off site	Ingestion, dermal contact	Yes	May be a potential exposure pathway for children playing in empty lot or playground.
Subsurface Soils	Leaching	Past spills/ wastewater discharges	None	Not available	No	Likelihood of human contact with contaminated subsurface soils is minimal.
Groundwater	Leaching	Contaminated soils/ direct discharge of wastes to groundwater	None	Ingestion, dermal contact	No	No potential exposure pathway for contact with groundwater as all homes and businesses in site vicinity are on public water supply.
			On site	Inhalation	No	Exposure to volatilized contaminants is expected to be minimal.

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**SCREENING OF POTENTIAL EXPOSURE PATHWAYS
CURRENT LAND USE SCENARIO
United Plating Site**

RECEIVING MATRIX	RELEASE MECHANISM	RELEASE SOURCE	EXPOSURE POINT	EXPOSURE ROUTE	PATHWAY RETAINED?	SCREENING COMMENTS
Surface Waters	Spills/direct discharges	Drums/tanks containing used or unused chemicals or wastes	None	Not available	No	Only surface waters present at site are in small sumps or floor drains; any such contaminated water will be removed during building remediation (see below).
Sediments	Spills/direct discharges	Drums/tanks containing used or unused chemicals or wastes	None	Not available	No	Only sediments present at site are in small sumps or floor drains; any such contaminated sediments will be removed during building remediation (see below).
Building Materials and Debris	Spills/discharges/fumes	Plating processes conducted at site	None	Not available	No	Potential exposure pathways will be eliminated as a result of the assumed remediation of existing building and contents.

TABLE 6-21 (Page 1 of 2)

SCREENING OF POTENTIAL EXPOSURE PATHWAYS - FUTURE LAND USE SCENARIOS

United Plating Site

RECEIVING MATRIX	RELEASE MECHANISM	RELEASE SOURCE	EXPOSURE POINT	EXPOSURE ROUTE	PATHWAY RETAINED?	SCREENING COMMENTS
Air	Volatilization	Contaminated surface soils	On site	Inhalation	No	Contaminants of concern in surface soils are not volatile.
			Off site	Inhalation	No	Same as above.
	Fugitive dust generation	Contaminated surface soils	On site	Inhalation	Yes	May be a potential exposure pathway for residents or workers at the site.
			Off site	Inhalation	Yes	May be a potential exposure pathway for residents or workers at off-site location.
Surface Soils	Spills/tracking	Wastewaters/ drummed wastes previously present at site	On site	Ingestion, dermal contact	Yes	May be a potential exposure pathway for residents or workers at the site.
			Off site	Ingestion, dermal contact	Yes	May be a potential exposure pathway for residents or workers at off-site location.
Subsurface Soils	Leaching	Past spills/ wastewater discharges	None	Not available	No	Likelihood of human contact with contaminated subsurface soils is minimal.

TABLE 6-21 (Page 2 of 2)

**SCREENING OF POTENTIAL EXPOSURE PATHWAYS -
FUTURE LAND USE SCENARIOS**

United Plating Site

RECEIVING MATRIX	RELEASE MECHANISM	RELEASE SOURCE	EXPOSURE POINT	EXPOSURE ROUTE	PATHWAY RETAINED?	SCREENING COMMENTS
Groundwater	Leaching	Contaminated soils/ direct discharge of wastes to groundwater	None	Ingestion, dermal contact	No	No potential exposure pathway for groundwater as any homes/businesses constructed at site would be connected to public water supply.
			On site	Inhalation	No	Exposure to volatilized contaminants is expected to be minimal.

is a documented release, a known exposure point at which humans may contact the contaminants, and an exposure route by which contact can occur, given the nature of the COCs and the exposure matrix. If an exposure pathway is not complete, then there can be no risk. The results of the screening of potential exposure pathways are included in Tables 6-20 and 6-21 and are discussed below by land use scenario.

6.3.1.1 *Current Land Use Scenario.* Potential air exposure pathways include the inhalation of volatilized constituents and the inhalation of contaminants adsorbed onto fugitive dust particles. Inhalation exposure to volatilized contaminants was eliminated as a potential exposure pathway at this site because the COCs in surface soils, including metals and PAHs, are not volatile. Inhalation of contaminants absorbed onto fugitive dusts was retained as a potential exposure pathway as contaminants adsorbed onto surficial soils may become airborne, primarily in areas of the site with exposed soils. The potential receptors for this exposure pathway are children trespassing on the site, either outside of or within the existing fence. Although adults may also trespass on-site, the frequency of exposure for children is assumed to be greater; in addition, children are more critical receptors due to their smaller body weights and developmental stage. Contaminated surface soils are also present in the adjacent empty lot; however, this area is vegetated and the generation of fugitive dusts is therefore expected to be minimal.

Contaminated surface soils both on and off the site have been retained as potential exposure pathways for children playing at the off-site location (i.e., empty lot) or trespassing on site. The potential exposure routes for contact with contaminated surface soils include ingestion and dermal contact. As with the inhalation pathway, children are expected to be the more critical receptors as they are likely to spend more time playing off-site or trespassing on the site than adults. Although subsurface soils at the site are also contaminated, there is no current exposure point for human contact with these soils. Therefore, the exposure pathways associated with subsurface soils have been eliminated from further consideration for the current land use scenario.

Contamination has been identified in the groundwater beneath the existing building; however, there are no documented potable water users of the groundwater on site or downgradient of the site. All homes and businesses in the site vicinity are on public water supply; therefore, there is no currently existing exposure point for human contact with the contaminated groundwater. The potential exposure pathways related to ingestion of or dermal contact with groundwater have been eliminated from further consideration.

Based on the results of the concentration-toxicity screening, TCE is the only volatile COC in groundwater at the site. To evaluate the potential health risks associated with inhalation of volatilized constituents from groundwater, a transport model must be developed to estimate contaminant concentrations in air from known concentrations in groundwater. The development of such a model requires detailed information on site conditions such as soil porosity, bulk density, moisture content, organic content, and presence of fractures. In the absence of site-specific data for these parameters, the theoretical maximum volatilization of TCE from groundwater was calculated using the following equation:

$$C_G = C_L \times H$$

where

C_G = concentration of TCE in gas phase ($\mu\text{g/l}$)
 C_L = concentration of TCE in liquid phase ($\mu\text{g/l}$)
 H = Henry's Law constant (unitless)

Based on a Henry's Law constant for TCE at 17.5°C of 0.265 and a maximum detected TCE concentration in groundwater of 430 $\mu\text{g/l}$, the theoretical maximum concentration of TCE in air is 114 $\mu\text{g/l}$ (equivalent to 114 mg/m^3). This value was compared to the OSHA PEL for TCE of 546 mg/m^3 for an 8-hr day, indicating that daily exposures to TCE in air at the calculated concentration are not expected to result in adverse health effects.

This calculated theoretical maximum concentration of TCE in air is the concentration in soil gas immediately above the shallow groundwater. The concentration of TCE in air at the ground surface is expected to be considerably less than that immediately above the aquifer due to adsorption, degradation, and diffusion processes affecting transport of TCE through the soil to the surface. The theoretical maximum concentration of TCE in soil gas is well below the OSHA PEL; therefore, exposures at the site due to volatilization of TCE from groundwater are expected to be minimal and this pathway was not retained for further evaluation.

The surface water and sediment samples collected as part of the RI were obtained from sumps or floor drains within or immediately adjacent to the existing building. No other surface water bodies are present on or near the site. Potential exposure to materials in the sumps and floor drains that were sampled is in some cases limited by the presence of grates or covers. As

discussed above, it was assumed that remediation of the building and its contents, including water and sediments, will eliminate any potential exposure pathways for humans.

6.3.1.2 Future Land Use Scenarios. The future use of the UP property is unknown; therefore, the land use scenarios evaluated for identifying potential exposure pathways included residential use of the site and the adjacent empty lot as well as commercial/industrial use of these properties. Although the current zoning of the property is unknown, the future residential use scenario was included for evaluation due to the presence of residential properties on three sides of the site. Residential or commercial/industrial use of the site would necessarily require either demolition of the existing building or other full remediation of any contamination; therefore, no exposure pathways associated with contaminated building materials or contents were considered as part of these scenarios.

As with the current land use scenario, the volatilization of contaminants to air exposure pathway was eliminated from further consideration as an exposure pathway because the COCs at the site (metals and PAHs) are not volatile. Inhalation of fugitive dusts generated from areas of contaminated surface soils was retained for consideration as an exposure pathway for both future residents and workers.

Contact with on- or off-site contaminated surface soils was retained as an exposure pathway for both residents and workers. The potential exposure routes for contact with the contaminants in the surface soils include ingestion and dermal contact. Because there is no potential exposure point for human contact with subsurface soils, they were eliminated as an exposure pathway for consideration.

The groundwater ingestion and dermal contact exposure pathways were not included for further consideration as it was assumed that there will be no future exposure point for human contact with the groundwater. Because of the groundwater contamination above the Class GA standards present at the site, approval would not be given for installation of potable groundwater wells at the site; therefore, any residences or commercial/industrial establishments constructed at the site would be connected to the public water supply system in the area. As discussed for the current land use scenario, exposures to volatilized contaminants from groundwater are expected to be minimal at this site and were therefore eliminated from further consideration.

6.3.2 Exposure Concentrations

To calculate the amount of a chemical that may be ingested, inhaled, or dermally absorbed, the concentration of that chemical in the matrix to which humans may be exposed must be determined. This exposure concentration is an average of the contaminant concentrations present throughout the matrix. Because of the uncertainties associated with any measurement of contaminant concentrations in the environment, the 95% upper confidence limit on the arithmetic average of the measured concentrations of the COCs is used in the risk assessment calculations (EPA 1989a). This value provides an estimate of the reasonable maximum concentration to which a population may be exposed.

Analytical data from the RI for the COCs in surface soils were used to calculate the arithmetic average of the detected concentrations and the 95% upper confidence limit on the arithmetic average, as shown in Table 6-22. All available sample results were included in the calculation of the averages; if the analytical results indicated that a COC was not present above the detection limit in a particular sample, a value of one-half the sample quantitation limit for that compound was used in the calculation.

Chemical-specific air monitoring data were not available for the site. Although models exist for the prediction of particulate concentrations in air from exposed soils, the absence of site-specific data, particularly grain-size information for surface soils, prohibited the development of a representative model for the site. Contaminant concentrations in air were therefore estimated by multiplying the 95% upper confidence limit on the arithmetic average of the surface soil contaminant concentrations by the regional (Schenectady area) average inhalable particulate (PM₁₀) concentration of 20 µg/m³ (NYSDEC 1993). PM₁₀ refers to all respirable airborne particulates with a diameter of 10 µm or less. The resulting calculated contaminant concentrations in air are included in Table 6-23 and are assumed to be reasonable maximum estimates of the concentrations of the COCs in air at the site.

6.3.3 Estimation of Chemical Intakes

6.3.3.1 Intake Equation. Chemical intake is defined as the estimated chemical-specific exposure for each pathway expressed in terms of mass of substance in contact with the body per unit body weight per unit time (i.e., mg/kg-day). The general equation for calculation of chemical intakes is as follows:

TABLE 6-22 (Page 1 of 2)

EXPOSURE CONCENTRATIONS FOR CONTAMINANTS OF CONCERN
United Plating Site

PATHWAY/ CONTAMINANT OF CONCERN	ARITHMETIC AVERAGE OF DETECTED CONCENTRATIONS	95% UPPER CONFIDENCE LIMIT ON ARITHMETIC AVERAGE
Ingestion/Dermal Contact With Off-Site Surface Soils (mg/kg):		
Arsenic	5.7	8.4
Cadmium	2.6	3.3
Chromium	26.9	32.3
Mercury	0.13	0.17
Nickel	54.5	108.9
Zinc	181.1	223.0
Benzo(a)pyrene	1.9	3.4
Ingestion/Dermal Contact With On-Site Surface Soils Outside Fence (mg/kg):		
Arsenic	3.5	4.5
Cadmium	2.0	2.8
Chromium	18.8	21.9
Copper	28.3	32.3
Nickel	18.8	22.0
Zinc	104.8	147.3
Benzo(a)pyrene	0.58	0.95

TABLE 6-22 (Page 2 of 2)

EXPOSURE CONCENTRATIONS FOR CONTAMINANTS OF CONCERN
United Plating Site

PATHWAY/ CONTAMINANT OF CONCERN	ARITHMETIC AVERAGE OF DETECTED CONCENTRATIONS	95% UPPER CONFIDENCE LIMIT ON ARITHMETIC AVERAGE
Ingestion/Dermal Contact With On-Site Surface Soils Within Fence (mg/kg):		
Arsenic	4.2	5.3
Cadmium	7.8	14.3
Chromium	38.7	48.5
Copper	46.5	54.1
Nickel	25.9	31.4
Benzo(a)pyrene	3.7	8.8
Dibenzofuran	0.79	2.0
Fluoranthene	8.7	21.0
Pyrene	7.1	16.9
Dibenzo(a,h)anthracene	0.92	2.2
Ingestion/Dermal Contact With All On-Site Surface Soils (mg/kg):		
Arsenic	3.8	4.6
Cadmium	4.7	7.9
Chromium	28.1	34.1
Copper	36.8	42.0
Nickel	22.0	25.4
Benzo(a)pyrene	2.0	4.4
Dibenzo(a,h)anthracene	0.49	1.1
Dibenzofuran	0.39	0.97
Fluoranthene	4.7	10.5
Pyrene	3.9	8.5

TABLE 6-23 (Page 1 of 2)

INHALATION PATHWAY EXPOSURE CONCENTRATIONS^a
United Plating Site

CONTAMINANT OF CONCERN	EXPOSURE CONCENTRATION (mg/m ³)
Off-Site Surface Soils (mg/kg):	
Arsenic	1.68E-07
Cadmium	6.61E-08
Chromium	6.46E-07
Mercury	3.35E-09
Nickel	2.18E-06
Zinc	4.46E-06
Benzo(a)pyrene	6.74E-08
On-Site Surface Soils Outside Fence (mg/kg):	
Arsenic	9.03E-08
Cadmium	5.62E-08
Chromium	4.38E-07
Copper	6.47E-07
Nickel	4.40E-07
Zinc	2.95E-06
Benzo(a)pyrene	1.90E-06
On-Site Surface Soils Within Fence (mg/kg):	
Arsenic	1.06E-07
Cadmium	2.85E-07
Chromium	9.70E-07
Copper	1.08E-06
Nickel	6.28E-07
Benzo(a)pyrene	1.75E-07
Dibenzofuran	4.04E-08
Fluoranthene	4.20E-07
Pyrene	3.37E-07
Dibenzo(a,h)anthracene	4.41E-08

a - Based on the 95th percentile upper confidence limit on the arithmetic average of detected concentrations of the contaminants in surface soils times the regional average inhalable particulate (PM₁₀) concentration of 20 µg/m³ (NYSDEC 1993).

TABLE 6-23 (Page 2 of 2)

INHALATION PATHWAY EXPOSURE CONCENTRATIONS^a
United Plating Site

CONTAMINANT OF CONCERN	EXPOSURE CONCENTRATION (mg/m ³)
All On-Site Surface Soils (mg/kg)	
Arsenic	9.15E-08
Cadmium	1.58E-07
Chromium	6.81E-07
Copper	8.41E-07
Nickel	5.08E-07
Benzo(a)pyrene	8.85E-08
Dibenzo(a,h)anthracene	2.20E-08
Dibenzofuran	1.94E-08
Fluoranthene	2.09E-07
Pyrene	1.70E-07

- a - Based on the 95th percentile upper confidence limit on the arithmetic average of detected concentrations of the contaminants in surface soils times the regional average inhalable particulate (PM₁₀) concentration of 20 µg/m³ (NYSDEC 1993).

$$\text{Chronic daily intake} = \frac{C \times CR \times EF \times ED}{BW \times AT}$$

where:

- C = chemical concentration; the average concentration contacted over the exposure period
- CR = contact rate; the amount of contaminated matrix contacted per unit time or event
- EF = exposure frequency
- ED = exposure duration
- BW = body weight; the average body weight of the exposed population over the exposure period
- AT = averaging time; period over which the exposure is averaged

The values of the variables in the chemical intake equation are dependent on the exposure pathway under consideration as well as on site-specific and exposed population characteristics. Values for the chemical-intake equation variables are selected so as to estimate the reasonable maximum exposure (EPA 1989a), defined as the highest exposure level that may reasonably be expected to occur at the site. This approach provides a conservative (i.e., high) estimate of the risk that is well above the average circumstance, but still within the range of possible exposures.

Tables 6-24 through 6-32 present the values used for estimation of chemical intakes in this risk assessment. The contaminant concentrations used in the intake equations were the exposure concentrations previously discussed, i.e., the 95% upper confidence limit on the arithmetic average of the contaminant concentrations in the matrix of concern. Where available, the remaining variable values were obtained from the EPA guidance document Standard Default Exposure Factors (EPA 1991). Exposure factors not available in this document were obtained from other EPA guidance (EPA 1989b,c, 1992) or were based on professional judgment, as discussed below. The guidance from which the value was obtained (if applicable) is referenced in the chemical intake equation tables. All intake values calculated for the UP site were chronic daily intakes, i.e., based on exposure time frames of seven years to a lifetime. (For children up to age 6 under the future land use scenario, the intake value was based on a six-year exposure time frame; however, this was treated as a chronic exposure.)

6.3.3.2 Current Land Use Scenario. Chemical intakes were calculated for three potential exposure pathways under the current land use scenario: ingestion of chemicals in soils,

TABLE 6-24

INGESTION OF CHEMICALS IN SOILS
CURRENT LAND USE SCENARIO
United Plating Site

Equation:

$$\text{Intake (mg/kg-day)} = \frac{\text{CS} \times \text{IR} \times \text{CF} \times \text{FI} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

CS = contaminant concentration in soil (mg/kg)
 IR = ingestion rate (mg soil/day)
 CF = conversion factor (10^{-6} kg/mg)
 FI = fraction ingested from contaminated source (unitless)
 EF = exposure frequency (events/year)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT = averaging time (period over which exposure is averaged - days)

Variable Values:

CS: 95% upper confidence limit on the arithmetic average of the field-measured concentrations (Table 6-22) .

IR: Off-site soils - 50 mg/day (ingestion rate for children over age 6 [EPA 1989b]).
 On-site soils (outside fence) - 50 mg/day (assumes same as off-site soils).
 On-site soils (within fence) - 25 mg/day (assume half of off-site soil ingestion rate).

FI: 1.0 (assume all soil contacted is contaminated).

EF: Off-site soils - 124 days/year (assumes 7 days/week during 3 summer months and 2 days/week during spring/fall [5 months]).
 On-site soils (outside fence) - 56 days/year (assumes 3 days/week during 3 summer months and 1 day/week during spring/fall [5 months]).
 On-site soils (within fence) - 56 days/year (same as above).

ED: Off-site soils - 10 years (assumes children ages 6 to 15).
 On-site soils (outside fence) - 10 years (assume children ages 6 to 15).
 On-site soils (within fence) - 7 years (assumes children ages 9 to 15).

BW: 37.8 kg (average body weight of children 6 to 15 years old [EPA 1989b]).
 43.6 kg (average body weight of children 9 to 15 years old [EPA 1989b]).

AT: Noncarcinogenic effects (off-site soils and on-site soils outside fence) - 10 years x 365 days/year = 3650 days.
 Noncarcinogenic effects (on-site soils within fence) - 7 years x 365 days/year = 2555 days.
 Carcinogenic effects - 70 years x 365 days/year = 25,550 days.

DERMAL CONTACT WITH CHEMICALS IN SOILS
CURRENT LAND USE SCENARIO
United Plating Site

Equation:

$$\text{Absorbed Dose (mg/kg-day)} = \frac{\text{CS} \times \text{CF} \times \text{SA} \times \text{AF} \times \text{ABS} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

- CS = contaminant concentration in soil (mg/kg)
 CF = conversion factor (10^{-6} kg/mg)
 SA = skin surface area available for contact (cm^2)
 AF = soil to skin adherence factor (mg/cm^2)
 ABS = absorption factor (unitless)
 EF = exposure frequency (days/year)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT = averaging time (period over which exposure is averaged - days)

Variable Values:

CS: 95% upper confidence limit on the arithmetic average of the field-measured concentrations (Table 6-22).

SA: Off-site soils - 1845 cm^2 (based on 50th percentile skin surface area value for children ages 6 to 15 [EPA 1989b] times 15% of body exposed on average [EPA 1992]).

On-site soils (outside fence) - 2055 cm^2 (same as off-site soils).

On-site soils (within fence) - 1845 cm^2 (based on 50th percentile skin surface area value for children ages 9 to 15 [EPA 1989b] times 15% of body exposed on average [EPA 1992]).

AF: $1.0 \text{ mg}/\text{cm}^2$ (reasonable upper-bound value [EPA 1992]).

ABS: 5% for PAHs (EPA 1989c).

Negligible for inorganics (EPA 1989c).

EF: Off-site soils - 124 days/year (assumes 7 days/week during 3 summer months and 2 days/week during spring/fall [5 months]).

On-site soils (outside fence) - 56 days/year (assumes 3 days/week during 3 summer months and 1 day/week during spring/fall [5 months]).

On-site soils (within fence) - 56 days/year (same as above).

TABLE 6-25 (Page 2 of 2)

**DERMAL CONTACT WITH CHEMICALS IN SOILS
CURRENT LAND USE SCENARIO
United Plating Site**

Variable Values (continued):

ED: Off-site soils - 10 years (assumes children ages 6 to 15).
On-site soils (outside fence) - 10 years (assumes children ages 6 to 15).
On-site soils (within fence) - 7 years (assumes children ages 9 to 15).

BW: 37.8 kg (average body weight of children 6 to 15 years old [EPA 1989b]).
43.6 kg (average body weight of children 9 to 15 years old [EPA 1989b]).

AT: Noncarcinogenic effects (off-site soils and on-site soils
outside fence) - 10 years x 365 days/year = 3650 days.
Noncarcinogenic effects (on-site soils within fence) -
7 years x 365 days/year = 2555 days.
Carcinogenic effects - 70 years x 365 days/year = 25,550 days.

TABLE 6-26

INHALATION OF AIRBORNE (PARTICULATE-PHASE) CHEMICALS
CURRENT LAND USE SCENARIO
United Plating Site

Equation:

$$\text{Intake Dose (mg/kg-day)} = \frac{\text{CA} \times \text{IR} \times \text{ET} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

CA = contaminant concentration in air (mg/m³)
 IR = inhalation rate (m³/hr)
 ET = exposure time (hrs/day)
 EF = exposure frequency (days/year)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT = averaging time (period over which exposure is averaged - days)

Variable Values:

CA: Based on 95% upper confidence limit on the arithmetic average of the field-measured concentrations times the regional average inhalable particulate (PM₁₀) concentration of 20 µg/m³ (NYSDEC 1993) (Table 6-23).

IR: 3.7 m³/hr (reasonable upper-bound outdoor inhalation rate for 10-year-old children [EPA 1989]).
 On - site soils (outside fence).

ET: 4 hrs (estimated maximum period of time children will spend at this location).
 On - site soils (within fence) - 2 hrs (estimated maximum period of time children will spend at this time).

EF: 56 days/year (assumes 3 days/week during 3 summer months and 1 day/week during spring/fall [5 months]).

ED: On-site soils (outside fence) - 10 years (assumes children ages 6 to 15).
 On-site soils (within fence) - 7 years (assumes children ages 9 to 15).

BW: 37.8 kg (average body weight of children 6 to 15 years old [EPA 1989b]).
 43.6 kg (average body weight of children 9 to 15 years old [EPA 1989b]).

AT: Noncarcinogenic effects (on-site soils outside fence)
 - 10 years x 365 days/year = 3650 days.
 Noncarcinogenic effects (on-site soils within fence) -
 7 years x 365 days/year = 2555 days.
 Carcinogenic effects - 70 years x 365 days/year = 25,550 days.

TABLE 6-27

**INGESTION OF CHEMICALS IN SOILS
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

Equation:

$$\text{Intake (mg/kg-day)} = \frac{\text{CS} \times \text{IR} \times \text{CF} \times \text{FI} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

CS = contaminant concentration in soil (mg/kg)
 IR = ingestion rate (mg soil/day)
 CF = conversion factor (10^{-6} kg/mg)
 FI = fraction ingested from contaminated source (unitless)
 EF = exposure frequency (events/year)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT = averaging time (period over which exposure is averaged - days)

Variable Values:

CS: 95% upper confidence limit on the arithmetic average of the field-measured concentrations (Table 6-22).

IR: Children - 200 mg/day (ingestion rate for children up to 6 years old [EPA 1991]).
 Adult - 100 mg/day (ingestion rate for children over age 6 and adults [EPA 1991]).

FI: 1.0 (assume all soil contacted is contaminated).

EF: 350 days/year (average number of days spent at residence per year for both children and adults [EPA 1991]).

ED: Children - 6 years (assumes children up to 6 years old [EPA 1991]).
 Adults - 24 years (90th percentile value for number of years at one residence [EPA 1991]).

BW: Children - 15 kg (average body weight of children 1 to 6 years old [EPA 1991]).
 Adults - 70 kg (average adult body weight [EPA 1991]).

AT: Noncarcinogenic effects (children) - 6 years x 365 days/year = 2190 days.
 Noncarcinogenic effects (adults) - 24 years x 365 days/year = 8760 days.
 Carcinogenic effects - 70 years x 365 days/year = 25,550 days.

TABLE 6-28 (Page 1 of 2)

DERMAL CONTACT WITH CHEMICALS IN SOILS
RESIDENTIAL LAND USE SCENARIO
 United Plating Site

Equation:

$$\text{Absorbed Dose (mg/kg-day)} = \frac{\text{CS} \times \text{CF} \times \text{SA} \times \text{AF} \times \text{ABS} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

- CS = contaminant concentration in soil (mg/kg)
 CF = conversion factor (10^{-6} kg/mg)
 SA = skin surface area available for contact (cm^2)
 AF = soil to skin adherence factor (mg/cm^2)
 ABS = absorption factor (unitless)
 EF = exposure frequency (days/year)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT = averaging time (period over which exposure is averaged - days)

Variable Values:

CS: 95% upper confidence limit on the arithmetic average of the field-measured concentrations (Table 6-22).

SA: Children - 876 cm^2 (based on 50th percentile skin surface area value for children ages 2 to 6 [EPA 1989b] times 12% of body exposed on average [EPA 1992]).

Adults - 2184 cm^2 (based on 50th percentile skin surface area value for adults [EPA 1989b] times 12% of body exposed on average [EPA 1992]).

AF: $1.0 \text{ mg}/\text{cm}^2$ (reasonable upper-bound value [EPA 1992]).

ABS: 5% for PAHs (EPA 1989c).
 Negligible for inorganics (EPA 1989c).

EF: 350 days/yr (average number days spent at residence per year for both children and adults [EPA 1991]).

ED: Children - 6 years (assumes children up to 6 years old [EPA 1991]).
 Adults - 24 years (90th percentile value for number of years at one residence [EPA 1991]).

BW: Children - 15 kg (average body weight of children 1 to 6 years old [EPA 1991]).
 Adults - 70 kg (average adult body weight [EPA 1991]).

TABLE 6-28 (Page 2 of 2)

**DERMAL CONTACT WITH CHEMICALS IN SOILS
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

Variable Values (continued):

AT: Noncarcinogenic effects (children) - 6 years x 365 days/year = 2190 days.

Noncarcinogenic effects (adults) - 24 years x 365 days/year = 8760 days.

Carcinogenic effects - 70 years x 365 days/year = 25,550 days.

TABLE 6-29

INHALATION OF AIRBORNE (PARTICULATE-PHASE) CHEMICALS
RESIDENTIAL LAND USE SCENARIO
 United Plating Site

Equation:

$$\text{Intake Dose (mg/kg-day)} = \frac{\text{CA} \times \text{IR} \times \text{ET} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

CA = contaminant concentration in air (mg/m³)
 IR = inhalation rate (m³/hr)
 ET = exposure time (hrs/day)
 EF = exposure frequency (days/year)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT = averaging time (period over which exposure is averaged - days)

Variable Values:

CA: Based on 95% upper confidence limit on the arithmetic average of the field-measured concentrations times the regional average inhalable particulate (PM₁₀) concentration of 20 µg/m³ (NYSDEC 1993) (Table 6-23).

IR: Children - 3.7 m³/hr (reasonable upper-bound outdoor inhalation rate for 10-year-old children [EPA 1989]).
 Adults - 3.0 m³/hr (reasonable upper-bound outdoor inhalation rate for adults [EPA 1989b]).

ET: Children - 1.0 hr/day (assumes 3 hrs/day, 5 days/week during 3 summer months and 3 day/week during spring/fall, averaged over the whole year).
 Adults - 0.43 hrs/day (annual average amount of time adults spend outdoors [EPA 1989b]).

EF: 350 days/year (average number of days spent at residence per year for both children and adults [EPA 1991]).

ED: Children - 6 years (assumes children up to 6 years old [EPA 1991]).
 Adults - 24 years (90th percentile value for number of years at one residence [EPA 1991]).

BW: Children - 15 kg (average body weight of children 1 to 6 years old [EPA 1991]).
 Adults - 70 kg (average adult body weight [EPA 1991]).

AT: Noncarcinogenic effects (children) - 6 years x 365 days/year = 2190 days.
 Noncarcinogenic effects (adults) - 24 years x 365 days/year = 8760 days.
 Carcinogenic effects - 70 years x 365 days/year = 25,550 days.

TABLE 6-30

**INGESTION OF CHEMICALS IN SOILS
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO
United Plating Site**

Equation:

$$\text{Intake (mg/kg-day)} = \frac{\text{CS} \times \text{IR} \times \text{CF} \times \text{FI} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

CS = contaminant concentration in soil (mg/kg)
 IR = ingestion rate (mg soil/day)
 CF = conversion factor (10^{-6} kg/mg)
 FI = fraction ingested from contaminated source (unitless)
 EF = exposure frequency (events/year)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT = averaging time (period over which exposure is averaged - days)

Variable Values:

CS: 95% upper confidence limit on the arithmetic average of the field-measured concentrations (Table 6-22).

IR: 50 mg/day (ingestion rate for adult workers [EPA 1991]).

FI: 1.0 (assume all soil contacted is contaminated).

EF: 250 days/year (average number of workdays per year [EPA 1991]).

ED: 25 years (95th percentile value for number of years worked at the same location [EPA 1991]).

BW: 70 kg (average adult body weight [EPA 1991]).

AT: Noncarcinogenic effects - 25 years x 365 days/year = 9125 days.
 Carcinogenic effects - 70 years x 365 days/year = 25,550 days.

TABLE 6-31

**DERMAL CONTACT WITH CHEMICALS IN SOILS
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO
United Plating Site**

Equation:

$$\text{Absorbed Dose (mg/kg-day)} = \frac{\text{CS} \times \text{CF} \times \text{SA} \times \text{AF} \times \text{ABS} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

- CS = contaminant concentration in soil (mg/kg)
 CF = conversion factor (10^{-6} kg/mg)
 SA = skin surface area available for contact (cm^2)
 AF = soil to skin adherence factor (mg/cm^2)
 ABS = absorption factor (unitless)
 EF = exposure frequency (days/year)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT = averaging time (period over which exposure is averaged - days)

Variable Values:

CS: 95% upper confidence limit on the arithmetic average of the field-measured concentrations (Table 6-22).

SA: 2184 cm^2 (based on 50th percentile skin surface area value for adults [EPA 1989b] times 12% of body exposed on average [EPA 1992]).

AF: $1.0 \text{ mg}/\text{cm}^2$ (reasonable upper-bound value [EPA 1992]).

ABS: 5% for PAHs (EPA 1989c).
 Negligible for inorganics (EPA 1989c).

EF: 250 days/year (average number of workdays per year [EPA 1991]).

ED: 25 years (95th percentile value for number of years worked at the same location [EPA 1991]).

BW: 70 kg (average adult body weight [EPA 1991]).

AT: Noncarcinogenic effects - 25 years $\times$ 365 days/year = 9125 days.
 Carcinogenic effects - 70 years $\times$ 365 days/year = 25,550 days.

TABLE 6-32

**INHALATION OF AIRBORNE (PARTICULATE-PHASE) CHEMICALS
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO
United Plating Site**

Equation:

$$\text{Intake Dose (mg/kg-day)} = \frac{\text{CA} \times \text{IR} \times \text{ET} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

CA = contaminant concentration in air (mg/m³)
 IR = inhalation rate (m³/hr)
 ET = exposure time (hrs/day)
 EF = exposure frequency (days/year)
 ED = exposure duration (years)
 BW = body weight (kg)
 AT = averaging time (period over which exposure is averaged - days)

Variable Values:

CA: Based on 95% upper confidence limit on the arithmetic average of the field-measured concentrations times the regional average inhalable particulate (PM₁₀) concentration of 20 µg/m³ (NYSDEC 1993) (Table 6-23).

IR: 20 m³/hr (reasonable upper-bound outdoor inhalation rate for adults over 8-hr workday [EPA 1991]).

ET: NA (IR for adults assumes 8-hr workday [EPA 1991]).

EF: 250 days/year (average number of workdays per year [EPA 1991]).

ED: 25 years (95th percentile value for number of years worked at the same location [EPA 1991]).

BW: 70 kg (average adult body weight [EPA 1991]).

AT: Noncarcinogenic effects - 25 years x 365 days/year = 9125 days.
 Carcinogenic effects - 70 years x 365 days/year = 25,550 days.

dermal contact with chemicals in soils, and inhalation of airborne (particulate-phase) chemicals. Three different chemical intake values were also calculated for each potential exposure pathway based on location as different exposure scenarios were assumed for contact with off-site soils (i.e., soils in the adjacent empty lot), on-site soils outside the existing fence, and on-site soils within the existing fence. It was assumed that the off-site location would be frequented by children more often than the site itself. It was also assumed that, because of the difficulty in accessing the on-site area within the fence, older children would be expected to trespass in this area of the site as compared to the children that may trespass on the unfenced portions of the site. The exposure factors assumed for each of the potential exposure pathways and soil locations are discussed below.

Exposure via Ingestion. The exposure factors for the soil ingestion pathway are included in Table 6-24. The ingestion of chemicals in off-site soils assumed that children ages 6 to 15 may play in the empty lot. Children under the age of 15 were assumed to be more sensitive to chemical exposures than older children and adults, who have greater body weights, while children under the age of 6 would be unlikely to spend a substantial amount of time at the empty lot. The average soil ingestion rate for children over the age of 6 has been estimated at 50 mg/day (EPA 1989b). The exposure duration is 10 years based on children ages 6 to 15. The assumed exposure frequency of 124 days/year was based on children playing in the empty lot seven days/week during the three summer months and two days/week during five spring and fall months. The average body weight of children ages 6 to 15 is 37.8 kg (EPA 1989b).

It was assumed that children trespassing on the UP site outside the existing fence were also 6 to 15 years old (exposure duration of 10 years); however, the exposure frequency was assumed to be 56 days/year based on three days/week during the summer months (three months) and one day/week during the spring and fall (five months). The ingestion rate (50 mg/day) and the average body weight (37.8 kg) values used for the off-site location were also used for the on-site location outside the fence.

It was assumed that children ages 9 to 15 may trespass on site within the existing fence. The exposure duration is therefore 7 years. It was assumed that the exposure frequency for the on-site soils within the fence was the same as that for the on-site soils outside the fence (i.e., 56 days/year); however, an ingestion rate of half that assumed for children trespassing outside the fence (i.e., 25 mg/day rather than 50 mg/day) was used as it was assumed that children

would spend less time per trespassing event inside the fence as compared to outside the fence. The average body weight for children ages 9 to 15 is 43.6 kg (EPA 1989b).

Exposure via Dermal Contact. The exposure factors for the dermal contact pathway, presented in Table 6-25, include similar assumptions for the ingestion of chemicals in soils (discussed above) for exposure duration, exposure frequency, and body weight. The skin surface area available for contact with soils was assumed to be 1845 cm² based on the 50th percentile skin surface area value for children ages 6 to 15 (EPA 1989b) times 15% of the body exposed on average for spring, summer, and fall (EPA 1992). The 50th percentile values for skin surface area were used to correspond with the use of an average value for body weight, as it is unlikely that a child with average body weight would have a 90th percentile value for skin surface area (EPA 1989a). The 50th percentile value for skin surface area for children aged 9 to 15 times 15% of the body surface area exposed on average was 2055 cm², corresponding to an average body weight of 43.6 kg.

The dermal contact chemical intake equation includes a factor for the absorption of the chemicals through the skin. The rate of absorption through skin is variable with the COC under consideration. Although few data are available on chemical absorption rates, EPA recommends the use of 5% for PAHs, while the rate of absorption of inorganic compounds through skin is assumed to be negligible (EPA 1989c). Therefore, chemical intakes were calculated only for PAHs. The dermal contact chemical intake equation also includes a factor for the soil-to-skin adherence factor, which was assumed to be 1.0 mg/cm², based on EPA guidance for a reasonable upper-bound value for this factor (EPA 1992).

Exposure via Inhalation. Exposure factors for the inhalation pathway under the current land use scenario are included in Table 6-26. Chemical intakes were calculated for the on-site inhalation pathway only as the off-site location is currently vegetated, and, therefore, the generation of fugitive dusts is expected to be minimal. Although some areas on-site are also vegetated, it was conservatively assumed that fugitive dusts may be generated from all on-site soils. The same exposure duration, exposure frequency, and body weight were assumed here as for the ingestion and dermal contact pathways. An inhalation rate of 3.7 m³/hr was assumed for children trespassing on site outside the fence and an exposure time of 4 hrs/day was assumed. The inhalation rate for children trespassing on site inside the fence was also assumed to be 3.7 m³/hr; however, the exposure time was assumed to be 2 hrs/day.

6.3.3.2 Residential Land Use Scenario. Chemical intakes were calculated for three potential exposure pathways under the future residential land use scenario: ingestion of chemicals in soils, dermal contact with chemicals in soils, and inhalation of airborne (particulate-phase) chemicals. It was assumed that the existing fence would be removed during redevelopment of the site for future residential use and that residents at the site may contact any of the on-site surface soils. Therefore, chemical intakes were calculated for two locations (as opposed to the three locations assumed for the current land use scenario) for each pathway: one for on-site soils and one for off-site soils (i.e., the adjacent empty lot, which may be developed separately from the UP site). Exposure factors assumed for each of the potential exposure factors and soil locations are discussed below.

Exposure via Ingestion. Table 6-27 summarizes the exposure factors for the ingestion of chemicals in soils under the residential land use scenario for both children and adults. The same exposure factors were applied for calculation of chemical intakes for both on-site and off-site soil exposures. The soil ingestion rates assumed were 200 mg/day for children up to 6 years old (EPA 1991) and 100 mg/day for children over age 6 and adults (EPA 1991). The exposure frequency assumed was 350 days/year, the average number of days spent at home for both children and adults (EPA 1991). The exposure durations for this pathway were 6 years for children up to age 6 and 24 years for adults, based on the 90th percentile value for number of years spent at one residence (EPA 1991). The average body weights used were 15 kg for children ages 1 to 6 and 70 kg for adults (EPA 1991).

Exposure via Dermal Contact. The exposure factors assumed for the dermal contact pathway under the residential land use scenario (Table 6-28) were the same as those assumed for the ingestion pathway discussed above for exposure frequency, exposure duration, and average body weight. The dermal contact pathway also includes factors for the skin surface area, which was assumed to be 876 cm² for children and 2184 cm² for adults, based on the 50th percentile skin surface area values for children ages 2 to 6 and adults times 12% of the body exposed on average throughout the year (EPA 1992). The soil-to-skin adherence factor was assumed to be 1.0 mg/cm² as a reasonable upper-bound value (EPA 1992). As discussed for the current land use scenario, the absorption factor for the rate of chemical absorption through the skin was assumed to be 5% for PAHs and negligible for inorganics; therefore, chemical intakes were calculated for PAHs only.

Exposure via Inhalation. Exposure factors for the inhalation pathway assuming future residential use of the site are included in Table 6-29 and are the same as the ingestion and

dermal contact pathways for exposure frequency, exposure duration, and body weight for children and adults. The inhalation rates were based on the reasonable upper-bound outdoor inhalation rates for 10-year-old children and adults of 3.7 m³/hr and 3.0 m³/hr, respectively (EPA 1989b). The exposure time for children was assumed to be 1 hr/day, based on children playing outdoors 3 hrs/day for five days/week during the summer (three months) and for three days/week during the spring and fall (five months), averaged over the whole year. The adult exposure time of 0.43 hr/day was based on the annual average amount of time spent outdoors (EPA 1989b).

6.3.3.4 Commercial/Industrial Land Use Scenario. Chemical intakes were calculated for three potential exposure pathways under the future commercial/industrial land use scenario: ingestion of chemicals in soils, dermal contact with chemicals in soils, and inhalation of airborne (particulate-phase) chemicals. It was assumed that the existing fence would be removed during redevelopment of the site for future commercial/industrial use and that workers at the site may contact any of the on-site surface soils. Therefore, chemical intakes were calculated for two locations for each pathway: one for on-site soils and one for off-site soils. The exposure factors assumed for each of the potential exposure pathways are discussed below.

Exposure via Ingestion. The exposure factors for workers potentially ingesting contaminated surface soils assuming future commercial/industrial land use are included in Table 6-30. These factors were applied for exposure to both on- and off-site soils. The soil ingestion rate was assumed to be 50 mg/day (EPA 1991) and the exposure frequency was 250 days/year based on the average number of workdays per year (EPA 1991). The exposure duration of 25 years is the 95th percentile value for number of years worked at the same location (EPA 1991). The average body weight for adults is 70 kg.

Exposure via Dermal Contact. The exposure factors for dermal contact with contaminated soils by workers both on- and off-site (Table 6-31) are the same as those assumed for ingestion of chemicals in soils as discussed above, with the exception of the skin surface area available for contact, the soil-to-skin adherence factor, and the chemical absorption factor, as required for calculating the dermal contact chemical intake. A skin surface area of 2184 cm² was assumed based on the 50th percentile skin surface area value for adults (EPA 1989b) times 12% of the total body area exposed on average (EPA 1992). EPA's recommended reasonable upper-bound value for the soil-to-skin adherence factor of 1.0 mg/cm² was assumed (EPA 1992). A chemical absorption factor of 5% was used for PAHs; the

absorption of inorganics through skin is assumed to be negligible; therefore, no chemical intakes were calculated for the inorganic COCs (EPA 1989c).

Exposure via Inhalation. The inhalation exposure factors for workers both on- and off-site (Table 6-32) are the same as for the ingestion of chemicals in soils, with the exception of the inhalation rate of 20 m³/day, the reasonable upper-bound inhalation rate for adults over an 8-hr workday (EPA 1991). The inhalation rate for workers assumes an 8-hr workday; therefore, multiplication of the inhalation rate (IR) by the exposure time (ET) in the chemical intake equation is not necessary.

The estimated chemical intakes calculated based on the exposure factors discussed above are summarized in Tables 6-33, 6-34, and 6-35 for the current land use, the future residential land use, and the future commercial/industrial land use scenarios, respectively. The complete chemical intake calculations are included in Appendix J.

6.4 TOXICITY ASSESSMENT

Assessing the toxicity of the COCs is the next step in evaluating the potential human health risks as a result of intake of these chemicals at the levels calculated in the previous section. Adverse health effects that may result from exposure to a COC are identified, and the relationship between the applied dose and the incidence of adverse effects is quantified. Toxicity values, i.e., RfDs and slope factors, are used to estimate the potential for adverse effects as a function of human exposure to the agent. The toxicity values for the COCs are then incorporated with the calculated chemical intakes in the risk characterization step (Section 6.5) to estimate the likelihood of adverse health effects as a result of exposure at this site.

6.4.1 Hazard Identification

This section discusses the currently documented health effects that have been associated with exposure to the site COCs: arsenic, cadmium, chromium, copper, mercury, nickel, zinc, benzo(a)pyrene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, and pyrene. Both acute and chronic symptoms are included as well as noncarcinogenic and carcinogenic effects. The discussion of potential carcinogenic effects of the COCs includes the weight-of-evidence classification assigned to the compound by EPA. The classification system developed by EPA

TABLE 6-33 (Page 1 of 3)

**ESTIMATED CHEMICAL INTAKES BY PATHWAY -
CURRENT LAND USE SCENARIO**

United Plating Site

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHRONIC DAILY INTAKE (mg/kg-day)	
			NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Ingestion of chemicals in soils	Children playing at off-site location	Arsenic	3.77E-06	5.39E-07
		Cadmium	1.48E-06	2.12E-07
		Chromium	1.45E-05	2.07E-06
		Mercury	7.64E-08	Not available
		Nickel	4.89E-05	6.99E-06
		Zinc	1.00E-04	Not available
		Benzo(a)pyrene	Not available	2.18E-07
	Children trespassing on-site outside fence	Arsenic	9.13E-07	1.30E-07
		Cadmium	5.68E-07	8.12E-08
		Chromium	4.44E-06	6.35E-07
		Copper	6.56E-06	Not available
		Nickel	4.46E-06	6.38E-07
		Zinc	2.99E-05	Not available
		Benzo(a)pyrene	Not available	2.75E-08

TABLE 6-33 (Page 2 of 3)

**ESTIMATED CHEMICAL INTAKES BY PATHWAY -
CURRENT LAND USE SCENARIO**

United Plating Site

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHRONIC DAILY INTAKE (mg/kg-day)	
			NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Ingestion of chemicals in soils (continued)	Children trespassing on-site within fence	Arsenic	4.66E-07	4.66E-08
		Cadmium	1.26E-06	1.25E-07
		Chromium	4.27E-06	4.27E-07
		Copper	4.76E-06	Not available
		Nickel	2.76E-06	Not available
		Benzo(a)pyrene	Not available	7.74E-08
		Dibenzo(a,h)anthracene	Not available	1.94E-08
		Dibenzofuran	1.76E-07	Not available
		Fluoranthene	1.85E-06	Not available
		Pyrene	1.49E-06	Not available
Dermal contact with chemicals in soils	Children playing at off-site location	Benzo(a)pyrene	Not available	4.03E-07
	Children trespassing on-site outside fence	Benzo(a)pyrene	Not available	5.08E-08
	Children trespassing on-site within fence	Benzo(a)pyrene	Not available	3.18E-07
		Dibenzo(a,h)anthracene	Not available	7.95E-08
		Dibenzofuran	7.23E-07	Not available
		Fluoranthene	7.59E-06	Not available
		Pyrene	6.11E-06	Not available

TABLE 6-33 (Page 3 of 3)
ESTIMATED CHEMICAL INTAKES BY PATHWAY -
CURRENT LAND USE SCENARIO
 United Plating Site

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHRONIC DAILY INTAKE (mg/kg-day)	
			NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Inhalation of airborne (particulate-phase) chemicals	Children trespassing on-site outside fence	Arsenic	5.42 E-09	7.75E-10
		Cadmium	3.38 E-09	4.82E-10
		Chromium	2.63 E-08	3.76E-09
		Copper	3.89 E-08	Not available
		Nickel	2.64 E-08	3.28E-09
		Zinc	1.77E-07	Not available
		Benzo(a)pyrene	Not available	1.63E-10
	Children trespassing on-site within fence	Arsenic	2.76E-09	2.76E-10
		Cadmium	7.42E-09	7.42E-10
		Chromium	2.53E-08	2.53E-09
		Copper	2.81E-08	Not available
		Nickel	1.64E-08	Not available
		Benzo(a)pyrene	Not available	4.56E-10
		Dibenzo(a,h)anthracene	Not available	1.15E-10
		Dibenzofuran	1.05E-09	Not available
		Fluoranthene	1.09E-08	Not available
		Pyrene	8.78E-09	Not available

TABLE 6-34 (Page 1 of 4)

**ESTIMATED CHEMICAL INTAKES BY PATHWAY -
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHRONIC DAILY INTAKE (mg/kg-day)	
			NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Ingestion of chemicals in soils	Children residing at off-site location	Arsenic	1.07E-04	9.21E-06
		Cadmium	4.22E-05	3.62E-06
		Chromium	4.13E-04	3.54E-05
		Mercury	2.17E-06	Not available
		Nickel	1.39E-03	1.19E-04
		Zinc	2.85E-03	Not available
		Benzo(a)pyrene	Not available	3.73E-06
	Adults residing at off-site location	Arsenic	1.15E-05	3.95E-06
		Cadmium	4.52E-06	1.55E-06
		Chromium	4.42E-05	1.52E-05
		Mercury	2.33E-07	Not available
		Nickel	1.49E-04	5.11E-05
		Zinc	3.05E-04	Not available
		Benzo(a)pyrene	Not available	1.60E-06
	Children residing on-site	Arsenic	0.00000588	5.04E-06
		Cadmium	1.01E-04	8.66E-06
		Chromium	4.36E-04	3.74E-05
		Copper	5.37E-04	Not available
		Nickel	3.25E-04	Not available
		Benzo(a)pyrene	Not available	4.82E-06
		Dibenzo(a,h)anthracene	Not available	1.21E-06
		Dibenzofuran	1.24E-05	Not available
		Fluoranthene	1.34E-04	Not available
		Pyrene	1.09E-04	Not available

TABLE 6-34 (Page 2 of 4)

**ESTIMATED CHEMICAL INTAKES BY PATHWAY -
RESIDENTIAL LAND USE SCENARIO**
United Plating Site

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHRONIC DAILY INTAKE (mg/kg-day)	
			NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Ingestion of chemicals in soils (continued)	Adults residing on-site	Arsenic	6.30E-06	2.16E-06
		Cadmium	1.08E-05	3.71E-06
		Chromium	4.67E-05	0.0016
		Copper	5.75E-05	Not available
		Nickel	3.48E-05	Not available
		Benzo(a)pyrene	Not available	2.07E-06
		Dibenzo(a,h)anthracene	Not available	5.17E-07
		Dibenzofuran	1.33E-06	Not available
		Fluoranthene	1.44E-05	Not available
		Pyrene	1.16E-05	Not available
Dermal contact with chemicals in soil	Children residing at off-site location	Benzo(a)pyrene	Not available	8.16E-07
	Adults residing at off-site location	Benzo(a)pyrene	Not available	0.000000174
	Children residing on-site	Benzo(a)pyrene	Not available	1.06E-06
		Dibenzo(a,h)anthracene	Not available	2.64E-07
		Dibenzofuran	2.72E-06	Not available
		Fluoranthene	2.94E-05	Not available
		Pyrene	2.38E-05	Not available

TABLE 6-34 (Page 3 of 4)

**ESTIMATED CHEMICAL INTAKES BY PATHWAY -
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHRONIC DAILY INTAKE (mg/kg-day)	
			NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Dermal contact with chemicals in soils (continued)	Adults residing on-site	Benzo(a)pyrene	Not available	2.26E-06
		Dibenzo(a,h)anthracene	Not available	5.64E-07
		Dibenzofuran	1.45E-06	Not available
		Fluoranthene	1.57E-05	Not available
		Pyrene	1.27E-05	Not available
Inhalation of airborne (particulate-phase) chemicals	Children residing at off-site location	Arsenic	3.97E-08	3.41E-09
		Cadmium	1.56E-08	1.34E-09
		Chromium	1.53E-07	1.31E-08
		Mercury	7.92E-10	Not available
		Nickel	5.16E-07	4.42E-08
		Zinc	1.05E-06	Not available
		Benzo(a)pyrene	Not available	1.37E-09
	Adults residing at off-site location	Arsenic	6.90E-09	2.37E-09
		Cadmium	2.72E-09	9.31E-10
		Chromium	2.65E-08	9.10E-09
		Mercury	1.38E-10	Not available
		Nickel	8.96E-08	3.07E-08
		Zinc	1.83E-07	Not available
		Benzo(a)pyrene	Not available	9.50E-10

TABLE 6-34 (Page 4 of 4)
**ESTIMATED CHEMICAL INTAKES BY PATHWAY -
 RESIDENTIAL LAND USE SCENARIO**
 United Plating Site

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHRONIC DAILY INTAKE (mg/kg-day)	
			NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Inhalation of airborne (particulate-phase) chemicals (continued)	Children residing on-site	Arsenic	2.16E-08	1.86E-09
		Cadmium	3.74E-08	3.20E-09
		Chromium	1.61E-07	1.38E-08
		Copper	1.99E-07	Not available
		Nickel	1.20E-07	Not available
		Benzo(a)pyrene	Not available	1.79E-09
		Dibenzo(a,h)anthracene	Not available	4.46E-10
		Dibenzofuran	4.59E-09	Not available
		Fluoranthene	4.94E-08	Not available
		Pyrene	4.02E-08	Not available
	Adults residing on-site	Arsenic	3.76E-09	1.29E-09
		Cadmium	6.49E-09	2.23E-09
		Chromium	2.80E-08	9.60E-09
		Copper	3.46E-08	Not available
		Nickel	2.09E-08	Not available
		Benzo(a)pyrene	Not available	1.25E-09
		Dibenzo(a,h)anthracene	Not available	3.10E-10
		Dibenzofuran	7.97E-10	Not available
		Fluoranthene	8.59E-09	Not available
		Pyrene	6.99E-09	Not available

TABLE 6-35 (Page 1 of 3)

**ESTIMATED CHEMICAL INTAKES BY PATHWAY -
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO**

United Plating Site

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHRONIC DAILY INTAKE (mg/kg-day)	
			NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Ingestion of chemicals in soils	Workers at off-site location	Arsenic	4.11E-06	1.47E-06
		Cadmium	1.61E-06	5.77E-07
		Chromium	1.58E-05	5.64E-06
		Mercury	8.32E-08	Not available
		Nickel	5.33E-05	1.90E-05
		Zinc	1.09E-04	Not available
		Benzo(a)pyrene	Not available	5.94E-07
	Workers on-site	Arsenic	2.25E-06	8.04E-07
		Cadmium	3.86E-06	1.38E-06
		Chromium	0.00000167	5.96E-06
		Copper	2.05E-05	Not available
		Nickel	1.24E-05	Not available
		Benzo(a)pyrene	Not available	7.69E-07
		Dibenzo(a,h)anthracene	Not available	1.92E-07
		Dibenzofuran	4.75E-07	Not available
		Fluoranthene	5.14E-06	Not available
		Pyrene	4.16E-06	Not available

TABLE 6-35 (Page 2 of 3)

**ESTIMATED CHEMICAL INTAKES BY PATHWAY -
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHRONIC DAILY INTAKE (mg/kg-day)	
			NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Dermal contact with chemicals in soils	Workers at off-site location	Benzo(a)pyrene	Not available	1.30E-06
	Workers on-site	Benzo(a)pyrene	Not available	1.68E-09
		Dibenzo(a,h)anthracene	Not available	4.20E-07
		Dibenzofuran	1.04E-06	Not available
		Fluoranthene	1.12E-05	Not available
		Pyrene	9.08E-06	Not available
Inhalation of airborne (particulate-phase) chemicals	Workers at off-site location	Arsenic	3.29E-08	1.17E-08
		Cadmium	1.29E-08	4.62E-09
		Chromium	1.26E-07	4.51E-08
		Mercury	6.56E-10	Not available
		Nickel	4.27E-07	1.52E-07
		Zinc	8.73E-07	Not available
		Benzo(a)pyrene	Not available	4.71E-09

TABLE 6-35 (Page 3 of 3)

**ESTIMATED CHEMICAL INTAKES BY PATHWAY -
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHRONIC DAILY INTAKE (mg/kg-day)	
			NONCARCINOGENIC EFFECTS	CARCINOGENIC EFFECTS
Inhalation of airborne (particulate-phase) chemicals (continued)	Workers on-site	Arsenic	1.79E-08	6.40E-09
		Cadmium	3.09E-08	1.10E-08
		Chromium	1.33E-07	4.76E-08
		Copper	1.65E-07	Not available
		Nickel	9.94E-08	Not available
		Benzo(a)pyrene	Not available	6.19E-09
		Dibenzo(a,h)anthracene	Not available	1.54E-09
		Dibenzofuran	3.80E-09	Not available
		Fluoranthene	4.09E-08	Not available
		Pyrene	3.33E-08	Not available

for the weight-of-evidence of carcinogenicity is included in Table 6-36 and indicates the strength of the evidence available concerning the carcinogenicity of the chemical to humans.

6.4.1.1 **Arsenic.** Arsenic is ubiquitous in nature; it is present in the Earth's crust in concentrations of 2 to 5 parts per billion (ppb). It is used in the glass, pigment, textile, tanning, and bronze-plating industries. Arsenic is found in a variety of metal alloys, as well as in some herbicides and insecticides (Cecil 1992).

Elemental arsenic is not toxic even if ingested in substantial amounts. There are three toxic forms of arsenic: pentavalent salts, trivalent salts, and arsenic gas (arsine). Arsenic gas is extremely toxic (Cecil 1992). The arsenic in the Earth's crust and in most foods is in the pentavalent form. Trivalent arsenic, which is far more toxic, accumulates in the body more readily than the pentavalent form. Prolonged contact with trivalent arsenic compounds results in local hyperemia of the skin and later vesicular or pustular eruption. The moist mucous membranes are most sensitive to the irritant action. Contact dermatitis may also be caused by trivalent and pentavalent forms (Sittig 1991).

Acute arsenic poisoning due to ingestion produces symptoms in 0.5 to 4 hrs after exposure, usually characterized by constriction of the throat followed by epigastric pain, vomiting, and diarrhea. Blood may appear in the vomitus and stools. If the amount ingested is sufficiently high, shock may develop due to severe fluid loss. Acute arsenic poisoning due to inhalation (other than arsine) is exceedingly rare in industry. When it does occur, cough, chest pain, dyspnea, giddiness, headache, and weakness precede gastrointestinal symptoms (Sittig 1991).

Chronic arsenic poisoning due to ingestion is rare and generally confined to patients taking prescribed medications. Symptoms are weight loss, nausea, and diarrhea alternating with constipation, pigmentation and eruption of the skin, loss of hair, and peripheral neuritis. Chronic hepatitis and cirrhosis have been described. Horizontal white lines on the fingernails and toenails are commonly seen in chronic arsenic poisoning (Sittig 1991).

Inhalation of trivalent and pentavalent arsenic compounds is the most common cause of chronic poisoning in industrial settings. This condition is divided into three phases based on signs and symptoms. The first stage involves weakness, loss of appetite, nausea, vomiting, a sense of heaviness in the stomach, and diarrhea. During the second stage, conjunctivitis, inflammation of the respiratory passages, hoarseness, and perforation of the nasal septum can occur. The third stage is characterized by peripheral (sensory) neuritis, initially of the hands

TABLE 6-36

**EPA WEIGHT-OF-EVIDENCE CLASSIFICATION SYSTEM
FOR CARCINOGENICITY**
United Plating Site

GROUP	DESCRIPTION
A	Human carcinogen
B1	Probable human carcinogen, based on limited human data
B2	Probable human carcinogen, based on sufficient evidence in animals and inadequate or no evidence in humans
C	Possible human carcinogen
D	Not classified as to human carcinogenicity
E	Evidence of noncarcinogenicity for humans

and feet, which may develop into motor paralyses in more severe cases. Liver damage from chronic arsenic poisoning is still debated. Chronic and acute arsenic poisoning have been reported to be responsible for toxic effects to the myocardium. Arsenic has a depressant effect on bone marrow (Sittig 1991).

Skin cancer may be caused by exposure to arsenic in drugs, drinking water, and in occupational environments. Lung cancer may be caused by exposure to arsenic, but this has not been conclusively shown. Blood dyscrasia and liver tumors may also be associated with exposure to arsenic (Sittig 1991). EPA has assigned a weight-of-evidence classification of A to arsenic, indicating that it is a known human carcinogen.

6.4.1.2 Cadmium. Cadmium is commonly used in electroplating to inhibit the corrosion of metal components. It is a naturally occurring element in air, soil, water, and food and is considered to be nonessential to humans. The major routes of exposure for cadmium include inhalation and ingestion. Symptoms of acute toxicity from inhalation exposures include pulmonary edema and pneumonitis. Other acute inhalation symptoms include dyspnea, coughing, and tightness of the chest. Lung damage, including lung fibrosis, emphysema, and bronchitis, anemia, proteinuria, and renal tubular damage may occur as a result of chronic inhalation exposures (Williams 1985).

Ingestion of high doses of cadmium causes severe irritation to the stomach, leading to vomiting and diarrhea. Other symptoms of acute cadmium poisoning include increased salivation, choking, abdominal pains, tenesmus, and headaches, which may be followed by renal failure and cardiopulmonary collapse. Chronic ingestion of cadmium results in a painful degenerative disease called itai-itai, as well as anemia, suppression of testicular function, and cardiovascular disease accompanied by hypertension.

The carcinogenicity of cadmium has been demonstrated in experimental animals; however, its carcinogenicity in humans is not well defined. Lung cancer has been shown to occur in animals exposed for long periods of time to cadmium in air. Studies in humans also suggest that long-term inhalation of cadmium can result in an increased risk of lung cancer. Prostate cancers have also been associated with cadmium exposures. EPA has assigned cadmium a weight-of-evidence classification of B1, probable human carcinogen, indicating that the human data available for evaluation of the carcinogenicity of this compound are limited. Oral exposures to cadmium are not believed to cause cancer (ATSDR 1993a).

6.4.1.3 **Chromium.** Chromium is commonly used in the electroplating industry as well as in the tanning, pigment production, and graphics industries. Chromium is generally present in the environment in the trivalent form; however, hexavalent chromium may be introduced to the environment via industrial discharges. Under oxidizing conditions, hexavalent chromium is reduced to trivalent chromium.

The acute and chronic adverse effects of chromium on humans are caused primarily by hexavalent chromium. Little information is available on the toxicity of trivalent chromium compounds. Hexavalent chromium is more easily absorbed than trivalent chromium by the lungs and gastrointestinal tract. Acute effects of hexavalent chromium include skin ulceration, irritative dermatitis, allergic skin reactions, allergic asthmatic reactions, ulcerations in the mucous membranes, and perforation of the nasal septum. Chronic effects may include bronchial carcinomas, adenocarcinomas, local sarcomas in muscles, and local carcinomas of the skin. Hexavalent chromium compounds also appear to be mutagenic (ATSDR 1993b). The weight-of-evidence classification assigned by the EPA for chromium is A, indicating that this metal is a known human carcinogen.

6.4.1.4 **Copper.** Copper occurs free or in ores in nature. Metallic copper is widely used in the electrical industry, in piping, roofing, cooking utensils, chemical and pharmaceutical equipment, and coinage. Copper alloys and compounds are also widely used, including for electroplating.

Copper salts act as irritants to the skin, causing itching, erythema, and dermatitis. Conjunctivitis and ulceration and turbidity of the cornea can be caused by exposure of the eye to copper salts. Industrial exposure to copper occurs chiefly from fumes generated in welding copper-containing metals. The fumes and dust cause irritation of the upper respiratory tract, metallic taste in the mouth, nausea, metal fume fever, and in some instances discoloration of the skin and hair. Inhalation of dusts, fumes, and mists of copper salts may cause nasal congestion, and on occasions perforation of the nasal septum. Ingestion of copper salts may result in increased salivation, nausea, vomiting, gastric pain, hemorrhagic gastritis, and diarrhea. It is unlikely that poisoning by ingestion in industry would progress to a serious point as small amounts induce vomiting. Chronic intoxication is rare, occurring only in individuals with Wilson's disease, a genetic condition (Sittig 1991). The EPA's weight-of-evidence classification for copper is D, indicating that it is not classifiable as to its human carcinogenicity.

6.4.1.5 **Mercury.** Mercury is commonly used for the electrolytic production of caustic and chlorine. It is also used in lamps, batteries, rectifiers, switches, barometers, and thermometers. Exposure of the skin and eyes to mercury may cause irritation. Prolonged contact with the skin can result in the symptoms described below under inhalation effects. Short-term exposure to mercury by ingestion generally does not produce ill effects.

Inhalation of mercury present in low levels produces nonspecific symptoms such as shyness, insomnia, anxiety, and loss of appetite. Higher levels may cause headaches, salivation, metallic taste, chills, cough, fever, tremors, abdominal cramps, diarrhea, nausea, vomiting, tightness in the chest, difficulty in breathing, and fatigue. Symptoms may begin several hours after exposure and may last a week. Large doses may result in flu-like symptoms and may result in death due to pneumonia.

Mercury accumulates quickly in the brain during exposure but is released very slowly, resulting in a buildup in brain tissue over time. The liver and kidneys may also be damaged by mercury accumulation. Symptoms of chronic exposure to mercury include headache, dizziness, restlessness, irritability, sleeplessness, tremors, increased salivation, loose teeth, irritation of the gums with a blue line between teeth and gums, loss of appetite, nausea, vomiting, diarrhea, urine changes, red patches on the skin, impaired memory, and possible permanent brain damage. The frequency of complaints and severity of symptoms increase with the levels of exposure. However, many of these symptoms have been reported at levels below recommended limits due to the accumulation of mercury over long-term exposure (Sittig 1991). The weight-of-evidence classification for mercury is D, indicating that it is not classifiable as to its human carcinogenicity.

6.4.1.6 **Nickel.** Nickel is used in industry for plating metal parts. It is an essential trace element for humans, and is present in a wide variety of common materials, including stainless steel and nickel-plated coins and jewelry. Nickel alloys and nickel compounds cause contact and atopic dermatosis in sensitive populations. Nickel dermatosis often begins as an erythema of the hand, with the skin gradually becoming eczematous with generalized lichenification. Ingestion of nickel may also result in chronic dermatitis. Other symptoms include gastroenteritis, colic, anemia, cachexia, and neurological symptoms (tremor and convulsions).

Inhalation of inorganic nickel compounds does not result in acute poisoning. Chronic exposures to nickel in air may result in asthma, hypertrophic rhinitis, nasal sinusitis, nasal polyposis, perforation of the nasal septum, and pulmonary irritations. An increased incidence

of lung, nasal, gastric, and renal cancers has been noted in workers occupationally exposed to nickel-containing dusts. Nickel refinery dusts have been determined to be carcinogenic to exposed workers, while inorganic nickel compounds are potential human carcinogens (ATSDR 1993c). Nickel's weight-of-evidence classification assigned by the EPA is A, indicating that it is a known human carcinogen.

6.4.1.7 Zinc. Zinc is also a commonly used metal in the electroplating industry and is an essential trace element required by humans. The routes of exposure for zinc poisoning include inhalation and ingestion. Acute inhalation exposures to zinc fumes may result in substernal chest pain, cough, dyspnea, impairment of pulmonary function, nasal passage irritation, acute pneumonitis, nausea, abdominal pain, vomiting, ulcers, constipation, headaches, and malaise. The long-term effects of exposure to zinc in air are unknown.

Ingestion of zinc may cause acute poisoning effects, including gastrointestinal distress (vomiting, abdominal cramps, diarrhea), lethargy, light-headedness, and staggering. Chronic effects resulting from ingestion of high doses of zinc include impaired immune and inflammatory responses, decreased levels of high-density lipoprotein cholesterol, anemia, and damage to the pancreas.

No relation between inhalation exposures to zinc and cancers in humans has been demonstrated, and very limited data exist linking ingestion of zinc to possible development of gastric cancers (ATSDR 1992). EPA has given zinc a weight-of-evidence classification of D, indicating that this compound is not classifiable as to its human carcinogenicity.

6.4.1.8 Benzo(a)pyrene. Benzo(a)pyrene is a PAH produced in the United States by one chemical company and distributed by several companies in small quantities for research purposes. It is also a by-product of combustion, with 96% originating from: (1) coal refuse piles, outcrops, and abandoned coal mines; (2) residential external combustion of bituminous coal; (3) coke manufacture; and (4) residential external combustion of anthracite coal. Human exposure to benzo(a)pyrene occurs during chemical production, tarring operations, refuse incinerator operations, power plant operations, coke manufacturing, and during scientific research. The general population may be exposed to benzo(a)pyrene from air pollution, cigarette smoke, and food sources. PAHs are also found in limited amounts in bitumens and asphalts used in industry and for paving.

Benzo(a)pyrene has both local and systemic carcinogenic effects on research animals. Local sarcomas have been produced in nonhuman primates following subcutaneous injections and lung carcinomas have been produced following intratracheal instillation. Benzo(a)pyrene is a potent skin carcinogen in mice. No human epidemiological studies of benzo(a)pyrene are available, and studies are insufficient to prove that benzo(a)pyrene is carcinogenic for man. However, coal tars and other materials known to be carcinogenic to humans may contain benzo(a)pyrene. A 1% solution applied to the skin caused skin irritation in humans (Sittig 1991). The weight-of-evidence classification for benzo(a)pyrene is B2, indicating that it is a probable human carcinogen.

6.4.1.9 Dibenzo(a,h)anthracene. Dibenzo(a,h)anthracene is another PAH formed during the incomplete burning of fossil fuel, garbage, or any organic matter, and is found in smoke in general; it condenses on dust particles and is distributed into water and soil and on crops. Dibenzo(a,h)anthracene is also a component of coal tar pitch, which is used in industry as a binder for electrodes, and of creosote, which is used to preserve wood.

Dibenzo(a,h)anthracene has been found to cause cancer in laboratory animals through ingestion or dermal application. Dibenzo(a,h)anthracene has not been well studied and it is not known whether inhalation causes cancer in humans or whether the substance causes other noncarcinogenic harmful effects (Sittig 1991).

6.4.1.10 Dibenzofuran. Dibenzofuran is used as an insecticide and in organic synthesis. It is a toxic substance but symptoms resulting from exposure to dibenzofuran are not known (Sittig 1991). The EPA weight-of-evidence classification for dibenzofuran is D, indicating that it is not classifiable as to its human carcinogenicity.

6.4.1.11 Fluoranthene. Fluoranthene is a PAH produced from the processing of organic raw materials such as coal and petroleum. It is a natural product of plant biosynthesis. Fluoranthene is also contained in cigarette smoke. Exposure would be expected to be higher near locations where fossil fuels are burned, among coke oven workers, steelworkers, roofers, automobile mechanics, and cigarette smokers.

There is concern about the toxicity of fluoranthene because it is widespread in the environment and belongs to a class of compounds (PAHs) that contain numerous potent carcinogens. Experimentally, fluoranthene has not been shown to be a mutagen or primary carcinogen, but it is a potent cocarcinogen. Other studies have shown its toxicity to various

freshwater and marine organisms, suggesting potential hazards to humans from fluoranthene in water (Sittig 1991). Fluoranthene's weight-of-evidence classification is D, indicating that it is not classifiable as to its human carcinogenicity.

6.4.1.12 **Pyrene.** Pyrene is a PAH used in biochemical research. It is a skin irritant and a suspected mutagen. Despite the high concentrations of pyrene to which humans may be exposed through food, there is currently little information available to implicate diet-derived PAHs as a cause of serious health effects (Sittig 1991). Pyrene's weight-of-evidence classification is D, indicating that it is not classifiable as to its human carcinogenicity.

6.4.2 Toxicity Values

Based on human and animal toxicity studies, EPA has developed toxicity values to quantitatively define the relationship between dose and response. The toxicity values were obtained from the IRIS on-line database, accessed in January 1996. The IRIS database is the preferred source of toxicity values for use in human health risk evaluations. The database is maintained on-line to ensure that the most up-to-date information is available. The HEAST Report (EPA 1995) was consulted when toxicity values were not available on IRIS. The HEAST tables contain interim toxicity values that have not been verified by the EPA workgroup responsible for approving toxicity values.

Toxicity values are provided for both noncarcinogenic and carcinogenic effects of chemicals. Noncarcinogenic effects are evaluated through the use of RfDs and RfCs. An RfD/C is an estimate of the daily exposure level for human populations, including sensitive subpopulations, that is not likely to result in adverse health effects for the exposed population. RfDs are for ingestion of chemicals, while RfCs are for inhalation exposures. Subchronic values are used to characterize potential noncarcinogenic effects associated with shorter-term exposures (two weeks to seven years), while chronic values have been developed for lifetime exposures (seven years to lifetime). As discussed earlier, only chronic exposures have been considered in this risk assessment; therefore, only chronic values are included here.

Carcinogenic effects are evaluated through the use of slope factors. The use of slope factors as opposed to RfD/Cs for carcinogenic effects results from the assumption that there is no threshold concentration of the compound to which humans may be exposed below which carcinogenesis does not occur. Instead, any exposure to a potentially carcinogenic compound poses a finite probability, however small, of generating a carcinogenic response. Therefore,

slope factors are developed that are upper-bound estimates of the probability of a carcinogenic response per unit intake of a chemical over a lifetime. The slope factor is used to estimate the upper-bound probability of developing cancer as a result of exposure to a contaminant over a lifetime at a particular level (EPA 1989a). The EPA weight-of-evidence classification must accompany the slope factor to indicate the degree of certainty in the carcinogenicity of the compound.

Toxicity values for potential noncarcinogenic effects, i.e., RfDs and RfCs, for the contaminants of concern at the UP site are included in Table 6-37. Toxicity values for potential carcinogenic effects, i.e., slope factors, are presented in Table 6-38. The origin of these values, generally either IRIS or the HEAST report, is indicated in the tables. The noncarcinogenic effects table includes the level of confidence in the RfD/Cs as well as the uncertainty and modifying factors that were used in calculation of the RfD/Cs. Uncertainty factors (UFs) represent specific areas of uncertainty that result from extrapolation of toxicity values from available data. EPA has established the following UFs:

- UF of 10 to account for variation in the general human population. This UF is intended to protect sensitive subpopulations, such as the elderly or children.
- UF of 10 to account for extrapolation from animal studies to human studies.
- UF of 10 to account for a no-observed-adverse-effect-level (NOAEL), which was derived from a subchronic rather than a chronic study.
- UF of 10 to account for the use of a lowest-observed-adverse-effect-level (LOAEL) rather than a NOAEL.

In addition to UFs, a modifying factor (MF) ranging from 1 to 10 is applied to reflect EPA's assessment of the quality of the database used to derive the toxicity value.

The toxicity values for chromium included in Tables 6-37 and 6-38 are for hexavalent chromium, which, as discussed in Section 6.4.1.3, is more toxic than trivalent chromium. Total chromium analyses were conducted only on the surface soils collected at the site; therefore, the form of the chromium present is unknown. However, analysis of site wastewater discharges in the past indicated the presence of hexavalent chromium, and therefore it was conservatively assumed that all chromium present in the surface soils is in the hexavalent state.

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TOXICITY VALUES: POTENTIAL NONCARCINOGENIC EFFECTS
United Plating Site

CHEMICAL	RfD/RfC ^a (mg/kg-day)	SOURCE ^b	CONFIDENCE LEVEL	UNCERTAINTY AND MODIFYING FACTORS
Arsenic	RfD: 0.0003	IRIS	MEDIUM	UF= 3 MF= 1
	RfC: NA	-	-	-
Cadmium	RfD: 0.0005	IRIS	HIGH	UF= 10 MF= 1
	RfC: NA	-	-	-
Chromium (VI)	RfD: 0.0005	IRIS	LOW	UF= 500 MF= 1
	RfC: NA	-	-	-
Copper	RfD: 0.04	EPA-ECAO ^c	NA	UF= NA MF= NA
	RfC: NA	-	-	-
Mercury	RfD: 0.0003	HEAST	NA	UF= 1000 MF= NA
	RfC: 0.0003	HEAST	NA	UF= 30 MF= NA
Nickel	RfD: 0.0002	IRIS	MEDIUM	UF= 300 MF= 1
	RfC: NA	-	-	-
Zinc	RfD: 0.0003	IRIS	MEDIUM	UF= 3 MF= 1
	RfC: NA	-	-	-

a - Values provided are for chronic exposure; RfD value is for ingestion of chemicals, RfC is for inhalation of chemicals.

b - Source: EPA's Integrated Risk Information System (IRIS), accessed January 1996, or the Health Effects Assessment Summary Tables (HEAST) Report, Annual FY 1995.

c - Source: EPA-ECAO Regional Support provisional value.

MF - Modifying factor.

UF - Uncertainty factor.

NA - Not available.

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TOXICITY VALUES: POTENTIAL NONCARCINOGEN EFFECTS
United Plating Site

CHEMICAL	RfD/RfC ^a (mg/kg-day)	SOURCE ^b	CONFIDENCE LEVEL	UNCERTAINTY AND MODIFYING FACTORS
Benzo(a)- pyrene	RfD: NA RfC: NA	- -	- -	- -
Dibenzo(a,h)- anthracene	RfD: NA RfC: NA	- -	- -	- -
Dibenzo- furan	RfD: 0.004 RfC: NA	EPA-ECAO ^c -	NA -	UF= NA MF= NA -
Fluoranthene	RfD: 0.04 RfC: NA	IRIS -	MEDIUM -	UF= 3000 MF= 1 -
Pyrene	RfD: 0.03 RfC: NA	IRIS -	MEDIUM -	UF= 3000 MF= 1 -

a - Values provided are for chronic exposure; RfD value is for ingestion of chemicals, RfC is for inhalation of chemicals.

b - Source: EPA's Integrated Risk Information System (IRIS), accessed January 1996, or the Health Effects Assessment Summary Tables (HEAST) Report, Annual FY 1995.

c - Source: EPA-ECAO Regional Support provisional value.

MF - Modifying factor.

UF - Uncertainty factor.

NA - Not available.

TABLE 6-38

TOXICITY VALUES: POTENTIAL CARCINOGENIC EFFECTS
United Plating Site

CHEMICAL	SLOPE FACTOR ^a (mg/kg-day) ⁻¹	WEIGHT-OF-EVIDENCE CLASSIFICATION ^b	SOURCE ^c
Oral Route:			
Arsenic	1.75E+00	A	IRIS
Cadmium	NA	D	IRIS
Chromium	NA	D	IRIS
Copper	NA	D	IRIS
Mercury	NA	D	IRIS
Nickel	NA	NA ^d	IRIS
Zinc	NA	D	IRIS
Benzo(a)pyrene	7.30E+00	B2	IRIS
Dibenzo(a,h)anthracene	7.30E+00 ^g	B2	EPA-ECAO ^g
Dibenzofuran	NA	D	IRIS
Fluoranthene	NA	D	IRIS
Pyrene	NA	D	IRIS
Inhalation Route:			
Arsenic	1.51E+01	A	IRIS
Cadmium	6.30E+00	B1	IRIS
Chromium	4.20E+01	A	IRIS
Copper	NA	D	IRIS
Mercury	NA	D	IRIS
Nickel	8.40E-01 ^e	A	IRIS
Zinc	NA	D	IRIS
Benzo(a)pyrene	6.10E+00 ^f	B2	EPA-ECAO ^g
Dibenzo(a,h)anthracene	6.10E+00 ^g	B2	EPA-ECAO ^g
Dibenzofuran	NA	D	IRIS
Fluoranthene	NA	D	IRIS
Pyrene	NA	D	IRIS

a - Slope factors listed are for chronic exposures.

b - See Table 6-38 for description of Weight-Of-Evidence Classification System.

c - Source: EPA's Integrated Risk Information System (IRIS), accessed January 1996, or the Health Effects Assessment Summary Tables (HEAST) Report, Annual FY 1995.

d - This compound is currently under evaluation by EPA for potential human carcinogenicity.

e - Slope factor for nickel refinery dusts.

f - Slope factor withdrawn from IRIS.

g - Source: EPA-ECAO Regional Support provisional value.

NA - Not available.

6.5 RISK CHARACTERIZATION

In risk characterization, the exposure assessment and toxicity assessment results are combined to obtain estimates of the risk to human health posed by the site. To characterize the risk for potential carcinogenic effects, the probability that a receptor will develop cancer over a lifetime of exposure is estimated from the chronic daily intake and the chemical-specific slope factor. Similarly, the risk of potential noncarcinogenic effects occurring is characterized by comparing the chronic daily intake for each chemical and pathway and the respective RfD/Cs for those chemicals. The total risk for each pathway is then calculated by summing the carcinogenic or noncarcinogenic risks for each chemical included in that pathway.

The following sections characterize of the noncarcinogenic and carcinogenic risks that may be posed by the COCs present at the UP site. The uncertainty in this risk assessment is discussed in Section 6.5.4.

6.5.1 Noncarcinogenic Risk Estimate

The potential for noncarcinogenic health effects resulting from exposure to COCs at the levels calculated in Section 6.3 is evaluated by comparing the chronic daily intakes to the chemical-specific RfD/Cs. The comparison is performed by calculating the hazard quotient, which is defined as the ratio of the chronic intake to the chronic RfD/C:

$$\text{Noncancer Hazard Quotation} = \frac{\text{Chronic Intake}}{\text{Chronic RfD/C}}$$

The hazard quotients calculated for each COC and exposure pathway are presented in Tables 6-39 to 6-41 by land use scenario (i.e., current land use, future residential land use, and future commercial/industrial land use). The complete risk characterization calculations are included in Appendix J. A hazard quotient of unity (1.0) or greater indicates that there may be a concern of noncarcinogenic health effects occurring in humans as a result of exposure. The greater the value of the hazard quotient above unity, the greater the level of concern; however, the hazard quotient should not be interpreted as a statistical probability of noncarcinogenic health effects occurring.

Individual hazard quotients were then summed for each pathway to obtain a hazard index for that pathway, as shown in Tables 6-39 to 6-41. The hazard indices provide an estimate of the

TABLE 6-39 (Page 1 of 2)

**RISK CHARACTERIZATION: ESTIMATED HAZARD INDICES -
CURRENT LAND USE SCENARIO**

United Plating Site

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	HAZARD QUOTIENT
Ingestion of chemicals in soils	Children playing at off-site location	Arsenic	0.0126
		Cadmium	0.003
		Chromium	0.0029
		Mercury	0.0003
		Nickel	0.0024
		Zinc	0.0003
	Pathway Hazard Index:		0.0215
	Children trespassing on-site outside fence	Arsenic	0.00304
		Cadmium	0.00114
		Chromium	0.00089
		Copper	0.00016
		Nickel	0.00022
		Zinc	0.0001
	Pathway Hazard Index:		0.00555
	Children trespassing on-site within fence	Arsenic	0.00155
		Cadmium	0.00252
		Chromium	0.00085
		Copper	0.00012
		Nickel	0.00014
		Dibenzofuran	0.00004
		Fluoranthene	0.00005
		Pyrene	0.00005
	Pathway Hazard Index:		0.00532

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**RISK CHARACTERIZATION: ESTIMATED HAZARD INDICES -
CURRENT LAND USE SCENARIO**

United Plating Site

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	HAZARD QUOTIENT	
Dermal contact with chemicals in soils	Children trespassing on-site within fence	Dibenzofuran	0.00018	
		Fluoranthene	0.00019	
		Pyrene	0.0002	
		Pathway Hazard Index:		0.00057
Inhalation of airborne (particulate-phase) chemicals	Children trespassing on-site outside fence	Arsenic	NV	
		Cadmium	NV	
		Chromium	NV	
		Copper	NV	
		Nickel	NV	
		Zinc	NV	
		Pathway Hazard Index:		NV
		Children trespassing on-site within fence	Arsenic	NV
Cadmium	NV			
Chromium	NV			
Copper	NV			
Nickel	NV			
Dibenzofuran	NV			
Fluoranthene	NV			
Pyrene	NV			
Pathway Hazard Index:		NV		
Total Hazard Index for Off-Site Children Across All Pathways:			0.0215	
Total Hazard Index for Children On-Site Outside Fence Across All Pathways:			0.00555	
Total Hazard Index for Children On-Site Within Fence Across All Pathways:			0.00589	

NV - No value; no RfC available for quantification of risk, indicating that these contaminants either are not associated with adverse noncarcinogenic health effects from inhalation or inadequate data exist to evaluate noncarcinogenic inhalation risks.

TABLE 6-40 (Page 1 of 3)

**RISK CHARACTERIZATION: ESTIMATED HAZARD INDICES -
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	HAZARD QUOTIENT
Ingestion of chemicals in soils	Children residing at off-site location	Arsenic	0.358
		Cadmium	0.0844
		Chromium	0.0826
		Mercury	0.0072
		Nickel	0.0696
		Zinc	0.0095
		Pathway Hazard Index:	0.6113
	Adults residing at off-site location	Arsenic	0.0384
		Cadmium	0.009
		Chromium	0.0088
		Mercury	0.0008
		Nickel	0.0075
		Zinc	0.001
		Pathway Hazard Index:	0.0655
	Children residing on-site	Arsenic	0.196
		Cadmium	0.202
		Chromium	0.0872
		Copper	0.0134
		Nickel	0.0162
		Dibenzofuran	0.0031
		Fluoranthene	0.0034
		Pyrene	0.0036
		Pathway Hazard Index:	0.5249

TABLE 6-40 (Page 2 of 3)

**RISK CHARACTERIZATION: ESTIMATED HAZARD INDICES -
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	HAZARD QUOTIENT
Ingestion of chemicals in soils (continued)	Adults residing on-site	Arsenic	0.021
		Cadmium	0.0216
		Chromium	0.0093
		Copper	0.0014
		Nickel	0.0017
		Dibenzofuran	0.0003
		Fluoranthene	0.0004
		Pyrene	0.0004
Pathway Hazard Index:			0.0561
Dermal contact with chemicals in soils	Children residing on-site	Dibenzofuran	0.00068
		Fluoranthene	0.00074
		Pyrene	0.00079
		Pathway Hazard Index:	
	Adults residing on-site	Dibenzofuran	0.00036
		Fluoranthene	0.00039
		Pyrene	0.00042
		Pathway Hazard Index:	
Inhalation of airborne (particulate-phase) chemicals	Children residing at off-site location	Arsenic	NV
		Cadmium	NV
		Chromium	NV
		Mercury	0.000003
		Nickel	NV
		Zinc	NV
		Pathway Hazard Index:	
	Adults residing at off-site location	Arsenic	NV
		Cadmium	NV
		Chromium	NV
		Mercury	0.0000005
		Nickel	NV
		Zinc	NV
Pathway Hazard Index:			0.0000005

NV - No value; no RfC available for quantification of risk, indicating that these contaminants either are not associated with adverse noncarcinogenic health effects from inhalation or inadequate data exist to evaluate noncarcinogenic inhalation risks.

TABLE 6-40 (Page 3 of 3)

**RISK CHARACTERIZATION: ESTIMATED HAZARD INDICES -
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	HAZARD QUOTIENT
Inhalation of airborne (particulate-phase) chemicals (continued)	Children residing on-site	Arsenic	NV
		Cadmium	NV
		Chromium	NV
		Copper	NV
		Nickel	NV
		Dibenzofuran	NV
		Fluoranthene	NV
		Pyrene	NV
	Pathway Hazard Index:		NV
	Adults residing on-site	Arsenic	NV
		Cadmium	NV
		Chromium	NV
		Copper	NV
		Nickel	NV
		Dibenzofuran	NV
		Fluoranthene	NV
		Pyrene	NV
	Pathway Hazard Index:		NV
	Total Hazard Index for Off-Site Children Across All Pathways:		0.6113
	Total Hazard Index for Off-Site Adults Across All Pathways:		0.0655
	Total Hazard Index for On-Site Children Across All Pathways:		0.5271
	Total Hazard Index for On-Site Adults Across All Pathways:		0.0573

NV - No value; no RfC available for quantification of risk, indicating that these contaminants either are not associated with adverse noncarcinogenic health effects from inhalation or inadequate data exist to evaluate noncarcinogenic inhalation risks.

TABLE 6-41 (Page 1 of 3)

**RISK CHARACTERIZATION: ESTIMATED HAZARD INDICES -
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	HAZARD QUOTIENT	
Ingestion of chemicals in soils	Workers at off-site location	Arsenic	0.0137	
		Cadmium	0.0032	
		Chromium	0.0032	
		Mercury	0.0003	
		Nickel	0.0027	
		Zinc	0.0004	
	Pathway Hazard Index:			0.0235
	Workers on-site	Arsenic	0.0075	
		Cadmium	0.00773	
		Chromium	0.00334	
		Copper	0.00051	
		Nickel	0.00062	
		Dibenzofuran	0.00012	
		Fluoranthene	0.00013	
		Pyrene	0.00014	
	Pathway Hazard Index:			0.02009
Dermal contact with chemicals in soils	Workers on-site	Dibenzofuran	0.00026	
		Fluoranthene	0.00028	
		Pyrene	0.0003	
	Pathway Hazard Index:			0.00084

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**RISK CHARACTERIZATION: ESTIMATED HAZARD INDICES -
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	HAZARD QUOTIENT
Inhalation of airborne (particulate-phase) chemicals	Workers at off-site location	Arsenic	NV
		Cadmium	NV
		Chromium	NV
		Mercury	0.000002
		Nickel	NV
		Zinc	NV
Pathway Hazard Index:			0.000002

NV - No value; no RfC available for quantification of risk, indicating that these contaminants either are not associated with adverse noncarcinogenic health effects from inhalation or inadequate data exist to evaluate noncarcinogenic inhalation risks.

TABLE 6-41 (Page 3 of 3)

**RISK CHARACTERIZATION: ESTIMATED HAZARD INDICES -
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	HAZARD QUOTIENT
Inhalation of airborne (particulate-phase) chemicals (continued)	Workers on-site	Arsenic	NV
		Cadmium	NV
		Chromium	NV
		Copper	NV
		Nickel	NV
		Dibenzofuran	NV
		Fluoranthene	NV
		Pyrene	NV
Pathway Hazard Index:			NV
Total Hazard Index for Off-Site Workers Across All Pathways:			0.023502
Total Hazard Index for On-Site Workers Across All Pathways:			0.02093

NV - No value; no RfC available for quantification of risk, indicating that these contaminants either are not associated with adverse noncarcinogenic health effects from inhalation or inadequate data exist to evaluate noncarcinogenic inhalation risks.

aggregate risk that may be posed to humans as a result of exposure to more than one contaminant through a particular pathway. A hazard index greater than unity indicates the potential for noncarcinogenic health effects for exposed populations. Any hazard quotient exceeding unity for a particular exposure pathway will automatically result in a hazard index greater than unity for that pathway; however, the sum of several hazard quotients of less than unity may also result in a hazard index that exceeds unity.

The hazard quotients and indices for the current land use scenario do not exceed unity for any of the exposure pathways evaluated (Table 6-39). Ingestion of chemicals in soils resulted in the highest estimated hazard quotients; however, the hazard quotients for this pathway were several orders of magnitude below unity. Chemicals in off-site soils resulted in higher estimated hazard quotients as compared to on-site soils, with a hazard index of 0.0215, due to the generally high concentrations of the COCs detected at the off-site location. The hazard indices for exposure to on-site soils outside the fence and within the fence were estimated at 0.00555 and 0.00532, respectively. For off-site soils, arsenic was the largest contributor to the total hazard index, while for on-site soils, arsenic and cadmium had the highest estimated hazard quotients. The estimated hazard index for dermal contact with on-site soils within the fence was calculated as 0.00057. Hazard quotients for the inhalation of airborne contaminants could not be calculated as RfCs were not available for any of the COCs in on-site soils, indicating that adverse noncarcinogenic health effects have not been found to be associated with inhalation of these contaminants or that inadequate data exist for quantification of the risks. The total hazard indices across all pathways for children off-site, for children on-site outside the fence, and for children on-site within the fence were 0.0215, 0.0056, and 0.0059, respectively, all well below unity.

The future residential land use scenario also did not result in hazard quotients or indices above unity (Table 6-40). For the ingestion pathway, off-site soils again resulted in a slightly higher estimated hazard index than on-site soils due to the generally higher concentrations of the COCs detected off-site. The hazard indices for ingestion of soils by children exceeded the hazard indices for ingestion of soils by adults by an order of magnitude for both on- and off-site soils. Arsenic contributed most substantially to the overall hazard index for off-site soils for both children and adults, while arsenic and cadmium had the highest hazard quotients for on-site soils. Dermal contact with on-site soils is not expected to result in adverse noncarcinogenic health effects for either adults or children, with calculated hazard indices one to two orders of magnitude below the estimated hazard indices for ingestion of chemicals in soils.

Mercury was the only COC with an RfC allowing for the quantification of noncarcinogenic inhalation risks for the future residential land use scenario. The estimated hazard quotient for inhalation of mercury for children was six orders of magnitude below unity, while the hazard quotient for inhalation of particulate-phase mercury by adults was seven orders of magnitude below unity. The lack of RfCs for the other COCs indicates that either inhalation of these compounds has not been associated with noncarcinogenic health effects or that inadequate data exist for the quantification of any such risks. The inhalation exposures are likely to be overestimated by this risk assessment as the calculated chemical intakes assume that all contaminated soils are exposed and may generate fugitive dusts; however, the portions of the site not covered by any future residences would most likely be vegetated or otherwise covered. Gardens, generally a small portion of a residential lot, are the only likely areas of exposed soils, and therefore the concentration of contaminated dust in the air at the site will most likely be substantially below the level assumed here.

The total hazard index summed from all potential exposure pathways was 0.6113 for children off-site and 0.5271 for children on-site, both below unity. The total hazard index across all pathways for adults both off- and on-site was an order of magnitude lower than the indices calculated for children, with values of 0.0655 and 0.0573, respectively.

The potential for adverse noncarcinogenic health effects associated with the future commercial/industrial use of the site is estimated to be very low (Table 6-41). The pathway hazard indices for ingestion of chemicals in soils by workers on- and off-site were estimated to be 0.02009 and 0.0235, respectively. Arsenic had the highest hazard quotient of the COCs at the off-site location, while arsenic, cadmium, and chromium contributed approximately equally to the total pathway hazard index for ingestion of on-site soils. The estimated pathway hazard index for dermal contact with contaminants in on-site soils by workers was several orders of magnitude below unity (0.00084). As with the residential land use scenario, mercury was the only COC for which an RfC was available for quantification of the noncarcinogenic health risks through the inhalation exposure pathway, resulting in a hazard quotient six orders of magnitude below unity. The total hazard indices across all pathways were approximately 0.02 for both on- and off-site workers.

6.5.2 Carcinogenic Risk Estimate

Carcinogenic risk is estimated as the increased possibility of a receptor developing cancer over a lifetime as a result of exposure to a COC through one of the identified pathways. The carcinogenic slope factors, as identified in Section 6.4.2, are multiplied by the chronic daily intakes to obtain the incremental cancer risk to the receptor. The following equation is used to quantify carcinogenic health risks:

$$\text{Cancer Risk} = \text{Chronic Daily Intake} \times \text{Slope Factor}$$

The calculated cancer risks for the COCs for each exposure pathway are presented in Tables 6-42 through 6-44 by land use scenario. The risk calculations for all scenarios are included in Appendix J. The acceptable level of cancer risk as a result of exposure to carcinogenic compounds is 1×10^{-6} , or an increased cancer risk of one in one million (NYSDEC 1994a).

The estimated cancer risks for the current land use scenario are included in Table 6-42. The ingestion of chemicals in soils poses a slightly increased cancer risk for children playing at the off-site location (2.53×10^{-6}). This risk is associated with ingestion of benzo(a)pyrene and arsenic in soils. No slope factors were available for cadmium, chromium, or nickel, as increased incidences of cancer have not been associated with ingestion of these chemicals. The estimated cancer risks for children trespassing on site outside the fence and within the fence were both below 1×10^{-6} , with values of 4.29×10^{-7} and 7.88×10^{-7} , respectively. Arsenic and benzo(a)pyrene contributed approximately equally to the risk associated with ingestion of on-site soils from outside the fence, while dibenzo(a)anthracene also contributed to the risk for soils on-site within the fence.

Slightly increased cancer risks were calculated for dermal contact with off-site soils (2.94×10^{-6}) and with on-site soils within the fence (2.90×10^{-6}). The estimated cancer risk for dermal contact with on-site soils outside the fence was slightly below 1×10^{-6} (3.71×10^{-7}). The dermal contact pathway risk is associated with carcinogenic PAHs in the soils, i.e., benzo(a)pyrene and dibenzo(a,h)anthracene.

The inhalation pathway did not result in increased cancer risks above 1×10^{-6} for either on-site soils within or outside the fence (values of 1.18×10^{-7} and 1.77×10^{-7} , respectively). The off-site soil inhalation exposure pathway was not evaluated as the vegetative cover present

TABLE 6-42 (Page 1 of 2)

**RISK CHARACTERIZATION: ESTIMATED CARCINOGENIC RISK -
CURRENT LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHEMICAL- SPECIFIC RISK
Ingestion of chemicals in soils	Children playing at off-site location	Arsenic	9.44E-07
		Cadmium	NV
		Chromium	NV
		Nickel	NV
		Benzo(a)pyrene	1.59E-06
		Total Pathway Risk:	2.53E-06
	Children trespassing on-site outside fence	Arsenic	2.28E-07
		Cadmium	NV
		Chromium	NV
		Nickel	NV
		Benzo(a)pyrene	2.01E-07
		Total Pathway Risk:	4.29E-07
	Children trespassing on-site within fence	Arsenic	8.16E-08
		Cadmium	NV
		Chromium	NV
		Benzo(a)pyrene	5.65E-07
		Dibenzo(a,h)anthracene	1.41E-07
		Total Pathway Risk:	7.88E-07

NV - No value; no slope factor available for quantification of risk, indicating that these contaminants either have not been found to be carcinogenic upon ingestion or inadequate data exist to evaluate their carcinogenicity via this pathway.

TABLE 6-42 (Page 2 of 2)

**RISK CHARACTERIZATION: ESTIMATED CARCINOGENIC RISK -
CURRENT LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHEMICAL- SPECIFIC RISK
Dermal contact with chemicals in soil	Children playing at off-site location	Benzo(a)pyrene	2.94E-06
		Total Pathway Risk:	2.94E-06
	Children trespassing on-site outside fence	Benzo(a)pyrene	3.71E-07
		Total Pathway Risk:	3.71E-07
	Children trespassing on-site within fence	Benzo(a)pyrene	2.32E-06
		Dibenzo(a,h)anthracene	5.81E-07
		Total Pathway Risk:	2.90E-06
	Inhalation of airborne (particulate-phase) chemicals.	Arsenic	1.17E-08
		Cadmium	3.04E-09
		Chromium	1.58E-07
		Nickel	3.17E-09
		Benzo(a)pyrene	9.95E-10
		Total Pathway Risk:	1.77E-07
	Children trespassing on-site within fence	Arsenic	4.17E-09
		Cadmium	4.68E-09
		Chromium	1.06E-07
		Benzo(a)pyrene	2.78E-09
		Dibenzo(a,h)anthracene	7.01E-10
		Total Pathway Risk:	1.18E-07
	Total Estimated Risk Off-Site Children Across All Pathways:		5.47E-06
	Total Estimated Risk For Children On-Site Outside Fence Across All Pathways		9.77E-07
	Total Estimated Risk For Children On-Site Within Fence Across All Pathways:		3.81E-06

NV - No value; no slope factor available for quantification of risk, indicating that these contaminants either have not been found to be carcinogenic upon ingestion or inadequate data exist to evaluate their carcinogenicity via this pathway.

TABLE 6-43 (Page 1 of 4)

**RISK CHARACTERIZATION: ESTIMATED CARCINOGENIC RISK -
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHEMICAL- SPECIFIC RISK
Ingestion of chemicals in soils	Children residing at off-site location	Arsenic	1.61E-05
		Cadmium	NV
		Chromium	NV
		Nickel	NV
		Benzo(a)pyrene	2.72E-05
		Total Pathway Risk:	4.33E-05
	Adults residing at off-site location	Arsenic	6.90E-06
		Cadmium	NV
		Chromium	NV
		Nickel	NV
		Benzo(a)pyrene	1.17E-05
		Total Pathway Risk:	1.86E-05
	Children residing on-site	Arsenic	8.82E-06
		Cadmium	NV
		Chromium	NV
		Benzo(a)pyrene	3.52E-05
		Dibenzo(a,h)anthracen	8.80E-06
		Total Pathway Risk:	5.28E-05

NV - No value; no slope factor available for quantification of risk, indicating that these contaminants either have not been found to be carcinogenic upon ingestion or inadequate data exist to evaluate their carcinogenicity via this pathway.

TABLE 6-43 (Page 2 of 4)

**RISK CHARACTERIZATION: ESTIMATED CARCINOGENIC RISK -
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHEMICAL- SPECIFIC RISK
Ingestion of chemicals in soils (continued)	Adults residing at on-site	Arsenic	3.78E-06
		Cadmium	NV
		Chromium	NV
		Benzo(a)pyrene	1.51E-05
		Dibenzo(a,h)anthracen	3.77E-06
		Total Pathway Risk:	2.27E-05
Dermal contact with chemicals in soil	Children residing at off-site location	Benzo(a)pyrene	5.96E-06
		Total Pathway Risk:	5.96E-06
	Adults residing at off-site location	Benzo(a)pyrene	1.27E-05
		Total Pathway Risk:	1.27E-05

NV - No value; no slope factor available for quantification of risk, indicating that these contaminants either have not been found to be carcinogenic upon ingestion or inadequate data exist to evaluate their carcinogenicity via this pathway.

TABLE 6-43 (Page 3 of 4)

**RISK CHARACTERIZATION: ESTIMATED CARCINOGENIC RISK -
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHEMICAL- SPECIFIC RISK
Inhalation of airborne (particulate-phase) chemicals	Children residing on-site	Benzo(a)pyrene	7.71E-06
		Dibenzo(a,h)anthracen	1.93E-06
		Total Pathway Risk:	9.64E-06
	Adults residing on-site	Benzo(a)pyrene	1.65E-05
		Dibenzo(a,h)anthracen	4.12E-06
		Total Pathway Risk:	2.06E-05
	Children residing at off-site location	Arsenic	5.14E-08
		Cadmium	8.44E-09
		Chromium	5.50E-07
		Nickel	3.71E-08
		Benzo(a)pyrene	8.34E-09
		Total Pathway Risk:	6.55E-07
	Adults residing at off-site location	Arsenic	3.57E-08
		Cadmium	5.87E-09
		Chromium	3.82E-07
		Nickel	2.58E-08
		Benzo(a)pyrene	5.79E-09
		Total Pathway Risk:	4.55E-07
	Children residing on-site	Arsenic	2.80E-08
		Cadmium	2.02E-08
		Chromium	5.80E-07
		Benzo(a)pyrene	1.09E-08
		Dibenzo(a,h)anthracen	2.72E-09
		Total Pathway Risk:	6.42E-07
	Adults residing on site	Arsenic	1.95E-08
		Cadmium	1.40E-08
		Chromium	4.03E-07
		Benzo(a)pyrene	7.61E-09
		Dibenzo(a,h)anthracen	1.89E-09
		Total Pathway Risk:	4.46E-07

TABLE 6-43 (Page 4 of 4)

**RISK CHARACTERIZATION: ESTIMATED CARCINOGENIC RISK -
RESIDENTIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHEMICAL- SPECIFIC RISK
	Total Estimated Risk for Children Residing Off-Site Across All Pathways		4.99E-05
	Total Estimated Risk for Adults Residing Off-Site Across All Pathways		3.18E-05
	Total Estimated Risk for Children Residing On-Site Across All Pathways		6.31E-05
	Total Estimated Risk for Adults Residing On-Site Across All Pathways		4.37E-05

TABLE 6-44 (Page 1 of 2)

**RISK CHARACTERIZATION: ESTIMATED CARCINOGENIC RISK -
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHEMICAL- SPECIFIC RISK
Ingestion of chemicals in soils	Workers at off-site location	Arsenic	2.57E-06
		Cadmium	NV
		Chromium	NV
		Nickel	NV
		Zinc	4.34E-06
		Total Pathway Risk:	6.91E-06
	Workers on-site	Arsenic	1.41E-06
		Cadmium	NV
		Chromium	NV
		Benzo(a)pyrene	5.61E-06
		Dibenzo(a,h)anthracene	1.40E-06
		Total Pathway Risk:	8.42E-06
Dermal contact with chemicals in soil	Workers at off-site location	Benzo(a)pyrene	9.47E-06
		Total Pathway Risk:	9.47E-06
	Workers on-site	Benzo(a)pyrene	1.23E-05
		Dibenzo(a,h)anthracene	3.06E-06
		Total Pathway Risk:	1.54E-05

NV - No value; no slope factor available for quantification of risk, indicating that these contaminants either have not been found to be carcinogenic upon ingestion or inadequate data exist to evaluate their carcinogenicity via this pathway.

TABLE 6-44 (Page 2 of 2)

**RISK CHARACTERIZATION: ESTIMATED CARCINOGENIC RISK -
COMMERCIAL/INDUSTRIAL LAND USE SCENARIO
United Plating Site**

EXPOSURE PATHWAY	RECEPTOR	CHEMICAL	CHEMICAL- SPECIFIC RISK	
Inhalation of airborne (particulate-phase) chemicals	Workers at off-site location	Arsenic	1.77E-07	
		Cadmium	2.91E-08	
		Chromium	1.90E-06	
		Nickel	1.28E-07	
		Benzo(a)pyrene	2.87E-08	
	Total Pathway Risk:			2.26E-06
	Workers on-site	Arsenic	9.66E-08	
		Cadmium	6.96E-08	
		Chromium	2.00E-06	
		Benzo(a)pyrene	3.77E-08	
		Dibenzo(a,h)anthracene	9.38E-09	
	Total Pathway Risk:			2.21E-06
Total Estimated Risk for Off-Site Workers Across All Pathways:			1.86E-05	
Total Estimated Risk for On-Site Workers Across All Pathways:			2.60E-05	

in the vacant lot is expected to prohibit the generation of fugitive dusts. Chromium in soils resulted in the highest estimated increased cancer risk for both on-site soil locations.

The resulting total estimated cancer risks for children across all pathways (ingestion, dermal contact, and inhalation) for the off-site soils and on-site soils within the fence slightly exceeded 1×10^{-6} , with values of 5.48×10^{-6} and 3.81×10^{-6} , respectively. Exposure to on-site soils outside the fence across all potential exposure pathways resulted in an estimated total increased cancer risk below 1×10^{-6} (9.77×10^{-7}).

All estimated carcinogenic risks for the future residential land use scenario exceeded 1×10^{-6} , with the exception of the inhalation risk pathway (Table 6-43). The estimated total pathway risks for children and adults residing at the off-site location and ingesting surface soils were 4.33×10^{-5} and 1.86×10^{-5} , respectively. This risk was attributable in both cases to the presence of benzo(a)pyrene and arsenic in soils. Children and adults residing on-site had slightly higher estimated pathway risks of 5.28×10^{-5} and 2.26×10^{-5} , respectively, than residents at the off-site location. The on-site estimated cancer risks were attributable to ingestion of benzo(a)pyrene, dibenzo(a,h)anthracene, and arsenic in surface soils. Dermal contact with surface soils also resulted in increased cancer risks above 1×10^{-6} for both children and adults at both locations, attributable to contact with benzo(a)pyrene in soils for the off-site location and with both benzo(a)pyrene and dibenzo(a,h)anthracene in soils on site. The estimated cancer risks for the dermal contact pathway ranged from 2.06×10^{-5} for adults residing on-site to 5.96×10^{-6} for children residing at the off-site location.

The inhalation of airborne contaminants did not result in estimated cancer risks above 1×10^{-6} for children or adults at either location. The estimated total inhalation pathway risks ranged from 4.46×10^{-7} for adults residing on-site to 6.55×10^{-7} for children residing off-site. Chromium was the largest contributor to the estimated inhalation pathway risks.

The total estimated risks across all pathways for the future residential land use scenario exceeded 1×10^{-6} by approximately one order of magnitude for both children and adults. The total estimated risk for children residing at the off-site location across all pathways was 4.99×10^{-5} and for children residing on-site was 6.31×10^{-5} . The total estimated risk across all pathways for adults residing off-site was 3.18×10^{-5} and for adults residing on-site was 4.36×10^{-5} .

The future commercial/industrial land use scenario resulted in carcinogenic risks that exceeded 1×10^{-6} for all potential exposure pathways (ingestion of soils, dermal contact with soils, and inhalation of airborne particulates). The total pathway risk for workers at the off-site location ingesting chemicals in soils was 6.91×10^{-6} , attributable to ingestion of arsenic and benzo(a)pyrene in soils. Ingestion of on-site soils also resulted in a slightly increased cancer risk (8.42×10^{-6}), attributable to the presence of arsenic, benzo(a)pyrene, and dibenzo(a,h)anthracene. Dermal contact with benzo(a)pyrene in off-site soils resulted in an estimated increased cancer risk for workers of 9.47×10^{-6} , while benzo(a)pyrene and dibenzo(a,h)anthracene both contributed to the estimated cancer risk of 1.53×10^{-5} for dermal exposures by on-site workers.

The inhalation pathway resulted in increased cancer risks slightly above 1×10^{-6} for both on- and off-site workers, with total pathway risk values of 2.21×10^{-6} and 2.26×10^{-6} , respectively. The estimated increased cancer risks for the inhalation pathway were primarily the result of chromium exposures. The total estimated cancer risks across all pathways for the future commercial/industrial land use scenario were 1.86×10^{-5} for off-site workers and 2.59×10^{-5} for on-site workers.

6.5.3 Conclusions

The risk assessment concluded that the COCs detected at the site at the currently identified levels do not pose unacceptable noncarcinogenic health risks to potentially exposed populations at the UP site. However, the health risk assessment concluded that several contaminants present in site surface soils at the currently identified levels, including carcinogenic PAHs (benzo[a]pyrene and dibenzo[a,h]anthracene) and metals (arsenic and chromium), pose increased cancer risks to current and future exposed populations. The potentially exposed current populations include children playing at the off-site location (the adjacent vacant lot) and children trespassing, future residential children and adults either off- or on-site, and future workers at both the off- and on-site locations. The estimated increased cancer risks ranged from slightly above 1×10^{-6} for children under the current land use scenario to an order of magnitude above 1×10^{-6} for the future residential and commercial/industrial land use scenarios.

6.5.4 Uncertainty

There are a number of sources of uncertainty in the quantification of the human health risk posed by the COCs present at the UP site. Uncertainty is introduced in the measurement of contaminant concentrations in site media, in the calculation of chemical intakes based on the exposure factor assumptions, and in the toxicity values used for evaluating the health risks resulting from intake of the chemicals at the levels estimated. These uncertainties are discussed below.

The estimation of chemical intakes in the risk assessment process is based on the measured contaminant concentrations at the site. The exposure concentrations used in the chemical intake equations are the 95% upper confidence limit on the arithmetic average of the detected contaminant concentrations in the media of concern. Use of the 95% upper confidence limit is recommended by EPA due to the uncertainty associated with any estimate of exposure concentration and is assumed to be a reasonable upper-bound concentration for contact by humans; however, confidence in the exposure concentrations is directly related to confidence in the analytical data for the site. As noted in the shallow soil data summary tables (Tables 6-1 through 6-3), a number of the compound values have been qualified by the data validator, indicating uncertainty in the data as to the contaminant concentrations present in the sample. The uncertainty associated with the surface soil data therefore results in uncertainty in the calculated exposure concentrations, which carries through the calculation of the chemical intakes and estimation of risks.

The exposure factors used in this risk assessment were based on the currently available guidance. Many of these factors are based on limited data; therefore, their use introduces uncertainty into the calculation of chemical intakes. Those factors for which guidance values were not available were estimated based on professional judgment and a knowledge of site conditions. Development of site-specific exposure factors also introduces uncertainty in the risk assessment process.

The slope factors developed by EPA are generally conservative and are intended to represent an upper-bound limit of the probability of a cancer response. Thus, the actual risk of cancer due to exposure to the COCs is likely to be lower than the estimated risk. The RfD/Cs are also conservative; however, they are generally considered to have an uncertainty of an order of magnitude or more. Consequently, the calculated hazard indices may be estimated high or low by an order of magnitude. As most of the hazard indices calculated for the UP site

were several orders of magnitude below unity, the likelihood of increased noncarcinogenic health effects resulting from contact with the COCs at the site is still expected to be low.

CHAPTER 7

HABITAT ASSESSMENT

7.1 INTRODUCTION

An ecological assessment of the UP site in Schenectady, New York, was performed on Tuesday, 17 October 1995, in accordance with guidelines provided in the NYSDEC document Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (NYSDEC 1994a). It consisted of a one-day site reconnaissance conducted to identify predominant on-site cover types, typical vegetative species, and fish and wildlife species expected to occupy each habitat. This assessment is required under Article 27 of the ECL to determine the potential for environmental damage caused by inactive hazardous waste sites. NYSDEC and the U.S. Fish and Wildlife Service (USF&WS) were contacted to determine whether any endangered, threatened, or special concern species inhabit the surrounding vicinity.

7.1.1 Study Area

The site is located at the junction of Seneca and Foster streets in the City of Schenectady, Schenectady County, New York. The UP property is approximately 1.7 acres, approximately one-third of which is covered by structures, gravel, or pavement. It is bordered on three sides by residential housing and on one side by an old field. On the southeastern side of the building is a small wetlands area. Though the open field habitat behind the building is not a part of the site, it is directly adjacent. A walkover of this field was deemed appropriate as wildlife using this habitat likely extend their home range to the UP property.

7.1.2 Methodology

The intent of the reconnaissance survey was to make a qualitative assessment of the ability of the habitat and cover types within 0.5 mile of the site to support fish and wildlife species. Factors to be considered in this determination were food, cover, bedding areas, and breeding sites. Use of fish and wildlife resources by humans (hunting, wildlife observation, etc.) on or within 0.5 mile of the site were also considered in assessing resource value.

7.2 DATA REVIEW AND FIELD STUDIES

To determine the presence of special concern, threatened, or endangered species at or in the vicinity of the UP facility, letters were sent to NYSDEC and USF&WS (Appendix K). Using the maps and site description provided by LMS, the agencies researched any documented sightings of protected species or significant habitat in the vicinity of the site.

A search of New York State Natural Heritage Program records (Appendix K) yielded the names of two species of vascular plants. Both plants are considered unprotected in New York State and have a G5 heritage ranking, meaning that the species are demonstrably secure globally but may be quite rare in parts of their range, especially at the periphery. The last reported siting of *Leucospora multifida* (or *Leucospora*) in the city of Schenectady was in 1993. This plant is also ranked S1, indicating that there are typically five or fewer occurrences and very few remaining individuals or acres, or some factor of the species biology that makes it especially vulnerable in New York. The species is listed as an "obligate" (almost always occurring in wetlands) by USF&WS. The last reported sighting of *Polygonum erectum*, or erect knotweed, was in 1946. This plant has a heritage rank of SH, meaning it is historically known to occur in New York State but has not been seen for the last 15 years. It is classified as "facultative upland" (occurring in nonwetlands) by USF&WS.

USF&WS reported that no Federally listed or proposed endangered or threatened species are known to occur in the project area. USF&WS also stated that their consultation of the National Wetlands Inventory (NWI) maps indicates no wetlands in the project area.

7.3 ECOLOGICAL COMMUNITIES AND WILDLIFE RESOURCES

All the species presented in Table 7-1 were found in the area immediately surrounding the UP building and/or in the field adjacent to the eastern side of the building. Neither of the two plant species mentioned by the New York State Natural Heritage Program were found. Three ecological communities were found in the study area: successional old field, reedgrass/purple loosestrife marsh, and interior/exterior of industrial building. These communities were classified according to descriptions provided in the NYSDEC document *Ecological Communities of New York State* (Reschke 1990) and are described below individually.

TABLE 7-1

VEGETATION SPECIES FOUND IN THE UP STUDY AREA (17 October 1995)
United Plating

COMMON NAME	SCIENTIFIC NAME	CLASSIFICATION
Chicory	<i>Cichorium intybus</i>	Perennial herb
Timothy grass	<i>Phleum pratense</i>	Perennial herb
Burdock	<i>Arctium minus</i>	Biennial herb
Red clover	<i>Trifolium pratens</i>	Perennial herb
Asters	<i>Aster</i> sp.	Perennial herb
New England aster	<i>Aster novae-angliae</i>	Perennial herb
Queen Anne's lace	<i>Daucus carota</i>	Herbaceous plant
Purple loosestrife	<i>Decodon verticillatus</i>	Herbaceous plant
Japanese knotweed	<i>Polygonum cuspidatum</i>	Perennial herb
Goldenrod	<i>Solidago juncea</i>	Perennial herb
Reed grass	<i>Phragmites communis</i>	Perennial herb
Mugwort	<i>Artemisia vulgaris</i>	Perennial herb
Orchard grass	<i>Dactylis glomerata</i>	Herbaceous plant
Foxtail	<i>Setaria</i> sp.	Annual
Lowbush blueberry	<i>Vaccinium angustifolium</i>	Shrub
Nightshade	<i>Solanum dulcamara</i>	Perennial herb
Peppergrass	<i>Lepidium virginicum</i>	Annual
Fox grape	<i>Vitis labrusca</i>	Vine
Concord grape	<i>Vitis</i> sp.	Vine
Virginia creeper	<i>Parthenocissus quinquefolia</i>	Vine
Staghorn sumac	<i>Rhus typhina</i>	Shrub
Grey birch	<i>Betula populifolia</i>	Tree
American elm	<i>Ulmus americana</i>	Tree
Black walnut	<i>Juglans nigra</i>	Tree
Box elder	<i>Acer negundo</i>	Tree
Quaking aspen	<i>Populus tremuloides</i>	Tree
Apple tree	<i>Malus</i> sp.	Tree

7.3.1 Successional Old Field

The successional old field found adjacent to and just east of the UP building is described as a meadow dominated by forbs and grasses on a site that has been cleared (for farming or development) and then abandoned (as per Reschke 1990). Herbs typical of these sites that were found at UP were goldenrod, orchard grass, common evening primrose, Queen Anne's lace, ragweed, dandelion, ox-tongue, calico aster, and New England aster. Shrubs may also be present in this ecological community, but account for less than 50% of the cover, as was the case with UP. Characteristic shrubs include arrow-wood, sumac, and raspberries. A typical bird species for this community is the field sparrow. Left to its own, this community would eventually succeed to a shrubland, woodland, or forest (Reschke 1990).

Wildlife observed using the site (or evidence thereof) include the brown snake, garter snake, feral cat, skunk, raccoon, and pigeon. Given the size, location, and use of this small patch of land (estimated at 0.3 acre), it will likely remain a field until some other use is found for it.

7.3.2 Reedgrass/Purple Loosestrife Marsh

This community, as defined by Reschke (1990), is a marsh that has been disturbed by filling or draining. In this small, approximately 600-ft² marsh behind (southeastern side) the UP building, tall reedgrass (*Phragmites australis*) and scatterings of purple loosestrife (*Lythrum salicaria*) were the dominant forms of vegetation. A feral cat was seen in this marsh during the survey. This ecological community is commonly found throughout New York State.

7.3.3 Interior/Exterior of Industrial Building

The deserted interior of the UP site may provide cover and habitat for rodents, pigeons, cats, bats, and birds such as the chimney swift (*Chaetura pelagica*). Scattered debris in the back of the building (eastern side) provides cover that may be used as habitat by small animals. Characteristic birds that may nest and roost on the exterior include American robin (*Turdus migratorius*), barn swallow (*Hirundo rustica*), rock dove (*Columba livia*), house sparrow (*Passer domesticus*), and European starling (*Sturnus vulgaris*) (Reschke 1990).

7.4 POTENTIAL RECEPTORS AND PATHWAYS OF EXPOSURE

Vegetation, animals, and birds may be exposed to contaminants contained in soil by various mechanisms. Wildlife species can become exposed to contaminants by direct ingestion of vegetation, by indirect ingestion soil particles, or by drinking from pools of water overlying contaminated soil. Vegetation may accumulate contaminants during uptake of water and nutrients from soil.

There is very limited habitat immediately surrounding the UP site; therefore, a limited number of species and individuals will make use of it. Potential receptors include those species found in each ecological community described above. Birds may nest in the abandoned building, but their forage area will extend beyond the site to the limits of their respective home ranges. Because of its size, the field adjacent to the site will only support vegetation and wildlife species with a very small home range (e.g., small snakes).

7.5 SUMMARY AND CONCLUSIONS

The field reconnaissance for this survey was completed during one day in fall 1995. The weather was sufficiently cold to preclude the presence of some species of animals that may have otherwise been seen such as rodents (including squirrels), snakes, and some birds. Small passerine birds, such as warblers, would have migrated out of the area. Nonetheless, the vegetation and wildlife species observed or determined to inhabit the UP site are typical of the successional old field habitat. Evidence of the presence of larger species typical to residential neighborhoods (e.g., skunk, raccoon) was also observed.

The area of the UP site itself is too small and developed to provide any valuable or significant wildlife habitat, and no rare, threatened, or endangered species were found in either the field reconnaissance or literature search. The only potential on-site habitats are the field to the southwest of the building and the patch of wetland behind (southeast) the building, both of which are too small to provide any significant cover. The 0.3-acre vacant lot directly behind (east) the UP building was the largest habitat in the vicinity of the site. The successional old field provides habitat for some species such as green snake, brown snake, rodents, and some medium-sized mammals such as skunks. The size and placement of this habitat make it limited in value as a wildlife resource because it is bordered on two sides by residential property, on one side by a road, and on the other side by the UP site. The neighborhood surrounding the

site is best described as suburban and is highly developed, thereby discouraging any significant use of this site by wildlife, except those species tolerant of human presence/disturbance. Additionally, the site does not appear to provide significant recreational (or other) use for humans.

CHAPTER 8

SUMMARY AND CONCLUSIONS

8.1 FIELD INVESTIGATION

The remedial investigation portion of the UP project was conducted under two tasks. During Task 2a, Initial Site Characterization, the extent of contamination of the equipment and debris within the building and degree of contamination of the building structure was determined. This was done by collecting and analyzing wipe, sweep, concrete chip, wood chip, and paint chip samples. As part of this task samples of sediment were collected and analyzed from sumps/drains inside and outside the building and, if present, water contained within these sumps/drains was collected and analyzed. This was done to determine whether the sumps/drains contained any hazardous wastes and may have been or continue to be a source of contamination to the soil and groundwater.

Soil and groundwater samples were collected and analyzed from various locations in and around the building using a probe. The samples were taken to provide information on the subsurface soil and groundwater contamination and to aid in locating the monitoring wells constructed under Task 2b.

Shallow soil samples, i.e., from 0-6 in. in depth, were collected and analyzed from 40 locations both on-site and off-site to determine the extent of soil contamination. These data were also used in the risk assessment.

Task 2b, Detailed Site Characterization, consisted of the construction, sampling, and analysis of test pits around the building to locate possible sources of contamination. Based on the test pit investigation and the soil and groundwater probe investigation, 12 monitoring wells were installed around and inside the building. At one upgradient and two downgradient locations triplicate wells were installed. The wells consisted of one shallow overburden well, one deeper overburden well installed at the overburden/bedrock interface, and one bedrock well. At all three locations, one soil sample from the overburden was collected and analyzed. Three wells were installed in the overburden underneath the building. At each location one soil sample was collected and analyzed.

Each well was sampled twice. During the first round samples were collected and analyzed for the TCL organics and TAL inorganics and cyanide. Both filtered and unfiltered metals were collected from most samples (sample volume limited the actual analyses that could be done). After receipt and review of the first round of data, a second round of sampling was recommended. During the second round samples were collected and analyzed for VOCs using a low-level method, PCBs, and unfiltered metals and cyanide.

The additional RI at the UP site was performed to further characterize the nature and extent of contamination identified during the previous RI. A GPR survey was performed on site, followed by the construction, sampling, and analysis of 14 monitoring wells and sampling and analysis of the 12 existing wells around and on the site.

GPR was performed along the front of the building to locate buried underground sewer, water, and/or drainage lines, and to determine their depths.

One triplicate set of wells was installed upgradient; one triplicate set, one double set, and one single well were installed in downgradient locations; and, one triplicate set and one double set were installed in utility bed trenches to monitor the possible flow of contamination off the site. The wells consisted of one shallow overburden well, one deeper overburden well installed at the overburden/bedrock interface, and one bedrock well. At UPMW-9B two soil samples, and at UPMW-10B, -11A, and -12C, one soil sample each were collected and analyzed for VOCs and TAL metals.

Groundwater samples were collected from the 12 existing, and the 14 new wells, and most samples (sample volume limited the actual analyses that could be done) were analyzed for low-level VOCs, TAL metals, cyanide, and low-level PCBs.

8.2 DATA INTERPRETATION

8.2.1 Building and Equipment Contamination

An investigation was conducted to determine the extent of contamination inside the building. The sampling effort consisted of collecting 94 wipe samples for metals and cyanide; 50 sweep and 20 concrete chip samples for metals, cyanide, and TCLP metals; 16 wood chip samples for metals and cyanide (with eight of the wood chips also analyzed for TCLP metals); and 20

paint chip samples for total lead analysis. The data were used in the focused feasibility study (FFS) of the building and contents conducted as part of Task 3.

The wipe samples were taken primarily from debris and equipment inside the building. The results indicated that the majority of the contaminated equipment and debris were found in the first four floors of the main building and in the wastewater treatment building. The rooms that formerly contained offices and upper floor storage rooms did not appear to have much contaminated debris and equipment. Most of the debris/equipment is contaminated with the site-related metals: cadmium, chromium, copper, lead, nickel, zinc, and cyanide. Of these metals only cadmium, chromium, and lead are considered hazardous; the other metals and cyanide do not have a TCLP limit. The wipe data were used to estimate the quantity of contaminated and hazardous debris requiring disposal in the FFS.

Ten of the pieces of equipment/debris were decontaminated by steam cleaning. The results of the precleaning and postcleaning wipe sample results show that 75% of the site-related metals were removed by steam cleaning.

Some of the paint chips were taken from pieces of debris/equipment. The results indicated that some of the equipment/debris was painted with lead-based paint (LBP). The paint itself has a potential to exceed the 5-mg/l TCLP limit for lead (based on the 20:1 dilution used by the TCLP test and dividing the total concentration by 20 will derive a concentration that exceeds the TCLP standard). Therefore, any sample with lead over 100 mg/kg has the potential to have leachable lead above the TCLP limit.

The sweep samples were samples of dust and dirt taken from surfaces inside the building and within pieces of equipment such as vats. The results indicated a high percentage of the samples contained cadmium, chromium, and/or lead above the TCLP limit. The entire first floor, including the office, yielded samples that exceeded the TCLP limit for one or more parameters. The samples also had high levels of copper, nickel, zinc, and cyanide. The highest TCLP chromium concentration was found in a sample from the second floor in the pipe and spring room at the bottom of a vat. All rooms on the second floor, with the exception of the office and parts storage room (which was not sampled), had at least one sample with a metal over the TCLP limit. The brewery room and lead smelting room on the third floor both had samples exceeding the TCLP limits for at least one metal. No sweep samples were collected from the parts storage room on the third floor. The fourth floor storage room had two samples that exceeded the TCLP limit for at least one metal. The

wastewater treatment building also had several samples with results that exceeded the TCLP limit for one or more metals. The first four floors of the main building and the wastewater treatment building contain hazardous levels of dust on either building surfaces or on debris/equipment.

Concrete chip samples were collected from various floor areas throughout the buildings. The samples were collected in areas that were stained or showed some sign of possible contamination. Only two of the samples had results exceeding the TCLP limit; the samples were collected in the second floor chemical storage room and the wastewater treatment building. The TCLP limit for chromium was exceeded in the second floor chemical storage room, where the sample was collected in an area that had a yellow stain.

Wood chip samples were collected from ceiling beams located in the first floor. Two of the eight samples analyzed for TCLP metals had results that exceeded the limit for chromium and lead. The samples were located in the silver plating room.

Several paint chip samples taken from interior building walls had concentrations of lead exceeding the definition of LBP.

Based on the analysis of the concrete and wood chip samples, much of the building interior is contaminated with metals but not at hazardous levels. Several hot spots of contamination exist in areas where spills likely occurred in the past. The LBP on the walls may create a disposal problem as it is likely to leach lead at hazardous levels. The primary contamination in the building is due to dirt and dust on building surfaces and within equipment.

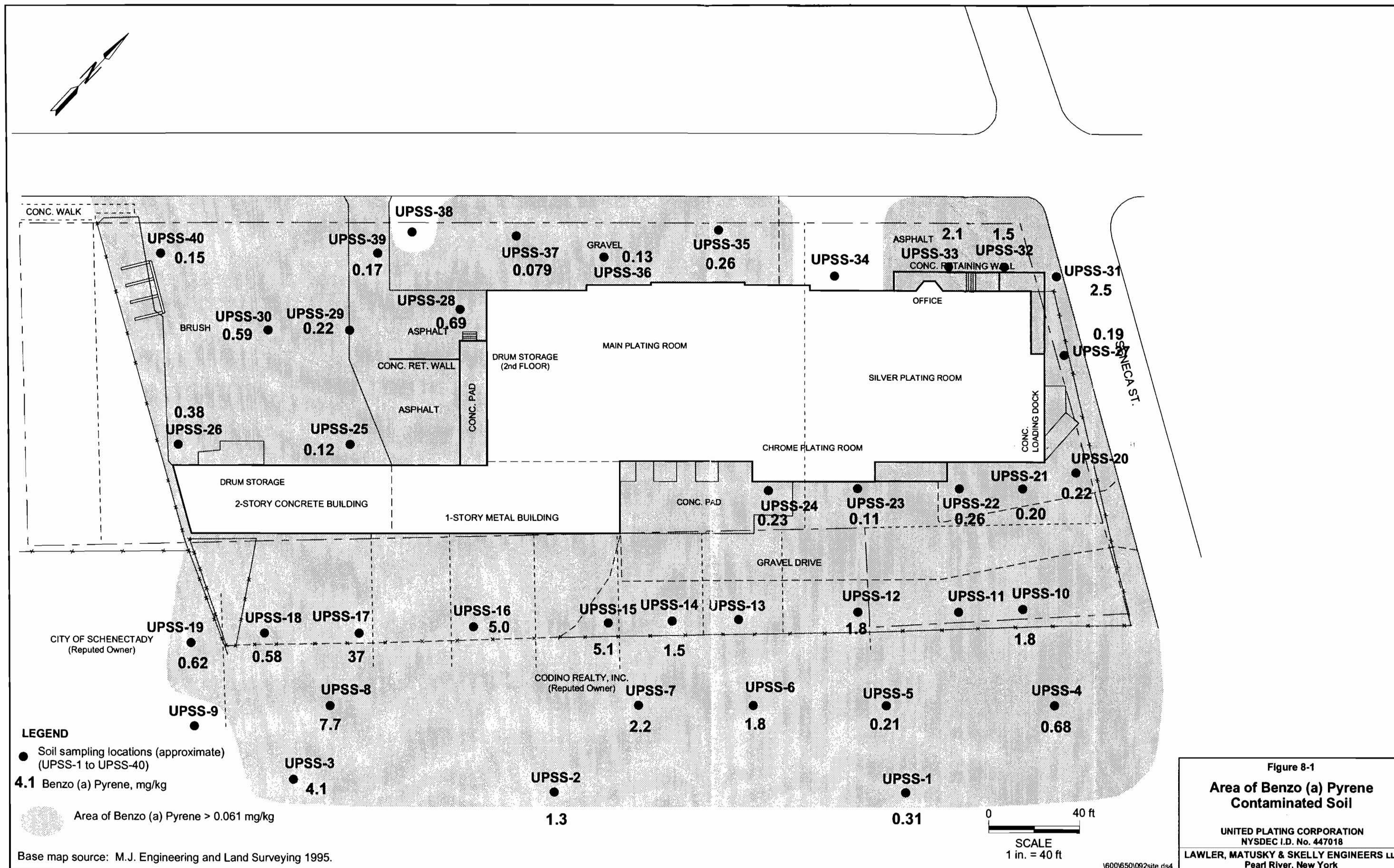
8.2.2 Shallow Soils

The shallow soil investigation consisted of collecting 40 soil samples around the UP site and from the vacant lot and playground located to the southeast of the site. The samples were analyzed for TCL organics and TAL inorganics and cyanide. Eight of the samples were collected in the vacant lot reputedly owed by Codino Realty, Inc., and two were collected in the playground reputedly owned by the City of Schenectady.

8.2.2.1 Organic Contaminants. The data were compared to the NYSDEC cleanup objectives and none of the samples had VOCs which exceeded the cleanup objectives. All samples had SVOCs exceeding the cleanup objectives except for UPSS-9, which was in the

playground, UPSS-11, 12, and -13, which were along the southeast fence near the eastern corner, UPSS-34, which was on the northwest side of the property outside of the silver plating room, and UPSS-38, which was east of the drum storage area. Figure 8-1 shows the area of benzo(a)pyrene that exceeded the cleanup objective (this contaminant is also one of the chemicals that drives the risk assessment). The cleanup objective for benzo(a)pyrene (BAP) is 0.061 mg/kg, or the method detection limit. As UPSS-11, -12, and -13 are surrounded by samples exceeding the cleanup objective, these samples are included within the area of contamination. The highest concentrations were found along the southeastern fence, where the concentration ranged from none detected (ND) at UPSS-13 to 37 mg/kg at UPSS-17; the average concentration was 5.5 mg/kg. The eight samples in the vacant lot ranged in concentration from 0.21 mg/kg at UPSS-5 to 7.7 mg/kg at UPSS-8, with an average of 2.3 mg/kg. As with the samples along the southeastern fence, most of the contamination is found directly to the southeast of the wastewater treatment building. The samples in the northern corner of the main building (corner of Foster Avenue and Seneca Street) ranged in concentration from 0.19 mg/kg at UPSS-27 to 2.5 mg/kg at UPSS-31, with an average concentration of 1.6 mg/kg. The lowest concentrations were found in the western area of the site (samples UPSS-25, -26, -28 to -30, and -34 to -40) and the area directly in front of the main building on the southeastern side (samples UPSS-20 to -24). Although the levels of BAP found are above cleanup objectives and indicate a potential health problem as a result of the risk assessment, discussions with NYSDOH officials have indicated that these concentrations are typical of urban settings and may not be site related (LMS 1998). The finding of BAP in the shallow soils may be due to combustion from industries/commercial establishments found in the area. It is likely that background levels found away from the site are similar to the range found at the UP site. Conversations between NYSDEC and NYSDOH have indicated that remediation of the shallow soils based on the BAP levels found at the site is not warranted. No pesticides or PCBs were detected in excess of cleanup objectives.

8.2.2.2 Inorganic Contaminants. Because the concentration of metals in the samples in the vacant lot appeared to be affected by the site, NYSDEC collected three background samples in the vicinity of the site. In addition NYSDOH had collected seven samples from the playground area in 1990. The NYSDEC and NYSDOH data were used to derive the area background soil concentrations for chromium, copper, nickel, and zinc. For cadmium, the eastern U.S. upper range concentration and NYSDEC cleanup goal of 1 mg/kg were used as some of the background data had detection limits higher than 1 mg/kg. For lead, the U.S. EPA guidance value of 400 mg/kg was used as the cleanup level. For metals other than those



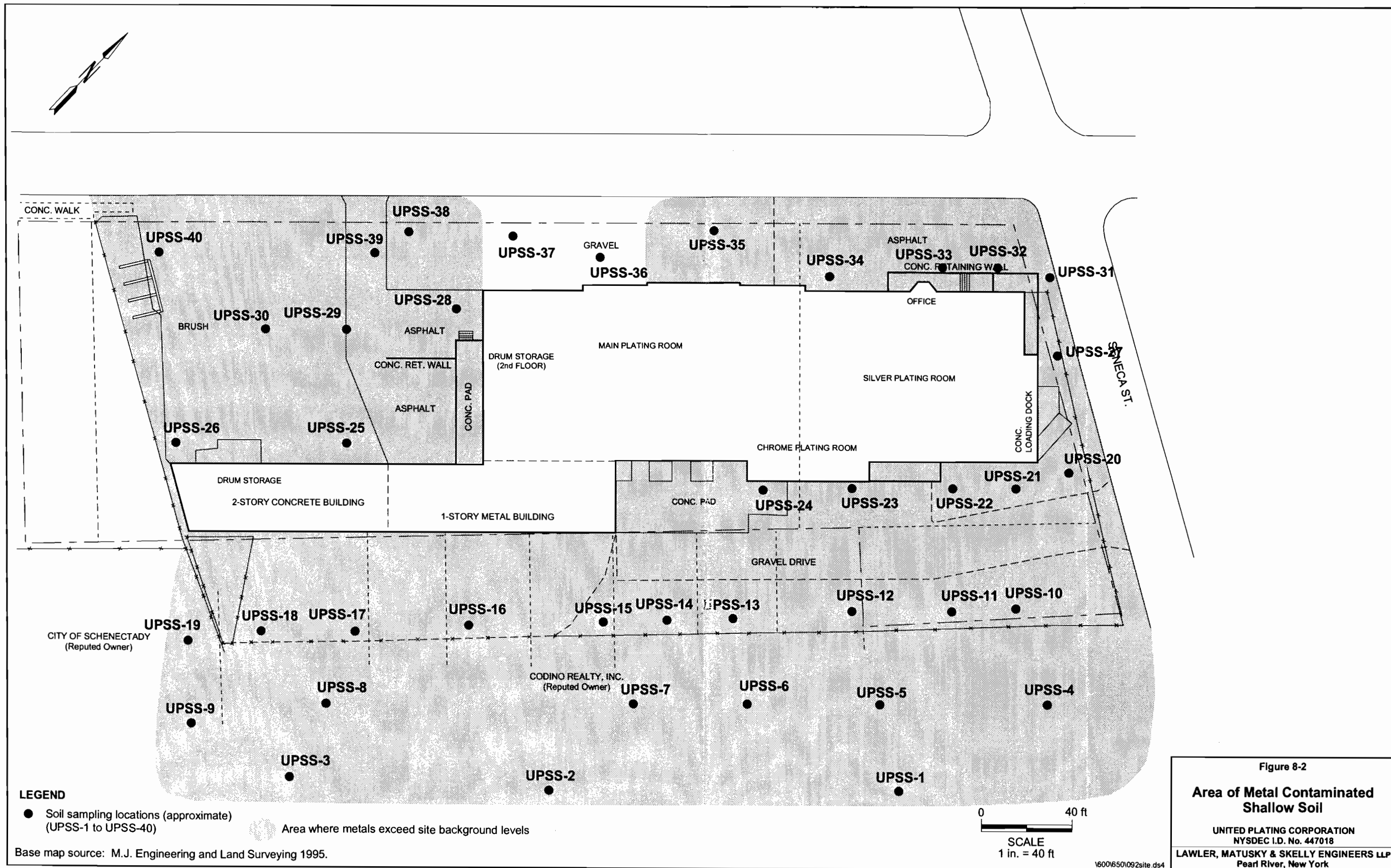
that are site-related and mercury, which has a specified cleanup objective, the upper range of the eastern U.S. background was used as the cleanup objective. Figure 8-2 shows the area where the soil exceeded the cleanup objective for one or more of the site-related metals. All samples except for UPSS-36 and -37 in the front of the main building along Foster Avenue exceeded the cleanup objective for one or more metals.

In the eight samples from the vacant lot (UPSS-01 to -08), all the cadmium, chromium, copper, nickel, and zinc values exceeded the site background level/cleanup objective. Cadmium ranged in concentration from 1.3 to 4.3 mg/kg, with an average of 3 mg/kg; chromium ranged in concentration from 21 to 37 mg/kg, with an average of 30 mg/kg; copper ranged in concentration from 30 to 87 mg/kg, with an average of 56 mg/kg; nickel ranged in concentration from 22 to 303 mg/kg, with an average of 63 mg/kg; and zinc ranged in concentration from 116 to 308 mg/kg, with an average of 193 mg/kg. The two samples from the playground area (UPSS-9 and -19) contained zinc higher than the site background level and cadmium, chromium, copper, mercury, and nickel were greater than the site background/cleanup objective in the sample closest to the UP property. The metals found in the playground area may be from site activities; however, these levels are typical of an urban setting.

The samples from the southeastern side (UPSS-10 to -24) contained chromium at concentrations higher than the site background in all samples. Chromium ranged from 18 to 72 mg/kg, with an average of 40 mg/kg; cadmium ranged from not detected to 49 mg/kg, with an average of 9.6 mg/kg; copper ranged from 17 to 75 mg/kg, with an average of 47 mg/kg; nickel ranged from ND to 39 mg/kg, with an average of 26 mg/kg; and zinc ranged from 61 to 280 mg/kg, with an average of 168 mg/kg. The vacant lot appears to have slightly more copper, nickel and zinc contamination than the area inside the fence.

The samples from the corner of Foster Avenue and Seneca Street (UPSS-27, and -31 to -33) contained cadmium, chromium, copper, and nickel in concentrations above the site background. Zinc was above the background in all but one sample. The average results were: cadmium - 2.6 mg/kg; chromium - 22 mg/kg; copper - 32 mg/kg; nickel - 20 mg/kg; and zinc - 199 mg/kg. Lead was found at 64,500 mg/kg in one sample (UPSS-33).

Samples from the remainder of the site (UPSS-25, -26, -28 to -30, and -34 to -40) had lower levels of metals, with two samples (UPSS-36 and -37) having no site-related metals in concentrations above background. The average concentrations for the six site-related metals



were: cadmium - 1.6 mg/kg; chromium - 16 mg/kg; copper - 25 mg/kg; nickel - 17 mg/kg; and zinc - 68 mg/kg.

8.2.3 Subsurface Soils

The subsurface soil investigation consisted of collecting 27 samples for VOC analysis and 31 samples for metals analysis during the soil probe investigation, collecting six samples for TCL organics and TAL inorganics and cyanide during the installation of the monitoring wells, and collecting seven VOC and metals samples during the test pit investigation. During the Additional RI work one test pit soil sample was collected and analyzed for TAL metals and cyanide, and five samples were collected and analyzed for TCL VOCs, TAL metals, and cyanide during the installation of monitoring wells. Probe soil samples were collected in the area surrounding the building (15 locations), in the vacant lot southeast of the site (three locations), and inside the building (four locations). At six probe locations, two VOC samples were collected and analyzed from two different depths and at two locations (UPP-20A and UPP-21) no VOC samples were collected. At 11 probe locations, two metals samples were collected and analyzed at two different depths and at two locations (UPP-20A and UPP-21); no metals samples were collected.

One sample was collected from each of the monitoring well locations during the RI. One sample was collected up gradient of the site next to the southeastern fence, two were taken downgradient of the site on the northwestern side, and three were collected inside the building. During the Additional RI work one sample was collected from each of three monitoring wells drilled downgradient of the site, and two samples were collected from one monitoring well drilled in the utility trench.

Seven test pit samples were collected from six locations, with two samples collected from one test pit. The sampled test pits were primarily located on the southeastern side of the building, with one (UPTP-07) located on the northwestern side.

During the Additional RI work one soil sample was collected from a test pit constructed adjacent to UPMW-11 after a lateral sewer line was apparently damaged during drilling.

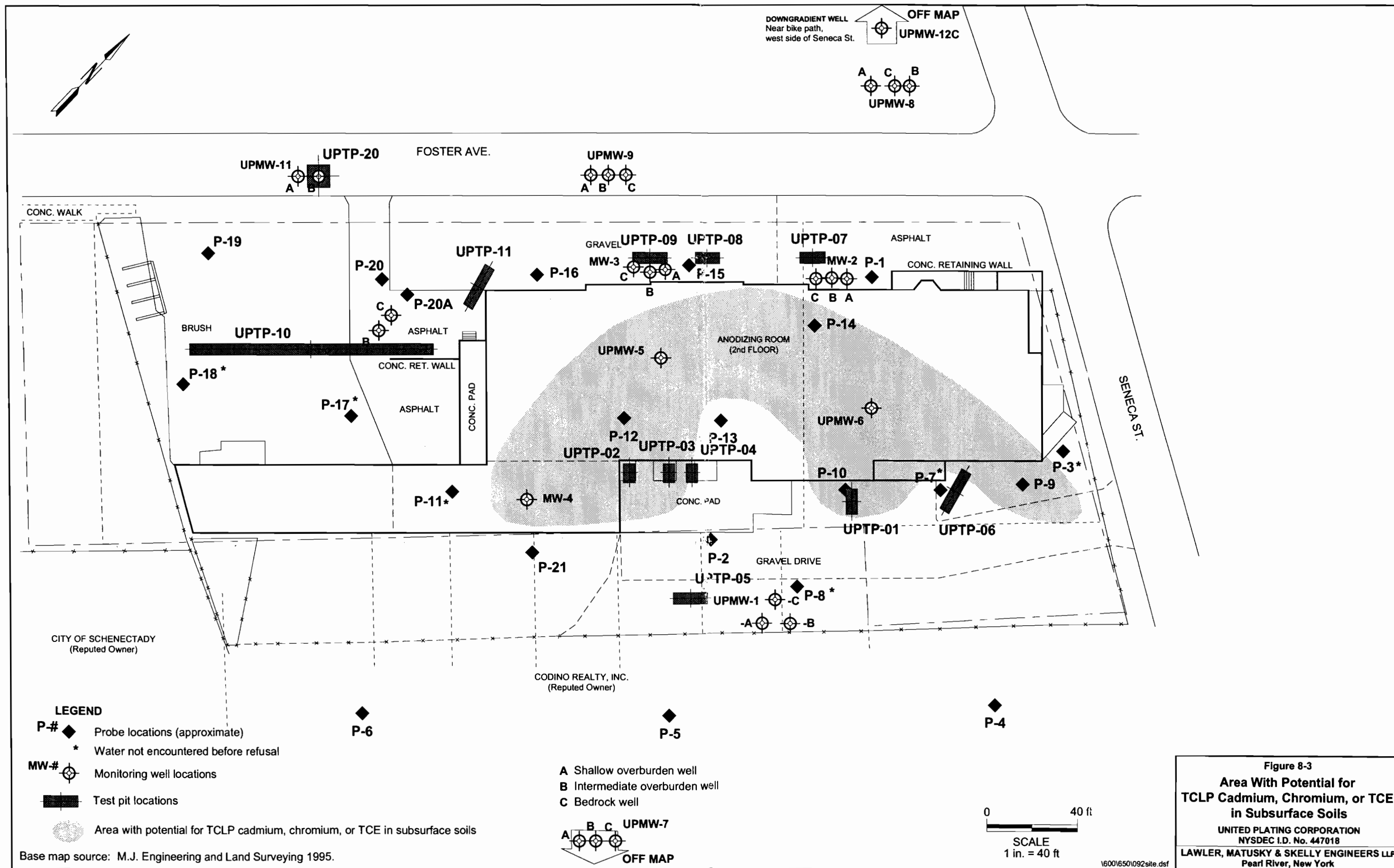
8.2.3.1 Organic Contaminants. None of the probe soil samples exceeded any NYSDEC cleanup objectives for VOCs, and none of the compounds detected exceeded 1 mg/kg. The sample from the boring drilled for UPMW-4, located inside the treatment building, had TCE

at 15 mg/kg, well above the cleanup objective of 0.7 mg/kg. Although not analyzed, this sample has the potential to exceed the 0.5-mg/l TCLP standard for TCE (based on the 20:1 dilution used by the TCLP test and dividing the total concentration by 20 will derive a concentration that exceeds the TCLP standard). This sample also had many SVOCs exceeding the cleanup objective and the total SVOC criterion was also exceeded. No pesticides or PCBs were detected in concentrations above the cleanup objective. None of the test pit samples collected during the RI had any VOCs exceeding the cleanup objective.

None of the soils collected from the installation of monitoring wells during the Additional RI work had any VOCs above cleanup objectives.

8.2.3.2 Inorganic Contaminants. The same cleanup levels/background concentrations used for the surface soils were also used to evaluate the subsurface soil site-related metals concentrations. The three probe locations in the vacant lot (UPP-4, -5, and -6) had copper in all but one sample, nickel in all samples, and cadmium in one sample higher than background. Samples from the probes (UPP-2, -3, -7, -8, -9, and -10), boring (UPMW-1A), and test pits (UPTP-01, -02, -03, -04, and -06) located within the fenced area on the southwestern side had copper in all 17 samples, nickel in all but two samples, cadmium in 11 samples, chromium in 14 samples, and zinc in three samples above the site background level. The probes (UPP-1, -15, -16, -17, -18, -19, and -20), two borings (UPMW-2A and -3A), and one test pit (UPTP-07) on the downgradient or northwestern side of the building had copper and nickel in all 12 samples, chromium in eight samples, and cadmium in two samples above the site background level. The probes (UPP-11, -12, -13, and -14) and borings (UPMW-4, -5, and -6) inside the building had copper, chromium, and nickel in all 11 samples, cadmium in six samples, and zinc in four samples above the site background level.

The subsurface soils do not impact the risk assessment as these soils are not accessible to children or adults, i.e., they cannot be inhaled or ingested. However, the subsurface soils have the potential to impact the groundwater through the leaching of the metals. Although TCLP metals were not analyzed the data were evaluated using the same rationale used to evaluate the TCE data (if the total concentration for the metal was < 20 times the TCLP standard, the metal would not be expected to leach to the groundwater at a hazardous level). The results of the evaluation are summarized on Figure 8-3, which shows the subsurface soils with the potential for TCLP TCE, cadmium and chromium. The area generally covers the area underneath most of the main building and a portion of the treatment building. Although the area outside the building had metals exceeding the site background concentrations, the



concentrations are not high enough to produce leachable levels of metals. The metals contaminated soils outside the building are likely caused by contaminated groundwater from the site.

8.2.4 Groundwater

The groundwater investigation for the RI consisted of collecting and analyzing 15 samples for VOCs, 12 samples for unfiltered metals and cyanide, 11 samples for filtered metals, and 10 samples for filtered cyanide from probes and the collecting and analyzing 24 VOC, 12 SVOC, 10 pesticide, 22 PCB, 24 unfiltered metal, 10 filtered metal, and 22 unfiltered cyanide samples. Monitoring wells were sampled twice, with TCL organics and TAL metals and cyanide analyzed in the first round and TCL VOCs, PCBs, and TAL metals and cyanide analyzed during the second round.

For the additional RI all 26 new and existing wells were sampled for low-level VOCs, low-level PCBs, and metals and cyanide with the exception of UPMW-11 (where only VOCs were collected) and UPMW-9A and -9B (where only VOCs, metals, and cyanides) were collected. There wells did not have sufficient water to allow for analysis of the remaining parameters.

8.2.4.1 Organic Contaminants. With the exception of benzene in the upgradient intermediate overburden well, none of the probe water samples or monitoring well samples collected in the vacant lot or within the fenced area to the southeast of the building had any VOCs exceeding the groundwater standard. One probe water sample (UPP-15) downgradient of the main building contained TCE and 1,1,1-TCA in concentrations well above the groundwater standard of 5 µg/l for each chemical. The TCE result was 28 times the standard and the 1,1,1-TCA result was 68 times the standard. Samples from the monitoring wells located downgradient of the main building did not contain any TCE or 1,1,1-TCA above the standard in either round of sampling during the RI. None of the off-site monitoring wells or downgradient wells outside the building had levels of these contaminants above standards during the Additional RI work. 1,1,1-TCA was detected at 2 µg/l during the second round of sampling at UPMW-2A and at 1.0 µg/l and 4.0 (duplicate of 4.2) in UPMW-2C during the Additional RI work. Although benzene was found above the groundwater standard in one of the downgradient well samples during the RI, it does not appear to be site related. Benzene was also found in UPMW-8C, UPMW-9A, and UPMW-10C above the standard during the Additional RI work. This finding may be related to the maintenance garage and not the site. The probe water samples and monitoring well samples taken from

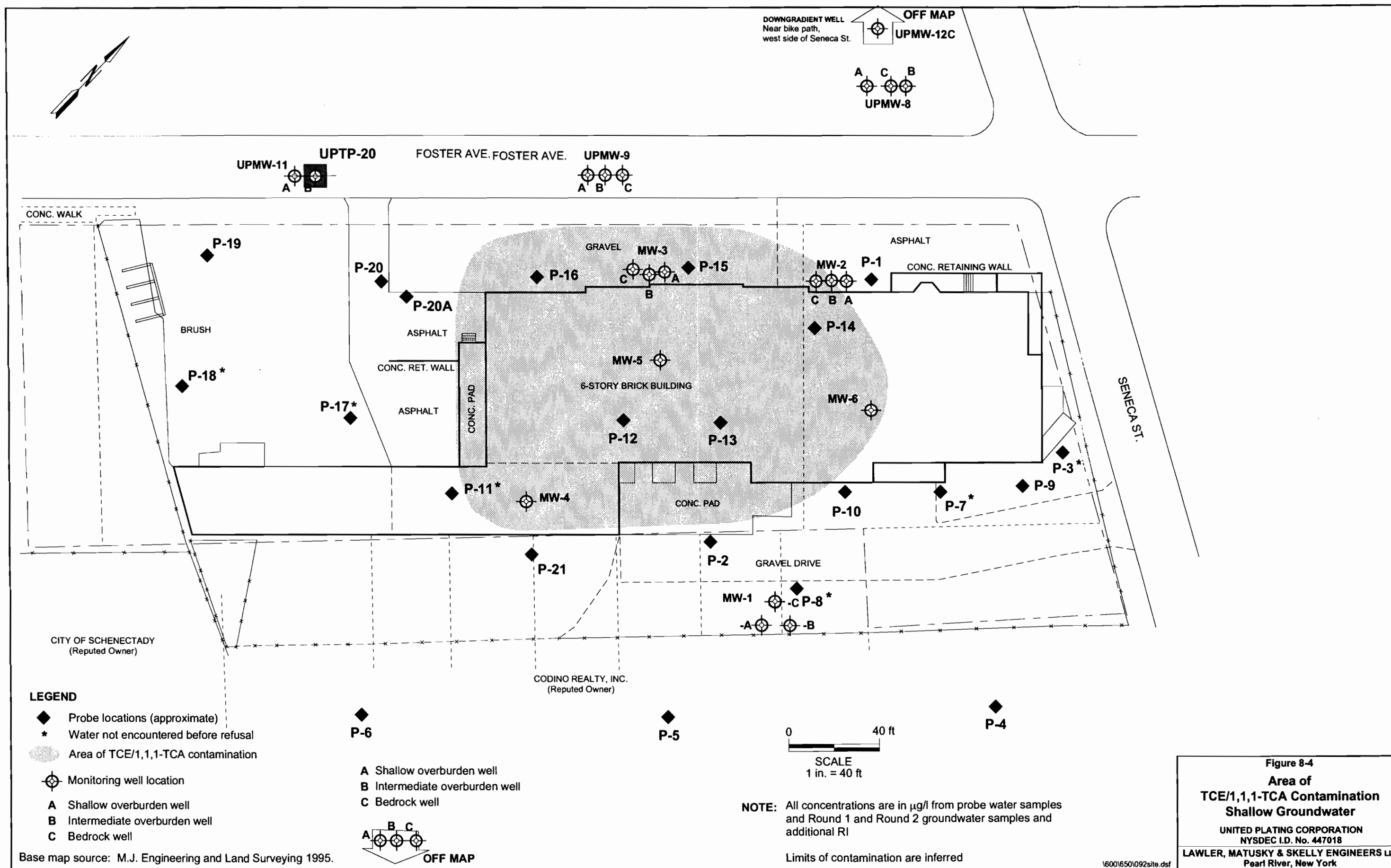
inside the main building all exceeded the groundwater standard for TCE. One probe water sample (UPP-14) contained 1,1,1-TCA and carbon tetrachloride in concentrations above the groundwater standard, and samples from one monitoring well (UPMW-4) had total 1,2-DCE and 1,2-DCP above the groundwater standard in the first round and cis-1,2-DCE above the standard in the second round. The concentrations of 430 and 170 µg/l of TCE in UPMW-4 in the first and second rounds, respectively, verify the presence of a TCE source, possibly in the soil or from a former discharge.

TCE was found at 400, 40, and 10 µg/l in UPMW-4, -5, and -6, respectively; 1,1,1-TCA was found at 69 µg/l in UPMW-6; and CIS-1,2-DCE was detected at 48 µg/l in UPMW-4 during the Additional RI work. These results are similar to those found in the first two rounds during the RI.

Figure 8-4 shows the extent of the TCE and 1,1,1-TCA contamination at the UP site in the shallow groundwater. The figure is based on the results of the probe water sampling and on the two rounds of groundwater sampling from the monitoring wells during the RI and the round of sampling during the Additional RI work. The area encompasses most of the area beneath the main building and a portion of the area underneath the wastewater treatment building. The contaminated plume spreads slightly to the southeast and to the northwest outside the footprint of the buildings. The Additional RI work showed that the contamination has not traveled much beyond the property boundary.

No SVOCs or pesticides were found in concentrations above the groundwater standard in any of the monitoring well samples. PCBs were found above the groundwater standard of 0.1 µg/l for total PCBs in several samples during both rounds of the RI; however, the data are suspect due to possible cross-contamination. PCBs were also detected above the standard in UPMW-6 and UPMW-7B during the Additional RI work. This finding in a background upgradient well indicates that PCBs are not a site-related problem.

8.2.4.2 Inorganic Contaminants. The unfiltered metals concentrations were significantly higher than the filtered metals results in the probe samples. This is a result of the sampling technique (water was allowed to collect within the probe and then withdrawn for a sample). Because the probe is not developed and not purged as with a monitoring well, fines are found in the water. Therefore, the high metals concentrations in the unfiltered samples are a result of the soil particles in the water, and the unfiltered results are not truly representative of the groundwater conditions. This discussion of the probe water samples includes only the filtered



metal results. In addition, the common groundwater contaminants (iron, magnesium, manganese, and sodium) are not discussed as they are not site related. In the two probes samples from the vacant lot (UPP-05 and -06), none of the site-related metals were detected in concentrations above the groundwater standard. For the three probes (UPP-02, -09, and -10) sampled within the fenced in area on the southeastern side of the site, only UPP-09 had any site-related metals above the groundwater standard. Chromium was detected at 94 µg/l in this sample; thallium was also detected above the guidance value.

Three probes were sampled on the northwestern, or downgradient, side of the site (UPP-15, -16, and -20A). UPP-20A did not contain any site-related metals above the groundwater standard. UPP-15 had chromium at 12,100 µg/l, about 242 times the groundwater standard. The sample was located downgradient of the chrome plating room. Antimony and thallium were detected above the guidance value in UPP-15. UPP-16, which was located downgradient of the drum storage area, had chromium at a concentration of 5960 µg/l, approximately 119 times the groundwater standard. Thallium was also above the guidance value in this sample.

Three probes (UPP-12, -13, and -14) were sampled inside the main building. The results showed chromium and cyanide above the groundwater standard in all three samples, with the highest concentration of chromium (38,100 µg/l) found at UPP-13, which was near the chrome plating room. The highest concentration of cyanide was 2160 µg/l in UPP-12. UPP-14 also had antimony above the guidance value. The probe water results indicated that most of the metals contamination exists beneath the building, with some immediately downgradient of the site.

The 12 monitoring wells installed during the RI were sampled twice for metals and cyanide. During the first round both filtered and unfiltered metals were collected, and in the second round only unfiltered metals were collected. The results from the first round indicated that the development and purging process removed most of the fines and that the unfiltered metals results represent the groundwater conditions for the site-related metals. The up gradient shallow and intermediate overburden wells (UPMW-1A and -1B) contained only antimony in concentrations above the guidance value. However, the up gradient bedrock well (UPMW-1C) had arsenic, chromium, lead, and zinc above the groundwater standard in both rounds of samples, with barium, beryllium, cadmium, and copper above the standard in the first round and antimony above the standard in the second round. Concentrations were generally higher

in the first round than the second round, probably as a result of the higher water table found during the second round.

The two shallow overburden wells (UPMW-2A and -3A) installed downgradient of the site contained no site-related metals above the groundwater standard, other than chromium in the first round at UPMW-2A at a concentration of 272 µg/l. UPMW-3A is situated near UPP-15, which had a very high concentration of chromium, indicative that the chromium contamination is very localized. Antimony was also detected above the guidance value in the second round at UPMW-3A.

The two intermediate overburden wells (UPMW-2B and -3B) had no site-related metals above the groundwater standard, except for chromium in the first round at UPMW-2B at a concentration of 54 µg/l.

The two bedrock downgradient wells (UPMW-2C and 3C) also had no site-related metals above the groundwater standard, except for chromium in the first round at UPMW-2C at a concentration of 191 µg/l. The chromium appears to be migrating downward into the bedrock at this location.

Three wells were installed inside the building (UPMW-4, -5, and -6). UPMW-4, located in the wastewater treatment building, contained arsenic, barium, beryllium, cadmium, chromium, lead, and zinc above the standard in the first round, with only antimony above the guidance value in the second round. UPMW-5, located in the main plating room, had chromium and cyanide above the standard in both rounds. UPP-13, which was installed slightly up gradient of UPMW-5, contained the same contaminants in concentrations above the standard. UPMW-6, located in the chrome plating room, had very high levels of chromium in both rounds (>30,000 µg/l) and antimony and cyanide above the standard. UPP-14, which was drilled downgradient of UPMW-6, also had high chromium and cyanide.

The 12 existing and 14 new monitoring wells were sampled as part of the Additional RI work. The upgradient shallow and intermediate wells (UPMW-1A,B and -7A,B) had no site-related metals above standards. The bedrock well at UPMW-7C had antimony above the standard and the bedrock well at UPMW-1C had antimony, arsenic, barium, beryllium, chromium, lead, selenium, and zinc above the groundwater standard, consistent with previous samplings.

The two shallow overburden wells (UPMW-2A and -3A) installed just outside the building had only chromium above the standard in UPMW-2A at 73 μ g/l. Chromium was also found above the standard during the first round RI sampling at this location. Neither the two intermediate nor the two bedrock wells at these two locations had any site-related metals above standards during the Additional RI work.

Only the intermediate well (UPMW-10B) located to the west of the building had antimony above the guidance value. No other site-related metals were found above the standard in this well or the bedrock well (UPMW-10C) at this location.

The shallow wells drilled in the utility trench (UPMW-9A and -11A) had only antimony above the guidance value in UPMW-9A. The intermediate well, UPMW-9B, had antimony, arsenic, beryllium, chromium, lead, selenium, and zinc above the standard, whereas the deep well (UPMW-9C) had no site-related metals above standards. The finding of site-related metals above standards at the intermediate well indicates that some contamination has spread from beneath the building into the utility trench, probably through drain or sewer pipes. Although there was insufficient water to analyze for metals at UPMW-11B, the presence of metals above the cleanup objective at this location indicates a possible impact to groundwater in this area.

The off-site downgradient wells on the corner of Foster Avenue and Seneca Street (UPMW-8) had only antimony and selenium above standards in the shallow well (UPMW-8A). No site-related metals were found above standards in either the intermediate or deep wells at this location, indicating that the site-related metals (chromium, lead, zinc) found in the utility trench are not impacting the downgradient groundwater. The utility trench has most likely trapped any contamination and the contaminated groundwater is flowing through the trench. The material surrounding the utility trench is more conducive to groundwater flow than the natural overburden material in the area. The deep well (UPMW-12C) located further downgradient of the site also did not have any site-related metals above standards.

Three wells were installed inside the building during the first phase of the RI. UPMW-4, inside the wastewater treatment building, had antimony, arsenic, chromium, copper, and lead above standards, similar to the December 1997 results. UPMW-5, located in the main plating room, had antimony, chromium, and cyanide above standards, again similar to the previous two rounds. UPMW-6, in the chrome plating room, had antimony, chromium, lead,

and cyanide above the standard. The level of chromium at 140,000 $\mu\text{g/l}$ was more the double that found previously.

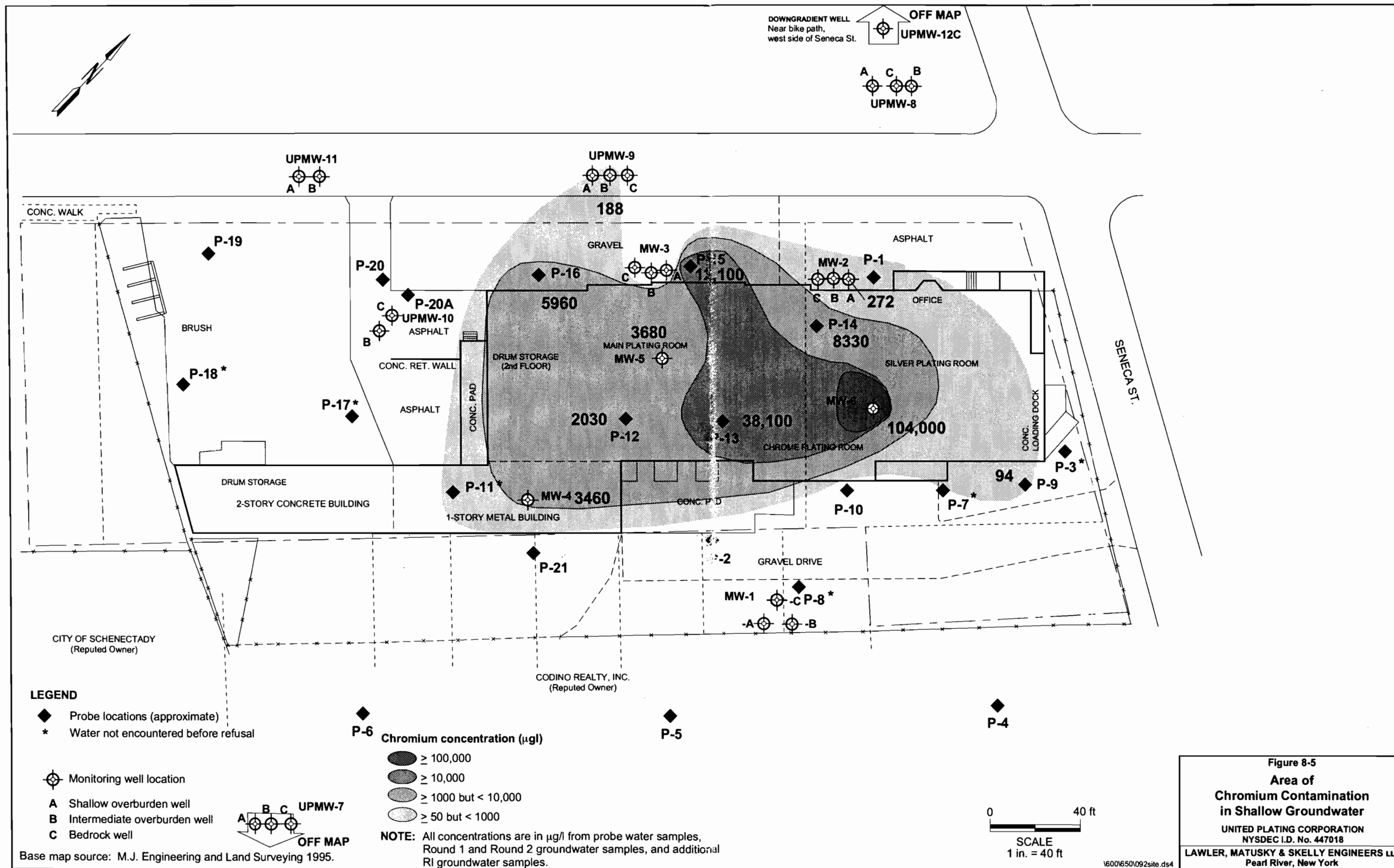
Figure 8-5 shows the extent of the chromium contamination in the shallow groundwater, and Figure 8-6 shows the extent of the cyanide contamination. The figures are based on the results of the probe water samples and the two rounds of monitoring well sampling during the RI and the round of groundwater sampling during the Additional RI work. The figure uses the highest concentration found during any of the sampling of the monitoring wells. Most of the chromium contamination is confined to the area beneath the building, with some contamination just to the southeast and northwest of the building footprint. The chromium appears to extend into the utility trench. The contamination in the up gradient bedrock well, UPMW-1C, is not included on this figure as it is assumed that this contamination is likely an isolated site-related occurrence. The cyanide contamination is confined to the area underneath the building.

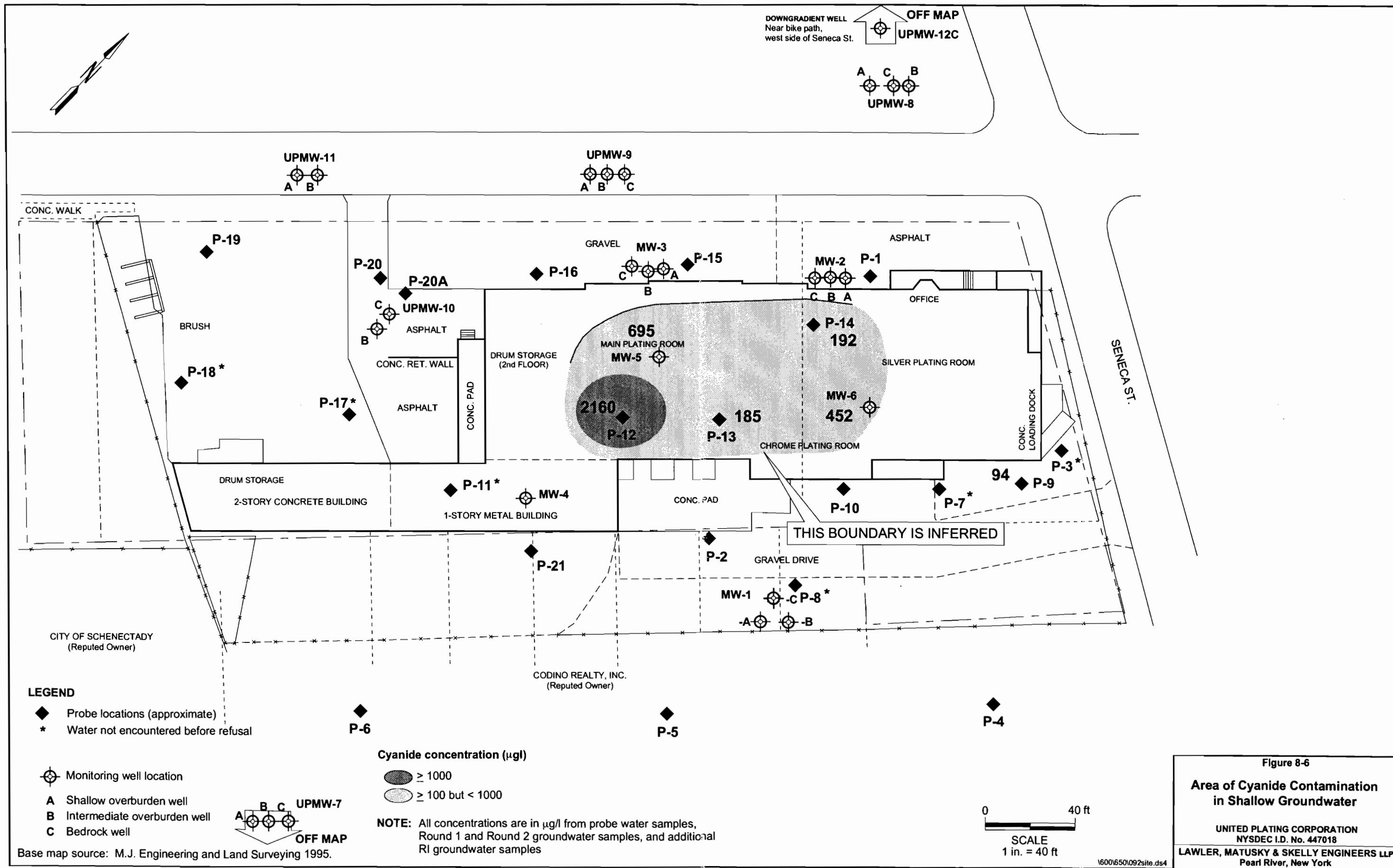
8.2.5 Surface Water and Sediment

Five surface water samples were collected and analyzed for metals and cyanide. The samples were collected from sumps and drains located inside and outside the building. No standards or criteria are available to evaluate these data; however, the results showed high levels of the site-related metals cadmium, chromium, copper, and zinc in all six samples and lead and cyanide in four of the five samples.

Sixteen sediment samples were collected and analyzed for metals and cyanide; three of the samples were analyzed for TCLP metals. Chromium, copper, lead, and zinc were found at high levels in all samples, cadmium in one sample, and cyanide in 15 samples. The TCLP limit for cadmium, chromium, and lead was exceeded in one sample (UPSD-03), which was located in the northernmost sump in the main plating room. The chromium TCLP limit was exceeded in sample UPSD-08, which was taken from the sump found in the chrome plating room.

It appears that most of the sumps and drains within the building contain sediment that may have hazardous levels of chromium and/or cadmium and lead.





8.3 RISK ASSESSMENT SUMMARY

The human health risk assessment conducted for the UP site (Chapter 6) evaluated potential human health risks associated with the site for both current and future land use scenarios, including future residential and commercial/industrial use of the site. The following potential exposure pathways were evaluated in the human health risk assessment:

Current Land Use Scenario:

- Ingestion of chemicals in surface soils and dermal contact with chemicals in surface soils by children playing at the off-site location (i.e., the vacant lot adjacent to the site)
- Ingestion of chemicals in surface soils, dermal contact with chemicals in surface soils, and inhalation of airborne (particulate-phase) chemicals by children trespassing on-site outside the existing fence
- Ingestion of chemicals in surface soils, dermal contact with chemicals in surface soils, and inhalation of airborne (particulate-phase) chemicals by children trespassing on-site within the existing fence

Future Residential Land Use Scenario:

- Ingestion of chemicals in surface soils, dermal contact with chemicals in surface soils, and inhalation of airborne contaminants by children and adults residing at the off-site location
- Ingestion of chemicals in surface soils, dermal contact with chemicals in surface soils, and inhalation of airborne contaminants by children and adults residing on-site

Future Commercial/Industrial Land Use Scenario:

- Ingestion of chemicals in surface soils, dermal contact with chemicals in surface soils, and inhalation of airborne contaminants by workers at the off-site location
- Ingestion of chemicals in surface soils, dermal contact with chemicals in surface soils, and inhalation of airborne contaminants by workers on-site.

The subsurface soil and groundwater pathways were not evaluated in the risk assessment as no human exposure points currently exist for these matrices. In addition, the building interior, surface water, and sediment pathways were not evaluated as these potential exposure

pathways will be eliminated as a result of the planned remediation of the building and its contents.

COCs for each of the above exposure pathways were selected based on the frequency of detection, range of detected concentrations, and relative toxicity of site contaminants as determined during the RI. The COCs for shallow soils vary with location (i.e., off-site soils, on-site soils outside fence, and on-site soils within fence); the COCs for the quantitative risk assessment included metals (i.e., arsenic, cadmium, chromium, copper, mercury, nickel, and zinc) and PAHs (i.e., benzo[a]pyrene, dibenzo[a,h]anthracene, dibenzofuran, fluoranthene, and pyrene). Chronic daily intakes, i.e., the mass of substance in contact with the body per unit body weight per unit time, were calculated for each potential exposure pathway and COC and were combined with toxicity values for the COCs to estimate increased cancer risks and noncancer hazard indices. A hazard index that exceeds unity (1.0) for noncarcinogenic compounds indicates that there may be a concern of adverse health effects occurring for exposed populations. NYSDEC has established an acceptable risk level of 1×10^{-6} for exposure to carcinogenic compounds.

The hazard indices calculated for each of the potential exposure pathways for the UP site did not exceed unity, indicating that the risk of noncarcinogenic health effects posed by the COCs at the currently identified levels is minimal. Estimated increased cancer risks were also calculated for each of the exposure pathways; estimated cancer risks exceeding the acceptable level of 1×10^{-6} resulted for a number of the pathways evaluated.

For the current land use scenario, both the ingestion of chemicals in soils and dermal contact with chemicals in soils resulted in potentially increased cancer risks for children playing at the off-site location. Dermal contact with chemicals in soils also resulted in potentially unacceptable cancer risks for children trespassing on-site within the fence. The resulting total estimated risks for children playing off-site and children trespassing on-site within the fence across all pathways (5.48×10^{-6} and 3.81×10^{-6} , respectively) exceeded the acceptable level; however, these calculated risks only slightly exceed the acceptable level of 1×10^{-6} . The carcinogenic risk associated with these exposure pathways is due primarily to the presence of benzo(a)pyrene in the soils.

Exposure pathways under the residential land use scenario for which the estimated carcinogenic risk exceeded the acceptable level included ingestion of chemicals in soils for children and adults residing at the off-site location, ingestion of chemicals in soils for children

and adults residing on-site, and dermal contact with chemicals in soils for children and adults residing on-site. As a result, the total estimated risk for both on- and off-site children and adults across all exposure pathways exceeded the acceptable level of 1×10^{-6} by an order of magnitude (estimated risks of 3.18×10^{-5} for adults residing off-site to 6.31×10^{-5} for children residing on-site). The estimated increased cancer risks are the result of ingestion of arsenic and benzo(a)pyrene (and dibenzo[a,h]anthracene for on-site soils) in surface soils.

Estimated cancer risks exceeded the acceptable level for all exposure pathways evaluated for the future commercial/industrial land use scenario, including ingestion of chemicals in soils, dermal contact with chemicals in soils, and inhalation of airborne (particulate-phase) chemicals by workers on- and off-site. The total estimated risk for off-site workers across all pathways was 1.86×10^{-5} and for on-site workers was 2.59×10^{-5} , both of which exceeded the acceptable risk level by an order of magnitude. The estimated risks for workers were due primarily to ingestion of arsenic and benzo(a)pyrene in off-site soils; arsenic, benzo(a)pyrene, and dibenzo(a,h) anthracene in on-site soils; dermal contact with benzo(a)pyrene and dibenzo(a,h)anthracene in soils; and inhalation of particulate-phase chromium.

The health risk assessment conducted for the UP concluded that several contaminants at levels currently present in surface soils, including certain carcinogenic PAHs (benzo[a]pyrene and dibenzo[a,h]anthracene) and metals (arsenic and chromium), may potentially result in increased cancer risks to exposed populations under both the current land use scenario and potential future land use scenarios. The estimated increased cancer risks ranged from slightly above the acceptable risk level of 1×10^{-6} for children playing off-site or trespassing on-site in the current land use scenario to an order of magnitude above the acceptable risk level for future residential or commercial/industrial use of the site.

8.4 REMEDIAL ACTION OBJECTIVES

Remedial action objectives are developed for a site to determine the levels to which contaminant concentrations must be reduced to protect human health and the environment. The remedial goals should establish cleanup levels for carcinogens that provide protection within the risk range of 10^{-4} to 10^{-7} in accordance with EPA's National Contingency Plan (NCP) requirements. NYSDEC has established an acceptable risk of 1×10^{-6} for carcinogens. Cleanup levels for noncarcinogens should be based on the RfDs for the compounds, i.e., the daily exposure levels to which individuals can be exposed without an appreciable risk of adverse health effects over a lifetime. Where available, the remedial goals may be set at the

chemical-specific ARARs (Table 6-19) if these levels are determined to meet the guidelines presented above for the protection of human health.

The human health risk assessment concluded that the levels of the COCs (primarily benzo[a]pyrene) in the surface soils posed an increased cancer risk to children playing in the area under the current land use as well as possible future residential use. An increased cancer risk was also possible for adults under future residential use and workers under future industrial/commercial land use. The risk of noncarcinogenic health effects was calculated to be minimal. However, the source of the BAP in the surface soils is not believed to be site-related and the concentrations found are within the range of typical urban soils. NYSDEC and NYSDOH have indicated that remediation of the shallow soils for BAP is not warranted.

The shallow soils are also contaminated with metals above cleanup levels. However, with the exception of the one lead 'hot spot' the levels found are within an order of magnitude or less of the cleanup level and most are within 50 mg/kg. These levels are typical concentrations found in urban soils as evidenced by the wide range of levels found in background soils. Therefore the only shallow soil area requiring remediation is the lead 'hot spot' at location UPSS-33. This area is delineated on Figure 8-7 and covers the area where the cleanup level of 400 mg/kg is exceeded.

The groundwater exposure pathway was not evaluated in the health risk assessment as no human exposure point currently exists for this matrix. However, New York State has promulgated groundwater standards for Class GA groundwaters, which include the groundwater underlying the UP site. Groundwater flow data indicate that the groundwater discharges into the Mohawk River about 0.25 mile northwest of the site. Therefore, contaminants present in the groundwater beneath the UP site may be transported to the surface water and sediments of the Mohawk River, where humans may come into contact with the contaminants. Based on the possible continued migration of contaminants into the Mohawk River, the Class GA standards have been adopted as the remedial action objectives for the groundwater at this site. As discussed in Section 8.2.4, chromium was selected as the indicator contaminant for determining the extent of the groundwater plume as it is the most prevalent COC. Therefore, the primary remedial action objective for the groundwater is the Class GA 50 µg/l chromium standard. Other secondary remedial action objectives for the groundwater are the Class GA standards for cyanide of 100 µg/l, TCE of 5 µg/l, and 1,1,1-TCA of 5 µg/l.

The subsurface soils do not present an exposure pathway to humans. The contaminants in the subsurface may pose a risk due to the continued migration of contaminants to the groundwater or for workers conducting future excavation at the site. Assuming that all the metals are leachable, concentrations of chromium and cadmium in the soil of 100 and 20, mg/kg, respectively, will produce levels that may exceed the TCLP hazardous levels for these metals. TCE levels greater than 10 mg/kg may also exceed the TCLP limit for this contaminant. These levels would most likely exceed the groundwater standards and will be the remedial action objectives for the subsurface soil.

8.5 QUANTITIES OF CONTAMINATED MEDIA

The remedial action objectives discussed above were used to estimate the quantities of contaminated media present at the site. The estimated quantities of contaminated media are important for evaluating potential remedial alternatives for the site in the FS, including the relative costs of each alternative. Table 8-1 presents a summary of the remedial action objectives and corresponding quantities of contaminated media for the UP site, which were calculated as discussed below. The quantity of contaminated equipment/debris inside the buildings and the quantity of contaminated building surfaces are not included on the table as they are derived as part of the FFS.

To determine the quantity of contaminated groundwater requiring remediation, the analytical data obtained in the RI were compared with the remedial action objectives established in the previous section. The COCs in the groundwater are chromium, cyanide, TCE, and 1,1,1-TCA. Seven of the 26 monitoring wells and six of 11 probe water samples contained chromium in concentrations above the groundwater standard of 50 µg/l; two of 26 monitoring wells and four of 11 probe water samples had cyanide above the groundwater standard of 100 µg/l; and three of 26 monitoring wells and five of 14 probe water samples had TCE/1,1,1-TCA above the groundwater standard of 5 µg/l. The cyanide contamination is contained within the area of chromium contamination and the TCE/1,1,1-TCA contamination is essentially contained within this same area. Therefore, chromium is used as the indicator compound for identification of the quantity of groundwater requiring remediation. As the areas containing cyanide and TCE/1,1,1-TCA contamination lie within the area of chromium contamination, remediation of the chromium-contaminated groundwater will also result in removal of the cyanide and TCE/1,1,1-TCA.

TABLE 8-1

REMEDIAL ACTION OBJECTIVES AND QUANTITIES OF CONTAMINATED MEDIA
United Plating Site

MATRIX	REMEDIAL ACTION OBJECTIVE	APPROXIMATE QUANTITY OF CONTAMINATED MEDIA
Surface Soil	Lead < 400 mg/kg	14,000 ft ³
Subsurface Soil	Chromium < 100 mg/kg ^a Cadmium < 20 mg/kg ^a TCE < 10 mg/kg ^a	215,500 ft ³
Groundwater	Chromium < 50 µg/l ^b Cyanide < 100 µg/l ^b TCE/1,1,1-TCA < 5 µg/l ^b	1.7 million gal

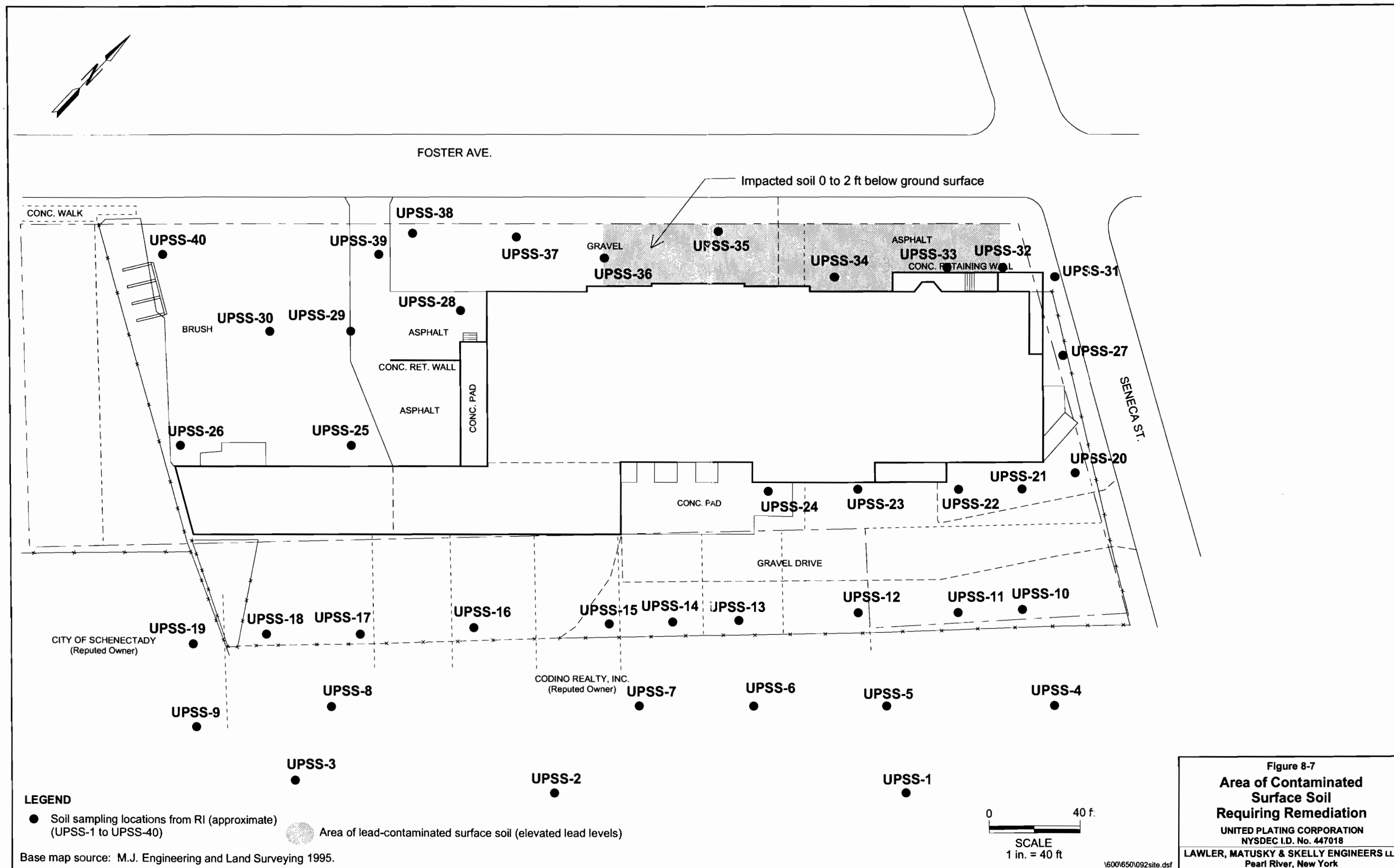
^a - Source: Twenty times TCLP limit.

^b - Source: NYSDEC Class GA Groundwater Standard.

Figure 8-5 depicts the approximate location of the chromium groundwater plume based on the 50- $\mu\text{g/l}$ isoconcentration line. The volume of contaminated groundwater was estimated by multiplying the affected area as shown on Figure 8-5 by the saturated thickness of each geological unit (fill/weathered till, basal till, and bedrock). The depth of the fill/weathered till unit was estimated to be 7 ft, with a porosity of 0.25; the depth of the basal till was estimated to be 10 ft, with a porosity of 0.2; and the depth of the saturated bedrock was estimated to be 30 ft, with a porosity of 0.05. The volume of chromium-contaminated groundwater at the UP site based on these assumptions is approximately 1.7 million gal. This estimate is based on the on-site monitoring wells sampled to date; if the plume extends off-site, the volume will be larger. The data indicate the possibility of the contaminant plume extending downgradient to the northwest/north.

Chromium, cadmium, and lead were identified as COCs in the site subsurface soils as these metals have the potential to leach hazardous levels to the groundwater. The volume of subsurface soils requiring remediation is calculated by multiplying the area shown on Figure 8-3 by the depth of the overburden layer underneath the building of 14 ft. Therefore, the quantity of subsurface soils requiring remediation is estimated to be 215,500 ft^3 . This is a conservative (i.e., high) estimate of subsurface soils that have leachable levels of contaminants, based on the limited sampling and analyses. More detailed sampling may pinpoint hot-spot areas.

Figure 8-7 shows the area requiring surface soil remediation. The volume of soil requiring remediation is calculated by multiplying the area shown on Figure 8-7 by a depth of 2 ft (NYSDEC definition of shallow soil). The volume of shallow soil requiring remediation is estimated to be approximately 14,000 ft^3 .



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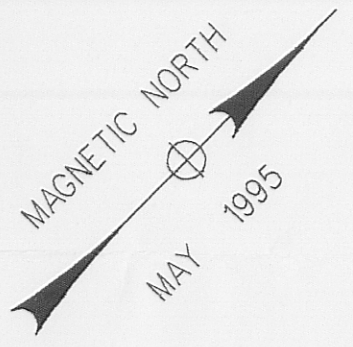
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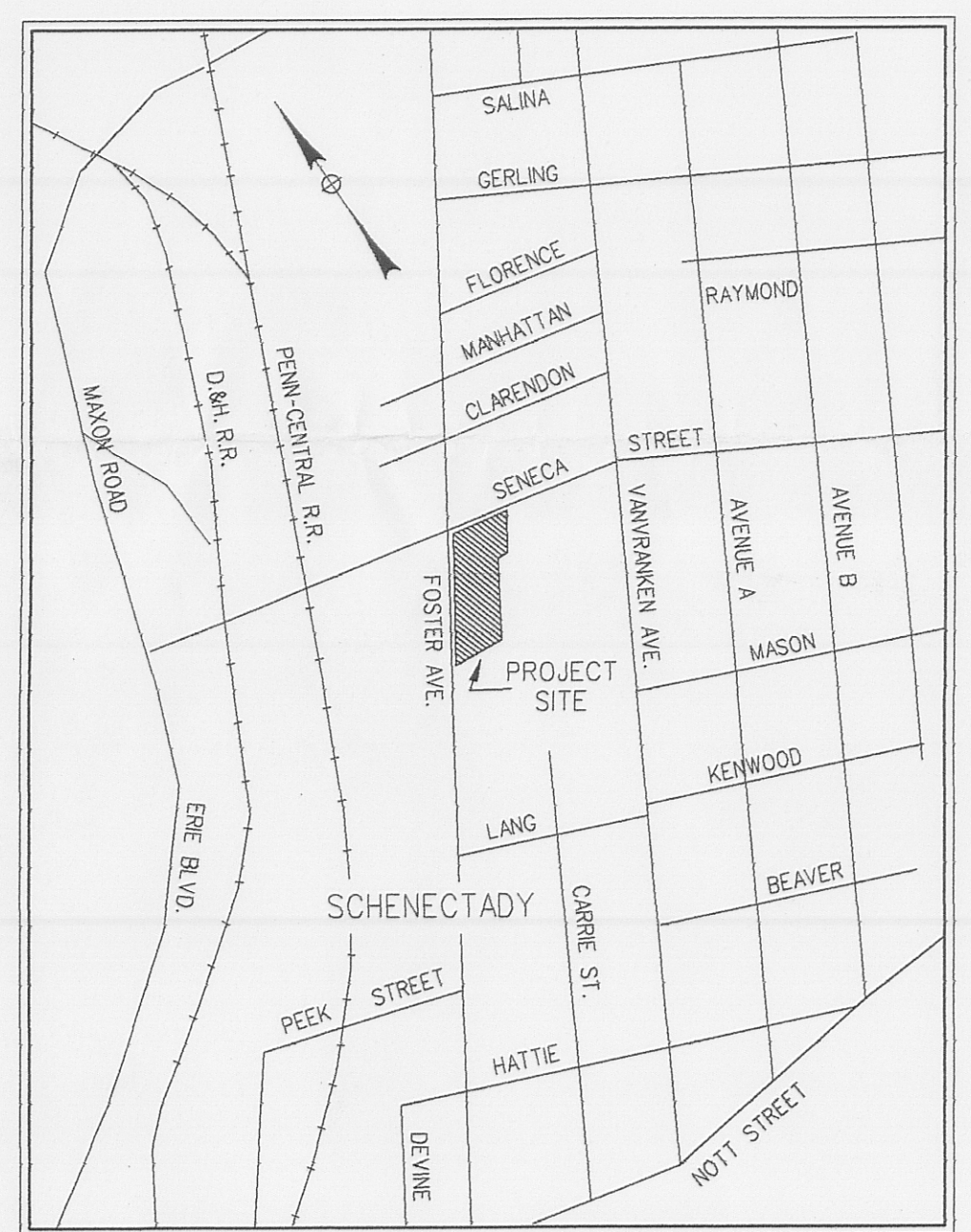
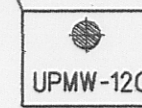
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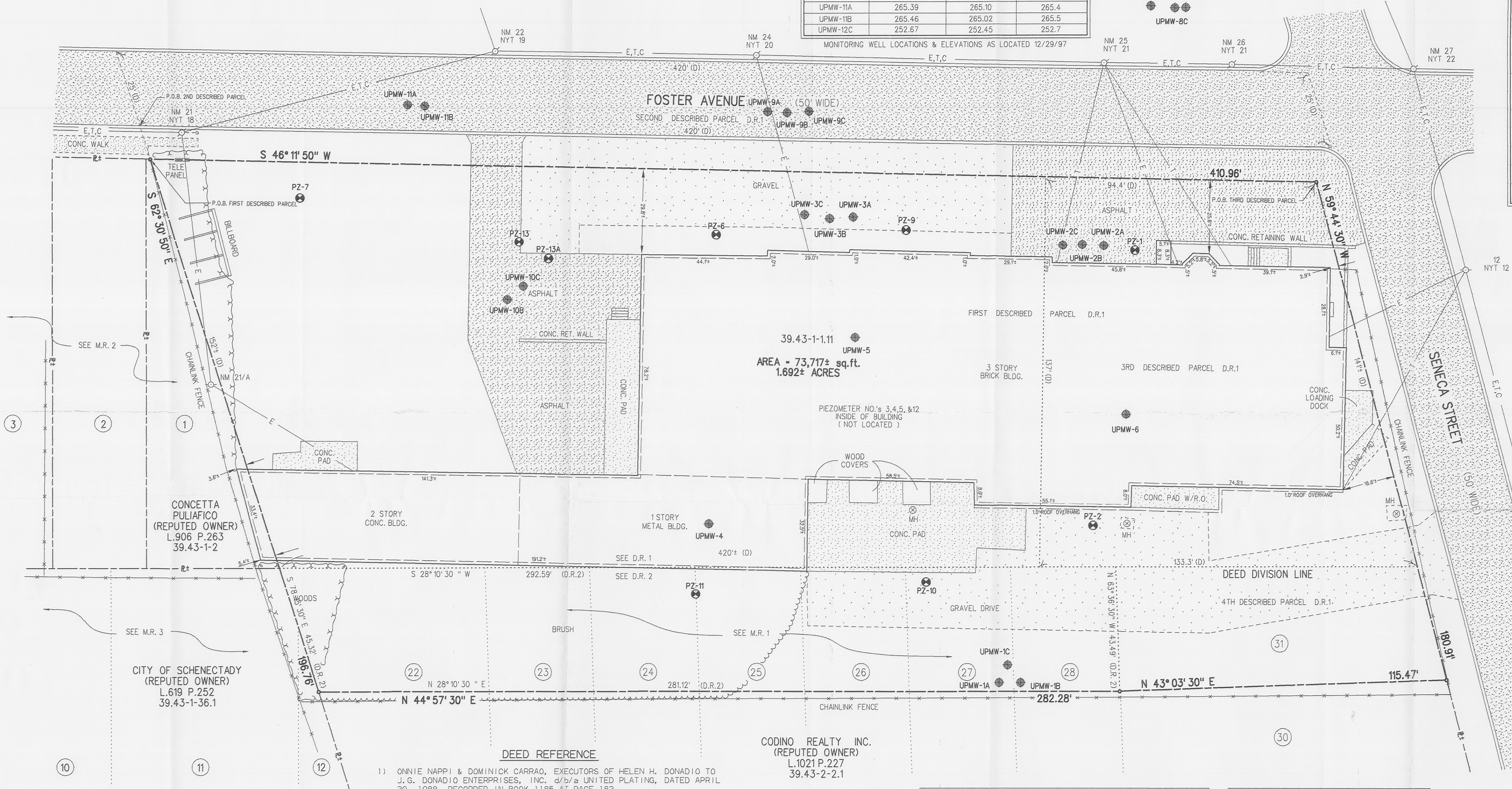


MONITORING WELL ELEVATION TABLE			
MONITORING WELL	ELEVATION OF RM OF PROTECTIVE CASING	ELEVATION OF INNER PVC WITH CAP OFF	ELEVATION OF GROUND SURFACE
UPMW-7A	280.00	279.79	280.0
UPMW-7B	279.96	279.72	280.0
UPMW-7C	279.98	279.75	280.0
UPMW-8A	265.47	265.12	265.5
UPMW-8B	265.58	265.22	265.6
UPMW-8C	265.58	265.22	265.6
UPMW-9A	266.16	265.97	266.2
UPMW-9B	266.21	265.93	266.2
UPMW-9C	266.27	266.01	266.3
UPMW-10B	269.27	268.90	269.3
UPMW-10C	269.06	268.75	269.1
UPMW-11A	265.39	265.10	265.4
UPMW-11B	265.46	265.02	265.5
UPMW-12C	252.67	252.45	252.7



SITE LOCATION PLAN
SCALE: N.T.S.

- LEGEND
- E.T.C. - OVERHEAD ELEC./ TELE./ CABLE LINES
 - (D) DEED DIMENSION
 - D.R. DEED REFERENCE
 - M.R. MAP REFERENCE
 - (31) SUBDIVISION LOT No.
 - PZ-1 PIEZOMETER LOCATION
 - UPMW-6 MONITORING WELL



- DEED REFERENCE
- ONNIE NAPPI & DOMINICK CARRAO, EXECUTORS OF HELEN H. DONADIO TO J.G. DONADIO ENTERPRISES, INC. d/b/a UNITED PLATING, DATED APRIL 30, 1988, RECORDED IN BOOK 1185 AT PAGE 183.
 - CODINO REALTY, INC., TO J.G. DONADIO ENTERPRISES, INC., DATED JANUARY 26, 1982, RECORDED IN BOOK 1053 AT PAGE 1069

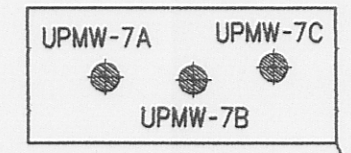
- MAP REFERENCES
- *MAP OF BUILDING LOTS BELONGING TO SIMON FRIEDMAN*, PREPARED BY C. H. PETERSEN, DATED MAY 22, 1930, FILED JUNE 13, 1930, FILED IN CABINET D AS MAP 190.
 - *MAP OF LOTS BELONGING TO HENRY C. BUHRMASTER*, PREPARED BY WM. GIFFORD, DATED AUGUST 27, 1902, FILED SEPTEMBER 27, 1902, FILED IN CABINET A AS MAP 334.
 - *MAP OF LOTS BELONGING TO CHARLES HOLTZMAN & THEO. ARNSTEIN*, PREPARED BY WM. GIFFORD, DATED AUGUST 8, 1902, FILED OCTOBER 8, 1902, FILED IN CABINET B AS MAP 172.
 - CITY OF SCHENECTADY WARD MAP, SECOND WARD, SHEET P, PROVIDED BY CITY ENGINEERING DEPARTMENT
 - CITY OF SCHENECTADY TAX MAP 039.43.

NOTES:

- THIS SURVEY WAS DONE WITHOUT THE BENEFIT OF AN ABSTRACT OF TITLE.
- SUBJECT TO ANY EASEMENTS OF RECORD.

UNAUTHORIZED ALTERATIONS OR ADDITION TO THIS SURVEY MAP IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW. COPIES OF THIS SURVEY MAP NOT BEARING THE LAND SURVEYOR'S EMBOSSED SEAL AND SIGNED WITH RED INK SHALL NOT BE CONSIDERED TO BE VALID COPIES.

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MONITORING WELL ELEVATION TABLE			
MONITORING WELL	ELEVATION OF RM OF PROTECTIVE CASING	ELEVATION OF INNER PVC WITH CAP OFF	ELEVATION OF GROUND SURFACE
UPMW-1A	277.02	276.81	273.54
UPMW-1B	276.93	276.73	273.53
UPMW-1C	277.18	276.83	273.54
UPMW-2A	269.32	269.00	269.29
UPMW-2B	269.18	268.79	269.16
UPMW-2C	269.19	268.75	269.18
UPMW-3A	268.04	267.57	268.02
UPMW-3B	268.07	267.80	268.04
UPMW-3C	267.85	267.50	267.82
UPMW-4	273.63	273.34	273.19
UPMW-5	273.88	273.60	273.38
UPMW-6	273.45	272.92	273.44

MONITORING WELL LOCATIONS & ELEVATIONS AS OF 11/9/95

PIEZOMETER ELEVATION TABLE			
PIEZOMETER NUMBER	ELEVATION (TOP OF PVC)	PIEZOMETER NUMBER	ELEVATION (TOP OF PVC)
PZ-1	269.49	PZ-8	277.11
PZ-2	274.10	PZ-9	268.51
PZ-3	273.32	PZ-10	273.29
PZ-4	273.42	PZ-11	274.30
PZ-5	273.74	PZ-12	273.62
PZ-6	268.31	PZ-13	268.24
PZ-7	269.18	PZ-13A	268.50

PIEZOMETER LOCATIONS & ELEVATIONS AS OF 6/26/95

11/10/95	ADDED MONITORING WELLS / TABLES
6/11/96	REVISED BOUNDARY
12/29/97	ADDED MONITORING WELLS / TABLES
1/13/98	REVISED ELEV.'S WELL 7A
DATE	REVISIONS

SURVEY OF THE FORMER
UNITED PLATING FACTORY
1742-44 FOSTER AVENUE
SCHENECTADY, N.Y.

CITY OF SCHENECTADY	SCHENECTADY COUNTY, N.Y.
SCALE: 1" = 20'	DATE: JUNE 26, 1995

M.J. ENGINEERING AND LAND SURVEYING, P.C.
1533 CRESCENT ROAD CLIFTON PARK, NEW YORK

WILLIAM J. SHOVER - L.S. 049900