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RAC II

Remedial Response, Enforcement Oversight and Non-time Critical Removal Activities at Sites of Release or Threatened Release of Hazardous Substances in EPA Region II

CDM

in association with TAMS

Final Remedial Investigation Report
Mercury Refining Company Site
Remedial Investigation/Feasibility Study
Colonie, New York

Work Assignment No.: 040-RICO-0276

Volume I

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PROJECT: RAC II Contract No.: 68-W-98-210
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SUBJECT: Final Remedial Investigation Report
Mercury Refining Company Site
Remedial Investigation/Feasibility Study
Colonie, New York

Dear Mr. Taccone:

CDM Federal Programs Corporation (CDM), on behalf of our entire RAC II Team, is pleased to submit the Final Remedial Investigation Report for the Mercury Refining Company Site at Colonie, New York as fulfillment of Subtask No. 9.2 of the Statement of Work.

If you have any questions regarding this submittal, please contact Demetrios Klerides at (212) 785-9123 or myself at (732) 225-7000.

Very truly yours,

CDM FEDERAL PROGRAMS CORPORATION
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Executive Summary

Executive Summary

This section provides a summary of the major findings of the RI. The conclusions drawn from the various investigations that were conducted concerning the nature and extent of contamination in catch basins, fish, surface water, sediment, soil, and groundwater are discussed below.

Site Setting and Physical Characteristics

The Mercury Refining Superfund Site lies on the west side of the Hudson Valley in the Hudson-Mohawk River Basin, and is approximately five miles northwest of the Hudson River and the central business district of Albany. A small unnamed stream flows along the southwestern boundary of the site and joins a channelized segment of Patroon Creek approximately 1,900 feet further to the southeast.

Temperatures for the area range from an average minimum in January of 24 degrees Fahrenheit (°F) to an average maximum in July of 72° F. Precipitation for the area is distributed evenly throughout the year, averaging about 37 inches; maximum monthly means are in June through August.

According to the *Soil Survey of Albany County, New York* (USDA 1992), the soils at the site are classified as Urban Land - Ur. The geology of the site is generally competent Paleozoic shale bedrock overlain by unconsolidated Quaternary glacial, glacio-lacustrine, glacio-fluvial, and recent fluvial deposits.

The groundwater at the site flows generally in a southerly direction and the water table is approximately 10 feet below ground surface (bgs). The flow lines for the shallow zone curve south-southwestwards towards the unnamed stream adjacent to the site. The deep monitoring zone appears to be influenced little by the configuration of the stream.

An assessment of the groundwater-surface water interaction was conducted at the site to determine the vertical flow relationship between the shallow groundwater and the stream. The measurements indicated that stream discharge increased in the downstream direction. Three transects of piezometers were installed in the stream bed and measured the water level in the stream relative to the water level in the stream bed. All three transects showed an upward gradient. Both of these analyses suggest that the contribution of groundwater to the baseflow of the stream increases in a downstream direction, indicating that shallow groundwater discharges to the stream.

Based on the physical characteristics of the site, a conceptual site model was developed, including transport of the primary site-related contaminant, mercury. Previous investigations suggested mercury was released to the environment in two phases:

- As a vapor released to the air and deposited as a solid on soils down wind of the site

- As elemental mercury, a dense non-aqueous phase liquid (DNAPL), released to site soils, stormwater collection system, and groundwater

These potential transport pathways for mercury are illustrated in the site conceptual model for site contaminant transport (Figure 3-18). Vapor phase mercury may have been transported by prevailing winds off site to the undeveloped area to the southeast of the site, an area used by all terrain vehicles (ATV) along an unpaved dirt track.

An ecological site characterization was performed at and around MERECO. The federally-listed endangered species, the Karner blue butterfly (*Lycaeides melissa samuelis*) has been reported by the United States Fish and Wildlife Service (USFWS) to be located within the area of the site. The habitat necessary to support this species was not observed. The New York State Department of Environmental Consrevation (NYSDEC) State-listed rare, threatened, and endangered species were reviewed and no threatened or endangered species were observed on site.

No federal- or state-mapped wetland areas are associated with the site (Figure 3-20). Terrestrial communities at the site are described in terms compatible with the ecological communities described in *Ecological Communities of New York State* (New York Heritage Program 2002) and include: industrial, successional old field, and successional hardwoods. The primary species expected to utilize the unnamed stream, Patroon Creek and the I-90 Pond as either habitat or as a food source are: frog, turtle, small fish, aquatic invertibrates, raccoon, mink, and muskrat.

Sources of Contamination

Improper disposal of residual materials from mercury recovery operations, fires at the facility, and poor housekeeping and waste management practices have resulted in the contamination of surface and subsurface soil, groundwater, and sediment in adjacent surface water bodies. In the past, residual wastes from mercury recovery operations were disposed over an embankment adjacent to a tributary to Patroon Creek. Elemental mercury was observed in deep soil borings, confirming that significant amounts of elemental mercury were released in the past. Other contaminants include polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and inorganics know to be associated with site-related activities.

Nature and Extent of Contamination

A summary of the nature and extent of contamination delineated in the site media is provided in the following sections. The results of the fate and transport evaluation of site contaminants are incorporated into the summaries. Figure 1-2 shows the site and all sample locations.

Catch Basins

The results of the catch basin sediment and catch basin surface water sampling are summarized in this section.

Summary of Catch Basin Sediment Contamination

The primary compounds of concernsin the catch basin sediment are mercury and the other inorganic contaminants. Concentrations of arsenic, cadmium, chromium, mercury, and silver exceeded their respective screening criteria in one or more of the sediment samples. Mercury exceeded its screening criterion in all of the catch basin sediment samples. Methylmercury was detected in three of the catch basins at concentrations ranging from 61.56 micrograms/kilogram (ug/kg) to 263.53 ug/kg. Although methylmercury to total mercury ratios were low, ranging from 0.1 to 1 percent, some methylation of mercury is occurring in the sediments.

Only one catch basin yielded sufficient sediment for analysis of the full suite of organic compound analyses. Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and pesticides were detected in sediment samples at concentrations exceeding screening criteria. Only one VOC, benzene, exceeded its screening criterion. Ten PAHs and eight pesticides exceeded screening criteria in this sample.

Summary of Catch Basin Surface Water Contamination

In general, catch basin surface water samples exceeded organic and inorganic screening criteria less frequently compared with sediment samples. However, this comparison is limited because there was insufficient sediment in some of the catch basins to perform the full suite of analyses. Indicator contaminants including cadmium and thallium exceeded their criteria in one and four surface water samples, respectively. Mercury, however, exceeded its screening criteria in all of the catch basin surface water samples. Methylmercury was widely distributed in the catch basins, indicating that the catch basins provide a suitable environment for methylation of mercury.

Organic compounds rarely exceeded screening criteria in the catch basin surface water samples. No VOCs or PCBs were detected in the catch basin surface water samples. Concentrations of three SVOCs, phenol, 2-methylphenol, and bis (2 ethylhexyl) phthalate, exceeded their respective screening criteria.

Catch Basin Sampling Conclusions

Inorganic contaminants, especially mercury, are present in the sediments and surface water in the catch basins. One catch basin is still used to collect runoff. Effluent from this catch basin is discharged directly to the tributary of Patroon Creek. Contaminated water continues to discharge from the effluent pipe connected to the inactive catch basin system into the tributary of Patroon Creek. The current closure method for the catch basins does not prevent contaminant from reaching the tributary. Based on contaminant levels detected in the active catch basin and the discharge pipe, the catch basin system remains a pathway for site-related contaminants to enter surface water.

Although a number of organic compounds exceeded sediment screening criteria, they are not believed to be associated with site activities. Organic contaminants likely are derived from runoff associated with industrial activities in the area and previous applications of pesticides.

Surface Water

In general, surface water samples rarely exceeded organic or inorganic screening criteria. Thallium exceeded screening criteria in a sample located just downstream of the site, but also exceeded its screening criteria in the background sample. Only one organic compound, methyl tert butyl ether (MTBE), was detected in surface water at a concentration exceeding its screening criterion. MTBE is a common gasoline additive and is not believed to be related to the site.

Sediment

Sediment sample results indicate significant contamination of sediments in the tributary of Patroon Creek, Patroon Creek, and the I-90 Pond, primarily with mercury and other indicator contaminants. VOCs, SVOCs, pesticides, and, to lesser extent, PCBs also were frequently detected in sediment samples from these water bodies.

Summary of Sediment Contamination - Inorganics

Eleven inorganics were detected in the 0 to 6 inch sediment grab samples. Inorganic contaminants, including arsenic, cadmium, chromium, nickel, and silver, exceeded screening criteria in one or more sediment grab samples. Mercury exceeded its screening criterion by up to 8 times at six locations; from just downstream of the site to downstream of the I-90 Pond. Iron, lead, copper, manganese, and zinc exceeded screening criteria both in downstream samples and background samples. Methylmercury was detected in all sediment grab samples.

Seven inorganics exceeded screening criteria in profile sediment samples (0 to 12 inches at 2-inch intervals). Mercury exceeded its screening criterion in all six intervals in the sample located just downstream of the site. Mercury also exceeded its screening criteria in a sample located further downstream in Patroon Creek. In general, exceedences of screening criteria for a number of inorganic contaminants were significantly greater in the downstream sample nearest to the site. A similar relationship exists for methylmercury concentrations.

Summary of Sediment Contamination - Organics

Organic compounds commonly were detected at concentrations exceeding screening criteria in the 0 to 6 inch sediment grab samples. A variety of PAHs were detected in nearly all sediment grab sample locations. PAHs often exceeded screening criteria by factors of 1,000 or more. Eleven pesticides were detected in sediment samples in concentrations exceeding screening criteria. The greatest number of pesticide exceedences (seven) occurred in the sample located at the I-90 Pond. Aroclor-1260 exceeded its screening criterion in samples from two locations, one of which was a background location.

VOCs were frequently detected in the profile sediment samples; however, none of the concentrations exceeded screening criteria. PAHs exceeded screening criteria in nearly all intervals of the profile sediment samples. One pesticide, 4,4' DDT, and one PCB, Aroclor -1254, exceeded screening criteria in the downstream sample nearest to the site.

Sediment Sampling Conclusions

Inorganic contaminants were widely distributed in stream sediments. Mercury exceeds its screening criterion in nearly all sediment samples. Significantly, mercury exceeds its screening criterion in the sediment sample collected in the most downstream sediment sample. This suggests that mercury contamination may be present in sediments further downstream in Patroon Creek. In addition, mercury exceeded its screening criteria in the 10 to 12 inch intervals of the profile samples, which suggests that mercury contamination may be present at greater depths in the sediments of the stream and I-90 Pond. Methylation of mercury is occurring in stream sediments with the associated potential for bioaccumulation and biomagnification of methylmercury in the food chain.

A variety of organic contaminants were commonly detected in sediment samples. VOCs were detected in a majority of sediment samples, but did not exceed screening criteria. A variety of PAHs were detected at concentrations well above screening criteria in the majority of sediment samples, including background samples. Historical operations at the site, especially operation of the retort furnace, may have contributed to the PAHs detected in the sediment samples. A number of pesticides were detected in sediment samples and are likely related to historical pesticide use in the Patroon Creek drainage basin and not related to site activities.

Fish Tissue

A number of inorganics were detected both in forage fish and sport fish samples collected upstream and downstream of the site; however, only mercury, in the sample collected at stream location SW-06, exceeded its screening criterion.

Summary of Fish Tissue Contamination - Stream

No VOCs, SVOCs, or pesticides were detected at concentrations exceeding screening criteria in any of downstream fish samples. The pesticides 4,4'-DDE and alpha chlordane exceeded their respective screening criteria in the background sample from Inga's Pond. PCBs were detected at concentrations above screening criteria in fish tissue samples collected downstream of the site.

With the exception of mercury, no inorganic analytes exceeded screening criteria in the sport or forage fish samples collected from the I-90 Pond. Mercury in the sport fish sample marginally exceeded its screening criteria.

Summary of Fish Tissue Contamination - I-90 Pond

No VOCs or SVOCs were detected in fish samples from the I-90 Pond above screening criteria. The pesticide alpha chlordane was detected just above its screening criteria in the sport fish sample from the I-90 Pond, but it was also detected above its screening criterion in the background sample from Inga's Pond. Alpha chlordane it is not known to be associated with the site. Aroclor-1254 and -1260 were detected at concentrations significantly above their respective screening criteria in the forage fish and sport fish samples from the I-90 Pond. Aroclor-1254 also exceeded its screening criterion in the forage fish sample from the I-90 Pond.

Fish Sampling Conclusions

No VOCs or SVOCs were detected above screening criteria in any of the fish samples. Pesticides detected in fish samples are not known to be site related as their concentrations are similar in background and downstream samples. The PCBs Aroclor-1254 and -1260 were commonly detected in all fish samples. However, the magnitude of the exceedences in the downstream samples and the upstream samples generally are similar.

Inorganic contamination in fish tissue is limited to mercury exceedences in two fish samples. Generally, mercury in tissue is present in the form of methylmercury, which is available for biomagnification in the food chain. This suggests the potential human exposure via ingestion of fish and for ecological impacts in the food chain.

Surface Soil

The results of on-site and off-site surface soil sampling and subsurface soil sampling are summarized and discussed in this Section.

Summary of Off-Site Soil Contamination

Inorganic contaminants were frequently detected in off-site surface soil samples. A variety of inorganics including arsenic, beryllium, copper, iron, manganese, mercury, and zinc were detected at concentrations exceeding screening criteria. Mercury exceeded its screening criterion in all of the 13 off-site soil samples.

None of the VOCs or pesticides detected in the off-site soil samples exceeded screening criteria. A number of PAHs including benzo(a)pyrene were detected at concentrations exceeding screening criteria. PCBs were not detected in the off-site surface soil samples.

The mercury contamination is likely related to wet and dry deposition of mercury emissions from historical site operations and fires at the site. PAHs present in the off-site surface soil samples may, at least in part, be related to historical emissions from the retort furnace. The off-site surface soil sampling area is downwind of the prevailing wind direction at the site. Surface soil samples also are located in an area that is used for recreation as evidence by an ATV trail. Individuals were observed using the area for recreation, including riding ATV's. In addition, the potential exists for exposure of ecological receptors that use this area.

Summary of On-Site Surface Soil Contamination

Inorganic contaminants were frequently detected in the on-site surface soil samples. Arsenic, cadmium, chromium, manganese, mercury, nickel, and zinc were detected at concentrations exceeding screening criteria in surface soil samples. Mercury and zinc concentrations exceeded screening criteria most frequently.

Inorganic contaminants exceeded screening criteria in the majority of on-site surface soil samples. However, many of the samples were collected below asphalt or concrete surface layers. These cover materials will likely prevent surface migration via runoff or wind. In some areas, the surface cover is deteriorated or absent, allowing soil contaminants to migrate from the site via runoff and wind transport or via leaching by precipitation and subsequent infiltration to groundwater.

Eight VOCs, four pesticides and one PCB were detected in the 13 surface soil samples collected from 0 to 2 feet in on-site soil borings. However, none of these compounds were detected above screening criteria. Six SVOCs, primarily PAHs, were detected in concentrations above screening criteria at six soil boring locations.

Summary of Subsurface Soil Contamination

Inorganic contaminants are widely distributed in subsurface soil samples. The highest levels of indicator contaminants, including mercury, were observed in samples collected from four locations, all within 100 feet on the east side of the site. The highest concentration of mercury, 38,000 mg/kg, was detected in a 10 to 12-foot sample interval in MW-05D (located in the footprint of the former retort furnace building). Elemental mercury was observed in samples from MW-05D to total depth of 66 feet bgs. In addition to MW-05D, mercury was detected above its screening criterion at depths ranging from 4 to 18 feet bgs in samples from 7 subsurface soil borings. A number of other inorganics were frequently detected at concentrations exceeding screening criteria including arsenic (9 locations), zinc (9 locations), and manganese (7 locations). Copper, chromium, and nickel concentrations exceeded screening criteria in 4 or fewer locations.

Only one VOC, acetone, was detected at a concentration above its screening criteria. No pesticides were detected at concentrations exceeding screening criteria. PCBs were detected above screening criteria in samples from four soil borings. Four PAHs exceeded screening criteria in samples from boring SBM-MW-07. One PAH exceeded its screening criterion in samples from boring SBM-MW-01.

Soil Sampling Conclusions

Elemental mercury was observed and high concentrations of mercury were detected in the subsurface soil borings. The highest levels of contamination occur within a small area on the east side of the site. The mercury distribution suggests that contamination in the subsurface was likely the result of spills or discharges in a fairly restricted area.

Due to its high specific gravity, the major direction of elemental mercury migration in subsurface soils is vertically downward. A major factor influencing whether elemental mercury will be found at the surface of the confining layer, is the total mass of mercury that was released. In order to form pools of elemental mercury, the mass of mercury released would have to be greater than the capacity of the intervening soils to sorb the mercury. Based on the depths of the observations of elemental mercury in the borings, it appears that the mass of mercury disposed over time at the facility is not sufficient to create significant pool of elemental mercury at the surface of the Lake Albany Silt and Clay (confining layer). However, elemental mercury was observed near the bottom of boring MW-05D, near the surface of the confining layer. The limit of visible elemental mercury at shallower depths in two nearby borings suggests that it has not reached the confining layer at all locations.

Although elemental mercury has a very low solubility in water, elemental mercury observed in soil boring samples will continue to be a source of groundwater contamination.

A variety of inorganic contaminants including arsenic, cadmium, chromium, manganese, mercury, nickel, and zinc were detected in soil samples at concentrations exceeding screening criteria. The organic contamination observed in the soil samples consists primarily of PAHs.

Groundwater

Analytical results for two rounds of sampling of new and existing monitoring well indicate a variety of inorganic contaminants in groundwater at concentrations exceeding screening criteria. Organic contaminants were not detected at concentrations exceeding screening criteria.

Summary of Groundwater Contamination - Inorganics

A variety of inorganic analytes were detected in groundwater samples from monitoring wells across the site; only iron and manganese were detected in concentrations consistently exceeding screening criteria. Manganese was detected in the background sample, but also may be related to manganese batteries brought to the site for processing. Arsenic was also frequently detected at concentrations exceeding screening criteria in wells hydraulically downgradient of the site. Other inorganics including selenium, magnesium, lead, and thallium, exceeded screening criteria in shallow monitoring wells, also located hydraulically downgradient.

Mercury was detected at concentrations exceeding its screening criterion only in samples from one well deep well, MW-5D. Elemental mercury was observed in the soil boring for MW-5D at a depth of at least 60 feet bgs. Mercury was detected in a number of other shallow and deep wells at the site, however, concentrations were always below mercury's groundwater screening criterion.

Summary of Groundwater Contamination - Organics

VOCs, SVOCs, and pesticides were not detected at concentrations exceeding screening criteria in any of the groundwater samples. PCBs were not detected in any of the groundwater samples.

Groundwater Sampling Conclusions

Elemental mercury was observed in deep soil borings MW-5D, SBD-01, and SBD-02, below the groundwater table. Mercury exceeded its screening criterion only in samples from one well, MW-5D. This suggests that either the plume is small and limited to the area around MW-5D or dissolved-phase mercury was not adequately characterized by the groundwater sampling program.

Draft Human Health Risk Assessment Summary

A review of the carcinogenic risks and noncarcinogenic hazards for exposures at the MERECO site showed values that exceeded the EPA's target hazard index of 1 and

EPA's target cancer risk range of 10^{-6} to 10^{-4} for recreational use of the creek/pond and for residential use of the groundwater. Potential future cancer risks to workers on the MERECO property and bordering the MERECO property were within the 10^{-6} to 10^{-4} range. Risks to other receptors were below the EPA threshold levels of concern.

Screening Level Ecological Risk Assessment Summary

Results of the Screening Level Ecological Risk Assessment indicate the potential for risk to ecological receptors from exposure to chemicals detected in site surface water, sediment, and soil. Contaminants of concern (COCs) in surface water and sediment of the streams and the I-90 Pond present an ecological risk to the aquatic invertebrates . The potential for ecological risks exists to freshwater fish and amphibians from copper, aluminum, and mercury in site surface water. The potential for ecological risk to the food chain receptors exist from sediment and surface soil COCs. Potential ecological risks exist for piscivorous birds, insectivorous birds, and piscivorous mammals, primarily from metals. Additional risk contributors are PCBs, pesticides, and SVOCs. Mercury is a contributor to the potential risks of the receptors with food chain exposures based on sediment COCs. Potential ecological risks exist to insectivorous mammals, primarily from SVOCs and the pesticide 4,4'-DDT. Mercury does not contribute to the potential risks for the receptors with food chain exposures based on soil COCs.

Conclusions

The findings of the RI are as follows:

- The catch basins are contaminated with inorganics, especially mercury and methylmercury. The catch basins have not been properly closed and remain a pathway for site related contaminants to reach the tributary of Patroon Creek and downstream receptors.

- Surface water in the stream and I-90 pond shows minimal impact from the site. However, surface water in the stream will provide a means for transport of contaminated sediments to downstream locations.

- Sediments are contaminated with a number of inorganics, including mercury, and methylmercury. Mercury contamination is present in the most downstream sample collected during the RI and at the maximum depth of the sediment samples. The I-90 Pond is sink for mercury-contaminated sediments transported downstream in the Patroon Creek drainage. Sediments are also contaminated with PAHs and pesticides.

- Fish tissue results indicate mercury contamination in fish in the Patroon Creek drainage. However, a limited number of fish were available at some of the sampling locations. Methylmercury in stream and pond sediments and surface water indicate a potential for bioaccummlation and biomagnification of mercury in the food chain. Mercury in sport fish in the I-90 Pond indicates a potential for human exposure.

- Off-site surface soils are contaminated with mercury and other inorganic contaminants that were likely deposited from mercury processing emissions from the site. PAHs were commonly detected in off-site surface soil samples and may be related to operation of the mercury retort furnace and to other industrial activities in the area near the site.

- Results of the groundwater-surface water interaction study indicate that shallow groundwater in the vicinity of the site discharges to the tributary of Patroon Creek, providing a pathway for groundwater from the site to enter the tributary.

- Subsurface soils at the site are grossly contaminated with mercury. High concentrations of elemental mercury were detected in many subsurface soil samples. Elemental mercury was observed in samples from one soil boring (MW-05D)at depths up 66 feet below the ground surface, near the surface of the confining layer, and at two other boring locations. Elemental mercury in the subsurface soils is a source for groundwater contamination.

- The deep soil boring data do not indicate that a significant mass of elemental mercury is present at the surface of the confining layer. Elemental mercury observed in two deep borings (SBD-01 and SBD-02) was well above the confining layer. However, elemental mercury was observed in one deep soil boring (MW-5D) near the surface of the confining unit.

- Groundwater is contaminated with mercury only at one well (MW-05D), the location that exhibited the highest concentrations of mercury in soil samples and visible elemental mercury. This suggests that either the plume is small or that the extent of dissolved-phase mercury contamination has not been adequately characterized.

Data Gaps

A number of data gaps were identified during the process of evaluating the RI. Data gaps exist where the current data are insufficient to draw conclusions or where the extent of contamination for a media pathway likely exceeds the boundaries of the sampling program. The following gaps were identified in the RI data:

- Stream sediment data are insufficient to define the extent of contamination in the stream and I-90 Pond. Current stream sediment data suggest that the sediment contamination is present at greater depths in the I-90 Pond, the tributary of Patroon Creek, and Patroon Creek stream and beyond the most downstream sample collected during the RI.

- The groundwater plume has not been adequately defined. Groundwater data suggest that either the plume is small or that the extent of dissolved-phase mercury contamination has not been adequately characterized.

Recommendations

Recommendations for further evaluation of the site are provided below:

- Mercury exceeds its screening criteria in the most downstream sediment sample and in the deepest sediment samples. Mercury contamination is likely present at greater depths in the pond. It is recommended that sediment profile samples be collected in the stream and I-90 Pond to better define the extent of contamination and to support development of remedial alternatives in the Feasibility Study.

- The extent of groundwater contamination has not been adequately defined. To further evaluate the extent of groundwater contamination, groundwater depth profile sampling for mercury is planned for the area hydraulically downgradient of monitoring well MW-5 and known areas of subsurface soil contamination between the site and the tributary of Patroon Creek.

- The catch basins contain high levels of mercury and other metals. Although the system was reportedly closed, mercury-contaminated runoff is still discharging to the tributary of Patroon Creek. The remaining water and sediment in the catch basins should be removed and the catch basin system, including piping, should be properly closed.

- Based on a review of wetland and floodplain mapping and the results of the ecological field investigation, wetland and floodplain delineations are not recommended at this time. The FS will include an evaluation of all applicable, relevant and appropriate requirements (ARARs) and "to be considered" criteria (TBCs) relevant to wetlands and flood plains. If a remedial action is selected that will potentially impact wetlands or floodplains in contaminated areas, the appropriate delineations will be performed as part of the remedial design.

1

Section One

Section 1
Introduction

1.1 Purpose of the Report

The purpose of this Final Remedial Investigation (RI) Report is to present the results of the surface and subsurface soil investigation, fish investigation, surface water and sediment investigation, groundwater investigation, hydrogeologic investigation, cultural resources survey, ecological investigation, human health risk assessment, and ecological risk assessment of the Mercury Refining Company(MERECO) Site located in the Towns of Guilderland and Colonie, New York. The report was prepared by CDM Federal Programs Corporation (CDM) for the United States Environmental Protection Agency (EPA), Region II, as authorized under the Response Action Contract (RAC II) 68-W-98-210, Work Assignment Number 040-RICO-0276.

The goal of these investigations was to define the nature and extent of contamination in various environmental media at the site and to define the hydrogeologic framework of the site. As part of this investigation, groundwater, soil, fish, surface water, and sediment samples were collected and analyzed. In this report the results of these analyses are compared with applicable New York and federal standards to determine the extent of contamination.

The RI report was prepared as part of the remedial investigation/feasibility study (RI/FS) for MERECO, conducted in accordance with the Final Work Plan Volume I, dated March 13, 2001 (CDM 2001a), the Final Work Plan Volume II, dated June 15, 2001 (CDM 2001b); the Final Quality Assurance Project Plan (QAPP), dated August 24, 2001 (CDM 2001c); and EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Office of Solid Waste and Emergency Response (OSWER) Directive Number 9355.301, October 1988.

1.2 Site Location

The MERECO property is an approximately 0.68 acre mercury reclamation facility located on the border between the Towns of Guilderland and Colonie and the City of Albany, Albany County, New York. The facility address is 26 Railroad Avenue, Colonie, New York.

Figures 1-1 and 1-2 show the site location and site plan, respectively. The areas to the north, east, and west of the site are principally light industrial with some commercial use and warehousing. The closest residence is located approximately 0.25 mile north of the site. An unnamed tributary to Patroon Creek and active railroad tracks form the southern boundary of the site. Beyond the railroad tracks are electrical power lines and undeveloped land that extends to Interstate 90, approximately one-quarter mile to the south. The tributary of Patroon Creek adjacent to the site extends from Inga's Pond (also called Murray Pond) to its confluence with Patroon Creek and is approximately 4,700 feet in length; the MERECO facility is approximately 1,600 feet upstream of Patroon Creek. Patroon Creek is dammed about 6,200 feet downstream of the confluence with the tributary, forming the I-90 Pond. Beyond the I-90 Pond dam, Patroon Creek continues and ultimately discharges to the Hudson River approximately five miles downstream of the MERECO property.

1.3 Site Description

Currently, two buildings are present at the site (Figure 1-3): (1) the "Phase I & IA Building", which was constructed in 1991 to replace the "Hand Shop" building and to house most of the company's operations; and (2) the 2,635 square foot "Container Storage Building", which is currently leased by Mercury Waste Solutions and used as a transfer facility for mercury waste materials. The Container Storage Building was constructed in 1989 with an impervious base that includes a sump to collect spilled materials; it was designed to eliminate run-on and run-off (MERECO 1997a).

The northern half of the property is covered by asphalt, concrete, and/or the buildings, and is surrounded by a chainlink fence. The remainder of the property is a grassy area between the Container Storage Building and the railroad. This is the area that was excavated, backfilled, and capped with a clay cap during the 1985 remediation (CDM 2001a). The western side of the grassy area slopes down to the gabion wall and the bank of the unnamed tributary to Patroon Creek.

Four monitoring wells that were installed in 1985 are still present: three downgradient of the facility (OW-1, OW-2, and OW-3) and one upgradient (OW-4). These wells were sampled quarterly by MERECO from 1991 to 2001. The quarterly groundwater monitoring samples are analyzed for inorganics and polychlorinated biphenyls (PCBs).

1.4 Site History

MERECO was founded in 1955. Using retorts, the facility reclaimed metallic mercury from mercury batteries and other mercury-bearing materials such as thermometers, neon signs, and dental amalgams. The recovered metallic mercury was then refined and marketed. MERECO also concentrated and brokered silver powders and small quantities of other precious metals.

In the past, waste batteries were dumped over an embankment to the tributary to Patroon Creek. From 1980 to 1988, waste batteries were stored in drums on wooden pallets in paved areas of the site prior to disposal. Initial sampling performed by the New York State Department of Environmental Conservation (NYSDEC) Fish and Wildlife Division showed PCB and mercury contamination. Further sampling conducted in November 1981 and June 1982 confirmed the presence of these contaminants in on-site soils, and mercury contamination of stream sediments. In 1983, the site was placed on the EPA National Priorities List (NPL).

In September 1983, a Resource Conservation and Recovery Act (RCRA) Site Investigation (SI) of the MERECO property and adjacent areas was conducted under the supervision of NYSDEC and included surveys of groundwater, surface soil (PCBs), surface water, stream sediment, and air quality (MERECO 1997a). According to MERECO (1997a), the SI concluded that:

- Process waste from MERECO had impacted subsurface soil and groundwater quality.
- PCB contamination was not a result of process waste from MERECO.
- Sediment and surface water quality in the stream adjacent to and downstream from the site were not significantly different from upstream conditions.

NYSDEC believes that the statements above, made by MERECO, are not supported by the data collected for this RI and other studies at the site. NYSDEC stated that the oil/grease phase of liquid produced from retorting red Kodak mercury camera batteries, mercury pacemakers, and mercury wetted round relays contained high levels of PCBs.

A Phase II RCRA SI was conducted in June 1984 to determine the areal and vertical extent of waste material and mercury in soils and to refine the understanding of the impact of the site on the local water courses. The Phase II SI concluded that approximately 1,950 cubic yards of waste material would need to be removed from the southern-most portion of the property to attain a residual mercury concentration of less than 10 milligrams/kilogram (mg/kg), and that trace concentrations of mercury were present in surface water and sediment both upstream and downstream of the site (MERECO 1997a). Additional investigations were conducted in 1985 by Conestoga-Rovers Associates (CRA 1985) on behalf of MERECO to characterize the extent of PCB contamination and to further characterize mercury concentrations in the stream and I-90 Pond.

Under a September 1985 Consent Decree with New York State, pursuant to the CERCLA (U.S. District Court Index No. 83-CV-1054), MERECO excavated and removed approximately 2,100 cubic yards of mercury-contaminated soil and debris and 300 cubic yards of PCB-contaminated soil from both on-site contaminated areas and from the (former) Owasco River Railway property (now owned by Conrail) south of MERECO's property line. A negotiated cleanup level of 20 mg/kg of mercury, or visual evidence of contamination plus two feet, was used. An unknown amount of waste was found beneath the Retort Furnace Building and, after being sealed with plastic sheets, was left in place. The excavated area was backfilled with clean fill, a clay cap was installed, and a concrete slab was poured over the portion of the site which now serves as the floor of the Container Storage Building.

Four monitoring wells were installed in 1985 and are still present: three hydraulically downgradient of the facility (OW-1, OW-2, and OW-3) and one hydraulically upgradient (OW-4). These wells were sampled quarterly by MERECO from 1991 to 2001. Well depths range from 14 to 21 feet in depth with 5-foot screens. The hydraulically upgradient well, OW-4, is located on the property of the Albany Pallet and Box Company north of the MERECO Site, approximately 20 feet north of MERECO's fence line. The three hydraulically downgradient wells, OW-1, OW-2, and

OW-3, are located in the remediated area in the southern section of the property. After remediation, a fish monitoring program was instituted and fish were collected by electroshocking from the I-90 Pond in 1985, 1986, 1987, and 1990. Mercury concentrations in fish tissue collected during monitoring were below 1 mg/kg (wet weight), the threshold of concern identified in the Consent Order and referred to the New York State Department of Environmental Conservation for clean up and enforcement.

A new Order-of-Consent with NYSDEC was signed on June 9, 1989. The Order called for identification and remediation of mercury-contaminated areas both on- and off-site and a program to evaluate and abate any unauthorized migration of mercury or other contaminants from the facility, including mercury emissions from both permitted and fugitive air sources. As part of these evaluations, the facility was required to perform a stack test, a storm sewer cleanup, an investigation of mercury-contaminated sediments in Patroon Creek, an ambient air concentration evaluation, an off-site deposition characterization study, installation of air pollution control equipment, fund a wildlife study to be performed by NYSDEC's Wildlife Pathology Unit, and perform periodic analyses of retort liquids and residues of PCBs.

On September 14, 1989, a fire destroyed the Hand Shop Building used for storage and to house the mercury purification operations and silver oxide battery processing. Approximately 224 cubic yards of charred building and destroyed equipment debris were shipped off-site for secure land burial. Approximately 7,650 gallons of wastewater collected from fire water run-off and site/equipment decontamination was removed from the site. A total of approximately 0.72 pound of mercury was present in the wastewater. Soil samples collected in the former Hand Shop area in November 1989 identified hot spots of mercury contamination that were subsequently cleaned. No PCBs were found. The Hand Shop Building was replaced in 1991 with the construction of the "Phase I" building.

NYSDEC collected numerous on- and off-site surface soil, sediment, and surface water samples during the spring, summer, and fall of 1989, including several samples collected during and immediately after the fire in September. Most of the sediment and surface water samples were from the Patroon Creek watershed (i.e., along the full length of Patroon Creek from Rensselaer Lake to the Hudson River, including Inga's Pond, the tributary adjacent to the site, and the I-90 Pond).

On April 10, 1991, another fire occurred, this time at the Break Trailer located in the western portion of the site. The fire also spread to an adjacent storage trailer. The Break Trailer had been used as a changing area/break room for employees. In addition, one-third of the trailer had been used for manual sorting and weighing of incoming materials to be processed, and approximately 400 pounds of mercury were in the trailer at the time of the fire.

On February 8, 1993, a new Order-on-Consent (Modification File No. R4-0882-90-11) was signed to address deficiencies in response to the 1989 Order. MERECO's proposed plan for the permanent abatement of mercury from the site, submitted pursuant to the 1989 Order and referred to as Phase I/Phase II, was considered inadequate by NYSDEC. In addition to continuing the provisions of the 1989 Order, the 1993 Order calls for the establishment of a schedule for the completion of all activities, resulting in a permanent remedy for the abatement of emissions and migration of pollutants, quarterly groundwater monitoring for ten years, remediation/removal of contaminated soils beneath the old furnace building, long-term monitoring of areas surrounding the site to detect off-site migration of pollutants (in lieu of the deposition characterization study required by the 1989 Order), the permitting of all air sources, correction of RCRA violations, and payment of regulatory fees, civil penalties, and natural resource damages.

Quarterly groundwater monitoring began in April 1991, with samples analyzed for PCBs and inorganics. PCBs have never been detected in groundwater, although the detection limit has been consistently higher than the NYSDEC groundwater quality standard. In the hydraulically downgradient wells, mercury, cadmium, chromium, copper, lead, and zinc have all been detected at concentrations at least 5-times higher than their respective NYSDEC groundwater quality standards. In the hydraulically upgradient well, only mercury concentrations have exceeded the NYSDEC standard.

In the fall of 1994, MERECO demolished the Retort Furnace Building and applied a concrete cap over this area. At this time, MERECO also dismantled a stainless steel trailer that was located just north of the Retort Furnace Building. In 1995, MERECO conducted a subsurface soil investigation beneath the former furnace building, during which visible free phase mercury was observed in soils extending from just below the concrete to a depth of about 13 feet in several borings. However, visible mercury was still observed at the bottom of one 18-foot boring and mercury concentrations were elevated in soil samples from the bottom of three other borings.

MERECO received its final 6 New York State Codes, Rules, and Regulations (NYCRR) Part 373 Hazardous Waste Management Permit (RCRA Part B Permit) from NYSDEC on December 31, 1996 for the purpose of controlling the generation and storage of waste on-Site and for investigating and remediating on and off-site contamination. All unfinished work required by the various prior consent orders was subsumed into the permit. The permit allows MERECO to store specific categories of hazardous waste in the Container Storage Building.

In 1997, MERECO conducted additional subsurface soil sampling both on and around the MERECO property to support the RCRA Facility Investigation required by their RCRA Part B permit. All samples were analyzed for mercury and a subset of samples were also analyzed for PCBs and metals. On-property samples were collected in August 1997 to supplement the information gathered in 1995. Several of the 1995 borings with elevated mercury concentrations at the bottom were revisited and advanced in an attempt to determine the vertical extent of contamination beneath the former furnace building. Elevated mercury concentrations were still observed at the bottom of two borings (SB-3A and SB-10A), including an observation of visible free-phase mercury at the bottom of SB-10A at 30 feet bgs. SB10A was located immediately south of the footprint of the former furnace building. The vertical extent of mercury contamination in the western half of the property was more limited: concentrations did not exceed 3.3 mg/kg at depths greater than 1 foot below ground surface (bgs). Off-property surface soil samples (0-6 inches and 6-12 inches bgs) were collected in December from the DJ Wholesale Building Materials storage yard, the Albany Pallet & Box Company storage yard, and the Diamond W parking lot, and showed some elevated concentrations (up to 150 mg/kg) to the east and north of the MERECO property.

In September 1997, PTI Environmental Services (PTI) conducted a field investigation in the Patroon Creek watershed on behalf of MERECO. The investigation included: (1) collection of surface water and sediment samples from the tributary to Patroon Creek, Patroon Creek itself, and the I-90 Pond; (2) collection of crayfish from three locations on Patroon Creek, and (3) a habitat quality assessment of the off-site area and natural areas in the vicinity of the facility. The surface water, sediment, and crayfish tissue samples were analyzed for total mercury. NYSDEC did not accept the PTI study.

From 1997 through 1999, MERECO evaluated potentially suitable corrective measures for the soils beneath the former furnace building and had Kiber Environmental conduct treatability studies for two potentially suitable technologies: physical treatment and in-situ stabilization/solidification. In-situ stabilization was selected as the preferred corrective measure in the proposed November 1999 work plan submitted to NYSDEC (MERECO/Kiber 1999).

In November 1999, because of MERECO's unsatisfactory progress in meeting the terms of the corrective action permit, and the various Administrative Orders, NYSDEC requested EPA to assume the role of lead agency for site remediation. In 1999, NYSDEC filed a complaint against Mercury Refining charging it with six RCRA violations and failure to complete all of the requirements of the RCRA Corrective Action permit.

In October 2000, EPA, under its RAC II Contract, authorized CDM to conduct an RI/FS at the MERECO Site. Field investigation activities at the site began in October 2001 and were completed in June 2002.

1.5 Summary of Historical Investigations

Several investigations have been conducted since the site was added to the NPL approximately 19 years ago. Analytical data are available for surface soil, subsurface soil, sediment, surface water, groundwater, and biota tissue. However, only limited documentation is available to evaluate or support usability of the historical data for an RI/FS conducted under CERCLA. For example, exact dates and locations are not documented for some samples, detection limits are not always provided, and there is no documentation of quality assurance (QA) review of laboratory analyses for most of the investigations. In addition, site conditions have changed since the time that some of the data were collected, so that historical information may not accurately reflect current (or future) patterns of contamination. The data were, however, used as a basis for determining locations and types of samples for this RI. The historical data are presented and summarized in the following subsections. The historical data are considered to provide only general information regarding the distribution and levels of contamination that existed at the site prior to the RI conducted by EPA.

1.5.1 Summary of Existing Soil Data

In 1989, NYSDEC collected surface soil samples (0 to 2 feet bgs) from 36 locations at the MERECO property and surrounding areas. All samples were analyzed for total mercury. Several samples were also analyzed for cadmium, lead, zinc, and total PCBs. It is not clear from the NYSDEC (1990) report which of the samples were collected before, during, or after the fire that occurred in September 1989. These data are summarized in Table 1-1. Maps from NYSDEC (1990) showing locations of the samples are provided in Appendix A. The highest mercury concentrations (ranging from 275 to 1,040 mg/kg) were found to the east of the MERECO property, at and just beyond the fence line with the DJ Wholesale Materials storage yard. Samples collected at a greater distance from the MERECO facility perimeter were much less contaminated (i.e., less than 10 parts per million [ppm]). Mercury concentrations in offsite soils tended to diminish more rapidly with distance in the upwind direction (north and west) than in the downwind direction (east and south) (NYSDEC 1990).

As part of the RCRA Facility Investigation, surface and subsurface soil samples were collected from the MERECO property in 1995 and 1997 (MERECO 1997b) and from the surrounding properties in 1997 (MERECO 1998a). All samples were analyzed for total mercury. Several samples were also analyzed for metals and PCBs. Soil data from the MERECO property are summarized in Tables 1-2 and 1-3, and data from the surrounding properties are summarized in Table 1-4.

For the 1995/1997 investigation of contamination at the MERECO property, the depth of borings and associated soil samples was determined, in part, by the presence of visible mercury and by mercury vapor concentrations measured in soil sample head space. Borings in the area of the former Retort Furnace Building ranged from 10 to 30 feet in depth, with soil samples collected at a depth of at least 7 feet bgs (i.e., mercury concentrations were not measured in surface soil in this area). Visible mercury contamination was observed in soil from several borings and extended to a depth of at least 30 feet bgs in one boring (SB-10/10A). The vertical limits of significant mercury contamination were not determined in at least two borings: SB-2/2A which had a concentration of 35 mg/kg at 17 feet bgs, and SB-10/10A which had visible mercury at 30 feet bgs. Borings on the western side of the property and in the area of the former steel trailer were shallower (i.e., from 4 to 9 feet bgs), and included some soil samples from the 0 to 1 foot and 1 to 2 feet range. Mercury contamination did not extend deeper than about 1 foot bgs in this area. The figure from MERECO (1997b) showing locations of the MERECO property borings is provided in Appendix A.

For the 1997 investigation of the properties surrounding the MERECO facility, soil samples were collected from 0 to 6 inches and 6 to 12 inches bgs. Mercury concentrations were highest in samples from locations bordering the MERECO property to the east and north. The highest mercury concentration (150 mg/kg) was collected at 6 to 12 inches bgs in SB-43, which is east of the former Retort Furnace Building area. The figure from MERECO (1998a) showing locations of the off-property soil samples is provided in Appendix A.

1.5.2 Summary of Existing Groundwater Data

Groundwater has been sampled quarterly from the four onsite wells since April 1991 (OW-1 through OW-4 shown on Figure 1-2), and analyzed for inorganics (arsenic, barium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, dissolved mercury, selenium, silver and zinc) and PCBs. Results from the quarterly monitoring are summarized in Table 1-5. Cadmium, chromium, copper, lead, mercury, and zinc have been detected at concentrations that exceed their respective NYSDEC groundwater quality standards by at least five-times in hydraulically downgradient wells. The pattern of mercury concentrations differed from that of the other inorganics: the highest mercury concentrations were detected in OW1-85, while the highest concentrations of most of the other inorganics were detected in OW2-85 (Figure 1-2). In the hydraulically upgradient well, only mercury exceeded the NYSDEC groundwater quality standard.

Groundwater samples were also analyzed for individual Aroclors (PCBs). Although PCBs were never detected in groundwater, the detection limits for the individual Aroclors [0.5 microgram/liter (ug/L)] were five times higher than the NYSDEC groundwater standard for PCBs (0.09 ug/L).

1.5.3 Summary of Existing Sediment Data

Several investigations of contamination in the surface water bodies near and downstream of the site have been conducted in the past. Figures from the original references showing the locations of samples are presented in Appendix A.

In 1983, 1984, and 1985, several sediment samples were collected from the tributary, Patroon Creek, and the I-90 Pond (CRA 1985). Sampling methods are not presented in the report made available for review, but it appears that several of the 1984 samples are 0-1 foot and 1-2 feet cores, and several of the 1985 samples were collected from the top 2 inches. All samples were analyzed for total mercury. In 1983, total mercury concentrations in the tributary ranged from 4.7 to 8.6 mg/kg. In 1984 and 1985, total mercury concentrations in the tributary, Patroon Creek, and the I-90 Pond ranged from non-detect to 2.3 mg/kg. The 1985 samples were also analyzed for organic mercury, total organic carbon (TOC), and grain size. However, the organic mercury measurements are questionable because the concentrations reported by CRA are often higher than the total mercury concentration and are higher than the NYS Department of Law duplicate results for organic mercury. Reported analytical results for these samples are presented in Table 1-6.

In 1989, NYSDEC collected 74 sediment samples from the Patroon Creek watershed (i.e., along the full length of Patroon Creek from Rensselaer Lake to the Hudson River, including Inga's Pond, the tributary, and the I-90 Pond). Most of the samples were collected from the top 2 inches of sediment. Sediment cores extending 10 inches below the surface were collected from two locations in the tributary near the site. The sampling dates were not reported by NYSDEC (1990). Reported analytical results for these samples are presented in Table 1-7. As shown, the highest concentrations were detected near the green pipe outfall from the MERECO facility (3.2 to 154 mg/kg) and downstream in the tributary just south of the railroad tracks (1.99 to 16 mg/kg). In addition, an elevated concentration of mercury (6.97 mg/kg) was detected just downstream of the dam at the I-90 Pond. Concentrations in the I-90 Pond itself ranged from 0.062 to 2.33 mg/kg.

In September 1997, PTI (1997a) collected 11 sediment samples from the tributary, Patroon Creek, and the I-90 Pond. The PTI samples were collected from the top 2 centimeters (slightly less than one inch) of sediment and were analyzed for total mercury, TOC, total solids, and grain size distribution. Reported analytical results for these samples are presented in Table 1-8. Concentrations in the 1997 samples ranged from 0.045 to 0.592 mg/kg. As previously noted, NYSDEC did not accept this 1997 study because the sampling methodology did not adequately characterize the creek sediment.

1.5.4 Summary of Existing Surface Water Data

Surface water samples were collected concurrently with sediment samples during the investigations described in the previous subsection. Figures from the original references showing the location of samples are presented in Appendix A.

In 1983, 1984, and 1985, several surface water samples were collected from the tributary, Patroon Creek, and the I-90 Pond (CRA 1985). All samples were analyzed for total mercury. Concentrations ranged from nondetect to 0.0034 milligrams/liter (mg/L) (in the tributary downstream of the MERECO property). The 1984 and 1985 samples were also analyzed for organic mercury. However, as with the sediment analyses, the organic mercury measurements are questionable because the concentrations reported by CRA are often higher than the total mercury concentration. In addition, NYS Department of Law duplicate results for both total and organic mercury differed significantly from the results reported by CRA: in one case 5 times higher and in another case 11 times lower than the CRA result. Reported analytical results for these samples are presented in Table 1-9.

In 1989, NYSDEC collected 22 surface water samples which were analyzed for total mercury. Four of the samples were collected from puddles at and near the site (at least two during the fire) and two were samples of the wash water during the fire. The remainder were collected from the tributary, Patroon Creek, and the Hudson River. Sampling dates are not reported. Reported analytical results for these samples are presented in Table 1-10. Concentrations in the tributary ranged from 0.0002 to 2.18 mg/L.

In September 1997, PTI collected seven surface water samples which were analyzed for total mercury, total suspended solids, and hardness (as $CaCO_3$). The samples were collected from the tributary (but not adjacent to the MERECO property), Patroon Creek, and the I-90 Pond. Total mercury and hardness results are presented in Table 1-11. No mercury was detected in the surface water samples above the detection limit of 0.0002 mg/L. As noted in Section 1.5.3, NYSDEC did not accept this study because the sampling methodology did not adequately characterize the creek sediment.

In 1992, NYSDEC collected one water sample from the 8-inch pipe that drains the MERECO property and analyzed the sample for arsenic, chromium, copper, lead, mercury, nickel, silver and zinc. Concentrations of copper, lead, mercury, nickel and zinc exceeded their New York State Surface Water Quality Standards and Guidance Values for Human Water Sources. Mercury was the most significant exceedence at over 100 times the standard. Results from this outfall sample are presented in Table 1-12.

1.5.5 Summary of Existing Biota Data

Several investigations in the vicinity of the site have included animal tissue samples. One investigation also included community surveys and surface water toxicity testing. Fish tissue samples were collected by MERECO and analyzed for total mercury in 1985, 1986, 1987, and 1990 as part of the fish monitoring program initiated by the 1985 Consent Order. The samples were collected from the I-90 Pond by electroshock techniques. All concentrations were less than 1 mg/kg (Table 1-13). Additional fish samples were collected and analyzed in 1999 by the NYSDEC from locations along Patroon Creek, from the Rensselear Lake outfall, upstream of the I-90 Pond, the I-90 Pond, the Conrail overpass (between I-90 Pond and Tivoli Lake), Tivoli Lake, and from below Tivoli Lake (Table 1-14). Of note, details of the tissue types collected, sampling procedures, and maps indicating the exact locations for the samples were not made available for review.

The 1989 NYSDEC investigation (NYSDEC 1990) included collection and analysis of invertebrates, fish, amphibians, reptiles, and small mammals in the vicinity of the site. Mammal samples were analyzed for mercury in the liver, kidneys, and carcass. The mercury concentrations ranged from 0.039 to 0.981 mg/kg in the liver, 0.178 to 2.76 mg/kg in the kidney, and 0.02 to 0.306 mg/kg in the carcass. The average concentration of mammal samples collected adjacent are to the site are 3.6 times, 2.5 times, and 3.0 times greater for liver, kidney, and carcass mercury concentrations, compared to off-site samples (Table 1-15). The non-mammal samples were from a variety of organs, based on species. All concentrations were less than 1 mg/kg (Table 1-16).

In 1994, NYSDEC conducted a Biological Impact Assessment of Patroon Creek (NYSDEC 1995). This study was not specifically related to the MERECO Site. Rather, the focus of the investigation was a lower reach of the creek, approximately ½ mile upstream of the outfall to the Hudson River (Station 6, several miles downstream of the MERECO Site), where NYSDEC had observed severe biological impairment in the early 1990s. The upstream location that was used for comparison was located just upstream of the I-90 Pond (Station 4). The study included analysis of crayfish tissue for metals, a macroinvertebrate community survey, and surface water toxicity testing (Table 1-17). The study concluded that significant biological impairment was indicated at the downstream reach (Station 6), primarily due to complex municipal/industrial wastes, including untreated sewage. The reach upstream of the I-90 Pond was moderately impacted. NYSDEC indicated that numerous nonpoint discharges and impoundments (Rensselaer Lake and other ponded areas) were the likely causes of the impact to biota just upstream of the I-90 Pond. The surface water toxicity test (chronic test using *Ceriodaphnia dubia*) showed no mortality in any test or control sample, suggesting that surface water quality in Patroon Creek is not causing biological impairment.

Three crayfish samples were collected from Patroon Creek during the 1997 PTI investigation (Table 1-18). These tissue samples were analyzed for total mercury and total solids. Mercury concentrations in crayfish tissue ranged from 0.16 to 0.23 mg/kg dry weight, which are below the NYSDEC 0.3 mg/kg dry weight level of concern (NYSDEC 1996) and the EPA recommended concentration of 0.3 ppm for protection of human health from consumption of fish and shellfish. As noted in Section 1.5.3, NYSDEC did not accept this study because the sampling methodology did not adequately characterize the creek sediment.

In 1999, NYSDECP analyzed 59 fish tissue samples from along the length of Patroon Creek for pesticides, PCBs, and mercury (all reported in wet weight concentrations).

Mercury was detected in all samples at concentrations ranging from 0.007 to 0.914 mg/kg; mercury was detected at its lowest concentrations predominantly in crayfish samples and from fish collected from the Conrail overpass sampling location, midway between the I-90 Pond and Tivoli Lake sampling locations. It was detected at its highest concentrations predominantly in largemouth bass tissue samples collected from the Tivoli Lake and I-90 Pond locations.

PCBs were detected in most samples; the highest concentrations of Aroclor 1242 were detected up to 0.623 mg/kg in crayfish samples from the Rensselear Lake outfall; the highest concentrations of Aroclor 1254 and Aroclor 1260 were detected at up to 0.802 mg/kg in carp and largemouth bass. The highest concentrations predominant were detected from the I-90 Pond. Aroclor 1254 and Aroclor 1260 were detected in all 59 samples, the lowest concentrations generally were found in the Rensselear Lake outfall sample (0.024 mg/kg) and from samples collected below the I-90 Pond.

Several pesticides were detected in fish samples, including DDE (at up to 0.058 mg/kg), DDD (at up to 0.016 mg/kg), DDT (at up to 0.008 mg/kg), and chlordane (at up to 0.027 mg/kg). In all cases, the highest concentrations of pesticides were detected in carp samples, predominantly collected from the I-90 Pond.

The results of the NYSDEC's fish sampling program suggested that mercury, PCBs (except for Aroclor 1242), and pesticides were detected at their highest concentrations in sport fish such as carp and Largemouth Bass; all were detected at their highest concentrations downstream of the MERECO Site, principally from the I-90 Pond. The highest concentrations of Aroclor 1242 were associated with forage fish samples collected from the background sample location as well as samples downstream of the MERECO Site.

1.6 Report Organization

This RI report is organized in the following manner with tables and figures presented after Section 9.

Section 1	Introduction - presents an overview of the MERECO Site and summarizes the site history and previous site investigations.
Section 2	Study Area Investigations - describes the areas of concern and describes the methodology and sampling rationale for the various investigations conducted for the RI.
Section 3	Physical Characteristics of the Study Area - describes the physical attributes of the study area, including surface topography, meteorology, surface water hydrology, geology, hydrogeology, and soil types. Sections on demography, land use, and ecology describe the area's demographic and human and ecological receptors.
Section 4	Nature and Extent of Contamination - lists the soil, sediment, surface water, and groundwater screening criteria against which site data were screened to determine the extent of contamination and describes the type and extent of contamination determined to be present in each of the media.
Section 5	Contaminant Fate and Transport - evaluates the persistence and mobility in the environment of the various types of contamination identified, and summarizes the fate and transport mechanisms that will apply within each media based on each area's physical characteristics.
Section 6	Baseline Human Health Risk Assessment - evaluates the risk calculations for human exposure scenarios.
Section 7	Screening Level Ecological Risk Assessment - evaluates the risk calculations for ecological exposure scenarios.
Section 8	Summary and Conclusions - summarizes the significant determinations of the remedial investigation.
Section 9	References.

2

Section Two

Section 2

Study Area Investigation

CDM conducted a field investigation at the MERECO Site to acquire data to support the RI/FS. The RI was conducted in accordance with the following EPA-approved project plans:

- The Final RI/FS Work Plan Volume I dated March 13, 2001 (CDM 2001a)
- The Final RI/FS Work Plan Volume II dated June 15, 2001 (CDM 2001b)
- The Final RI/FS QAPP dated August 24, 2001 (CDM 2001c)

The deviations from the QAPP, made during the field investigation, were documented on Field Change Request (FCR) forms. The FCR forms describe the deviation from the QAPP, the reason for the deviation, and the recommended modification. The deviation was agreed upon by the CDM site manager and the CDM field operations leader, after consulting the EPA remedial project manager (RPM). The changes that were made did not effect the representativeness, completeness, precision, or accuracy of the data collected in the field. The FCRs are discussed in this section as appropriate and are included in Appendix B. Analytical data were reviewed to ensure that they met the project quality requirements for representativeness, completeness, precision, and accuracy. A data usability summary is provided in Appendix C.

The investigation included the completion of surface soil sampling, stream surface water and sediment sampling, fish sampling, catch basin surface water and sediment sampling, subsurface soil sampling, downhole gamma logging, synoptic water level measurements, piezometer installation, monitoring well installation and development, and groundwater sampling. The technical SOPs and the project specific SOPs that describe this work in detail are presented in Appendices B and C of the Final QAPP (CDM 2001 c). This work was conducted from October 25, 2001 through April 5, 2002. Table 2-1 summarizes the field activities conducted during the RI. Table 2-2 summarizes the laboratory analytical methods used to analyze the samples. Tables 2-3 through 2-8 present a summary of the soil, fish, groundwater, surface water, and sediment samples collected during this investigation.

2.1 Surface Feature Investigation

A topographic survey of the site and its immediate vicinity was completed by Compass Surveying, a land surveyor under contract to CDM and licensed by the State of New York. Compass performed surveying and mapping activities in December 2001 and completed the surveying activities in May 2002. Compass conducted an aerial survey and used conventional mapping techniques to map the site. The locations and elevations of all existing monitoring wells and sampling locations were surveyed and identified on the site base map. Calibration of all field instruments, in accordance with the Statement of Work, was the responsibility of Compass.

Based on the aerial survey, a topographic site base map with a scale of 1 inch equals 50 feet with a one foot contour interval was prepared. Property boundaries from tax maps and physical features such as buildings, driveways, roads, railroads, woodlands, and creeks are identified on the map.

In addition, a site location map, with a scale of one inch equals 250 feet with a five-foot contour interval, that illustrates both the site and the area within a one-mile radius, was also produced. Physical features such as buildings, driveways, roads, railroads, woodlands, and creeks are identified on the map.

2.2 Meteorological Investigations

Daily temperature and precipitation data were obtained for the period of October 2001 through April 2002, for the Colonie area (Albany Airport New York monitoring stations) from the National Oceanic and Atmospheric Administration (NOAA). The meteorological data are discussed in Section 3.2 of this report.

2.3 Geological and Hydrological Investigations

The objective of these investigations was to characterize the subsurface geological and hydrogeological conditions at the site. The investigations included: a groundwater-surface water interaction evaluation, monitoring well installation, synoptic water level measurements, and downhole gamma logging. The results of CDM's geological and hydrogeological investigations are presented in Section 3.5 of this report.

2.3.1 Groundwater-Surface Water Interaction Evaluation

CDM conducted an evaluation of the groundwater-surface water interaction in the tributary of Patroon Creek adjacent to the site. The purpose of this study was to evaluate whether potentially contaminated groundwater from the site is seeping into the tributary of Patroon Creek and its sediments. Three methods were used to evaluate the groundwater-surface water interaction.

On October 24, 2001 CDM measured the flow in the unnamed tributary using a Flowmate 2000™ flow meter. Two locations were selected, one upstream of the site and one downstream of the site. A measuring tape was stretched across the stream and flow measurements were taken at one-foot intervals across the stream. Water depth, location, flow meter depth, and flow were recorded. On the same day an attempt was made to install the potentiomanometer that was constructed for the project. The initial design specified in the Final QAPP, (CDM 2001c) was designed for gravel stream channels and did not work effectively in the silty sediments of the stream bed of the unnamed tributary.

On December 11, 2001, CDM returned to the site with three redesigned potentiomanometers constructed from pre-fabricated steel drive points with a one-foot screened interval and a five-foot carbon steel riser pipe. A two-foot section of polyvinyl chloride (PVC) pipe was attached to the outside of the carbon steel riser to allow for stream water level measurements to be collected. The potentiomanometers were installed in transects of three potentiomanometers, with one installed near each bank and one installed in the middle of the stream. Each potentiomanometer was driven approximately two feet into the stream sediments using a fence post driver and allowed to equilibrate for three hours. After three hours water levels were taken from the temporary piezometer and from the stream.

On December 12, 2001, CDM installed a permanent piezometer in the stream near the site. The piezometer was constructed from a one-foot section of screen with a drive point attached and a four-foot section of carbon steel riser. The piezometer was installed using a fence post driver and was driven two feet into the stream bed.

2.3.2 Monitoring Well Installation

In November 2001, CDM installed five deep monitoring wells (MW-01D, MW-02D, MW-05D, MW-06D, and MW-07D) and one shallow monitoring well (MW-07S). The monitoring well network was designed to monitor groundwater quality both upgradient and downgradient of the site. Two deep wells were installed on site and nested with the existing wells OW-1 and OW-2. One deep well was installed in the center of the capped area of the site in the area of greatest free mercury contamination. A deep well (MW-07D) and a shallow well (MW-07S) were installed upgradient in a background location and a deep well was installed south the tributary of Patroon Creek in a downgradient location (MW-06D). Monitoring well locations are shown on Figure 2-1.

CDM determined the screen interval for the monitoring wells based on the lithologic descriptions and natural gamma logging of the boreholes. To ensure productive monitoring wells, CDM attempted to locate the well screens in sandier intervals. Monitoring wells were installed using the hollow-stem auger method to create a ten inch diameter borehole. Continuous split-spoons were collected to determine the lithology of the boring. The boring was advanced to the top of a silty clay layer that is found at the site from 55 to 70 feet bgs. Once the boring was completed, one foot of Morie No. 01 sand was placed at the bottom of the borehole. Four-inch diameter Schedule 40 PVC casing and 10 feet of Schedule 40 PVC 0.010-inch slot screen were then set in the borehole. Morie No. 01 sand was added to the annulus until a continuous sand filter pack extended from one foot below the screen interval to two feet above the screen interval. Two feet of bentonite pellets were placed above the sand filter pack. The bentonite seal was then overlain with a cement-bentonite grout that extended to the ground surface. All excess soil cuttings generated during the drilling activities were drummed and stored at the MERECO facility. Appendix D contains well construction details.

Three wells (MW-01D, MW-02D and MW-06D) were finished by truncating the PVC riser two feet above ground surface and installing a protective steel surface casing extending six inches above the PVC riser. The remaining three wells (MW-05D, MW-07D, and MW-07S) were finished by truncating the PVC riser just below ground surface and were completed as flush mounts. A cement pad was constructed on all wells and was sloped away from the protective casing to create a drainage apron. A tag indicating the well number was attached inside the protective casing.

The monitoring wells were developed by the drilling subcontractor using a submersible pump to improve the hydraulic connection with the aquifer. Development was considered complete when a relatively sediment-free discharge was achieved and the pH, temperature, and specific conductivity remained consistent within a +/- 10 percent range. Development water was contained in a 500 gallon polyethylene tank and pumped into a 6,500 gallon Baker tank for storage and subsequent disposal by CDM's waste disposal subcontractor.

2.3.3 Synoptic Water Level Measurements

Synoptic water level measurements were collected from site wells and piezometer to develop equipotential maps for the water bearing zone. The data was to determine vertical and horizontal flow gradients and were evaluated in light of other surface and subsurface hydrogeologic information to develop a comprehensive hydrogeologic conceptual model for the site.

Two rounds of synoptic water level measurements were collected from four existing wells and six newly installed wells on December 17, 2001 and March 19, 2002. The synoptic water level measurements were collected with an electronic water level indicator. Static water levels in the wells were measured to the nearest 0.01 foot from the surveyors mark, a grove notched into the inner PVC casing. All measurements were recorded in the field logbook and on synoptic water level measurement data sheets (Appendix E).

2.3.4 Downhole Gamma Logging

Downhole gamma logging was conducted by CDM personnel in the five boreholes that were completed as deep monitoring wells (MW-01D, MW-02D, MW-05D, MW-06D and MW-07D). The technique was performed to supplement the characterization of site lithology, by indicating the presence of clay beds which may not have been observed in samples collected with split-spoons. Because clay beds may act as barriers to downward migration of contamination, and significantly impact contamination migration pathways, it is important to recognize their presence. The logging was performed through the hollow stem augers prior to the casing and screen installation and was correlated to the lithology from the split-spoon samples. Gamma logs are presented in Appendix F.

2.4 Catch Basin Sampling

CDM collected one round of surface water and sediment samples from five on-site catch basins (CB-01 through CB-05) and an out-fall pipe (CB-06). The objective of the catch basin sampling program was to determine if the catch basins were a continuing source of contamination to the stream. The catch basin sampling locations are shown on Figure 2-2.

The catch basins were sealed by the MERECO staff by placing a 1/4 inch steel plate over the basin opening and sealing the plate in place using silicone caulk. The pipes connecting the basins were also plugged using expandible screw plugs. CDM gained access to the catch basins by removing the steel cover plates; however, CDM did not remove any of the plugs from between the basins. CDM collected surface water samples from each catch basin and the outfall pipe. All the catch basins contained water; however, there was only enough sediment for a full set of analyses for CB-01.

Enough sediment was collected from CB-03 for Target Analyte List (TAL) metals and total and methyl mercury analysis. Sufficient sediment was collected from CB-06 for total and methyl mercury analysis. Surface water was collected before sediment samples at each location. Sample bottles were filled by immersing the entire container into the water just below the water surface. An effort was made to avoid disturbing the underlying sediments. Sample-dedicated surgical, phthalate-free gloves were worn at each location.

For all the catch basin samples and the outfall pipe sample, the volatile organic sample was collected first. The first vial filled was used to determine the minimum amount of hydrochloric acid (HCl) required to bring the sample pH to less than 2. After the required amount of HCl was determined, it was then added to the actual sample containers. After the containers were filled, the vials were checked to ensure that zero head-space was achieved. Once the volatile organic sample was completed, the remaining analytical fractions were collected.

Sediment samples were collected using a decontaminated stainless steel trowel. The volatile organic sample was collected first, directly from the sampling trowel using an Encore™ sampler. Sediment for the remaining parameters was then placed in a decontaminated stainless steel mixing bowl and thoroughly homogenized prior to filling sample containers. Sample-dedicated surgical, phthalate-free gloves were worn at each location.

Surface water samples were analyzed for full Target Compound List (TCL) organic parameters and for TAL metals through the EPA Contract Laboratory Program (CLP), and total dissolved solids (TDS), TOC, total suspended solids (TSS), sulfate, and hardness by the CDM analytical laboratory subcontractor, PDP Analytical. Samples were also analyzed for total and methyl mercury by Cebam Analytical, Inc., also under subcontract to CDM. Laboratory analytical methods are presented in Table 2-2.

Sediment samples were analyzed for full TCL organic parameters and for TAL metals through the EPA CLP and for TOC, pH, and grain size by the CDM analytical laboratory subcontractor, PDP Analytical. Sediment samples also were analyzed for total and methyl mercury by Cebam Analytical, Inc. Laboratory analytical methods are presented in Table 2-2.

Upon completion of sampling, the steel plate was replaced and re-caulked using silicone caulk. The sample locations were marked with orange spray paint on the asphalt. The following information was recorded in the field logbook: sample location, identification number, sample date and time.

2.5 Surface Water and Sediment Investigations

CDM collected a total of 14 surface water and 26 sediment samples from the unnamed tributary of Patroon Creek, Patroon Creek, and the I-90 pond. The objective of the surface water and sediment sampling program was to determine the impact of site contamination on these water bodies. To provide background data for the RI and the risk assessment, CDM collected surface water and sediment samples from two background locations upstream of the site. The surface water and sediment locations are shown on Figure 2-3.

Surface water was collected before sediment samples at each location. The most downstream surface water sample was collected first, with the subsequent sampling progressing in an upstream direction to the final upstream sampling point. Sample bottles were filled by immersing the entire container into the water just below the water surface with the opening in the sample container in an upstream direction. An effort was made to avoid disturbing the underlying sediments. All surface water samples were collected according to the procedures described in Section 2.4.

Sediment samples were also collected from downstream locations first, with sampling progressing in an upstream direction. At each location, the required sample depth (zero to six inches) was excavated using a decontaminated stainless steel trowel. All sediment samples were collected according to the procedures described in Section 2.4.

At two locations, SW/SD-03 and SW/SD-06, additional sediment samples were collected from 0 to 2, 2 to 4, 4 to 6, 6 to 8, 8 to 10, and 10 to 12 inches. A Wildco™ hand core sediment sampler was used to obtain the cores for sampling. However, the hand coring device did not retain the fine sediments in the stream bed. A FCR form was prepared and a decontaminated 2-inch diameter bucket auger was used to obtain the samples (Appendix B). Sample cores were divided into the appropriate sample intervals using a stainless steel trowel. For each sample interval, sediment samples were collected according to the procedures described in Section 2.4.

Surface water samples were analyzed for full TCL organic parameters and TAL metals through the EPA CLP, and TDS, TOC, TSS, sulfate, and hardness by the CDM analytical laboratory subcontractor, PDP Analytical. Samples SW-03, SW-06, and SW-11 were also analyzed for total and methyl mercury by Cebam Analytical, Inc., a laboratory under subcontract to CDM. Laboratory analytical methods are presented in Table 2-2.

Sediment samples were analyzed for full TCL organic parameters and TAL metals through the EPA CLP and TOC, pH, cation exchange capacity (CEC), and grain size by the CDM analytical laboratory subcontractor, PDP Analytical. Sediment samples were also analyzed for total and methyl mercury by Cebam Analytical, Inc. Laboratory analytical methods are presented in Table 2-2.

Upon completion of sampling, each location was marked with a wooden stake and flagging; an indelible marker was used to mark the sample location on the stake. The following information was recorded in the field logbook: sample location, identification number, sample date and time, water temperature at the point and time of sampling, pH, specific conductance (SpC), turbidity, and dissolved oxygen (DO) content of the water sample.

2.6 Fish Sampling

CDM collected a total of 11 fish samples, from four locations; 5 forage fish samples (ECO) for the screening level ecological risk assessment and 6 sport fish (HHR) samples for use in the human health risk assessment. The following samples were collected at each location:

- ECO-02-PD, HHR-02-PDA and HHR-02-PDB from Inga's Pond
- ECO-02-ST and HHR-02-ST from location SW/SD-02
- ECO-06-ST and HHR-06-ST from location SW/SD-06
- ECO-10-PDA, ECO-10-PDB, HHR-10-PDA, and HHR-10-PDB from the I-90 Pond

Sample locations are shown in Figure 2-4. Fish sampling activities were conducted from November 7 to 9, 2001. The fish samples were collected using an electroshocker operated by CDM's ecological services subcontractor, Normandeau Associates. CDM attempted to collect enough fish for 2 forage fish samples and 2 sport fish samples per location for a total of 12 samples; however, the fish population at some of the locations was small. Only enough fish were collected for 11 samples.

After the fish were caught, the species in the catch were identified by a Normandeau biologist and each fish was weighed. The fish species and weight were recorded in the logbook. Table 2-9 contains species, weight, and sample information for the fish samples. Samples were wrapped in aluminum foil and labeled with the sample name and placed in a plastic bag. The samples were then placed in a cooler with dry ice and shipped to CDM's subcontract laboratory, Enchem Incorporated, for analysis. Samples were analyzed for full TCL/TAL parameters and percent lipids. Laboratory analytical methods are presented in Table 2-2.

2.7 Soil Investigations

The soil investigation program consisted of both surface soil samples and sub-surface soil borings. The surface soil samples were collected from areas considered downwind of the site in the prevailing wind direction. Subsurface borings were installed for four purposes: shallow on-site samples; shallow off-site samples; deep on-site samples; and monitoring wells.

2.7.1 Surface Soil Sampling Activities

CDM collected 13 surface soil samples for the ecological and human health risk assessments. The sampling locations were across the railroad in the area south and southeast of the site in the prevailing wind direction (Figure 2-5). Three samples were collected from 0 to 12 inches bgs. Five samples were collected from 0 to 2 inches bgs and co-located with five samples collected from 0 to 6 inches bgs.

The objective of the surface soil sampling program was to assess potential historical wind-blown contamination fallout from previous facility emissions and site fires. The surface soil sampling locations were reviewed in the field with the EPA RPM, representatives of EPA's Biological Technical Assistance Group (BTAG), and representatives from NYSDEC.

At the human health soil sampling locations, the required sample depths (0 to 2 and 0 to 6 inches bgs) were excavated using a decontaminated stainless steel trowel. At the ecological soil sampling locations the required sample depth (0 to 12 inches bgs) was excavated using a decontaminated 2-inch diameter bucket auger. At each location, the volatile organic sample was collected first with an Encore™ sampler, directly from the split spoon. Soil for the remaining parameters was placed into a decontaminated stainless steel mixing bowl and thoroughly homogenized prior to filling the sampling containers.

Soil samples were analyzed for full TCL organic parameters and TAL metals through the EPA CLP and TOC, pH, CEC, and grain size by the CDM analytical laboratory subcontractor, PDP Analytical. Laboratory analytical methods are presented in Table 2-2. Upon completion of sampling, each location was marked with a wooden stake and flagged. An indelible marker was used to mark the sample location on the stake. The following information was recorded in the field logbook: sample location, identification number, and sample date and time.

2.7.2 Subsurface Soil Boring Activities

CDM collected soil samples from 20 boring locations to obtain data to characterize both the nature and spatial distribution of subsurface contamination. The locations of the shallow and deep soil borings are shown on Figures 2-6 and 2-7, respectively. Soil boring activities were conducted from November 5 through December 6, 2001. Soil borings were advanced by a truck-mounted hollow stem auger drill rig that was operated by CDM's drilling subcontractor, Unitech Drilling. Continuous split-spoon samples were collected by driving a 3-inch-diameter split-spoon through the sample interval in advance of the auger. Each split spoon was scanned with a photoionization detector (PID) immediately upon being opened and a small amount of soil was placed in a plastic bag for analysis with a mercury vapor analyzer. The soil was then characterized and described by the CDM geologist, using the Burmeister Soil Classification System. Sample descriptions were recorded on a boring log and in the field logbook. Soil boring logs are provided in Appendix G.

Four types of borings were installed at the site:

- Monitoring well borings were drilled to the clay layer at approximately 60 feet below the site. Samples were collected at the water table and at the interval with the highest mercury vapor reading.

- Deep soil borings were drilled on-site to the top of the clay layer. Samples were collected at two foot intervals from ground surface to the water table and at the interval with the highest mercury vapor reading.

- Water table borings were drilled to the water table (10 to 12 feet bgs). Samples were collected at two-foot intervals from ground surface to the water table.

- Shallow soil borings were installed on site from ground surface to four feet bgs. Samples were collected from 0 to 2 feet and 2 to 4 feet.

All soil samples were collected according to the procedures described in Section 2.7.1. All soil samples were analyzed for TCL/TAL parameters through the EPA CLP. The samples were also analyzed for TOC, CEC, pH, and grain size by PDP Analytical, a laboratory under subcontract to CDM. Laboratory analytical methods are presented in Table 2-2.

2.8 Groundwater Investigation

CDM collected groundwater samples to define the nature and extent of site related contamination in the underlying overburden aquifer. Two rounds of groundwater samples were collected from each monitoring well. Samples were collected from 10 wells including the following:

- The two deep wells, MW-01D and MW-02D nested with existing wells OW-1 and OW-2
- The onsite well, MW-05D, installed through the concrete cap into the source area
- MW-06D located across the railroad tracks from the facility
- The four existing wells, OW-1, OW-2, OW-3 and OW-4, installed in 1985 by MERECO
- The upgradient cluster MW-07D/MW-07S

The two rounds of sampling were conducted in December 2001 and March 2002. The schedule for sampling is summarized in Table 2-1. Well locations are shown in Figure 2-1.

Groundwater samples were collected using the low-flow purging and sampling technique for groundwater monitoring wells as described in the EPA Region II Final Groundwater Sampling SOP entitled "Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling", dated March 16, 1998. The procedures in the QAPP were followed. Low flow groundwater sampling sheets are provided in Appendix H.

The sampling was conducted using an adjustable rate, positive displacement pump to remove stagnant water from the targeted interval at a rate that matched the aquifer recharge rate, and to collect representative groundwater samples with minimal disturbance and low turbidity. The pump intake was placed within the targeted horizon of the screened interval of the well casing (normally the middle or just above the middle). The purge rate on the pump was kept to less than 500 milliliters (ml) per minute, and the drawdown was monitored to ensure it remained less than 0.1 meter (0.3 foot).

The water was evacuated until water quality parameters (DO, pH, temperature, redox potential and specific conductivity stabilized. Turbidity was measured and a goal of 5-10 nephelometric turbidity units (NTUs) was established for water clarity. However, site groundwater did not always reach turbidity levels as low as 10 NTUs. Therefore, if the remaining parameters had stabilized, including the turbidity readings, and all steps had been taken to reduce turbidity, then the sample was collected and the final turbidity reading was recorded.

Samples were collected with minimal turbulence directly from dedicated Teflon-lined polyethylene tubing. The volatile organic sample was collected first. Once the volatile organic sample was completed, the remaining analytical fractions were collected. Phthalate-free, sample-dedicated gloves were worn during sampling.

All groundwater samples were analyzed for low detection limit volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), pesticides/PCBs, and TAL metals through the EPA CLP. Groundwater samples were also analyzed for water quality parameters including hardness, TSS, TDS, TOC, and sulfate, by the CDM laboratory subcontractor, PDP analytical. Laboratory analytical methods are presented in Table 2-2.

2.9 Population and Land Use

Based on the estimates of the resident population of New York State villages taken from the website of the New York State Data Center, the population of the Town of Colonie was estimated to be approximately 79,258 on April 1, 2000. The site and its surrounding area is zoned Industrial District I (all industry). The areas to the north, east, and west of the site are principally light industrial with some retail commercial development and warehousing. Interstate 90 is located approximately 750 feet south of the site. The land between the site and I-90 contains railroad tracks, an electrical utility right-of-way, and an all terrain vehicle (ATV) trail, but is otherwise vacant and undeveloped. Some household debris was observed in this area. This land is zoned for light industrial use by the City of Albany. The closest residence is located approximately 1/4 mile north of the site.

The entire area is currently supplied with potable water from the Latham Water District public water supply derived from a surface water reservoir in Watervliet, approximately five miles northeast of the site. No known private wells are known near the site. However, NYSDEC classifies all fresh groundwater in the state as 'Class GA fresh groundwater', for which the assigned best usage is as a source of potable water supply. The NYSDEC groundwater standards for Class GA fresh groundwater are based on residential use. Therefore, although there are no known current users of groundwater at or near the site, the groundwater could be used as drinking water in the future.

2.10 Ecological Investigation

The ecological investigation included characterization of the site and a determination of the presence of threatened or endangered species and sensitive habitats.

2.10.1 Ecological Characterization

An ecological characterization of the site was conducted to document existing site conditions relative to the vegetative community structure, wildlife utilization, and identification of sensitive ecological resources such as wetlands. Visual observations were made at the site and in adjacent areas of habitat conditions, wildlife utilization, and contaminant exposure pathways. An ecological community map of the site was prepared that notes plant community types, locations of aquatic habitats, and areas of developed land. Results of this characterization are provided in Section 3.6.

2.10.2 Threatened, Endangered Species/Sensitive Environments

Information on sensitive ecological communities and special concern species was requested from the US Fish and Wildlife Service (USFWS) and the NYSDEC. Information received under this activity was reviewed, organized, and presented in Section 3.6. The endangered species, the Karner Blue Butterfly (*Lycaeides melissa samuelis*), has been reported as having a possible occurrence within the area of the site. CDM has visually inspected the site for the potential of the site to support the habitat of the Karner Blue Butterfly and this determination is reported in Section 3.6.

2.11 Control of Investigation-Derived Waste

Investigation-derived waste (IDW) including disposal material related to site activities (e.g., used Tyvek coveralls and gloves), and all semi-solid wastes (e.g., drill cuttings) were drummed and stored in the warehouse at the Mercury Refining site. Liquid waste (e.g., purge water from wells) and waste decontamination fluids (from personal and equipment decontamination) was stored in a 6,500 gallon Baker tank located next to the decontamination pad on the property leased from the Diamond W Corporation. All IDW was disposed of by CDM's waste disposal subcontractor, SeaCoast Environmental. CDM performed field oversight and health and safety monitoring during all waste disposal field activities.

2.12 Cultural Resources Survey

The cultural resources survey at the site was conducted by John Milner Associates, Inc. (JMA), under contract to CDM, on July 30, 2001. The site is located within an area identified as the general location of prehistoric camps. However, in the opinion of JMA, twentieth century development, including the construction of the MERECO facility and remediation efforts at the site have resulted in extensive disturbance of the area, making it highly unlikely that prehistoric or historic archeological features are present within the project area. Depending on the results of the RI, future additional remediation activities may take place in the area defined by the rail tracks on the north and extending south to the confluence of the unnamed tributary and Patroon Creek. This parcel is apparently undisturbed and an archeological survey should be preformed before ground disturbing remediation activities are conducted.

2.13 Water Supply Wells

A five mile-radius well search was conducted around the site to identify drinking water supply wells that potentially could be threatened by off-site migration of site-derived groundwater contamination. The well search revealed no drinking water supply wells that are screened in the shallow aquifer and are hydraulically downgradient from the site. No wells were identified within a one-mile radius hydraulically downgradient from the site (in an east southeasterly direction), apart from the monitoring wells installed at the Colonie Interim Storage Site (CISS), a New York State Inactive Hazardous Waste Site. Figure 2-8 shows the locations of the nearest water supply wells within the vicinity of the MERECO Site.

3

Section Three

Section 3
Physical Characteristics of the Study Area

This chapter presents a detailed evaluation of site conditions, and is based on the findings of the RI field activities, previous site investigation reports, published geological research documents, personal communication with staff of the New York Geological Survey, NYSDEC, other state agencies, local geologists, proceedings and guidebooks of local geological associations, and data publically available on the internet. All literature sources used to prepare this section are presented in Section 9.0.

3.1 Surface Features

The MERECO Site lies on the west side of the Hudson Valley, and is approximately five miles northwest of the Hudson River and the central business district of Albany. The site is located on an area of relatively low topographic relief known as the Lake Albany Plain, part of the Hudson-Champlain Lowlands of eastern New York (Figure 3-1). The Taconic Mountains are to the east, the Helderberg Escarpment and Catskill Mountains are to the south, and the Adirondack Mountains are distant to the north. The site is at the eastern edge of a low undulating area known as the Pine Bush, an area of about 40 square miles of sand dunes and bogs located between Albany and Schenectady and covered by Pitch Pine and scrub oak (Dineen 1975). Although the regional land surface is generally gently sloping, streams in the area have cut sharp V-shaped valleys, especially in the Pine Bush.

The land surface around the site slopes towards the south and southwest, towards a gently sloping flood plain of an eastward-flowing tributary of the Hudson River called Patroon Creek. The site rests on a southward-facing river terrace that flanks the northern side of the Patroon Creek flood plain. A small unnamed tributary of Patroon Creek flows across the southern boundary of the site and has cut a steep-sided gully immediately south of the site and northwest of Railroad Avenue.

According to the *Albany* 1:24,000 United States Geological Survey (USGS) topographic map (1980), the site is at an elevation of approximately 240 feet above mean sea level (amsl). Properties to the north and northwest are slightly upgradient. The flood plain of Patroon Creek to the south and southeast is slightly downgradient, providing a gently southeastward sloping grade upon which Conrail railway tracks and Interstate-90 have been built. The site is flat with a very gentle southwestern slope from the northwestern portions of the site toward the southwest.

3.2 Meteorology

The climate in the New York area is typical of the northeastern North American continent and can be classified as Polar Continental. Alternating air masses of cold dry polar air and moist warm tropical air are characteristic of this climate. Temperatures for the area range from an average minimum in January of 24 degrees Fahrenheit (°F) to an average maximum in July of 72° F (Dineen 1975). Extreme cold and warm maximums occur from the seasonal alteration of air masses which are typical for mid-latitude locations. The frost-free period is about 169 days from late April to mid October.

Winds for the area are predominantly from a westerly direction, which is typical of mid-latitude northern hemisphere locations. Wind directions typically change with the alteration of air masses, changing from a west-northwest direction in winter months to a west-southwest direction in the summer months. The highest mean monthly average annual wind velocity for the area is 11 miles per hour (mph) recorded in March; the lowest mean monthly average annual wind velocity for the area is 7 mph recorded in August.

Precipitation for the area is distributed evenly throughout the year, averaging about 37 inches; maximum monthly means are in June through August. Precipitation is typically snow during the winter months. Temperature and precipitation data for the period October 2001 to April 2002 were obtained from NOAA for the site and are summarized in Figure 3-2.

3.3 Surface Water Hydrology

The site is located in the Hudson-Mohawk River Basin, a major drainage basin in upstate and eastern New York (Figure 3-1). The headwaters of the Mohawk and Hudson rivers originate in the foothills of the Adirondack Mountains. From their confluence at Troy, approximately five miles north of Albany, the Hudson River flows approximately 150 miles south, eventually discharging into the Atlantic Ocean.

Small tributaries draining the area west of Albany have cut deeply into the post-glacial sand-rich deposits of the Pine Bush Formation. The Pine Bush lies within a dendritic (tree-like) branching stream system, consisting of several catchment areas. West of Albany, the southern-most catchment areas of the Normans Kill and Patroon Creek drain into the Hudson River. Patroon Creek originates in the Town of Colonie, approximately two miles west-northwest of the MERECO Site, the upper reaches of which have been dammed to form Rensselaer Lake, a surface water impoundment. Patroon Creek was culverted or channelized along much of its course during the construction of I-90.

A small unnamed stream flowing along the southwestern boundary of the site joins a channelized segment of Patroon Creek approximately 1,900 feet further to the southeast. The unnamed stream rises one mile northwest of the site near Interchange 2 of the Northway (Interstate 87). The stream is entrenched for most of its course and has been dammed, forming an elongate impoundment, approximately 3,000 feet northwest of the site, called Inga's Pond. Based on field observations, the channel bottoms are composed of mostly silts and fine sands. According to the site's Flood Insurance Rate Map (Panel No. 360001-0010 C), the site is located within Zone C, an area of minimal flooding (National Flood Insurance Program 1980).

West of the site, the stream has been channelized from just north of Railroad Avenue to the southern boundary of the site, where the stream flows east within a gully, before flowing southeast through a culvert beneath the adjacent railway tracks. To prevent erosion of the site soils, a gabion wall was constructed in 1985 during site stabilization activities where the stream bends to the southeast and enters the railway culvert (MERECO 1986).

A catch basin system on site was closed at the direction of NYSDEC. This system discharged directly to the unnamed tributary. Currently one of the catch basins remains open to collect runoff from the Mercury Refining and the Pallet Company sites. The water collected in this basin is pumped, using a submersible pump, through a hose, into the unnamed tributary.

3.4 Soils

According to the *Soil Survey of Albany County, New York* (USDA 1992), the soils at the site are classified as Urban Land - Ur. This soil classification describes nearly level to strongly sloping areas where asphalt, concrete, buildings, or other impervious materials cover more than 85 percent of the land's surface. Slopes range from 0 to 15 percent.

Included in this unit are small areas of mostly miscellaneous fill. In some areas, the fill has been placed over streams, swamps, and flood plains. The unit has very few areas that retain the original soil characteristics for that location due to its disturbance during building activities. Onsite investigation is needed to determine the potential and capabilities of any areas of soil material for any specific purpose (USDA 1992).

The undeveloped area south of the MERECO Site, south of the railway, consists of soils classified as Udipsamments - Ud. This soil classification describes nearly level to very steep areas of disturbed sandy soils. Slopes range from 0 to 45 percent. These soils are well drained to somewhat excessively drained.

These soils typically consists of about 40 percent cuts of mostly brown or yellowish-brown loamy fine sand and sand or Colonie or Elnora soils; 30 percent fills of mixed sandy material moved from the upper part of the Colonie or Elnora soils; 10 percent Urban land; and 20 percent other soils.

Included in this unit are small areas of undisturbed Colonie and Elnora soils. Colonie soils are very deep and somewhat excessively drained to well drained. Elnora soils are very deep and moderately well drained. Also included are areas (of less than three acres) of soils that have finer textures than the Udipsamments, such along the tributary to Patroon Creek immediately south of the railway easement. Areas of Udipsamments commonly are used for athletic fields, sand and borrow pits, or large fill and graded areas, or are idle.

Udipsamments have a rooting depth ranging up to 80 inches but in most areas it is in the upper 24 inches. Permeability is moderately rapid or rapid where the soils are relatively undisturbed and uncompacted. The available water capacity is low or very low, and runoff is slow or medium. The surface layer ranges from strongly acid to slightly acid. These soils are so variable that onsite investigation is needed to determine the potential and limitations for any proposed use (USDA 1992).

3.5 Geology/Hydrogeology

This section provides a detailed description of the MERECO Site's geology and hydrogeology with respect to its location within the New York State Capital District; a summary and evaluation of the site-specific geology and hydrogeology gathered from RI field sampling activities; and a presentation and discussion of a conceptual hydrogeologic model for the site.

3.5.1 Regional Geologic/Hydrogeologic Setting

Regional Geology

The site is situated on the western edge of the Taconic Orogenic Mountain Chain that stretches from Quebec as far south as the Lower Hudson Valley, New York. The bedrock underlying the Albany Capital District is of Lower Paleozoic age (Figure 3-3). According to Kidd *et al.* (1995), the site lies within the western part of the "Mohawk River Zone" of the Cohoes Melange, which consists of deformed (broken up) shale-dominated rocks with lens-shaped belts of less-deformed sandstones and/or shales.

Prior to the last glaciation, major streams in the Capital District preferentially followed valleys in the less resistant shale; these included the preglacial Mohawk and Colonie Channels (Dineen 1975; Dineen and Hanson 1983). Modern drainage patterns do not reflect the distribution and extent of these buried valleys. The buried bedrock surface of the river valleys has up to 300 feet of relief. The site overlies the "Colonie Channel" buried valley (Figure 3-4).

During the last glaciation, the Capital District, along with the rest of the northern United States, was covered by a great thickness of ice. The last major episode occurred during the Pleistocene Epoch (beginning 200,000 years ago) and concluded with the Wisconsin glaciation. The Wisconsin glaciation brought ice advancing across the region, eroding bedrock and soils and depositing a blanket of till (a mixture of boulders, gravel, sand, and clay). About 20,000 years ago, the glaciers began receding and meltwaters filled the Hudson Valley and surrounding area with water to a level of 340 feet above present sea level, forming glacial Lake Albany which extended from Glens Falls to Newburgh (Figure 3-5; Dineen 1975, 1982; Smith *et al.* 1995).

The glaciers and succeeding meltwaters of the Capital District deposited a thick, wedge-shaped accumulation of deposits filling the former bedrock valleys. Figure 3-6 presents a summary of the characteristic surficial glacial deposits recognized in the Capital District, west of Albany. The outcrop map of surficial deposits is presented in Figure 3-7. The generalized stratigraphy of the valley fill deposits in the Capital District area is summarized below (from Dineen 1975, 1982; Smith *et al.* 1995):

Glacial Till

Till, deposited directly beneath the glacier, is composed of a 3- to 100-foot thick, compact, unsorted, dark grey boulder clay. Till is thickest in the preglacial valleys and is thin-to-absent elsewhere. Till becomes thicker towards the northeast in the vicinity of a drumlin field located north of the site (Figure 3-8; Dineen and Hanson 1983).

Ice-Contact Sand and Gravel
Ice-Contact Sand and Gravel was deposited by meltwater in contact with the glacier and is commonly stratified. This deposit is loose to compact, well sorted to poorly sorted, brown, and is up to 50 feet thick. The sand and gravels are relatively thin and grade vertically and laterally into basal Lake Albany Silt and Clay or deltaic sand and gravel. Permeability decreases with poor sorting, and compactness increases with increasing silt and clay content.

Lake Albany Silt and Clay
These soft to hard, grey, reddish-grey, yellow, or brown lake silts and clays are 3 to 200 feet thick. They consist of 0.03- to 6-inch thick varves of clay, grading down to silt representing annual glacial lake sedimentation cycles. The basal 10 feet and upper third of the silt clay sequence are dominated by sandy silt. Turbidite sands (deposited by lake bottom sediment gravity currents) occur in the lake sequence; some turbidites can be traced for more than 10 miles (16 kilometers). Contorted beds may occur due to differential compaction during a brief period of glacial readvance, leading to deposition of an overlying till deposit.

Delta Sand and Gravel
This unit is dark to light brown, cross-bedded to horizontally-bedded sand and gravel with some silt and is 3 to 150 feet thick. Deltas are common along the edges of the valleys where tributary streams entered Lake Albany (Dineen and Hanson 1983). These deposits grade lakeward into silt and clay, and grade shoreward into outwash.

Lake Albany Silt and Sand
This deposit contains 10 to 50 percent silt, is light yellow brown to light grey, grades down into silt and clay, and grades upwards and eastwards into lake sand. The unit thickens towards the south and southeast, can vary in thickness from 5 to 100 feet, pinches out towards the east, and is dominant above an elevation of 200 feet amsl. Where till is absent on bedrock terraces, this unit can be found draped directly on the bedrock surface.

Lake Albany 330-foot Clay
The 3- to 6-foot thick clay layer is found within the upper section of the lake sand (see below), deposited during a brief period when the water surface in Lake Albany was at an elevation of 330-feet amsl. The clay unit has a distinctive upper contact, which slopes down towards the south and east. The clay is discontinuous with several gaps 200 to 500 feet-wide.

Lake Albany Sand
A fine to medium-grained very light yellow brown to light grey sand containing thin laminae of silt and frequently ripple cross-lamination; the sand unit grades downward and westward into the silt and sand unit and varies in thickness from 5 to 100 feet.

The Lake Albany 300-foot Clay is found in the upper section of this unit close to the axis of the buried channels.

Wind-Blown Sand

This unit is a very well sorted, fine-grained sand that is light yellow brown and cross-laminated. It usually is 5 to 50 feet thick, thickens towards the east as dune hills 25 to 75 feet high (especially in the Pine Bush), and overlies the lake sands and silts. The wind-blown sand also overlaps the ice contact sands and gravels on the eastern edge of the Colonie Channel.

Floodplain Deposits

Floodplain Deposits are brown to dark brown, consist of highly oxidized cobble to silt that fine upward, deposited in lenticular beds, and contain many truncation surfaces. They contain variable quantities of organic matter. The deposits are 20 to 40 feet thick along the Mohawk and Hudson Rivers and less than 10 feet thick along the smaller streams.

Artificial Fill

This unit is observed beneath some urban areas, composed of a heterogeneous mix of concrete or brick fragments, wood, glass, cobbles, sand, silt, clay, and organic matter. Its color and thickness are variable.

Regional Hydrogeology

The regional hydrogeologic framework is subdivided into two aquifer systems: a deep aquifer and a shallow aquifer. Figure 3-6 summarizes the general hydrogeological characteristics of the bedrock and glacial deposits in the Capital District.

Deep Aquifer

The presence of a complex, deep aquifer system in the bottom of the preglacial Colonie Channel was confirmed by Dineen and Hanson (1983). Water-bearing sand and gravel ice contact units have been identified below the extensive Lake Albany Silt and Clay unit and resting on till deposits that blanket the bedrock surface. The unit's confinement between impermeable lake clays and poorly permeable till deposits has created confined artesian conditions in the deep aquifer. In the vicinity of the Albany County Airport, to the north of Colonie, where the aquifer is at about 200 feet bgs, the aquifer is under artesian flowing conditions where the land surface is below an elevation of 320 feet amsl. This might indicate the aquifer is recharged from areas of higher altitude such as the sandy hills of the Pine Bush along the margins of the pre-glacial Colonie paleovalley. According to Dineen and Hanson (1983), the aquifer probably discharges principally by upward leakage through the lake deposits and sustains a number of area wetlands.

The known areal extent of the deep aquifer is limited to areas where ice-contact sands and gravels have been recognized in boreholes (e.g., deltas, kames, and eskers), deposited during the early stages of glacial retreat in the region. Therefore, the aquifer unit is discontinuous and, although it can be very productive (up to 2,000 gallons/minute) in some wells, does not constitute a substantial, regional source.

Shallow Aquifer

The shallow aquifer in the region (commonly referred to as the Pine Bush Aquifer, e.g., Dineen 1982; Smith *et al.* 1995) is defined here as the unconfined water table aquifer in the glacial deposits of Lake Albany. The aquifer is above the Lake Albany Clay deposit within lake sand, delta sand and gravel, outwash, postglacial wind-blown sand, and floodplain deposits. The Lake Albany Clay unit defines the base of the unconfined aquifer, separating the deep and shallow aquifers within the Colonie Channel. The shallow aquifer system provides a few to several hundred gallons of water per minute to domestic, industrial, and small public supply wells.

The shallow aquifer sands are widespread, thick, and permeable. The aquifer ranges in thickness from 5 to 150 feet. The depth to water is 10 to 15 feet bgs throughout most of the area. The seasonal fluctuation in depth to water is approximately 2.4 feet in observation wells, except where wells are located near surface water bodies such as Rensselaer Lake; here wells maintain a more constant water level (Snavely 1983).

The water table roughly parallels the land surface, although local variations may alter the direction of flow. Figure 3-9 is a generalized water table map; the direction of groundwater flow is perpendicular to the lines of equal head. Hydraulically downgradient groundwater flow discharges to surface water where the aquifer is dissected by stream channels. All streams in the area receive groundwater; during periods without precipitation or direct runoff, streams are sustained by groundwater inflow (Snavely 1983).

The finer-grained units within the shallow aquifer, such as the Lake Albany 300-foot Clay act as localized confining units and impede the vertical movement of water (Figure 3-6). The clay layer creates perched water tables in places, increasing the complexity of the shallow aquifer system. At the CISS site, 3,000 feet to the east of the MERECO Site, hydrogeologic data collected for monitoring wells screened in "upper" and "lower" sand units, above and below the 300-foot clay, indicated that the two shallow aquifer zones are hydraulically connected and are part of the same system.

3.5.2 Site Geology

This section describes the stratigraphic framework for the site geology and a summary and interpretation of the downhole gamma logging results.

3.5.2.1 Stratigraphic Overview

The stratigraphic framework of the site broadly is divided into competent Paleozoic shale bedrock overlain by unconsolidated Quaternary glacial, glacio-lacustrine, glacio-fluvial, and Recent fluvial deposits. A more detailed description of site stratigraphy is presented below.

Bedrock Geology

During a previous site subsurface investigation, conducted by CRA in 1986, bedrock was not encountered during the installation of shallow soil borings and monitoring wells. However, Dineen and Hanson (1983) presented a topography of the bedrock surface using test boring and seismic control points in the site's vicinity (Figure 3-4). With reliance on the published data, bedrock beneath the site is likely to be at a depth between 140 and 190 feet bgs. Deep borings in the area indicate bedrock is composed of black shale.

3.5.2.2 Glacial Geology

The site overlies the western side of the preglacial Colonie Channel buried valley (Figure 3-4). Dineen and Hanson (1983) mapped the surface geology and constructed geological cross sections using available subsurface data. Figure 3-7 indicates the site is directly underlain by floodplain deposits. The cross-section across the Colonie Channel in Figure 3-10 indicates that below these surficial deposits the site is underlain by an approximately 150-foot thick wedge of glacial, glacio-lacustrine, and glacio-fluvial deposits.

CDM completed a series of deep and shallow soil borings at the MERECO Site to collect lithologic data and samples for chemical analysis. Deep borings were completed at monitoring wells MW-01D, MW-02D, MW-05D, MW-06D, MW-07D and deep soil borings SBD-01, SBD-02, SBD-03, and SBD-04. Soil boring logs and monitoring well construction diagrams are provided in Appendices G and I, respectively.

Figure 3-11 (located in the back pocket of this report) presents a series of three cross sections (labeled A-A', B-B' and C-C') prepared to illustrate the geology of the site. At each soil boring location, the lithology, an interpreted lithostratigraphy, a gamma log, and a mercury vapor log are presented to illustrate the site geology and nature and extent of elemental mercury contamination. The locations of the lines of section also are illustrated on bottom left corner of the figure. Cross-sections B-B' and C-C' illustrate conditions at the MERECO property in detail. Cross section B-B' and C-C' show the interbedded nature of the lithology above the Lake Albany Silt and Clay and the extent of mercury contamination.

The deepest borings penetrated the top of the Lake Albany Silt and Clay lithological unit. The glacial till and Ice-Contact Sand and Gravel, deeper lithological units encountered deeper in the succession elsewhere in the Colonie Channel, were not penetrated during the RI field investigation. However, published reports for the site's vicinity indicate that the glacial till is approximately one to two feet thick, resting on bedrock (Dineen and Hanson 1983). The Ice-Contact Sand and Gravel was not encountered in nearby deep well borings at the State University of New York (SUNY) Albany campus.

Below is a summary of site-specific descriptions of the interpreted lithostratigraphic sedimentary units defined using site subsurface boring data (from oldest/deepest to youngest/shallowest).

Lake Albany Silt and Clay

The site is underlain by the Lake Albany Silt and Clay at a depth ranging from about 59 feet bgs at monitoring well MW-02D, in the southeast corner of the site to 72 feet bgs at monitoring well MW-07D northwest of the site. Cross-section A-A′ shows the Lake Albany Silt and Clay extending from south of the site, at monitoring well MW-06D, under the tributary to Patroon Creek, under the site, and northwest to monitoring well MW-07D. Twenty-two feet of clay were penetrated at monitoring well MW-07D without running out of the clay. At all other locations the clay was penetrated for a few feet before the boring was halted. This unit may be equivalent to the Lake Albany Silt and Clay described by Dineen (1982).

Well data from the SUNY Albany campus southwest of the site, south of Patroon Creek, shows the clay unit thins rapidly from at least 80 feet thick on the northeastern corner of the campus (closest to the MERECO Site) to the southwest and northeast, interfingering with sands and silts.

Silt, Clayey Silt, and Silty Clay

This unit, consisting mainly of interbedded dark grey silts and clays, is identified across the study area overlying the Lake Albany Silt and Clay unit. It is approximately 15 to 20 feet thick and appears to be a transitional fine-grained lithological unit separating clay-rich Lake Albany deposits from overlying sand-rich facies. This fine-grained unit may be equivalent to the Lake Albany Silt and Sand described by Dineen (1982).

Sand Unit

Overlying the Silt, Clayey Silt, and Silty Clay unit, the Sand Unit can be traced across the study area; it consists of well sorted, dark yellow-brown to dark grey, fine to very fine sand and silty sand. The unit appears to be approximately 25 to 50 feet thick, but is thinner and finer grained beneath the site. This unit may be equivalent to the Lake Albany Sand described by Dineen (1982).

Silt and Sandy Silt

The Sand Unit fines upwards abruptly into a silt-dominated lithologic unit that outcrops immediately beneath surface soils to the north, south, and to the west of the MERECO facility. The unit consists of interbedded yellow-brown to dark grey-brown silt, silty sand, sandy silt, silty clay and clayey silt. The unit appears to be approximately 15 to 30 feet thick and is thicker beneath the site where its upper portion may consist of unsorted fill material containing cinders and concrete fragments.

Surficial Sand

Surficial Sand is identified beneath the MERECO as a dark yellowish or greyish brown very fine sand up to approximately 20 feet thick; the unit thins towards the north, south, and west and is not identified in MW-6D, MW-7D, or MW-1D. The upper five to ten feet commonly are characterized by fill consisting of a chaotic mix of gravel, cinders, and relic building materials, which is expected given the industrial history of the property. The upper portions of this unit are equivalent to Artificial Fill and lower portions may be equivalent to the Dune (or Wind-Blown) Sand units described by Dineen (1982).

Mercury Contamination

CDM measured the concentration of mercury vapors and recorded observations for visible elemental mercury for each soil sample collected, as shown on Figure 3-11 and on the boring logs in Appendix G. Elemental mercury was visible in split spoon samples collected from monitoring well boring MW-05D to a depth of about 60 feet bgs. Observations from the adjacent borings, SBD-01 and SBD-02 also revealed elemental mercury contamination above and below the water table, but at shallower depths ranging from about 20 feet to 15 feet bgs, respectively.

Mercury vapor concentrations in the soil samples from MW-5D, SBD-01, and SBD-02 are highest above the water table, decreasing markedly in the saturated zone; this may be due to a greater proportion of the elemental mercury dissolving and/or dispersing once it migrates to groundwater. All three boring logs suggest the vertical migration of mercury is limited or impeded by fine grained sediments of lower permeability such as the Silt, Clayey Silt, and Silty Clay unit. In MW-5D, elemental mercury was observed in split spoon samples down to the top of the Lake Albany Silt and Clay. A lack of observed elemental mercury and detected mercury vapor in the Lake Albany Silt and Clay unit suggests that mercury likely has not migrated deeper than the top of this lithological unit.

3.5.2.3 Downhole Gamma Logging

Downhole gamma logs MW-01D, MW-02D, MW-05D, MW-06D and MW-07D are presented in Appendix F. The downhole gamma logs were compared with the lithologic logs for the deep soil borings. In general, the gamma logs corresponded with the lithologic logs prepared during the soil boring activities. As counts per second (c/sec) increase, grain size should decrease; each gamma log indicated a general increase in c/sec from the Silt and Sand lithological unit to the underlying Lake Albany Silt and Clay unit. Radioactive mineral content in the succession affects the gamma response. The provenance of the minerals in the glacial deposits of the Capital District likely is from rocks that may be rich in radioactive minerals, chiefly from the Adirondacks and Canadian Shield to the north.

In general, the gamma response within the top 10 to 15 feet bgs is ragged, likely due to the occurrence of fill material underlying the site. Below the fill material, the response curve becomes more or less linear, especially in MW-05D, MW-06D and MW-07D, corresponding to the silty fine sand identified in much of the Silt and Sand Unit. The gamma response curves for MW-01D and MW-02D are more ragged, although the split spoon sample log indicates the lithology is a very fine sand. Slight variations may occur in sand grain petrography, grain size, and/or silt and clay content that were not discernable in the field. Clay-rich confining layers were not indicated in the gamma response curves; although, thin clay beds were commonly identified in split spoon samples from within the sandy overburden units. The clay-rich beds are not considered to be significant confining units within the shallow aquifer. Clay beds such as these likely were deposited in marginal lacustrine environments where they are likely to be erosionally truncated and discontinuous.

In MW-07D, the only boring to penetrate through a significant thickness of the Lake Albany Silt and Clay, the gamma response at about 55 feet bgs clearly indicates a transition from the Silt and Sand Unit into the clay-rich Lake Albany Silt and Clay Unit. This lithological transition is indicated by a corresponding rapid increase in counts per second. Within the clay-rich unit, at approximately 62 feet bgs, a negative fluctuation in the response curve likely indicates a sand-rich bed, possibly derived from a prograding lake bed delta sand or turbidite.

3.5.3 Site Hydrogeology

Of the two aquifers or water-bearing units identified in the region, only the shallow aquifer system has been recognized within the MERECO Site's vicinity; owing to the lack of on-site deep boring data, it is unknown whether the confined deeper sand and gravel aquifer (described above) is present beneath the Lake Albany Silt and Clay.

3.5.3.1 Groundwater Occurrence and Flow

A review of static water level elevation measurements from the existing onsite shallow observation wells (OW-1 through OW-4) between April 1993 and October 1997 suggested the water table slopes moderately down toward the unnamed stream adjacent to the site, from northeast to southwest across the site (MERECO 1997c - 2000). During that period, the average difference in static head elevation across the site from OW-4 (on the northeastern portion of the site) to OW-1 (on the southwestern portion of the site) was about 5.5 feet. The average depth to water was about 10 feet at OW-4 and just over 6 feet bgs at OW-1.

After completion of the seven new onsite monitoring wells in November 2001, synoptic water level data were collected from all onsite monitoring wells on December 19, 2001 and March 19, 2002. The deep monitoring wells were completed in the lower portion of the Silt and Sand Unit while MW-07S and the existing wells were completed in the upper portion of the Silt and Sand Unit (screens set at 15 to 25 feet bgs). Monitoring well construction logs for wells installed by CDM are provided in Appendix D. The depth to water and elevation data are presented in Table 3-1. These groundwater elevation data were used to construct potentiometric surface contour maps for each monitoring zone. Figures 3-12 and 3-13 show the estimated potentiometric surfaces for the shallow and deep monitoring zones of the shallow aquifer on December 19, 2001, respectively. Figures 3-14 and 3-15 show the estimated potentiometric surfaces for the shallow and deep monitoring zones on March 19, 2002, respectively.

Groundwater moves both horizontally and vertically from areas of high head to areas of low head along flow lines whose direction is normal to the contour lines constructed for the potentiometric surface. The data suggest groundwater flows generally in a southerly direction. For the first round of synoptic measurements, the potentiometric gradient for the shallow monitoring zone (Figure 3-12) slopes at a similar gradient to that of the deep zone (Figure 3-13); the shallow zone gradient is 0.0242 compared with the deeper zone's gradient of 0.0153. The flow lines for the shallow zone curve south-southwestwards towards the unnamed stream. In contrast, the second round of measurements shows significant differences in gradient and orientation of the shallow and deep potentiometric surfaces. The shallow potentiometric surface (Figure 3-14) slopes at a gradient of 0.0450 towards the southwest (and the unnamed stream) and its configuration suggests it is strongly influenced by the stream. The deep potentiometric surface's gradient is 0.0154, generally planar, and very similar in configuration and elevation to the deep potentiometric surface drawn for the first round (Figure 3-15). The deep monitoring zone appears to be influenced little by the configuration of the stream.

The much greater differences of orientation and horizontal gradient between the shallow and deep zones in the second round of synoptic measurements compared with the first round may be attributed to a greater infiltration rate from precipitation and snow melt in March compared with December.

According to the regional water level contour map, the predicted flowpaths suggest alignment normal to the topographic contours, with the water table sloping toward the east-southeast in the area of the site toward Patroon Creek (Figure 3-9). Therefore, the proximity of the unnamed stream to the site appears to have a localized effect on the slope of the water table.

The synoptic water level measurement data also reveal a vertical downward gradient ranging from 0.15 foot per foot (ft/ft) [gradients are ft/ft and are therefore unitless] at the MW-01D/OW-1 well pair to 0.6 at the MW-02D/OW-02 pair in December 2001. In March 2002, the vertical gradients ranged from 0.09 at MW-01D/OW-1 to 0.73 at MW-02D/OW-02. The downward hydraulic gradient could promote the downward migration of site-derived contaminants if they percolate down to the water table and become dissolved in groundwater. Analytical results (Section 4) indicate contaminant solutes have reached the water table at the site. However, it is important to mention that elemental mercury would be expected to sink through both unsaturated and saturated zones, regardless of the vertical hydraulic gradient.

3.5.3.2 Hydraulic Characteristics of the Unnamed Stream

Groundwater-Surface Water Interaction Evaluation

The elevation of the water table in OW-1 close to the unnamed tributary stream is at or slightly above the level of water in the adjacent stream, suggesting that the stream bed is in direct hydraulic contact with the shallow aquifer. CDM conducted an evaluation of the groundwater-surface water interaction in the stream adjacent to the site. The purpose of this study was to evaluate whether potentially contaminated groundwater from the site seeps into the tributary stream and sediments.

CDM measured the flow in the unnamed tributary at two locations, one upstream of the site, at SD-03, and one downstream of the site, at SD-04 (Figure 3-16). The measurements indicated that stream discharge increased downstream from 2.35 cubic feet per second (cfs) at SD-03 to 2.46 cfs at SD-04 (Table 3-2). This suggests that the contribution of groundwater to the baseflow of the stream increases in a downstream direction, as is characteristic in a gaining stream.

In order to evaluate the vertical hydraulic gradient between surface water and shallow groundwater along the unnamed stream, CDM installed three transects of three potentiomanometer measuring stations across the stream (Figure 3-17). At each station, the difference in hydraulic head was measured in the stream and the aquifer (at two feet beneath the stream bed). Transect T1 was installed upstream of the site, transect T2 was placed adjacent to the site, and T3 was installed downstream of the site, south of the railway culvert. At each transect, one potentiomanometer was installed near each bank and one was installed in the middle of the stream.

The results of the groundwater-surface water interaction evaluation indicate that in all but one measurement station on the third transect (T3), water level in the bank potentiomanometers is elevated relative to the one in the stream bed. Refer to Figure 3-17 for presentation of these data. The upward gradient indicates that the stream is receiving groundwater discharging directly from the shallow aquifer through its bed and banks; therefore, the stream has a gaining hydraulic regime.

The T3 transect is located on the eastern, upstream reach of a meander loop in the stream channel. At this location, groundwater is entering the stream on the western side of the channel, at station T3C, and in the middle of the stream, at station T3B, as shown in Figure 3-16. However, on the east side of the channel at station T3A (the side that is closest to the meander-loop point bar (e.g. Reading 1986), surface water is discharging both to groundwater and the downstream reach of the loop which is lower in elevation than T3. Therefore, a proportion of surface water likely is draining out of the east side of the channel, lowering the potentiometric surface with respect to groundwater.

The results of the groundwater-surface water interaction evaluation indicate the stream is hydraulically gaining; therefore, site-derived groundwater is discharging to the stream.

3.5.4 Conceptual Hydrogeologic Model

The MERECO Site is located next to a small unnamed tributary stream of Patroon Creek, itself a tributary of the Hudson River located approximately five miles downstream to the east. The site overlies a thick succession of unconsolidated glacial till, pro-glacial lake silt and clay, fluvio-glacial silts, sands, and gravel deposits, and overlying artificial fill. These are complex interbedded deposits measuring up to 200 feet thick in the area of the site. Above the pro-glacial Lake Albany Silt and Clay Unit (LASC), which is thick and locally extensive, the Silt and Sand Unit, a laterally-continuous sand-rich fluvio-glacial deposit was encountered; this unit contains discontinuous thin layers of poorly permeable clay. Locally, a permeable ice-contact sand and gravel deposit exists beneath the lake silt-clay, underlain by till and shale bedrock of poor permeability.

A deep confined aquifer occurs in ice-contact deposits beneath the Lake Albany Silt and Clay, which isolates the deeper aquifer from the shallow aquifer. The silt-clay confining unit is thick and aerially extensive; therefore, the deeper aquifer is not considered to be at risk from contaminant migration from the shallow aquifer unit.

The Silt and Sand Unit, consisting of sands, silts and clays of the overlying the LASC unit, constitutes the shallow unconfined aquifer at the site. The thickness of the shallow aquifer beneath the site is approximately 60 to 70 feet. All of the existing and newly-installed monitoring wells are screened in the upper aquifer unit, either just below the water table at about ten to twenty feet bgs or approximately 10 to 20 feet above the silt-clay confining layer. Published reports for the site area's glacial geology suggest the shallow aquifer likely thickens and deepens towards the west as the underlying lake silt-clay confining unit thins westward.

As part of the RI, CDM evaluated lithologic and stratigraphic data from the deep monitoring well borings and deep soil borings in an attempt to determine the dip of the surface of the LASC unit below the site. Regional cross sections indicate the top surface of the LASC dips westward. However, as discussed below, lithologic data gathered from the MERECO Site do not confirm whether this lithological interface is dipping westward beneath the site.

The estimated elevations of the top of the LASC unit were taken from the soil borings clustered at the site and completed north of the tributary of Patroon Creek. These data were plotted and contoured to evaluate the slope of the LASC unit surface. However, because of the small lateral distances among the borings and small elevation differences of the top of the LASC unit, the analysis was inconclusive and did not show any clear slope in the surface of the LASC.

An additional evaluation was performed on a larger scale to include lithologic data from MW-6D, the deep well south of the tributary of Patroon Creek, and MW-7D, the deep background well north of the site. This evaluation suggests that the surface of the LASC unit slopes to the north. However, results of this analysis are uncertain because the MW-6D and MW-7D borings and the tightly clustered deep borings on the site are located essentially along a northwest-southeast trending line. In addition, the lateral distances among the on-site deep borings (mostly within the property boundary) are small relative to the distance between MW-6D and MW-7D (see Figure 3-11). Thus, it is not possible to interpret the surface of a planar feature from data points that are essentially along a line.

Additional deep subsurface borings, spaced appropriately to the west of the site, would be needed to determine the slope of the top of the LASC unit. The slope of the LASC confining unit has a direct bearing on contaminant transport as explained below.

The water table is about 10 feet bgs and groundwater flows in a southwesterly direction toward the unnamed stream. According to the regional water level measurements, the predicted regional groundwater flowpath is toward the south-southeast in the area of the site towards Patroon Creek. Therefore, the proximity of the stream to the site has a localized effect on the slope of the water table. In addition, groundwater-surface water interaction investigations of the unnamed stream indicate groundwater is discharging to the stream. Consequently, site-derived groundwater likely discharges to the unnamed stream and has the potential to reach Patroon Creek further to the southeast.

Expected Fate and Transport of Site Contaminants
The primary site-related contaminant is mercury. Previous investigations suggested mercury was released to the environment in two phases:

- As a vapor released to the air and deposited as a solid on soils down wind of the site
- As elemental mercury, a dense non-aqueous phase liquid (DNAPL), released to site soils, stormwater collection system, and groundwater

These potential transport pathways for mercury are illustrated in the site conceptual model for site contaminant transport (Figure 3-18). Vapor phase mercury may have been transported by prevailing winds off site to the undeveloped area to the southeast of the site, an area used by ATV recreational vehicles along an unpaved dirt track.

Previous field observations and the current RI field investigation identified elemental mercury in site subsurface soil borings in the vadose zone and in the saturated zone to at least 60 feet beneath the former furnace building, as observed in the soil boring split spoons for MW-05D. Elemental mercury is a liquid at normal atmospheric conditions, has a very high specific gravity of 13.5 at 20° centigrade (C), and is relatively insoluble in water (having a solubility of only 0.002 micrograms per liter (μg/L) at normal pH/redox conditions). If unimpeded by impermeable layers, elemental mercury can sink through vadose zone soils and saturated zones of an aquifer. Groundwater flow in the aquifer may modify mercury's downward trajectory; however, gravity is the dominant controlling influence over the migration pathway of dense non-aqueous phase liquid (DNAPL). If a clay layer is not continuous, the elemental mercury may "spill" over the edge of the clay lens and continue to sink through the aquifer until it encounters another impermeable surface (as shown in Figure 3-18).

Once a critical mass of elemental mercury encounters a subhorizontal clay layer, it will tend to flow along the top of the clay layer in the down dip direction (which could be in an opposite direction to groundwater flow). However, this will occur provided the slope of the clay interface is great enough so that the gravitational force on the mercury DNAPL (the potential energy required for down dip flow) surpasses its relatively high surface tension (the potential energy required to remain stationary). Therefore, there is a potential for the DNAPL to flow in a different direction to groundwater flow, depending on the dip azimuth of the clay interface.

Although published generalized cross sections across the site's vicinity indicate the top surface of the LASC unit slopes gently to the west, the lack of soil boring sample data west of the site, as discussed above, precludes a precise assessment of its slope and whether the horizontal migration of elemental mercury is affected.

Only soil boring MW-5D contained elemental mercury down to the top of the silt and clay unit. It is possible that there may not have been sufficient volume and time since the first release of the mercury at the MERECO Site to allow for the accumulation of a critical mass of DNAPL at the clay bed interface sufficiently large to initiate down dip horizontal flow.

3.6 Ecology

Ecological aspects of the site and the surrounding area are discussed in this section, including: the presence of endangered species and sensitive environments on or near the site; the aquatic habitats of the unnamed tributary of Patroon Creek, Patroon Creek, and the I-90 Pond; and the terrestrial communities at the site and in the surrounding area.

3.6.1 Ecological Site Characterization

An ecological characterization of the site was conducted in May 2002 as described in Section 2.10. The ecological investigation characterized the site's terrestrial and aquatic communities in terms of vegetative composition, wildlife habitat, and observed/expected wildlife usage. Additionally, potential wetlands associated with the site were evaluated by reviewing state and federal wetland mapping, soil type information, and flood plain information, and supplemented with field observations.

3.6.1.1 Threatened, Endangered, Species/Sensitive Environments

Information on sensitive ecological communities and special concern species was requested from the USFWS and NYSDEC. Information received is provided in Appendix I and is summarized in this section.

The federally-listed endangered species, the Karner blue butterfly (*Lycaeides melissa samuelis*) has been reported by the USFWS to be located within the area of the site. Potential habitat for the Karner blue butterfly is distinguished by the presence of wild lupine (*Lupinus perennis*) which is the only known food plant for the larvae. No wild lupine habitat was observed by CDM within the investigated area. CDM's ecological assessment was performed in May, at a time of year when signs of lupine vegetation are observable. The closest reported wild lupine habitat to the site appears to be located in the Albany Pine Bush, a significant habitat that begins a little less than one mile west of the site.

Other than the Karner blue butterfly and occasional transients, the USFWS reports that no other federally-listed or federally-proposed endangered or threatened species are known to exist at the site. Additionally, no site habitat is currently designated or proposed "critical habitat" in accordance with the provisions of the Endangered Species Act.

Information provided by NYSDEC indicates the potential for a protected plant species to be located in the area of the MERECO Site, between Railroad Avenue to the north and the Conrail railroad tracks to the south. However, the identity of the species is not provided. NYSDEC also reported numerous State-listed rare, threatened, and endangered species that are within three miles of the site:

State-listed endangered species: vascular plants Bayard's malaxis (*Malaxis bayardii*), Virginia false gromwell (*Onosmodium virginianum*), sheep fescue (*Festuca saximontana*), puttyroot (*Aplectrum hyemale*), blunt-lobe grape fern (*Botrychium oneidense*) , invertebrate Karner blue butterfly.

State-listed threatened species: vascular plants yellow giant-hyssop (*Agastache nepetoides*), whip nutrush (*Scleria triglomerata*), clustered sedge (*Carex cumulata*), little-leaf trefoil (*Desmodium ciliare*), yellow wild flax (*Linum sulcatum*), Carey's smartweed (*Polygonum careyi*) invertebrate frosted elfin (*Callophyrs irus*)

Rare species: vascular plant Schweitnitz's flatsedge (*Cyperus schweinitzii*)

Special concern species: invertebrate inland barrens buckmoth (*Hemileuca maia maia*)

Ecological communities: pitch pine-oak forest

Significant habitats: pine barrens habitat Mad Hatter Karner Blue Site (Guilderland, Albany County, New York) and Shakers #1 Karner Blue Site (Colonie, Albany County, New York)

3.6.1.2 Aquatic Habitats

Aquatic habitats associated with the site are those of Patroon Creek and its unnamed tributary (Figure 3-19). In the vicinity of the site, Patroon Creek flows in a southeasterly direction along the northern edge of Interstate 90. The I-90 Pond is located approximately one mile downstream of the site along Patroon Creek.

Tributary to Patroon Creek

The tributary has a variable depth, width, water flow rate, and vegetative cover in the area observed from the MERECO facility to its confluence with Patroon Creek. At the MERECO facility, the tributary measured from approximately seven to fifteen feet wide and had a depth of six inches to approximately three feet (at a pool). The water flow was moderate in most areas, although slow in some, as the water moved through pools, debris, or widened areas. The tributary passed through several culverts and oxbows. The banks of the tributary were, in general, natural and moderately steep to the streambed. The streambed substrate appeared to be fine (silty) with the area nearest the MERECO facility having a rockier bottom. Vegetation coverage of the tributary varied significantly from no overhang or bank coverage to complete vegetation coverage. Similarly, there was variation in the amount of debris within the tributary from little to considerable (but not enough to dam the flow). Debris were usually pieces of woody vegetation, but garbage/trash was also observed.

Frog, turtle, and small fish are the wildlife species primarily expected to utilize the tributary in the observed area.

Patroon Creek from the tributary to I-90 Pond

Patroon Creek was observed after the confluence with the tributary. In general, Patroon Creek flows straighter and more consistently, and has a more consistent width than the tributary. The Creek is generally 15 to 20 feet wide with a moderate flow. The typical depth range is from two to four feet. While the vegetative cover varied from no cover to complete coverage, the Creek was usually covered by overhanging vegetation. The banks had natural vegetation in most locations; however, portions of the bank had been modified with riprap to protect it from erosion.

Raccoon (*Procyon lotor*) are expected to utilize the Creek as a food source and their tracks were observed along the stream. Mink (*Mustela vison*) are also expected to use the creek as a source of food. Crayfish have been reported as being collected from the creek in a previous study of the site (NYSDEC 1995). Turtles, frogs, and aquatic invertebrates are expected to utilize the creek habitat. Fish have been collected from the creek in this investigation and those that have been observed from the creek are reported on Table 3-3.

I-90 Pond

The pond is oblong in shape and is approximately 1,000 feet long by 200 feet wide. It has been created or modified by man and has an overflow dam and associated aging structures at the downstream end. The depth of this pond is approximately 10 to 12 feet deep with a mucky/silty bottom. Common reed (*Phragmites australis*) and cattail (*Typha* sp.) are prevalent around the pond and within the west end of the pond, respectively. An unidentified mat of aquatic vegetation is present on the bottom of the pond. Yellow iris (*Iris pseudacorus*) are also present at the pond edge in scattered locations.

Biota observed from the I-90 pond in this and previous investigations are represented on Table 3-3. Other wildlife usage of the pond is expected to include mink, raccoon, muskrat (*Ondatra zibethicus*), turtles, frogs, and aquatic invertebrates.

3.6.1.3 Site Wetlands

CDM performed a desktop review of existing wetland information, which included the review of available wetland and flood plain mapping and observations from site visits, to evaluate the potential presence of wetlands and floodplains in the study area. The findings of the desktop evaluation of the wetlands and floodplains are discussed below.

There are no federally- or state-mapped wetland areas associated with the site. No wetlands mapped by the USFWS National Wetland Inventory (NWI) are close to the site. As shown on Figure 3-20, wetlands mapped by the State of New York do not occur within the site study area. Based upon field observations made during the ecological investigation, wetland areas appear to be limited to the open water areas of the tributary, Patroon Creek, and the I-90 Pond.

A portion of the site, essentially limited to the area adjacent to the tributary, the Paroon Creek, and the I-90 Pond, is within a 500 year floodplain. This floodplain area, as designated on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), is shown on Figure 3-21. The FIRM map designation indicates the floodplain is within an area inundated by 500-year flooding and by 100-year flooding with average depths of less than one foot or with drainage areas less than 1 square mile.

3.6.1.4 Terrestrial Communities

Terrestrial communities at the site are described in terms compatible with the ecological communities described in *Ecological Communities of New York State* (New York Heritage Program 2002) and include: industrial, successional old field, and successional hardwoods. The locations and types of ecological communities are portrayed on Figure 3-19.

Industrial

The industrial portion of the site corresponds to the mowed lawn, paved road/path, and urban structure exterior ecological community categories. It is characterized by an area of mowed grass that sits over capped soils, paved surfaces surrounding the MERECO facility, and the exterior surfaces of the facility structure. Characteristic wildlife of the mowed grass area include such birds as American robin (*Turdus migratorius*), upland sandpiper (*Bartramia longicauda*), and killdeer (*Charadrius vociferus*). Characteristic wildlife species of the exterior structures include birds such as common nighthawk (*Chordeiles minor*), American robin, rock dove (*Columba livia*), and house sparrow (*Passer domesticus*).

Successional old field

Successional old field is located in upland areas adjacent to the Patroon Creek tributary from the MERECO facility to Patroon Creek. These areas are characterized by forbs and grasses with sporadic presence of shrubs (less than 50 % of the community). Typical vegetation observed for this community is provided on Table 3-4. Streambank vegetation in these areas commonly consisted of silky dogwood

(*Cornus ammomum*), common reed (*Phragmites australis*), sumac (*Rhus typhina* and *R. glabra*), brambles (*Rubus* spp.), smartweeds (*Polyganum* spp.), and grape (*Vitis* spp.).

White-tailed deer (*Odocoileus virginianus*) tracks and browsed vegetatiion were observed. Eastern cottontail rabbits (*Sylvilagus floridanus*) were observed throughout the old field areas. Other wildlife species expected to utilize the successional old field areas include small mammals, such as white-footed mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus maniculatus*), and short-tailed shrew (*Blarina brevicauda*); larger mammals, such as striped skunk (*Mephitis mephitis*), raccoon, woodchuck (*Marmota monax*), and red fox (Vulpes fulva); and, reptiles such as turtles and snakes.

Bird species characteristic of successional old field communities may include the field sparrow (*Spizella pusilla*) and perhaps eastern towhee (*Pipilo erthrophthalamus*), song sparrow (*Melospiza melodia*), brown thrasher (*Toxostoma rufum*), golden-wing warbler (*Vermivora chysoptera*), blue-winged warbler (*Vermivora chrysoptera*), chestnut-sided warbler (*Dendroica pensylvanica*), yellow-breasted chat (*Icteria virens*), and indigo bunting (*Passerina cyanea*). Birds of prey, such as hawks and owls, are also expected to utilize these old field areas.

Successional hardwoods

The successional hardwood forest associated with the site is located between the Conrail Railroad Tracks and Interstate 90. The vegetation observed in these forested areas are species representative of both the Northern and Southern Successional Hardwood categories (New York Heritage Program 2002). Canopy coverage was observed to range from moderately open to relatively dense/closed. Typical vegetation observed for this community is provided on Table 3-4. Streambank vegetation in this community commonly consisted of boxelder (*Acer negundo*), red maple (*Acer rubrum*), slippery elm (*Ulmus rubra*), and the occasional silver maple (*Acer saccharinum*).

Widlife species expected to utilize the successional hardwood forested areas are white-tailed deer, eastern gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), white-footed mouse, deer mouse, short-tailed shrew, striped skunk, opposum (*Didelphis marsupialis*), raccoon, red fox, toads, snakes, turtles, and salamanders.

Bird species characteristic of successional hardwood forests include chestnut-sided warbler (*Dendroica pensylvanica*), possibly Nashville warbler (*Vermivora ruficapilla*). A variety of other warblers, thrushes, finches, and wrens are likely to be utilizing this forest. Birds of prey, such as hawks and owls, are also expected to utilize this forested community.

4

Section Four

Section 4
Nature and Extent of Contamination

This section documents the type and distribution of organic and inorganic contamination in surface water, sediments, soil, fish, and groundwater at the Mercury Refining site. Section 4.1 contains a discussion of CDM's approach to the evaluation, with the use of applicable screening levels, and characterization of site contamination. Section 4.2 presents the evaluation of the nature and extent of contamination.

4.1 Approach to the Evaluation of Contamination

The characterization and evaluation of the nature and extent of contamination is focused on those constituents identified as contaminants of potential concern (COPCs) in site surface water, sediments, soil, fish, and groundwater. COPCs were generally determined by evaluating exceedences of screening criteria or naturally occurring background levels; the frequency of the exceedences; and the magnitude of the exceedences. Although all detected contaminants were subject to the media-specific screening process, they are not all discussed in detail in the text. The characterization of site conditions emphasizes the extent and spatial distribution of site-related contaminants in site media. Contaminant concentrations that exceed the applicable screening criteria are summarized in this section of the report. A complete set of analytical data is provided in Appendix J. Analytical data tables showing exceedences of screening criteria are provided in Appendix K and analytical summary tables are provided in Appendix L.

4.1.1 Selection of Screening Criteria

As a first step in the evaluation of the nature and extent of contamination at the MERECO Site, screening criteria were selected to evaluate contaminants detected in the surface water, groundwater, soil, sediment and fish samples collected during the RI. Whenever possible, established regulatory criteria, known as chemical-specific applicable or relevant and appropriate requirements (ARARs), were used to screen the data. In the absence of ARARs, regulatory guidance values, known as "to be considered" (TBC), were used to screen the data.

In preparing the screening criteria, the lowest value of the applicable ARAR/TBC was used as the applicable screening criteria, unless otherwise noted. Some compounds, like PCBs, do not have individual screening values for the individual Aroclors, but a screening value was available for the sum of those compounds. In those cases, to be most conservative, the screening value for each component was assumed to be that for the sum of all components. The following list indicates how the screening criteria were compiled for each media:

- Surface water screening criteria were compiled from the New York Ambient Water Quality Standards and Guidance Values (NYWQS) for both human water source and human fish consumption. The higher screening value was chosen for mercury because the value of 0.7 parts per trillion (ppt) was significantly lower than the method detection limit.

- Groundwater screening criteria were compiled from the EPA National Primary Drinking Water Standards (NPDWS), NYWQS for groundwater, and the New York State Department of Health (NYSDOH) Drinking Water Standards. To be conservative, the new EPA NPDWS value for arsenic of 10 ug/L is used as a screening value; however, this ARAR does not take effect until January 23, 2006.

- Soil screening criteria were compiled from New York State Soil Cleanup Objectives and Cleanup Objectives to Protect Groundwater (Technical and Administrative Guidance Memorandum [TAGM] #4046), EPA Region 9 Preliminary Remediation Goals (PRGs) for residential soil (used to develop Region 3 risk based screening criteria), and site background concentrations. The TAGM values are based on regional background concentrations. The PRGs were developed as risk based values adjusted to the cancer risk benchmark 1E-6 and the hazard quotient 0.1. Section 4.1.3 contains a detailed explanation of the development of site background concentrations.

- Sediment screening criteria were compiled from Guidelines for the Protection and Management of Aquatic Sediment Quality and the NYSDEC Technical Guidance for Screening Contaminated Sediments. The NYSDEC criteria were calculated using an average total organic carbon value of 14 grams of organic carbon per kilogram for sediments. This value was calculated from the 0-6 inch sediment samples as to not produce a spatial bias and should not be compared with the average TOC values in Section 5 that include the catch basins and the interval samples. The values for human health bioaccumulation were used. For compounds without human health bioaccumulation values, benthic chronic toxicity values were used.

- Fish screening criteria are EPA Region 3 risk-based concentrations for human consumption of fish. Depending on the chemical properties, the values are based on either cancer or non-cancer risks. Mercury has no screening value. For screening purposes, it is assumed that all the mercury in the fish samples is in the form of methylmercury, which has a screening value of 0.1 mg/kg.

The screening criteria were submitted to EPA for review in a Technical Memorandum dated September 2002. The screening criteria were verbally approved by EPA. The screening criteria used to evaluate the analytical data for this RI are identified in Tables 4-1 through 4-5.

4.1.2 Selection of Indicator Compounds

Selected indicator contaminants will be used to focus the evaluation of the nature and extent of contamination in surface water, sediment, groundwater, soil, and fish tissue. To select the indicator compounds, CDM reviewed the analytical data collected during the RI, analyzed the spatial distribution of contamination, and reviewed the historical activities at the MERECO Site. The analysis focused specifically on the results from the on-site catch basins, as those data give a good indication of contamination resulting from on-site processes. The spatial distribution of contamination in the stream was also considered. Based on that evaluation, the contaminants mercury, methylmercury, arsenic, thallium, silver, cadmium, chromium, manganese, nickel, PCBs, and SVOCs (especially PAHs) were selected as indicators representative of site-related contamination. However, some of the indicator contaminants also may be attributable to other anthropogenic sources in the site area or to background levels. They are discussed below:

- SVOC contamination may have resulted from the operation of MERECO's retort furnace. However, MERECO is located in an industrial area; SVOCs detected exceed screening criteria in background samples as well as downstream samples and are associated with many industrial processes (and general air pollution).
- Historical records show that PCB-bearing materials were brought to the MERECO Site and PCB remediation activities occurred at the site in the past. However, PCBs detected exceed screening criteria in background samples as well as downstream samples.
- Historical records indicate that manganese and zinc-bearing materials were brought to MERECO for processing. However, manganese and zinc also exceed screening criteria in background samples.

Other contaminants were eliminated as site-related indicator contaminants based on the following rationale:

- VOAs were not detected at significant concentrations in any of the samples and are not associated with historical operations at the site.
- Pesticides were not detected in significant concentrations in any of the samples and are not associated with historical operations at the site.
- Other inorganics, including iron, aluminum, magnesium, and copper, exceeded screening criteria in almost every sample and are believed to be attributable to site background conditions.
- The highest concentrations of lead are found upstream of the site and in areas downstream of the National Lead Superfund site. National lead is located along Patroon Creek, approximately 800 feet east of the MERECO facility.

The results for indicator compounds will be discussed in relation to the site. The results for non-indicator contaminants are discussed briefly in the following sections; however, they will not be discussed in relation to the site. A complete set of analytical data is presented in Appendix J and all exceedences of screening criteria are presented in Appendix K.

4.1.3 Background Samples

In a developed area such as Colonie, it is difficult to obtain background environmental samples that are completely free of contaminants. Industrial and commercial activities, runoff from roadways and parking areas, and rain-out and direct fallout of airborne pollutants are likely to contribute measurable concentrations of contaminants to area surface waters, sediments, and groundwater. Review of results shows that the RI background samples were generally not impacted by the site-specific contamination. Therefore, the samples are considered to be appropriate for comparison to samples impacted by site-related compounds.

During the surface water/sediment sampling event, two background surface water and sediment samples were collected upstream of the site in the unnamed tributary of Patroon Creek (SW-01/SD-01 and SW-02/SD-02). During the fish sampling event, five fish samples were collected from background locations, including Inga's pond (ECO-02-PD, HHR-02-PDA, and HHR-02-PDB) and the unnamed tributary at the location of the SW-02/SD-02 sample (ECO-02-ST and HHR-02-ST). The background samples were collected from upstream areas considered to be unaffected by site contaminants. Background samples were analyzed for the same parameters as the investigation samples.

To provide background groundwater samples, two upgradient monitoring wells, MW-07D and MW-07S, were installed to monitor background water quality, in an area considered to be unaffected by site-related contamination. Background groundwater samples were analyzed for the same parameters as the investigative samples. Table 4-6 presents a list of background samples and their locations relative to the site.

Estimates of the background concentration of analytes in soil samples were developed using data from a total of 11 soil samples collected from 0 to 10 feet bgs in the MW-7D deep soil boring and the water table soil borings SBW-02 and SBW-03. These locations were chosen because they were not impacted by site-related activities. Of the samples from these three locations, only one was available from a depth greater than 10 feet bgs. The sample was collected at MW-07D from 60 to 62 feet bgs. Since only one sample was available from a depth below 10 feet bgs and since this sample is not likely to have been impacted by offsite industrial or other anthropogenic sources, it was not used in computing the background concentration. Samples from the 0 to 10 foot interval of SBW-03 provide a "strata" that is representative of soil that may have been affected by offsite industrial or other anthropogenic sources, but has not been impacted by contaminants from the site.

The sample data from SBW-03 were tabulated and the detections for each analyte were compared to the screening criteria derived from regulations (Table 4-3). The analytes present in the background samples above the original screening criteria (used in the Draft RI Report) were the SVOCs benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and dibenzo(a,h)anthracene and the inorganic analytes aluminum, arsenic, beryllium, chromium, iron, manganese, and zinc. The data for these compounds or analytes were evaluated to determine the type of distribution and the mean and median values (not-detected values were assumed to be present at 1/2 of the detection limit). The data for benzo(a)anthracene and benzo(b)fluoranthene were log normally distributed, while the results for benzo(a)pyrene, chrysene, and dibenzo(a,h)anthracene were non-parametric. All the inorganic data were normally distributed.

Either the mean or median values were compared to the original screening criteria because these values express the central tendency of the sample population and therefore provide a reasonable estimate of the background concentration of the compounds or analytes in the soil samples. For log normally distributed data, the geometric mean was compared to the original screening criteria. For non-parametric data, the median was compared to the original screening criteria. For normally distributed data, the arithmetic mean was compared to the original screening criteria. If the mean or median value, as appropriate, was greater than the original screening criteria, then this background concentration was used as the screening criteria to evaluate the results of the subsurface soil sampling program. Accordingly, the screening criteria for benzo(a)pyrene, dibenzo(a,h)anthracene, arsenic, beryllium, iron, manganese, and zinc were adjusted to the background value. The screening criteria for soils are summarized in Table 4-3.

4.1.4 Nature of Mercury and Methylmercury

In the sections on catch basins, surface water, and sediment, both total and methylmercury will be discussed as an indicator of site-related contamination. Mercury exists in the environment in many chemical species. Total mercury is a measure of all species of mercury. Methylmercury is an organometallic species of mercury which is a portion of the total mercury concentration. This distinction is important because the chemical characteristics and toxicological effects of inorganic and organic mercury are very different.

Inorganic mercury is insoluble (e.g., Hg_2Cl_2 [calomel]) to very insoluble (e.g., HgS [cinnabar]) under most natural conditions. Elemental mercury is also very insoluble in water. However, sulfate reducing bacteria can convert inorganic mercury to organic methylmercury ($HgCH_3^+$). Methylmercury is soluble and can be converted into dimethylmercury [$(HgCH_3)_2$], which is volatile.

Another important difference between methyl and inorganic mercury is that methylmercury bioaccumulates, meaning that the methylmercury concentration in an organism continues to increase throughout its life and that the majority of the methylmercury in the organism will be passed to what consumes it (biomagnification). For example, a minnow may contain 0.1 mg/kg of methylmercury and not be effected, but the raccoon that eats 5,000 minnows in its life may contain 500 mg/kg of mercury and show adverse effects. The effects continue to be magnified up the food chain.

Generally, at moderate levels of mercury (<10 mg/kg), the proportion of methylmercury becomes a more significant portion of the total mercury concentration.

Mercury to methyl mercury ratios were used to provide a rough estimate of the degree of methylation in the samples. This relationship may provide insight into processes that effect the concentration and distribution of mercury in the stream system. However, it should be noted that a number of factors affect the methylation rates so it is very difficult, if not impossible, to calculate site-specific methylation rates. A more complete discussion of the chemistry of mercury is contained in Section 5.4.3.

4.2 Nature and Extent of Contamination

This section presents and discusses the results of the catch basin, surface water, sediment, fish, soil and groundwater investigations conducted during the RI at the MERECO Site. In each subsection, the organic and inorganic analytical results are discussed, with an emphasis on the indicator compounds identified in Section 4.1.2. To the extent possible, the data are also compared to the historical sampling data collected at this site. In some cases the data collected during this investigation are significantly different from data collected in previous investigations. The quality and validity of the historical data has not been verified by CDM.

4.2.1 Data Presentation

The analytical results from the RI were put into the site database for evaluation purposes. A full set of analytical data is presented in Appendix J. The data were exported to an Environmental Geographic Information System (EGIS) for analysis and graphical presentation. The data presented on the figures in this section are in units consistent with Appendix J and are as follows: inorganic data for aqueous samples is presented in ug/L; inorganic data for solid samples is presented in mg/kg; and organic data for solid samples is presented in micrograms per kilogram (ug/kg). A data usability evaluation assesses the usability of the analytical data generated from the field investigation (Appendix C).

4.2.2 Catch Basins

Catch basin surface water and sediment sampling was conducted at the MERECO Site to characterize the nature and extent of contamination in the site runoff collection system. One round of samples was collected from five catch basins and an outfall pipe between November 11 and 15, 2001 (Figure 4-1). The catch basins were sealed by facility personnel in 2000. CB-1, CB-2, CB-4, and CB-5 were sealed by plugging the inflow and outflow pipes with expandible plugs, covering the covering the openings with 1/4 inch thick steel plates and caulking the edges with silicone caulk. To sample these basins, the steel plate and caulk were removed and samples were collected from material in the basins. CB-3 was sealed by plugging the inflow and outflow pipes with expandible plugs and placing a new basin inside the existing basin and caulking it into place with silicone caulk. The new basin is currently used to collect site runoff which is pumped through a hose into the stream using a sump pump. The sample from CB-3 was collected from the new basin because the old basin was inaccessible. CB-6, the outfall pipe, was sealed with an expandible plug. All sampling locations were re-sealed immediately after sampling.

Surface water samples were collected from the catch basins and analyzed for VOCs, SVOCs, pesticides, PCBs, TAL metals, and subcontract wet chemistry parameters. Sediment was collected from catch basin 1 (CB-1) and analyzed for VOCs, SVOCs, pesticides, PCBs, TAL metals, grain size, pH, TOC, CEC, total and methylmercury. Due to sediment volume limitations, catch basin 3 (CB-3) was sampled only for TAL metals and total and methylmercury and the outfall pipe (CB-6) was sampled only for total and methylmercury. Screening criteria exceedences for catch basin surface water and sediment samples are provided in Appendix K. Exceedences of inorganic analytes in the catch basin surface water and sediments are shown on Figures 4-1 and 4-2, respectively.

4.2.2.1 Organic Compounds

Surface Water

No VOCs or PCBs were detected in the catch basin surface water samples. Five SVOCs were detected in the samples, with three exceeding their screening criteria. The two significant exceedences, phenol (200 times screening criteria) and 2-methylphenol (80 times screening criteria) were detected in SWC-03, which is the basin currently collecting site runoff. The other exceedence, bis(2-ethylhexyl)phthalate (1.1 times screening criteria) was detected in SWC-02. The pesticide delta-BHC was detected at levels just exceeding its screening criteria in SWC-03. No other pesticides were detected.

Sediment

SDC-01 was the only sample location with enough sediment volume for full TCL/TAL analysis. Seven VOCs were detected in the sample from SDC-01, but only benzene exceeded its screening criteria by 1.2 times. Twenty SVOCs were detected in SDC-01 and 10 polycyclic aromatic hydrocarbons (PAHs) exceeded screening criteria. Benzo(a)pyrene had the greatest exceedence, detected at 25 times screening criteria. Ten pesticides were detected and eight exceeded screening criteria. The greatest exceedences were alpha chlordane (1,500 times screening criteria), heptachlor epoxide (1,000 times screening criteria), 4,4'-DDE (300 times screening criteria) and 4,4'-DDD (200 times screening criteria). The four other exceedences were less than 40 times their screening criteria. All PCB data were rejected in validation. The rationale for rejecting data is discussed in the data usability assessment (Appendix C).

4.2.2.2 Inorganic Analytes

Surface water

Twenty-three metals were detected in the catch basin surface water samples. Five metals exceeded screening criteria, including three indicator compounds: cadmium, mercury, and thallium (Figure 4-1). Cadmium exceeded screening criteria by 2 times and only in SWC-01. Thallium concentrations exceeded screening criteria by 20 times in SWC-03, 16 times in SWC-04, 11 times in SWC-05, and 14 times in SWC-06. Thallium was not detected in SWC-01 and SWC-02. Mercury exceeded screening criteria in every sample from 55 times in SWC-01 to 4 times in SWC-03 (sample from the open basin). Generally mercury concentrations decreased from the catch basin furthest from the stream to the catch basin nearest the discharge to the tributary of Patroon Creek (36.8 to 5.9 ug/L).

Methylmercury concentrations ranged from 0.00332 ug/L (3.32 nanograms per liter [ng/L]) in SWC-03 to 0.1583 ug/L SWC-04; however, methylmercury in surface water has no screening criterion. The highest ratios of total to methylmercury are found in SWC-04 (4 %), SWC-05 (17.5 %), and SWC-06 (5 %). The open basin (SWC-03) and the basins with high mercury concentrations (SWC-01 and SWC-02) have much lower methyl to total mercury ratios of 0.25 %, 0.18 %, and 0.07 %, respectively.

Sediment

Twenty-three metals were detected in the samples and 12 exceeded screening criteria, including 6 of the 7 indicator compounds (thallium has no sediment screening criterion). Volume for TAL metals analysis was available from CB-1 and CB-3, CB-6 was sampled for only total and methylmercury. Inorganic exceedences are shown on Figure 4-2. Arsenic concentrations exceeded screening criteria by 17 times in SDC-01. Cadmium concentrations exceeded screening criteria in SDC-01 by 79 times and in SDC-03 by 3 times. Chromium concentrations exceeded screening criteria in SDC-01 by 3 times. Mercury concentrations exceeded screening criteria by 1,460 times in SDC-01, 82 times in SDC-03, and 90 times in SDC-06. Nickel concentrations exceeded screening criteria by 7 times in SDC-01. Silver concentrations exceeded screening criteria in SDC-01 by 550 times and in SDC-03 by 15 times.

Methylmercury was detected in SDC-01, SDC-03, and SDC-06 at 263.53, 61.56, and 136.19 ug/kg, respectively; however, methylmercury has no sediment screening criterion. The ratios of total to methylmercury indicate that the percent of methylmercury is much lower in the sediments than in the surface water, 0.1 %, 0.5 % and 1 % for SDC-01, SDC-03, and SDC-06, respectively. As with surface water, the total mercury concentrations decrease downstream in the system from CB-01 to CB-06, but the ratio of total to methylmercury increases.

4.2.2.3 Comparison with Existing Data

No existing data are available for comparison to the RI catch basin sediments results. Catch basin surface water samples will be compared to runoff samples collected in 1990 and 1992. The 1990 samples were analyzed only for total mercury (Table 1-10). The detections ranged from 41 to 0.0122 mg/L of mercury in the historical samples, which is about 3 orders of magnitude greater than the range of concentrations (36.8 to 5.9 ug/L) detected in the RI catch basin surface water samples.

In 1992 NYSDEC collected one water sample from the outfall pipe (SWC-06); it was analyzed for arsenic, chromium, copper, lead, mercury, nickel, silver, and zinc (Table 1-12). The data is comparable, within an order of magnitude, to the data collected during the RI. Arsenic was the only compound with a higher concentration in the RI sampling than in the NYSDEC sampling. The NYSDEC sample was collected before the catch basins were closed; the variation is, therefore, reasonable.

4.2.2.4 Summary of Catch Basin Contamination

The contamination in the catch basins is likely a result of non-point runoff from the site. The primary concerns in the catch basin surface water and sediment samples are mercury and the other inorganic indicator compounds. All of the indicator compounds were detected in the catch basins and exceeded screening criteria in at least one sample. Mercury exceeded screening criteria in every surface water and sediment sample collected from the catch basins, with the highest concentrations in CB-1. The high concentrations in CB-1 are likely due to its proximity to the former retort furnace building and the sorting trailer. This basin would have received most of the runoff from that area. The concentrations in the other basins are a combination of contamination from upstream catch basins and additional site runoff. The samples from the open catch basin(CB-3) are most representative of the current site runoff and had most of the significant detections of organic contaminants.

In the past, the catch basins were probably a primary migration pathway for contamination from the site to the stream. This is supported by the historical data, which shows that metals concentrations in the catch basin water have not significantly decreased since the basins were closed. Comments from the NYSDEC indicate that they conducted a downhole camera investigation that revealed a break in the pipe that leads to the outfall. The leaky pipe could contribute to contamination of both the stream and the soils surrounding the catch basin system.

CB-3 is currently used to collect site runoff and is pumped directly into the stream. Water flows out of the catch basins through and around the outfall pipe of the inactive system, with obvious staining on the sediments below the outfall pipe. The discharge indicates that the current method of closure has not removed the catch basin system as a source of contamination to the tributary of Patroon Creek. Based on the contaminant levels in the samples collected at the outfall pipe, the flow of water and transport of sediment from the catch basin system to the tributary continues to be a pathway for mercury and other inorganic contaminants to enter the tributary of Patroon Creek.

4.2.3 Surface Water

Stream surface water sampling was conducted both upstream and downstream of the MERECO Site to characterize the nature and extent of contamination in the stream from contaminants associated with the site and to provide information for the RI. Fourteen samples were collected between October 30 and November 7, 2001, from locations upstream of the site, in the unnamed tributary, in Patroon Creek, and in the I-90 pond (Figure 4-3). The surface water samples are co-located with stream sediment samples.

Stream surface water samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and TAL metals by the EPA CLP laboratory. The samples were also analyzed for hardness, TSS, TDS, TOC, sulfate, and pH. Three stream surface water samples, SW-03, SW-06, and SW-11, were also analyzed for total and methylmercury. Screening criteria exceedences for surface water samples are provided in Appendix K.

4.2.3.1 Organic Compounds

The VOC methyl tertiary-butyl ether (MTBE) was detected below the screening criterion in four surface water samples: SWS-07, SWS-09, SWS-12, and SWS-13. The SVOC bis(2-ethylhexyl) phthalate was detected in one sample, SWS-03, below its screening criteria. No other VOCs, SVOCs, pesticides or PCBs were detected in the stream surface water samples.

4.2.3.2 Inorganic Analytes

Twenty inorganics were detected in the samples at or below screening criteria. The concentration of manganese exceeded screening criteria in the background sample from location SWS-01 and the concentration of thallium exceeded screening criteria at background location SWS-02 and just downstream of the site in the sample from location SWS-03. Although mercury was not detected above the method detection limit of 0.1 ug/L, methylmercury was detected in the three samples where it was analyzed. The highest concentration detected was 0.086 ug/L in sample SWS-11 collected from the I-90 Pond. Methylmercury was detected in samples SWS-03 and SWS-06 at 0.00022 ug/L and 0.0002 ug/L, respectively. No other inorganics exceeded criteria in the surface water samples.

4.2.3.3 Comparison with Existing Data

Three previous studies assessed surface water in the area of MERECO. A 1983 to 1985 study was conducted by CRA and collected six rounds of samples at locations both upstream and downstream of MERECO. Samples were analyzed for varying species of mercury (Table 1-9). A 1989 study conducted by NYSDEC collected numerous samples of on-site puddles and runoff, samples very near the site, and samples downstream near the Hudson River. Four sample locations were comparable to the RI sample locations, three of those were non-detect and the fourth was 0.0012 mg/L (Table 1-10). The last historical study was conducted in 1997 by PTI. The sample locations in this study are most comparable to the RI sample locations. All of the samples collected were non-detect; however, this study was rejected by NYSDEC (Table 1-11). For a more complete discussion of the historical surface water data refer to Section 1.5.4.

It is difficult to perform reasonable comparisons of the historical data with the RI data. The historical surface water samples were analyzed only for mercury and mercury was not detected in the RI surface water samples. The organic mercury data collected during the CRA study are suspect and are likely reported in incorrect units (Sections 1.5.4). The locations of many of the samples are either at MERECO or significantly upstream or downstream of the site; beyond the RI study area. The majority of the samples collected in the same areas as the RI samples were non-detect for mercury.

4.2.3.4 Summary of Surface Water Contamination

No significant detections were noted of site related contamination in the surface water samples. MTBE is a gasoline additive that is common in groundwater and surface waters and is not related to site activities. All of the locations where MTBE was detected are located along or near major roadways. All of the exceedences of inorganics were upstream or adjacent to the MERECO Site. In general, it is difficult to compare the historical data with the RI data. The majority of the samples collected in the same areas as the RI samples were non-detect. There were no detections of inorganic mercury in the RI data and the historical organic mercury data is suspect (Section 1.5.4).

4.2.4 Sediment

Twenty-six sediment samples were collected at 14 locations along Patroon Creek and its unnamed tributary that flows past the MERECO Site (Figure 4-4). Grab samples were collected from 0 to 6 inches bgs. At two locations, SDS-03 and SDS-06, depth profile samples were collected at two-inch intervals from 0 to 12 inches below the sediment surface. Sediment samples were analyzed for full TCL/TAL parameters, for total and methylmercury, grain size, TOC, CEC, and pH. Screening criteria exceedences for sediment samples are provided in Table 3 of Appendix K. Exceedences of benzo(a)pyrene, pesticides, PCBs, and inorganics are presented graphically on Figures 4-4 though 4-6, respectively.

4.2.4.1 Organic Compounds

Grab Sediment Samples (0 to 6 inches)

Eight VOCs were detected in the grab sediment samples; however, none of the detected concentrations exceeded screening criteria. SD-02, SD-03, and SD-06 had no detections of VOCs. Thirty-two SVOCs were detected, with 14 exceeding screening criteria in one or more samples. PAHs, including pyrene, benzo(a) anthracene, chrysene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h) anthracene, and benzo(g,h,i)perylene, exceeded screening criteria at nearly all locations and often by factors of 1,000 or more. Benzo(a)pyrene was chosen to represent the SVOC contamination because it was found at almost all locations and is considered the most toxic PAH. The results are shown on Figure 4-4.

A total of 14 pesticides were detected in the samples, 11 of which exceeded screening criteria. Eleven of the pesticides (seven exceeding criteria) were only detected in SDS-11, which is located at the downstream end of the I-90 Pond. The gamma-chlordane concentration in background sample SD-02 exceeded its screening criteria. Two PCBs, Aroclor-1260 and Aroclor-1254, exceeded screening criteria in three samples. Aroclor-1260 exceeded screening criteria in background sample SD-02 (400 ug/kg) and in the I-90 Pond in sample SD-11 (4,400 ug/kg). The only other detection of Aroclor-1254 occurred in sample SD-09, just upstream of the I-90 Pond. Figure 4-5 shows exceedences of pesticides and PCBs.

Profile Sediment Samples (0 to 12 inches by 2-inch intervals)

Seven VOCs were detected in the profile samples; however, none of the detected concentrations exceeded screening criteria. VOCs were only detected in the 2 to 4 inch and 10 to 12 inch intervals of the SD-03 profile. VOCs were detected in every interval of the SD-06 profile. Twenty-six SVOCs were detected and were generally pervasive throughout all intervals at both locations. PAHs, including pyrene, benzo(a)anthracene, benzo(k)fluoranthene, and benzo(a)pyrene, exceeded screening criteria at nearly all locations.

The only pesticide exceeding screening criteria near the site was 4,4'-DDT in the 0 to 2 inch interval of the depth profile sample SD-03, although it was not detected in the 0 to 6 inch grab sample collected from the same location. Aroclor-1254 exceeded screening criteria in the 2 to 4, 4 to 6, and 6 to 8 inch intervals of the depth profile sample at SD-03, but not in the 0 to 6 inch grab sample collected from the same location. No pesticides or PCBs were detected in the profile samples at SD-06.

4.2.4.2 Inorganic Analytes

Grab Sediment Samples (0 to 6 inches)

Twenty-three inorganics were detected in the stream sediment samples. Eleven inorganics exceeded screening criteria including six indicator compounds (Figure 4-6) (thallium has no sediment screening criterion). The majority of the exceedences were at SD-11, located approximately 30 feet above the dam at the I-90 Pond. Arsenic concentrations exceeded screening criteria by less then 2 times at locations SD-10, SD-11, SD-12, and SD-13. Cadmium concentrations exceeded screening criteria by 3 times at location SD-11. Chromium concentrations exceeded screening criteria by almost 3 times at location SD-11. Mercury concentrations exceeded screening criteria by up to 8 times at locations SD-03, SD-04, SD-05, SD-10, SD-11, and SD-14. Nickel concentrations exceeded screening criteria by less then 2 times at location SD-11. Silver concentrations exceeded screening criteria by 2.5 times at location SD-11. Iron, lead, copper, manganese, and zinc exceed screening criteria both in the background samples and in the downstream samples. Manganese was the only indicater compound that was higher downstream of the I-90 Pond than in the background samples (Figure 4-6). Methylmercury was detected in every sediment sample, with concentrations ranging from 0.13 ug/kg at background location SD-01 to 4.78 ug/kg in the I-90 Pond at location SD-11. No screening criteria is established for methylmercury.

Profile Sediment Samples (0 to 12 inches by 2-inch intervals)

Twenty-three inorganics were detected in the stream sediment samples. Seven inorganics exceeded screening criteria, including two indicator compounds. The concentrations of indicator compounds exceeding screening criteria were about 140 times greater in the SD-03 boring than in the SD-06 boring. Silver exceeded screening criterion in the 6 to 8 and 8 to 10 inch intervals of SD-03. Mercury exceeded screening criterion in every interval in SD-03 and in the 8 to 10 and 10 to 12 inch intervals of SD-06. The concentrations of methylmercury were significantly higher in SD-03 than at SD-06. The average methylmercury concentrations were 0.0078 mg/kg and 0.00097 mg/kg for SD-03 and SD-06, respectively. However, the ratios of total to methylmercury concentrations are much higher in SD-06 where mercury concentrations are lower.

4.2.4.3 Comparison with Existing Data

Three previous studies assessed sediment in the area of MERECO. A 1983 to 1985 study was conducted by CRA and collected three rounds of samples at locations both upstream and downstream of MERECO. Samples were analyzed for varying species of mercury (Table 1-6). Sample results were compared for similar locations and generally the data collected during the RI were significantly lower than the 1983 and two to ten times lower 1984 historical data by two to ten times. However the mercury concentration detected in the RI sample collected from I-90 Pond (SD-11- 1.1 mg/kg) was very comparable with the range of mercury concentrations (0.2 - 1.9 mg/kg) detected in the 1985 samples collected from the I-90 Pond (PS-1-85 through PS-10-85).

A 1989 study conducted by NYSDEC collected numerous samples, both upstream and downstream of the site (Table 1-7), that were analyzed for total mercury. There were significantly more samples collected in this study than were collected during the RI, so RI data was compared to the locations closest to their sampling location. In general, the historical sampling results for mercury were significantly higher than the RI sampling results with two notable exceptions. The mercury concentration in the historical sample collected in the I-90 Pond (89-11-18A - 2.33 mg/kg) was approximately two times greater than the mercury concentration in the RI sample (SD-11 - 1.1 mg/kg). The stratified samples collected at location SD-03 had mercury concentrations that were significantly lower in the 0 to 2-inch interval, but comparable or significantly higher in the 2 to 10 inch intervals than the concentrations in the RI samples.

The last historical study was conducted in 1997 by PTI (Table 1-8). The sample locations in this study are comparable to the RI and the samples were analyzed for only total mercury. The sample results for the location close to the MERECO Site (SD-03) was essentially identical to the RI sample results; however, the rest of the RI sample results did not compare well with the historical sample results. The RI results varied from two to ten times, both above and below, the historical data. The PTI study was rejected by NYSDEC. For a more complete discussion of the historical sediment data refer to Section 1.5.4.

4.2.4.4 Summary of Sediment Contamination

The organic contamination detected in the sediment samples is found both in the background samples and the downstream samples, and the concentration of benzo(a)pyrene in background location SD-02 is significantly higher than concentrations in the stream near the MERECO Site. PAHs are widespread in the environment and are byproducts of incomplete combustion of a variety of fuels.

Mercury and other indicator compounds exceed screening criteria adjacent to the site and downstream of the site, but not in the background locations. This is consistent with historical studies that show similar trends in the mercury distribution.. Mercury concentrations are highest near the site and in the I-90 Pond. Due to the decrease in velocity of the water, the contamination from the stream settles and concentrates in the I-90 Pond. The pond functions as a sink for contamination; however, mercury and other indicator compounds exceed screening criteria in samples downstream of the pond, so the pond is not trapping all of the contamination.

The depth profile data indicate that the indicator compounds are deposited in the stream beds at higher concentrations than in the surface samples. In a small, flood prone stream system such as Patroon Creek, significant amounts of contamination could be transported during scour events.

Stream sediment data are insufficient to define the extent of contamination in the stream and I-90 Pond. From the variability of the historical data, it is evident that the mercury contamination is not spatially homogeneous, even over small areas. Current stream sediment data suggest that the sediment contamination is present at depths greater than 12 inches in the I-90 Pond, in the tributary of Patroon Creek, and Patroon Creek stream. The downstream extent of contamination has not been established. The most downstream sample, SD-14, contained mercury at levels that exceeded screening criteria.

4.2.5 Fish Tissue

One round of fish tissue samples was collected from four locations to obtain data for use in the human health and screening level ecological risk assessments; the sampling locations were Inga's Pond and SW-02 (background sample locations upstream of the MERECO Site), and SW-06 and I-90 Pond (downstream locations) (Figure 4-7). Fish tissue samples were collected to determine if site-related contaminants have migrated into the food chain of fish species living in the waters from the vicinity of the MERECO Site.

Table 2-8 contains species, mass, and sample information for the fish samples. The species of sport fish captured, such as carp and perch, tended to be larger than forage fish. Larger sport fish species tend to bioaccumulate higher concentrations of mercury than smaller forage fish species. Piscivorous fish (fish that eat other fish) tend to accumulate higher levels of mercury than invertivorous fish (fish that eat invertebrates) and herbivorous fish (fish that eat plants). Sport fish, such as perch, are more commonly piscivorous than forage fish.

To simplify the description of the fish tissue sampling, this section is divided into a description of the sampling results from the unnamed tributary, including Inga's Pond, and the results from the I-90 Pond. Screening criteria exceedences for fish tissue samples are provided in Appendix K. Exceedences of inorganic analytes are presented on Figure 4-7. All results were reported in wet weight concentrations.

4.2.5.1 Stream

Organic Compounds

No VOCs or SVOCs were detected in the stream fish samples above the screening criteria. Although pesticides were detected at SW-02 and SW-06, none exceeded screening criteria. The pesticides 4,4'-DDE and alpha-chlordane were detected at 18 ug/kg and 11 ug/kg, respectively; up to two times above screening criteria in the background sport fish sample from Inga's Pond; none were detected above screening criteria in the other downstream samples.

PCBs were not detected in the forage fish sample collected from Inga's Pond, but significantly exceed the criteria for Aroclor-1260 (by 90 times) in the sport fish sample (detected at 180 ug/kg). At SW-02, a background location, both Aroclor-1254 and Aroclor-1260 were detected over 30 times above their screening criterion in the forage fish sample (detected at 78 ug/kg and 60 ug/kg, respectively) and 40 times above the criterion for Aroclor-1254 in the sport fish sample (detected at 58 ug/kg). The same two Aroclors were detected above screening criteria in each of the forage fish and sport fish samples collected immediately downstream of the site in the unnamed stream at SW-06. Aroclor-1254 and Aroclor-1260 were detected at up to 88 ug/kg and 100 ug/kg, respectively. The magnitude of exceedences of PCBs from fish samples collected upstream of the site were comparable to those collected downstream of the site.

Inorganic Analytes

Inorganic analytes were commonly detected in both fish tissue types; none were detected above the applicable screening criteria in samples collected upstream of the site. However, mercury was detected above the screening criterion in the downstream sport fish sample at SW-06, exceeding the screening criterion by 2.2 times (found at 0.22 mg/kg). Figure 4-7 shows the fish sample concentrations that exceed screening criteria:

4.2.5.2 I-90 Pond

Organic Compounds

No VOCs or SVOCs were detected in the I-90 Pond fish samples above the screening criteria.

As with the background sample from Inga's Pond, the pesticide alpha-chlordane was detected just above its screening criterion of 9 ug/kg in the I-90 Pond sport fish sample (at 11 ug/kg); it is not suspected to be site derived.

Aroclor-1254 and Aroclor-1260 were detected up to 65 and 205 times above their respective screening criteria in the forage fish samples (detected at 130 ug/kg and 180 ug/kg, respectively) and sport fish samples (at 120 ug/kg and 410 ug/kg, respectively); elevated concentrations of these two Aroclors also were detected in the background samples from Inga's Pond. In addition, Aroclor-1248 was detected at 39 times its criterion in the forage fish sample (detected at 78 ug/kg). In general, concentrations of PCBs were higher in the forage fish tissue compared with the sport fish tissue, although the concentration of Aroclor-1260 was much greater in the sport fish sample.

Inorganic Analytes

Inorganic analytes commonly were detected in both forage fish and sport fish samples; however, none were detected above the applicable screening criteria except mercury, which was detected above its screening criterion in the sport fish sample. It marginally exceeded the screening criterion (detected at 0.11 mg/kg). With the exception of the elevated mercury sample from the I-90 Pond, the concentrations of analytes in the I-90 Pond samples were similar to background samples.

4.2.5.3 Comparison with Existing Data

Several fish sampling studies have been conducted since the mid-1980s in the vicinity of the site. The fish tissue samples collected in 1985, 1986, 1987, and 1990 from the I-90 Pond by MERECO contained less than 1 mg/kg of mercury. A 1989 NYSDEC investigation (NYSDEC 1990) included collection and analysis of fish in the vicinity of the site. All concentrations were less than 1 mg/kg (see Section 1.5.5 for details of previous sampling events).

In 1999 NYSDEC collected 59 fish tissue samples from 6 locations along the length of Patroon Creek, including 3 sampling locations downstream of the I-90 Pond (the Railroad [Conrail] Overpass, Tivoli Lake, and below Tivoli Lake). Refer to Table 1-14 for presentation of these data. Samples were analyzed for pesticides, PCBs, and mercury (all reported in wet weight concentrations).

Several pesticides were detected in the 1999 NYSDEC fish samples, including DDE up to 58 ug/kg, DDD up to 16 ug/kg, DDT up to 8 ug/kg, and chlordane up to 27 ug/kg. In all cases, the highest concentrations of pesticides were detected in carp samples, predominantly collected from the I-90 Pond. The highest detected pesticide concentrations were significantly higher than those observed in the RI fish tissue samples from the I-90 Pond.

PCBs were detected in most 1999 NYSDEC samples; the highest concentrations of Aroclor-1242 were detected up to 623 ug/kg in crayfish samples from the Rensselear Lake outfall; the highest concentrations of Aroclor-1254 and Aroclor-1260 were detected up to 802 ug/kg in sport fish, carp and largemouth bass, collected predominantly from the I-90 Pond. These concentrations are significantly higher than those reported for RI fish tissue samples collected from the I-90 Pond. Aroclor-1254 and Aroclor-1260 were detected in all of the 59 samples; unlike Aroclor-1242. The lowest concentrations of Aroclor-1254 and Aroclor-1260 generally were found in the Rensselaer Lake outfall sample (at concentrations as low as 24 ug/kg) and from samples collected downstream of the I-90 Pond.

Mercury was detected in all 1999 NYSDEC samples at concentrations ranging from 0.007 to 0.914 mg/kg. Mercury was detected at its lowest concentrations predominantly in crayfish samples and from fish collected from the Conrail overpass sampling location, midway between the I-90 Pond and Tivoli Lake. It was detected at its highest concentrations predominantly in sport fish, largemouth bass, tissue samples collected from the Tivoli Lake and I-90 Pond locations.

The results of the NYSDEC's fish sampling program suggested that mercury, PCBs (except for Aroclor 1242), and pesticides were detected at their highest concentrations in sport fish such as carp and largemouth bass; all were detected at their highest concentrations downstream of the MERECO Site, principally from the I-90 Pond. The highest concentrations of Aroclor 1242 were associated with forage fish samples collected from the background sample location as well as samples downstream of the MERECO Site and is likely not site derived.

The existing data indicate significant concentrations of site-derived contaminants such as PCBs and mercury exist in fish, principally sport fish, within the lower reaches of Patroon Creek. In general, the sampling results gathered during the RI are much lower in concentration than the NYSDEC fish sampling program. This could suggest that the concentrations of site-derived contaminants detected in downstream fish tissue samples during the NYSDEC sampling program attenuated in magnitude from 1999 to 2001. Alternatively, and more likely, the differences in the fish data sets reflects the smaller number of samples collected during the RI field investigation.

4.2.5.4 Summary of Fish Tissue Contamination

The RI fish tissue results do not suggest widespread contamination of fish tissue in the Patroon Creek drainage. However, the fish sampling locations were limited and few fish were available at some of the sampling locations.

No VOCs or SVOCs exceeded screening criteria in the stream and I-90 Pond fish tissue samples. Although pesticides were rarely detected, two pesticides exceeded screening criteria in the sport fish sample from Inga's Pond and the I-90 Pond.

PCBs Aroclor-1254 and Aroclor-1260 commonly were detected in all fish samples. The magnitude of exceedences of PCBs from fish samples collected upstream of the site were comparable to those collected downstream of the site. An elevated level of Aroclor-1248 also was detected in the forage fish sample from I-90 Pond. In general, concentrations of PCBs were highest in the forage fish tissue compared with the sport fish tissue, despite the tendency for bioaccumulation of contaminants to occur in sport fish compared with forage fish. The forage fish may be more exposed to contaminants through ingestion of benthic organisms that ingest contaminated sediments.

Analytical results for PCBs found in upstream, onsite, and downstream stream sediments are comparable with the fish tissue results, suggesting this pathway may exist. However, a direct link between PCB contamination from the site and PCBs identified in fish tissue can not be made through review of fish tissue results alone because fish can migrate both upstream and downstream of the site.

Inorganic analytes were commonly detected in the both fish tissue types; none were detected above the applicable screening criteria for samples collected upstream of the site. However, mercury was detected above its screening criterion in the forage fish sample at SW-06 (just downstream of the site) and the sport fish sample at I-90 Pond. It is assumed that all mercury present in the fish samples is present in the form of methyl mercury.

4.2.6 Soil

This section presents and discusses the results of the surface and subsurface soil investigations at the MERECO Site which were conducted to characterize the nature and extent of contamination and provide data for completing ecological and human health risk assessments. For clarity of presentation, the surface and subsurface soil discussions are presented separately and the organic and inorganic results are discussed separately. Screening criteria exceedences for soil samples are provided in Appendix K. Figures 4-8 through 4-11 present the inorganic exceedences for the surface soils, shallow borings, water table borings and deep borings, respectively.

4.2.6.1 Surface Soil

Thirteen surface soil samples were collected at five off-site locations: HHR-04, HHR-05/ECO-02 (collocated samples), HHR-06/ECO-03 , HHR-07/ECO-01, and HHR-08. These sampling locations are south of the MERECO Site boundary and across the unnamed tributary to Patroon Creek. At three locations (HHR-05/ECO-02, HHR-06/ECO-03, and HHR-07/ECO-01) samples were collected from 0 to 2 inches and 0 to 6 inches for the human health risk assessment and from 0 to 12 inches for the ecological risk assessment. At the remaining two locations (HHR-04 and HHR-08) samples were collected from 0 to 2 inches and 0 to 6 inches for the human health risk assessment. To characterize the nature and extent of surface soil contamination on the site, CDM also evaluated the results of the 12 surface samples collected from 0 to 2 feet in the shallow soil borings, water table soil borings, and deep soil borings. Five shallow and six water table soil borings were installed on and around the site and samples were collected from 0 to 2 feet at each of these locations. One soil sample was collected from 0 to 2 feet at deep soil boring location SBD-04. The locations of these borings, data summaries, and screening criteria are shown on Figures 4-9, 4-10, and 4-11.

Organic Compounds

Six VOCs and five pesticides were detected in the off-site surface soil samples; however, none of the detections exceeded screening criteria. PCBs were not detected in the surface soil samples. Twenty-two SVOCs were detected in the off-site surface soil samples; eight of the SVOCs exceeded screening criteria in samples SSS-HHR-04-0-2, SSS-HHR-04-0-6, SSS-HHR-05-0-6, and SSS-HHR-07-0-2. SVOCs that exceeded screening criteria include acetophenone, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, phenol, and benzo(a)anthracene.

Eight VOCs, four pesticides, and one PCB were detected the 13 surface soil samples collected from 0 to 2 feet in on-site soil borings (this group includes samples SBD-01-A which was collected from 1 to 3 feet bgs). However, none of these compounds were detected at concentrations above screening criteria. Twenty-one SVOCs were detected in onsite surface soil samples collected from 0 to 2 feet. Six SVOCs were detected above screening criteria at locations SBS-01, SBS-02, SBS-03, SBS-05, SBW-02, and SBD-04. The SVOCs that exceeded screening criteria included chrysene, benzo(b)fluoranthene, benzo(a)pyrene, phenol, and benzo(a)anthracene.

Inorganic Analytes

Mercury was detected above screening criteria in all 13 off-site surface soil samples. Mercury concentrations ranged from 0.24 mg/kg in the sample from 0 to 6 inches collected at HHR-06 to 1.3 mg/kg in the sample collected from 0 to 2 inches at HHR-07. HHR-07 is on the west bank of the unnamed tributary to Patroon Creek. HHR-06 is located to the east of HHR-07 (Figure 4-8). Arsenic was detected above screening criteria in 9 of the 13 samples at concentrations ranging from 2.6 mg/kg in the sample from 0 to 12 inches at ECO-03 and 6.9 mg/kg in the sample from 0-2 inches at HHR-08. HHR-08 is located on the east bank of the unnamed tributary to Patroon Creek. Manganese was detected above screening criteria in 7 of the 13 samples with concentrations ranging from 366 mg/kg in the sample from 0-12 inches at ECO-01 to 442 mg/kg in sample the sample from 0-2 inches at HHR-08. Zinc was detected above screening criteria in all 13 samples with concentrations ranging from 37.2 mg/kg in the sample from 0 to 6 inches collected at HHR-06 to 128 mg/kg in the sample collected from 0 to 6 inches at HHR-07. Copper was detected above screening criteria in 4 of the 13 samples with concentrations ranging from 25.5 mg/kg in the sample from 0 to 2 inches collected at HHR-04 to 98.5 mg/kg in the sample collected from 0 to 6 inches at HHR-07. Concentrations of beryllium and iron also exceeded screening criteria.

Arsenic was detected above the screening criteria in 4 of the 12 onsite surface soil samples at concentrations ranging from 2.8 mg/kg at SBW-04, to the west of the site, to 5.3 mg/kg at SBW-05 close to the site. Mercury was detected above the screening criteria in six of these samples at concentrations ranging from 0.3 mg/kg at SBW-02, north of the site, to 33.1 mg/kg in sample collected at SBW-05, close to the site. Mercury was detected at 22.1 mg/kg in the sample collected at SBS-05, west of SBW-05. At the other four locations where mercury was detected above the screening criteria, concentrations were below 1 mg/kg.

Manganese was detected above screening criteria at 3 of the 14 locations with concentrations ranging from 349 mg/kg to 2700 mg/kg. Zinc was detected above screening criteria at 6 of the 14 locations with concentrations ranging from 253 mg/kg to 8,600 mg/kg. Copper detections exceeded screening criteria at 3 of the 14 locations with concentrations ranging from 53.4 mg/kg to 99.6 mg/kg. At SBS-05 and SBW-05 four inorganics, mercury, nickel, cadmium, and chromium, were detected above the screening criteria in the 0 to 2 foot samples. Nickel was detected above the screening criteria in the 0 to 2 foot sample from SBS-01.

4.2.6.2 Subsurface Soil

To collect data on the extent of subsurface soil contamination, five shallow soil borings (SBS), six water table soil borings (SBW), five monitoring wells (MW), and four deep soil borings (SBD) were completed on and around the site. Figures 4-9, 4-10, and 4-11 show the locations of these borings, selected analytical results, and screening criteria. Soil boring logs are provided in Appendix G. The five shallow soil borings are clustered in a roughly circular pattern on the site. The six water table soil boring were installed to a depth of up to 12 feet. Four of the borings were located to the north of the site and two were located on the eastern side of the site. One deep soil boring, MW-07D, and two water table borings, SBW-02 and SBW-03, were completed at offsite locations and the data from them are considered representative of background concentrations (see Subsection 4.1.3).

Organic Compounds
Twelve VOCs were detected in the subsurface soil samples but only one VOC, acetone, was detected above its screening criteria. Seven pesticides were detected in the subsurface soil samples but none were above their respective screening criteria. PCBs Aroclor-1248, Aroclor-1254, and Aroclor-1260 were detected in subsurface soil boring samples. PCBs were detected above screening criteria in samples from borings SBD-01, SBD-02, SBM-MW-01D, and SBM-MW-05D.

Twenty-five SVOCs were detected in the subsurface soil samples; four SVOCs (benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene) exceeded screening criteria in samples from boring SBM-MW-07. One SVOC, benzo(a)anthracene, exceed screening criteria in samples from boring SBM-MW-01.

Inorganic Analytes
Among the shallow soil borings (SBS), arsenic was not detected above the screening criteria in any of the five samples collected from 2 to 4 feet. Mercury was detected above the screening criteria only in the samples collected from 2 to 4 feet, at concentrations of 0.55 mg/kg, and 4.6 mg/kg at SBS-04 and SBS-05, respectively. (Figure 4-9).

Among the four water table soil borings (SBW) located to the north of the site, SBW-01, SBW-02, SBW-03, and SBW-04, arsenic, and manganese and were detected above screening criteria. At SBW-06 arsenic, mercury and copper were detected above the screening criteria. The most significant concentrations of indicator compounds were observed in samples collected at SBW-05. At this location, northeast of the former retort furnace building and sorting trailer, arsenic, mercury, nickel, manganese, zinc, copper, cadmium, and chromium were detected above the screening criteria. Runoff from the site flowed in the direction of boring SBW-05 during fire fighting, which may have contributed contamination to this area.

The most significant concentrations of indicator compounds were observed in the samples collected from five onsite locations: MW-05D, SBD-01, SBD-02, SBD-03, and SBD-04. These locations are clustered together, within about 100 feet of each other, on the eastern side of the site near the former retort furnace building and sorting trailer. The highest concentration of mercury, 38,800 mg/kg, was observed in the sample collected from 10 to 12 feet at location MW-05D. In addition, mercury was visible and mercury vapor readings of up to 1 ppm were observed in the boring to a total depth of 66 feet below ground surface (Figure 3-11). An elevated concentration of mercury, 995 mg/kg, was observed in the sample collected from 64 to 66 feet bgs at MW-05D. This was the deepest mercury contamination observed in any of the borings at the site; however this was the deepest sample collected. Elevated mercury concentrations were observed in two samples collected from SBD-02 east of MW-05D. The mercury concentrations in these samples ranged from 395 mg/kg (3,950 times the screening criteria) to 798 mg/kg (7,980 times the screening criteria) in the sample collected from 4 to 6 and 16 to18 feet, respectively. Mercury was also observed in the samples from SBD-03 and SBD-04 but in both cases, the highest concentrations, above 1 mg/kg, were observed in the shallowest samples: 2 to 4 feet at SBD-03 and 0 to 2 feet at SBD-04. In samples below these depths at these two locations, the concentration of mercury was less than, or close to, 1 mg/kg.

Finally, while the mercury data in the soil samples from SDB-01 were rejected due to laboratory QA problems, during drilling of the boring mercury DNAPL was observed at depths of 1 to 7, 9 to 13, 16 to 18, and 20 to 22 feet bgs and mercury vapor readings up to 0.39 ppm were observed in the interval from 0 to 22 feet (these vapor readings are comparable to readings in the MW-05D boring). These observations indicate that mercury is present in this boring at significant concentrations, probably above the screening criteria in the 0 to 22 foot interval and possibly below 22 feet (Figure 3-11).

A majority of the indicator compound were also detected in the deep soil/monitoring well soil sampling locations. Arsenic was detected above the screening criteria in seven of the nine locations (arsenic was not detected above screening criteria in samples from borings SBD-2 and SBD-4). Zinc was detected above screening criteria in all nine of the borings. Manganese was detected above screening criteria in seven of the nine borings. Copper was only detected above screening criteria in MW-7D, the background location. Chromium was detected above screening criteria in four of the borings. Nickel was detected above screening criteria in four of the borings. Thallium, silver and cadmium were not detected at concentrations exceeding screening criteria.

4.2.6.3 Comparison with Existing Data

Soil sampling was conducted at the MERECO Site in 1989, 1995, and 1997. In 1989 43 samples were collected, mostly from 0 to 2 inches (Table 1-1). Forty of the samples were collected at or near the site and all samples were analyzed for total mercury. Results ranged from not detected to 1,040 mg/kg at a manhole drain. The other three samples were collected at offsite locations and mercury was detected at concentrations of 0.08 to 0.117 mg/kg. PCBs were also detected in two samples and seven samples were also analyzed for cadmium, lead, and zinc.

In 1995 and 1997 soil samples were collected at depths ranging from 0 to 18 feet bgs from a total of 29 borings (Table 1-2). All samples were analyzed for total mercury and concentrations detected ranged from not detected to 178 mg/kg. Four samples from two locations were also analyzed for other metals and PCBs. PCBs were detected at one of these locations (Table 1-3).

In 1997 soil samples were collected at three offsite locations, from 0-6 and 6-12 inches. Samples collected from 0 to 6 inches were analyzed for total mercury, copper, nickel, and zinc. Samples collected from 6 to 12 inches were analyzed for total mercury only.

Mercury was detected in the samples from 0 to 6 inches at concentrations ranging from 1.3 to 27.4 mg/kg and was not detected from 6 to12 inches.

4.2.6.4 Summary of Soil Contamination

The primary organic contaminants observed in the soil samples are SVOCs. The following SVOCs exceeded screening criteria in at least one surface or subsurface soil boring: acetophenone; chrysene; benzo(b)fluoranthene; benzo(k)fluoranthene; benzo(a)pyrene; indeno(1,2,3-cd)pyrene; phenol; and benzo(a)anthracene. The PCBs Aroclor-1248, Aroclor-1254, and Aroclor-1260 were detected in subsurface soil boring samples. PCBs were detected above screening criteria in samples from borings SBD-01, SBD-02, SBM-MW-01D, and SBM-MW-05D.

Surface soil sample results indicate that mercury contamination, and to a lesser extent arsenic, extends over most of the site. Mercury was also detected frequently above screening criteria at onsite locations on the eastern and southern sides of the site including SBD-03, SBS-05, and SBW-05. Mercury was observed in only one location north of the site: SBW-04. However, at these locations the highest mercury concentrations were observed in the shallow samples and dropped off quickly with depth.

Mercury has contaminated subsurface soil at depths up to 66 feet at MW-05D, up to 18 feet at SBD-02 and SBD-04, up to14 feet at SBD-03, up to 12 feet at SBW-06, up to 10 feet at SBW-05 and MW-01D, and up to 4 feet at SBS-05. These data indicate that the concentrations of contaminants such as mercury change quickly over short distances. The reason for this distribution of contaminants appears to be a function of their location with respect to the source area at the former retort furnace building and sorting trailer. Lithology does not appear to be a major factor in controlling vertical migration of contaminants above the LA SC unit.

These observations suggest that site related contamination is probably the result of dumping or spills at specific locations where, due to its high specific gravity, mercury moved primarily downward through the soil. Site related contamination, principally mercury, has migrated off-site, as indicated by the results of surface soil sampling conducted south of the site. Offsite mercury contamination has probably occurred primarily from deposition of mercury carried aloft during site fires and from mercury processing operations. Surface water runoff and erosion do not contribute significantly to offsite contamination because the majority of the mercury contamination is contained below a concrete cap and the asphalt paving.

4.2.7 Groundwater

Groundwater sampling was conducted at the MERECO Site to characterize the nature and extent of contamination in groundwater from contaminants associated with the site and to provide information for the RI. Two rounds of groundwater sampling were conducted; round one between December 17 and 20, 2001 (Figure 4-12) and round two between March 18 and 22, 2002, with one sample (from MW-05D) on April

5, 2002 (Figure 4-13). Samples were collected from five newly-installed monitoring wells and the four existing shallow monitoring wells.

Groundwater monitoring well samples were analyzed for low detection limit VOCs, TCL SVOCs, pesticides/PCBs, TAL metals, TSS, TOC, sulfate, hydrogen sulfide, and pH.

4.2.7.1 Organic Compounds

VOCs, SVOCs, and pesticides were rarely detected in the groundwater samples and none exceeded screening criteria. PCBs were not detected in any groundwater samples.

4.2.7.2 Inorganic Analytes

Inorganics commonly were detected in groundwater samples across the site. Iron and manganese were detected above their respective Federal National Secondary Drinking Water Regulations (NSDWRs or secondary standards) in most samples. The secondary standards were used because there are no Federal National Primary Drinking Water standards or maximum contaminant level (MCLs) for iron and manganese. Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects in drinking water. The highest exceedences of iron and manganese were observed in the shallow onsite well OW-3, where their respective criteria were exceeded by 200 and 152 times. It should be noted that samples from OW-3 were highly turbid despite redevelopment and extended purging before sampling. This may account for the high levels of inorganics detected in samples from this well. Background samples from upgradient shallow and deep wells MW-07S and MW-07D contained only iron above its screening criterion.

Mercury was detected above its screening criterion only in onsite samples from MW-05D at up to 33 times its screening criterion. Elevated concentrations of arsenic were detected in groundwater samples collected from onsite monitoring wells south of the facility building and hydraulically downgradient from the site (MW-02D, OW-03S, MW-05D, and MW-06D); all arsenic concentrations were less than two times the screening criterion; the greatest exceedence of 1.9 times the criterion was observed in MW-06D downgradient of the site.

Other analytes exceeding their criteria were found only in shallow wells OW-2S and OW-3S, located immediately downgradient of the facility, including selenium, magnesium, lead, and thallium. None of these analytes exceeded their screening criteria by more than two times, except thallium at OW-3 which exceeded its criterion by 75 times. However, the turbidity of both samples collected from OW-3 was elevated and could at least partially explain the observed inorganic exceedences.

4.2.7.3 Comparison with Existing Data

Quarterly groundwater monitoring of the existing four monitoring wells occurred from April 1991 through March 2001, with samples analyzed for PCBs and inorganics

(Table 1-5). As with the RI sampling program, PCBs were not detected in groundwater samples. Some of the highest concentrations of each analyte were detected in samples collected during the period 1996 to 1998. From the mid to late 1990s, the concentrations of inorganics generally reduced in magnitude until the end of quarterly groundwater monitoring program. This may suggest that the site-derived groundwater contamination attenuated over time. In general, concentrations of inorganics reported in the existing data set are higher in magnitude compared with those detected during the RI groundwater sampling program. For example, maximum detected concentrations in the 1991 to 2001 data set for arsenic, mercury, cadmium, chromium, copper, lead, and zinc in the hydraulically downgradient wells were commonly at least an order of magnitude greater than the RI maximum concentrations from 2001 and 2002.

Analytes commonly detected in the upgradient well, OW-4, were not detected during the RI sampling program. Mercury was not detected in the upgradient well in March 2000 and the final round of quarterly sampling from OW-4 indicated mercury had reduced in concentration to less than 2.0 ug/L (unfiltered sample) and 0.2 ug/L (filtered sample). Similarly, the RI groundwater sampling rounds in 2001 and 2002 indicated the mercury concentration was below the method detection limit of 0.1 ug/L.

4.2.7.4 Summary of Groundwater Contamination

VOCs, SVOCs, and pesticides were rarely detected in the groundwater samples and none exceeded screening criteria; PCBs were not detected.

Inorganics commonly were detected in groundwater samples across the site; only iron and manganese were detected consistently above their respective secondary screening criteria in most samples collected. Background samples contained only iron above its screening criterion. The elevated concentrations of iron likely represent background levels for the study area. Manganese exceedences in downgradient wells likely indicate that manganese is site derived. Mercury was detected above its screening criterion only in samples from MW-05D. Elevated concentrations of arsenic were detected in groundwater samples collected from monitoring wells onsite and hydraulically downgradient from the site and likely also is a site-derived contaminant.

Elemental mercury was observed in soil boring MW-05D from the vadose zone down to at least 60 feet bgs. The only exceedence of dissolved-phase mercury was detected in MW-05D, screened between 50 and 60 feet bgs. Although mercury was detected below its screening criterion in groundwater samples from OW-1S, OW-2S, and OW-3S, dissolved-phase mercury was not detected above its screening criterion in any other downgradient shallow or deep monitoring wells.

This suggests that either the mercury plume is limited in extent or the extent of dissolved-phase mercury contamination was not adequately characterized by the RI groundwater sampling program. Consequently, a data gap exists with respect to the known vertical and horizontal distribution of mercury dissolved-phase contamination at the site. Further groundwater investigation is needed to determine whether dissolved-phase mercury contamination is localized around MW-05D or has migrated downgradient and has not been identified by the current monitoring well network.

5

Section Five

Section 5
Contaminant Fate and Transport

This section examines the chemical and physical processes that affect both the fate and transport of inorganic and organic contaminants in the surface water, sediments groundwater, and soils at the MERECO Site. The focus will be on the COPCs at the site. An understanding of the fate and transport of contaminants aids the evaluation of current and future potential exposure risks and the evaluation of remedial technologies in the feasibility study. This section provides the following:

- A listing of the contaminants of interest at the site
- A listing of potential transport pathways as presented or identified in the site conceptual model
- A summary of the chemistry of the primary COPCs and COPC classes
- The relevant physical-chemical properties of the contaminants
- Fate and transport characteristics of the contaminants of concern
- Assessment of the fate of COPCs based on information presented in this section and the results of the RI

5.1 Contaminants of Interest

Among the metals detected during the MERECO Site RI, mercury, lead, arsenic, chromium, silver, iron, chromium and nickel were frequently detected at concentrations exceeding screening criteria. Arsenic is of primary concern in the assessment of groundwater risks. Lead will be briefly discussed as well. However, based on its widespread occurrence and toxicity, this section will mainly focus on the fate and transport of mercury.

Organic contaminants detected above screening criteria include PCBs including Aroclor-1254, Aroclor-1248, and Aroclor-1260; PAHs including benzo(a)pyrene, pyrene, benzo(a)anthrancene, benzo(k)fluoranthene, benzo(g,h,i)perylene; and pesticides including endrin, gamma-chlordane, alpha-chlordane, dieldrin, heptachlor, 4'4-DDD, 4'4-DDT, and 4'4-DDE. From a risk standpoint, PCBs are the main organic COPC and will be the primary organic contaminant discussed in this section.

5.2 Site Conceptual Model

The site's hydraulic contaminant model is defined in Section 3.5.4 of this RI report. This section addresses potential sources and contaminant transport pathways.

From 1955, the MERECO facility began processing used batteries, switches, relays, and other equipment for the recycling of mercury. Storage procedures and dumping of contaminated materials caused the leakage of chemicals from waste materials onto onsite soils. In addition, two fires at the site (1989 and 1991) resulted in releases of mercury into catch basins, surface soils, and the creeks. The conceptual model of the site identifies transport mechanisms and pathways which contaminants might travel from the source. These potential pathways are:

- Vertical flow of mercury DNAPL from the old retort furnace building onto surface soils down to the water table
- Pooling of liquid mercury onto the semi-confining layers of the sand and silt unit in the upper aquifer and on top of the LASC unit
- Horizontal flow of dissolved phase mercury in the direction of groundwater flow in the upper aquifer
- Historical runoff from the surface soils and runoff from mercury contamination on concrete/asphalt into several catch basins and thereafter into the stormwater outfall basins; stormwater flows along the culvert beneath the railroad tracks into the unnamed stream
- Local groundwater discharge into the unnamed stream
- Airborne transport of emissions from the former furnace building aided by prevailing winds, and dry and wet deposition on land and surface water bodies of wind blown fall out
- Bioaccumulation and biomagnification in biota tissue

5.3 Organic Contaminants

The organic contaminants found above screening levels during the MERECO Site RI include the following SVOCs, pesticides, and PCBs:

Class	**Analytes Exceeding Screening Criteria**	**Media**
SVOCs	PAHs	Stream and catch basin sediment, surface soil, subsurface soil
	Phenols	Catch basin surface water
Pesticides	various	Stream and catch basin sediment
	delta-BHC, gamma-BHC	Catch basin surface water
PCBs	Aroclor-1248	Shallow soil borings, biota
	Aroclor-1260, Aroclor-1254	Stream sediment, deep soil borings

Of all the organic compounds listed above, PCBs are the primary COPC for the MERECO Site based on risk, the level of exceedences, and the historical site use. Phenols were only detected in SWC-03 and will not be evaluated in this section, while PAHs and pesticides will be briefly discussed.

5.3.1 PAHs

This group of SVOCs is widely present and relatively persistent in the environment. The degree of persistence increases with the size of the compound's chemical structure. The relatively high octanol/water coefficients of PAHs (Table 5-1) indicate that, in water, they will primarily be detected in the suspended particulate fraction.

The larger PAHs such as benzo(a)anthracene, and benzo(b)fluoranthene are not volatile and loss to the atmosphere is insignificant. Biodegradation and biotransformation are the ultimate fate mechanisms affecting most PAHs. The smaller PAHs, such as phenanthrene, are readily biodegraded, with half-lives in soil measured in hours to weeks. The larger PAHs take much longer to biodegrade, with half-lives measured in weeks to months.

5.3.2 Pesticides

DDT, DDD, and DDE have a moderate solubility in water, low vapor pressure, low subsurface mobility (Table 5-1), and little tendency to biodegrade. DDE is a degradation product of DDT under anaerobic conditions. Aerobic biodegradation of DDT is extremely slow and variable (half-life ($t_{1/2)}$ = days to years).

> DDT → DDD → Various products, e.g., 1-chloro-2,bis-(p-chlorophenyl)ethylene
>
> 4,4'-DDD (2) →4,4'-DDE
> (1) – Rapid anaerobic conversion in soil
> (2) – Slow aerobic conversion

In an aqueous medium these pesticides will strongly sorb to sediments; however, slow evaporation can take place. The mobile fraction of these pesticides is increased by the presence of dissolved organic matter. Photolysis may be an important loss mechanism in surface waters, but not in sediments. Bioaccumulation of DDT is an important pathway of contaminant transport and sediment ingesting organisms will readily concentrate DDT because of its high lipid solubility. Pesticide biodegradation, aging, and volatization account for their moderate decrease over time.

5.3.3 PCBs

5.3.3.1 Chemical and Physical Characteristics of PCBs

PCBs are extremely stable organic compounds composed of two linked benzene rings to each of which up to five chlorine atoms may be attached. They are high molecular weight compounds that exhibit low water solubility, low flammability, low vapor pressure, low electrical conductivity, and high heat capacity. These characteristics made them suitable for wide uses in industry as coolants and insulators. PCBs were found in some of the electrical equipment in the incoming waste stream at the MERECO Site. PCB contamination probably also resulted from the disposal of waste debris from the mercury reclamation process. In the past, process wastes were disposed in the back of the facility, on the embankment of the tributary. A summary of the chemical and physical characteristics of Aroclors-1254 and -1260 is found on Table 5-1.

5.3.3.2 Transport and Fate of PCBs in Site Soils and Surface Water

The PCB results for the catch basin sediment samples were rejected and no exceedences were detected in the surface water samples. PCBs were detected above criteria in the stream sediments, deep soil borings and in biota samples. Stream sediment SDS-11-0 to 6 inches showed a maximum result for Aroclor-1260 of 4,400 µg/kg. In the deep soil borings, Aroclor-1248 had a maximum value of 1,500 µg/kg in SBD-01, and Aroclor-1260 was found at a maximum value of 45 J µg/kg in SBM-MW-5-A. In the biota samples, all three Aroclors were found above screening between 78 J µg/kg and 410 J µg/kg.

PCBs were introduced to the MERECO Site with incoming waste materials such as batteries and other mercury bearing materials. They were discharged to the soils through leaks from drums stored on pallets on site. Although 300 cubic yards of PCB contaminated soils were excavated from the site, contaminated soils found under the former furnace building were capped and left onsite. PCBs have settled into the sediments and may slowly be released into the surrounding surface water bodies near the site. The levels of PCBs in the surface water are below analytical detection limits, however, PCBs can bioaccumulate in biota to risk levels that threaten ecological and human health.

5.3.3.3 PCB Transport Mechanisms and Transformation Processes

PCBs were not detected above screening criteria in the groundwater or surface waters of the site. However, they were found in all other media, sediments, water table and shallow borings, deep soil borings and biota and in upgradient biota samples. PCBs may have reached these deep borings from spills at the site. PCBs were likely distributed in the various matrices at the site by several transport mechanisms, namely, volatilization, sorption, sediment transport and bioconcentration. The exact fate of the PCBs is dependent on the level of chlorination and the isomeric substitution pattern (ATSDR 2002). PCBs can volatilize from soil and water surfaces and enter the atmosphere (ATSDR 2002).

Transport in Soils

PCBs, particularly the highly chlorinated congeners, adsorb strongly to sediments and soil where they tend to persist with half-lives on the order of months to years (Kohl and Rice 1998). Base catalyzed dechlorination and photolysis are minor transformation processes. Biodegradation in anaerobic conditions results in the formation of less toxic mono and biphenyl congeners which are aerobically degraded (Abramowicz 1990). The process is thought to include hydrogen as an electron donor and water as a proton source (Nies and Vogel 1991). A low redox potential (Eh <-400 millivolts [mV]) and the absence of oxygen or sulfidogenic redox conditions are required for the reductive dechlorination to occur.

Transport in Surface Water and Groundwater

PCBs in surface water exist in dissolved, particulate, or colloidal states (Baker and Eisenreich 1990). The particulate and colloidal forms are more predominant for the Arochlors found at the site. Loading to surface water comes mainly from atmospheric deposition and transportation is effected by diffusion and water currents. PCBs leave the water column via volatilization to the air and sorption to sediment particles and also by biota bioconcentration. Photolysis appears to be the only significant abiotic process in water, since hydrolysis and oxidation do not significantly degrade PCBs (EPA 1979).

PCBs were not detected in the groundwater either historically or during the RI, although detection levels (0.5 ug/L) were above the NYSDEC groundwater standard (0.09 ug/L). PCBs were not investigated in the historical surface water investigation; in the RI, no significant levels were found in the surface water. The relative absence of PCBs from the groundwater and surface water is consistent with the expected transport processes for PCBs, that is, retardation due to sorption to soil particles. A more likely pathway for transport of PCBs to surface water is via entrainment of particulate-bound PCBs in surface runoff, especially during storm events.

Since PCBs were not detected in the surface water or groundwater samples during the RI, the above transport processes would only become important if a storm water event stirred up the bottom sediments. This would create a vehicle for transport of sediment particles. The data indicates that currently, site PCBs are highly partitioned to soils and are relatively absent from the groundwater and surface waters.

Bioconcentration and bioaccumulation
The three Aroclors found in the deep soil borings were also detected in biota samples in upstream and downstream locations. The fact that they were found in upgradient biota samples may indicate that PCB sources other than the MERECO Site have contributed to the contamination, or fish may have moved upstream.

Biodegradation
Biodegradation of PCBs and pesticides is very slow and occurs under aerobic and anaerobic conditions. It involves chemical degradation by microbes in soil or water. For the PCBs present at the site, soil is the more important media. The Aroclors of interest, Aroclor-1248, -1254 and -1260, do not biodegrade readily under aerobic conditions and are persistent (Abramowicz 1990). The high TOC content of the sediments and surface soil makes this a less important mechanism for the transformation of PCBs. In addition, reductive dechlorination is known to occur on a limited basis under soil anaerobic conditions.

These transport pathways and transformation mechanisms show that the main organic contaminants found at the site, the PAHs, and PCBs, are likely to remain sorbed to soils. Sorbed particles may be transported with overland stormwater flow or as sediments. Some volatilization from soil may occur.

5.4 Inorganic Contaminants

The table below shows some of the metals detected above screening criteria and the media in which criteria were exceeded.

Inorganic Analytes Exceeding Screening Criteria	Media
Manganese, thallium	Surface water
Mercury, methylmercury, arsenic, chromium, copper, iron, lead, manganese, nickel, cadmium, silver, zinc	Stream sediment

Mercury, methylmercury, thallium, manganese, cadmium, antimony	Surface water catch basin
Mercury, manganese, cadmium, antimony, arsenic, chromium, iron, copper, lead, silver, zinc	Sediment catch basin
Arsenic, beryllium, copper, iron, manganese, mercury, zinc	Surface soil
Mercury, copper, manganese, nickel, zinc	Shallow soil boring
Mercury, arsenic, chromium, manganese, nickel, zinc	Deep soil boring
Arsenic, iron, lead, manganese, mercury, nickel, silver, thallium	Groundwater
Mercury (assumed to be methylmercury)	Fish

5.4.1 Inorganic Chemistry

The physical characteristics of detected metals are shown on Table 5-1. Metal solubilities are important because they affect the behavior of the metal, determining whether it will form a solute allowing it to be mobile under aqueous conditions or show tendencies to precipitate and sorb to particulate material.

The persistence of metals depends on the rates of leaching, amount of rainfall, and individual metal properties. The persistence of metals is complicated by processes such as precipitation and dissolution which are dependent upon pH, the presence of certain ions or complexing agents, and concentrations of the metals in solution.

5.4.2 Transport Mechanisms

The major processes affecting the transport, or mobility, of the metals in soils and groundwater are advection, dissolution/precipitation, adsorption, and bioaccumulation/bioconcentration.

Advection. The physical transport of adsorbed or precipitated metals with groundwater flow, stormwater runoff, or wind blown dust. The rate of dispersion is equal to the flow rate of the water or wind.

Dissolution/precipitation. Whether a chemical is transported in a dissolved state in infiltrating rain water or groundwater or is precipitated out of solution depends on the solubility of that chemical in water. Most metals are relatively insoluble, but metal solubility is highly dependent upon redox conditions and pH, as discussed in more detail below.

Adsorption. Metals become mobilized in surface soils by forming solutes which may react with surfaces of soil solids, especially clays, creating chemical bonds between the surface and metal ion. Most clay minerals have an excess of imbalanced negative charges in the crystal lattice. Adsorptive processes in soils thus favor the adsorption of cations. Divalent cations are usually more strongly adsorbed than monovalent ions. Attenuation of metals through adsorption varies from those that are weakly attenuated, such as sodium, potassium, and magnesium; moderately attenuated, such as iron; and those which are strongly adsorbed, such as lead, cadmium, mercury, and zinc.

Bioaccumulation/bioconcentration. Some chemicals, such as lead, mercury, pesticides, and PCBs, tend to bioaccumulate/bioconcentrate in animal or plant tissue. In fact, plant uptake is sometimes used as a remedial strategy to remove these contaminants from soils and sediment. For mercury, phytoremediation is not practical because transpiration of volatile mercury from the plant is not desirable .

Bioaccumulation is of importance for mercury in biota. It is the uptake and build up of the contaminant by biota due to mercury increases in biota faster than it is eliminated. Bioconcentration or biomagnification is the process whereby small concentrations of contaminants increase through the consumption of bioaccumulated chemicals contained in smaller prey. Higher concentrations thus occur in predator species, especially those at the top of the food chain. Ultimately, species such as eagles and ospreys become at risk, and fish predatory species like bass and pickerel can accumulate sufficient mercury to be of concern to the human population, especially pregnant women.

5.4.2.1 Mobility of Metals

A variety of factors affect the mobility of metals in soil/water systems, including: the presence of water (soil moisture content); the presence of other complexing chemicals in solution; the pH and oxidation/reduction potential, which affect the speciation of all metals and complexing agents; the temperature; and, soil properties, such as cation exchange capacity, the presence of hydrous oxides of iron and magnesium, the amount of organic matter present in the soil and the distribution of soil particles. Some physical factors at the site are summarized below:

Parameter	Soil	Groundwater	Surface Water
pH	7.0	7.4	7.4
TOC	11,767 mg/kg	1u - 1.9 mg/L	4 (mode)
Redox Potential	-	-25 - 284 (97.8 mV-avg)	-

The pH of soils and groundwater affects the hydrolysis rate, partitioning equilibrium, and contaminant solubility. Soil pH values collected during the RI varied from 4.8 to pH 9.4 with an average of 7.0. Methylation of mercury is favored by low pH, however, many other factors such as low dissolved organic carbon and microbial activity control this process. Low pH values also mobilizes some metals by leaching. Mercury is less mobile under low pH conditions since its adsorption and formation of precipitates increases with increased pH. Lead is absorbed above pH 6.0.

Redox potential determines the chemical species that predominate and therefore the mobility and fate in the environment. High redox potential values favors the existence of oxidized species, whereas, low redox favors reduced species and those compounds without oxygen or multiple bonds.

High organic content in soil increases contaminant absorption and hinders the movement of contaminants through the soil. Since most areas of the site are paved or asphalted, and soil removal has occurred, the amount of fill material on site is limited. However, the sediments of the catch basin and nearby streams have high TOC levels. Low TOC levels were only found in the deep soil borings. Those site contaminants subject to retardation will likely be trapped by the shallow site soils.

TOC levels were higher in sediment locations, as expected (average 17,158 mg/kg), and were lowest in the deep soil borings (average 3,462 mg/kg). Groundwater temperature varied from 10 °C to 14.6 °C. Clay underlies the site from about 59 feet bgs at well MW-02D in the southeast corner of the site, to more than 72 feet bgs at well MW-07D at the northwest section of the site. The lithology above the Lake Albany Clay is interbedded sand, silt, silty sand, sandy silt, silty clay and clayey silt. This upper aquifer contains semi-confining layers.

In a study of metals retention in soils, the relative mobility of several metals in various soil types was assessed (EPA 1987). The study indicated that chromium, mercury, and nickel are among the most mobile, while lead and copper are the least mobile. For the metals studied, the mobility varied with the conditions, although the order of mobility was generally:

Most Mobile--Cr(6) > Hg > Ni >As>Se>Cd>Zn>Be> Pb > Cu > Cr(3) -- Least Mobile

The above order was investigated from studies that used estimates of overall mobility for each metal, based on the anticipated speciation of the chemicals in fresh water, general solubility patterns, and general soil sorption patterns. Guidelines used to assign metals to a mobility group (high, medium, or low) were:

- Metals whose predominant species in freshwater are anions (e.g., arsenic) which are only minimally retarded in soils, are among the most mobile
- Metals known to be fairly strongly sorbed to most soils under normal environmental conditions (i.e., pH 6 to 8 near neutral redox potential) are among the least mobile
- Metals whose predominant freshwater species are cations, especially divalent heavy metals (i.e., copper, lead) which are subject to sorption via cation exchange, are among the least mobile

The relative mobilities assigned to the metal contaminants are shown in Table 5-1.

Arsenic. Arsenic is generally mobile and is known to volatilize when biological activity or highly reducing conditions produce arsine or methyl-arsines. Iron oxide, pH, and redox controls soil sorption. At high redox levels, arsenate predominates and has low mobility. As the pH increases and the redox level decreases arsenite predominates and is more subject to leaching.

Arsenic was found above criteria in the downgradient off site stream sediments (SD-10, SD-11, and SD-13 between 6.9 mg/kg and 13 mg/kg); catch basin sediment SDC-03 at 9 mg/kg; in off site surface soil samples ECO-01, -02, -03 and HHR-5, -6, -7, -8, between 2.1 mg/kg and 6.9 mg/kg; and many subsurface samples (shallow borings (0.3 mg/kg to 2.2 mg/kg), water table borings (1.0 to 9.0 mg/kg) and deep borings (0.9 mg/kg to 7.0 mg/kg)). In the groundwater, arsenic was detected above criteria in samples MW-05D and MW-02D (both rounds), and OW-3 (19.2 ug/L), and in downgradient well MW-06D (16 ug/L). Arsenic is widely distributed across all media, onsite and offsite. However, since other sources in this industrial area may likely have contributed to these detections, or arsenic may be naturally occurring in the MERECO Site environs, no prediction of arsenic's mobility was made.

Lead. Lead is virtually immobile in all but sandy soils. Its predominant fate in the environment is sorption to soils and sediments. The adsorption of lead is pH dependent, decreasing with decreasing pH. Below pH 7, lead becomes progressively more mobile. Above pH 6, lead is adsorbed to clays or forms lead carbonate, an insoluble compound. In natural water, lead concentrations decrease over time; sorption of lead to both sediments and suspended particulates is the favored process with clay, hydrous metal oxides, and organic matter influencing this sorption.

Lead was found in one groundwater sample, OW-3 at 25.5 μg/L; in stream sediment samples upgradient of the site in SD-02 (downgradient of Inga's Pond) at 72.9 mg/kg; and downgradient of the site in SD-14 at 36.9 mg/kg. Lead levels above criteria in the stream sediment collected on site, SD-03, ranged from 157 mg/kg (2 to 4 inches) to 41.7 mg/kg (8 to 10 inches). No other exceedences were noted for lead in onsite samples. Due to the industrial nature of the site area, the MERECO Site is likely not the only contributor to lead contamination in the stream sediments. The data shows however, that stream sediments are acting as a sink for lead deposition.

5.4.3 Mercury Chemistry

Mercury is the only metal that is a liquid at room temperature. Mercury and some of its compounds exert a vapor pressure that facilitates vaporization at ambient temperatures. Mercury's physical and chemical properties are dependent on its speciation, the compound to which it is bonded and the nature of the bond. It is chemically reactive and exists in three oxidation states:

Hg^0 (metallic mercury),
Hg_2^{1+} (Mercurous) [Hg_2Cl_2]
Hg^{2+} (Mercuric e.g., ($HgCl_2$), ($Hg(OH)_2$), (HgS)

Typical compounds found in water and sediments are the mercuric salts and the organomercuric compounds, the mercurous form being unstable. Mercury forms covalent bonds with carbon in organic compounds, the organomercurics, such as, methylmercuric chloride (CH_3HgCl), dimethylmercury $(CH_3)_2Hg$ and phenylmercury (EPA 1997).

Mercury and its compounds exhibit wide variations of solubilities. Mercuric sulfide is insoluble as are the organomercurics, reflecting the strong affinity for sulfide, whereas mercuric chloride is soluble (1 g/35 ml of water). Methylmercury's water solubility is lower than that of elemental mercury which is 5.6×10^{-5} at 25 °C but is highly soluble in lipids and thus is highly absorbed by the brain and that of dimethylmercury is about 1 gram per liter of water at 21°C (National Academic Press 2000).

Methylmercury

Bacteria and phytoplankton can convert inorganic mercury to methylmercury. Methylation is thought to be effected by lower pH values, and decreasing dissolved oxygen content. Sunlight has the reverse effect of breaking down methylmercury to Hg (II) or Hg (^{0}). Methylmercury is more toxic than inorganic mercury and takes a longer time to be eliminated from organisms. Methylmercury, therefore, bioaccumulates in the organism as its level increases faster than it can be eliminated. Each successive level in the food chain thus consumes greater quantities of methylmercury. Biomagnification of methylmercury causes it to accumulate to potentially harmful concentrations in fish and higher organisms (USGS 2000). Potential damage to sensitive ecological (e.g., loons) and human receptors (e.g., small children and pregnant women) is the reason for fish advisories in New York and other states. The exposure route of concern for methylmercury is therefore not direct contact with sediment or water since methylmercury concentrations are typically very low (ppt) in either media but from bioaccumulation and biomagnification in the food chain.

5.4.3.1 Fate and Transport of Mercury

The geochemical cycle of mercury is complex and not completely understood at this time. The major features involve the vaporization of elemental mercury into the atmosphere, long range transport by wind, dry and wet deposit to water and soil, sorption to soil and sediment particles, methylation, bioaccumulation and biomagnification in the food chain (ATSDR 1999).

5.4.3.2 Mercury Transport in Soils

The mobility of mercury in soil is limited by the complexing behavior of mercury. Soil conditions of pH, temperature, and humic content are normally favorable for the formation of inorganic mercury (II) compounds (mercuric) and inorganic mercury (II) compounds complexed with organic anions (Schuster 1991). Mercury's strong affinity for sulfur-containing compounds results in the formation of complexes with soil organic matter such as fulvic and humic acids. These complexes are less mobile than the more soluble mercury compounds.

Mercury in soil is mostly bound to organic matter (humus). Another fraction of the mercury in soils will be adsorbed onto dissolvable organic ligands and other forms of dissolved organic carbon. These two fractions are susceptible to transportation by runoff. However, the amount of mercury partitioning into soil moisture for runoff is thought to be a small fraction of the amount of mercury stored and deposited into the soil. Mercury species affinity for soil makes this media a reservoir for natural and anthropogenic mercury emissions (Meili et al. 1991 and Swedish EPA 1991 as found in EPA-452/R-97-005 1997).

Mercury (II) (mercuric) complexes, if present in soil, can be reduced to the elemental state (Hg^0) by humic substances (Nriagu 1979), diffuse through the soil, and be released to the atmosphere. Microbes in anoxic soil can also act on Hg (II) to form methylmercury. The top layers of sediment is where most of this transformation occurs (EPA 1997). Compeau and Bartha (1985) showed that sulfate reducing bacteria such as *Desufovibrio Desufuricans* are the main group of bacteria that perform this reaction. The presence of methylmercury in every sediment sample in which mercury exceeded screening criteria seems to indicate that the bacteria required for this conversion are present in the stream and catch basin sediments at the MERECO Site. Mercury methylation rates appear to be controlled by the organic matter content of sediments (Choi and Bartha 1994).

Methylmercury detections at onsite locations did not correlate well with mercury levels. A comparison of methylmercury concentrations to mercury at onsite locations showed wide and inconsistent variations. For example, in SD-03 the ratio was 0.0016; in catch basin surface water sample SWC-05 it was 0.174 and in neighboring sample SWC-02 the ratio was 0.0007. This may be due to lack of sufficient data points or more likely due to the specificity of conditions for methylation to occur. Despite a low TOC content, high mercury levels were found in the deep soil boring MW-5. This seems to be related to its proximity to the source.

Methylmercury was not analyzed in the subsurface samples and no onsite surface soils were collected due to paved surfaces. The surface soil samples collected downgradient of the site reflect mercury concentrations in the 0.2 to 1.3 mg/kg ranges. Mercury concentrations decrease with depth in the surface soil samples HHR-7 and ECO-01. Transport of mercury in these areas is possibly in a dissolved phase where the binding capacity of the soil is not exceeded. In contrast, mercury found in the deep soil boring MW-5D, 38,800 mg/kg at 10 to 12 feet, and as deep as 60 feet is suggestive of mercury transport as DNAPL in this area of the site.

Production of methylmercury in sediments is low throughout the site, 0.03% (SDX-03) to 1.43% (SDS-12). Of these levels, the higher methylmercury percentages are in sediment samples SDS-01, 1.3% (200 feet downgradient of Rensselaer Lake), SDS-05, 0.82% (Patroon Creek tributary) and SDS-12, 1.42 % (downgradient tributary of I-90 Pond). Methylmercury production may be inhibited in some areas like SDS-10 and SDS-14. Preferential production of methylmercury is shown in SDS-05 and possible inhibition at SDS-14.

In offsite locations, the sediment data shows a more direct correlation between the mercury and methylmercury content of the soils and the TOC levels. Sediment pH values did not vary much (6.5 - 7.9), but lower pH levels seemed to correspond with lower mercury levels and vice versa.

The RI data results for methylmercury are lower than or in the lower range of literature predictions. For example, the 1997 EPA report to Congress indicates that between one and three percent of the mercury in surface soils is methylmercury. The percentage of methylmercury to mercury in all sediment samples falls between 0.3 and 1.4. The lower value is less than the predicted values, however, the maximum percentage of methylmercury to mercury in sediment samples is within the range cited by the report.

The catch basin sediment samples have high levels of mercury, e.g. SDC-01 (219 mg/kg). Mercury and methylmercury in the stream sediment sample closest to the site, SD-03 (9 and 9.6 mg/kg), also show levels much higher than those samples collected downgradient to the site in the Patroon Creek tributaries and the 1-90 Pond, but much less than that found in the catch basin sediment. Partitioning of mercury in the runoff to the stream sediments appears to be a major contributor to mercury transport.

No surface samples were collected on site since most areas are paved, cemented, or asphalted. Soil below the former furnace building was removed and the area capped with concrete. However, some contaminated soil was left below the former furnace building.

Mercury was found above the screening criteria in only one well during groundwater sampling rounds 1 and 2 (MW-05D at 22.5 ug/L and 11.1 ug/L, respectively). Traces of visible mercury or beads of mercury were observed throughout this boring and mercury vapor was detected between 0.03 milligrams per cubic meter (mg/m^3) and >0.99 mg/m^3. This well is located just beside the former furnace building and is consistent with the historical waste disposal practices at the site. Mercury was detected in the deepest soil sample collected at 65 feet bgs in the boring for MW-05D (70 feet total), SBD-MW-05D-C, at 995 mg/kg. Mercury vapor in headspace screening was detected for soil samples collected as deep as 65 feet bgs at 0.1 mg/m^3.

At location MW-05D, mercury has apparently been transported by DNAPL flow in elemental free phase form through the unsaturated zone down to lower ranges of the upper aquifer. No evidence is currently available to indicate that mercury has accumulated on the Lake Albany clay. Mercury's low solubility in water allows a minimal fraction of the mercury DNAPL to dissolve into the groundwater and move along by advective transport. The current data show mercury's distribution in the groundwater is limited to MW-05D. Therefore, horizontal advective flow may be minimal, or mercury has been retarded by aquifer material, as no mercury was detected in the wells installed south of MW-05D.

Soil samples from and visual observation of the deep soil and water table borings reflect that most of the mercury is present in the upper aquifer, which sits above the Lake Albany Silt and Clay unit. The deep aquifer is, therefore, somewhat protected from mercury contamination at the current time. The subsurface soils currently acts as a reservoir for this contaminant. However, slow leaching of mercury into the groundwater is a possible future scenario for mercury DNAPL. Transportation of dissolved plumes with the water gradient may more widely contaminate the groundwater.

The slope of the Lake Albany Silt and Clay unit may also determine the direction of any transport offsite. There is not sufficient data to definitively determine the orientation of the slope of the clay unit. The current data suggest that the slope is relatively small and would not likely be steep enough to overcome mercury's high surface tension, thus offsite migration via this scenario is unlikely.

5.4.3.3 Atmosphere

Mercury volatilizes mainly in the elemental state but some oxidized forms will also be emitted in the air. Both particulate and gaseous forms of mercury vaporized into the atmosphere will redeposit at locations away from the source. Water soluble forms of mercury (e.g., mercuric chloride) will be redeposited closer to the site by dissolution in the rainwater or snow. Less soluble forms of mercury (e.g., elemental mercury) will travel further away before it is dry deposited or converted to more soluble forms of mercury and washed out of the air.

Mercury undergoes many physical and chemical transformations in the atmosphere. Elemental mercury appears to undergo aqueous oxidation with ozone followed by an in-droplet adsorption onto primarily soot particles (Iverfeldt and Lindqvist 1986; Munthe 1992; Petersen *et al.* 1995; Pleijel and Munthe 1995). The residence time of soluble mercury in the atmosphere is reported to be about one year (Mason *et al.* 1994).

Air samples were not collected during the RI. Airborne mercury is diluted by local winds, and precipitation events (rain and snow); however, this stream adds to the mercury already circulating in the general air mass. Two fires at the site may have facilitated the airborne distribution of mercury from the site and redeposited onto offsite locations.

5.4.3.4 Groundwater and Surface Water

Surface runoff at the site during rain events have settled in the catch basins. These soils contain high mercury levels and contribute to the detections of mercury in the catch basin surface waters (2.4 mg/kg to 36.8 mg/kg).

Monitoring well MW-05D was the only groundwater location where mercury was detected above screening levels (rounds one and two, 22 and 11 ug/L, respectively). Mercury, above screening criterion, and methylmercury were also detected in the surface waters of the catch basins, but there were no detections in the stream surface waters.

The physical conditions at the site will allow retardation of the more immobile metals. Mercury, however, with its unique characteristics, may form DNAPL.

5.5 Summary

It is difficult to predict the mobility of metals because of the wide range of soil conditions in the environment and the resulting high variability of certain physical parameters. Soil sorption constants may vary over several orders of magnitude for a given metal in different soils and/or under different environmental conditions. Thus, no single sorption constant describes the binding of metals in solution to soils and no one mobility prediction holds for all environmental conditions. Metal contaminants at the site are relatively insoluble in water, especially lead and mercury, and show high tendencies to adsorb to soil or organic matter in soil, or be suspended in aqueous media. However, the data for the MERECO Site shows widespread distribution of metals across the site, upgradient, and downgradient of the site, as far as the most downgradient sampling location, SD-14. The industrial nature of the area surrounding the site partially accounts for this distribution; as well as sorption to mobile soils particles.

Of the major metal contaminants found at the site in various media, only arsenic, lead, manganese, thallium, and mercury were detected in the groundwater samples. The low ratio of mercury in the groundwater versus the site soils are consistent with the expected fate of mercury in which the site soils, sediments, and nearby biota in streams and tributaries and the 1-90 Ponds act as sinks. However, site soils appear to have moved offsite, contaminating the sediments of the streams and soil in the vicinity of the site, from stormwater flow in the catch basins and in the streams in the area. MW-05D shows high mercury levels whereas, in the adjacent boring, SBD-04, mercury levels drop off, indicating that the contaminant is restricted in areal extent to the vicinity of MW-05.

PCBs were introduced to the MERECO Site with the incoming waste materials such as batteries and other mercury bearing materials. They were discharged to the soils through leaks from drums stored on pallets in the yard. Although 300 cubic yards of PCB contaminated soils were excavated from the site, additional contaminated soils found under the former furnace building were capped with plastic and cement and left on-site (EPA 2002). The remaining PCBs have mainly sorbed onto sediment particles. Any release into the surrounding surface water bodies near the site via redissolution of sediment-bound PCBs have been minimal, however, the potential exists for ingestion and bioaccumulation by fish.

Evaluation of the data indicates that the fate of the main contaminants, mercury and PCBs, is to remain adsorbed to site soils and be transported in stormwater runoff of sediments. In addition, mercury's peculiarity as a liquid metal, has resulted in its transport by downward migration to a depth of 60 feet in the source area.

5.6 Evaluation of Site Conceptual Model

A re-evaluation of the site conceptual model presented in Section 5.2 will aid the determination of those fate and transport processes which appear to be occurring at the site based on the data presented in this RI report.

The first pathway was the vertical flow of mercury DNAPL from the old retort furnace building onto surface soils down to the water table. Evidence of this was observed in well MW-05D, located at the former furnace building, where high levels of mercury were found.

The second pathway, pooling of liquid mercury onto the semi-confining layers of the sand and silt unit in the upper aquifer and on top of the LA SC unit was not observed or shown from the data. Beads of mercury were absorbed along the mercury transport path as shown from visual observations noted on the boring logs MW-05D, SBD-01, and SBD-02. However, an accumulation of mercury was not observed at the top of LASC unit. In its movement towards the aquitard, mercury likely fractionated due to its high surface tension effectively reducing the amount reaching the clay unit.

The third pathway was described as horizontal flow of dissolved phase mercury in the direction of groundwater flow in the upper aquifer. The RI data indicate that there is not an extensive plume of dissolved mercury in the groundwater. This is likely a result of mercury's high affinity for soils, slow water solubility, low groundwater movement. Additional data would be required to confirm the extent of mercury contamination in groundwater. Quarterly groundwater monitoring began in April 1991, with samples analyzed for PCBs and inorganics. PCBs have never been detected in groundwater, although the detection limit has been consistently higher than the NYSDEC groundwater quality standard. In the hydraulically downgradient wells, mercury, cadmium, chromium, copper, lead, and zinc have all been detected at concentrations at least 5-times higher than their respective NYSDEC groundwater quality standards. In the hydraulically upgradient well, only mercury concentrations have exceeded the NYSDEC standard

The fourth pathway, historical runoff from the surface soils and runoff from mercury contamination on concrete/asphalt into several catch basins and thereafter into the stormwater outfall basins and stormwater flow along the culvert beneath the railroad tracks into the unnamed stream, appears to be main pathway for contaminant transport offsite. This path could account for the concentrations observed in the I-90 Pond. Lower concentrations and no detections of mercury in the tributaries past location SD-05 and as far as the I-90 Pond may be the result of scouring of these sediments and the lack of curves or bends for deposition of sediments. Free flowing surface water carrying fines and other sedimentary material in the streams have facilitated mercury transport to the I-90 Pond where some of it has been deposited in the curved banks of the bends in the pond.

Conceptual pathway five, local groundwater discharge into the unnamed stream, does not appear to play a significant role in contaminant transport due to the low solubility of the main site COPCs. Mercury was not detected near the points of groundwater discharge to the stream.

Air samples were not collected to document airborne transport of emissions from the former retort furnace building by prevailing winds, and dry and wet deposition of wind blown fall out on land and surface water bodies. However, the presence of mercury in the shallow surface offsite soils which cannot be attributed to stormwater runoff suggests that deposition from airborne contaminants has occurred. In addition, off-property surface soil samples (0-6 inches and 6-12 inches bgs) were collected historically from the DJ Wholesale Building Materials storage yard, the Albany Pallet & Box Company storage yard, and the Diamond W parking lot. These samples showed some elevated concentrations (up to 150 mg/kg) to the east and north of the MERECO property and are suggestive of airborne transport and dry or wet redeposition to the off-site soils. Air data would confirm this sixth conceptualized pathway.

The seventh conceptual pathway was bioaccumulation and biomagnification in biota tissue. These mechanisms are taking place but mercury and PCBs were found in both upstream and downstream sample locations so the data is non-definitive. There is sufficient mercury in the environment for both to occur. Methylation of mercury seems to be occurring in locations favorable to these processes regardless of the total mercury present. Due to the limited fish data collected, the RI data did not provide sufficient evidence to show that mercury found in the biota samples were related to the site, although the historical data indicates that mercury from the site had some impact on the fish. PCBs were found in biota samples at levels exceeding their screening criteria, however, the concentrations were lower than those found in the historical data. The smaller scope of the fish investigation during the RI, compared to the historical investigation, prevents direct comparison of the fish data to evaluate this pathway more conclusively.

6

Section Six

Section 6
Human Health Risk Assessment

A Human Health Risk Assessment (HHRA) for the MERECO Site is currently being conducted by CDM to characterize the potential human health risks associated with the MERECO Site. The following is a summary of preliminary findings.

6.1 Summary of Approach

In the HHRA, contaminants in various media at the MERECO Site were quantitatively evaluated for potential health threats to the following receptors:

- current and future recreational users of the Patroon Creek watershed
- current and future recreational users of the ATV trail
- future trespassers at the MERECO property
- future workers at the MERECO property
- future construction workers at the MERECO property
- future workers at the properties bordering MERECO
- future residents using groundwater as their potable water supply

The estimates of cancer risk and noncancer health hazard, and the greatest chemical contributors to these estimates were identified.

Chemicals of potential concern were selected based on criteria outlined in the Risk Assessment Guidelines for Superfund (RAGS) (EPA 1989), primarily through comparison to risk-based screening levels. The chemicals of potential concern were primarily inorganics, but also included several PAHs, PCBs, and pesticides, and one VOC. The essential nutrients (i.e., calcium, magnesium, potassium, and sodium) were not quantitatively addressed as their potential toxicity is significantly lower than other inorganics at the site, and most existing toxicological data pertain to dietary intake.

Exposure routes and human receptor groups were identified and quantitative estimates of the magnitude, frequency, and duration of exposure were made. Exposure points were estimated using the minimum of the 95% Upper Control Limit (UCL) and the maximum concentration. Chronic daily intakes were calculated based on the reasonable maximum exposure (RME) (the highest exposure reasonably expected to occur at a site). The intent is to estimate a conservative exposure case that is still within the range of possible exposures. Central tendency (CT) exposure assumptions were also developed.

In the toxicity assessment, current toxicological human health data (i.e., reference doses and slope factors) were obtained from various sources and were utilized in the order as specified by RAGS (EPA 1989).

Risk characterization involved integrating the exposure and toxicity assessments into quantitative expressions of risks/health effects. Specifically, chronic daily intakes were compared with concentrations known or suspected to present health risks or hazards.

In accordance with the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) Section 300.430 (e)(2) for known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper-bound lifetime cancer risk to an individual of between 10^{-6} and 10^{-4}. Per RAGS Part B: Development of Risk-Based Preliminary Remediation Goals (EPA 1991b), for noncarcinogenic effects, the NCP does not specify a range, but it is generally appropriate to assume an acceptable hazard index equal to 1.

In general, the EPA recommends target values or ranges (i.e., cancer risk of 10^{-6} to 10^{-4} or hazard index of one) as threshold values for potential human health impacts (EPA 1989). These target values aid in determining whether additional response action is necessary at the site.

6.1.1 Summary of Site Risks

This section presents a summary of the carcinogenic risks and noncarcinogenic hazards for exposures to contaminants in various media at the MERECO site that were quantitatively evaluated for potential health threats.

6.1.1.1 Summary of Risks to Recreational Users of the Creek/Pond

Risks associated with several exposure pathways at the creek/pond were estimated for adults and adolescents: wading in the creek and pond with incidental ingestion and dermal exposure to sediment and surface water, and ingestion of fish from the creek and pond. Total excess lifetime cancer risk for adult recreational users was about 2×10^{-4} (two in ten thousand) for the reasonable maximum exposure (RME) scenario, primarily from ingestion of fish containing PCBs (i.e., 82 percent of the total risk to this receptor) and incidental ingestion of sediment containing benzo(a)pyrene (i.e., five percent of the total risk to this receptor). Total excess lifetime cancer risk for each adolescent and child recreational users was 3×10^{-5}, within EPA's target risk range of 10^{-6} to 10^{-4}.

The total RME hazard index (HI) for adult, adolescent, and child recreational receptors at the creek/pond exceeded the threshold of 1 for noncancer effects (HI of 9 for adults, 10 for adolescents, and 8 for children), indicating that noncancer health effects may occur from RME fish ingestion exposures. When the hazard indices are broken out by target organ, the hazard indices exceeded unity for effects to the eye/skin/nails from ingestion of PCBs in fish. When central tendency (CT) exposure assumptions (i.e., more typical exposures) were used, the hazard index for both adult, adolescent, and child recreational receptors at the creek/pond dropped to two, still above the threshold of one.

6.1.1.2 Summary of Risks to Recreational Users of the ATV Trail

Risks associated with recreational use of the ATV Trail were estimated for adolescents, and based on incidental ingestion and dermal contact with soil and inhalation of airborne particulates generated by vehicle traffic on the trail. Total excess lifetime cancer risk for ATV Trail users was 4×10^{-6} (four in one million), within EPA's target risk range of 10^{-6} to 10^{-4}.

The noncancer hazard indices for ATV Trail users were above the threshold of 1 at 10 for the RME scenario and 2 for the CT exposure scenario, indicating that noncancer health effects may occur from RME or CT recreational exposures to soil at the trail. When hazard index is broken out by target organ, the hazard index exceeded unity for effects to the central nervous system predominantly through the ingestion and inhalation of manganese.

6.1.1.3 Summary of Risks to Routine Workers at the MERECO Property

Potential future risks associated with routine work at MERECO were estimated, assuming that the asphalt and concrete currently covering contaminated soils at the site are removed at some point in the future. Future workers could be exposed to surface soil via incidental ingestion, dermal contact, and inhalation of particulates. Future workers could also be exposed to volatiles, including mercury, in subsurface soil via vapor intrusion into indoor air. Total RME excess lifetime cancer risk for routine workers at MERECO was 6×10^{-6} (six in one million), within EPA's target risk range of 10^{-6} to 10^{-4}.

The noncancer hazard index for workers at MERECO was 0.8, below the threshold of 1, indicating that noncancer health effects are not expected to occur from RME or CT worker exposures.

6.1.1.4 Summary of Risks to Trespassers at the MERECO Property

Potential future risks associated with trespassing at the MERECO property were estimated for adolescents, assuming that the asphalt and concrete currently covering contaminated soils at the site are removed at some point in the future. Total RME excess lifetime cancer risk for trespassers was 9×10^{-7} (nine in ten million), below the lower end of EPA's target risk range of 10^{-6} to 10^{-4}.

The noncancer hazard index for trespassers was 0.3, below the threshold of 1, indicating that noncancer health effects are not expected to occur from RME or CT trespasser exposures to soil at the MERECO property.

6.1.1.5 Summary of Risks to Construction Workers at the MERECO Property

Potential future risks associated with construction work at the MERECO property were estimated, assuming exposure to subsurface soil via incidental ingestion, dermal contact, and inhalation of particulates. Total RME excess lifetime cancer risk for construction workers was 1×10^{-7} (one in ten million), below the lower end of EPA's target risk range of 10^{-6} to 10^{-4}.

The noncancer hazard index for construction workers was 70 in the RME exposure scenario, above the threshold of 1, indicating that noncancer health effects may occur from RME construction worker exposures to soil at the MERECO property. When the hazard index is broken out by target organ, the hazard index exceeded unity for effects to the central nervous system through the ingestion and inhalation of mercury.

6.1.1.6 Summary of Risks to Routine Workers at Properties Bordering MERECO

Potential future risks associated with routine work at properties bordering MERECO were estimated, assuming exposure to surface soil via incidental ingestion, dermal contact, and inhalation of particulates. Total RME excess lifetime cancer risk for routine workers at these properties was 5×10^{-6} (five in one million), within EPA's target risk range of 10^{-6} to 10^{-4}.

The noncancer hazard index for workers at properties bordering MERECO was 0.5, below the threshold of 1, indicating that noncancer health effects are not expected to occur from RME or CT worker exposures.

6.1.1.7 Summary of Risks to Residents Using Groundwater

Because all fresh groundwater in New York State is classified for use as a potable water supply, potential future risks were estimated for adult and child residents assuming exposure to groundwater that is used as tap water. The total RME cancer risk for adult and child resident exposures was 4×10^{-4} (four in ten thousand), which exceeds the EPA range of 10^{-6} to 10^{-4}. Over 95 percent of this risk is associated with arsenic in groundwater. When CT exposure assumptions are used, the total cancer risk for adult and child residents decreases to 1×10^{-4}, which is at the upper end of the range of 10^{-6} to 10^{-4}.

The total RME HI for both adult and child residents exceeded the threshold of 1 for noncancer effects (HI of 30 for adults and 300 for children), indicating that noncancer health effects may occur from RME exposures to groundwater by residents. When the hazard index is broken out by target organ, the hazard index exceeded unity for effects to the nervous system and skin for adults and to the nervous system, liver, kidney, GI tract, and skin for children. Noncancer effects to the nervous system were primarily associated with ingestion and inhalation of mercury (HI of 15 for adults and 200 for children) and ingestion of manganese (hazard index of 6 for adults and 13 for children). Noncancer effects to the skin were associated with arsenic in groundwater (hazard index of 2 for adults and 4 for children). Potential effects to the liver and kidney of child residents was associated with inhalation of chloroform vapors (hazard index of 13). When CT exposure assumptions (i.e., more typical exposures) are used, the hazard indices for adult and child residents still exceeded the threshold of one (i.e., 20 for adults and 50 for children).

6.1.1.8 Summary of Uncertainties

As in any risk assessment, the estimates of potential health threats (carcinogenic risks and noncarcinogenic health effects) for the MERECO site have associated uncertainties. In general, the main areas of uncertainty include the following:

- Environmental data
- Exposure parameter assumptions
- Toxicological data
- Risk characterization

As a result of the uncertainties, the risk assessment should not be construed as presenting absolute risks or hazards. Rather, it is a conservative analysis intended to indicate the potential for adverse impacts to occur based on reasonable maximum and central tendency exposures.

7

Section Seven

Section 7
Screening Level Ecological Risk Assessment

CDM prepared a Screening Level Ecological Risk Assessment (SLERA) for the remedial investigation of the site. The following is a summary of the SLERA process and results.

7.1 Summary of the SLERA Approach

The objective of the SLERA was to identify the potential current and future environmental risks associated with the site that would exist if no action is taken. Conservative assumptions were used in the SLERA so that no contaminant exposure pathway present at the site that might present ecological risks would be missed.

This report was prepared in accordance with Volume I of the RI/FS work plan for the site (CDM 2001a), and in accordance with EPA's *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (ERAGS) (EPA 1997).

A four-step process was utilized to assess site-related ecological risks for a reasonable maximum exposure scenario:

- *Problem Formulation* —Qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants, and selection of endpoints for further study
- *Exposure Assessment*—a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors, and measurement or estimation of exposure point concentrations
- *Ecological Effects Assessment*—literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors
- *Risk Characterization*—measurement or estimation of both current and future adverse effects

7.1.1 Problem Formulation

In this step of the SLERA, the following was presented: the ecological character of the site, a preliminary conceptual model (including the discussion of exposure pathways and the determination of endpoints), the selection of potential contaminants of concern (COCs), and the selection of receptor species.

7.1.1.1 Ecological Character of Site

Terrestrial and aquatic communities are both associated with the site. Terrestrial communities are industrial, successional old field, and successional hardwoods. Aquatic habitats include freshwater stream and pond environments.

Information on threatened and endangered species and sensitive environments at the site were obtained from the NYSDEC and USFWS. The federally-listed endangered species, the Karner blue butterfly (*Lycaeides melissa samuelis*) has been reported by the USFWS to be located within the area of the site. Potential habitat for the Karner blue butterfly is distinguished by the presence of wild lupine (*Lupinus perennis*) which is the only known food plant for the larvae. No wild lupine habitat was observed by CDM within the investigated area. CDM's ecological assessment was performed in May, at a time of year when signs of lupine vegetation are observable. The closest reported wild lupine habitat to the site appears to be located in the Albany Pine Bush, a significant habitat that begins a little less than one mile west of the site.

7.1.1.2 Preliminary Conceptual Model

The primary contaminant at the site is mercury. Previous investigations suggested mercury was released to the environment in three phases:

- As a vapor released to the air and deposited as a solid on soils down wind (south and east) of the site
- As elemental mercury released to site soils, the storm water collection system, and groundwater

Contaminants from the site may have entered the surface water and sediment of the unnamed tributary, Patroon Creek, and the I-90 Pond, possibly via runoff through the catch basin and catch basin drainage pipe and subsequent transport of contaminated soil by overland surface water flow. Additionally, airborne contamination from the site may have impacted the surface soils and aquatic habitats at and near the site. Environmental receptors may be exposed to contaminants found in the soil at/near the site and to contaminants that are in the sediment and surface water of the aquatic habitats of the tributary, Patroon Creek, and the I-90 Pond. Exposure of ecological receptors to contaminants may occur via direct contact with contaminated surface water, sediment, and/or soil. Exposure of higher trophic-level receptors can also occur through food chain exposure (through the ingestion of prey that have become contaminated through site-related exposure).

Assessment endpoints were determined and included the following:

- Protection of freshwater invertebrates from the toxic effects (on survival and growth) of site-related chemicals present in sediment and surface water
- Protection of fish from the toxic effects (on survival and growth) of site-related chemicals present in sediment and surface water

- Protection of amphibians from the toxic effects (on survival and growth) of site-related chemicals present in sediment and surface water

- Protection of piscivorous birds to ensure that ingestion of contaminants in surface water, sediment, and prey does not have negative impacts on growth, survival, and reproduction

- Protection of insectivorous birds to ensure that ingestion of contaminants in surface water, sediment, and prey does not have negative impacts on growth, survival, and reproduction

- Protection of piscivorous mammals to ensure that ingestion of contaminants in surface water, sediment, and prey does not have negative impacts on growth, survival, and reproduction

- Protection of insectivorous mammals to ensure that ingestion of contaminants in soil, surface water, and prey does not have negative impacts on growth, survival, and reproduction

- Protection of carnivorous birds to ensure that ingestion of contaminants in soil, surface water, and prey does not have negative impacts on growth, survival, and reproduction

Measurement endpoints are chosen to link the existing site conditions to the goals established by the assessment endpoints and are useful for assessment endpoint evaluation. Measurement endpoints selected to correspond to the assessment endpoints were:

- For aquatic invertebrates: comparison of exposure hazard quotients (HQs) to a reference value of 1.0. Exposure HQs are calculated for individual chemicals by dividing the surface water and sediment concentrations by aquatic invertebrate-based surface water and sediment screening values.

- For the fish and frog: comparison of exposure HQs to a reference value of 1.0. Exposure HQs are calculated for individual chemicals by dividing the surface water concentrations by fish-based or amphibian-based surface water screening values. (The contribution to the ecological risks to the fish and frog from sediment contamination were not determined in the SLERA due to the lack of established fish and amphibian ecotoxicity values for sediment exposures.)

- For the food-chain-modeled receptors (heron, mallard, mink, shrew, and hawk): comparison of dietary HQs to a reference value of 1.0. Dietary HQs are calculated for individual chemicals by dividing an estimated level of exposure by an ecotoxicity value that is associated with a no observed adverse effect level (NOAEL).

7.1.1.3 Selection of Chemicals of Concern

Chemicals of potential concern were selected based on the ERAGS guidance and on EPA's *Ecological Assessment of Superfund Sites: An Overview* (EPA 1991). The COC selection process involved the comparison of contaminant concentrations against screening values (ecologically-based media quality criteria and guidance values). Chemicals were selected as COCs when maximum contaminant concentrations exceeded screening values, when screening values were not available for chemicals, and when contaminants were considered to bioaccumulate.

Chemicals of potential concern for the soil were as follows:

- VOCs - carbon disulfide, 2-butanone, and 4-methyl-2-pentanone
- SVOCs - benzaldehyde, phenol, acetophenone, caprolactam, 2-methylnaphthalene, phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene
- Pesticides - beta-BHC, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and gamma-chlordane
- Inorganics - aluminum, chromium, copper, iron, manganese, mercury, thallium, and zinc

Chemicals of potential concern for sediment were as follows:

- VOCs - acetone, carbon disulfide, methyl acetate, 2-butanone, 4-methyl-2-pentanone, and bromoform
- SVOCs - benzaldehyde, phenol, 2-chlorophenol, acetophenone, 4-methylphenol, n-nitroso-di-n-propylamine, 4-chloro-3-methylphenol, 1,1'-biphenyl, acenaphthylene, acenaphthene, 4-nitrophenol, dibenzofuran, 2,4-dinitrotoluene, fluorene, pentachlorophenol, phenanthrene, anthracene, carbazole, di-n-butylphthalate, fluoranthene, pyrene, benzyl butyl phthalate, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate; di-n-octylphthalate, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene
- Pesticides/PCBs - beta-BHC, heptachlor, heptachlor epoxide, endosulfan I, endosulfan sulfate, dieldrin, endrin, endrin ketone, endrin aldehyde, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, alpha-chlordane, gamma-chlordane, Aroclor-1254, and Aroclor-1260
- Inorganics - aluminum, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, methyl mercury, nickel, selenium, silver, thallium, vanadium, and zinc

Chemicals of potential concern for surface water were as follows:

- VOC - MTBE
- SVOC - bis(2-ethylhexyl)phthalate
- Inorganics - aluminum, antimony, barium, copper, iron, lead, manganese, methyl mercury, and nickel

7.1.1.4 Selection of Ecological Receptors

Receptors were selected as a subset of all potential ecological receptors at the site and were chosen to represent trophic levels and habitats that occur at the site. Receptor species included short-tailed shrew (*Blarina brevicauda*) to represent insectivorous mammals, red-tailed hawk (*Buteo jamaciensis*) to represent carnivorous birds, great blue heron (*Ardea heroides*) to represent piscivorous birds, mallard (*Anas platyrhynchos*) to represent insectivorous birds, mink (*Mustela vison*) to represent piscivorous mammals, frog to represent amphibians, freshwater fish, and aquatic invertebrates.

7.1.2 Exposure Assessment

Aquatic invertebrates, fish, and frog have the potential to be exposed directly to contaminants in surface water and sediment associated with the tributary, Patroon Creek and the I-90 Pond. In the SLERA, maximum contaminant concentrations in surface water and sediment were used to approximate exposure point concentrations. Due to the lack of established amphibian and fish ecotoxicity values for exposure to chemicals in sediment, only surface water pathways were evaluated for the fish and frog.

Contaminant exposures for the great blue heron, mallard, mink, short-tailed shrew, and red-tailed hawk occur through direct contact with the contaminated media and through the receptor's diet. Exposure point concentrations were estimated for these receptors using food chain exposure doses. Dietary exposure doses were generated for ecological receptor exposure to site contaminants by multiplying the ingestion rate of the receptors by the estimated contaminant concentration in food items and the portion of the food item in the diet, summing these values, and dividing the summed value by the body weight of the receptor species. Bioaccumulation factors were included in the exposure model when estimating the contaminant concentration in food items.

7.1.3 Ecological Effects Assessment

The goal of the ecological effects evaluation is to determine the toxic effects of COCs of the site on the selected ecological receptors. A database and literature search was performed to identify COC benchmark toxicity values for use in the estimation of the ecological risk.

Chronic NOAELs for COCs were preferentially selected to represent the benchmark toxicity values used the assessment as they ensure that risk is not underestimated (EPA 1997). Where necessary, adjustments were made to available toxicity values using safety factors to reflect levels of uncertainty.

When toxicity data were not available for the selected receptor species, toxicity values from other animal studies were used. No additional correction factors were applied to the available toxicity value if the value was for an animal within the same taxonomic class as the receptor. Values for taxonomic classes other than the receptor species were not used. When more than one value was applied, the most conservative value for the most closely-related species to the receptor(s) was used.

7.1.4 Risk Characterization

Potential ecological risks to ecological receptors from contaminants at the site were characterized by several means and are presented below.

7.1.4.1 Aquatic Risk

Potential ecological risks to contaminants in the sediment and surface water of the site were assessed using direct comparisons of contaminant concentrations in sediment and surface water with criteria, guidelines, and benchmark concentration values based on aquatic ecotoxicity.

Comparisons were made between the maximum detected contaminant levels and associated values during the screening phase for COCs. This resulted in a number of COCs for surface water and sediment. For the aquatic invertebrate community, the potential for adverse ecological risks to contaminants appears to exist in the both surface water and sediment from the following chemical parameter groups:

For surface water, the following COCs are a potential concern for aquatic invertebrates:

- SVOC - bis(2-ethylhexyl)phthalate
- Inorganics - aluminum, copper, iron, lead, manganese, and nickel

For sediments, the following COCs are a potential concern for aquatic invertebrates:

- SVOCs- phenol, 2-chlorophenol, 4-methylphenol, 4-chloro-3-methylphenol, acenaphthene, 4-nitrophenol, fluorene, pentachlorophenol, phenanthrene, di-n-butylphthalate, fluoranthene, pyrene, benzo(a)anthracene, bis(2-ethylhexyl)phthalate; benzo(b)fluoranthene
- Pesticides/PCBs - beta-BHC, heptachlor, heptachlor epoxide, endosulfan I, dieldrin, endrin, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, alpha-chlordane, gamma-chlordane, Aroclor-1254 , Aroclor-1260

- Inorganics - arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, and zinc. (Mercury is a significant contributor to the potential risk).

Freshwater fish and frog were used as a receptors to further assess the potential ecological risks from surface water contamination. Potential risks to these receptors were assessed by direct comparisons of contaminant concentrations in surface water with freshwater fish and frog benchmark values. The potential for ecological risk was considered possible if the HQ or sum of the HQs (hazard index) was greater than one. The potential risk from surface water exposure to the fish and frog can be summarized as follows:

The estimated hazard index for the freshwater fish of greater than 27 indicates the potential for adverse effects resulting from exposure to site surface water. The primary risk contributors are copper and aluminum, which contribute 57 and 36 percent of the potential risk, respectively. Mercury is also a contributor to the potential risk for fish, at 5 percent.

The hazard index for frog is estimated at 16, which indicates the potential for adverse effects resulting from exposure to site surface water. Copper and aluminum are, as with the fish, the primary risk contributors, contributing 86 and 11 percent to the potential risk, respectively. Mercury is also a contributor to the potential risk for the frog, at 3 percent.

7.1.4.2 Food Chain Risk

Potential ecological risks to contaminant uptake through the food chain were estimated for food chain receptors: great blue heron, mink, mallard, short-tailed-shrew, and red-tailed hawk. Exposures to the food chain receptors were modeled, as follows:

- The great blue heron and mink are expected to be exposed to contaminants in the sediment, surface water and in fish (exposed to the contaminated sediment and surface water).

- The mallard is expected to be exposed to contaminants in the sediment, surface water and aquatic invertebrates (exposed to the contaminated sediment and surface water).

- The short-tailed shrew is expected to be exposed to contaminants in the soil, surface water, and soil invertebrates (exposed to the contaminated soil and surface water).

- The red-tailed hawk is expected to be exposed to contaminants in the soil, surface water, and small mammal prey (exposed to the contaminated soil and surface water).

Potential risks to the food chain receptors were assessed by comparing estimated exposure dose levels with dose-based toxicological benchmark values to obtain HQs for each COC. The potential for ecological risk was considered possible if the hazard quotient or sum of the HQs (hazard index) was greater than one. Potential ecological risks results are discussed below:

Piscivorous birds
The hazard index of 4 for the great blue heron indicates that there is a potential for ecological risks to piscivorous birds from food chain exposure to contaminants in sediment and surface water. Cumulatively, there is a potential risk, but none of the individual COCs appear to provide a potential risk by itself. The primary risk contributors to the potential risk are aluminum, chromium, lead, and zinc, with their contribution to the potential risk of 14, 14, 16, and 16 percent, respectively.

Insectivorous birds
The hazard index of 957 for the mallard indicates that there is a potential for ecological risks to insectivorous birds from food chain exposure to contaminants in sediment and surface water. The primary risk contributors are endrin, zinc, and Aroclor-1260, with their contribution to the potential risk of 34, 27, and 10 percent, respectively. Other COCs were contributors to the potential risk were numerous, including mercury (with an HQ of 60).

Piscivorous mammals
The hazard index of 25 for the mink indicates that there is a potential for ecological risks to piscivorous mammals from food chain exposure to contaminants in sediment and surface water. The primary risk contributors are thallium, lead and iron, with their contribution to the potential risk of 45, 23, and 18 percent, respectively.

Insectivorous mammals
The hazard index of 9 for the short-tailed shrew indicates that there is a potential for ecological risks to insectivorous mammals from food chain exposure to contaminants in soil and surface water. The primary risk contributors are benzo(a)pyrene, phenanthrene, and 4,4'-DDT with their contribution to the potential risk of 50, 16, and 11 percent, respectively. Mercury does not appear to be a contributor to the potential risk.

Carnivorous birds
The hazard index of much less than 1 for the red-tailed hawk indicates that there is not a potential for ecological risks to carnivorous birds from food chain exposure to contaminants in soil and surface water.

7.1.4.3 Evaluation of Potential Risk Using Tissue Concentrations

A comparison was made of chemical concentrations detected in whole body fish tissue with effects-based scientific literature values for fish tissue concentrations to indicate if the COCs had been taken up into the fish at levels sufficient to cause adverse effects (such as growth and survival). Fish tissue concentrations are lower than the values that were found to cause adverse effects for fish. The type of fish collected may have an impact on the uptake and accumulation of site contaminants and the resulting whole body residue values. The type of fish collected during the RI for whole body fish analysis where primarily forage fish and not the larger and possibly more fatty predator fish species.

Whole body fish tissue concentrations from fish collected at the site in previous studies ranged from 0.044 to 0.96 mg/kg. When compared to the range of effects-based tissue values for mercury in whole body fish tissue of 0.4 to 96.8 mg/kg, the data indicate that some of the fish collected in these previous investigations showed mercury levels that would indicate adverse effects (growth and/or survival). It appears that the higher levels of mercury were found in rock bass (*Ambloplites rupestris*), a species of fish that was not caught during the RI investigation.

7.1.4.4 Uncertainty

To prepare the SLERA, it was necessary to make assumptions at each step in the ERAGS process. Because of the uncertainty associated with the use of these assumptions, potential risks may be over- or underestimated. Overall, conservative assumptions were used in the SLERA.

8

Section Eight

Section 8
Summary and Conclusions

This section provides a summary of the major findings of the RI. The conclusions drawn from the various investigations that were conducted concerning the nature and extent of contamination in catch basins, fish, surface water, sediment, soil, and groundwater are discussed below. Recommendations for additional activities needed to fill data gaps are also provided.

A HHRA is currently being prepared for this site. The HHRA will be submitted as a separate document. A description of the HHRA process for the MERECO Site is provided in Section 6. A Draft SLERA was submitted as a separate document. A discussion of the ERAGS SLERA process as it was applied to the MERECO Site and the findings of the SLERA are provided in Section 7. The findings of the SLERA are summarized in this section.

8.1 Sources of Contamination

Improper disposal of residual materials from mercury recovery operations, fires at the facility, and poor housekeeping and waste management practices have resulted in the contamination of surface and subsurface soil, groundwater, and sediment in adjacent surface water bodies. In the past, residual wastes from mercury recovery operations were disposed of over an embankment adjacent to a tributary to Patroon Creek. Elemental mercury was observed in deep soil borings, confirming that significant amounts of elemental mercury were released in the past.

Fires occurred at the facility in 1989 and 1991. The 1989 fire destroyed a building that housed the mercury purification operations and silver oxide battery processing equipment. The 1991 fire destroyed a trailer that was used for manual sorting of mercury. The trailer reportedly contained 400 pounds of mercury, some of which may have been released to the air during the fire.

A number of catch basins for the collection of run-off from the site were closed by order of NYSDEC because of the potential for contamination of adjacent water bodies. Sample results from the RI indicate that the catch basins are a continuing source of mercury contamination to the tributary of Patroon Creek, and, thus, Patroon Creek itself.

In response to a 1985 Consent Order, MERECO removed approximately 2,100 cubic yards of mercury-contaminated soil located between the facility and the tributary of Patroon Creek. Mercury remaining in the soil adjacent to the excavated area was covered by the concrete slab of a warehouse building that was built adjacent to the excavated area.

8.2 Nature and Extent of Contamination

A summary of the nature and extent of contamination delineated in the site media is provided in the following sections. The results of the fate and transport evaluation of site contaminants are incorporated into the summaries.

8.2.1 Catch Basins

The results of the catch basin sediment and catch basin surface water sampling are summarized in this section.

8.2.1.1 Summary of Catch Basin Sediment Contamination

The primary concerns in the catch basin sediment are mercury and the other inorganic indicator compounds. All of the indicator compounds were detected in catch basin sediment samples. Concentrations of arsenic, cadmium, chromium, mercury, and silver exceeded their respective screening criteria in one or more of the sediment samples. Mercury exceeded its screening criteria in all of the catch basin sediment samples. Methylmercury was detected in three of the catch basins (SDC-01, SDC-03, and SDC-06) at concentrations ranging from 61.56 ug/kg/g to 263.53 ug/kg. Although methylmercury to total mercury ratios were low, ranging from 0.1 to 1 percent, some methylation of mercury is occurring in the sediments.

Only one catch basin, SDC-01, yielded sufficient sediment for analysis of the full suite of organic compound analyses. VOCs, SVOCs, and pesticides were detected in sediment samples at concentrations exceeding screening criteria. Only one VOC, benzene, exceeded its screening criteria. Ten PAHs and eight pesticides exceeded screening criteria in SDC-01.

8.2.1.2 Summary of Catch Basin Surface Water Contamination

In general, catch basin surface water samples exceeded organic and inorganic screening criteria less frequently compared to sediment samples. However, this comparison is limited because there was insufficient sediment in some of the catch basins to perform the full suite of analyses. Indicator contaminants including cadmium and thallium exceeded their criteria in one and four surface water samples, respectively. Mercury, however, exceeded its screening criteria in all of the catch basin surface water samples. Methymercury was widely distributed in the catch basins, indicating that the catch basins provide a suitable environment for methylation of mercury.

Organic compounds rarely exceeded screening criteria in the catch basin surface water samples. No VOCs or PCBs were detected in the catch basin surface water samples. Concentrations of three SVOCs, phenol, 2-methyphenol, and bis (2 ethylhexyl) phthalate, exceeded their respective screening criteria.

8.2.1.3 Catch Basin Sampling Conclusions

Indicator contaminants, especially mercury, are present in the sediments and surface water in the catch basins. One catch basin, CB-3, is still used to collect runoff. Effluent from this catch basin is discharged directly to the tributary of Patroon Creek. Contaminated water continues to discharge from the effluent pipe connected to the inactive catch basin system into the tributary of Patroon Creek. The current closure method for the catch basins does not prevent contaminants from reaching the tributary. Based on contaminant levels detected in the active catch basin and the discharge pipe, the catch basin system remains a pathway for site-related contaminants to enter surface water.

Although a number of organic compounds exceeded sediment screening criteria, they are not believed to be associated with site activities. Organic contaminants likely are derived from runoff associated with industrial activities in the area and previous applications of pesticides.

8.2.2 Surface Water

In general, surface water samples rarely exceeded organic or inorganic screening criteria. Thallium exceeded screening criteria in SWS-03 located just downstream of the site, but also exceeded its screening criteria in the background sample. Only one organic compound, MTBE, was detected in surface water at a concentration exceeding its screening criterion. MTBE is a common gasoline additive and is not believed to be related to the site.

8.2.3 Sediment

Sediment sample results indicate significant contamination of sediments in the tributary of Patroon Creek, Patroon Creek, and the I-90 Pond, primarily with mercury and other indicator contaminants. VOCs, SVOCs, pesticides, and, to lesser extent, PCBs were also frequently detected in sediment samples from these water bodies.

8.2.3.1 Summary of Sediment Contamination - Inorganics

Eleven inorganic analytes, including six indicator contaminants, were detected in the 0 to 6 inch sediment grab samples. Inorganic contaminants, including arsenic, cadmium, chromium, nickel, and silver exceeded screening criteria in one or more sediment grab samples. Mercury exceeded its screening criterion by up to 8 times at six locations; from SD-03, located just downstream to the site, to SD-14, located downstream of the I-90 Pond. Iron, lead, copper, manganese, and zinc exceeded screening criteria both in downstream samples and background samples. Methylmercury was detected in all sediment grab samples. Methylmercury concentrations ranged from 0.13 ug/kg to 4.78 ug/kg in sediment sample SD-11 located in the I-90 Pond.

Seven inorganics, including two indicator contaminants, exceeded screening criteria in profile sediment samples. Mercury exceeded its screening criteria in all six intervals in sample SD-03, located just downstream of the MERECO Site. Mercury also exceeded its screening criteria in sample SD-06 located further downstream in Patroon Creek. In general, exceedences of screening criteria for a number of inorganic contaminants were significantly greater in SD-03 compared to SD-06. A similar relationship exists for methylmercury concentrations in SD-03 compared to SD-06. In both SD-03 and SD-06, contaminant levels increased with depth, indicating a decrease in contaminant influx over time.

8.2.3.2 Summary of Sediment Contamination - Organics

Organic compounds were commonly detected at concentrations exceeding screening criteria in the 0 to 6 inch sediment grab samples. A variety of PAHs were detected in nearly all sediment grab sample locations. PAHs often exceeded screening criteria by factors of 1,000 or more. Eleven pesticides were detected in sediment samples in concentrations exceeding screening criteria. The greatest number of pesticide exceedences (seven) occurred in the sample SD-11, located at the downsrtream end of the I-90 Pond. Aroclor-1260 exceeded its screening criterion in samples from two locations, one of which was a background location.

VOCs were frequently detected in the profile sediment samples; however, none of the concentrations exceeded screening criteria. PAHs exceeded screening criteria in nearly all intervals of the profile sediment samples. One pesticide, 4,4' DDT, and one PCB, Aroclor-1254, were exceeded screening criteria in SD-03.

8.2.3.3 Sediment Sampling Conclusions

Inorganic contaminants, including many indicator contaminants, were widely distributed in stream sediments. Mercury exceeds its screening criterion in nearly all sediment samples. Significantly, mercury exceeds its screening criterion in sediment sample SD-14, which is the most downstream sediment sample collected during the field investigation. This suggests that mercury contamination may be present in sediments further downstream in Patroon Creek. In addition, mercury exceeded its screening criteria in the 10 to 12 inch intervals in sediment samples SD-03 and SD-06, which suggests that mercury contamination may be present at greater depths in the sediments of the stream and I-90 Pond. Methylation of mercury is occurring in stream sediments with the associated potential for bioaccumulation and biomagnification of methylmercury in the food chain.

A variety of organic contaminants were commonly detected in sediment samples. VOCs were detected in a majority of sediment samples, but did not exceed screening criteria. A variety of PAHs were detected at concentrations well above screening criteria in the majority of sediment samples, including background samples. PAHs are widespread in the environment and are commonly produced from the incomplete combustion of a wide variety of fuels and other organic materials. Historical operations at the site, especially operation of the retort furnace, may also have contributed to the PAHs detected in the sediment samples. Similarly, a number of pesticides were detected in sediment samples and are likely related to historical pesticide use in the Patroon Creek drainage basin and not related to site activities.

8.2.4 Fish Tissue

A number of inorganics were detected both in forage fish and sport fish samples collected upstream and downstream of the site; however, only mercury, in the sample collected at stream location SW-06, exceeded its screening criterion.

8.2.4.1 Summary of Fish Tissue Contamination - Stream

No VOCs, SVOCs, or pesticides were detected at concentrations exceeding screening criteria in any of downstream fish samples. The pesticides 4,4'-DDE and alpha chlordane exceeded their respective screening criteria in the background sample from Inga's Pond. PCBs were detected at concentrations above screening criteria in fish tissue samples collected from SW-02 and SW-06, located downstream of the site.

With the exception of mercury, no inorganic analytes exceeded screening criteria in the sport or forage fish samples collected from the I-90 Pond. Mercury in the sport fish sample marginally exceeded its screening criteria (by 1.3 times).

8.2.4.2 Summary of Fish Tissue Contamination - I-90 Pond

No VOCs or SVOCs were detected in fish samples from the I-90 Pond above screening criteria. Alpha chlordane was detected just above its screening criteria in the sport fish sample from the I-90 Pond but it was also detected above its screening criterion in the background sample from Inga's Pond. Alpha chlordane it is not known to be associated with the site. Aroclor-1254 and -1260 were detected at concentrations significantly above their respective screening criteria in the forage fish and sport fish samples from the I-90 Pond. Aroclor-1254 also exceeded its screening criterion in the forage fish sample from the I-90 Pond.

A variety of inorganics were detected in fish tissue samples, however, only mercury exceeded its screening criterion. Mercury exceeded its screening criterion in two fish samples; the forage fish sample from SW-06 and the sport fish sample from the I-90 Pond.

8.2.4.3 Fish Sampling Conclusions

No VOCs or SVOCs were detected above screening criteria in any of the fish samples. Pesticides detected in fish samples are not known to be site related as their concentrations are similar in background and downstream samples. The PCBs Aroclor-1254 and -1260 were commonly detected in all fish samples. However, the magnitude of the exceedences in the downstream samples and the upstream samples generally are similar.

Inorganic contamination in fish tissue is limited to mercury exceedences in two fish samples; the forage fish sample from SW-06 and the sport fish sample from the I-90 Pond. Generally, mercury in tissue is present in the form of methylmercury, which is available for biomagnification in the food chain. This suggests the potential human exposure via ingestion of fish and for ecological impacts in the food chain. The potential exists for additional contamination of fish from methylmercury present in the surface water and sediment, as indicated by sample results.

8.2.5 Surface Soil

The results of on-site and off-site surface soil sampling and subsurface soil sampling are summarized and discussed in this Section.

8.2.5.1 Summary of Off-Site Soil Contamination

Inorganic contaminants were frequently detected in off-site surface soil samples. A variety of inorganics including arsenic, beryllium, copper, iron, manganese, mercury, zinc were detected at concentrations exceeding screening criteria. Arsenic, manganese, and mercury, and zinc exceeded screening criteria more frequently than the other metals (7 to 13 of the samples). Mercury exceeded its screening criterion in all of the 13 off-site soil samples.

None of the VOCs or pesticides detected in the offsite soil samples exceeded screening criteria. Organic contamination in off-site soil samples is limited primarily to PAHs. A number of PAHs including benzo(a)pyrene were detected at concentrations exceeding screening criteria. Phenol was the only other SVOC that exceeded its screening criteria. PCBs were not detected in the offsite surface soil samples.

The mercury contamination is likely related to wet and dry deposition of mercury emissions from historical site operations. PAHs present in the offsite surface soil samples may, at least in part, be related to historical emissions from the retort furnace. he off-site surface soil sampling area is downwind of the prevailing wind direction at the site. Surface soil samples also are located in an area that is used for recreation as evidence by an ATV trail. CDM observed individuals using the area for recreation, including riding ATV's. During dry weather, ATVs generate significant quantities of dust, which increases the potential for human exposure and migration of contaminants via the air pathway. Given this land use, the potential exists for human exposure to mercury and PAH contamination in soil. In addition, the potential exists for exposure of ecological receptors that use this area.

8.2.5.2 Summary of On-site Surface Soil Contamination

Inorganic contaminants were frequently detected in the on-site surface soil samples. Arsenic, cadmium, chromium, manganese, mercury, nickel, and zinc were detected at concentrations exceeding screening criteria in surface soil samples. Mercury and zinc concentrations exceeded screening criteria most frequently; both exceeded screening criteria in six on-site surface soil samples.

Inorganic contaminants exceeded screening criteria in the majority of on-site surface soil samples. However, many of the samples were collected below asphalt or concrete surface layers. These cover materials will likely prevent surface migration via runoff or wind. In some areas, the surface cover is deteriorated or absent, allowing soil contaminants to migrate from the site via runoff and wind transport and human exposure by direct contact. In addition, contaminants in the uncovered areas can be leached from soils by precipitation and infiltrate to groundwater.

Eight VOCs, four pesticides and one PCB were detected in the 13 surface soil samples collected from 0 to 2 feet in onsite soil borings. However, none of these compounds were detected above screening criteria. Six SVOCs, primarily PAHs, were detected in concentrations above screening criteria at six soil boring locations; SBS-01, SBS-02, SBS-03, SBS-05, SBW-02, and SBD-04.

8.2.5.3 Summary of Subsurface Soil Contamination

Inorganic contaminants are widely distributed in subsurface soil samples. Highest levels of indicator contaminants, including mercury, were observed in samples collected from four locations (MW-5D, SBD-02, SBD-03, and SBD-04), all located within 100 feet on the east side of the site. The highest concentration of mercury, 38,000 mg/kg, was detected in a 10 to 12-foot sample interval in MW-05D. Elemental mercury was observed in samples from MW-05D to total depth of 66 feet bgs. In addition to MW-05D, mercury was detected above its screening criterion at depths ranging from 4 to 18 feet bgs in samples from SBD-02, SBD-04, SBD-03, SBW-06, SBW-05, SBS-05, and MW-01D. A number of other inorganics were frequently detected at concentrations exceeding screening criteria including arsenic (9 locations), zinc (9 locations), and manganese (7 locations). Copper, chromium, and nickel concentrations exceeded screening criteria in 4 or fewer locations.

Only one VOC, acetone, was detected at a concentration above its screening criteria. No pesticides were detected at concentrations exceeding screening criteria. PCBs were detected above screening criteria in samples from borings SBD-01, SBD-02, SBM-MW-01D, and SBM-MW-05D. Four PAHs exceeded screening criteria in samples from boring SBM-MW-07. One PAH exceeded its screening criterion in samples from boring SBM-MW-01.

8.2.5.4 Soil Sampling Conclusions

Elemental mercury was observed and high concentrations of mercury were detected in the subsurface soil borings. The highest levels of contamination occur within a small area on the east side of the site. The mercury distribution suggests that contamination in the subsurface was likely the result of spills or discharges in a fairly restricted area.

Due to its high specific gravity, the major direction of elemental mercury migration in subsurface soils is vertically downward. A major factor influencing whether elemental mercury will be found as DNAPL at the surface of the confining layer, is the total mass of mercury that was released. In order to form pools of mercury DNAPL, the mass of mercury released would have to be greater than the capacity of the intervening soils to sorb the mercury. Based on the depths of the observations of mercury in the borings, it appears that the mass of mercury disposed over time at the facility is not sufficient to create significant pools of mercury DNAPL at the interface of the LASC layer (confining layer) and the surficial aquifer. No pools of mercury DNAPL were observed in soil boring samples collected at the surface of the confining layer. However, elemental mercury was observed near the bottom of boring MW-05D, near the surface of the confining layer. The limit of visible elemental mercury at shallower depths in SBD-01 and SBD-02 suggests that it has not reached the confining layer at all locations. The number of deep borings in the source area was limited and mercury DNAPL could be present within in a very limited area below the site.

Although elemental mercury has a very low solubility in water, elemental mercury observed in soil boring samples will continue to be a source of groundwater contamination.

A variety of indicator contaminants including arsenic, cadmium, chromium, manganese, mercury, nickel, and zinc were detected in soil samples at concentrations exceeding screening criteria.

The organic contamination observed in the soil samples consists primarily of PAHs.

8.2.6 Groundwater

8.2.6.1 Summary of Groundwater Contamination - Inorganics

A variety of inorganic analytes were detected in groundwater samples from monitoring wells across the site; only iron and manganese were detected in concentrations consistently exceeding screening criteria. Manganese was detected in the background sample, but also may be related to manganese batteries brought to the site for processing. Arsenic was also frequently detected at concentrations exceeding screening criteria in wells hydraulically downgradient of the site (MW-02D, OW-03S, MW-5D, and MW-6D). Other analytes, including selenium, magnesium, lead, and thallium, exceeded screening criteria in shallow monitoring wells OW-2S and OW-3S, also located hydraulically downgradient.

Mercury was detected at concentrations exceeding its screening criterion only in samples from one well deep well, MW-5D. Elemental mercury was observed in the soil boring for MW-5D at a depth of at least 60 feet bgs. Mercury was detected in a number of other shallow and deep wells at the site, however, concentrations were always below mercury's groundwater screening criterion.

8.2.6.2 Summary of Groundwater Contamination - Organics

VOCs, SVOCs, and pesticides were not detected at concentrations exceeding screening criteria in any of the groundwater samples. PCBs were not detected in any of the groundwater samples.

8.2.6.3 Groundwater Sampling Conclusions

Elemental mercury was observed in deep soil borings MW-5D, SBD-01, and SBD-02, below the groundwater table. Mercury exceeded its screening criterion only in samples from one well, MW-5D. This suggests that either the plume is small and limited to the area around MW-5D or dissolved-phase mercury was not adequately characterized by the groundwater sampling program. Further groundwater sampling is needed to determine whether the dissolved-phase mercury contamination is localized around MW-5D or has migrated and was not identified by the current monitoring well network.

8.3 Draft Human Health Risk Assessment Summary

Results of the Draft HHRA indicate the potential for cancer and noncancer health risks to human receptors from exposure to chemicals detected in soil, groundwater, sediment, and fish. The highest cancer risks are associated with residents who may use the groundwater for drinking water and bathing/showering in the future (4×10^{-4} for combined adult and child exposure). This risk is almost completely due to the presence of arsenic in groundwater. The next highest cancer risks are to adult recreational users of the creek/I-90 Pond (2×10^{-4}), primarily from ingestion of PCBs in fish. The next highest risk is to future site workers exposed to soil (6×10^{-6}), and is within EPA's target range of 10^{-6} to 10^{-4}.

Mercury is not a carcinogen, but contributes to the potential for noncancer health effects. The highest non-cancer risks are associated with child residents who may use the groundwater for drinking water and bathing/showering in the future. The HI estimate for this receptor is 250, over 75 percent of which is due to inhalation of mercury vapor while bathing/showering; manganese, iron, thallium, and arsenic also contributed to this HI. The next highest non-cancer risks are associated with future construction workers during excavation at the site. The HI estimate for construction workers is 70, almost entirely due to ingestion of mercury present in subsurface soil.

As a result of uncertainties in estimating health risks, the risk assessment should not be construed as presenting absolute risks or hazards. Rather, it is a conservative analysis intended to indicate the potential for adverse impacts to occur based on reasonable on reasonable maximum and central tendency exposures.

8.4 Screening Level Ecological Risk Assessment Summary

Results of the SLERA indicate the potential for ecological risk to ecological receptors from exposure to chemicals detected in site surface water, sediment, and soil. COCs may present an ecological risk to the aquatic invertebrates from surface water and sediment of the streams and the I-90 Pond. The potential for ecological risks exists to freshwater fish and amphibians from copper, aluminum, and mercury in site surface water. The potential for ecological risk to the food chain receptors exist from sediment and surface soil COCs. Potential ecological risks exist for piscivorous birds, insectivorous birds, and piscivorous mammals, primarily from metals. Additional risk contributors are PCBs, pesticides, and SVOCs. Mercury is a contributor to the potential risks of the receptors with food chain exposures based on sediment COCs. Potential ecological risks exist to insectivorous mammals, primarily from SVOCs and the pesticide 4,4'-DDT. Mercury does not contribute to the potential risks for the receptors with food chain exposures based on soil COCs.

8.5 Conclusions

The findings of the RI are as follows:

- The catch basins are contaminated with inorganics, especially mercury and methylmercury. The catch basins have not been properly closed and remain a pathway for site related contaminants to reach the tributary of Patroon Creek and downstream receptors.

- Surface water in the stream and I-90 Pond shows minimal impact from the site. However, surface water in the stream will provide a means for transport of contaminated sediments to downstream locations.

- Sediments are contaminated with inorganics, including mercury, and methylmercury. Mercury contamination is present in the most downstream sample collected during the RI and at the maximum depth of the sediment samples. The I-90 Pond is a sink for mercury-contaminated sediments transported downstream in the Patroon Creek drainage. Sediments are also contaminated with PAHs and pesticides, which are not believed to be related to the site.

- Fish tissue results indicate mercury contamination in fish in the Patroon Creek drainage. However, the fish sampling locations were limited and a limited number of fish were available at some of the sampling locations. Methylmercury in stream and pond sediments and surface water indicates that the potential for bioaccummlation and biomagnification of mercury in the food chain. Mercury in sport fish in the I-90 Pond indicates a potential for human exposure.

- Off-site surface soils are contaminated with mercury and other inorganic contaminants that were likely deposited from mercury processing emissions from the site. PAHs were commonly detected in off-site surface soil samples and may be related to operation of the mercury retort furnace and to other industrial activities in the area near the site.

- Results of the groundwater-surface water interaction study indicate that shallow groundwater in the vicinity of the site discharges to the tributary of Patroon Creek, providing a pathway for groundwater from the site to enter the tributary.

- Subsurface soils at the site are grossly contaminated with mercury. High concentrations of elemental mercury were detected in many subsurface soil samples. Elemental mercury was observed in soil samples from boring MW-05D at depths up 66 feet bgs, near the surface of the confining layer, and at two other boring locations. Elemental mercury in the subsurface soils is a source for groundwater contamination.

- The deep soil boring data do not indicate that a significant quantity of mercury DNAPL is pooled at the surface of the confining layer. Elemental mercury observed in two deep borings (SBD-01 and SBD-02), was well above the confining layer. However, elemental mercury was observed in deep soil boring MW-5D near the surface of the confining unit.

- Groundwater is contaminated with mercury only at MW-05D, the location that exhibited the highest concentrations of mercury in soil samples, and visible elemental mercury. This suggests that either the plume is small or that the extent of dissolved-phase mercury contamination has not been adequately characterized.

- Results of the SLERA indicate that the potential exists for risk to ecological receptors from exposure to COCs in site surface water, sediment, and soil. Potential ecological risk exists for food chain receptors, primarily from metals, but also from PCBs, pesticides, and SVOCs. Mercury is a contributor to the potential risks for receptors with food chain exposures based on sediment COCs. Potential ecological risks exist to insectivorous mammals, primarily from SVOCs and the pesticide 4,4'-DDT. Mercury does not contribute to the potential risks for the receptors based on food chain exposures to soil COCs

8.6 Data Gaps

A number of data gaps were identified during the process of evaluating the RI data. Data gaps exist where the current data are insufficient to draw conclusions or where the extent of contamination for a media pathway likely exceeds the boundaries of the sampling program. The following gaps were identified in the RI data:

- Stream sediment data are insufficient to define the extent of contamination in the stream and I-90 Pond. Current stream sediment data suggest that the sediment contamination is present at greater depths in the I-90 Pond, the tributary of Patroon Creek, and Patroon Creek stream and beyond the most downstream sample collected during the RI.

- The groundwater plume has not been adequately defined. Groundwater data suggest that either the plume is small or that the extent of dissolved-phase mercury contamination has not been adequately characterized.

8.7 Recommendations

Recommendations for additional activities needed to fill data gaps in the RI are provided below.

- Mercury concentrations in stream sediments indicate that mercury exceeds it screening criteria in the most downstream sediment sample (SD-14) and in the deepest sediment samples (12 inches). Mercury contamination is likely present at greater depths in the pond, which is a sink for sediments transported by Patroon Creek. It is recommended that sediment profile samples be collected in the stream and I-90 Pond to better define the extent of contamination and to support development of remedial alternatives in the FS.

- The extent of groundwater contamination has not been adequately defined. To further evaluate the extent of groundwater contamination, groundwater depth profile sampling for mercury is planned for the area hydraulically downgradient of monitoring well MW-5 and known areas of subsurface soil contamination; between the site and the tributary of Patroon Creek.

- The catch basins contain high levels of mercury and other metals. Although the system was reportedly closed, mercury-contaminated runoff is still discharging to the tributary of Patroon Creek. The remaining water and sediment in the catch basins should be removed and the catch basin system, including piping, should be properly closed.
- Based on a review of wetland and floodplain mapping and the results of the ecological field investigation, wetland and floodplain delineations are not recommended at this time. The FS will include an evaluation of all applicable, relevant and appropriate requirements (ARARs) and "to be considered" criteria (TBCs) relevant to wetlands and flood plains. If a remedial action is selected that will potentially impact wetlands or floodplains in contaminated areas, the appropriate delineations will be performed as part of the remedial design and be included in the remedial design report.

9

Section Nine

Section 9
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10

Section
Ten

Section 10
Glossary of Abbreviations

amsl	Above mean sea level
ARAR	Applicable or Relevant and Appropriate Requirement
As	Arsenic
ATV	All terrain vehicle
Be	Beryllium
bgs	Below ground surface
BTAG	Biological Technical Assistance Group
$CaCO_3$	Calcium carbonate
Cd	Cadmium
CDM	CDM Federal Programs Corporation
CEC	Cation Exchange Capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	Cubic feet per second
CISS	Colonie Interim Storage Site
CLP	Contract Laboratory Program
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
c/sec	Counts per second
Cr	Chromium
CRA	Conestoga-Rovers Associates
CT	Central tendency
Cu	Copper
°C	Degrees Centigrade
DNAPL	Dense non-aqueous phase liquid
DO	Dissolved Oxygen
EGIS	Environmental Geographic Information System
EPA	United States Environmental Protection Agency
ERAGS	Ecological Risk Assessment Guidance for Superfund
FCR	Field Change Request
FEMA	Federal Emergency Management Agency
FIRM	Floof Insurance Rate Map
ft/ft	Foot per foot
°F	Degrees Fahrenheit
HCl	Hydrochloric acid
Hg	Mercury
HHRA	Human Health Risk Assessment
HI	Hazard index
H_2S	Hydrogen sulfide
IDW	Investigation Derived Waste
km	Kilometer
JMA	John Milner Associates, Inc.
LASC	Lake Albany Silt and Clay
MCL	Maximum Contaminant Level
mg/m^3	milligram per cubic meter

MERECO	Mercury Refining Corporation
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
ml	milliliter
mph	Miles per hour
mV	Millivolts
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MTBE	Methyl tertiary-butyl ether
ng/g	Nanograms per gram
ng/l	Nanograms per liter
Ni	Nickel
NOAA	National Oceanic and Atmospheric Association
NPDWS	National Primary Drinking Water Standards
NPL	National Priorities List
NSDWR	National Secondary Drinking Water Regulations
NTU	Nephleometric Turbidity Units
NWI	National Wetland Inventory
NYCRR	New York Codes, Rules and Regulations
NYWQS	New York Ambient Water Quality Standards and Guidance Values
NYSDEC	New York Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSWER	Office of Solid Waste and Emergency Response
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCB	Polychlorinated biphenyl
PID	Photoionization Detector
ppm	Parts per million
ppt	Parts per trillion
PRG	Preliminary Remediation Goal
PTI	PTI Environmental Services
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
RAC II	Response Action Contract, Region II
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable maximum exposure
RPM	Remedial Project Manager
Se	Selenium
SI	Site Investigation
SLERA	Screening Level Ecological Risk Assessment
SpC	Specific Conductance
SUNY	State University of New York
SVOC	Semivolatile Organic Compound
$t^{1}/_{2}$	Half life
TAGM	Technical and Administrative Guidance Memorandum

TAL	Target Analyte List
TBC	"To Be Considered" Material
TCL	Target Compound List
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TSS	Total Suspended Solids
UCL	Upper Control Limit
ug/kg	Micrograms per kilogram
ug/L	Micrograms per liter
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOA	Volatile Organic Analyte
VOC	Volatile Organic Compound
Zn	Zinc

Tables

TABLE 1-1
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED IN 1989
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Map	Sample ID	Location	Total Mercury (mg/kg)*	Total PCBs (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
A-0	89-02-21	230 RR Avenue	0.137				
A-0	89-02-22	30' N of tel. Pole #254A	0.103				
A-0	89-02-24	Lafite front yard	0.157				
A-0	89-04-09	ATV trail, 75 m E of 89-04-08	1.59				
A-0	89-06-22	Main gate	28.8		0.9	29	229
A-0	89-73-01	Fenceline between DJ & Mereco	288	2.84	28.9	225	8330
A-0	89-73-01-D	Fenceline between DJ & Mereco	275				
A-0	89-73-02	Grassy, SW corner of DJ(0"-2")	6.37	0.07	1.8	94	497
A-0	89-73-02-D	Grassy, SW corner of DJ(0"-2")	5.9				
A-0	89-73-04	SW corner of Holland Warehouse	5.38				
A-0	89-73-04-D	SW corner of Holland Warehouse	5.34				
A-0	89-73-05	Lawn @ W side of GA Computers	0.845				
A-0	89-73-05-D	Lawn @ W side of GA Computers	0.762				
A-1	89-02-23	Clay under fan, Southmost Mereco	7.89				
A-1	89-02-25	Betw. RR & DJ, 50' E Mereco	3.54				
A-1	89-02-26	Betw. RR & DJ, 75' E Mereco	3.8				
A-1	89-04-07	480' W Mereco, 25' fr RR tracks	1.19				
A-1	89-06-19	At fence, DJ & trailer	311		35.6	181	5360
A-1	89-06-20	DJ fence & frame building	497		21.8	948	5070
A-1	89-10-06	4' W of MRC	8.99				
A-1	89-10-07	34' W of MRC	2.49				
A-1	89-10-08	64' W of MRC	1.55				
A-1	89-10-09	94' W of MRC	2.91				
A-1	89-10-10	124' W of MRC	0.796				
A-1	89-10-20	Fence bet. Pallet Co & Diamond W	7.6				
A-1	89-10-21	20m W of MRC	2.81				
A-1	89-10-31	Fenceline bet. DJ & Pallet Co.	5.49				
A-1	89-73-03	Grated Manhole Drain @ DJ	1040				
A-1	89-73-03-D	Grated Manhole Drain @ DJ	955				
A-2	89-04-08	ATV trail, S Mereco	1.3				
A-2	89-04-10	20' N of hi-ten pole (0"-2")	5.51				
A-2	89-06-21	Green pipe	95.5		7.7	35	1170
A-2	89-53-1	ATV trail, South of MRC	0.251				
A-2	89-53-2	ATV trail, South of DJ	0.103				
A-2	89-53-3	ATV trail, South of DJ	0.108				
A-2	89-53-4	Hi-ten. Pole, South of MRC	1.11				
A-3	89-10-32	SE of MRC, bet. RR track & ATV	1.46				
A-4	89-13-03	250m W of MRC, 0"-2" depth	0.136				
A-4	89-13-04	250m W of MRC, 4"-6" depth **	0.115				
J	89-48-30	Hudson River Outfall Cove	0.08				
NO***	89-73-06	6 Mile Water Works Park(Control)	0.117		<0.7	46	133
NO***	89-73-06-D	6 Mile Water Works Park(Control)	0.113				

Source: NYSDEC. 1990. Draft Evaluation of Off-Site Contamination Associated with a Mercury Recycling Facility: Mercury Refining Company (Colonie, NY). March, 1990. All samples were taken in 1989. Specific date of collection was not provided. *See Appendix A for sample locations on maps from NYDSEC, 1990.*

An empty cell indicates that the sample was not analyzed for this parameter.

<: Not detected. Value shown is the quantitation limit.

* All units are in mg/kg dry weight

** All samples were taken at a depth of 0-2", except for sample 89-13-04 which was taken at a depth of 4-6".

*** The location of these samples was not indicated on maps from source.

TABLE 1-2
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED FROM MERECO PROPERTY IN 1995 AND 1997: MERCURY
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location	Depth (ft)	Date Collected	Total Mercury (mg/kg)
SB-1	SB-1	7-8	Mar-95	0.22
SB-1	SB-1	8-9	Mar-95	0.36
SB-2	SB-2	8-9	Mar-95	15.2
SB-2	SB-2	9-10	Mar-95	39.7
SB-2A	SB-2	15-16	8/18/1997	3.3
SB-2A	SB-2	16-17	8/18/1997	35
SB-3	SB-3	11-12	Mar-95	119
SB-3	SB-3	12-13	Mar-95	178
SB-3A	SB-3	16-17	8/18/1997	ND
SB-3A	SB-3	17-18	8/18/1997	ND
SB-4	SB-4	11.7-12.1	Mar-95	ND
SB-4	SB-4	12.1-12.8	Mar-95	0.66
SB-6	SB-6	12-13	Jul-95	4.1
SB-7	SB-7	11-12	Jul-95	ND
SB-7	SB-7	12-13	Jul-95	ND
SB-8	SB-8	13-15	Jul-95	3.5
SB-8	SB-8	15-17	Jul-95	1.5
SB-9	SB-9	12-13	Jul-95	ND
SB-9	SB-9	9-10	Jul-95	0.12
SB-11	SB-11	17-18	Jul-95	1.1
SB-12	SB-12	15-17	Jul-95	4.7
SB-13	SB-13	11-12	Jul-95	1.1
SB-13	SB-13	12-13	Jul-95	4
SB-14	SB-14	10-12	Jul-95	1.5
SB-15	SB-15	11-12	Jul-95	2.5
SB-15	SB-15	12-13	Jul-95	46.6
SB-15	SB-15	16-17	8/18/1997	2.4
SB-15	SB-15	17-18	8/18/1997	0.4
SB-16	SB-16	2-4	8/18/1997	ND
SB-16	SB-16	6-8	8/18/1997	ND
SB-16	SB-16	8-9	8/18/1997	ND
SB-17	SB-17	1-2	8/18/1997	15
SB-17	SB-17	4-6	8/18/1997	ND
SB-18	SB-18	1-2	8/18/1997	23
SB-18	SB-18	6-8	8/18/1997	2.8
SB-18	SB-18	8-9	8/18/1997	ND
SB-19	SB-19	0-1	8/18/1997	2
SB-19	SB-19	1-2	8/18/1997	1.9
SB-20	SB-20	0-1	8/18/1997	ND
SB-20	SB-20	1-2	8/18/1997	ND
SB-21	SB-21	0-1	8/18/1997	0.3
SB-21	SB-21	1-2	8/18/1997	ND
SB-22	SB-22	1-2	8/18/1997	0.2
SB-22	SB-22	2-3	8/18/1997	0.7
SB-23	SB-23	2-3	8/18/1997	ND
SB-23	SB-23	3-4	8/18/1997	ND
SB-24	SB-24	0-1	8/18/1997	ND
SB-24	SB-24	1-2	8/18/1997	ND

TABLE 1-2
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED FROM MERECO PROPERTY IN 1995 AND 1997: MERCURY
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location	Depth (ft)	Date Collected	Total Mercury (mg/kg)
SB-25	SB-25	0-1	8/18/1997	11
SB-25	SB-25	1-2	8/18/1997	3.3
SB-26	SB-26	0-1	8/18/1997	34
SB-26	SB-26	1-2	8/18/1997	ND
SB-27	SB-27	0-1	8/18/1997	ND
SB-27	SB-27	1-2	8/18/1997	0.3
SB-28	SB-28	0-1	8/18/1997	43
SB-28	SB-28	1-2	8/18/1997	ND
SB-129	SB-29	0-1	8/18/1997	
SB-29	SB-29	0-1	8/18/1997	2.3
SB-29	SB-29	1-2	8/18/1997	ND
SB-30	SB-30	0-1	8/18/1997	0.7
SB-30	SB-30	1-2	8/18/1997	ND

Source: Mercury Refining Company, Inc. 1997. RCRA Facility Investigation Interim Corrective Measures Sampling Visit Report. November, 1997

See Appendix A for sample locations on map from Mercury Refining Company, Inc., 1997.
ND: Not detected. Sample-specific detection limit was not reported in indicated reference.
An empty cell indicates that the sample was not analyzed for this parameter.

TABLE 1-3
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED FROM MERECO PROPERTY IN 1995 AND 1997: PCBS AND INORGANICS
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location	Depth (ft)	Date Collected	Arsenic (mg/kg)	Barium (mg/kg)	Chromium (mg/kg)	Total PCBs (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
SB-23	SB-23	2-3	8/18/1997	1.7	17.3	5.5	ND	ND	11.9	12.2	8.5	ND	ND	27.6
SB-23	SB-23	3-4	8/18/1997	2	13.4	4.6	ND	ND	6	7.3	7.9	ND	ND	23.3
SB-129	SB-29	0-1	8/18/1997	3.1	38.6	8	0.17	ND	24.2	366	9.9	ND	ND	109
SB-29	SB-29	0-1	8/18/1997	2.4	44.5	10	0.077	0.5	25	90	11.7	ND	ND	104
SB-29	SB-29	1-2	8/18/1997	1.6	23.1	5	0.056	1.3	11	30	7.6	ND	ND	31

Source: Mercury Refining Company, Inc. 1997. RCRA Facility Investigation Interim Corrective Measures Sampling Visit Report. November, 1997

See Appendix A for sample locations on map from Mercury Refining Company, Inc., 1997.
ND: Not detected. Sample-specific detection limit was not reported in indicated reference.

TABLE 1-4
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED IN 1997 FROM PROPERTIES BORDERING MERECO
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location	Depth (inches)	Total Mercury (mg/kg)	Total PCBs (mg/kg)	Copper (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
SB-31	SB-31	0-6"	6.5		28.1	34.6	278
SB-31	SB-31	6-12"	2.4				
SB-32	SB-32	0-6"	7.2		23.4	51.1	106
SB-32	SB-32	6-12"	15.5				
SB-33	SB-33	0-6"	5		14	11.9	55.6
SB-33	SB-33	6-12"	2.4				
SB-34	SB-34	0-6"	7.5		17.4	10	99
SB-34	SB-34	6-12"	3.7				
SB-135	SB-35	0-6"	9.8	ND	13.5	6.7	42.5
SB-35	SB-35	0-6"	9.8	0.03	14.9	8.2	49
SB-35	SB-35	6-12"	1.6				
SB-36	SB-36	0-6"	11.1		10.2	8	24.4
SB-36	SB-36	6-12"	3.2				
SB-37	SB-37	0-6"	10.8		27.1	23.7	60.7
SB-37	SB-37	6-12"	ND				
SB-38	SB-38	0-6"	ND		26.9	22.3	57.4
SB-38	SB-38	6-12"	1.4				
SB-39	SB-39	0-6"	ND		34.8	29.1	70
SB-39	SB-39	6-12"	1.5				
SB-40	SB-40	0-6"	1.9		20.1	14.9	64.8
SB-140	SB-40	6-12"	65.9				
SB-40	SB-40	6-12"	27				
SB-41	SB-41	0-6"	ND		27.2	19.6	69.3
SB-41	SB-41	6-12"	3.4				
SB-42	SB-42	0-6"	1.1		25.2	17.6	89.8
SB-42	SB-42	6-12"	3				
SB-43	SB-43	0-6"	13.1		18.2	14.2	88.9
SB-43	SB-43	6-12"	150				
SB-44	SB-44	0-6"	1.2	ND	25.5	19.4	68.2
SB-44	SB-44	6-12"	1.2				
SB-45	SB-45	0-6"	1.9		26.2	14.1	54.3
SB-45	SB-45	6-12"	5.2				
SB-46	SB-46	0-6"	ND	ND	25.4	17.3	56.2
SB-46	SB-46	6-12"	1.4				
SB-47	SB-47	0-6"	1.3		21	16.4	50.4
SB-47	SB-47	6-12"	2.2				
SB-48	SB-48	0-6"	ND		27.3	18.9	86.7
SB-48	SB-48	6-12"	ND				
SB-49	SB-49	0-6"	ND		20.8	15.7	67.8
SB-49	SB-49	6-12"	ND				
SB-150	SB-50	0-6"	ND		10.6	12	35.8
SB-50	SB-50	0-6"	1.1		13.3	13.1	39.8
SB-50	SB-50	6-12"	ND				
SB-51	SB-51	0-6"	4.2		21.8	28.5	866
SB-51	SB-51	6-12"	ND				
SB-52	SB-52	0-6"	1.3		4.8	ND	41
SB-52	SB-52	6-12"	ND				

TABLE 1-4
SUMMARY OF ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED IN 1997 FROM PROPERTIES BORDERING MERECO
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location	Depth (inches)	Total Mercury (mg/kg)	Total PCBs (mg/kg)	Copper (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
SB-53	SB-53	0-6"	27.4		23	11.4	192
SB-53	SB-53	6-12"	ND				

Source: Mercury Refining Company, Inc. 1998. RCRA Facility Investigation, AOC-4, -5, & -6 Soil Sampling Report, AOC-2 Sediment Sampling and Cleaning Report. January, 1998.

See Appendix A for sample locations on map from Mercury Refining Company, Inc., 1998.
All samples were collected December 18, 1997.
ND: Not detected. Sample-specific detection limit was not reported in indicated reference.
An empty cell indicates that the sample was not analyzed for this parameter.

TABLE 1-5
SUMMARY OF ANALYTICAL RESULTS FOR QUARTERLY GROUNDWATER MONITORING (1993-2000)
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Date Collected	Arsenic (mg/l)	Barium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Chromium Hex (mg/l)	Copper (mg/l)	Lead (mg/l)	Mercury (mg/l)	Mercury-Filtered (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Zinc (mg/l)	Temp (°C)	Spec. Cond (umhos/cm)	Static W L (feet)	PCB (ug/l)	pH (su)	Ref*
	NYS GWS:	0.025	1	0.005	0.05	0.05	0.2	0.025	0.0007	0.0007	0.1	0.01	0.05	0.3				0.09		
	MDL:	0.005		0.005	0.005	0.02	0.05	0.005	0.0004	0.0004	0.05	0.005	0.02	0.01				0.5		
OW1-85	4/19/1993	0.009	0.012	ND	ND	ND	0.06	0.01	0.0015	0.0015	ND	ND	ND	0.12	12	968	7.85	ND	7.5	1
OW1-85	8/25/1993	0.012	0.15	0.017	ND	ND	0.1	0.03	0.0052	ND	ND	ND	ND	0.34	16	944	8.59	ND	7.4	1
OW1-85	11/8/1993	ND	0.06	ND	ND	ND	ND	ND	0.0033	ND	ND	ND	ND	0.06	12	1121	8.58	ND	7.7	1
OW1-85	2/23/1994	ND	0.05	ND	0.1	ND	ND	0.007	0.0005	ND	ND	ND	ND	0.02	10	952	8.63	ND	7.7	1
OW1-85	6/16/1994	0.01	0.018	ND	ND	ND	0.11	0.042	0.054	ND	ND	ND	ND	0.23	15	906	8.26	ND	6.9	1
OW1-85	8/15/1994	ND	0.16	ND	ND	ND	ND	0.006	0.0084	ND	ND	ND	ND	0.11	14	915	8.45	ND	7.4	1
OW1-85	11/16/1994	ND	0.05	ND	ND	ND	ND	ND	0.0038	ND	ND	ND	ND	0.04	12	900	8.79	ND	7.7	1
OW1-85	3/20/1995	ND	0.06	ND	ND	ND	ND	0.017	0.0101	ND	0.05	ND	ND	0.07	12	930	8.52	ND	7.7	1
OW1-85	5/31/95			ND	ND		0.07	0.017	ND	ND				0.06	14	776		ND	7.6	1
OW1-85	8/16/1995			ND	ND		ND	ND	ND	ND				0.02	17.5	1051			7.6	1
OW1-85	3/19/96			ND	0.049		0.14	0.047	0.035	0.0008				0.68				ND		1
OW1-85	10/3/96			ND	0.038		0.084	0.032	0.038	ND				0.65	16.6	1050	8.26	ND	8.08	1
OW1-85	12/23/96			ND	0.021		0.052	0.023	0.012	< .0002				0.3	8.8	908	7.78	ND	7.6	1& 25
OW1-85	3/13/1997			ND	< .01		0.07	0.014	0.02	< .0002				0.32	14.2	749	8.23	ND	7.75	26
OW1-85	6/24/1997			ND	0.063		0.17	0.05	0.018	< .0002				0.52	15.1	894	8.35	ND	6.56	16
OW1-85	10/1/1997			ND	0.047		0.17	0.055	0.046	< .0002				0.77	14.3	725	8.55	ND	7.12	17
OW1-85	3/10/1998			ND	0.058		0.1	0.013	0.013	< .0002				0.35	9.5	859		ND	7.6	18
OW1-85	6/25/1998			ND	0.038		0.06	ND	0.006	< .0002				0.16				ND		19
OW1-85	9/30/1998			ND	0.047		0.025	0.01	0.11	< .0002				0.15				ND		20
OW1-85	12/29/1998			ND	0.036		0.055	0.015	0.013	< .0002				0.29				ND		22
OW1-85dup	12/29/1998			ND	0.058		0.028	0.009	0.0068	0.0005				0.18				ND		22
OW1-85	3/30/1999			ND	0.05		0.11	0.025	0.0086	< .0002				0.44				ND		22
OW1-85	9/28/1999			ND	0.021		0.026	ND	0.0078	< .0002				0.2				ND		23
OW1-85	3/3/2000			ND	0.04		0.1	0.042	< .002	< .0002				0.59				ND		24

TABLE 1-5
SUMMARY OF ANALYTICAL RESULTS FOR QUARTERLY GROUNDWATER MONITORING (1993-2000)
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Date Collected	Arsenic (mg/l)	Barium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Chromium Hex (mg/l)	Copper (mg/l)	Lead (mg/l)	Mercury (mg/l)	Mercury-Filtered (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Zinc (mg/l)	Temp (°C)	Spec. Cond (umhos/cm)	Static W L (feet)	PCB (ug/l)	pH (su)	Ref*
	NYS GWS:	0.025	1	0.005	0.05	0.05	0.2	0.025	0.0007	0.0007	0.1	0.01	0.05	0.3				0.09		
	MDL:	0.005		0.005	0.005	0.02	0.05	0.005	0.0004	0.0004	0.05	0.005	0.02	0.01				0.5		
OW2-85	4/19/1993	0.014	0.25	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	0.09	11	1002	10.98	ND	6.7	1
OW2-85	8/25/1993	ND	0.08	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	0.02	17	993	12.1	ND	6.5	1
OW2-85	11/8/1993	ND	0.08	ND	ND	ND	ND	ND	0.0007	0.0005	ND	ND	ND	0.02	12	1025	11.94	ND	6.8	1
OW2-85	2/23/1994	ND	0.07	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	0.01	11	1010	12.13	ND	7	1
OW2-85	6/16/1994	0.008	0.25	ND	ND	ND	ND	0.072	ND	ND	ND	0.009	ND	0.01	14	953	11.48	ND	6.2	1
OW2-85	8/15/1994	0.009	0.07	0.031	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.16	15	960	11.78	ND	6.4	1
OW2-85	11/16/1994	ND	0.13	0.031	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.16	12	950	12.19	ND	6.9	1
OW2-85	3/20/1995	ND	0.17	ND	ND	ND	ND	0.009	0.0068	ND	0.08	ND	ND	0.02	12	910	11.8	ND	6.8	1
OW2-85	5/31/95			ND	ND		ND	0.02	ND	ND				0.05	13	667		ND	6.5	1
OW2-85	8/16/1995			ND	ND		ND	0.02	ND	ND				0.03	15	905			6.7	1
OW2-85	3/19/96			0.007	0.078		0.29	0.099	0.0008	0.0012				0.7				ND		1
OW2-85	10/3/96			ND	0.32		1.3	0.38	0.0048	ND				2.7	17.8	1150	11.58	ND	7.93	1
OW2-85	12/23/96			0.013	0.23		0.96	1.2	0.0029	< .0002				1.8	9.6	1126	10.57	ND	6.8	1&25
OW2-85dup	12/23/96			ND	0.032		0.12	0.087	< .002	< .0002				0.31				ND		25
OW2-85	3/13/1997			ND	< .01		0.037	0.012	0.0004	< .0002				0.1	15.4	1263	11.46	ND	6.94	26
OW2-85	6/24/1997			0.016	0.27		0.83	0.26	0.0023	< .0002				1.9	15.2	1372	11.67	ND	6.18	16
OW2-85	10/1/1997			0.006	0.097		0.43	0.19	0.0048	< .0002				1.1	14.2	1017	11.9	ND	6.69	17
OW2-85	3/10/1998			ND	0.14		0.44	0.086	0.0014	< .0002				0.77	9.3	1124		ND	6.9	18
OW2-85	6/25/1998			ND	0.071		0.21	0.052	0.0007	< .0002				0.44				ND		19
OW2-85	9/30/1998			ND	0.038		0.041	0.015	0.0003	< .0002				0.14				ND		20
OW2-85	12/29/1998			ND	0.1		0.28	0.078	0.0005	< .0002				0.8				ND		22
OW2-85	3/30/1999			ND	0.071		0.34	0.11	0.0003	< .0002				0.92				ND		22
OW2-85dup	3/30/1999			ND	0.038		0.22	0.079	0.0002	< .0002				0.61				ND		22
OW2-85	9/28/1999			ND	0.032		0.081	0.034	< .0002	< .0002				0.18				ND		23
OW2-85	3/3/2000			ND	0.025		0.13	0.078	0.004	< .0002				0.4				ND		24

TABLE 1-5
SUMMARY OF ANALYTICAL RESULTS FOR QUARTERLY GROUNDWATER MONITORING (1993-2000)
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Date Collected	Arsenic (mg/l)	Barium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Chromium Hex (mg/l)	Copper (mg/l)	Lead (mg/l)	Mercury (mg/l)	Mercury-Filtered (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Zinc (mg/l)	Temp (°C)	Spec. Cond (umhos/cm)	Static W L (feet)	PCB (ug/l)	pH (su)	Ref*
	NYS GWS:	0.025	1	0.005	0.05	0.05	0.2	0.025	0.0007	0.0007	0.1	0.01	0.05	0.3				0.09		
	MDL:	0.005		0.005	0.005	0.02	0.05	0.005	0.0004	0.0004	0.05	0.005	0.02	0.01				0.5		
OW3-85	4/19/1993	0.014	0.08	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	0.05	13	1509	10.85	ND	6.3	1
OW3-85	8/25/1993	0.008	0.13	0.056	0.01	ND	0.28	0.02	ND	ND	0.06	ND	ND	0.27	16	1103	11.9	ND	6.1	1
OW3-85	11/8/1993	0.008	0.02	ND	ND	ND	ND	ND	ND	0.0002	ND	ND	ND	0.01	13	953	12.46	ND	6.6	1
OW3-85	2/23/1994	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	12	898	12.64	ND	6.9	1
OW3-85	6/16/1994	0.01	0.06	ND	ND	ND	ND	0.019	ND	ND	ND	ND	ND	0.01	15	800	11.49	ND	5.9	1
OW3-85	8/15/1994	0.006	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	13	756	11.74	ND	6	1
OW3-85	11/16/1994	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	13	691	12.67	ND	6.5	1
OW3-85	3/20/1995	ND	0.04	ND	ND	ND	ND	0.011	ND	ND	0.06	ND	ND	ND	13	764	12.2	ND	6.5	1
OW3-85	5/31/95																			1
OW3-85	8/16/1995																			1
OW3-85	3/19/96			ND	0.035		0.037	0.011	0.001	ND				0.096				ND		1
OW3-85	10/3/96			ND	0.02		ND	0.011	ND	ND				0.076	17.6	710	11.98	ND	8.2	1
OW3-85	12/23/96			ND	0.019		0.022	0.011	< .002	< .0002				0.13	8.8	908	7.78	ND	6.8	1 & 25
OW3-85	3/13/1997			ND	< .01		< .02	< .01	0.0002	ND				0.044	15.7	728	12.19	ND	6.57	26
OW3-85	6/24/1997			ND	0.13		0.35	0.11	0.0037	< .0002				0.59	14.8	745	11.88	ND	6.15	16
OW3-85Dup	6/24/1997			ND	0.17		0.52	0.16	0.0021	< .0002				0.84				ND		16
OW3-85	10/1/1997			ND	0.086		0.28	0.1	0.0013	0.0003				0.5	13.7	609	12.39	ND	6.54	17
OW3-85	3/10/1998			ND	0.028		< .02	ND	< .0002	< .0002				0.029	10.1	685		ND	6.7	18
OW3-85	6/25/1998			ND	0.027		< .02	ND	< .0002	0.0003				0.031				ND		19
OW3-85Dup	6/25/1998			ND	0.046		0.11	0.042	0.0008	< .0002				0.18				ND		19
OW3-85	9/30/1998			ND	0.079		< .02	0.009	0.0003	< .0002				0.065				ND		20
OW3-85	12/29/1998			ND	0.081		0.29	0.13	0.0023	< .0002				0.59				ND		22
OW3-85	3/30/1999			ND	0.018		0.029	ND	< .0002	< .0002				0.091				ND		22
OW3-85	9/28/1999			ND	0.043		< .02	0.009	< .0002	< .0002				0.098				ND		23
OW3-85	3/3/2000			ND	0.059		0.046	0.028	< .002	< .0002				0.18				ND		24
OW3-85Dup	3/3/2000			ND	0.04		0.044	0.031	< .002	< .0002				0.18				ND		24

TABLE 1-5
SUMMARY OF ANALYTICAL RESULTS FOR QUARTERLY GROUNDWATER MONITORING (1993-2000)
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Date Collected	Arsenic (mg/l)	Barium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Chromium Hex (mg/l)	Copper (mg/l)	Lead (mg/l)	Mercury (mg/l)	Mercury-Filtered (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Zinc (mg/l)	Temp (°C)	Spec Cond (umhos/cm)	Static W L (feet)	PCB (ug/l)	pH (su)	Ref*
	NYS GWS:	0.025	1	0.005	0.05	0.05	0.2	0.025	0.0007	0.0007	0.1	0.01	0.05	0.3				0.09		
	MDL:	0.005		0.005	0.005	0.02	0.05	0.005	0.0004	0.0004	0.05	0.005	0.02	0.01				0.5		
OW4-85	11/8/1993	ND	0.06	ND	ND	ND	ND	ND	ND	0.0005	ND	ND	ND	0.01	12	794	10.43	ND	6.4	1
OW4-85	2/23/1994																			1
OW4-85	6/16/1994	ND	0.05	ND	ND	ND	ND	ND	0.001	ND	ND	ND	ND	0.01	14	768	9.26	ND	5.6	1
OW4-85	8/15/1994	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	13	744	10.13	ND	5.8	1
OW4-85	11/16/1994	ND	0.06	ND	ND	ND	ND	ND	0.0004	ND	ND	ND	ND	ND	12	725	11.05	ND	6.4	1
OW4-85	3/20/1995	ND	0.06	ND	ND	ND	ND	0.006	ND	ND	0.06	ND	ND	ND	10	705	9.93	ND	6.2	1
OW4-85	5/31/95			ND	ND		ND	ND	ND	ND				ND	13	540			6.2	1
OW4-85	8/16/1995			ND	ND		ND	ND	ND	ND				0.03	17	725			6.4	1
OW4-85	3/19/96																			1
OW4-85	10/3/96			ND	0.021		ND	ND	0.0045	ND				0.071	17	1010	9.88	ND	7.25	1
OW4-85	12/23/96			ND	0.013		< .02	0.005	0.0026	< .0002				0.091	9.3	911	8.57	ND	6.3	1 & 25
OW4-85	3/13/1997			ND	< .01		< .02	< .01	0.0032	< .0002				0.029	15.3	856	9.76	ND	6.45	26
OW4-85	6/24/1997			ND	0.03		ND	ND	0.0013	< .0002				0.02	14.1	1012	9.72	ND	6.16	16
OW4-85	10/1/1997			ND	0.02		0.022	0.02	0.0046	< .0002				0.12	13.8	976	10.67	ND	7.05	17
OW4-85dup	10/1/1997			ND	0.011		< .02	0.023	0.01	< .0002				0.17				ND		17
OW4-85	3/10/1998			ND	< .01		< .02	ND	0.001	< .0002				< .02	9	923		ND	6.4	18
OW4-85dup	3/10/1998			ND	< .01		< .02	ND	0.0016	0.0023				0.026				ND		18
OW4-85	6/25/1998			ND	< .01		< .02	ND	0.0003	< .0002				< .02				ND		19
OW4-85	9/30/1998			ND	0.03		< .02	ND	0.002	< .0002				0.038				ND		20
OW4-85dup	9/30/1998			ND	0.024		< .02	ND	0.002	< .0002				0.028				ND		20
OW4-85	12/29/1998			ND	0.019		< .02	ND	0.0031	< .0002				0.066				ND		22
OW4-85	3/30/1999			ND	< .01		< .02	ND	0.0009	0.0015				0.065				ND		22
OW4-85	9/28/1999			ND	0.011		< .02	ND	0.0005	< .0002				< .02				ND		23
OW4-85dup	9/28/1999			ND	< .01		< .02	ND	0.0008	< .0002				< .02				ND		23
OW4-85	3/3/2000			ND	< .01		< .02	ND	< .002	< .0002				< .02				ND		24

TABLE 1-5
SUMMARY OF ANALYTICAL RESULTS FOR QUARTERLY GROUNDWATER MONITORING (1993-2000)
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

*Reference:
1. Mercury Refining Company, Inc. 1997. RCRA Facility Investigation Task I Report on Current Conditions. May.
16. Mercury Refining Company, Inc. 1997. Laboratory report for quarterly groundwater samples. July 30.
17. Mercury Refining Company, Inc. 1997. Laboratory report for quarterly groundwater samples. November 14.
18. Mercury Refining Company, Inc. 1998. Laboratory report for quarterly groundwater samples. March 27.
19. Mercury Refining Company, Inc. 1998. Laboratory report for quarterly groundwater samples. July 27.
20. Mercury Refining Company, Inc. 1998. Laboratory report for quarterly groundwater samples. October 23.
22. Mercury Refining Company, Inc. 1999. Laboratory report for quarterly groundwater samples. June 15.
23. Mercury Refining Company, Inc. 1999. Laboratory report for quarterly groundwater samples. November 1.
24. Mercury Refining Company, Inc. 2000. Laboratory report for quarterly groundwater samples. May 23.
25. Mercury Refining Company, Inc. 1997. Laboratory report for quarterly groundwater samples. January 28.
26. Mercury Refining Company, Inc. 1997. Laboratory report for quarterly groundwater samples. April 14.

See Figure 1-2 of text for sample locations.
ND: Not detected. Sample- specific detection limit was not reported in indicated reference.
<: Not detected. Value shown is the quantitation limit.

TABLE 1-6
SUMMARY OF ANALYTICAL RESULTS FOR SEDIMENT SAMPLES COLLECTED IN 1983-1985
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

		1983	1984	1985 CRA Results					1985 NYSDOL Results
Location	Location Description	Total Mercury	Total Mercury	Total Mercury	Organic Mercury	Inorganic Mercury	Total Organic Carbon	Grain Size (% <75 um)	Organic Mercury
Upstream		4.7	–	–	–	–	–	–	–
Central		5.1	–	–	–	–	–	–	–
Downstream		8.6	–	–	–	–	–	–	–
RLS-1	Rensselaer Lake	–	–	0.2	**0.6**	NC	1453	3	–
CS-1	Tributary - upstream near Inga's Pond	–	<0.25	<0.3	**0.3**	NC	2171	3	<0.04
CS-2	Tributary - upstream of site	–	0.4	–	–	–	–	–	–
CS-3	Tributary - downstream of site	–	1	–	–	–	–	–	–
CS-4	Patroon Creek - upstream	–	1.5	<0.2	**0.7**	NC	2708	5	0.15
CS-5	Patroon Creek - downstream of site	–	0.8	–	–	–	–	–	–
CS-6	Patroon Creek - downstream of site	–	0.5	–	–	–	–	–	–
CS-7	Patroon Creek - downstream of site	–	<0.25	–	–	–	–	–	–
PS-8-84	I-90 Pond	–	0.5	–	–	–	–	–	–
PS-9-84	I-90 Pond	–	1.1	–	–	–	–	–	–
PS-10-84	I-90 Pond	–	2.1	–	–	–	–	–	–
PS-11-84	I-90 Pond	–	2.3	–	–	–	–	–	–
PS-1-85	I-90 Pond	–	–	0.8	0.7	0.1	9779	75	–
PS-2-85	I-90 Pond	–	–	1.5	<0.1	1.4	16546	95	–
PS-3-85	I-90 Pond	–	–	1.6	<0.1	1.5	12860	71	–
PS-4-85	I-90 Pond	–	–	1.9	0.9	1	21242	99	<0.05
PS-5-85	I-90 Pond	–	–	1.7	0.3	1.4	17161	88	–
PS-6-85	I-90 Pond	–	–	1.6	<0.1	NC	19028	96	–
PS-7-85	I-90 Pond	–	–	1.1	0.2	0.9	11982	90	–
PS-8-85	I-90 Pond	–	–	0.2	**0.3**	NC	1756	7	–
PS-9-85	I-90 Pond	–	–	0.4	0*	0*	2685	9	<0.04
PS-10-85	I-90 Pond	–	–	<0.2	0.4	NC	1280	4	–
DCS-1	Patroon Creek - downstream of I-90 Pond	–	–	0.3	<0.1	NC	4465	7	<0.04

Source: Conestoga-Rovers Associates. 1985. Section of report (pp. 11,12,15,16,18; Figures 3-5) summarizing surface water and sediment sample results for 1983-1985.

See Appendix A for sample locations on maps from CRA, 1985.
Bold values: note that this organic mercury concentration exceeds the total mercury concentration.
– = Not sampled
<: *Not detected. Value shown is the quantitation limit.*
NC = Not calculated
* Source document presented result as "0". This is likely to have been a typographical error, but the correct result is not known.
All results in mg/kg

TABLE 1-7
SUMMARY OF ANALYTICAL RESULTS FOR SEDIMENT SAMPLES COLLECTED IN 1989
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Map	Sample ID	Location	Depth (inches)	Total Mercury (mg/kg)*
A-2	89-10-22	Downstream of Culvert	0-2"	0.647
A-2	89-10-23	Downstream of Culvert	0-2"	0.686
A-2	89-10-24	Just S of RR tracks, S of DJ	0-2"	1.24
A-2	89-10-25	Just S of RR tracks, S of DJ	0-2"	4.93
A-2	89-10-26	Just S of RR tracks, S of MRC	0-2"	3.94
A-2	89-10-29	Wetland SE of MRC	0-2"	0.96
A-2	89-13-06	S of DJ Wholesale bet. ATV & RR	0-2"	0.206
A-2	89-13-07	S of DJ Wholesale bet. ATV & RR	0-2"	2.44
A-2	89-13-08	S of DJ Wholesale bet. ATV & RR	0-2"	1.99
A-2	89-15-14	S of DJ Wholesale bet. ATV & RR	0-2"	4.81
A-2	89-16-19	18" from Green Pipe (MRC)	0-2"	88.6
A-2	89-16-20	2m upstream of Culvert near MRC	0-2"	0.569
A-2	89-19-07	20m upstream of Green Pipe (MRC)	0-2"	1.86
A-2	89-19-8A	MRC Green Pipe	0"-1"	13.2
A-2	89-19-8A	MRC Green Pipe	1"-3"	51.3
A-2	89-19-8C	MRC Green Pipe	3"-5"	3.22
A-2	89-19-8D	MRC Green Pipe	5"-7"	4.2
A-2	89-19-8E	MRC Green Pipe	7"-9"	0.657
A-2	89-19-9A	Patroon Creek S of DJ	0"-1"	2.76
A-2	89-19-9B	Patroon Creek S of DJ	1"-3"	6.76
A-2	89-19-9C	Patroon Creek S of DJ	3"-6"	2.24
A-2	89-19-9D	Patroon Creek S of DJ	6"-11"	0.61
A-2	89-48-20	Green Pipe (MRC)	0-2"	154
A-2	89-48-21	South of DJ	0-2"	16
A-2	89-53-5	South of MRC	0-2"	2.78
A-2	89-53-6	South of DJ	0-2"	3.53
A-3	89-10-11	Patroon Creek, upstream of MRC	0-2"	0.116
A-3	89-10-12	Patroon Creek, upstream of MRC	0-2"	0.154
A-3	89-10-30	Puddle, 400m E of MRC	0-2"	0.908
A-3	89-13-09	S of DJ Wholesale, S of ATV Trail	0-2"	0.364
A-4	89-13-05	250m W of MRC, puddle sed.	0-2"	0.494
A-4	89-15-15	Murray Pond Outlet	0-2"	0.05
A-4	89-15-16	100m downstream of Murray Pond	0-2"	0.156
A-4	89-16-06	Creek from Rensselaer Lake	0-2"	0.045
A-4	89-19-10	Patroon Creek 300m upstream of MRC	0-2"	0.063
A-4	89-19-11	Patroon Creek N of Murray Pond	0-2"	0.129
A-4	89-45-05	Rensselaer Lake	0-2"	0.028
A-4	89-45-06	Rensselaer Lake	0-2"	<0.046
B	89-10-19	Patroon Creek, N side of I-90	0-2"	0.846
C	89-11-13	Mouth of I-90 Pond (0"-2")	0-2"	0.199
C	89-11-14**	Delta, W end of I-90 Pond	0-2"	0.15
C	89-11-15	100m upstream of I-90 Pond	0-2"	0.429
C	89-11-16	West end of I-90 Pond	0-2"	1.08
C	89-11-17	Middle of I-90 Pond	0-2"	1.33
C	89-11-18A	I-90 Pond Core (0-25cm. Depth)	0-10"	2.33
C	89-11-18B	I-90 Pond Core (25-49cm. Depth)	10-20"	1.67
C	89-16-22	I-90 Pond	0-2"	0.062
C	89-16-23	I-90 Pond	0-2"	0.092
C	89-16-24	I-90 Pond	0-2"	0.133
C	89-16-25	Base of I-90 Pond Falls	0-2"	6.97

TABLE 1-7
SUMMARY OF ANALYTICAL RESULTS FOR SEDIMENT SAMPLES COLLECTED IN 1989 MERCURY REFINING COMPANY SUPERFUND SITE COLONIE, NEW YORK

Map	Sample ID	Location	Depth (inches)	Total Mercury (mg/kg)*
D	89-11-20	70m upstream of Everett Rd.Culvert	0-2"	0.311
D	89-11-21	120m upstream of Everett Rd.Culvert	0-2"	0.132
D	89-11-22	Ditch from Tobin Plant to Pat. Creek	0-2"	0.071
D	89-11-23	Ditch from Tobin Plant to Pat. Creek	0-2"	0.074
D	89-11-24	70m downstream of I-90 Pond	0-2"	0.134
E	89-16-26	Sand Creek	0-2"	<0.031
F	89-11-28	E end Everett Rd. Industrial Park	0-2"	0.037
F	89-11-29	E end Everett Rd. Industrial Park	0-2"	0.106
G	89-11-30	200m W of I-90 Exit 6 (Arbor Hill)	0-2"	0.173
G	89-11-31	Tivoli St, W. of N. Pearl St.	0-2"	0.073
G	89-11-32	Paltroon Creek-W. end of Tivoli St.	0-2"	0.053
G	89-11-33	Paltroon Creek-W. end of Tivoli St.	0-2"	0.071
G	89-17-31	100m E of Tivoli Lake	0-2"	0.102
G	89-17-32	300m E of Tivoli Lake	0-2"	0.112
H	89-17-33	West end of Tivoli Street	0-2"	0.061
H	89-17-34	Middle of Tivoli Street	0-2"	0.08
J	89-11-34	50m W of Route 787	0-2"	0.034
J	89-12-01	Patroon Creek-outfall to Hudson Riv	0-2"	0.248
J	89-18-22	Hudson River Outfall Cove	0-2"	0.054
J	89-18-23	Hudson River Outfall Cove	0-2"	0.046
J	89-18-24	Hudson River Outfall Cove	0-2"	0.212
J	89-18-25	Hudson River Outfall Cove	0-2"	0.664
J	89-48-31	Hudson River Outfall Cove	0-2"	0.193
J	89-48-32	Hudson River Outfall Cove	0-2"	0.057

Source: NYSDEC. 1990. Draft Evaluation of Off-Site Contamination Associated with a Mercury Recycling Facility: Mercury Refining Company (Colonie, NY). March, 1990.

See Appendix A for sample locations on maps from NYSDEC, 1990.
<: Not detected. Value shown is the quantitation limit.
* All units are in mg/kg dry weight
** Matrix = sand, all others Matrix = sediment.

TABLE 1-8
SUMMARY OF ANALYTICAL RESULTS FOR SEDIMENT SAMPLES COLLECTED IN 1997
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location*	Depth (inches)	Total Mercury (mg/kg)**	Qualifier	Total Organic Carbon (% DW)	Total Solids (%)
SS01	1	0-1"	0.0851	U	15.2	52.9
SS02	2	0-1"	0.2		0.5	73
SS03	3	0-1"	0.045	U	0.67	73.5
SS04	4	0-1"	0.481		0.67	73.2
SS05	5	0-1"	0.592		1.71	66.4
SS06	6	0-1"	0.0596	U	0.29	75.5
SS07	7	0-1"	0.0795	J	2.12	60.4
SS11(DUP)	7	0-1"	0.0749	U	2.64	60.1
SS08	8	0-1"	0.131	J	0.65	71.4
SS09	9	0-1"	0.108	J	0.38	72.8
SS10	10	0-1"	0.141	J	6.44	41

Source: PTI. 1997. Summary of September Field Investigation in Off-site Areas. Letter Report from Elizabeth A. Henry to John Anderson. December 10, 1997.
See Appendix A for sample locations on map from PTI, 1997.
Date Collected September 9 & 10, 1997.
** All units are in mg/kg dry weight
U: Not detected. Sample-specific detection limit was not reported in indicated reference.
J: Estimated value.
An empty cell indicates that the sample was not analyzed for this parameter.

TABLE 1-9
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES COLLECTED FROM 1983-1985
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

			1983 CRA	1984 CRA						1985 CRA			1985 NYSDOL	
				Storm Event		Post Storm		Dry						
Location	Location Description	Filtration	Total Mercury	Total Mercury	Organic Mercury	Total Mercury	Organic Mercury	Total Mercury	Organic Mercury	Total Mercury	Organic Mercury	Inorganic Mercury	Total Mercury	Organic Mercury
Upstream	Tributary - upstream of site	U	<1	--	--	--	--	--	--	--	--	--	--	--
Upstream	Tributary - upstream of site	F	<1	--	--	--	--	--	--	--	--	--	--	--
Central	Tributary - near site	U	<1	--	--	--	--	--	--	--	--	--	--	--
Central	Tributary - near site	F	<1	--	--	--	--	--	--	--	--	--	--	--
Downstream	Tributary - downstream of site	U	<1	--	--	--	--	--	--	--	--	--	--	--
Downstream	Tributary - downstream of site	F	<1	--	--	--	--	--	--	--	--	--	--	--
W-1	Tributary - upstream of site	U	--	<0.5	<0.2	<0.5	<0.2	<0.5	<0.2	0.3	<0.2	NC	<0.2	<0.6
W-1	Tributary - upstream of site	F	--	--	--	--	--	--	--	0.5	0.4	0.1	2.6	<0.6
W-2	Patroon Creek - upstream	U	--	<0.5	<0.2	<0.5	**1.2**	<0.5	<0.2	<0.2	**0.3**	NC	<0.2	1.7
W-2	Patroon Creek - upstream	F	--	--	--	--	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.6
W-3	Tributary - downstream of site	U	--	<0.5	<0.2	<0.5	<0.2	<0.5	0.5	3.3	**3.7**	NC	<0.2	<0.6
W-3	Tributary - downstream of site	F	--	--	--	--	--	--	--	3.4	0.4	3	0.3	<0.6
W-4	Patroon Creek - downstream	U	--	<0.5	<0.2	0.8	<0.2	<0.5	<0.2	<0.2	**0.2**	NC	--	--

TABLE 1-9
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES COLLECTED FROM 1983-1985
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

			1983 CRA	1984 CRA						1985 CRA			1985 NYSDOL	
				Storm Event		Post Storm		Dry						
Location	Location Description	Filtration	Total Mercury	Total Mercury	Organic Mercury	Total Mercury	Organic Mercury	Total Mercury	Organic Mercury	Total Mercury	Organic Mercury	Inorganic Mercury	Total Mercury	Organic Mercury
W-4	Patroon Creek - downstream	F	--	--	--	--	--	--	--	0.7	0.3	0.4	--	--
W-5	I-90 Pond	U	--	<0.5	<0.2	2.7	<0.2	<0.5	<0.2	0.2	**0.4**	NC	--	--
W-5	I-90 Pond	F	--	--	--	--	--	--	--	0.4	0.4	0	--	--
RLW-1	Patroon Creek - upstream near Rensselaer Lake	U	--	--	--	--	--	--	--	<0.2	<0.2	NC	--	--
RLW-1	Patroon Creek - upstream near Rensselaer Lake	F	--	--	--	--	--	--	--	0.7	0.2	0.5	--	--
DW-1	Patroon Creek - downstream of I-90 Pond	U	--	--	--	--	--	--	--	0.3	0.4	NC	<0.2	<0.6
DW-1	Patroon Creek - downstream of I-90 Pond	F	--	--	--	--	--	--	--	0.3	<0.2	NC	<0.2	<0.6
Trip Blank		U	--	--	--	--	--	--	--	0.5	<0.2	NC	--	--

Source: Conestoga-Rovers Associates. 1985. Section of report (pp. 11,12,15,16,18; Figures 3-5) summarizing surface water and sediment samples results for 1983-1985.

See Appendix A for sample locations on maps from CRA, 1985.
Bold values: note that this organic mercury concentration exceeds the total mercury concentration.
-- : Not sampled
<: Not detected. Value shown is the quantitation limit.
NC = Not calculated
All results in ug/L
F: filtered
U: unfiltered

TABLE 1-10
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES COLLECTED IN 1989
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Map ID	Sample ID	Location	Total Mercury	Units	Qualifier
A-1	89-10-16	Storm Runoff (MRC)	0.0558	mg/L	
A-1	89-10-17	Puddle, DJ Parking Lot	0.0138	mg/L	
A-1	89-10-18	Puddle, DJ Parking Lot	0.288	mg/L	
A-1	89-13-19	75m. Upstream of MRC	0.0004	mg/L	U
A-1	89-48-11*	Puddle at MRC	41	mg/L	
A-1	89-48-12*	Wash Water (during fire)	0.0057	mg/L	
A-1	89-48-13*	2nd Wash Water	0.015	mg/L	
A-1	89-48-14*	Puddle, DJ Parking Lot	7.4	mg/L	
A-2	89-10-13	Green Pipe (MRC)	0.126	mg/L	
A-2	89-10-14	Patroon Creek, South of MRC	0.001	mg/L	
A-2	89-10-15	Storm Culvert (MRC)	0.0122	mg/L	
A-2	89-10-27	South of MRC, South of RR track	0.0004	mg/L	U
A-2	89-10-28	Downstream of ATV trail	0.0012	mg/L	
A-2	89-48-09	Storm Culvert (MRC)	0.61	mg/L	
A-2	89-48-10	Green Pipe (MRC)	0.45	mg/L	
C	89-11-11	Mouth of I-90 Pond	0.0004	mg/L	U
D	89-11-12	Spillway of I-90 Pond	0.0004	mg/L	U
J	89-12-02	Patroon Creek, Hudson River Outfall	0.0004	mg/L	U
J	89-12-03	Patroon Creek, Hudson River Outfall	0.0004	mg/L	U
J	89-48-28	Patroon Creek, 100m From Hudson R.	0.031	mg/L	
NO**	89-48-26	Patroon Creek, 100m From Hudson R.	0.032	mg/L	
NO**	89-48-27	Patroon Creek, 100m From Hudson R.	0.032	mg/L	
y	E489-504-02	Tributary - just upstream of MERECO	0.0002	mg/L	U
y	E489-504-03	Tributary - between RR & ATV	0.0611	mg/L	
y	E489-504-04	Tributary - between outfalls & RR	0.0295	mg/L	
y	E489-504-05	Tributary - large pipe outfall	0.0073	mg/L	
y	E489-504-06	Tributary - green pipe outfall	2.18	mg/L	

Sources:
NYSDEC. 1990. Draft Evaluation of Off-Site Contamination Associated with a Mercury Recycling Facility: Mercury Refining Company (Colonie, NY). March, 1990.
NYSDEC. 1989. Mercury Refining. Memorandum from Don Bell to Eric Hamilton. October 2, 1989

See Appendix A for sample locations on maps from NYSDEC, 1990 and NYSDEC, 1989.
All NYSDEC, 1990 samples were taken in 1989. Specific date of collection was not provided.
All NYSDEC, 1989 samples collected September 19, 1989, five days after fire destroyed the Hand Shop building
U: Not detected. Sample-specific detection limit was not reported in indicated reference.
* The following values were indicated on the map for these samples:
1.37 mg/kg (89-48-11); 0.0053 mg/kg (89-48-12); 0.022 mg/kg (89-48-13); 0.632 mg/kg (89-48-14)
** The location of these samples was not indicated on maps from source.

TABLE 1-11
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES COLLECTED IN 1997
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location *	Total Mercury (mg/L)	Qualifier	Hardness (mg/L)
SW01	1	0.0002	U	293
SW05	5	0.0002	U	305
SW06	6	0.0002	U	292
SW07	7	0.0002	U	236
SW08	8	0.0002	U	256
SW09	9	0.0002	U	258
SW10	10	0.0002	U	258

Source: PTI. 1997. Summary of September Field Investigation in Off-site Areas.
Letter Report from Elizabeth A. Henry to John Anderson. December 10, 1997.

See Appendix A for sample locations on map from PTI, 1997.
Collected September 9 & 10, 1997.
U: Not detected. Sample-specific detection limit was not reported in indicated reference.

TABLE 1-12
SUMMARY OF ANALYTICAL RESULTS FOR SELECTED METALS IN OUTFALL WATER SAMPLES COLLECTED IN 1992
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location	Constituent	Value (mg/L)
NYSDEC 92	8" pipe draining the MERECO property	Arsenic	0.0052
NYSDEC 92	8" pipe draining the MERECO property	Chromium	0.0105
NYSDEC 92	8" pipe draining the MERECO property	Copper	0.158
NYSDEC 92	8" pipe draining the MERECO property	Lead	0.0672
NYSDEC 92	8" pipe draining the MERECO property	Mercury (total)	0.0714
NYSDEC 92	8" pipe draining the MERECO property	Nickel	0.0591
NYSDEC 92	8" pipe draining the MERECO property	Silver	0.009
NYSDEC 92	8" pipe draining the MERECO property	Zinc	2.92

Source: NYSDEC. 1992. Mercury Refining. Memorandum from Fred Sievers to Gary Peck. February 14, 1992.

TABLE 1-13
SUMMARY OF ANALYTICAL RESULTS FOR FISH TISSUE SAMPLES COLLECTED FROM THE I-90 POND (1985-1990)
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Date Collected	Species	Length (cm)	Weight (g)	Sex	Value (mg/kg wet)	Duplicate Analyses	Reference
1	1985	Largemouth bass	28.1	407	F	0.49		1
2	1985	Largemouth bass	25.8	297	M	0.238		1
3	1985	Largemouth bass	16.4	66.9	F	0.595	0.435/0.755	1
4	*1985*	*Largemouth bass*	*14.2*	*38.2*	*I**	*0.495*		*1*
5	1985	Bluegill sunfish	12.3	35.2	F	0.209		1
6	1985	Bluegill sunfish	14.7	52.1	F	0.37		1
7	1985	Bluegill sunfish	15.3	61.7	M	0.378		1
8	1985	Bluegill sunfish	15.6	65	M	0.147		1
9	1985	Bluegill sunfish	14.1	55.1	M	0.164		1
10	1985	Bluegill sunfish	13.2	37.2	F	0.094		1
11	1985	Carp	32.2	416.2	M	0.244		1
12	1985	Carp	27.1	245.7	M	0.12		1
13	1985	Carp	35.7	558.6	M	0.151		1
14	1985	Carp	29.8	379.1	M	0.154	0.219/0.089	1
15	1985	Carp	25.7	227.1	M	0.22	0.133/0.306	1
16	1985	Carp	38.3	863.1	M	0.17		1
17	1985	Carp	42.5	1,095	F	0.34	0.299/0.380	1
18	1985	Carp	19.7	114.1	M	0.105		1
19	1985	Carp	36.2	680	F	0.182		1
20	1985	Carp	44.4	1333	M	0.066		1
9	1986	Largemouth bass	14.8	44.9	F	0.21		1
10	1986	Carp	33.6	664.6	F	0.37	0.37/0.37	1
11	1986	Rock bass	18.3	135.9	M	0.78		1
15	1986	Rock bass	17.5	104	F	0.92	0.95/0.88	1
16	1986	Rock bass	18.8	150.3	F	0.94		1
18	1986	Rock bass	18.1	134.4	F	0.96		1
19	1986	Rock bass	20	184.5	M	0.52		1
22	1986	Carp	31.6	446.6	M	0.41		1
23	1986	Carp	23.9	187.6	M	0.33		1
26	1986	Carp	33	541	F	0.12		1
28	1986	Carp	35.6	657.2	F	0.48		1
1	1987	Carp	38.6	1,037.80	F	0.126		1
1	1987	Rock bass	21.3	199.8	F	0.388	0.431/0.346	1
2	1987	Carp	37.6	818.2	M	0.198		1
2	1987	Largemouth bass	27.5	377.5	F	0.246		1
2	1987	Rock bass	20.3	186	F	0.344	0.336/0.351	1
3	1987	Carp	37.6	194.1	M	0.17	0.162/0.177	1
3	1987	Rock bass	21.1	194.1	F	0.655	0.602/0.708	1
4	1987	Carp	35.1	697.6	M	0.171		1
4	1987	Rock bass	18.9	147.4	F	0.486	0.420/0.551	1
5	1987	Carp	35.5	859.6	F	0.184	0.211/0.157	1
5	1987	Largemouth bass	17.3	83.3	F	0.251	0.249/0.253	1

TABLE 1-13
SUMMARY OF ANALYTICAL RESULTS FOR FISH TISSUE SAMPLES COLLECTED FROM THE I-90 POND (1985-1990)
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Date Collected	Species	Length (cm)	Weight (g)	Sex	Value (mg/kg wet)	Duplicate Analyses	Reference
1	7/31/1990	Carp	42.3	1,132	M	0.156	0.133/0.178	13 & 1
1	7/31/1990	Largemouth bass	23.5	160	F	0.272	0.260/0.284	13 & 1
1	7/31/1990	Rock Bass	21.4	220	M	0.342	0.358/0.327	13 & 1
2	7/31/1990	Largemouth bass	17.1	839	F	0.282	0.311/0.253	13 & 1
3	7/31/1990	Largemouth bass	18.2	949	M	0.32	0.322/0.318	13 & 1
6	7/31/1990	Carp	42.7	1,186	F	0.186	0.192/0.179	13 & 1
7	7/31/1990	Carp	50.8	1,803	M	0.146	0.142/0.150	13 & 1
8	7/31/1990	Carp	47.5	1,615	F	0.202	0.214/0.189	13 & 1
8	7/31/1990	Largemouth bass	15.8	601	F	0.286	0.278/0.295	13 & 1
9	7/31/1990	Largemouth bass	23.7	191	M	0.232	0.233/0.232	13 & 1
10	7/31/1990	Carp	53	2,610	F	0.156	0.139/0.173	13 & 1

Sources:

1. Mercury Refining Company, Inc. 1997. RCRA Facility Investigation Task I Report on Current Conditions. May, 1997
2. Lawler, Matusky & Skelly Engineers. 1990. Fish Monitoring Program at Mercury Refining Co. Inc. Letter from Donna Randall to Kevin Young. September 27.

All Samples collected from the I-90 Pond. Where duplicate samples were analyzed, "Value (mg/kg wet)" is the average of the duplicate results.

I* = The sex of the fish was listed as "Immature" in the source document.

TABLE 1-14
1999 NYSDEC PATROON CREEK SAMPLING RESULTS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Tag No.	Location	Species	Length (mm)	Weight (g)	Percent Moisture (%)	Percent Lipids (%)	Mercury (ppm)	Aroclor 1242 (ppm)	Aroclor 1254/60 (ppm)	DDE (ppm)	DDD (ppm)	DDT (ppm)	Mirex (ppm)	Photomirex (ppm)	HCB (ppm)
9648184	Tivoli Lake	LMB	445	1458	77.9	1.96	1.96	0.047	0.144	0.019	0.003	0.002	<0.002	<0.005	<0.002
9648184	Tivoli Lake	LMB	445	1662	77.9	1.96	0.837	0.044	0.13	0.018	0.003	<0.002	<0.002	<0.005	<0.002
9648183	Tivoli Lake	LMB	402	1200	76.1	3.43	0.602	0.087	0.187	0.023	0.004	0.002	<0.002	<0.005	<0.002
9648182	I-90 Pond	LMB	260	238	80	0.77	0.507	0.035	0.21	0.007	0.002	<0.002	<0.002	<0.005	<0.002
9648150	Upstream of I-90 Pond	WS	274	220	80.1	0.48	0.496	<0.02	0.054	0.002	<0.002	<0.002	<0.002	<0.005	<0.002
9648178	I-90 Pond	LMB	276	296	79.1	0.96	0.474	0.053	0.237	0.01	0.005	<0.002	<0.002	<0.005	<0.002
9648174	I-90 Pond	WS	317	320	81.4	0.49	0.42	0.02	0.065	0.002	<0.002	<0.002	<0.002	<0.005	<0.002
9648181	I-90 Pond	LMB	249	244	79.7	0.53	0.359	<0.02	0.152	0.006	0.002	<0.002	<0.002	<0.005	<0.002
9648180	I-90 Pond	LMB	265	316	80.2	0.99	0.342	0.055	0.225	0.008	0.004	<0.002	<0.002	<0.005	<0.002
9648179	I-90 Pond	LMB	284	350	79.8	0.86	0.341	0.126	0.257	0.012	0.006	<0.002	<0.002	<0.005	<0.002
9648177	I-90 Pond	WS	287	224	78.7	1.63	0.282	0.053	0.175	0.005	0.003	<0.002	<0.002	<0.005	<0.002
9648152	Upstream of I-90 Pond	WS	237	142	81	0.23	0.272	<0.02	0.043	0.002	<0.002	<0.002	<0.002	<0.005	<0.002
9648175	I-90 Pond	WS	283	240	78.9	2.13	0.26	0.054	0.183	0.004	0.003	<0.002	<0.002	<0.005	<0.002
9648176	I-90 Pond	WS	289	198	81.2	0.68	0.251	0.033	0.074	0.003	<0.002	<0.002	<0.002	<0.005	<0.002
9648151	Upstream of I-90 Pond	WS	259	188	79.4	1.52	0.228	0.048	0.082	0.004	0.003	<0.002	<0.002	<0.005	<0.002
9648170	I-90 Pond	CARP	486	1570	76.2	7.23	0.214	0.112	0.561	0.013	0.009	0.006	<0.002	<0.005	<0.002
9648153	Upstream of I-90 Pond	WS	236	140	78.6	2.03	0.207	0.043	0.095	0.004	0.003	<0.002	<0.002	<0.005	<0.002
9648185	Tivoli Lake	LMB	328	526	77.2	1.11	0.2	0.021	0.078	0.01	<0.002	<0.002	<0.002	<0.005	<0.002
9648154	Upstream of I-90 Pond	WS	211	98	79.9	1.31	0.175	0.034	0.131	0.013	0.004	0.002	<0.002	<0.005	<0.002
9648173	I-90 Pond	WS	367	492	79.2	1.14	0.174	0.035	0.081	0.003	0.002	<0.002	<0.002	<0.005	<0.002
9648141	Railroad overpass	WS	184	70	75.6	2.99	0.173	0.083	0.122	0.006	0.003	0.004	<0.002	<0.005	<0.002
9648139	Rensselear Lake	WS	194	76	79	0.77	0.162	<0.02	0.041	0.002	<0.002	<0.002	<0.002	<0.005	<0.002
9648186	Tivoli Lake	LMB	314	426	78.6	0.97	0.161	<0.02	0.043	0.005	<0.002	<0.002	<0.002	<0.005	<0.002
9648159	Below Tivoli Lake	WS	244	140	76.7	2.18	0.157	0.044	0.14	0.019	0.003	0.004	<0.002	<0.005	<0.002
9648144	Railroad overpass	WS	85	66	78.6	1.32	0.157	0.071	0.093	0.005	0.002	0.003	<0.002	<0.005	<0.002
9648172	I-90 Pond	MCARP	478	1742	75.7	3.2	0.156	0.088	0.503	0.026	0.005	0.005	<0.002	<0.005	<0.002
9648169	I-90 Pond	CARP	461	1354	72.6	7.84	0.144	0.176	0.802	0.021	0.016	0.008	<0.002	<0.005	0.002
9648192	Tivoli Lake	BLG	115	25	75.4	1.94	0.134	<0.02	0.067	0.007	<0.002	<0.002	<0.002	<0.005	<0.002
9648168	I-90 Pond	CARP	435	1082	75.9	4.8	0.13	0.166	0.654	0.017	0.006	0.006	<0.002	<0.005	<0.002
9648142	Railroad overpass	WS	211	98	68.4	2.22	0.124	0.06	0.11	0.007	0.004	0.004	<0.002	<0.005	<0.002
9648190	Tivoli Lake	BLG	131	3	76.6	1.48	0.123	<0.02	0.06	0.018	<0.002	<0.002	<0.002	<0.005	<0.002
9648143	Railroad overpass	WS	200	76	69.5	1.99	0.102	0.066	0.121	0.006	0.003	0.005	<0.002	<0.005	<0.002
9648171	I-90 Pond	CARP	382	800	76.5	3.16	0.0953	0.106	0.454	0.012	0.008	0.005	<0.002	<0.005	<0.002

TABLE 1-14
1999 NYSDEC PATROON CREEK SAMPLING RESULTS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Tag No.	Location	Species	Oxychlordane (ppm)	trans-Chlordane (ppm)	cis-Chlordane (ppm)	trans-Nonachlor (ppm)	Heptachlor (ppm)	Aldrin (ppm)	Hexachlorobenzene (ppm)	o,p-DDE (ppm)	Endosulfan I (ppm)	o,p-DDD (ppm)
9648184	Tivoli Lake	LMB	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648184	Tivoli Lake	LMB	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648183	Tivoli Lake	LMB	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648182	I-90 Pond	LMB	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648150	Upstream of I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648178	I-90 Pond	LMB	<0.005	<0.005	0.006	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648174	I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648181	I-90 Pond	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648180	I-90 Pond	LMB	<0.005	<0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648179	I-90 Pond	LMB	<0.005	<0.005	0.006	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648177	I-90 Pond	WS	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648152	Upstream of I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648175	I-90 Pond	WS	<0.005	<0.005	0.006	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648176	I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648151	Upstream of I-90 Pond	WS	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648170	I-90 Pond	CARP	0.009	0.008	0.017	0.016	<0.005	<0.005	<0.005	0.008	<0.005	<0.005
9648153	Upstream of I-90 Pond	WS	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648185	Tivoli Lake	LMB	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648154	Upstream of I-90 Pond	WS	<0.005	<0.005	0.006	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648173	I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648141	Railroad overpass	WS	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648139	Rensselear Lake	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648186	Tivoli Lake	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648159	Below Tivoli Lake	WS	<0.005	<0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648144	Railroad overpass	WS	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648172	I-90 Pond	MCARP	<0.005	0.006	0.012	0.011	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648169	I-90 Pond	CARP	0.015	0.016	0.027	0.019	0.005	<0.005	<0.005	0.012	<0.005	<0.005
9648192	Tivoli Lake	BLG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648168	I-90 Pond	CARP	0.006	0.009	0.019	0.013	<0.005	<0.005	<0.005	0.006	<0.005	<0.005
9648142	Railroad overpass	WS	<0.005	<0.005	0.008	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648190	Tivoli Lake	BLG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648143	Railroad overpass	WS	<0.005	<0.005	0.008	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648171	I-90 Pond	CARP	0.008	0.007	0.015	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

TABLE 1-14
1999 NYSDEC PATROON CREEK SAMPLING RESULTS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Tag No.	Location	Species	Endosulfan II (ppm)	Endrin aldehyde (ppm)	o,p-DDT (ppm)	cis-Nonachlor (ppm)	Edosulfan sulfate (ppm)	alpha-HCH (ppm)	beta-HCH (ppm)	gamma-HCH (ppm)	delta-HCH (ppm)	Dieldrin (ppm)	Endrin (ppm)
9648184	Tivoli Lake	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648184	Tivoli Lake	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648183	Tivoli Lake	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648182	I-90 Pond	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648150	Upstream of I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648178	I-90 Pond	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648174	I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648181	I-90 Pond	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648180	I-90 Pond	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648179	I-90 Pond	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648177	I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648152	Upstream of I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648175	I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648176	I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648151	Upstream of I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648170	I-90 Pond	CARP	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648153	Upstream of I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648185	Tivoli Lake	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648154	Upstream of I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648173	I-90 Pond	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648141	Railroad overpass	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648139	Rensselear Lake	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648186	Tivoli Lake	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648159	Below Tivoli Lake	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648144	Railroad overpass	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648172	I-90 Pond	MCARP	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648169	I-90 Pond	CARP	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648192	Tivoli Lake	BLG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648168	I-90 Pond	CARP	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648142	Railroad overpass	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648190	Tivoli Lake	BLG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648143	Railroad overpass	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648171	I-90 Pond	CARP	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

TABLE 1-14
1999 NYSDEC PATROON CREEK SAMPLING RESULTS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Tag No.	Location	Species	Length (mm)	Weight (g)	Percent Moisture (%)	Percent Lipids (%)	Mercury (ppm)	Aroclor 1242 (ppm)	Aroclor 1254/60 (ppm)	DDE (ppm)	DDD (ppm)	DDT (ppm)	Mirex (ppm)	Photomirex (ppm)	HCB (ppm)
9648188	Tivoli Lake	BLG	148	64	80.6	1.02	0.0916	<0.02	0.104	0.011	<0.002	<0.002	<0.002	<0.005	<0.002
9648187	Tivoli Lake	LMB	148	64	78.1	1.01	0.0877	0.024	0.049	0.006	<0.002	<0.002	<0.002	<0.005	<0.002
9648189	Tivoli Lake	BLG	135	44	79.8	1.22	0.0846	0.033	0.078	0.01	<0.002	<0.002	<0.002	<0.005	<0.002
9648191	Tivoli Lake	BLG	130	40	78.4	1.02	0.0832	0.026	0.059	0.008	<0.002	<0.002	<0.002	<0.005	<0.002
9648160	Below Tivoli Lake	WS	221	132	77	3.19	0.0822	0.074	0.127	0.008	0.003	0.003	<0.002	<0.005	<0.002
9648161	Below Tivoli Lake	WS	193	86	76.8	2.83	0.0756	0.069	0.116	0.007	0.002	0.004	<0.002	<0.005	<0.002
9648162	Below Tivoli Lake	WS	189	76	77	3.12	0.0737	0.068	0.091	0.006	0.002	0.003	<0.002	<0.005	<0.002
9648163	Below Tivoli Lake	WS	162	40	80	1.04	0.0705	0.089	0.052	0.003	<0.002	<0.002	<0.002	<0.005	<0.002
9648155	Upstream of I-90 Pond	CCHUB	51	1	78.6	1.94	0.0558	0.053	0.101	0.058	0.002	<0.002	<0.002	<0.005	<0.002
9648135	Rensselear Lake	BB	146	46	77.2	4.95	0.0502	0.046	0.076	0.014	0.002	<0.002	<0.002	<0.005	<0.002
9648145	Railroad overpass	WS	167	64	79.8	1.02	0.0474	0.033	0.043	0.002	<0.002	<0.002	<0.002	<0.005	<0.002
9648156	Upstream of I-90 Pond	CRAYF	12	14	80.8	1.26	0.0438	0.022	0.077	0.003	<0.002	<0.002	<0.002	<0.005	<0.002
9648136	Rensselear Lake	BB	138	32	77.2	5.23	0.0426	0.16	0.062	0.006	0.002	<0.002	<0.002	<0.005	<0.002
9648158	Upstream of I-90 Pond	CRAYF	6	1	73.3	0.3	0.0291	0.239	0.173	0.012	<0.002	0.002	<0.002	<0.005	<0.002
9648137	Rensselear Lake	BB	82	12	76.9	3.87	0.0266	0.384	0.072	0.01	0.002	<0.002	<0.002	<0.005	<0.002
9648164	Below Tivoli Lake	CRAYF	13	18	81.3	1.08	0.021	0.077	0.076	0.005	<0.002	<0.002	<0.002	<0.005	<0.002
9648165	Below Tivoli Lake	CRAYF	10	9	63.9	1.1	0.0183	0.314	0.08	0.005	<0.002	<0.002	<0.002	<0.005	<0.002
9648157	Upstream of I-90 Pond	CRAYF	8	3	77.7	0.37	0.0182	0.519	0.041	0.003	<0.002	<0.002	<0.002	<0.005	<0.002
9648149	Railroad overpass	CRAYF	5	1	77	1.77	0.0167	0.282	0.094	0.005	<0.002	<0.002	<0.002	<0.005	<0.002
9648166	Below Tivoli Lake	CRAYF	7	2	78.4	0.34	0.0157	0.044	0.037	0.003	<0.002	<0.002	<0.002	<0.005	<0.002
9648138	Rensselear Lake	BB	69	5	75.2	4.84	0.0135	0.203	0.06	0.013	0.002	<0.002	<0.002	<0.005	<0.002
9648147	Railroad overpass	CRAYF	9	6	74.4	1.87	0.0122	0.046	0.097	0.005	0.002	<0.002	<0.002	<0.005	<0.002
9648146	Railroad overpass	CRAYF	15	20	74.1	0.68	0.0121	0.061	0.055	0.003	<0.002	<0.002	<0.002	<0.005	<0.002
9648140	Rensselear Lake	CRAYF	8	3	71.2	0.67	0.0116	0.623	0.024	0.002	<0.002	<0.002	<0.002	<0.005	<0.002
9648167	Below Tivoli Lake	CRAYF	6	2	83.2	1.17	0.0104	0.378	0.081	0.013	<0.002	<0.002	<0.002	<0.005	<0.002
9648148	Railroad overpass	CRAYF	10	7	84.1	2.3	0.0077	0.1	0.138	0.008	0.002	<0.002	<0.002	<0.005	<0.002

TABLE 1-14
1999 NYSDEC PATROON CREEK SAMPLING RESULTS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Tag No.	Location	Species	Oxychlordane (ppm)	trans-Chlordane (ppm)	cis-Chlordane (ppm)	trans-Nonachlor (ppm)	Heptachlor (ppm)	Aldrin (ppm)	Hexachlorobenzene (ppm)	o,p-DDE (ppm)	Endosulfan I (ppm)	o,p-DDD (ppm)
9648188	Tivoli Lake	BLG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648187	Tivoli Lake	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648189	Tivoli Lake	BLG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648191	Tivoli Lake	BLG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648160	Below Tivoli Lake	WS	<0.005	<0.005	0.007	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648161	Below Tivoli Lake	WS	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648162	Below Tivoli Lake	WS	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648163	Below Tivoli Lake	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648155	Upstream of I-90 Pond	CCHUB	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648135	Rensselear Lake	BB	0.005	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648145	Railroad overpass	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648156	Upstream of I-90 Pond	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648136	Rensselear Lake	BB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648158	Upstream of I-90 Pond	CRAYF	0.011	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648137	Rensselear Lake	BB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648164	Below Tivoli Lake	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648165	Below Tivoli Lake	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648157	Upstream of I-90 Pond	CRAYF	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648149	Railroad overpass	CRAYF	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648166	Below Tivoli Lake	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648138	Rensselear Lake	BB	0.009	<0.005	0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648147	Railroad overpass	CRAYF	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648146	Railroad overpass	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648140	Rensselear Lake	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648167	Below Tivoli Lake	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648148	Railroad overpass	CRAYF	0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

TABLE 1-14
1999 NYSDEC PATROON CREEK SAMPLING RESULTS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Tag No.	Location	Species	Endosulfan II (ppm)	Endrin aldehyde (ppm)	o,p-DDT (ppm)	cis-Nonachlor (ppm)	Edosulfan sulfate (ppm)	alpha-HCH (ppm)	beta-HCH (ppm)	gamma-HCH (ppm)	delta-HCH (ppm)	Dieldrin (ppm)	Endrin (ppm)
9648188	Tivoli Lake	BLG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648187	Tivoli Lake	LMB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648189	Tivoli Lake	BLG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648191	Tivoli Lake	BLG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648160	Below Tivoli Lake	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648161	Below Tivoli Lake	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648162	Below Tivoli Lake	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648163	Below Tivoli Lake	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648155	Upstream of I-90 Pond	CCHUB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648135	Rensselear Lake	BB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648145	Railroad overpass	WS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648156	Upstream of I-90 Pond	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648136	Rensselear Lake	BB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648158	Upstream of I-90 Pond	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648137	Rensselear Lake	BB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648164	Below Tivoli Lake	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648165	Below Tivoli Lake	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648157	Upstream of I-90 Pond	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005
9648149	Railroad overpass	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648166	Below Tivoli Lake	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648138	Rensselear Lake	BB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648147	Railroad overpass	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648146	Railroad overpass	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648140	Rensselear Lake	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648167	Below Tivoli Lake	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
9648148	Railroad overpass	CRAYF	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

TABLE 1-14
1999 NYSDEC PATROON CREEK SAMPLING RESULTS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Notes:

< - not detected. Value shown is the quantitation limit.

Fish species listed (note that the species names represent professional judgement, since this information was provided only as abbreviations):

BB - Brown bullhead (*Ameiurus nebulosus*)
BLG - Bluegill (*Lepomis machrochirus*)
CARP - Common carp (*Cyprinus carpio*)
CCHUB - Creek chub (*Semolitus atromaculatus*)
CRAYF - crayfish
LMB - Largemouth bass (*Micropterus salmoides*)
MCARP - undetermined carp species
WS - White sucker (*Catastomus commersoni*)

Unit abbreviations:

mm - millimeter
g - gram
ppm - parts per million

Other abbreviations:

DDD - 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane
DDE - 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene
DDT - 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane
HCB - Hexachlorobenzene
HCH - hexachlorocyclohexane
NYSDEC - New York State Department of Environmental Conservation

Sample date reported as August 13, 1999.

Source: Data faxed from Mr. Tom Taccone, U.S. Environmental Protection Agency, New York, New York to Kristin Edelman, CDM Federal Programs Corporation, New York, New York on January 23, 2003.

TABLE 1-15
SUMMARY OF ANALYTICAL RESULTS FOR BIOTA SAMPLES COLLECTED FROM THE MRC SITE VICINITY IN 1989: MAMMALS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location	Biota Type	Species	Mercury (mg/kg wet) in Liver	Mercury (mg/kg wet) in Kidney	Mercury (mg/kg wet) in Carcass
89-13-20	Area 1 - Upwind	Mammal	White-footed mouse	0.082	0.548	0.038
89-13-21	Area 1 - Upwind	Mammal	White-footed mouse	0.123	0.763	0.043
89-13-22	Area 1 - Upwind	Mammal	Deer mouse	0.176	0.5	0.05
89-13-23	Area 1 - Upwind	Mammal	Deer mouse	0.066	0.356	0.026
89-14-17	Area 1 - Upwind	Mammal	Deer mouse	0.057	0.217	0.02
89-16-33	Area 1 - Upwind	Mammal	White-footed mouse	0.132	0.394	0.072
89-16-34	Area 1 - Upwind	Mammal	Short-tailed shrew	0.592	1.9	0.177
89-13-24	Area 2 - MRC Adjacent	Mammal	Meadow Jumping mouse	0.352	1.71	0.095
89-13-25	Area 2 - MRC Adjacent	Mammal	Deer mouse	0.44	1.07	0.165
89-13-26	Area 2 - MRC Adjacent	Mammal	Deer mouse	0.48	0.75	0.13
89-13-27	Area 2 - MRC Adjacent	Mammal	Deer mouse	0.643	1.38	0.24
89-13-28	Area 2 - MRC Adjacent	Mammal	White-footed mouse	0.962	2.76	0.23
89-14-18	Area 2 - MRC Adjacent	Mammal	Deer mouse	0.476	1.94	0.15
89-14-19	Area 2 - MRC Adjacent	Mammal	Meadow Jumping mouse	0.981	1.72	0.135
89-14-20	Area 2 - MRC Adjacent	Mammal	Deer mouse	0.556	2.11	0.306
89-14-22	Area 2 - MRC Adjacent	Mammal	Meadow vole	0.09	1.17	0.061
89-15-13	Area 2 - MRC Adjacent	Mammal	White-footed mouse	0.4	1.66	0.095
89-13-29	Area 3 - Downwind	Mammal	Meadow vole	0.06	1.39	0.036
89-16-5	Area 3 - Downwind	Mammal	Meadow vole	0.042	0.449	<0.025
89-17-1	Area 3 - Downwind	Mammal	Boreal Red-Backed vole	0.039	0.343	0.032
89-17-22	Area 3 - Downwind	Mammal	Eastern chipmuck	0.47	0.88	0.068
89-44-30	Area 4 - Rensselaer Lake	Mammal	Deer mouse	0.049	0.468	0.028
89-44-31	Area 4 - Rensselaer Lake	Mammal	Deer mouse	0.042	0.178	<0.028

Source: NYSDEC. 1990. Draft Evaluation of Off-Site Contamination Associated with a Mercury Recycling Facility: , 1990.

TABLE 1-16
SUMMARY OF ANALYTICAL RESULTS FOR BIOTA SAMPLES COLLECTED FROM THE MERECO SITE VICINITY IN 1989: NON-MAMMALS
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Location	Biota Type	Species	Mercury (mg/kg wet) in Whole	Mercury (mg/kg wet) in Liver	Mercury (mg/kg wet) in Kidney	Mercury (mg/kg wet) in Carcass	Mercury (mg/kg wet) in Egg	Mercury (mg/kg wet) in Skinless Filet
I-90 Pond	Fish	Golden Shiners		0.228	0.237	0.137	0.064	
I-90 Pond	Fish	Sunfish	0.128	0.243		0.255		
I-90 Pond	Fish	Sunfish	0.68	0.478		0.13		
I-90 Pond	Fish	White Suckers		0.163	0.277			0.318
I-90 Pond	Fish	White Suckers		0.341	0.56			0.435
I-90 Pond	Fish	White Suckers		0.201	0.146			0.401
I-90 Pond	Invertebrate	Crayfish	0.044					
I-90 Pond	Invertebrate	Damsel Flies	0.1					
I-90 Pond	Invertebrate	Water Striders	0.108					
I-90 Pond	Reptile	Snapping turtles		0.285	0.318	0.15		
I-90 Pond	Reptile	Snapping turtles		0.372	0.307	0.148		
I-90 Pond	Terr. Invertebrate	Grasshoppers	<0.025					
MRC Adjacent	Amphibian	Toad tadpoles	0.542					
MRC Adjacent	Fish	Minnows, Bluntnose	0.164					
MRC Adjacent	Invertebrate	Crayfish	0.13					
MRC Adjacent	Invertebrate	Damsel Flies	0.275					
MRC Adjacent	Invertebrate	Water Striders	0.479					
MRC Adjacent	Terr. Invertebrate	Grasshoppers	0.114					
Murray Pond	Fish	Minnows, Bluntnose	0.051					
Murray Pond	Invertebrate	Crayfish	0.074					
Rensselaer Lake	Fish	Sunfish		0.191		0.142		
Rensselaer Lake	Fish	Sunfish		0.221		0.128		
Rensselaer Lake	Invertebrate	Damsel Flies	0.107					
Rensselaer Lake	Terr. Invertebrate	Grasshoppers	<0.025					

Source: NYSDEC. 1990. Draft Evaluation of Off-Site Contamination Associated with a Mercury Recycling Facility: Mercury Refining Company (Colonie, NY). March, 1990.

<: Not detected. Value shown is the quantitation limit.
An empty cell indicates that the sample was not analyzed for this parameter.

TABLE 1-17
SUMMARY OF ANALYTICAL RESULTS FOR CRAYFISH TISSUE SAMPLES COLLECTED IN 1994
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location	Analyte	Value (mg/kg dry)
NYSDEC 94-4	Station 4	Aluminum	<100
NYSDEC 94-4	Station 4	Arsenic	<2
NYSDEC 94-4	Station 4	Cadmium	0.3
NYSDEC 94-4	Station 4	Chromium	<5
NYSDEC 94-4	Station 4	Copper	230
NYSDEC 94-4	Station 4	Iron	343
NYSDEC 94-4	Station 4	Lead	2
NYSDEC 94-4	Station 4	Manganese	416
NYSDEC 94-4	Station 4	Mercury	0.97
NYSDEC 94-4	Station 4	Nickel	<5
NYSDEC 94-4	Station 4	Selenium	<1
NYSDEC 94-4	Station 4	Titanium	<5
NYSDEC 94-4	Station 4	Zinc	78
NYSDEC 94-6	Station 6	Aluminum	278
NYSDEC 94-6	Station 6	Arsenic	2
NYSDEC 94-6	Station 6	Cadmium	<0.1
NYSDEC 94-6	Station 6	Chromium	<2
NYSDEC 94-6	Station 6	Copper	167
NYSDEC 94-6	Station 6	Iron	794
NYSDEC 94-6	Station 6	Lead	3
NYSDEC 94-6	Station 6	Manganese	622
NYSDEC 94-6	Station 6	Mercury	0.1
NYSDEC 94-6	Station 6	Nickel	<2
NYSDEC 94-6	Station 6	Selenium	1
NYSDEC 94-6	Station 6	Titanium	6
NYSDEC 94-6	Station 6	Zinc	89

Source: NYSDEC. 1995. Biological Impact Assessment: Patroon Creek, Albany County, New York.
Survey date: July 14, 1994. Robert Bode, Edward Kuzia, Margaret Novak, Lawrence Abele. August 21.

See Appendix A for sampling locations on map from NYSDEC, 1995.
Station 4 is located in Patroon Creek upstream of I-90 Pond.
Station 6 is located in Patroon Creek 1/2 mile upstream of the Hudson River.
<: Not detected. Value shown is the quantitation limit.

TABLE 1-18
SUMMARY OF ANALYTICAL RESULTS FOR CRAYFISH TISSUE SAMPLES COLLECTED IN 1997
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Sample ID	Location	Analyte	Value (mg/kg dry)	Total Solids (%)
CF07	7	Mercury	0.16	30.9
CF08	8	Mercury	0.18	32.6
CF09	9	Mercury	0.23	31.7

Source: PTI. 1997. Summary of September Field Investigation in Off-site Areas.
Letter Report from Elizabeth A. Henryto John Anderson. December 10, 1997.

See Appendix A for sample locations on map from PTI, 1997.
Data Collected September 9, 1997.

TABLE 2-1
SUMMARY OF RI FIELD ACTIVITIES
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Activity	Dates
Topographical Survey Activities	December 2001
Ecological Assessment	June 10, 2002
Cultural Resources Survey	July 31, 2001
Surface Soil Sampling	October 25 - 29, 2001
Catch Basin Sediment Sampling	November 12 - 15, 2001
Catch Basin Surface Water Sampling	November 12 - 15, 2001
Stream Sediment Sampling	October 30 - November 7, 2001
Stream Surface Water Sampling	October 30 - November 7, 2001
Subsurface Soil Boring Sampling	November 6 - December 6, 2001
Well Development	November 27 - December 7, 2001
Groundwater Sampling Round 1	December 17 - 20, 2001
Groundwater Sampling Round 2	March 18 - 22, 2002
Fish Sampling	November 6 - 8, 2001
Potentiomanometer Investigation	December 11 - 12, 2001

TABLE 2-2
ANALYTICAL METHOD SUMMARY
MERCURY REFINING COMPANY SITE
COLONIE, NEW YORK

Analytical Parameter	Analytical Method
Groundwater:	
Low Detection Limit Volatile Organics	OLC03.2 (b)
TCL SVOC, Pesticides, PCBs	OLM04.2 (b)
TAL Metals	ILM04.1 (c)
Hydrogen Sulfide	SW846 Chapter 7, Part 7.3 Reactivity, Section 7.3.4 (a)
Sulfate	EPA 375.3 (d)
Total Organic Carbon	EPA 415.2 (d)
Total Suspended Solids	EPA 160.2 (d)
Soil:	
TCL Volatile Organics	Collect/Prep 5035/5030 (a), Analysis OLM04.2 (b)
TCL SVOC, Pesticides, PCBs	OLM04.2(b)
TAL Metals	ILM04.1(c)
Cation Exchange Capacity	SW846, 9081 (a)
Grain Size	ASTM D2216-90 & D421-85 (f)
pH	SW-846, 9045 (a)
Total Organic Carbon	Lloyd Kahn (e)
Sediment:	
TCL Volatile Organics	Collect/Prep 5035/5030 (a), Analysis OLM04.2 (b)
TCL SVOC, Pesticides, PCBs	OLM04.2 (b)
TAL Metals	ILM04.1 (c)
Cation Exchange Capacity	SW846, 9081 (a)
Grain Size	ASTM D2216-90 & D421-85 (f)
Methyl Mercury	mod Bloom, 1989
pH	SW-846, 9045 (a)
Total Organic Carbon	Lloyd Kahn (e)
Surface Water:	
TCL Volatile Organics	OLM04.2 (b)
TCL SVOC, Pesticides, PCBs	OLM04.2 (b)
TAL Metals	ILM04.1 (c)
Hardness	EPA 130.2 (d)
Methyl Mercury	EPA 1630 (draft)
Sulfate	EPA 375.3 (d)

TABLE 2-2
ANALYTICAL METHOD SUMMARY
MERCURY REFINING COMPANY SITE
COLONIE, NEW YORK

Analytical Parameter	Analytical Method
Total Dissolved Solids	EPA 160.1 (d)
Total Organic Carbon	EPA 415.2 (d)
Total Suspended Solids	EPA 160.2 (d)
Fish Tissue:	
TCL Volatile Organics	SW-846 (a) Method 8260B
TCL SVOC	SW-846 (a) Method 8270C
TCL Pesticides/PCBs	Extraction via EPA methods with modifications used by NJDEP (d), followed by analysis via SW-846 (a) Methods 8081A and 8082
TAL Metals	SW846 (a) Methods 6010B/7000
Percent Lipid	SW-846 (a), Method 8290, Section 6.7

Notes:

(a) Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, SW-846, 3rd Edition (SW-846).
(b) "Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration". Document number OLM04.2 (or current revision). Aqueous samples collected for low concentration volatile organic compounds will be analyzed according to Chemical Analytical Services for Low Concentration Samples for Organic Compounds by Gas Chromatography/Mass Spectrometry (GTC/MS and Gas Chromatography/Electron Capture (GC/EC) Techniques, Document No. OLC02.1 (or current revision).
(c) "Statement of Work for Inorganic Analysis, Multi-Media, Multi Concentration". USEPA Contract Laboratory program, Document number ILM04.1 (or current revision).

(d) EPA methods with modifications used in the NJDEP's Toxics in Biomonitoring Program.
(e) Determination of Total Organic Carbon in Sediment, July 27, 1988, prepared by Lloyd Kahn and Attachment B, Supplemental Technical Direction and Additional QC Procedures.
(f) American Society for Testing and Materials (ASTM) Designation: D421-85 for sample preparation and ASTM Designation: D2216-90 for grain size analysis

ABBREVIATIONS USED:

CLP	Contract Laboratory Program
CN	Cyanide
PCB	Polychlorinated biphenyls
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
VOC	Volatile Organic Compound

TABLE 2-3
SURFACE SOIL ANALYTICAL SAMPLE SUMMARY
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Sample Name	Analysis	Start Depth	End Depth	Date Collected	Comments
SSS-ECO-01-0-12	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	1	10/29/01	MS/MSD
SSS-ECO-02-0-12	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	1	10/25/01	
SSS-ECO-03-0-12	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	1	10/26/01	
SSS-HHR-04-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	0.17	10/25/01	
SSS-HHR-04-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	0.5	10/25/01	
SSS-HHR-05-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	0.17	10/25/01	
SSS-HHR-05-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	0.5	10/25/01	
SSS-HHR-06-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	0.17	10/26/01	
SSS-HHR-06-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	0.5	10/26/01	
SSS-HHR-07-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	0.17	10/26/01	
SSS-HHR-07-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	0.5	10/26/01	
SSS-HHR-08-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	0.17	10/29/01	
SSS-HHR-08-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	0.5	10/29/01	

Notes:

VOA	Volatile organic analytes
SVOC	Semi-volatile organic compounds
P/PCBs	Pesticides/Polychlorinated biphenyls
TOC	Total organic carbon
CEC	Cation exchange capacity
MS/MSD	Matrix spike/matrix spike duplicate

TABLE 2-4
SUBSURFACE SOIL SAMPLES ANALYTICAL SUMMARY
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Sample Name	Analysis	Start Depth (feet)	End Depth (feet)	Collection Date	Comments
Deep Soil Borings					
SBD-01-A	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	1	3	11/26/2001	
SBD-01-B	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	3	5	11/26/2001	
SBD-01-C	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	5	7	11/26/2001	
SBD-01-D	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	7	9	11/26/2001	
SBD-01-E	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	9	11	11/26/2001	
SBD-01-F	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	11	13	11/26/2001	
SBD-01-G	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	16	18	11/26/2001	
SBD-02-A	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	11/27/2001	
SBD-02-B	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	4	6	11/27/2001	
SBD-02-C	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	6	8	11/27/2001	
SBD-02-D	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	8	10	11/27/2001	
SBD-02-E	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	10	12	11/27/2001	
SBD-02-F	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	12	14	11/27/2001	
SBD-02-G	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	16	18	11/27/2001	
SBD-03-A	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	12/4/2001	
SBD-03-B	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	8	10	12/4/2001	
SBD-03-C	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	10	12	12/4/2001	
SBD-03-D	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	12	14	12/4/2001	
SBD-03-E	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	40	42	12/4/2001	
SBD-04-A	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	12/5/2001	
SBD-04-B	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	12/5/2001	MS/MSD
SBD-04-C	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	4	6	12/5/2001	
SBD-04-D	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	6	8	12/5/2001	
SBD-04-E	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	8	10	12/5/2001	
SBD-04-F	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	10	12	12/5/2001	
SBD-04-G	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	16	18	12/5/2001	
SBD-07-A	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	11	13	11/26/2001	Dup of SBD-01-F
SBD-07-B	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	12	14	11/27/2001	Dup of SBD-02-F

TABLE 2-4
SUBSURFACE SOIL SAMPLES ANALYTICAL SUMMARY
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Sample Name	Analysis	Start Depth (feet)	End Depth (feet)	Collection Date	Comments
Monitoring Well Soil Borings					
SBM-MW1D-A	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	8	10	11/28/2001	MS/MSD
SBM-MW1D-B	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	4	6	11/28/2001	
SBM-MW2D-A	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	12	14	11/15/2001	
SBM-MW2D-B	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	16	18	11/15/2001	
SBM-MW5D-A	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	10	12	11/19/2001	
SBM-MW5D-B	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	4	6	11/19/2001	
SBM-MW5D-C	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	64	66	11/20/2001	
SBM-MW6D-A	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	13	15	11/14/2001	
SBM-MW6D-B	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	20	22	11/14/2001	
SBM-MW7D-A	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	8	10	11/7/2001	MS/MSD
SBM-MW7D-B	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	60	62	11/7/2001	
Shallow Soil Borings					
SBS-01-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	12/6/2001	
SBS-01-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	12/6/2001	
SBS-02-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	12/6/2001	
SBS-02-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	12/6/2001	
SBS-03-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	12/6/2001	MS/MSD
SBS-03-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	12/6/2001	
SBS-04-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	12/6/2001	
SBS-04-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	12/6/2001	
SBS-05-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	12/6/2001	
SBS-05-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	12/6/2001	
Water Table Soil Borings					
SBW-01-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	11/30/2001	
SBW-01-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	11/30/2001	MS/MSD
SBW-01-4-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	4	6	11/30/2001	
SBW-01-6-8	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	6	8	11/30/2001	
SBW-01-8-10	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	8	10	11/30/2001	

TABLE 2-4
SUBSURFACE SOIL SAMPLES ANALYTICAL SUMMARY
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Sample Name	Analysis	Start Depth (feet)	End Depth (feet)	Collection Date	Comments
SBW-02-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	12/6/2001	
SBW-02-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	12/6/2001	
SBW-02-4-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	4	6	12/6/2001	
SBW-02-6-8	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	6	8	12/6/2001	
SBW-02-8-10	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	8	10	12/6/2001	
SBW-03-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	11/30/2001	
SBW-03-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	11/30/2001	
SBW-03-4-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	4	6	11/30/2001	
SBW-03-6-8	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	6	8	11/30/2001	
SBW-03-8-10	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	8	10	11/30/2001	
SBW-04-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	12/6/2001	
SBW-04-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	12/6/2001	MS/MSD
SBW-04-4-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	4	6	12/6/2001	
SBW-04-6-8	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	6	8	12/6/2001	
SBW-05-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	11/6/2001	
SBW-05-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	11/6/2001	
SBW-05-4-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	4	6	11/6/2001	
SBW-05-6-8	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	6	8	11/6/2001	
SBW-05-8-10	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	8	10	11/6/2001	
SBW-06-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	0	2	11/6/2001	
SBW-06-10-12	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	10	12	11/6/2001	
SBW-06-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	2	4	11/6/2001	
SBW-06-4-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	4	6	11/6/2001	
SBW-06-6-8	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	6	8	11/6/2001	
SBW-06-8-10	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH	8	10	11/6/2001	

Notes:

VOA	Volatile organic analytes	SVOC	*Semi-volatile organic compounds*
P/PCBs	Pesticides/Polychlorinated biphenyls	TOC	Total organic carbon
CEC	Cation exchange capacity	MS/MSD	Matrix spike/matrix spike duplicate

TABLE 2-5
STREAM SURFACE WATER AND SEDIMENT ANALYTICAL SAMPLE SUMMARY
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Sample Name	Analysis	Start Depth (ft)	End Depth (ft)	Date Collected	Comment
Stream Surface Water					
SWS-01	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	11/2/2001	MS/MSD
SWS-02	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	11/5/2001	
SWS-03	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness, total Hg, methyl Hg	N/A	N/A	11/5/2001	
SWS-04	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	11/2/2001	
SWS-05	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	10/31/2001	
SWS-06	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness, total Hg, methyl Hg	N/A	N/A	11/1/2001	
SWS-07	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	10/31/2001	MS/MSD
SWS-08	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	10/31/2001	
SWS-09	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	10/30/2001	
SWS-10	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	11/7/2001	
SWS-11	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness, total Hg, methyl Hg	N/A	N/A	11/7/2001	
SWS-12	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	10/30/2001	
SWS-13	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	10/30/2001	
SWS-14	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness	N/A	N/A	10/30/2001	
Stream Sediment					
SDS-01-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	11/2/2001	MS/MSD
SDS-02-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	11/5/2001	
SDS-03-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	11/5/2001	
SDS-04-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	11/2/2001	
SDS-05-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	10/31/2001	
SDS-06-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	11/1/2001	
SDS-07-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	10/31/2001	MS/MSD
SDS-08-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	10/31/2001	
SDS-09-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	10/30/2001	

TABLE 2-5
STREAM SURFACE WATER AND SEDIMENT ANALYTICAL SAMPLE SUMMARY
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Sample Name	Analysis	Start Depth (ft)	End Depth (ft)	Date Collected	Comment
SDS-10-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	11/7/2001	
SDS-11-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	11/7/2001	
SDS-12-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	10/30/2001	
SDS-13-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	10/30/2001	
SDS-14-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	10/30/2001	
SDS-15-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	10/31/2001	Dup of SDS-05-0-6
SDS-16-0-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	11/5/2001	Dup of SDS-03
Stream Sediment by layers					
SDX-03-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.17	11/5/2001	
SDX-03-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0.17	0.33	11/5/2001	
SDX-03-4-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0.33	0.5	11/5/2001	
SDX-03-6-8	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0.5	0.67	11/5/2001	
SDX-03-8-10	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0.67	0.83	11/5/2001	
SDX-03-10-12	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0.83	1	11/5/2001	
SDX-06-0-2	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.17	11/1/2001	
SDX-06-2-4	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0.17	0.33	11/1/2001	
SDX-06-4-6	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0.33	0.5	11/1/2001	
SDX-06-6-8	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0.5	0.67	11/1/2001	
SDX-06-8-10	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0.67	0.83	11/1/2001	
SDX-06-10-12	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0.83	1	11/1/2001	

Notes:

VOA	Volatile organic analytes	SVOC	Semi-volatile organic compounds
P/PCBs	Pesticides/Polychlorinated biphenyls	TOC	Total organic carbon
CEC	Cation exchange capacity	TSS	Total suspended solids
TDS	Total dissolved solids	Hg	Mercury
MS/MSD	Matrix spike/matrix spike duplicate		

TABLE 2-6
CATCH BASIN ANALYTICAL SAMPLE SUMMARY
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Sample Name	Analysis	Start Depth (Inches)	End Depth (Inches)	Date Collected	Comments
Catch Basin Surface Water					
SWC-01	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness, total Hg, methyl Hg	N/A	N/A	11/12/01	
SWC-02	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness, total Hg, methyl Hg	N/A	N/A	11/12/01	MS/MSD, no sediment in catch basin to sample
SWC-03	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness, total Hg, methyl Hg	N/A	N/A	11/13/01	
SWC-04	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness, total Hg, methyl Hg	N/A	N/A	11/14/01	no sediment in catch basin to sample
SWC-05	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness, total Hg, methyl Hg	N/A	N/A	11/14/01	no sediment in catch basin to sample
SWC-06	VOA, SVOC, P/PCBs, Metals, TOC, TSS, TDS, Sulfate, Hardness, total Hg, methyl Hg	N/A	N/A	11/15/01	
Catch Basin Sediment					
SDC-01	VOA, SVOC, P/PCBs, Metals, TOC, CEC, Grain size, pH, total Hg, methyl Hg	0	0.5	11/12/01	
SDC-03	Metals, total Hg, methyl Hg	0	0.5	11/13/01	Not enough volume for VOA or SVOC/PEST/PCB
SDC-06	Total Hg, methyl Hg	0	0.5	11/15/01	Not enough volume for CLP analyses

Notes:

VOA	Volatile organic analytes	SVOC	Semi-volatile organic compounds
P/PCBs	Pesticides/Polychlorinated biphenyls	TOC	Total organic carbon
CEC	Cation exchange capacity	TSS	Total suspended solids
TDS	Total dissolved solids	Hg	Mercury
MS/MSD	Matrix spike/matrix spike duplicate		

TABLE 2-7
GROUNDWATER ANALYTICAL SAMPLE SUMMARY
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Sample Name	Analysis	Screen Depth (feet)	Date Collected	Comments
GWM-1D-R1	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	38	12/19/2001	
GWM-2D-R1	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	47	12/19/2001	
GWM-5D-R1	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	55	12/20/2001	
GWM-6D-R1	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	50	12/19/2001	
GWM-7D-R1	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	50	12/17/2001	MS/MSD
GWM-7S-R1	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	15	12/17/2001	
GWM-OW1-R1	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	15	12/19/2001	
GWM-OW2-R1	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	15	12/20/2001	turbidity higher and silt in samples
GWM-OW3-R1	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	15	12/18/2001	
GWM-OW4-R1	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	15	12/18/2001	
GWM-1D-R2	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	38	3/21/2002	
GWM-2D-R2	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	47	3/20/2002	
GWM-5D-R2	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	55	3/21/2002	
GWM-6D-R2	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	50	4/5/2002	
GWM-7D-R2	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	50	3/19/2002	Deep background well
GWM-7S-R2	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	15	3/19/2002	Shallow background well
GWM-OW1-R2	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	15	3/21/2002	
GWM-OW2-R2	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	15	3/20/2002	
GWM-OW3-R2	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	15	3/19/2002	
GWM-OW4-R2	LDL VOA, SVOC, P/PCB, Metals, TOC, TSS, TDS, Sulfate, H_2S	15	3/21/2002	

Notes:

LDL VOA	Low detection limit volatile organic analytes
SVOC	Semi-volatile organic compounds
P/PCBs	Pesticides/Polychlorinated biphenyls
TOC	Total organic carbon
TSS	Total suspended solids
TDS	Total dissolved solids
MS/MSD	Matrix spike/matrix spike duplicate
H_2S	Hydrogen sulfide

TABLE 2-8
FISH ANALYTICAL SAMPLE SUMMARY
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Sample Name	Sample Type	Analysis	Collection Date	Comment
FSF-ECO-02-PD	Forage fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/07/01	Background
FSF-ECO-02-ST	Forage fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/06/01	Background
FSF-ECO-06-ST	Forage fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/06/01	
FSF-ECO-10-PDA	Forage fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/07/01	
FSF-ECO-10-PDB	Forage fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/07/01	Split of FSF-ECO-10-PDA
FSS-HHR-02-PDA	Sport fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/07/01	Background
FSS-HHR-02-PDB	Sport fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/07/01	Split of FSS-HHR-02-PDA, Background
FSS-HHR-02-ST	Sport fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/06/01	
FSS-HHR-06-ST	Sport fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/06/01	
FSS-HHR-10-PDA	Sport fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/07/01	
FSS-HHR-10-PDB	Sport fish	VOA, SVOC, Pesticides, PCBs, TAL Metals, Lipids	11/07/01	Split of FSS-HHR-10-PDA

Notes:

VOA	Volatile organic analytes
SVOC	Semi-volatile organic compounds
PCBs	Polychlorinated biphenyls
TAL	Target analyte list

TABLE 2-9
FISH SPECIES AND SAMPLE MASS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Location	Date	Time	Sample Designation on chain of custody	Common Name	Scientific Name	Mass (g)	Length (mm)	Total Mass (g)
10 (I-90 Pond)	11/7/2001	11:45	FSF-ECO-10-PDA	Golden Shiner	*Notemigonus crysoleucas*	52	161	**52**
10 (I-90 Pond)	11/7/2001	11:45	FSF-ECO-10-PDB	Pumpkinseed Sunfish	*Lepomis gibbosus*	85	151	
10 (I-90 Pond)	11/7/2001	11:45	FSF-ECO-10-PDB	Pumpkinseed Sunfish	*Lepomis gibbosus*	81	143	
10 (I-90 Pond)	11/7/2001	11:45	FSF-ECO-10-PDB	Pumpkinseed Sunfish	*Lepomis gibbosus*	38	120	
10 (I-90 Pond)	11/7/2001	11:45	FSF-ECO-10-PDB	Pumpkinseed Sunfish	*Lepomis gibbosus*	101	157	
10 (I-90 Pond)	11/7/2001	11:45	FSF-ECO-10-PDB	Pumpkinseed Sunfish	*Lepomis gibbosus*	59	133	
10 (I-90 Pond)	11/7/2001	11:45	FSF-ECO-10-PDB	Pumpkinseed Sunfish	*Lepomis gibbosus*	40	120	
10 (I-90 Pond)	11/7/2001	11:45	FSF-ECO-10-PDB	Pumpkinseed Sunfish	*Lepomis gibbosus*	45	125	
10 (I-90 Pond)	11/7/2001	11:45	FSF-ECO-10-PDB	Pumpkinseed Sunfish	*Lepomis gibbosus*	43	122	**492**
10 (I-90 Pond)	11/7/2001	11:45	FSF-HHR-10-PDB	Yellow Bullhead	*Ameiurus natalis*	159	230	
10 (I-90 Pond)	11/7/2001	11:45	FSF-HHR-10-PDB	Yellow Bullhead	*Ameiurus natalis*	324	276	**483**
10 (I-90 Pond)	11/7/2001	11:45	FSS-HHR-10-PDA	Carp	*Cyprinus carpio*	551	329	
10 (I-90 Pond)	11/7/2001	11:45	FSS-HHR-10-PDA	Carp	*Cyprinus carpio*	665	341	**1,216**
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Carp	*Cyprinus carpio*	64	164	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Carp	*Cyprinus carpio*	28	112	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Carp	*Cyprinus carpio*	76	170	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Carp	*Cyprinus carpio*	66	165	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Carp	*Cyprinus carpio*	59	151	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Carp	*Cyprinus carpio*	50	143	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Carp	*Cyprinus carpio*	37	126	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Carp	*Cyprinus carpio*	48	136	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Carp	*Cyprinus carpio*	24	103	**1,117**
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	70	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	65	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	72	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	42	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	63	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	74	

TABLE 2-9
FISH SPECIES AND SAMPLE MASS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Location	Date	Time	Sample Designation on chain of custody	Common Name	Scientific Name	Mass (g)	Length (mm)	Total Mass (g)
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	61	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	72	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	62	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	61	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	43	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	62	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	70	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	60	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	70	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	60	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	66	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	51	
2 (Inga's Pond)	11/7/2001	16:00	FSF-ECO-02-PD	Bluntnose minnow	*Pimephales notatus*	*	42	**64**
2 (Inga's Pond)	11/7/2001	16:00	FSS-HHR-02-PDA	Yellow Bullhead	*Ameiurus natalis*	72	175	**72**
2 (Inga's Pond)	11/7/2001	16:00	FSS-HHR-02-PDB	Carp	*Cyprinus carpio*	108	188	
2 (Inga's Pond)	11/7/2001	16:00	FSS-HHR-02-PDB	Carp	*Cyprinus carpio*	216	240	**324**
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	64	176	
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	63	178	
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	60	176	
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	81	182	
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	50	160	
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	52	163	
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	47	161	
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	62	177	
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	48	154	
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	48	162	
2 Stream	11/6/2001	10:30	FSF-ECO-02-ST	White Sucker	*Catostomus commersoni*	45	160	**1,016**
2 Stream	11/6/2001	10:30	FSS-HHR-02-ST	White Sucker	*Catostomus commersoni*	104	208	
2 Stream	11/6/2001	10:30	FSS-HHR-02-ST	White Sucker	*Catostomus commersoni*	110	210	
2 Stream	11/6/2001	10:30	FSS-HHR-02-ST	White Sucker	*Catostomus commersoni*	98	194	

TABLE 2-9
FISH SPECIES AND SAMPLE MASS
MERCURY REFINING SUPERFUND SITE
COLONIE, NEW YORK

Location	Date	Time	Sample Designation on chain of custody	Common Name	Scientific Name	Mass (g)	Length (mm)	Total Mass (g)
2 Stream	11/6/2001	10:30	FSS-HHR-02-ST	White Sucker	*Catostomus commersoni*	85	191	**397**
6 Stream	11/6/2001	13:30	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	50	160	
6 Stream	11/6/2001	13:30	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	31	133	
6 Stream	11/6/2001	13:30	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	64	180	
6 Stream	11/6/2001	13:30	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	44	160	
6 Stream	11/6/2001	13:30	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	70	175	
6 Stream	11/6/2001	13:30	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	36	145	
6 Stream	11/6/2001	13:30	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	17	109	
6 Stream	11/6/2001	13:30	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	16	110	
6 Stream	11/6/2001	13:30	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	16	101	
6 Stream	11/6/2001	13:30	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	10	80	
6 Stream	11/8/2001	9:10	FSF-ECO-06-ST	White Sucker	*Catostomus commersoni*	25	146	**464**
6 Stream	11/8/2001	9:10	FSF-ECO-06-ST	Creek Chub Sucker	*Semolitus atromaculatus*	*	71	
6 Stream	11/8/2001	9:10	FSF-ECO-06-ST	Creek Chub Sucker	*Semolitus atromaculatus*	*	78	
6 Stream	11/8/2001	9:10	FSF-ECO-06-ST	Creek Chub Sucker	*Semolitus atromaculatus*	*	70	
6 Stream	11/8/2001	9:10	FSF-ECO-06-ST	Creek Chub Sucker	*Semolitus atromaculatus*	*	47	
6 Stream	11/8/2001	9:10	FSF-ECO-06-ST	Creek Chub Sucker	*Semolitus atromaculatus*	*	50	
6 Stream	11/8/2001	9:10	FSF-ECO-06-ST	Creek Chub Sucker	*Semolitus atromaculatus*	*	71	
6 Stream	11/8/2001	9:10	FSF-ECO-06-ST	Creek Chub Sucker	*Semolitus atromaculatus*	*	56	
6 Stream	11/8/2001	9:10	FSF-ECO-06-ST	Creek Chub Sucker	*Semolitus atromaculatus*	*	45	**20**
6 Stream	11/6/2001	13:30	FSS-HHR-06-ST	White Sucker	*Catostomus commersoni*	224	262	**224**

Notes:

*	Fish were too small to weigh individually	g	grams
mm	millimeter	HHR	Human health risk
ECO	Ecological risk	FSS	Fish sample, sport fish
FSF	Fish sample, forage fish	PD	Pond
ST	Stream		

TABLE 3-1
MONITORING WELL WATER LEVEL ELEVATIONS
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

Location	Date	Depth to Water (Ft.)	Water Level Elevation (ft. above mean sea level)	Surface Elevation (ft. above mean seal level)
MW-1D	12/19/2001	8.71	217.81	223.91
MW-1D	3/19/2002	8.48	218.04	223.91
MW-2D	12/19/2001	13.18	217.83	228.58
MW-2D	3/19/2002	12.95	218.06	228.58
MW-5D	12/20/2001	14.18	219.15	233.86
MW-5D	3/19/2002	13.73	219.60	233.86
MW-6D	12/19/2001	17.48	214.24	229.57
MW-7D	12/17/2001	11.01	225.46	236.84
MW-7D	3/19/2002	10.72	225.75	236.84
MW-7S	12/17/2001	10.95	225.45	236.89
MW-7S	3/19/2002	10.62	225.78	236.89
OW-1	12/19/2001	8.77	217.96	224.00
OW-1	3/19/2002	8.60	218.13	224.00
OW-2	12/19/2001	12.25	218.43	228.70
OW-2	3/19/2002	11.90	218.79	228.70
OW-3	12/18/2001	13.29	219.21	230.68
OW-3	3/19/2002	12.70	219.80	230.68
OW-4	12/18/2001	10.70	222.80	233.67
OW-4	3/19/2002	6.37	227.13	233.67

TABLE 3-2
STREAM DISCHARGE MEASUREMENTS
MERCURY REFINING COMPANY SUPERFUND SITE
COLONIE, NEW YORK

SW/SD-03
Stream width = 8 feet

Station	Depth of water (inches)	Width (feet)	Depth of gage (inches)	Flow (ft/sec)	Volume (cfs)
1	2.2	0.5	1.32	0.13	0.01
2	4.0	1	2.40	0.19	0.06
3	4.5	1	2.70	1.57	0.59
4	5.0	1	3.00	1.66	0.69
5	4.2	1	2.52	1.38	0.48
6	4.5	1	2.70	0.93	0.35
7	4.8	1	2.88	0.39	0.16
8	3.8	0.5	2.28	0.05	0.01
		7.00			2.35

SW/SD-04
Stream width = 7.7 feet

Station	Depth of water (inches)	Width (feet)	Depth of gage (inches)	Flow (ft/sec)	Volume (cfs)
1	6.0	0.5	3.60	0.13	0.03
2	10.2	1	6.12	0.31	0.26
3	10.5	1	6.30	0.81	0.71
4	8.0	1	4.80	0.83	0.55
5	4.5	0.5	2.70	0.98	0.18
6	3.0	3.7	1.80	0.78	0.72
		7.70			2.46

TABLE 3-3
AQUATIC SPECIES OBSERVED AND EXPECTED
MERCURY REFINING SITE
COLONIE, NEW YORK

<table>
<tr><th colspan="4">Observed Aquatic Species</th></tr>
<tr><th>Group</th><th>Common Name</th><th>Scientific Name</th><th>Location Observed</th></tr>
<tr><td>Fish</td><td>White sucker</td><td><i>Catostomus commersoni</i></td><td>Creek</td></tr>
<tr><td></td><td>Creek chub sucker</td><td><i>Semolitus atromaculatus</i></td><td>Creek</td></tr>
<tr><td></td><td>Bluegill</td><td><i>Lepomis macrochirus</i></td><td>I-90 pond</td></tr>
<tr><td></td><td>Bluntnose minnow</td><td><i>Pimephales notatus</i></td><td>I-90 pond</td></tr>
<tr><td></td><td>Carp</td><td><i>Cyprinus carpio</i></td><td>I-90 pond</td></tr>
<tr><td></td><td>Golden shiner</td><td><i>Notemigomus crysoleucas</i></td><td>I-90 pond</td></tr>
<tr><td></td><td>Pumpkinseed</td><td><i>Lepomis gibbosus</i></td><td>I-90 pond</td></tr>
<tr><td></td><td>Yellow bullhead</td><td><i>Ameiurus natalis</i></td><td>I-90 pond</td></tr>
<tr><td>Invertebrate</td><td>River snail</td><td><i>Viviparus viviparus</i></td><td>Creek</td></tr>
<tr><th colspan="4">Other Aquatic Species Expected[1]</th></tr>
<tr><th>Group</th><th>Common Name</th><th>Scientific Name</th><th>Location Expected</th></tr>
<tr><td>Fish</td><td>Yellow perch</td><td><i>Perca flavescens</i></td><td>Creek</td></tr>
<tr><td></td><td>Chain pickerel</td><td><i>Esox niger</i></td><td>I-90 pond</td></tr>
<tr><td></td><td>Brown bullhead</td><td><i>Ictalurus nebulosus</i></td><td>I-90 pond</td></tr>
<tr><td></td><td>Fathead minnow</td><td><i>Pimpephales promelas</i></td><td>I-90 pond</td></tr>
<tr><td>Reptile</td><td>Snapping turtle</td><td><i>Chelydra serpentina</i></td><td>I-90 pond</td></tr>
<tr><td>Invertebrate</td><td>Freshwater crayfish</td><td><i>Cambarus</i> species and/or <i>Orconectes</i> species</td><td>Creek and pond</td></tr>
<tr><td></td><td>Damselfly</td><td>Order Odonata</td><td>I-90 pond</td></tr>
<tr><td></td><td>Water strider</td><td>Family Gerridae</td><td>I-90 pond</td></tr>
</table>

[1] These species have been observed or collected in previous investigation. See background. section of report.

TABLE 3-4
VEGETATION LIST AND PLAND COMMUNITY ASSOCIATIONS
MERCURY REFINING SITE
COLONIE, NEW YORK

Habitat[1]	Component	Common Name	Botanical Name	Frequency of Observation[2]
Successional Hardwoods	Trees	American holly	*Ilex opaca*	I
		American elm	*Ulmus americana*	I
		Black cherry	*Prunus serotina*	I
		Pin oak	*Quercus palustris*	C
		Pitch pine	*Pinus rigida*	I
		Bigtooth aspen	*Populus grandidentata*	C/I
		Green ash	*Fraxinus pensyvanica*	I
		Boxelder	*Acer negundo*	C
		Red maple	*Acer rubrum*	C
		Sassafras	*Sassafra albidum*	C
		Silver maple	*Acer saccharinum*	I
		Slippery elm	*Ulmus rubra*	C/I
		White Oak	*Quercus alba*	C/I
	Shrubs	Silky dogwood	*Cornus ammomum*	C
	Herbs	Bracken fern	*Pteridium aquilinum*	I
		Impatiens	*Impatiens capensis*	C
		Purple loosestrife	*Lythrum salicaria*	I
		Sensitive fern	*Onoclea sensibilis*	I
		Skunk cabbage	*Symplocarpus foetidus*	I
	Vines	Grape	*Vitis* spp.	I
		Virginia creeper	*Parthenocissus quiquefolia*	I
Succesional Old Field	Shrubs	Brambles	*Rubus* spp.	C
		Northern arrowood	*Viburnum recognitum*	I
		Silky dogwood	*Cornus ammomum*	C
		Smooth sumac	*Rhus glabra*	C
		Staghorn sumac	*Rhus typhina*	C
		Willows	*Salix spp.*	C
	Herbs	Common chickweed	*Cerastium arvense*	I
		Common milkweed	*Asclepias syriaca*	C/I
		Common mullen	*Verbascum thapsus*	I
		Common reed	*Phragmites australis*	C
		Early goldenrod	*Solidago juncea*	I
		Evening primrose	*Oenothera biennis*	I
		Flat-top goldenrod	*Euthamia graminifolia*	I
		Hawkweed	*Hieracium* sp.	I
		Horsetail	*Equisetum* sp.	C/I
		Joe-pye weed	*Eupatorium* sp.	I
		New England aster	*Aster novae-angliae*	I
		Orchard grass	*Dactylis glomerata*	I
		Panic grass	*Panicum* spp.	C
		Path rush	*Juncus* sp.	C/I
		Purple loosestrife	*Lythrum salicaria*	C
		Quackgrass	*Agropyron repens*	C/I
		Rough-stemmed golenrod	*Solidago rugosa*	C
		Sedge	*Carex* spp.	C/I

TABLE 3-4
VEGETATION LIST AND PLAND COMMUNITY ASSOCIATIONS
MERCURY REFINING SITE
COLONIE, NEW YORK

Habitat[1]	Component	Common Name	Botanical Name	Frequency of Observation[2]
Succesional Old Field, continued		Sensitive fern	*Onoclea sensibilis*	I
		Smartweed	*Polyganum* spp.	C
		Smooth brome	*Bromus inermis*	I
		Tall goldenrod	*Solidago altissima*	I
		Timothy	*Phleum pratense*	I
		Vetch	*Vicia* spp.	C/I
	Vines	Grape	*Vitis* spp.	C
		Poison ivy	*Toxicodendron radicans*	C
		Virginia creeper	*Parthenocissus quiquefolia*	I
Mowed Grass	Herbs	Cultivated grass	unidentified species	D

[1] The names for many of the ecological community types are based on *Ecological Communities of New York State*, Second Edition (Draft), A revised and expanded edition of Carol Reschke's *Ecological Communities of New York State*. 2002. Albany, NY: New York Natural Heritage Program.

[2] Frequency of observation is distinguished by:

I = Infreqent
C = Common or frequent
D = Dominant

Table 4-1
Surface Water Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Contaminant	Unit	New York State Surface Water Quality Standards and Guidance Values for Human Water Source (1)		New York State Surface Water Quality Standards and Guidance Values for Human Fish Consumption (2)		Mercury Refining Surface Water Screening Criteria (3)	
Volatile Organic Compounds							
1,1,1-Trichloroethane	ug/l	5		NL		5	
1,1,2,2-Tetrachloroethane	ug/l	0.2		NL		0.2	
1,1,2-Trichloroethane	ug/l	1		NL		1	
1,1,2-Tricholoro-1,2,2-	ug/l	5		NL		5	
1,1-Dichloroethane	ug/l	5		NL		5	
1,1-Dichloroethene	ug/l	0.7		NL		0.7	
1,2,3-Trichlorobenzene	ug/l	5	D	NL		5	D
1,2,4-Trichlorobenzene	ug/l	5	D	NL		5	D
1,2-Dibromo-3-chloropropane	ug/l	0.04		NL		0.04	
1,2-Dibromoethane	ug/l	0.0006		NL		0.0006	
1,2-Dichlorobenzene	ug/l	3		NL		3	
1,2-Dichloroethane	ug/l	0.6		NL		0.6	
1,2-Dichloropropane	ug/l	1		NL		1	
1,3-Dichlorobenzene	ug/l	3		NL		3	
1,4-Dichlorobenzene	ug/l	3		NL		3	
2-Butanone	ug/l	50		NL		50	
2-Hexanone	ug/l	50		NL		50	
4-Methyl-2-pentanone	ug/l	NL		NL		NL	
Acetone	ug/l	50		NL		50	
Benzene	ug/l	1		10		1	
Bromochloromethane	ug/l	5		NL		5	
Bromodichloromethane	ug/l	50		NL		50	
Bromoform	ug/l	50		NL		50	
Bromomethane	ug/l	5		NL		5	
Carbon Disulfide	ug/l	60		NL		60	
Carbon Tetrachloride	ug/l	0.4		NL		0.4	
Chlorobenzene	ug/l	5		400		5	
Chloroethane	ug/l	5		NL		5	
Chloroform	ug/l	7		NL		7	
Chloromethane	ug/l	5		NL		5	
cis-1,2-Dichloroethene	ug/l	5		NL		5	
cis-1,3-Dichloropropene	ug/l	0.4	G	NL		0.4	G
Cyclohexane	ug/l	NL		NL		NL	
Dibromochloromethane	ug/l	50		NL		50	
Dichlorodifluoromethane	ug/l	5		NL		5	
Dichlorofloromethane	ug/l	5		NL		5	
Ethylbenzene	ug/l	5		NL		5	
Isopropylbenzene	ug/l	5		NL		5	
Methyl Acetate	ug/l	NL		NL		NL	

Table 4-1
Surface Water Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Contaminant	Unit	New York State Surface Water Quality Standards and Guidance Values for Human Water Source (1)		New York State Surface Water Quality Standards and Guidance Values for Human Fish Consumption (2)		Mercury Refining Surface Water Screening Criteria (3)	
Methyl Tert-Butyl Ether	ug/l	10		NL		10	
Methylcyclohexane	ug/l	NL		NL		NL	
Methylene Chloride	ug/l	5		200		5	
m-Xylene	ug/l	5		NL		5	
o-Xylene	ug/l	5		NL		5	
p-Xylene	ug/l	5		NL		5	
Styrene	ug/l	5		50	E	5	
Tetrachloroethene	ug/l	0.7		1		0.7	
Toluene	ug/l	5		6000		5	
trans-1,2-Dichloroethene	ug/l	5		NL		5	
trans-1,3-Dichloropropene	ug/l	0.4	G	NL		0.4	G
Trichloroethene	ug/l	5		40		5	
Trichlorofloromethane	ug/l	5		NL		5	
Vinyl Chloride	ug/l	0.3		NL		0.3	
Xylenes (total)	ug/l	5		NL		5	
Semi-Volatime Organics							
1,1'-Biphenyl	ug/l	5		NL		5	
2,2'-oxybis(1-Chloropropane)	ug/l	5		NL		5	
2,4,5-Trichlorophenol	ug/l	1	X,E	NL		1	X
2,4,6-Trichlorophenol	ug/l	1	X,E	NL		1	X
2,4-Dichlorophenol	ug/l	5	X	0.3	E	0.3	X
2,4-Dimethylphenol	ug/l	50	X	1000		50	X
2,4-Dinitrophenol	ug/l	10	X	400		10	X
2,4-Dinitrotoluene	ug/l	5		NL		5	
2,6-Dinitrotoluene	ug/l	0.07		NL		0.07	
2-Chloronaphthalene	ug/l	10		NL		10	
2-Chlorophenol	ug/l	1	X,E	NL		1	X
2-Methylnaphthalene	ug/l	NL		NL		NL	
2-Methylphenol	ug/l	1	X,E	NL		1	X
2-Nitroaniline	ug/l	5		NL		5	
2-Nitrophenol	ug/l	1	X,E	NL		1	X
3,3'-Dichlorobenzidine	ug/l	5		NL		5	
3-Nitroaniline	ug/l	5		NL		5	
4,6-Dinitro-2-methylphenol	ug/l	1	X,E	NL		1	X
4-Bromophenyl-phenylether	ug/l	NL		NL		NL	
4-Chloro-3-methylphenol	ug/l	1	X,E	NL		1	X
4-Chloroaniline	ug/l	5		NL		5	
4-Chlorophenyl-phenylether	ug/l	NL		NL		NL	
4-Methylphenol	ug/l	1	X,E	NL		1	X
4-Nitroaniline	ug/l	5		NL		5	

Table 4-1
Surface Water Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Contaminant	Unit	New York State Surface Water Quality Standards and Guidance Values for Human Water Source (1)		New York State Surface Water Quality Standards and Guidance Values for Human Fish Consumption (2)		Mercury Refining Surface Water Screening Criteria (3)	
4-Nitrophenol	ug/l	1	X,E	NL		1	X
Acenaphthene	ug/l	20		NL		20	
Acenaphthylene	ug/l	NL		NL		NL	
Acetophenone	ug/l	NL		NL		NL	
Anthracene	ug/l	50		NL		50	
Atrazine	ug/l	3		NL		3	
Benzaldehyde	ug/l	NL		NL		NL	
Benzo(a)anthracene	ug/l	0.002		NL		0.002	
Benzo(a)pyrene	ug/l	0.002		0.0012		0.0012	
Benzo(b)fluoranthene	ug/l	0.002		NL		0.002	
Benzo(g,h,i)perylene	ug/l	NL		NL		NL	
Benzo(k)fluoranthene	ug/l	0.002		NL		0.002	
bis(2-Chloroethoxy)methane	ug/l	5		NL		5	
bis(2-Chloroethyl)ether	ug/l	0.03		NL		0.03	
bis-(2-Ethylhexyl)phthalate	ug/l	5		NL		5	
Butylbenzylphthalate	ug/l	50		NL		50	
Caprolactam	ug/l	NL		NL		NL	
Carbazole	ug/l	NL		NL		NL	
Chrysene	ug/l	0.002		NL		0.002	
Dibenz(a,h)anthracene	ug/l	NL		NL		NL	
Dibenzofuran	ug/l	NL		NL		NL	
Diethylphthalate	ug/l	50		NL		50	
Dimethylphthalate	ug/l	50		NL		50	
Di-n-butylphthalate	ug/l	50		NL		50	
Di-n-octyl phthalate	ug/l	50		NL		50	
Fluoranthene	ug/l	50		NL		50	
Fluorene	ug/l	50		0.54		0.54	
Hexachlorobenzene	ug/l	0.04		0.00003		0.00003	
Hexachlorobutadiene	ug/l	0.5		0.01		0.01	
Hexachlorocyclopentadiene	ug/l	5		NL		5	
Hexachloroethane	ug/l	5		0.6		0.6	
Indeno(1,2,3-cd)pyrene	ug/l	0.002		NL		0.002	
Isophorone	ug/l	50		NL		50	
Naphthalene	ug/l	10	E	NL		10	
Nitrobenzene	ug/l	0.4		30	E	0.4	
N-Nitroso-di-n-propylamine	ug/l	NL		NL		NL	
N-Nitrosodiphenylamine	ug/l	50		NL		50	
Pentachlorophenol	ug/l	1	X,E	NL		1	X
Phenanthrene	ug/l	50		NL		50	
Phenol	ug/l	1	X,E	NL		1	X

Table 4-1
Surface Water Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Contaminant	Unit	New York State Surface Water Quality Standards and Guidance Values for Human Water Source (1)		New York State Surface Water Quality Standards and Guidance Values for Human Fish Consumption (2)		Mercury Refining Surface Water Screening Criteria (3)	
Pyrene	ug/l	50		NL		50	
Pesticides/PCBs							
4,4'-DDD	ug/l	0.3		0.00008		0.00008	
4,4'-DDE	ug/l	0.2		0.000007		0.000007	
4,4'-DDT	ug/l	0.2		0.00001		0.00001	
Aldrin	ug/l	0.002	A	0.001	A	0.001	A
alpha-BHC	ug/l	0.01		0.002		0.002	
alpha-Chlordane	ug/l	NL		NL		NL	
Aroclor-1016	ug/l	0.09	C	0.000001	C	0.000001	C
Aroclor-1221	ug/l	0.09	C	0.000001	C	0.000001	C
Aroclor-1232	ug/l	0.09	C	0.000001	C	0.000001	C
Aroclor-1242	ug/l	0.09	C	0.000001	C	0.000001	C
Aroclor-1248	ug/l	0.09	C	0.000001	C	0.000001	C
Aroclor-1254	ug/l	0.09	C	0.000001	C	0.000001	C
Aroclor-1260	ug/l	0.09	C	0.000001	C	0.000001	C
beta-BHC	ug/l	0.04		0.007		0.007	
delta-BHC	ug/l	0.04		0.008		0.008	
Dieldrin	ug/l	0.004		0.0000006		0.0000006	
Endosulfan I	ug/l	NL		NL		NL	
Endosulfan II	ug/l	NL		NL		NL	
Endosulfan sulfate	ug/l	NL		NL		NL	
Endrin	ug/l	0.2		0.002		0.002	
Endrin aldehyde	ug/l	5		NL		5	
Endrin ketone	ug/l	5		NL		5	
gamma-BHC (Lindane)	ug/l	0.05		0.008		0.008	
gamma-Chlordane	ug/l	NL		NL		NL	
Heptachlor	ug/l	0.04		0.0002		0.0002	
Heptachlor epoxide	ug/l	0.03		0.0003		0.0003	
Methoxychlor	ug/l	35		NL		35	
Toxaphene	ug/l	0.06		0.000006		0.000006	
Inorganic Analytes							
Aluminum	ug/l	NL		NL		NL	
Antimony	ug/l	3		NL		3	
Arsenic	ug/l	50		NL		50	
Barium	ug/l	1,000		NL		1000	
Beryllium	ug/l	3		NL		3	
Cadmium	ug/l	5		2.7		2.7	
Calcium	ug/l	NL		NL		NL	
Chromium	ug/l	50		NL		50	
Cobalt	ug/l	NL		NL		NL	

Table 4-1
Surface Water Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Contaminant	Unit	New York State Surface Water Quality Standards and Guidance Values for Human Water Source (1)		New York State Surface Water Quality Standards and Guidance Values for Human Fish Consumption (2)		Mercury Refining Surface Water Screening Criteria (3)	
Copper	ug/l	200		NL		200	
Cyanide	ug/l	200		9,000		200	
Iron	ug/l	NL		NL		NL	
Lead	ug/l	50		NL		50	
Magnesium	ug/l	35,000		NL		35000	
Manganese	ug/l	300	E	NL		300	
Mercury	ug/l	0.7		0.0007	B	0.7	F
Nickel	ug/l	100		NL		100	
Potassium	ug/l	NL		NL		NL	
Selenium	ug/l	10		NL		10	
Silver	ug/l	50		NL		50	
Sodium	ug/l	NL		NL		NL	
Sulfate	ug/l	250,000		NL		250,000	
Thallium	ug/l	0.5		NL		0.5	
Vanadium	ug/l	NL		NL		NL	
Zinc	ug/l	2,000		NL		2,000	

Notes:

1.	New York Ambient Water Quality Standards and Guidance Values, August 4, 1999. Source of Drinking Water (surface water)
2.	New York Ambient Water Quality Standards and Guidance Values, August 4, 1999. Human Consumption of Fish (fresh water)
3.	Mercury Surface Water Screening Criteria is the lowest New York Ambient Water Quality Standard for human health.
A	Applies to the sum of Aldrin and Dieldrin
B	Applies to dissolved Hg
C	Standard applied to the sum of the PCB compounds
D	Standard applied to the sum of 1,2,3-, 1,2,4- and 1,3,5-trichlorobenzene
E	Standard is for aesthetic purposes; listed if no standard or guidance value available for human water source
F	The screening level of 0.7 was chosen because the detection limit is 0.1 and the value of 0.0007 applies to dissolved Hg
G	Applies to the sum of cis- and trans- 1,3-dichloropropene
NL	Chemical name not listed or screening value of this type not listed for the chemical
X	Standard applies to the sum of Phenol compounds
ug/l	micrograms per liter

Table 4-2
Groundwater Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	National Primary Drinking Water Standards (1)	NYSDEC Groundwater Quality Standards (2)	NYSDOH Drinking Water Quality Standards (3)	Mercury Refining Groundwater Screening Criteria (4)
Volatile Organic Compounds					
1,1,1-Trichloroethane	ug/l	200	5	5	5
1,1,2,2-Tetrachloroethane	ug/l	NL	5	5	5
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/l	NL	5	NL	5
1,1,2-Trichloroethane	ug/l	5	1	5	1
1,1-Dichloroethane	ug/l	NL	5	5	5
1,1-Dichloroethene	ug/l	7	5	5	5
1,2,3-Trichlorobenzene	ug/l	NL	5	5	5
1,2,4-Trichlorobenzene	ug/l	70	5	5	5
1,2-Dibromo-3-chloropropane	ug/l	0.2	0.04	0.2	0.04
1,2-Dibromoethane	ug/l	0.05	0.0006	0.05	0.0006
1,2-Dichlorobenzene	ug/l	600	3	5	3
1,2-Dichloroethane	ug/l	5	0.6	5	0.6
1,2-Dichloropropane	ug/l	5	1	5	1
1,3-Dichlorobenzene	ug/l	NL	3	5	3
1,4-Dichlorobenzene	ug/l	75	3	5	3
2-Butanone	ug/l	NL	50	NL	50
2-Hexanone	ug/l	NL	50	50	50
4-Methyl-2-pentanone	ug/l	NL	NL	50	50
Acetone	ug/l	NL	50	50	50
Benzene	ug/l	5	1	5	1
Bromochloromethane	ug/l	NL	5	5	5
Bromodichloromethane	ug/l	80	50	100	50
Bromoform	ug/l	80	50	100	50
Bromomethane	ug/l	NL	5	5	5
Carbon Disulfide	ug/l	NL	60	50	50
Carbon Tetrachloride	ug/l	5	5	5	5
Chlorobenzene	ug/l	100	5	5	5
Chloroethane	ug/l	NL	5	5	5

Table 4-2
Groundwater Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	National Primary Drinking Water Standards (1)		NYSDEC Groundwater Quality Standards (2)		NYSDOH Drinking Water Quality Standards (3)		Mercury Refining Groundwater Screening Criteria (4)	
Chloroform	ug/l	80		7		100		7	
Chloromethane	ug/l	NL		5		5		5	
cis-1,2-Dichloroethene	ug/l	70		5		5		5	
cis-1,3-Dichloropropene	ug/l	NL		0.4		5		0.4	
Cyclohexane	ug/l	NL		NL		NL		NL	
Dibromochloromethane	ug/l	80		50		100		50	
Dichlorodifluoromethane	ug/l	NL		5		5		5	
Ethylbenzene	ug/l	700		5		5		5	
Isopropylbenzene	ug/l	NL		5		5		5	
Methyl Acetate	ug/l	NL		NL		NL		NL	
Methyl Tert-Butyl Ether	ug/l	NL		10		50		10	
Methylcyclohexane	ug/l	NL		NL		NL		NL	
Methylene Chloride	ug/l	5		5		5		5	
m-Xylene	ug/l	NL		5		5		5	
o-Xylene	ug/l	NL		5		5		5	
p-Xylene	ug/l	NL		5		5		5	
Styrene	ug/l	100		5		5		5	
Tetrachloroethene	ug/l	5		5		5		5	
Toluene	ug/l	1,000		5		5		5	
trans-1,2-Dichloroethene	ug/l	100		5		5		5	
trans-1,3-Dichloropropene	ug/l	NL		0.4		5		0.4	
Trichloroethene	ug/l	5		5		5		5	
Trichlorofluoromethane	ug/l	NL		5		5		5	
Vinyl Chloride	ug/l	2		2		2		2	
Xylenes (total)	ug/l	10,000		5		5		5	
Semi-Volatile Organics									
1,1'Biphenyl	ug/l	NL		5		NL		5	
2,2'-oxybis(1-Chloropropane)	ug/l	NL		5		NL		5	
2,4,5-Trichlorophenol	ug/l	NL		1	X	5		1	X

Table 4-2
Groundwater Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	National Primary Drinking Water Standards (1)		NYSDEC Groundwater Quality Standards (2)		NYSDOH Drinking Water Quality Standards (3)		Mercury Refining Groundwater Screening Criteria (4)	
2,4,6-Trichlorophenol	ug/l	NL		1	X	5		1	X
2,4-Dichlorophenol	ug/l	NL		5	X	NL		5	X
2,4-Dimethylphenol	ug/l	NL		50	X	50		50	X
2,4-Dinitrophenol	ug/l	NL		10	X	NL		10	X
2,4-Dinitrotoluene	ug/l	NL		5		50		5	
2,6-Dinitrotoluene	ug/l	NL		5		50		5	
2-Chloronaphthalene	ug/l	NL		10		5		5	
2-Chlorophenol	ug/l	NL		1	X	5		1	X
2-Methylnaphthalene	ug/l	NL		NL		NL		NL	
2-Methylphenol	ug/l	NL		1	X	50		1	X
2-Nitroaniline	ug/l	NL		5		5		5	
2-Nitrophenol	ug/l	NL		1	X	50		1	X
3,3'-Dichlorobenzidine	ug/l	NL		5		5		5	
3-Nitroaniline	ug/l	NL		5		5		5	
4,6-Dinitro-2-methylphenol	ug/l	NL		1	X	50		1	X
4-Bromophenyl-phenylether	ug/l	NL		NL		50		50	
4-Chloro-3-methylphenol	ug/l	NL		1	X	5		1	X
4-Chloroaniline	ug/l	NL		5		5		5	
4-Chlorophenyl-phenylether	ug/l	NL		NL		50		50	
4-Methylphenol	ug/l	NL		1	X	50		1	X
4-Nitroaniline	ug/l	NL		5		5		5	
4-Nitrophenol	ug/l	NL		1	X	50		1	X
Acenaphthene	ug/l	NL		20		50		20	
Acenaphthylene	ug/l	NL		NL		50		50	
Acetophenone	ug/l	NL		NL		50		50	
Anthracene	ug/l	NL		50		50		50	
Atrazine	ug/l	3		7.5		3		3	
Benzaldehyde	ug/l	NL		NL		NL		NL	
Benzo(a)anthracene	ug/l	NL		0.002		50		0.002	

Table 4-2
Groundwater Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	National Primary Drinking Water Standards (1)	NYSDEC Groundwater Quality Standards (2)	NYSDOH Drinking Water Quality Standards (3)	Mercury Refining Groundwater Screening Criteria (4)
Benzo(a)pyrene	ug/l	0.2	ND	0.2	ND
Benzo(b)fluoranthene	ug/l	NL	0.002	50	0.002
Benzo(g,h,i)perylene	ug/l	NL	NL	50	50
Benzo(k)fluoranthene	ug/l	NL	0.002	50	0.002
bis(2-Chloroethoxy)methane	ug/l	NL	5	5	5
bis(2-Chloroethyl)ether	ug/l	NL	1	5	1
bis(2-Ethylhexyl)phthalate	ug/l	6	5	6	5
Butylbenzylphthalate	ug/l	NL	50	50	50
Caprolactam	ug/l	NL	NL	NL	NL
Carbazole	ug/l	NL	NL	50	50
Chrysene	ug/l	NL	0.002	50	0.002
Dibenz(a,h)anthracene	ug/l	NL	NL	50	50
Dibenzofuran	ug/l	NL	NL	50	50
Diethylphthalate	ug/l	NL	50	50	50
Dimethylphthalate	ug/l	NL	50	50	50
Di-n-butylphthalate	ug/l	NL	50	NL	50
Di-n-octyl phthalate	ug/l	NL	50	50	50
Fluoranthene	ug/l	NL	50	50	50
Fluorene	ug/l	NL	50	NL	50
Hexachlorobenzene	ug/l	1	0.04	1	0.04
Hexachlorobutadiene	ug/l	NL	0.5	5	0.5
Hexachlorocyclopentadiene	ug/l	50	5	5	5
Hexachloroethane	ug/l	NL	5	5	5
Indeno(1,2,3-cd)pyrene	ug/l	NL	0.002	50	0.002
Isophorone	ug/l	NL	50	50	50
Naphthalene	ug/l	NL	10	50	10
Nitrobenzene	ug/l	NL	0.4	5	0.4
N-Nitroso-di-n-propylamine	ug/l	NL	NL	50	50
N-Nitrosodiphenylamine	ug/l	NL	50	50	50

Table 4-2
Groundwater Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	National Primary Drinking Water Standards (1)		NYSDEC Groundwater Quality Standards (2)		NYSDOH Drinking Water Quality Standards (3)		Mercury Refining Groundwater Screening Criteria (4)	
Pentachlorophenol	ug/l	1		1	X	1		1	X
Phenanthrene	ug/l	NL		50		50		50	
Phenol	ug/l	NL		1	X	50		1	X
Pyrene	ug/l	NL		50		50		50	
Pesticides/PCBs									
4,4'-DDD	ug/l	NL		0.3		5		0.3	
4,4'-DDE	ug/l	NL		0.2		NL		0.2	
4,4'-DDT	ug/l	NL		0.2		5		0.2	
Aldrin	ug/l	NL		ND		5		ND	
alpha-BHC	ug/l	NL		0.01		5		0.01	
alpha-Chlordane	ug/l	2	##	0.05		2		0.05	
Aroclor-1016	ug/l	0.5		0.09	W	0.5		0.09	W
Aroclor-1221	ug/l	0.5		0.09	W	0.5		0.09	W
Aroclor-1232	ug/l	0.5		0.09	W	0.5		0.09	W
Aroclor-1242	ug/l	0.5		0.09	W	0.5		0.09	W
Aroclor-1248	ug/l	0.5		0.09	W	0.5		0.09	W
Aroclor-1254	ug/l	0.5		0.09	W	0.5		0.09	W
Aroclor-1260	ug/l	0.5		0.09	W	0.5		0.09	W
beta-BHC	ug/l	NL		0.04		5		0.04	
delta-BHC	ug/l	NL		0.04		5		0.04	
Dieldrin	ug/l	NL		0.004		5		0.004	
Endosulfan I	ug/l	NL		NL		50		50	
Endosulfan II	ug/l	NL		NL		50		50	
Endosulfan sulfate	ug/l	NL		NL		50		50	
Endrin	ug/l	2		ND		2		ND	
Endrin aldehyde	ug/l	NL		5		5		5	
Endrin ketone	ug/l	NL		5		NL		5	
gamma-BHC (Lindane)	ug/l	0.2		0.05		0.2		0.05	
gamma-Chlordane	ug/l	2	##	0.05		2		0.05	

Table 4-2
Groundwater Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	National Primary Drinking Water Standards (1)		NYSDEC Groundwater Quality Standards (2)		NYSDOH Drinking Water Quality Standards (3)		Mercury Refining Groundwater Screening Criteria (4)	
Heptachlor	ug/l	0.4		0.04		0.4		0.04	
Heptachlor epoxide	ug/l	0.2		0.03		0.2		0.03	
Methoxychlor	ug/l	40		35		40		35	
Toxaphene	ug/l	3		0.06		3		0.06	
Inorganic Analytes									
Aluminum	ug/l	NL		NL		NL		NL	
Antimony	ug/l	6		3		6		3	
Arsenic	ug/l	10	A	25		50		10	A
Barium	ug/l	2,000		1,000		2,000		1000	
Beryllium	ug/l	4		3		4		3	
Cadmium	ug/l	5		5		5		5	
Calcium	ug/l	NL		NL		NL		NL	
Chromium	ug/l	100		50	Z	100		50	Z
Cobalt	ug/l	NL		NL		NL		NL	
Copper	ug/l	1,300	TT	200		1,300		200	
Cyanide	ug/l	200		200		200		200	
Iron	ug/l	NL		300	Y	300		300	Y
Lead	ug/l	15	TT	25		15		15	TT
Magnesium	ug/l	NL		35,000		NL		35000	
Manganese	ug/l	NL		300	Y	300		300	Y
Mercury	ug/l	2		0.7		2		0.7	
Nickel	ug/l	NL		100		NL		100	
Potassium	ug/l	NL		NL		NL		NL	
Selenium	ug/l	50		10		50		10	
Silver	ug/l	NL		50		100		50	
Sodium	ug/l	NL		20,000		NL		20000	
Sulfate	ug/l	NL		250,000		250,000		250000	
Thallium	ug/l	2		0.5		2		0.5	

Table 4-2
Groundwater Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	National Primary Drinking Water Standards (1)		NYSDEC Groundwater Quality Standards (2)		NYSDOH Drinking Water Quality Standards (3)		Mercury Refining Groundwater Screening Criteria (4)	
Vanadium	ug/l	NL		NL		NL		NL	
Zinc	ug/l	NL		2,000		5,000		2000	

Notes:

1.	EPA National Primary Drinking Water Standards (web page), EPA 816-F-01-007, July 2002
2.	New York Ambient Water Quality Standards and Guidance Values, August 4, 1999
3.	New York State Department of Health Drinking Water Standards
4.	Mercury Groundwater Screening Criteria is the lowest value of the EPA National Primary Drinking Water Standards, New York Ground Water Quality Standards, and the New York Department of Health Drinking Water Standards
MCL	Maximum Contaminant Level
NA	Chemical name listed but no value available
NL	Chemical name not listed or screening value of this type not listed for the chemical
ND	The criteria for this compound is below any detection limit
TT	Treatment Technique
##	Criteria is for Chlordane
A	The 10 ug/l standard for arsenic does not take effect until January 23, 2006. Until then the standard is 50 ug/l.
W	This value applies to a sum of all PCB compounds
X	This value applies to a sum of all phenolic compounds
Y	The sum of iron and manganese should not exceed 500 ug/l
Z	Also applies to hexavalent chromium
ug/l	micrograms per liter

TABLE 4-3
SOIL SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

Chemical Name	Unit	NYSDEC Recommended Soil Cleanup Objectives (1)		NYSDEC Soil Cleanup Objectives to Protect Ground Water (2)		USEPA Region 2 Risk-Based Screening Criteria for Residential Soil (3)		Site Specific Background Concentration (mg/kg) (4)		Mercury Refining Soil Screening Criteria (5)	
Volatile Organic Compounds											
1,1,1-Trichloroethane	mg/kg	0.8	A	0.8		63	nc			0.8	A
1,1,2,2-Tetrachloroethane	mg/kg	0.6	A	0.6		0.4	ca			0.4	A
1,1,2-Trichloroethane	mg/kg	10	A	NL		0.8	ca			0.8	A
1,1,2-Tricholoro-1,2,2-trifluoroethane	mg/kg	6.0	A	6.0		2,091	nc			6.0	A
1,1-Dichloroethane	mg/kg	0.2	A	0.2		59	nc			0.2	A
1,1-Dichloroethene	mg/kg	0.4	A	0.4		0.05	ca			0.1	A
1,2,3-Trichlorobenzene	mg/kg	10	A	NL		NL				10	A
1,2,4-Trichlorobenzene	mg/kg	3.4	A	3.4		65	nc			3.4	A
1,2-Dibromo-3-chloropropane	mg/kg	10	A	NL		0.15	nc			0.1	A
1,2-Dibromoethane	mg/kg	10	A	NL		0.01	ca			0.01	A
1,2-Dichlorobenzene	mg/kg	7.9	A	7.9		90	nc			7.9	A
1,2-Dichloroethane	mg/kg	0.1	A	0.1		0.35	ca			0.1	A
1,2-Dichloropropane	mg/kg	10	A	NL		0.35	ca			0.4	A
1,3-Dichlorobenzene	mg/kg	1.6	A	1.6		1.3	nc			1.3	A
1,4-Dichlorobenzene	mg/kg	8.5	A	8.5		3.4	ca			3.4	A
2-Butanone	mg/kg	0.3	A	0.3		733	nc			0.3	A
2-Hexanone	mg/kg	10	A	NL		NL				10	A
4-Methyl-2-pentanone	mg/kg	1	A	1		79	nc			1	A
Acetone	mg/kg	0.2	A	0.11		157	nc			0.1	A
Benzene	mg/kg	0.06	A	0.06		0.65	ca			0.1	A

TABLE 4-3
SOIL SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

Chemical Name	Unit	NYSDEC Recommended Soil Cleanup Objectives (1)		NYSDEC Soil Cleanup Objectives to Protect Ground Water (2)		USEPA Region 2 Risk-Based Screening Criteria for Residential Soil (3)		Site Specific Background Concentration (mg/kg) (4)		Mercury Refining Soil Screening Criteria (5)	
Bromochloromethane	mg/kg	10	A	NL		NL				10	A
Bromodichloromethane	mg/kg	10	A	NL		1.0	ca			1.0	A
Bromoform	mg/kg	10	A	NL		62	ca			10	A
Bromomethane	mg/kg	10	A	NL		0.4	nc			0.4	A
Carbon Disulfide	mg/kg	2.7	A	2.7		36	nc			2.7	A
Carbon Tetrachloride	mg/kg	0.6	A	0.6		0.2	nc			0.2	A
Chlorobenzene	mg/kg	1.7	A	1.7		15	nc			1.7	A
Chloroethane	mg/kg	1.9	A	1.9		3	ca			1.9	A
Chloroform	mg/kg	0.3	A	0.3		0.04	nc			0.04	A
Chloromethane	mg/kg	10	A	NL		1.2	ca			1.2	A
cis-1,2-Dichloroethene	mg/kg	10	A	NL		4.3	nc			4.3	A
cis-1,3-Dichloropropene	mg/kg	10	A	NL		NL				10	A
Cyclohexane	mg/kg	10	A	NL		953	nc			10	A
Dibromochloromethane	mg/kg	10	A	NL		1.1	ca			1.1	A
Dichlorodifluoromethane	mg/kg	10	A	NL		9.4	nc			9.4	A
Ethylbenzene	mg/kg	5.5	A	5.5		152	nc			5.5	A
Isopropylbenzene	mg/kg	10	A	NL		16	nc			10	A
Methyl Acetate	mg/kg	10	A	NL		2,209	nc			10	A
Methyl Tert-Butyl Ether	mg/kg	10	A	NL		NL				10	A
Methylcyclohexane	mg/kg	10	A	NL		259	nc			10	A
Methylene Chloride	mg/kg	0.1	A	0.1		9	ca			0.1	A

TABLE 4-3
SOIL SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

Chemical Name	Unit	NYSDEC Recommended Soil Cleanup Objectives (1)		NYSDEC Soil Cleanup Objectives to Protect Ground Water (2)		USEPA Region 2 Risk-Based Screening Criteria for Residential Soil (3)		Site Specific Background Concentration (mg/kg) (4)		Mercury Refining Soil Screening Criteria (5)	
Styrene	mg/kg	10	A	NL		464	nc			10	A
Tetrachloroethene	mg/kg	1.4	A	1.4		6	ca			1.4	A
Toluene	mg/kg	1.5	A	1.5		59	nc			1.5	A
trans-1,2-Dichloroethene	mg/kg	0.3	A	0.3		6	nc			0.3	A
trans-1,3-Dichloropropene	mg/kg	10	A	NL		NL				10	A
Trichloroethene	mg/kg	0.7	A	0.7		2	nc			0.7	A
Trichlorofluoromethane	mg/kg	10	A	NL		39	nc			10	A
Vinyl Chloride	mg/kg	0.2	A	0.12		0.15	ca			0.1	A
Xylenes (Total)	mg/kg	1.2	A	1.2		135	nc			1.2	A
Semi-Volatile Organics											
1,1'-Biphenyl	mg/kg	NL		NL		301	nc			301	
2,2'-oxybis(1-Chloropropane)	mg/kg	NL		NL		2.9	ca			2.9	
2,4,5-Trichlorophenol	mg/kg	0.1		0.1		611	nc			0.1	
2,4,6-Trichlorophenol	mg/kg	NL		NL		44	ca			44	
2,4-Dichlorophenol	mg/kg	0.4		0.4		18	nc			0.4	
2,4-Dimethylphenol	mg/kg	NL		NL		122	nc			122	
2,4-Dinitrophenol	mg/kg	0.2		0.2		12	nc			0.2	
2,4-Dinitrotoluene	mg/kg	NL		NL		12	nc			12	
2,6-Dinitrotoluene	mg/kg	1.0		1.0		6	nc			1.0	
2-Chloronaphthalene	mg/kg	NL		NL		385	nc			385	
2-Chlorophenol	mg/kg	0.8		0.8		6	nc			0.8	

TABLE 4-3
SOIL SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

Chemical Name	Unit	NYSDEC Recommended Soil Cleanup Objectives (1)		NYSDEC Soil Cleanup Objectives to Protect Ground Water (2)		USEPA Region 2 Risk-Based Screening Criteria for Residential Soil (3)		Site Specific Background Concentration (mg/kg) (4)		Mercury Refining Soil Screening Criteria (5)	
2-Methylnaphthalene	mg/kg	36		36		NL				36	
2-Methylphenol	mg/kg	0.1		0.1		306	nc			0.1	
2-Nitroaniline	mg/kg	0.43		0.43		0.35	nc			0.3	
2-Nitrophenol	mg/kg	0.33		0.33		NL				0.3	
3,3'-Dichlorobenzidine	mg/kg	NL		NL		1.1	ca			1.1	
3-Nitroaniline	mg/kg	0.5		0.5		NL				0.5	
4,6-Dinitro-2-methylphenol	mg/kg	NL		NL		NL				NL	
4-Bromophenyl-phenylether	mg/kg	NL		NL		NL				NL	
4-Chloro-3-methylphenol	mg/kg	0.24		0.24		NL				0.24	
4-Chloroaniline	mg/kg	0.22		0.22		24	nc			0.22	
4-Chlorophenyl-phenylether	mg/kg	NL		NL		NL				NL	
4-Methylphenol	mg/kg	0.9		0.9		31	nc			0.9	
4-Nitroaniline	mg/kg	NL		NL		NL				NL	
4-Nitrophenol	mg/kg	0.1		0.1		49	nc			0.1	
Acenaphthene	mg/kg	50		90		368	nc			50	
Acenaphthylene	mg/kg	41		41		NL				41	
Acetophenone	mg/kg	NL		NL		0.05	nc			0.05	
Anthracene	mg/kg	50		700		2,190	nc			50	
Atrazine	mg/kg	NL		NL		2.2	ca			2.2	
Benzaldehyde	mg/kg	NL		NL		611	nc			611	
Benzo(a)anthracene	mg/kg	0.22		3		0.62	ca			0.22	

TABLE 4-3
SOIL SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

Chemical Name	Unit	NYSDEC Recommended Soil Cleanup Objectives (1)	NYSDEC Soil Cleanup Objectives to Protect Ground Water (2)	USEPA Region 2 Risk-Based Screening Criteria for Residential Soil (3)		Site Specific Background Concentration (mg/kg) (4)	Mercury Refining Soil Screening Criteria (5)
Benzo(a)pyrene	mg/kg	0.06	11.0	0.06	ca	0.2	0.2
Benzo(b)fluoranthene	mg/kg	1.1	1.1	0.62	ca		0.62
Benzo(g,h,i)perylene	*mg/kg*	50	800	NL			50
Benzo(k)fluoranthene	mg/kg	1.1	1.1	6	ca		1.1
bis(2-Chloroethoxy)methane	mg/kg	NL	NL	NL			NL
bis(2-Chloroethyl)ether	mg/kg	NL	NL	0.21	ca		0.2
bis-(2-Ethylhexyl)phthalate	mg/kg	50	435	35	ca		35
Butylbenzylphthalate	mg/kg	50	122	1,222	nc		50
Caprolactam	mg/kg	NL	NL	3,055	nc		3,055
Carbazole	mg/kg	NL	NL	24	ca		24.3
Chrysene	mg/kg	0.4	0.4	62	ca		0.4
Dibenzo(a,h)anthracene	mg/kg	0.014	165,000	0.06	ca	0.18	0.18
Dibenzofuran	mg/kg	6.2	6.2	29	nc		6.2
Diethylphthalate	mg/kg	7.1	7.1	4,888	nc		7.1
Dimethylphthalate	mg/kg	2.0	2.0	61,103	nc		2.0
Di-n-butylphthalate	mg/kg	8.1	8.1	611	nc		8.1
Di-n-octylphthalate	mg/kg	50	120	122	nc		50
Fluoranthene	mg/kg	50	1,900	229	nc		50
Fluorene	mg/kg	50	350	264	nc		50
Hexachlorobenzene	mg/kg	0.41	1.4	0.3	ca		0.3
Hexachlorobutadiene	mg/kg	NL	NL	1.8	nc		1.8

TABLE 4-3
SOIL SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

Chemical Name	Unit	NYSDEC Recommended Soil Cleanup Objectives (1)		NYSDEC Soil Cleanup Objectives to Protect Ground Water (2)		USEPA Region 2 Risk-Based Screening Criteria for Residential Soil (3)		Site Specific Background Concentration (mg/kg) (4)		Mercury Refining Soil Screening Criteria (5)	
Hexachlorocyclopentadiene	mg/kg	NL		NL		42	nc			42	
Hexachloroethane	mg/kg	NL		NL		6.1	nc			6.1	
Indeno(1,2,3-cd)pyrene	mg/kg	3.2		3.2		0.62	ca			0.62	
Isophorone	mg/kg	4.4		4.4		512	ca			4.4	
Naphthalene	mg/kg	13		13		5.6	nc			5.6	
Nitrobenzene	mg/kg	0.2		0.2		2.0	nc			0.2	
N-Nitroso-di-n-propylamine	mg/kg	NL		NL		0.07	ca			0.07	
N-Nitrosodiphenylamine	mg/kg	NL		NL		99	ca			99	
Pentachlorophenol	mg/kg	1.0		1.0		3.0	ca			1.0	
Phenanthrene	mg/kg	50		220		NL				50	
Phenol	mg/kg	0.03		0.03		3,666	nc			0.0	
Pyrene	mg/kg	50		665		231	nc			50	
Pesticides/PCBs											
4,4'-DDD	mg/kg	2.9		7.7		2.4	ca			2.4	
4,4'-DDE	mg/kg	2.1		4.4		1.7	ca			1.7	
4,4'-DDT	mg/kg	2.1		2.5		1.7	ca			1.7	
Aldrin	mg/kg	0.04		0.5		0.03	ca			0.03	
alpha-BHC	mg/kg	0.11		0.2		0.09	ca			0.09	
alpha-Chlordane	mg/kg	0.54		2.0		NL				0.54	
Aroclor-1016	mg/kg	1		10		0.39	nc			0.39	
Aroclor-1221	mg/kg	1		10		0.22	ca			0.22	

TABLE 4-3
SOIL SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

Chemical Name	Unit	NYSDEC Recommended Soil Cleanup Objectives (1)		NYSDEC Soil Cleanup Objectives to Protect Ground Water (2)		USEPA Region 2 Risk-Based Screening Criteria for Residential Soil (3)		Site Specific Background Concentration (mg/kg) (4)		Mercury Refining Soil Screening Criteria (5)	
Aroclor-1232	mg/kg	1		10		0.22	ca			0.22	
Aroclor-1242	mg/kg	1		10		0.22	ca			0.22	
Aroclor-1248	mg/kg	1		10		0.22	ca			0.22	
Aroclor-1254	mg/kg	1		10		0.11	nc			0.11	
Aroclor-1260	mg/kg	1		10		0.22	ca			0.22	
beta-BHC	mg/kg	0.2		0.2		0.32	ca			0.2	
delta-BHC	mg/kg	0.3		0.3		NL				0.3	
Dieldrin	mg/kg	0.04		0.1		0.03	ca			0.03	
Endosulfan I	mg/kg	0.9		0.9		NL				0.9	
Endosulfan II	mg/kg	0.9		0.9		NL				0.9	
Endosulfan Sulfate	mg/kg	1.0		1.0		NL				1.0	
Endrin	mg/kg	0.1		0.1		1.8	nc			0.1	
Endrin aldehyde	mg/kg	NL		NL		NL				NL	
Endrin ketone	mg/kg	NL		NL		NL				NL	
gamma-BHC (Lindane)	mg/kg	0.06		0.06		0.44	ca			0.06	
gamma-Chlordane	mg/kg	0.54		14.0		NL				0.54	
Heptachlor	mg/kg	0.1		0.1		0.11	ca			0.1	
Heptachlor epoxide	mg/kg	0.02		0.02		0.05	ca			0.02	
Methoxychlor	mg/kg	NL		900		31	nc			31	
Toxaphene	mg/kg	NL		NL		0.44	ca			0.44	

TABLE 4-3
SOIL SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

Chemical Name	Unit	NYSDEC Recommended Soil Cleanup Objectives (1)		NYSDEC Soil Cleanup Objectives to Protect Ground Water (2)		USEPA Region 2 Risk-Based Screening Criteria for Residential Soil (3)		Site Specific Background Concentration (mg/kg) (4)		Mercury Refining Soil Screening Criteria (5)	
Inorganic Analytes											
Aluminum	mg/kg	NL	B	NL		7,614	nc			7,614	
Antimony	mg/kg	NL	B	NL		3.1	nc			3.1	
Arsenic	mg/kg	7.5	bkg,D	NL		0.39	ca	2.4		2.4	bkg
Barium	mg/kg	300	bkg, D	NL		537	nc			300	bkg
Beryllium	mg/kg	0.16	bkg, D	NL		15	nc	0.3		0.3	bkg
Cadmium	mg/kg	1.0	bkg, D	NL		3.7	nc			1	bkg
Calcium	mg/kg	NL	B	NL		NL				NL	B
Chromium	mg/kg	10	bkg, D	NL		211	ca			10	bkg
Cobalt	mg/kg	30	bkg, D	NL		469	nc			30	bkg, D
Copper	mg/kg	25	bkg, D	NL		291	nc			25	bkg, D
Cyanide	mg/kg	NL	C	NL		NL				0.0	C
Iron	mg/kg	2,000	bkg, D	NL		2,346	nc	10,669		10,669	bkg, D
Lead	mg/kg	NL	B	NL		NL				NL	
Magnesium	mg/kg	NL	B	NL		NL				NL	B
Manganese	mg/kg	NL	B	NL		176	nc	340		340	
Mercury	mg/kg	0.1	D	NL		2.30				0.1	
Nickel	mg/kg	13.0	bkg, D	NL		156	nc			13.0	bkg
Potassium	mg/kg	NL	B	NL		NL				NL	B
Selenium	mg/kg	2.0	bkg, D	NL		39	nc			2.0	bkg
Silver	mg/kg	NL	B	NL		39	nc			39	

TABLE 4-3
SOIL SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

Chemical Name	Unit	NYSDEC Recommended Soil Cleanup Objectives (1)		NYSDEC Soil Cleanup Objectives to Protect Ground Water (2)		USEPA Region 2 Risk-Based Screening Criteria for Residential Soil (3)		Site Specific Background Concentration (mg/kg) (4)		Mercury Refining Soil Screening Criteria (5)	
Sodium	mg/kg	NL	B	NL		NL				NL	B
Thallium	mg/kg	NL	B	NL		NL				NL	
Vanadium	mg/kg	150	bkg, D	NL		55	nc			54.7	bkg
Zinc	mg/kg	20	bkg, D	NL		2346	nc	24.2		24.2	bkg, D

Notes:

1. New York State Soil Cleanup Objectives (TAGM #4046, January 1994)
2. New York State Soil Cleanup Objectives to Protect Groundwater (TAGM #4046, January 1994)
3. Based on EPA Region 9 Preliminary Remediation Goals (PRGs) for residential soil, adjusted to cancer benchmark = 1E-6 and hazard quotient = 0.1. http://www.epa.gov/region09/waste/sfund/prg/
4. Site background, computed by CDM. This value was used in cases where the screening risk-based screening criteria was below the computed site background (see Subsection 4.1.3). This value was applied to subsurface soil samples only and was not applied to ecological risk or human health risk soil samples.
5. Mercury Soil Screening Criteria is the lowest value of the NYSDEC Soil Cleanup Objectives, Soil Cleanup Objectives to Protect Groundwater and the EPA Soil Screening Levels for organics. For inorganics, the Mercury Soil Screening Criteria is the lowest risk-based value unless that value is below background. Per NYSDEC guidance for soil cleanup objectives (TAGM #4046), if the risk-based value is below background, the background value is used.

A	Total VOCs <10 ppm
B	Site background
C	Must be calculated on a site specific basis dependant upon site specific form of cyanide
D	Recommended soil cleanup objective is based on average background concentrations and is not risk-based
bkg	or site background
nc	Screening Toxicity Value is based on noncancer effects
ca	Screening Toxicity Value is based on cancer effects
NL	Chemical name not listed or screening value of this type not listed for the chemical
mg/kg	milligrams per kilogram

Table 4-4
Sediment Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	Ontario Sediment Quality		New York State Sediment Screening Criteria (2)		Mercury Refining Sediment Screening Criteria (3)	
Volatile Organic Compounds							
1,1,1-Trichloroethane	mg/kg	NL		NL		NL	
1,1,2,2-Tetrachloroethane	mg/kg	NL		0.0042	B	0.0042	
1,1,2-Trichloro-1,2,2-trifluoroethane	mg/kg	NL		NL		NL	
1,1,2-Trichloroethane	mg/kg	NL		0.0084	B	0.0084	
1,1-Dichloroethane	mg/kg	NL		NL		NL	
1,1-Dichloroethene	mg/kg	NL		0.00028	B	0.00028	
1,2,3-Trichlorobenzene	mg/kg	NL		1.274	A,B,E	1.274	E
1,2,4-Trichlorobenzene	mg/kg	NL		1.274	A,B,E	1.274	E
1,2-Dibromo-3-chloropropane	mg/kg	NL		NL		NL	
1,2-Dibromoethane	mg/kg	NL		NL		NL	
1,2-Dichlorobenzene	mg/kg	NL		0.168	A,B,D	0.168	D
1,2-Dichloroethane	mg/kg	NL		0.0098	B	0.0098	
1,2-Dichloropropane	mg/kg	NL		NL		NL	
1,3-Dichlorobenzene	mg/kg	NL		0.168	A,B,D	0.168	D
1,4-Dichlorobenzene	mg/kg	NL		0.168	A,B,D	0.168	D
2-Butanone	mg/kg	NL		NL		NL	
2-Hexanone	mg/kg	NL		NL		NL	
4-Methyl-2-pentanone	mg/kg	NL		NL		NL	
Acetone	mg/kg	NL		NL		NL	
Benzene	mg/kg	NL		0.0084	B	0.0084	
Bromochloromethane	mg/kg	NL		NL		NL	
Bromodichloromethane	mg/kg	NL		NL		NL	
Bromoform	mg/kg	NL		NL		NL	
Bromomethane	mg/kg	NL		NL		NL	
Carbon Disulfide	mg/kg	NL		NL		NL	
Carbon Tetrachloride	mg/kg	NL		0.0084	B	0.0084	
Chlorobenzene	mg/kg	NL		0.049	A,B	0.049	
Chloroethane	mg/kg	NL		NL		NL	
Chloroform	mg/kg	NL		NL		NL	
Chloromethane	mg/kg	NL		NL		NL	
cis-1,2-Dichloroethene	mg/kg	NL		NL		0	
cis-1,3-Dichloropropene	mg/kg	NL		NL		NL	
Cyclohexane	mg/kg	NL		NL		NL	
Dibromochloromethane	mg/kg	NL		NL		NL	
Dichlorodifluoromethane	mg/kg	NL		NL		NL	
Ethylbenzene	mg/kg	NL		0.336	A,B	0.336	
Isopropylbenzene	mg/kg	NL		0.168	B	0.168	
Methyl Acetate	mg/kg	NL		NL		NL	
Methyl Tert-Butyl Ether	mg/kg	NL		NL		NL	
Methylcyclohexane	mg/kg	NL		NL		NL	
Methylene Chloride	mg/kg	NL		NL		NL	

Table 4-4
Sediment Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	Ontario Sediment Quality		New York State Sediment Screening Criteria (2)		Mercury Refining Sediment Screening Criteria (3)	
m-Xylene	mg/kg	NL		NL		NL	
o-Xylene	mg/kg	NL		NL		NL	
p-Xylene	mg/kg	NL		NL		NL	
Styrene	mg/kg	NL		NL		NL	
Tetrachloroethene	mg/kg	NL		0.0112	B	0.0112	
Toluene	mg/kg	NL		0.686	A,B	0.686	
trans-1,2-Dichloroethene	mg/kg	NL		NL		NL	
trans-1,3-Dichloropropene	mg/kg	NL		NL		NL	
Trichloroethene	mg/kg	NL		0.028	B	0.028	
Trichlorofluoromethane	mg/kg	NL		NL		NL	
Vinyl Chloride	mg/kg	NL		0.00098	B	0.00098	
Xylenes (total)	mg/kg	NL		1.288	A,B,F	1.288	F
Semi-Volatile Organics							
1,1'Biphenyl	mg/kg	NL		NL		NL	
2,2'-oxybis(1-Chloropropane)	mg/kg	NL		NL		NL	
2,4,5-Trichlorophenol	mg/kg	NL		NL		NL	
2,4,6-Trichlorophenol	mg/kg	NL		NL		NL	
2,4-Dichlorophenol	mg/kg	NL		NL		NL	
2,4-Dimethylphenol	mg/kg	NL		NL		NL	
2,4-Dinitrophenol	mg/kg	NL		NL		NL	
2,4-Dinitrotoluene	mg/kg	NL		NL		NL	
2,6-Dinitrotoluene	mg/kg	NL		NL		NL	
2-Chloronaphthalene	mg/kg	NL		NL		NL	
2-Chlorophenol	mg/kg	NL		NL		NL	
2-Methylnaphthalene	mg/kg	NL		0.476	A,B	0.476	
2-Methylphenol	mg/kg	NL		NL		NL	
2-Nitroaniline	mg/kg	NL		NL		NL	
2-Nitrophenol	mg/kg	NL		NL		NL	
3,3'-Dichlorobenzidine	mg/kg	NL		NL		NL	
3-Nitroaniline	mg/kg	NL		NL		NL	
4,6-Dinitro-2-methylphenol	mg/kg	NL		NL		NL	
4-Bromophenyl-phenylether	mg/kg	NL		NL		NL	
4-Chloro-3-methylphenol	mg/kg	NL		NL		NL	
4-Chloroaniline	mg/kg	NL		NL		NL	
4-Chlorophenyl-phenylether	mg/kg	NL		NL		NL	
4-Methylphenol	mg/kg	NL		NL		NL	
4-Nitroaniline	mg/kg	NL		NL		NL	
4-Nitrophenol	mg/kg	NL		NL		NL	
Acenaphthene	mg/kg	NL		1.96	A,B	1.96	
Acenaphthylene	mg/kg	NL		NL		NL	
Acetophenone	mg/kg	NL		NL		NL	
Anthracene	mg/kg	0.22	I	1.498	A,B	0.22	I
Atrazine	mg/kg	NL		NL		NL	

Table 4-4
Sediment Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	Ontario Sediment Quality		New York State Sediment Screening Criteria (2)		Mercury Refining Sediment Screening Criteria (3)	
Benzaldehyde	mg/kg	NL		NL		NL	
Benzo(a)anthracene	mg/kg	0.320	I	0.168	A,B	0.168	I
Benzo(a)pyrene	mg/kg	0.370	I	0.0182	B	0.0182	I
Benzo(b)fluoranthene	mg/kg	NL		NL		NL	
Benzo(g,h,i)perylene	mg/kg	0.170	I	NL		0.17	I
Benzo(k)fluoranthene	mg/kg	0.240	I	NL		0.24	I
bis(2-Chloroethoxy)methane	mg/kg	NL		NL		NL	
bis(2-Chloroethyl)ether	mg/kg	NL		0.00042	B	0.00042	
bis(2-Ethylhexyl)phthalate	mg/kg	NL		2.793	A,B	2.793	
Butylbenzylphthalate	mg/kg	NL		NL		NL	
Caprolactam	mg/kg	NL		NL		NL	
Carbazole	mg/kg	NL		NL		NL	
Chrysene	mg/kg	0.340	I	NL		0.34	I
Dibenz(a,h)anthracene	mg/kg	0.060	I	NL		0.06	I
Dibenzofuran	mg/kg	NL		NL		NL	
Diethylphthalate	mg/kg	NL		NL		NL	
Dimethylphthalate	mg/kg	NL		NL		NL	
Di-n-butylphthalate	mg/kg	NL		NL		NL	
Di-n-octyl phthalate	mg/kg	NL		NL		NL	
Fluoranthene	mg/kg	NL		14.28	A,B	14.28	
Fluorene	mg/kg	0.19	I	0.112	A,B	0.112	I
Hexachlorobenzene	mg/kg	NL		0.0021	B	0.0021	
Hexachlorobutadiene	mg/kg	NL		0.0042	B	0.0042	
Hexachlorocyclopentadiene	mg/kg	NL		0.0616	A,B	0.0616	
Hexachloroethane	mg/kg	NL		NL		NL	
Indeno(1,2,3-cd)pyrene	mg/kg	0.200	I	NL		0.2	I
Isophorone	mg/kg	NL		NL		NL	
Naphthalene	mg/kg	NL		0.42	A,B	0.42	
Nitrobenzene	mg/kg	NL		NL		NL	
N-Nitroso-di-n-propylamine	mg/kg	NL		NL		NL	
N-Nitrosodiphenylamine	mg/kg	NL		NL		NL	
Pentachlorophenol	mg/kg	NL		0.56	A,B	0.56	
Phenanthrene	mg/kg	0.56	I	1.68	A,B	0.56	I
Phenol	mg/kg	NL		0.0084	A,B,G	0.0084	G
Pyrene	mg/kg	0.49	I	13.454	A,B	0.49	I
Pesticides/PCBs							
4,4'-DDD	mg/kg	0.008	I	0.00014	B	0.00014	I
4,4'-DDE	mg/kg	0.005	I	0.00014	B	0.00014	I
4,4'-DDT	mg/kg	0.007	I	0.00014	B	0.00014	I
Aldrin	mg/kg	0.002	I	0.0014	B	0.0014	I
alpha-BHC	mg/kg	0.006	I	NL		0.006	I
alpha-Chlordane	mg/kg	0.007	I	0.000014	B,C	0.000014	I,C
Aroclor-1016	mg/kg	0.007	I	0.0000112	B	0.0000112	I

Table 4-4
Sediment Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	Ontario Sediment Quality		New York State Sediment Screening Criteria (2)		Mercury Refining Sediment Screening Criteria (3)	
Aroclor-1221	mg/kg	0.07	H,I	0.0000112	B	0.0000112	H,I
Aroclor-1232	mg/kg	0.07	H,I	0.0000112	B	0.0000112	H,I
Aroclor-1242	mg/kg	0.07	H,I	0.0000112	B	0.0000112	H,I
Aroclor-1248	mg/kg	0.03	I	0.0000112	B	0.0000112	I
Aroclor-1254	mg/kg	0.06	I	0.0000112	B	0.0000112	I
Aroclor-1260	mg/kg	0.005	I	0.0000112	B	0.0000112	I
beta-BHC	mg/kg	0.005	I	NL		0.005	I
delta-BHC	mg/kg	0.003	I	NL		0.003	I
Dieldrin	mg/kg	0.002	I	0.0014	B	0.0014	I
Endosulfan I	mg/kg	NL		0.00042	A,B	0.00042	
Endosulfan II	mg/kg	NL		NL		NL	
Endosulfan sulfate	mg/kg	NL		NL		NL	
Endrin	mg/kg	NL		0.0112	B	0.0112	
Endrin aldehyde	mg/kg	NL		NL		NL	
Endrin ketone	mg/kg	NL		NL		NL	
gamma-BHC (Lindane)	mg/kg	0.003	I	NL		0.003	I
gamma-Chlordane	mg/kg	NL		0.000014	B,C	0.000014	
Heptachlor	mg/kg	NL		0.0000112	B	0.0000112	
Heptachlor epoxide	mg/kg	0.005	I	0.0000112	B	0.0000112	
Methoxychlor	mg/kg	NL		0.0084	A,B	0.0084	
Toxaphene	mg/kg	NL		0.00028	B	0.00028	
Inorganic Analytes							
Aluminum	mg/kg	NL		NL		NL	
Antimony	mg/kg	NL		2.0	I	2	I
Arsenic	mg/kg	6	I	6	I	6	I
Barium	mg/kg	NL		NL		NL	
Beryllium	mg/kg	NL		NL		NL	
Cadmium	mg/kg	0.6	I	0.6	I	0.6	I
Calcium	mg/kg	NL		NL		NL	
Chromium	mg/kg	26	I	26	I	26	I
Cobalt	mg/kg	NL		NL		NL	
Copper	mg/kg	16	I	16	I	16	I
Iron	mg/kg	2	I	20	I	2	I
Lead	mg/kg	31	I	31	I	31	I
Magnesium	mg/kg	NL		NL		NL	
Manganese	mg/kg	460	I	460	I	460	I
Mercury	mg/kg	0.2	I	0.15	I	0.15	I
Nickel	mg/kg	16		16	I	16	I
Potassium	mg/kg	NL		NL		NL	
Selenium	mg/kg	NL		NL		NL	
Silver	mg/kg	1	I	1	I	1	I
Sodium	mg/kg	NL		NL		NL	
Sulfate	mg/kg	NL		NL		NL	

Table 4-4
Sediment Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	Ontario Sediment Quality		New York State Sediment Screening Criteria (2)		Mercury Refining Sediment Screening Criteria (3)	
Thallium	mg/kg	NL		NL		NL	
Vanadium	mg/kg	NL		NL		NL	
Zinc	mg/kg	120	I	120	I	120	I

Notes:

1. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of the Environment, 1993. Values are based on effects to aquatic life.
2. Technical Guidance for Screening Contaminated Sediments, Division of Fish, Wildlife and Marine Resources, January 25, 1999. Values are based on Human Health Bioaccumulation unless otherwise noted.
3. Mercury Sediment Screening Criteria is the lower of the Ontario Sediment Screening Criteria and the NYS screening criteria

NL	Chemical name not listed or screening value of this type not listed for the chemical
A	There is no human health bioaccumulation number listed for this compound. Criteria is for benthic aquatic life chronic toxicity for fresh water
B	Values are calculated based on an average TOC of 14 gOC/kg. Only TOC concentrations from 0-6 inch sediment samples were includes in this average as to not spatially bias the average.
C	Value applies to total Chlordane
D	Value applies to total Dichlorobenzenes
E	Value applies to total Trichlorobenzenes
F	Value applies to total Xylenes
G	Value applies to total Phenols
H	Value applies to total PCBs
I	Value is Lowest Effect Level (LEL) for aquatic life
mg/kg	micrograms per kilogram

Table 4-5
Fish Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	USEPA Region 3 Risk Based Concentration for Fish Consumption (1)		Mercury Refining Fish Screening Criteria (2)	
Volatile Organic Compounds					
1,1,1-Trichloroethane	mg/kg	379	N	379	N
1,1,2,2-Tetrachloroethane	mg/kg	0.1	C	0.1	C
1,1,2-Trichloro-1,2,2-trifluoroethane	mg/kg	40,556	N	40,556	N
1,1,2-Trichloroethane	mg/kg	0.06	C	0.06	C
1,1-Dichloroethane	mg/kg	135	N	135	N
1,1-Dichloroethene	mg/kg	0.005	C	0.005	C
1,2,3-Trichlorobenzene	mg/kg	NL		NL	
1,2,4-Trichlorobenzene	mg/kg	13.5	N	13.5	N
1,2-Dibromo-3-chloropropane	mg/kg	0.002	C	0.002	C
1,2-Dibromoethane	mg/kg	0.00004	C	0.00004	C
1,2-Dichlorobenzene	mg/kg	122	N	122	N
1,2-Dichloroethane	mg/kg	0.03	C	0.03	C
1,2-Dichloropropane	mg/kg	0.05	C	0.05	C
1,3-Dichlorobenzene	mg/kg	41	N	41	N
1,4-Dichlorobenzene	mg/kg	0.1	C	0.1	C
2-Butanone	mg/kg	811	N	811	N
2-Hexanone	mg/kg	54	N	54	N
4-Methyl-2-pentanone	mg/kg	110	N	110	N
Acetone	mg/kg	135	N	135	N
Benzene	mg/kg	0.06	C	0.06	C
Bromochloromethane	mg/kg	NL		NL	
Bromodichloromethane	mg/kg	0.05	C	0.05	C
Bromoform	mg/kg	0.4	C	0.4	C
Bromomethane	mg/kg	1.9	N	1.9	N
Carbon Disulfide	mg/kg	135	N	135	N
Carbon Tetrachloride	mg/kg	0.02	C	0.02	C
Chlorobenzene	mg/kg	27	N	27	N
Chloroethane	mg/kg	1.1	C	1.1	C
Chloroform	mg/kg	13.5	N	13.5	N
Chloromethane	mg/kg	0.2	C	0.2	C
cis-1,2-Dichloroethene	mg/kg	14	N	14	N
cis-1,3-Dichloropropene	mg/kg	0.03	C,^	0.03	C,^
Cyclohexane	mg/kg	NL		NL	
Dibromochloromethane	mg/kg	0.04	C	0.04	C
Dichlorodifluoromethane	mg/kg	270	N	270	N
Ethylbenzene	mg/kg	135	N	135	N
Isopropylbenzene	mg/kg	140	N	140	N
Methyl Acetate	mg/kg	1,352	N	1,352	N
Methyl Tert-Butyl Ether	mg/kg	0.8	C	0.8	C
Methylcyclohexane	mg/kg	NA		NA	

Table 4-5
Fish Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	USEPA Region 3 Risk Based Concentration for Fish Consumption (1)		Mercury Refining Fish Screening Criteria (2)	
Methylene Chloride	mg/kg	0.4	C	0.4	C
m-Xylene	mg/kg	2,704	N	2,704	N
o-Xylene	mg/kg	2,704	N	2,704	N
p-Xylene	mg/kg	NA		NA	
Styrene	mg/kg	270	N	270	N
Tetrachloroethene	mg/kg	0.06	C	0.06	C
Toluene	mg/kg	270	N	270	N
trans-1,2-Dichloroethene	mg/kg	NL		NL	
trans-1,3-Dichloropropene	mg/kg	0.03	C,^	0.03	C,^
Trichloroethene	mg/kg	0.008	C	0.008	C
Trichlorofluoromethane	mg/kg	406	N	406	N
Vinyl Chloride	mg/kg	0.004	C	0.004	C
Xylenes (total)	mg/kg	2,704	N	2,704	N
Semi-Volatile Organics					
1,1'Biphenyl	mg/kg	NL		NL	
2,2'-oxybis(1-Chloropropane)	mg/kg	NL		NL	
2,4,5-Trichlorophenol	mg/kg	135	N	135	N
2,4,6-Trichlorophenol	mg/kg	0.3	C	0.3	C
2,4-Dichlorophenol	mg/kg	4.1	N	4.1	N
2,4-Dimethylphenol	mg/kg	27	N	27	N
2,4-Dinitrophenol	mg/kg	2.7	N	2.7	N
2,4-Dinitrotoluene	mg/kg	2.7	N	2.7	N
2,6-Dinitrotoluene	mg/kg	1.4	N	1.4	N
2-Chloronaphthalene	mg/kg	NL		NL	
2-Chlorophenol	mg/kg	6.8	N	6.8	N
2-Methylnaphthalene	mg/kg	27	N	27	N
2-Methylphenol	mg/kg	68	N	68	N
2-Nitroaniline	mg/kg	NA		NA	
2-Nitrophenol	mg/kg	NL		NL	
3,3'-Dichlorobenzidine	mg/kg	0.007	C	0.007	C
3-Nitroaniline	mg/kg	NL		NL	
4,6-Dinitro-2-methylphenol	mg/kg	1.4	N	1.4	N
4-Bromophenyl-phenylether	mg/kg	NL		NL	
4-Chloro-3-methylphenol	mg/kg	NL		NL	
4-Chloroaniline	mg/kg	5.4	N	5.4	N
4-Chlorophenyl-phenylether	mg/kg	NL		NL	
4-Methylphenol	mg/kg	6.8	N	6.8	N
4-Nitroaniline	mg/kg	NL		NL	
4-Nitrophenol	mg/kg	11	N	11	N
Acenaphthene	mg/kg	81	N	81	N
Acenaphthylene	mg/kg	NL		NL	

Table 4-5
Fish Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	USEPA Region 3 Risk Based Concentration for Fish Consumption (1)		Mercury Refining Fish Screening Criteria (2)	
Acetophenone	mg/kg	135	N	135	N
Anthracene	mg/kg	406	N	406	N
Atrazine	mg/kg	0.01	C	0.01	C
Benzaldehyde	mg/kg	135	N	135	N
Benzo(a)anthracene	mg/kg	0.004	C	0.004	C
Benzo(a)pyrene	mg/kg	0.0004	C	0.0004	C
Benzo(b)fluoranthene	mg/kg	0.004	C	0.004	C
Benzo(g,h,i)perylene	mg/kg	NL		NL	
Benzo(k)fluoranthene	mg/kg	0.04	C	0.04	C
bis(2-Chloroethoxy)methane	mg/kg	NL		NL	
bis(2-Chloroethyl)ether	mg/kg	0.003	C	0.003	C
bis(2-Ethylhexyl)phthalate	mg/kg	0.0023	C	0.0023	C
Butylbenzylphthalate	mg/kg	270	N	270	N
Caprolactam	mg/kg	676	N	676	N
Carbazole	mg/kg	0.2	C	0.2	C
Chrysene	mg/kg	0.4	C	0.4	C
Dibenz(a,h)anthracene	mg/kg	0.0004	C	0.0004	C
Dibenzofuran	mg/kg	5.4	N	5.4	N
Diethylphthalate	mg/kg	1,081	N	1,081	N
Dimethylphthalate	mg/kg	13,519	N	13,519	N
Di-n-butylphthalate	mg/kg	135	N	135	N
Di-n-octyl phthalate	mg/kg	27	N	27	N
Fluoranthene	mg/kg	54	N	54	N
Fluorene	mg/kg	54	N	54	N
Hexachlorobenzene	mg/kg	0.002	C	0.002	C
Hexachlorobutadiene	mg/kg	0.04	C	0.04	C
Hexachlorocyclopentadiene	mg/kg	8.1	N	8.1	N
Hexachloroethane	mg/kg	0.2	C	0.2	C
Indeno(1,2,3-cd)pyrene	mg/kg	0.004	C	0.004	C
Isophorone	mg/kg	3.3	C	3.3	C
Naphthalene	mg/kg	27	N	27	N
Nitrobenzene	mg/kg	0.7	N	0.7	N
N-Nitroso-di-n-propylamine	mg/kg	0.0005	C	0.0005	C
N-Nitrosodiphenylamine	mg/kg	0.6	C	0.6	C
Pentachlorophenol	mg/kg	0.03	C	0.03	C
Phenanthrene	mg/kg	NL		NL	
Phenol	mg/kg	811	N	811	N
Pyrene	mg/kg	41	N	41	N
Pesticides/PCBs					
4,4'-DDD	mg/kg	0.01	C	0.01	C
4,4'-DDE	mg/kg	0.009	C	0.009	C

Table 4-5
Fish Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	USEPA Region 3 Risk Based Concentration for Fish Consumption (1)		Mercury Refining Fish Screening Criteria (2)	
4,4'-DDT	mg/kg	0.009	C	0.009	C
Aldrin	mg/kg	0.00019	C	0.00019	C
alpha-BHC	mg/kg	0.0005		0.0005	
alpha-Chlordane	mg/kg	0.009	C, *	0.009	C, *
Aroclor-1016	mg/kg	0.045	C, #	0.045	C, #
Aroclor-1221	mg/kg	0.002	C, #	0.002	C, #
Aroclor-1232	mg/kg	0.002	C, #	0.002	C, #
Aroclor-1242	mg/kg	0.002	C, #	0.002	C, #
Aroclor-1248	mg/kg	0.002	C, #	0.002	C, #
Aroclor-1254	mg/kg	0.002	C, #	0.002	C, #
Aroclor-1260	mg/kg	0.002	C, #	0.002	C, #
beta-BHC	mg/kg	0.0018		0.0018	
delta-BHC	mg/kg	NL		NL	
Dieldrin	mg/kg	0.0002	C	0.0002	C
Endosulfan I	mg/kg	8.1	N	8.1	N
Endosulfan II	mg/kg	NL		NL	
Endosulfan sulfate	mg/kg	NL		NL	
Endrin	mg/kg	0.4	N	0.4	N
Endrin aldehyde	mg/kg	NL		NL	
Endrin ketone	mg/kg	NL		NL	
gamma-BHC (Lindane)	mg/kg	0.0024		0.0024	
gamma-Chlordane	mg/kg	0.009	C, *	0.009	C, *
Heptachlor	mg/kg	0.0007	C	0.0007	C
Heptachlor epoxide	mg/kg	0.0003	C	0.0003	C
Methoxychlor	mg/kg	6.8	N	6.8	N
Toxaphene	mg/kg	0.003	C	0.003	C
Inorganic Analytes					
Aluminum	mg/kg	1,352	N	1,352	N
Antimony	mg/kg	0.5	N	0.5	N
Arsenic	mg/kg	0.002	C	0.002	C
Barium	mg/kg	95	N	95	N
Beryllium	mg/kg	2.7	N	2.7	N
Cadmium	mg/kg	1.4	N	1.4	N
Calcium	mg/kg	NL		NL	
Chromium	mg/kg	2,028	N	2,028	N
Cobalt	mg/kg	27	N	27	N
Copper	mg/kg	54	N	54	N
Cyanide	mg/kg	27	N	27	N
Iron	mg/kg	406	N	406	N
Lead	mg/kg	NL		NL	
Magnesium	mg/kg	NL		NL	

Table 4-5
Fish Screening Criteria
Mercury Refining Superfund Site
Colonie, New York

Chemical Name	Unit	USEPA Region 3 Risk Based Concentration for Fish Consumption (1)		Mercury Refining Fish Screening Criteria (2)	
Manganese	mg/kg	189	N	189	N
Mercury	mg/kg	NA		0.1	A
Nickel	mg/kg	27	N	27	N
Potassium	mg/kg	NL		NL	
Selenium	mg/kg	6.8	N	6.8	N
Silver	mg/kg	6.8	N	6.8	N
Sodium	mg/kg	NL		NL	
Sulfate	mg/kg	NL		NL	
Thallium	mg/kg	0.09	N	0.09	N
Vanadium	mg/kg	9.5	N	9.5	N
Zinc	mg/kg	406	N	406	N

Notes:

1.	EPA Region 3 risk-based concentration for human consumption of fish, http://www.epa.gov/reg3hwmd/risk/index.htm
2.	Mercury Fish Screening Criteria is equal to the EPA Region 3 risk-based concentration for human consumption of fish
NA	*Chemical name listed but no value available*
NL	Chemical name not listed
N	Risk-based concentration is based on noncancer effects
C	Risk-based concentration is based on cancer effects
*	Value applies to total chlordane
#	Value applies to total PCBs
^	Value applies to total 1,3-Dichloropropene
A	0.1 mg/kg is screening criteria value for methyl Hg, and it is assumed that all the Hg present in the fish is in the form of methyl Hg
mg/kg	milligrams per kilogram

TABLE 4-6
BACKGROUND SAMPLE LOCATIONS AND ANALYTICAL PARAMETERS
MERCURY REFINING SITE
COLONIE, NEW YORK

Sample Name	Sample Location	Media	Analytical Parameters
MW-7D-A	MW-7D	Soil	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Inorganics, TOC, grain size, CEC, pH
SBW-02-0-2 SBW-02-2-4 SBW-02-4-6 SBW-02-6-8 SBW-02-8-10	SBW-02	Soil	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Inorganics, TOC, grain size, CEC, pH
SBW-03-0-2 SBW-03-2-4 SBW-03-4-6 SBW-03-6-8 SBW-03-8-10	SBW-03	Soil	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Inorganics, TOC, grain size, CEC, pH
SWS-01	SW/SD-01	Surface water	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Metals, hardness, TSS, TDS, TOC, sulfate, pH
SWS-02	SW/SD-02	Surface water	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Metals, hardness, TSS, TDS, TOC, sulfate, pH
SDS-01	SW/SD-01	Sediment	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Metals, TOC, grain size, CEC, pH
SDS-02	SW/SD-02	Sediment	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Metals, TOC, grain size, CEC, pH
ECO-02-PD	Inga's Pond	Forage Fish	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Metals, percent lipids
HHR-02-PDA	Inga's Pond	Sport Fish	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Metals, percent lipids
HHR-02-PDB	Inga's Pond	Sport Fish	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Metals, percent lipids
ECO-02-ST	SW/SD-02	Forage Fish	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Metals, percent lipids
HHR-02-ST	SW/SD-02	Sport Fish	TCL VOCs, TCL SVOCs, Pesticides, and PCBs, TAL Metals, percent lipids

Notes:

CEC	Cation exchange capacity	PCB	Poly chlorinated biphenyl
SVOC	Semi-volatile organic compound	TAL	Target analyte list
TCL	Target compound list	TOC	Total organic carbon
TSS	Total suspended solids	VOC	Volatile organic compound

TABLE 5-1
FATE AND TRANSORT PROPERTIES FOR SITE CONTAMINANTS ABOVE SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

CONTAMINANT	Molec. Weight (g/mole)	Specific Density '@ 20^{0}C-25^{0}C	Water Solubility '@ 25^{0}C (mg/l)	Vapor Pressure '@ 25^{0}C (mm Hg)	Henry's Law Constant (atm-m^3/mol)	Koc	log Kow	Kd1 (cc/gm)	Rf	Adsorption	Volatility from Water	Mobility
TCL Semi-Volatile Organics												
Phenol	94.1	1.06	8.20E+04	3.40E-01	4.54E-07	3.20E+01	1.46	3.2E-02	3.7E+00	Low	Moderate	High
2-methylphenol	108.0	1.03	2.50E+04	2.40E-01	1.20E-06	2.20E+01	1.9	2.2E-02	2.8E+00	Low	Moderate	High
4-chloro-3-methylphenol	142.6	No data	3.85E+03	5.00E-02	1.78E-06	7.76E+02	3.1	7.8E-01	6.6E+01	Moderate	Moderate	Moderate
bis(2-ethylhexyl)phthalate	391.0	0.98	3.40E-01	1.00E-07	1.10E-05	7.64E+04	5.11	7.6E+01	6.4E+03	High	Moderate	Low
Phenanthrene	178.2	1.18	1.20E+00	6.80E-04	2.56E-05	1.39E+04	4.46	1.4E+01	1.2E+03	High	Moderate	Low
Fluoranthene	202.3	1.25	2.06E-01	5.00E-06	6.46E-06	3.80E+04	4.9	3.8E+01	3.2E+03	High	Moderate	Low
Chrysene	228.3	1.27	2.00E-03	6.30E-07	1.05E-06	2.45E+05	5.91	2.5E+02	2.0E+04	High	Moderate	Low
Benzo(a)pyrene	252.3	1.35	1.20E-03	6.30E-09	1.60E-06	4.00E-05	6.04	4.0E-08	1.0E+00	Low	Moderate	High
Benzo(a)anthrancene	228.3	1.27	1.00E-02	2.20E-08	8.00E-06	1.90E+05	5.6	1.9E+02	1.6E+04	High	Moderate	Low
Benzo(b)fluoranthene	252.3	No data	1.40E-02	5.00E-07	1.20E-05	5.50E+05	6.04	5.5E+02	4.6E+04	High	Moderate	Low
Benzo(k)fluoranthene	252.3	No data	5.50E-04	9.59E-11	3.87E-05	5.50E+05	6.1	5.5E+02	4.6E+04	High	Moderate	Low
Pyrene	202.3	1.27	1.32E-01	2.50E-06	1.09E-05	4.68E+04	5.18	4.7E+01	3.9E+03	High	Moderate	Low
Benzo(a)pyrene	252.3	1.35	1.20E-03	5.60E-09	4.90E-07	5.50E+06	6.06	5.5E+03	4.6E+05	High	Moderate	Low
Indeno(1,2,3-c,d) pyrene	276.3	No data	6.20E-02	1.00E-09	3.00E-20	3.10E+07	6	3.1E+04	2.6E+06	High	Low	Low
Dibenz(a,h)anthrancene	278.4	1.28	5.00E-04	1.00E-10	7.30E-08	3.31E+07	6.5	3.3E+04	2.8E+06	High	Low	Low
Benzo(g,h,i)perylene	276.3	No data	2.60E-04	1.00E-10	1.40E-07	7.76E+06	7.1	7.8E+03	6.5E+05	High	Moderate	Low
TCL Pesticides/PCBs												
Ar-1248	299.5	1.41	0.054	4.94E-04	3.50E-03	1.90E+05	5.75	1.9E+02	1.6E+04	High	High	Low
Ar-1254	328.0	1.54	5.70E-02	7.71E-05	2.00E-03	1.90E+05	6.5	1.9E+02	1.6E+04	High	High	Low
Ar-1260	357.7	1.62	8.00E-02	4.05E-05	4.60E-03	3.95E+05	6.8	4.0E+02	3.3E+04	High	High	Low
4,4'-DDD	320.1	1.38	9.00E-02	1.02E-06	2.16E-05	4.37E+04	5.99	4.4E+01	3.6E+03	High	Moderate	Low
4,4'-DDE	319.0	No data	4.00E-02	6.50E-06	2.34E-05	1.00E+06	5.8	1.0E+03	8.3E+04	High	Moderate	Low
4,4'-DDT	354.0	1.56	5.00E-03	1.90E-07	5.10E-04	2.40E+05	6.2	2.4E+02	2.0E+04	High	Moderate	Low
alpha-chlordane	409.8	No data	5.10E-02	No data	No data	1.00E+06	5.93	1.0E+03	8.3E+04	High	High	Low
gamma-chlordane	409.8	1.59	5.60E-02	1.00E-05	4.80E-05	1.41E+05	6	1.4E+02	1.2E+04	High	Moderate	Low
beta-BHC	290.8	1.89	2.40E-01	2.80E-07	2.30E-07	2.90E+03	3.8	2.9E+00	2.4E+02	High	Moderate	Moderate
delta-BHC	290.8	1.87	3.14E+01	1.70E-05	2.50E-07	1.90E+03	4.14	1.9E+00	1.6E+02	Moderate	Moderate	Moderate
gamma-BHC (Lindane)	290.8	1.59	7.52E+00	6.70E-05	4.80E-07	1.07E+03	3.7	1.1E+00	9.0E+01	Moderate	Moderate	Moderate
Aldrin	364.9	1.7	1.01E+00	2.31E-05	1.40E-06	4.07E+02	5.52	4.1E-01	3.5E+01	Low	Moderate	Moderate
Dieldrin	380.9	1.75	2.00E-01	3.10E-06	2.00E-07	3.55E+04	5.16	3.5E+01	3.0E+03	High	Moderate	Low
Endrin	380.9	1.65	2.20E-01	2.00E-07	5.00E-07	3.16E+04	5.34	3.2E+01	2.6E+03	High	Moderate	Low
Endosulfan I	406.9	1.74	5.30E-01	1.00E-05	1.01E-04	2.04E+03	3.55	2.0E+00	1.7E+02	High	Moderate	Moderate

TABLE 5-1
FATE AND TRANSORT PROPERTIES FOR SITE CONTAMINANTS ABOVE SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

CONTAMINANT	Molec. Weight (g/mole)	Specific Density '@ 20^{0}C-25^{0}C	Water Solubility '@ 25^{0}C (mg/l)	Vapor Pressure '@ 25^{0}C (mm Hg)	Henry's Law Constant (atm-m^3/mol)	Koc	log Kow	Kd1 (cc/gm)	Rf	Adsorption	Volatility from Water	Mobility
Heptachlor	373.2	1.65	5.60E-02	3.00E-04	4.80E-03	2.19E+04	5.44	2.2E+01	1.8E+03	High	High	Low
Heptachlor epoxide	389.3	No data	2.75E-01	2.60E-06	3.20E-05	2.09E+04	5.4	2.1E+01	1.7E+03	High	Moderate	Low
TAL Inorganics		g/cm^3										
Aluminum	27.0	2.7	Insoluble	NA	No data	No data	No data	3.3E-01	2.9E+01	Low	NA	Moderate
Antimony	121.8	6.7	Insoluble	NA	No data	No data	No data	4.5E+01	3.8E+03	High	NA	Low
Arsenic	75.0	4.7	Insoluble	NA	No data	No data	No data	3.0E+01	2.5E+03	High	NA	Low
Beryllium	9.0	1.82	Insoluble	NA	No data	No data	No data	6.5E+02	5.3E+06	High	NA	Low
Cadmium	112.0	8.65	Insoluble	NA	No data	No data	No data	7.5E+01	80001	High	NA	Low
Chromium	52.0	7.1	Insoluble	NA	No data	No data	No data	1.8E+06	1.5E+08	High	NA	Low
Copper	64.0	8.92	Insoluble	NA	No data	No data	No data	2.5E+04	1250001	High	NA	Low
Iron	56.0	--	Insoluble	NA	No data	No data	No data	1.7E+02	1.4E+04	High	NA	Low
Lead	207.0	11.34	Insoluble	NA	No data	No data	No data	2.9E+00	2.4E+02	High	NA	Moderate
Manganese	55.0	7.2	Decomposes	NA	No data	No data	No data	1.8E+02	1.5E+04	High	NA	Low
Mercury	200.6	13.5	0.28 umoles/L	2.00E-03	No data	No data	5.95	3.2E+02	2.7E+04	High	High	Low
Dimethyl Mercury (Methyl Mercury)	230.7	3.2	Insoluble	No data	No data	2.73 [log]	2.28	NA	--	NA	NA	NA
Mercuric (II) Chloride	271.5	5.4	6.9E+04	1 [@136.2^{0}C)	No data	No data	No data	NA	--	NA	NA	NA
Mercuric (II) Sulfide	232.7	7.7	Insoluble	No data	No data	No data	No data	NA	--	NA	NA	NA
Nickel	59.0	8.9	Insoluble	NA	No data	No data	No data	7.9E+01	6.6E+03	High	NA	Low
Selenium	79.0	4.4	Insoluble	NA	No data	No data	No data	2.9	146	High	NA	Moderate
Silver	108.0	10.5	Insoluble	NA	No data	No data	No data	40	--	High	NA	Low
Thallium	204.0	11.85	Insoluble	NA	No data	No data	No data	87	4351	High	NA	Low
Zinc	65.0	7.14	Insoluble	NA	No data	No data	No data	6300	315001	High	NA	Low

VARIABLES

Fraction Organic Carbon, foc =	0.100%	15697		15697
Soil Bulk Density, Rho_b =	2.5		gm/cc	
Effective Porosity, Eta_e =	3%			

Adsorption is	"Low"	if Kd <	0.5
	"High"	if Kd >	2
	"Moderate"	if Kd is in-between	

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TABLE 5-1
FATE AND TRANSORT PROPERTIES FOR SITE CONTAMINANTS ABOVE SCREENING CRITERIA
MERCURY REFINING SITE
COLONIE, NEW YORK

Volatilization from Water is	"Low"	if H <	1.0E-07
	"High"	if H >	1.0E-03
	"Moderate"	if H is in-between	
Mobility is	"High"	if Rf <	1.0E+01
	"Low"	if Rf >	1.0E+03
	"Moderate"	if Rf is in-between	

NOTATION

Koc = Soil Organic Carbon/Water Partition Coefficient, cc/gm

Kow = n-Octanol/Water Partition Coefficient, dimensionless

Kd = Soil/Water Partition Coefficient [= Koc X foc for organics], cc/gm

Rf = Retardation Factor = 1 + (Rho_b X Kd / Eta_e), dimensionless

NOTES:

The Kd values for inorganics are based information provided in the EPA Soil Screening Guidance Document (EPA, 1994).
The Kd values for beryllium, cadmium, copper, mercury, nickel, and zinc were developed by EPA using
an equilibrium geochemical speciation model (MINTEQ2), assuming a certain pore-water chemistry.
The values for arsenic, selenium, and thallium were based on empirical, pH-dependent relationships
developed by EPA.
However, for these values to be more site-specific, site-specific modeling would be required because, unlike
for organics, Kd values for inorganics are significantly affected by a variety of soil conditions.

Kd values for metals from Thibault, et al (1990)

Figures

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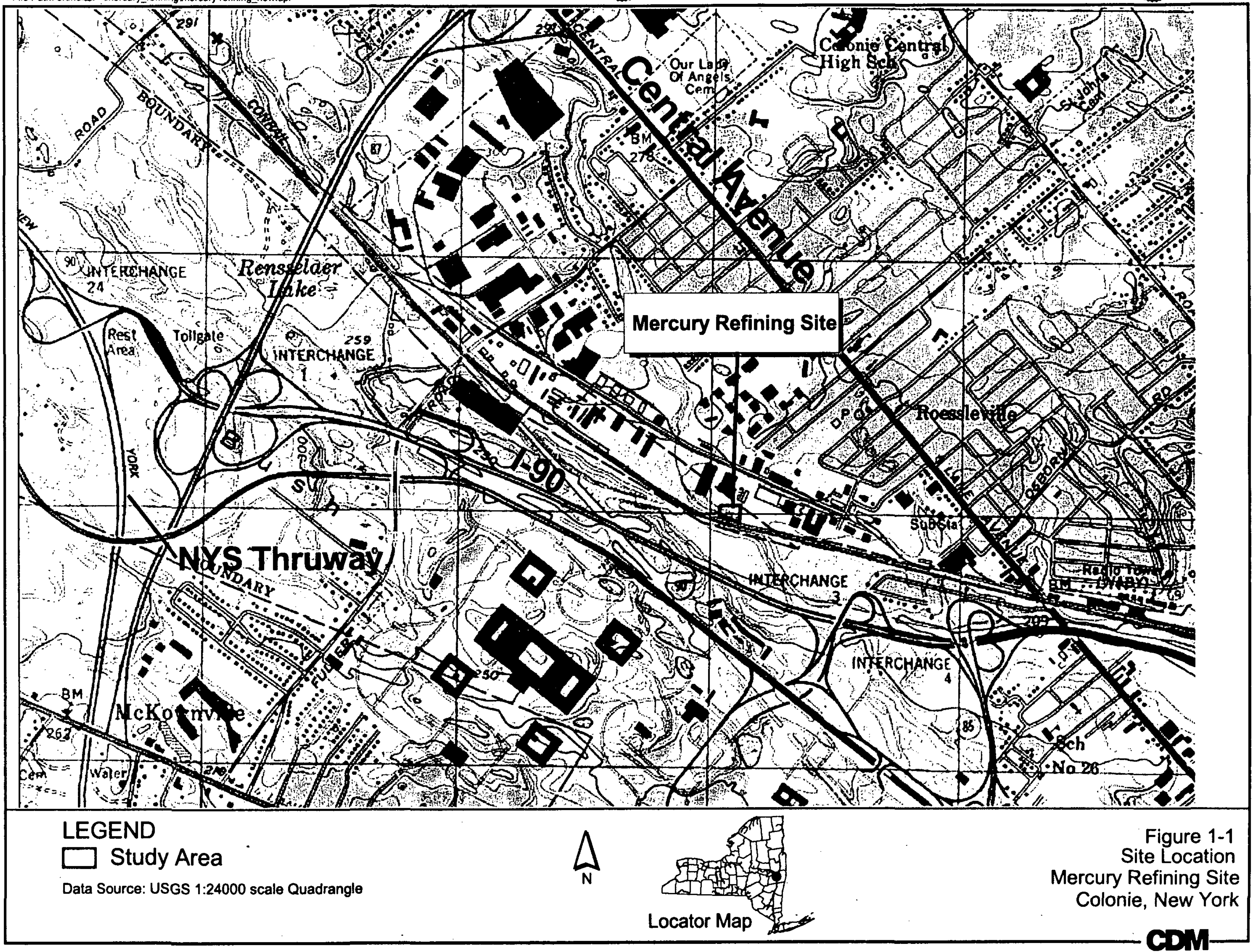

LEGEND

☐ Study Area

Data Source: USGS 1:24000 scale Quadrangle

Figure 1-1
Site Location
Mercury Refining Site
Colonie, New York

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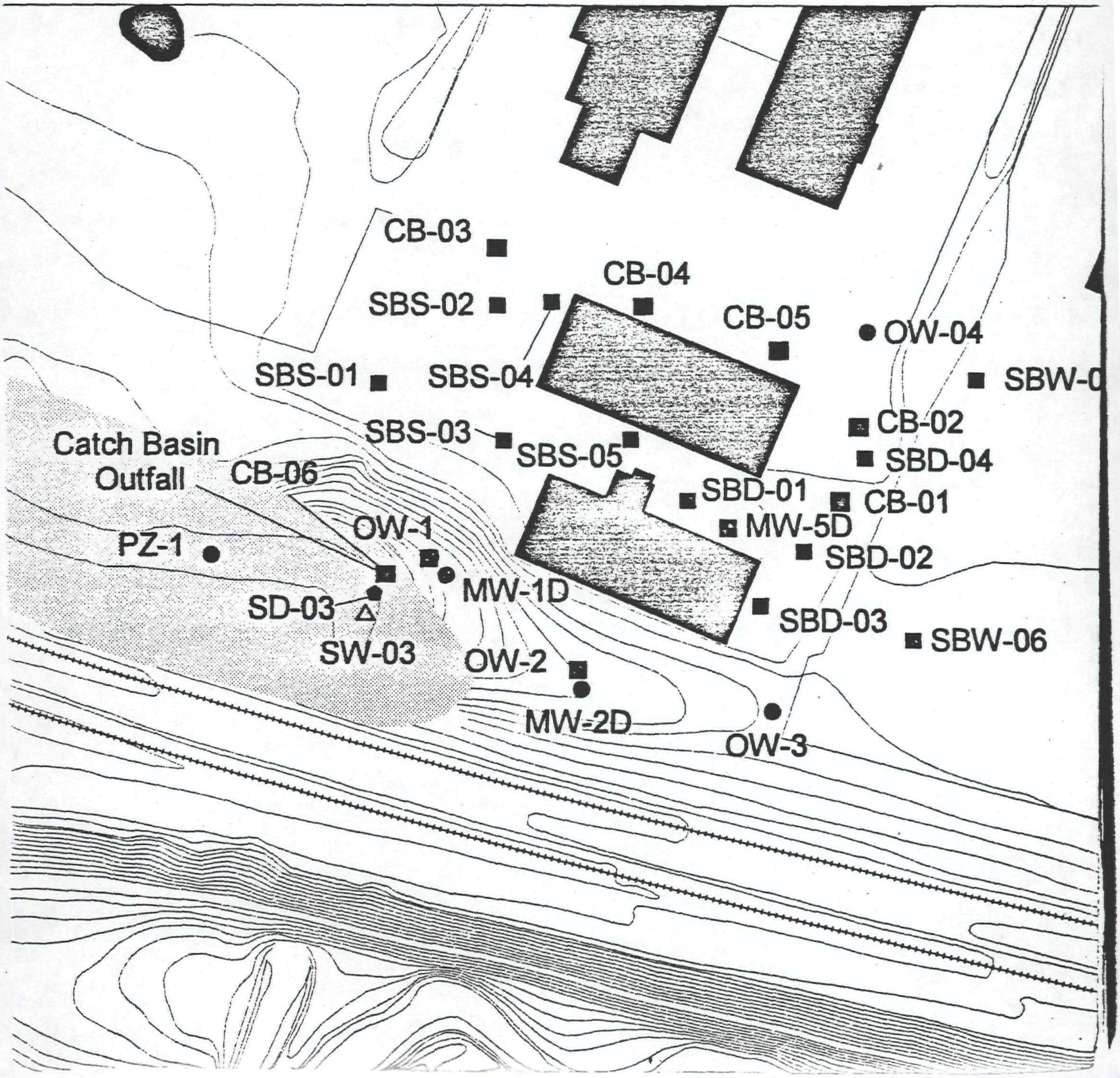
Figure 1-2
Site Map
Mercury Refining Site
Colonie, New York
CDM

THIS MAP IS AN OVERSIZED DOCUMENT. IT IS AVAILABLE FOR REVIEW AT THE U.S. EPA SUPERFUND RECORDS CENTER, 290 BROADWAY, 18TH FLOOR, NEW YORK, NY 10007

Mercury Refining Site



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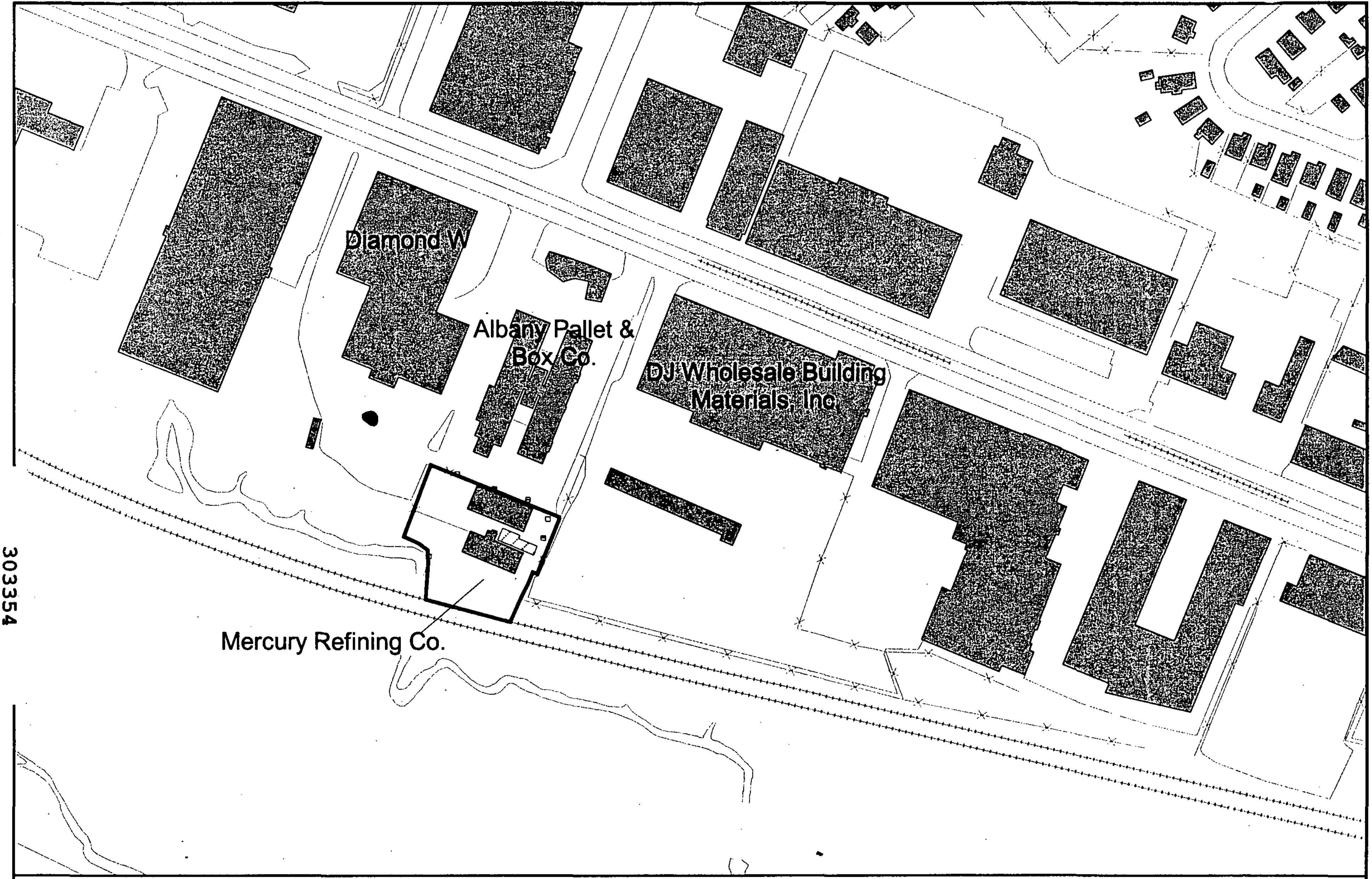

Figure 1-3
Mercury Refining Property
Mercury Refining Site
Colonie, New York

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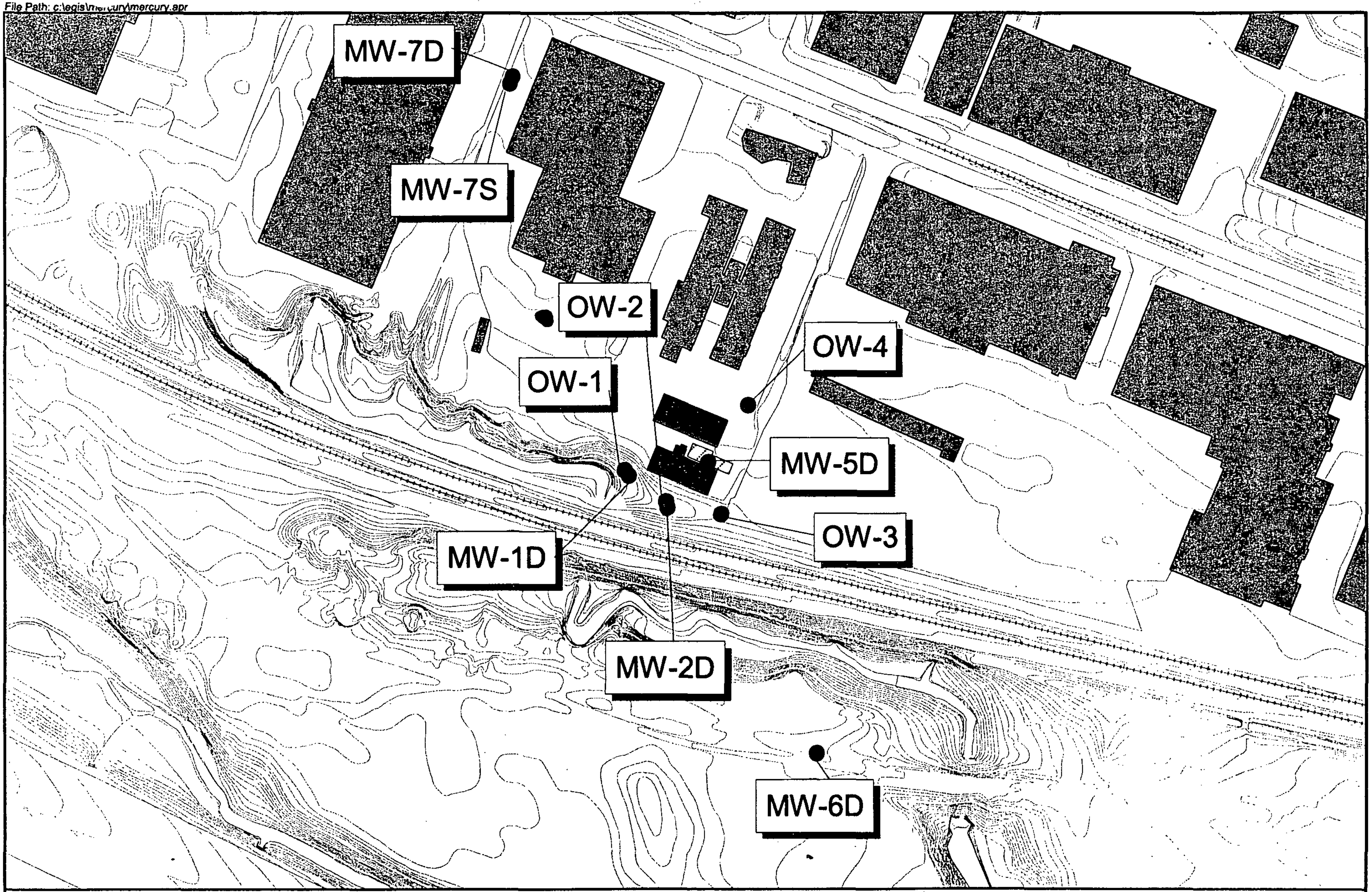

Figure 2-1
Groundwater Sample Locations
Mercury Refining Site
Colonie, New York

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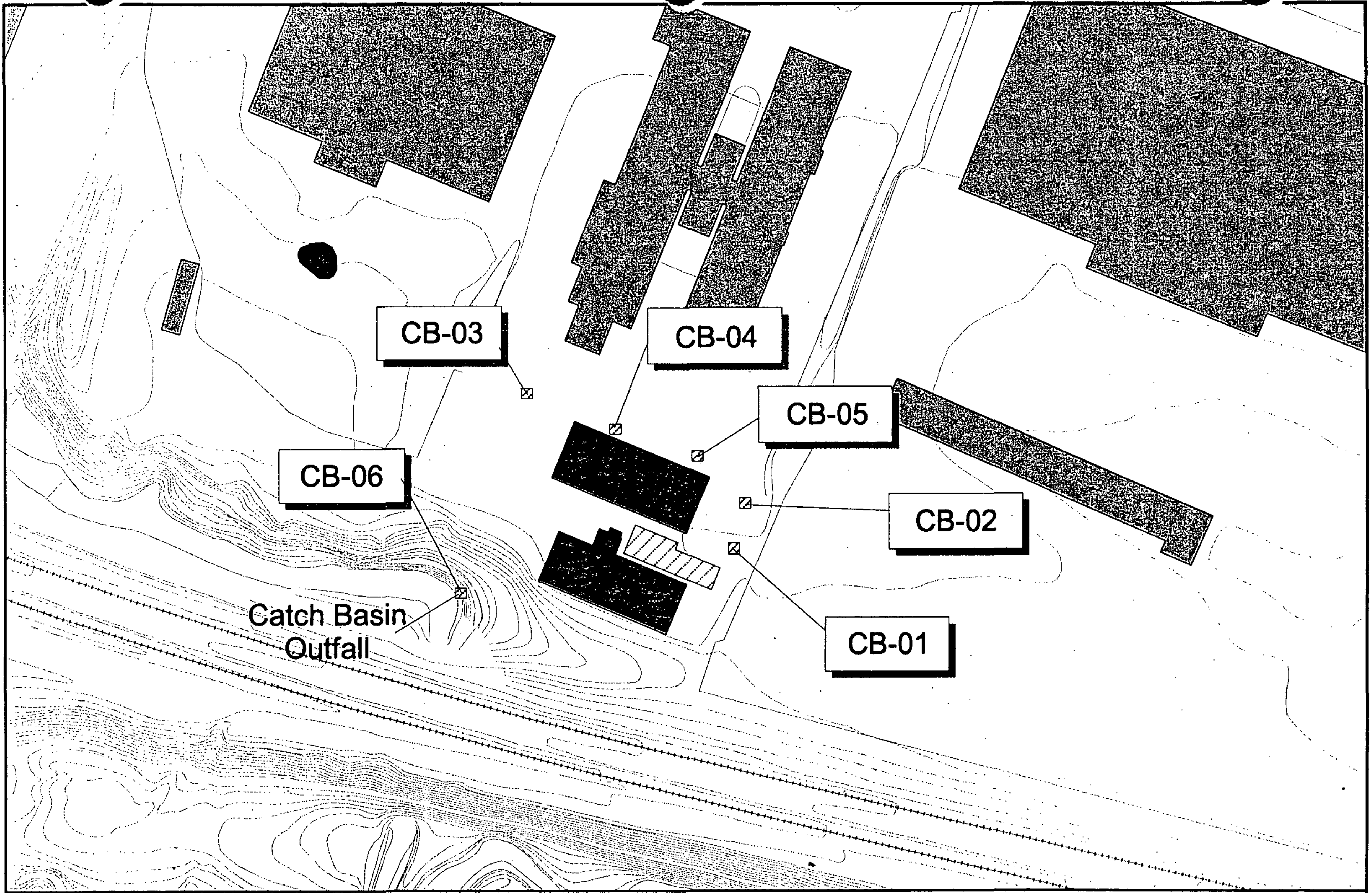

LEGEND

- ▨ Catch Basins
- ▩ Buildings
- /\/ Roads
- /\/ Railroads
- ■ Pavement
- ■ Site Buildings
- /\/ Streams
- ▨ Historical Site Building

N

0 50 100 Feet

Figure 2-2
Catch Basin Sediment Sample Locations
Mercury Refining Site
Colonie, New York

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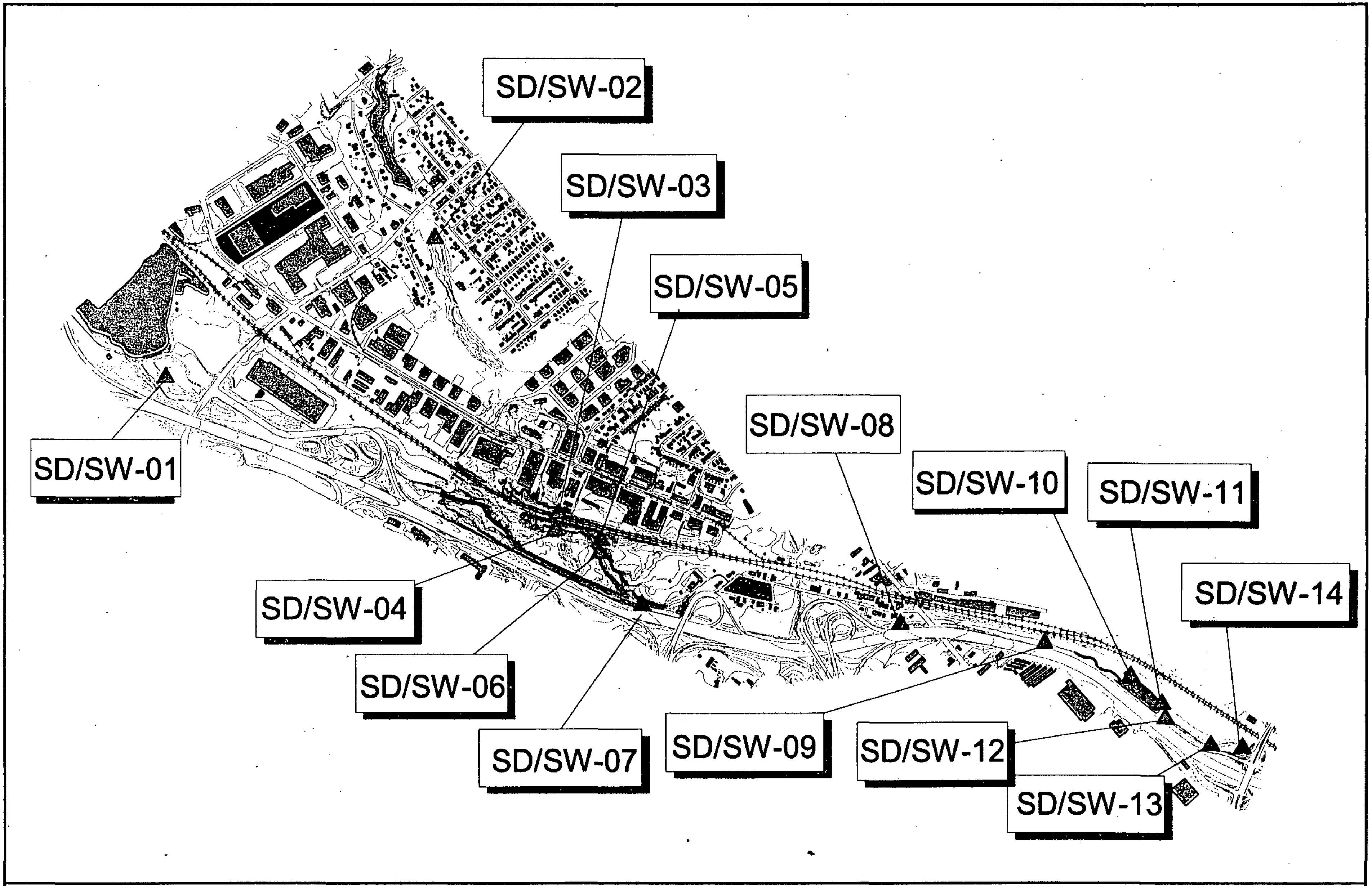

SW = Surface Water Sample
SD = Sediment Sample

Figure 2-3
Stream Sediment and Surface Water
Sample Locations
Mercury Refining Site
Colonie, New York

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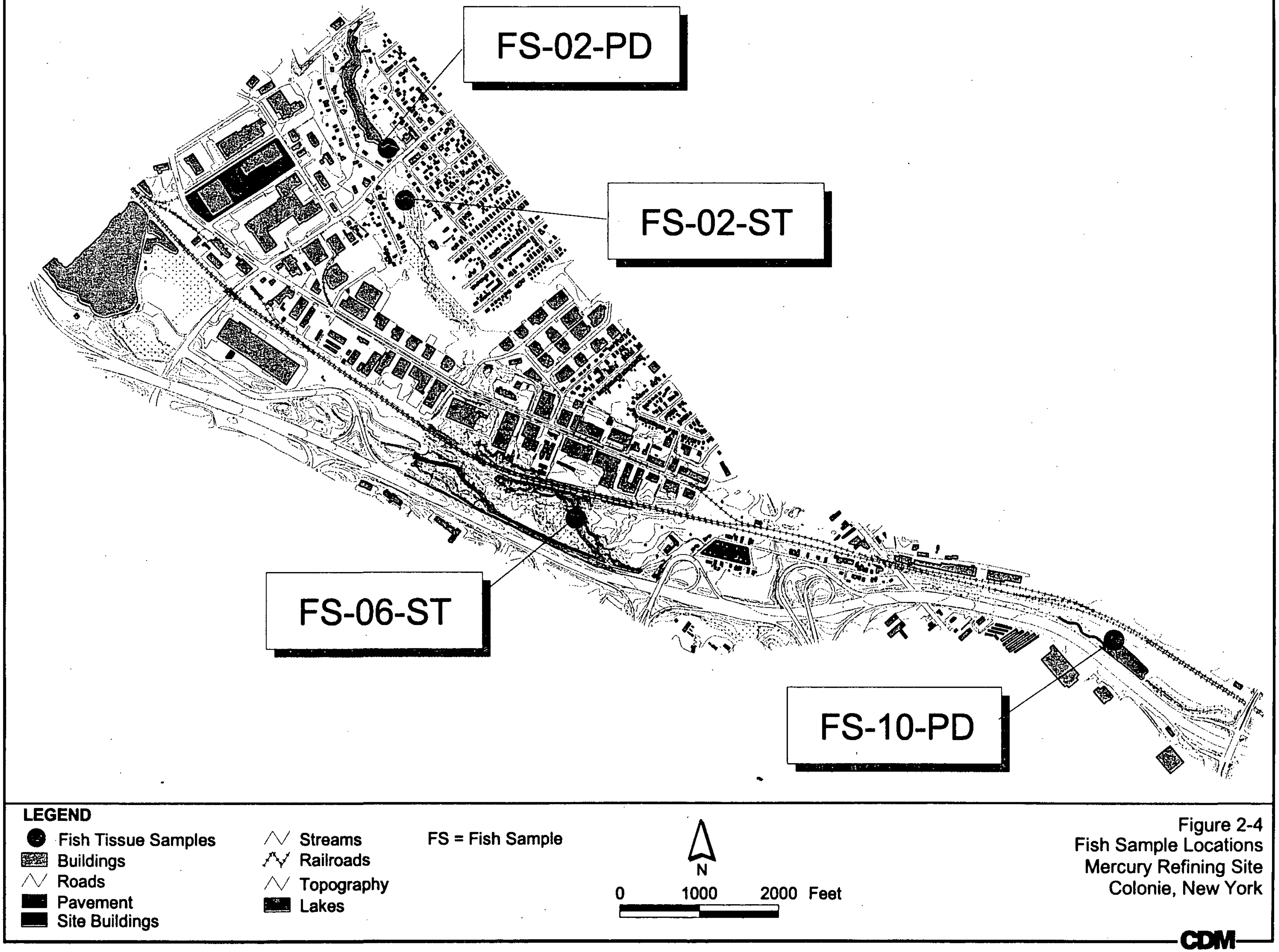

Figure 2-4
Fish Sample Locations
Mercury Refining Site
Colonie, New York

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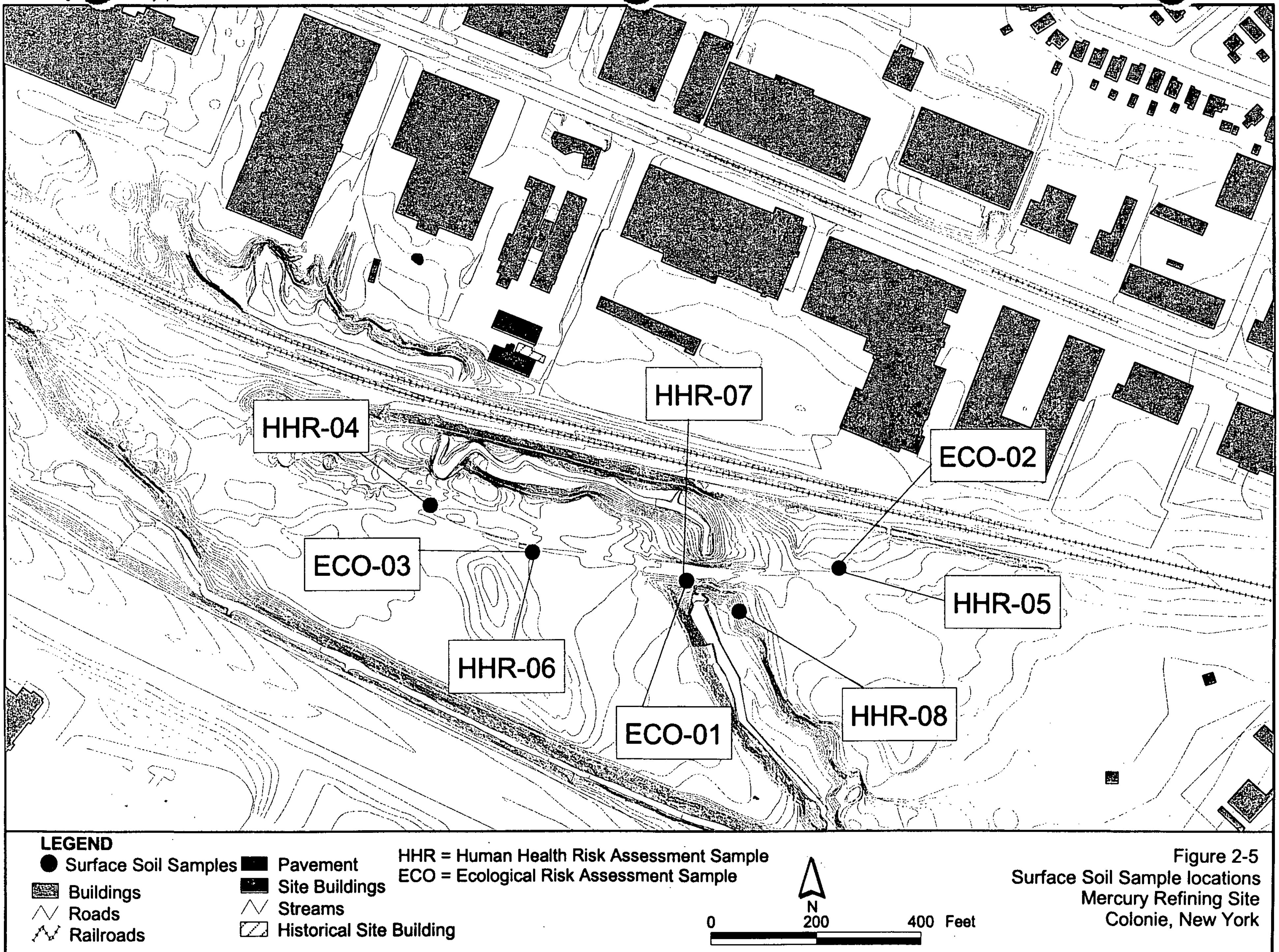

Figure 2-5
Surface Soil Sample locations
Mercury Refining Site
Colonie, New York

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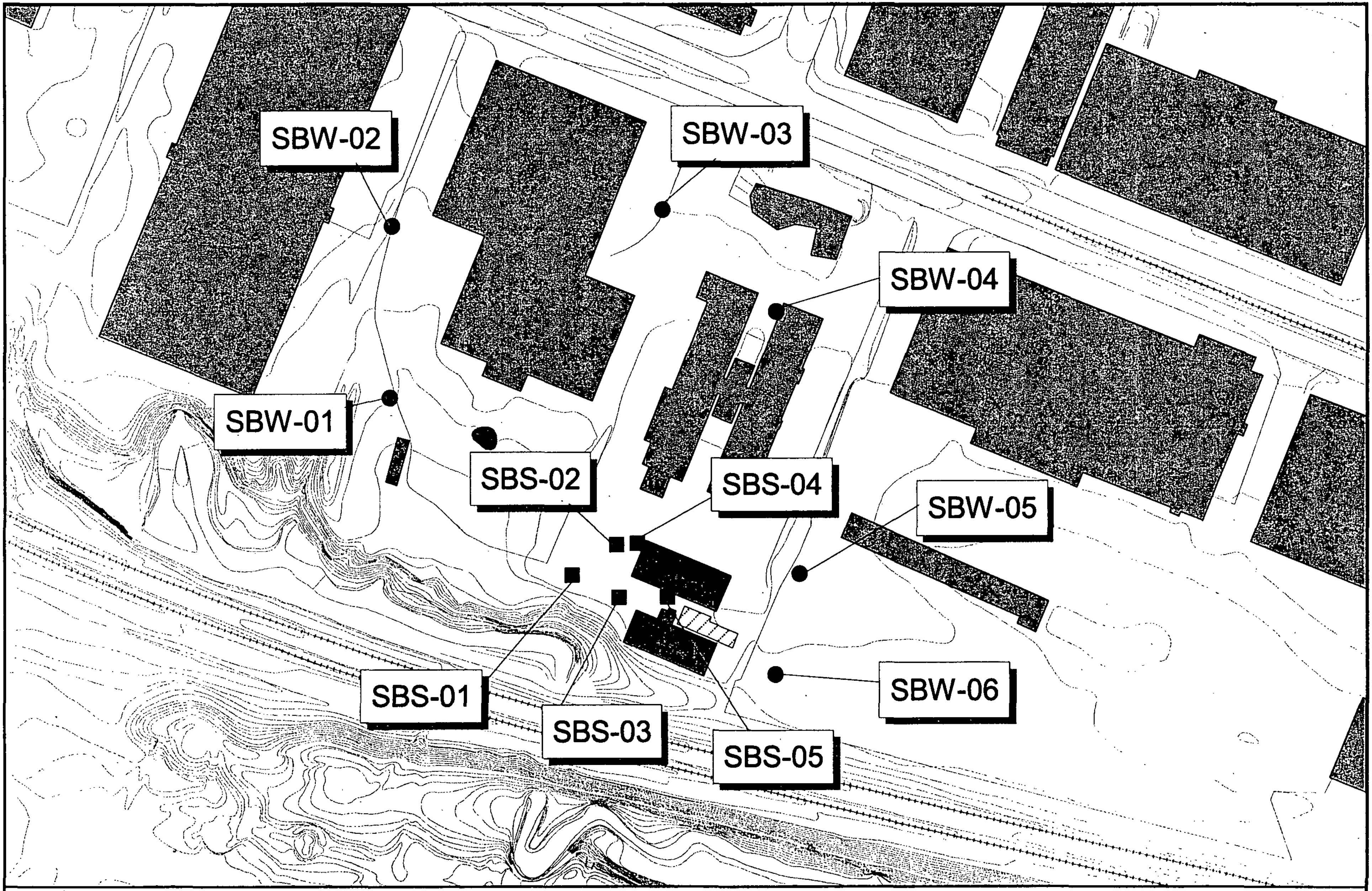

Figure 2-6
Shallow Soil Boring Locations
Mercury Refining Site
Colonie, New York

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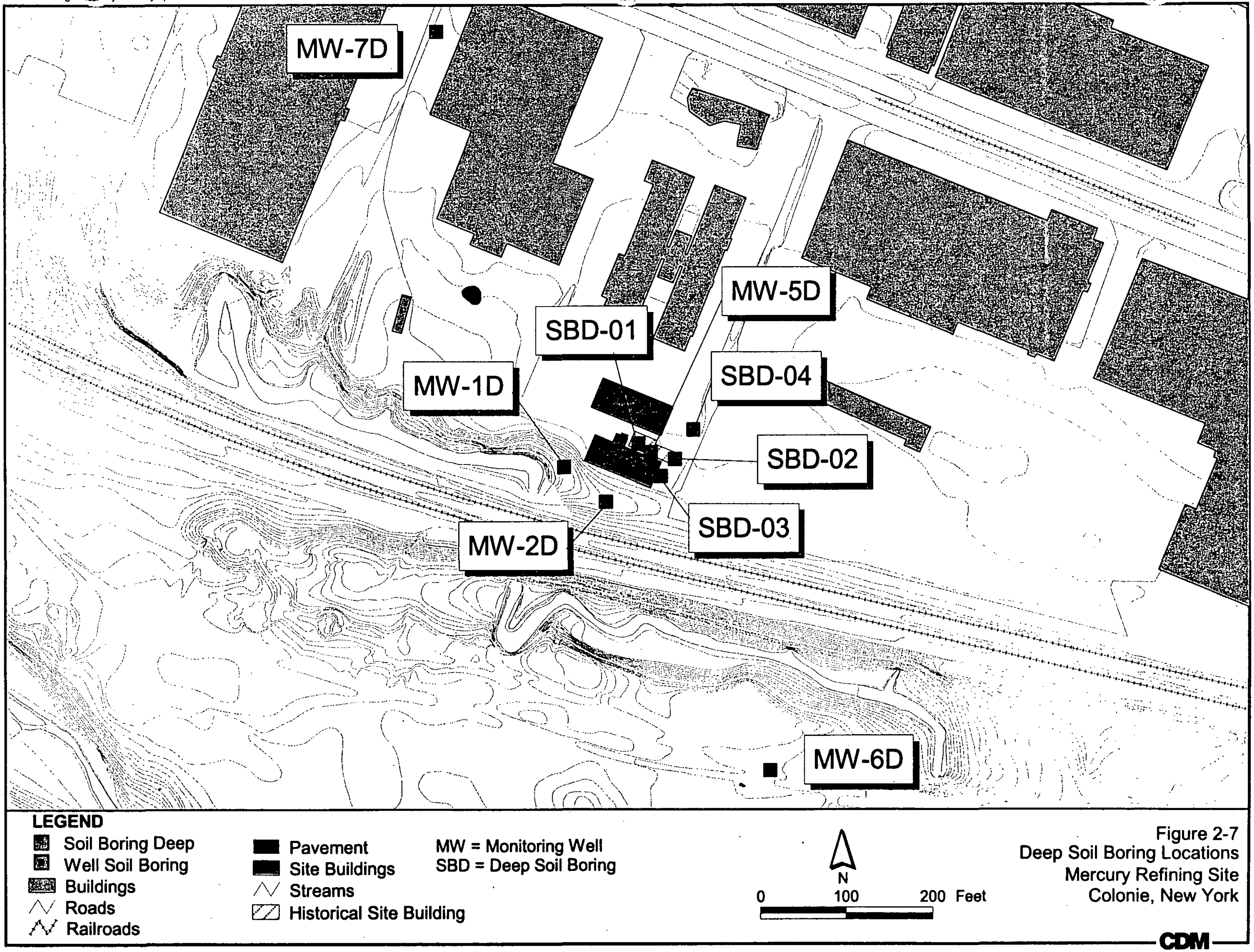
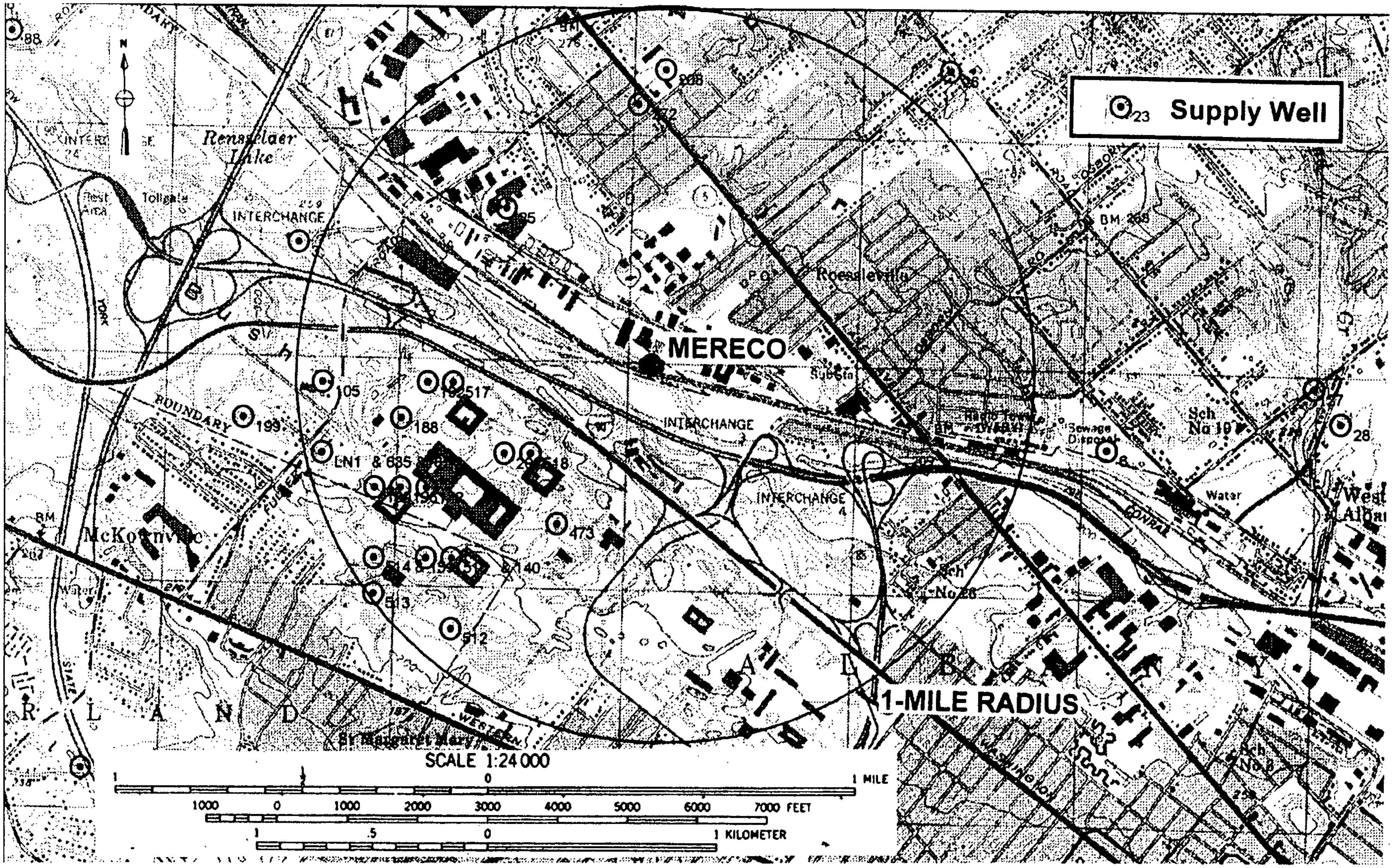


Figure 2-7
Deep Soil Boring Locations
Mercury Refining Site
Colonie, New York



supply well locations downloaded from a USGS 5-mile radius well search requested for the MERECO Site (November, 2000)

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Figure 2-8
WATER SUPPLY WELLS WITHIN A ONE-MILE RADIUS OF THE MERECO SITE
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

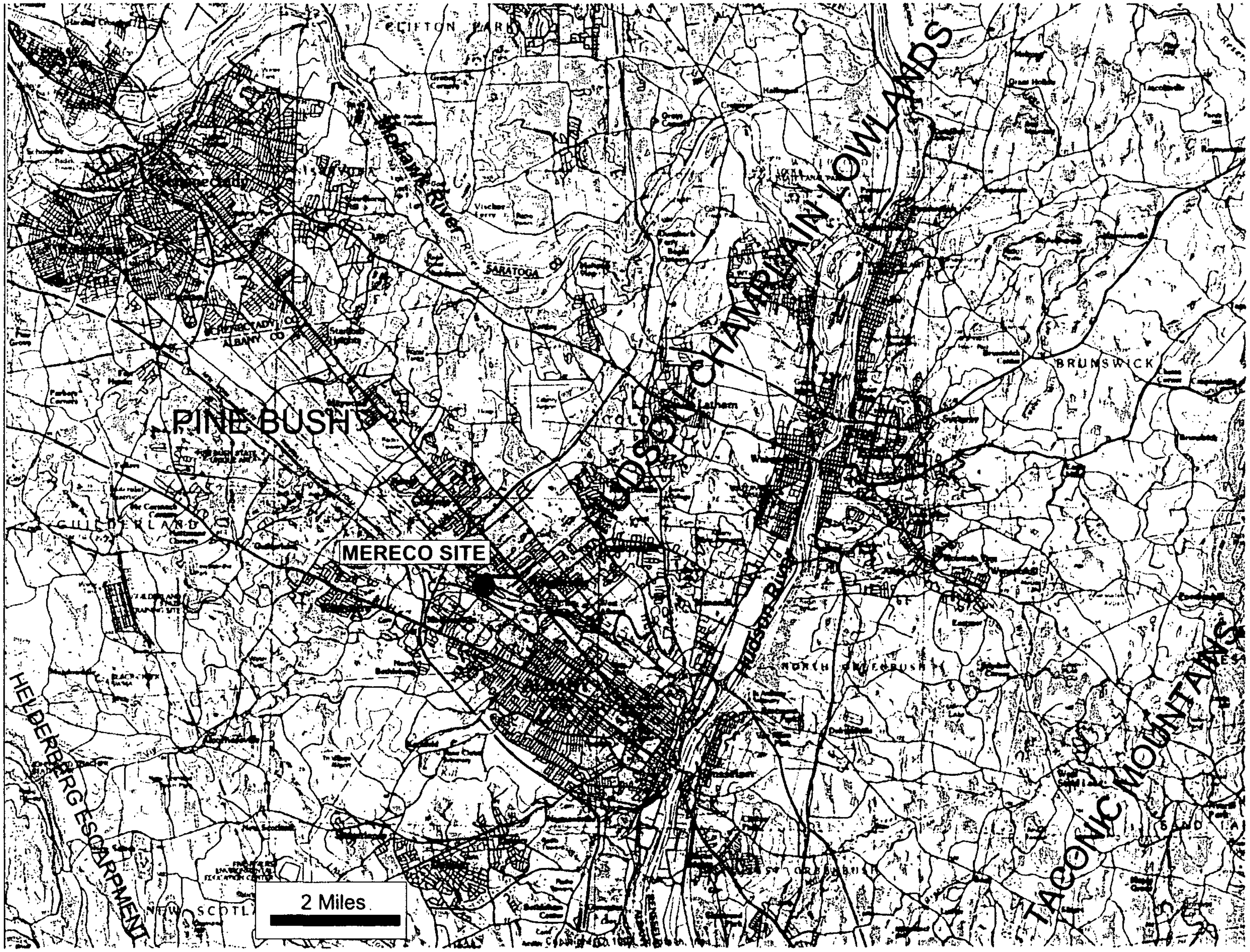

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Figure 3-1
LOCATION OF ALBANY AND HUDSON-CHAMPLAIN LOWLANDS
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

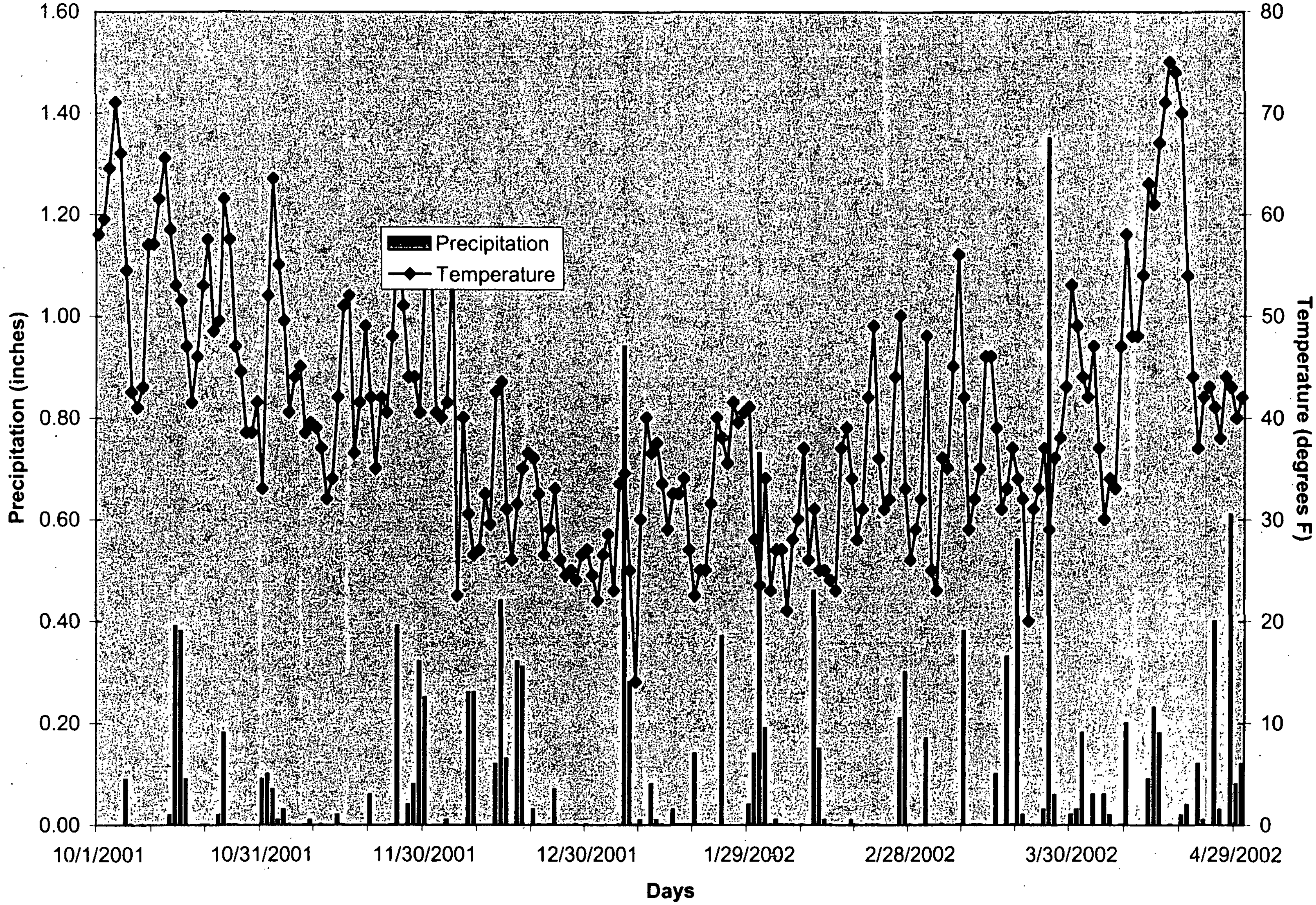
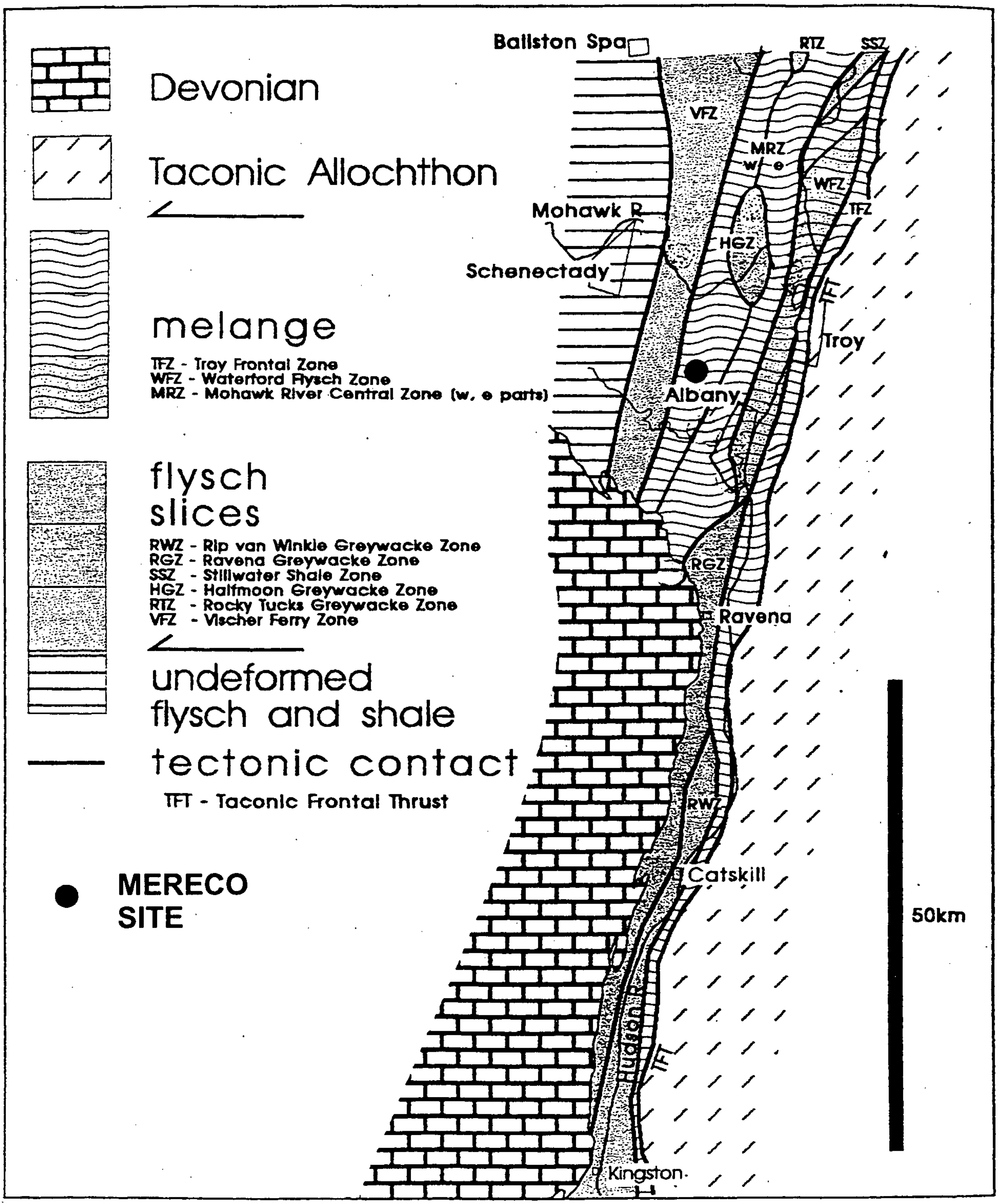
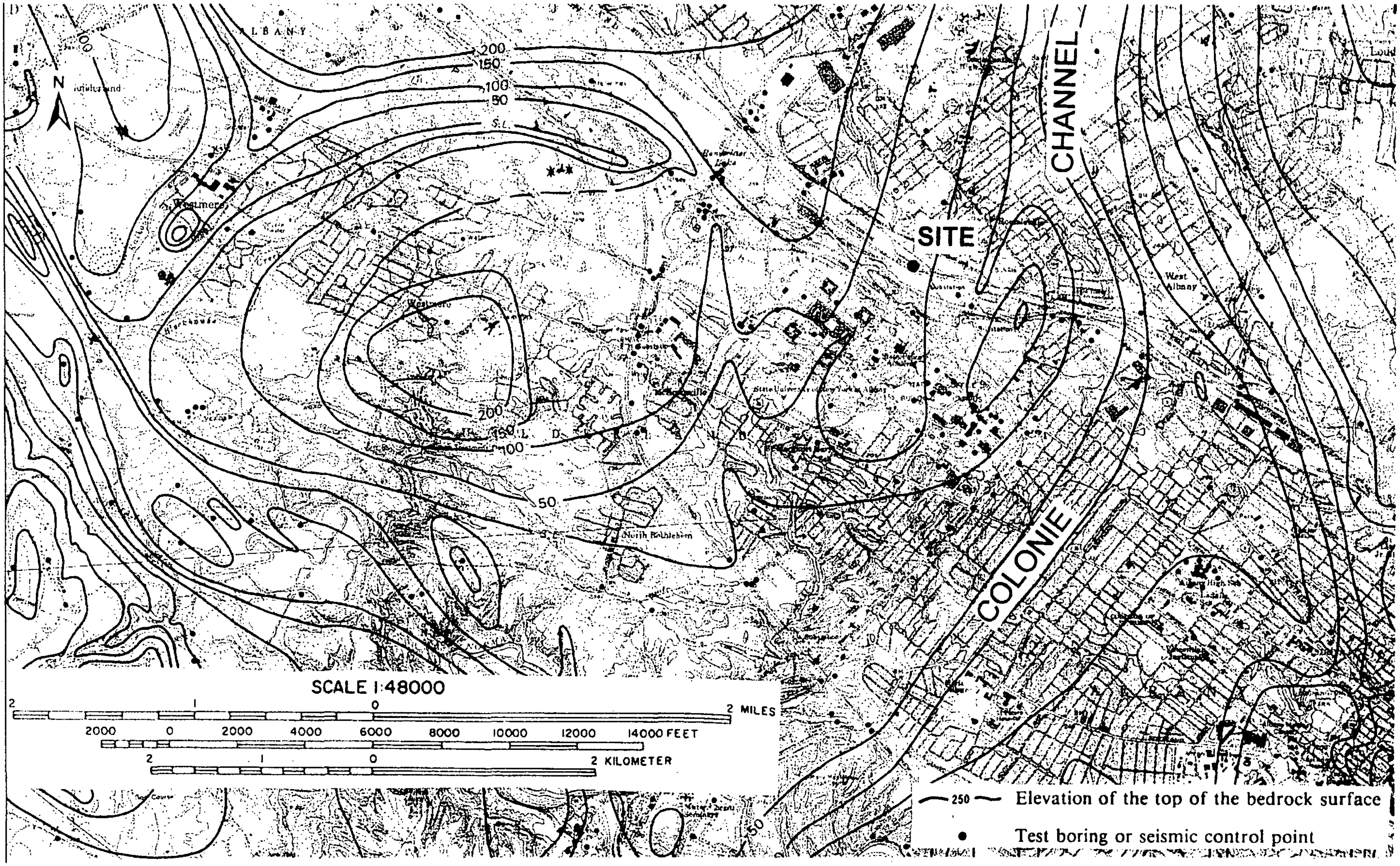


Figure 3-2
Daily Average Temperature and Precipitation Data for October 2001 to April 2002
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site



from Kidd et al. (1995)

Figure 3-3
GENERAL BEDROCK GEOLOGY OF
THE UPPER HUDSON VALLEY
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site



from Dineen and Hanson (1983)

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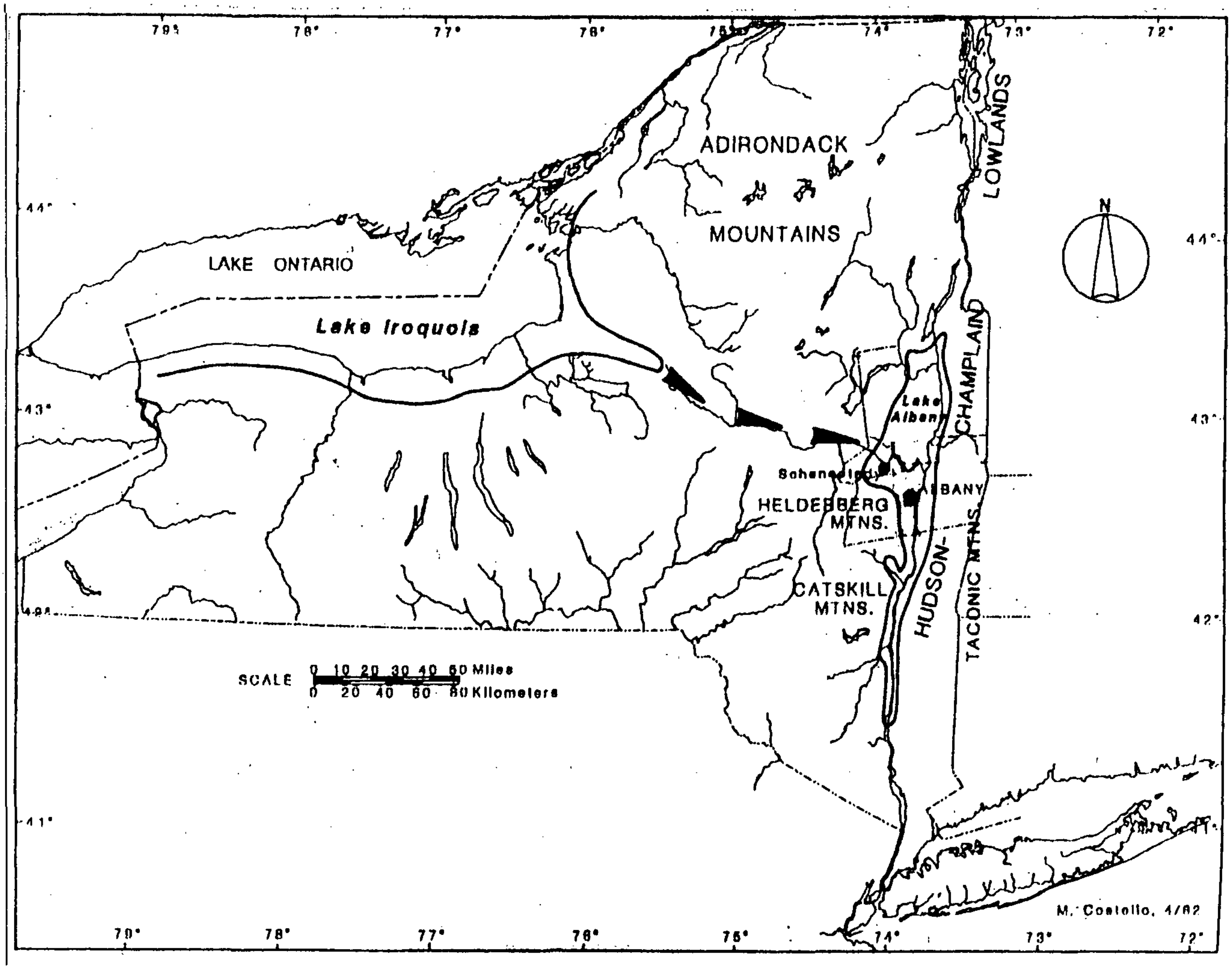
Figure 3-4
TOPOGRAPHY OF BEDROCK SURFACE
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site



from Dineen & Hanson (1983)

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Figure 3-5
HISTORICAL LOCATION OF LAKE ALBANY
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

AGE		UNIT	MAP SYMBOL	DESCRIPTION	SEDIMENTARY STRUCTURE	THICKNESS: METERS	NOTES	
RECENT		ARTIFICIAL FILL	AF	Heterogeneous, with concrete fragments, boulders, cobbles, sand, silt, clay, and organic matter. Color is variable.	Massive to thickly bedded.	0.3 to 15, 1 average	Permeable to impermeable, loose to very compact, can contain leachable materials and chemicals.	UPPER AQUIFER UNIT
		Unconformity						
HOLOCENE		DUNE SAND	QDS	Slightly silty, light yellow brown, fine to very fine sand, grains are subangular to subrounded.	Cross-bedded, >15° dip	1.5 to 30, 6 average	Highly permeable, loose, weathered to 6m, readily eroded by wind and water.	
		Disconformity						
PLEISTOCENE	Woodfordian	LAKE ALBANY SAND	QLAS	Slightly silty, light yellow brown to light gray, subangular, medium to very fine sand.	Thin bedding, some ripple cross-laminae.	0.3 to 15, 1 average	Highly to moderately permeable (vertical permeability impeded where silt layers are present), loose to compact, unstable in steep slopes, easily eroded by water.	
		300 FT. CLAY	QLAV	Silty, varved, light gray to light brown clay, siltier at top and bottom.	Varves and 0.3m beds	0.3 to 5, 1 average	Impermeable, plastic, unstable in slopes, spring lines form at upper contact with sand, is an aquiclude, impedes vertical water movement.	
		Disconformity to gradational contact						
		LAKE ALBANY SILT & SAND	QLAM	Silty to very silty, light yellow brown to light gray sand.	Horizontal to ripple laminated.	0.3 to 15, 8 average	Moderately permeable, loose to compact, silt unstable in steep slopes, impedes water movement and "clouds" water, erodes easily by water.	
		Disconformity to gradational contact						
		LAKE ALBANY SILT & CLAY	QLAC	Varved, brown to gray silty clay and clayey silt, trace sandy beds.	Varves with ripple cross-laminated silt beds.	8 to 50 15average	Impermeable, plastic, some water movement along silt beds, flows or slumps in slopes >12°, flows under load, is aquiclude.	LOWER AQUIFER UNIT
		Unconformity to gradational contact						
		ICE-CONTACT SAND & GRAVEL	QI	Stratified brown to dark gray gravel to silty sand and gravel, tends to fine upward into silt.	Graded bedding is frequent, ripple-laminated (sand & silt).	0.3 to 3	Permeable, loose to compact, water is frequently under artesian pressure.	
		Unconformity to disconformity						
		TILL	QT	Dark gray to dark brown, bouldery, gravelly, sandy clay with few lenses of gravel.	Massive	1.5 to 15, 5 average	Impermeable, compact, sometimes permeable at base.	
		Unconformity						
ORDOVICIAN		BEDROCK		Black shale and dark gray graywacke	Well bedded		Impermeable, and compact except where fractured.	

NEW YORK STATE GEOLOGICAL SURVEY Geology, R. Dineen Graphics, J. Skiba 12/80

adapted from Dineen (1982)

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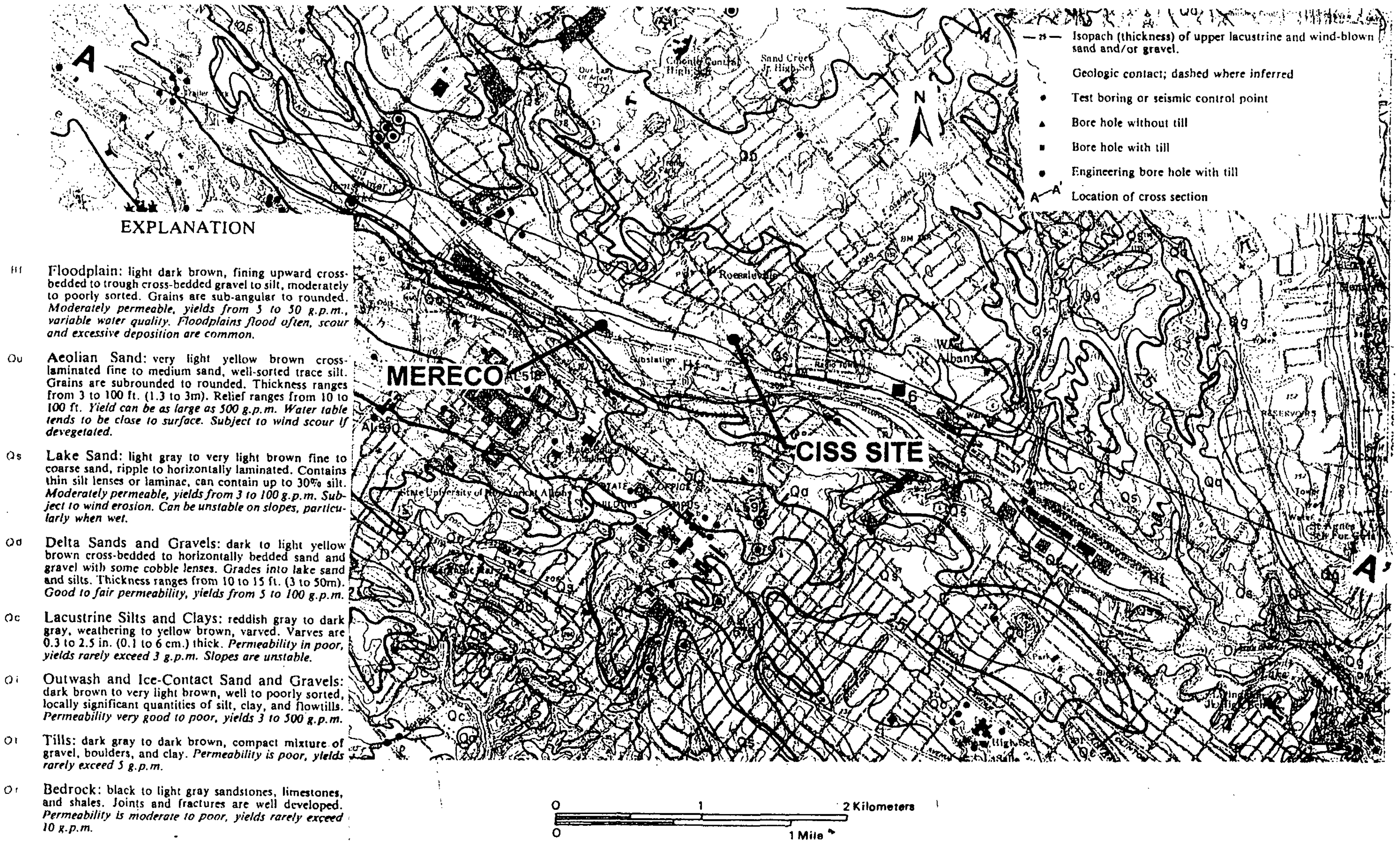
Figure 3-6
STRATIGRAPHY OF THE STUDY AREA
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site



EXPLANATION

Hf **Floodplain:** light dark brown, fining upward cross-bedded to trough cross-bedded gravel to silt, moderately to poorly sorted. Grains are sub-angular to rounded. *Moderately permeable, yields from 5 to 50 g.p.m., variable water quality. Floodplains flood often, scour and excessive deposition are common.*

Qu **Aeolian Sand:** very light yellow brown cross-laminated fine to medium sand, well-sorted trace silt. Grains are subrounded to rounded. Thickness ranges from 3 to 100 ft. (1.3 to 3m). Relief ranges from 10 to 100 ft. *Yield can be as large as 500 g.p.m. Water table tends to be close to surface. Subject to wind scour if devegetated.*

Qs **Lake Sand:** light gray to very light brown fine to coarse sand, ripple to horizontally laminated. Contains thin silt lenses or laminae, can contain up to 30% silt. *Moderately permeable, yields from 3 to 100 g.p.m. Subject to wind erosion. Can be unstable on slopes, particularly when wet.*

Qd **Delta Sands and Gravels:** dark to light yellow brown cross-bedded to horizontally bedded sand and gravel with some cobble lenses. Grades into lake sand and silts. Thickness ranges from 10 to 15 ft. (3 to 50m). *Good to fair permeability, yields from 5 to 100 g.p.m.*

Qc **Lacustrine Silts and Clays:** reddish gray to dark gray, weathering to yellow brown, varved. Varves are 0.3 to 2.5 in. (0.1 to 6 cm.) thick. *Permeability in poor, yields rarely exceed 3 g.p.m. Slopes are unstable.*

Qi **Outwash and Ice-Contact Sand and Gravels:** dark brown to very light brown, well to poorly sorted, locally significant quantities of silt, clay, and flowtills. *Permeability very good to poor, yields 3 to 500 g.p.m.*

Qt **Tills:** dark gray to dark brown, compact mixture of gravel, boulders, and clay. *Permeability is poor, yields rarely exceed 5 g.p.m.*

Qr **Bedrock:** black to light gray sandstones, limestones, and shales. Joints and fractures are well developed. *Permeability is moderate to poor, yields rarely exceed 10 g.p.m.*

from Dineen (1982)

Refer to Figure 3-10 for line of secion A-A'

CDM

Figure 3-7
SURFICIAL GEOLOGY
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

EXPLANATION OF FIGURE

ICE-CONTACT GRAVEL MASSES

1. South Bethlehem /Coeymans Kame Delta
2. Wemple Kame Delta
3. Corning Kame Delta
4. Meadowdale Moraine-Outwash Complex
5. New Salem Kame Delta
6. New Scotland Esker Complex
7. Elsmere Gravel Blanket
8. Guilderland Kame /Fullers Gravel Terrace
9. Loudonville Esker Complex
10. Pollock Road Kame Delta
11. Schenectady Esker Complex
12. Scotia Esker Complex
13. Grooms Kame Delta
14. Halfmoon Kame Deltas
15. Usher Esker Complex
16. Newtown Road Kame Delta
17. Waterford Kame Deltas
18. Rensselaer Kame Delta
19. Hampton Kame Delta
20. East Greenbush /Schodack Kame Deltas
21. Willow Glen Kame Delta
22. Ballston Spa Kame Delta
23. Voorheesville Delta

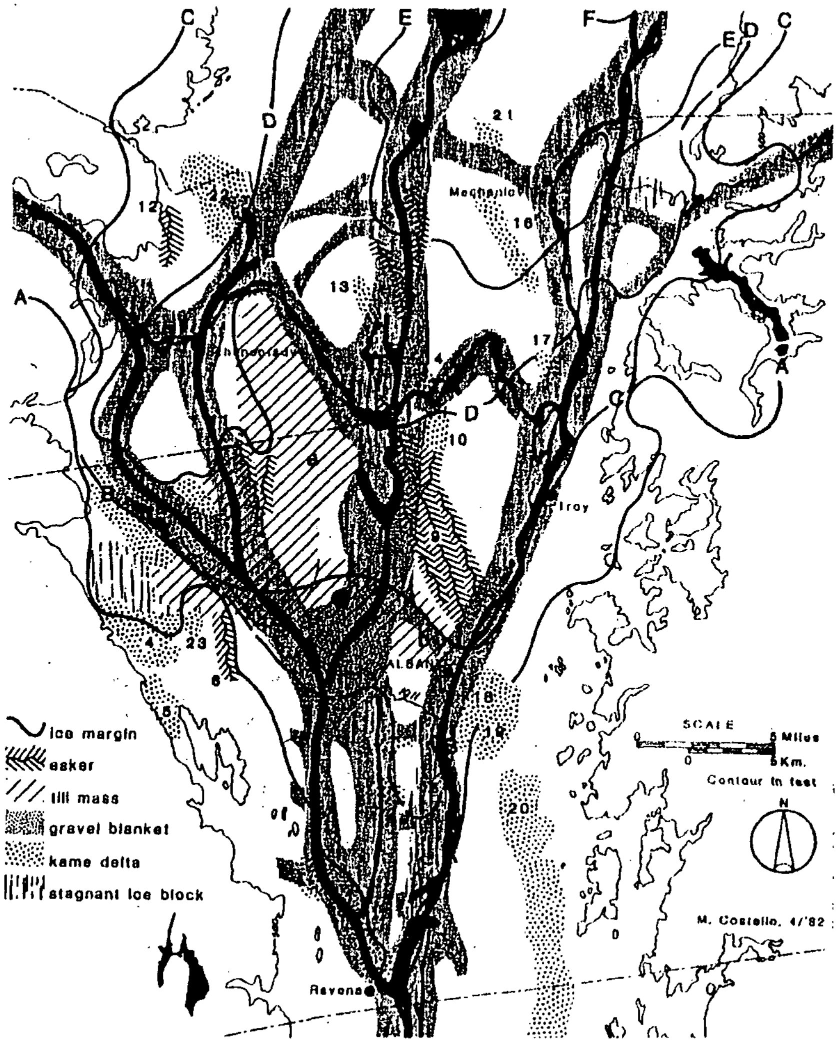
ICE MARGINS

A. Meadowdale-Hampton[1]
B. Guilderland[1]
C. Rensselaer[1]
D. Niskayuna[2]
E. Round Lake[2]
F. Saratoga Lake[2]

from: 1. LaFleur, 1979, 1965.
2. Hanson, 1977.

TILL MASS

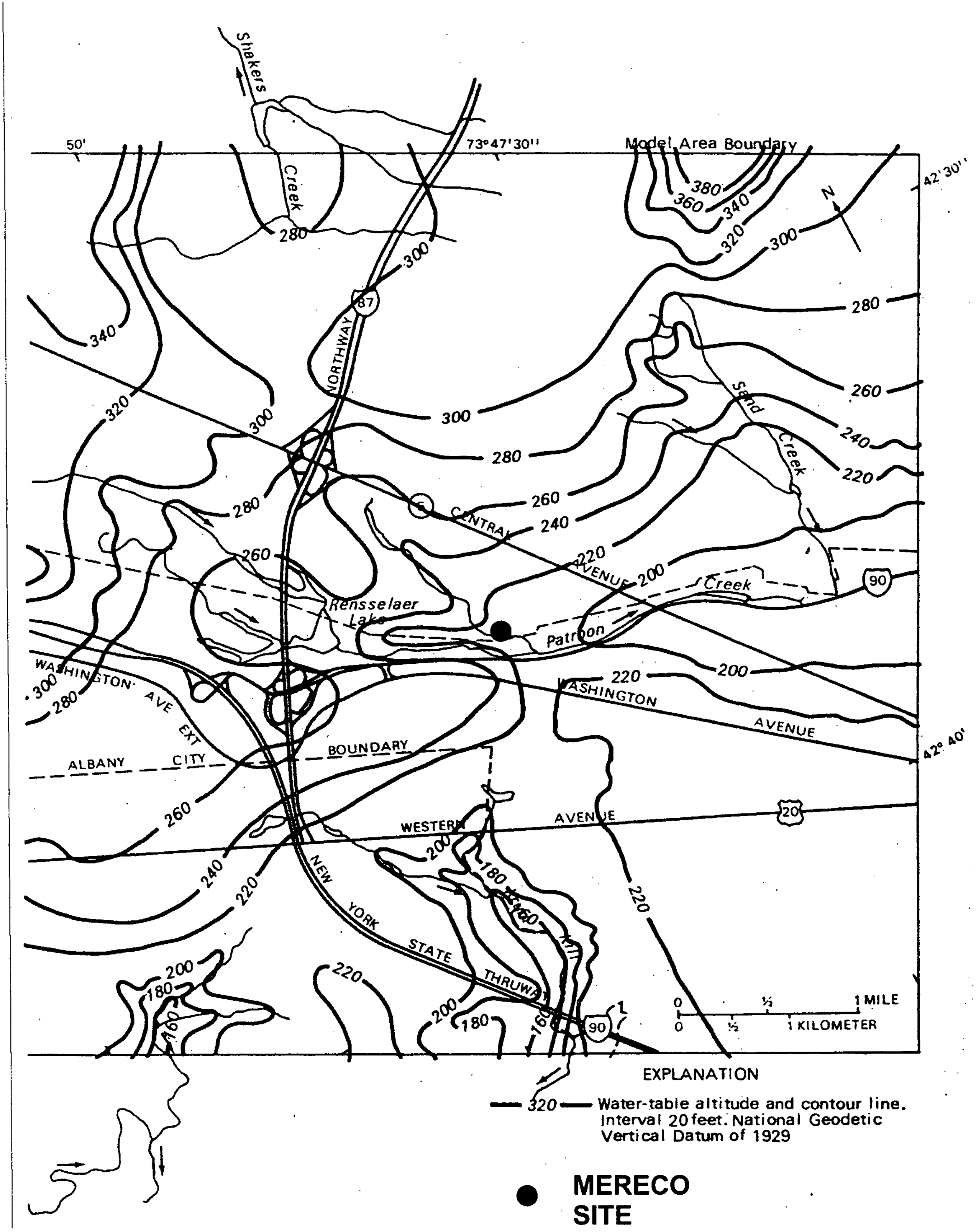
a. Hartman's-Schenectady Drumlin Field
b. Mckownville Till Ridge



MERECO SITE

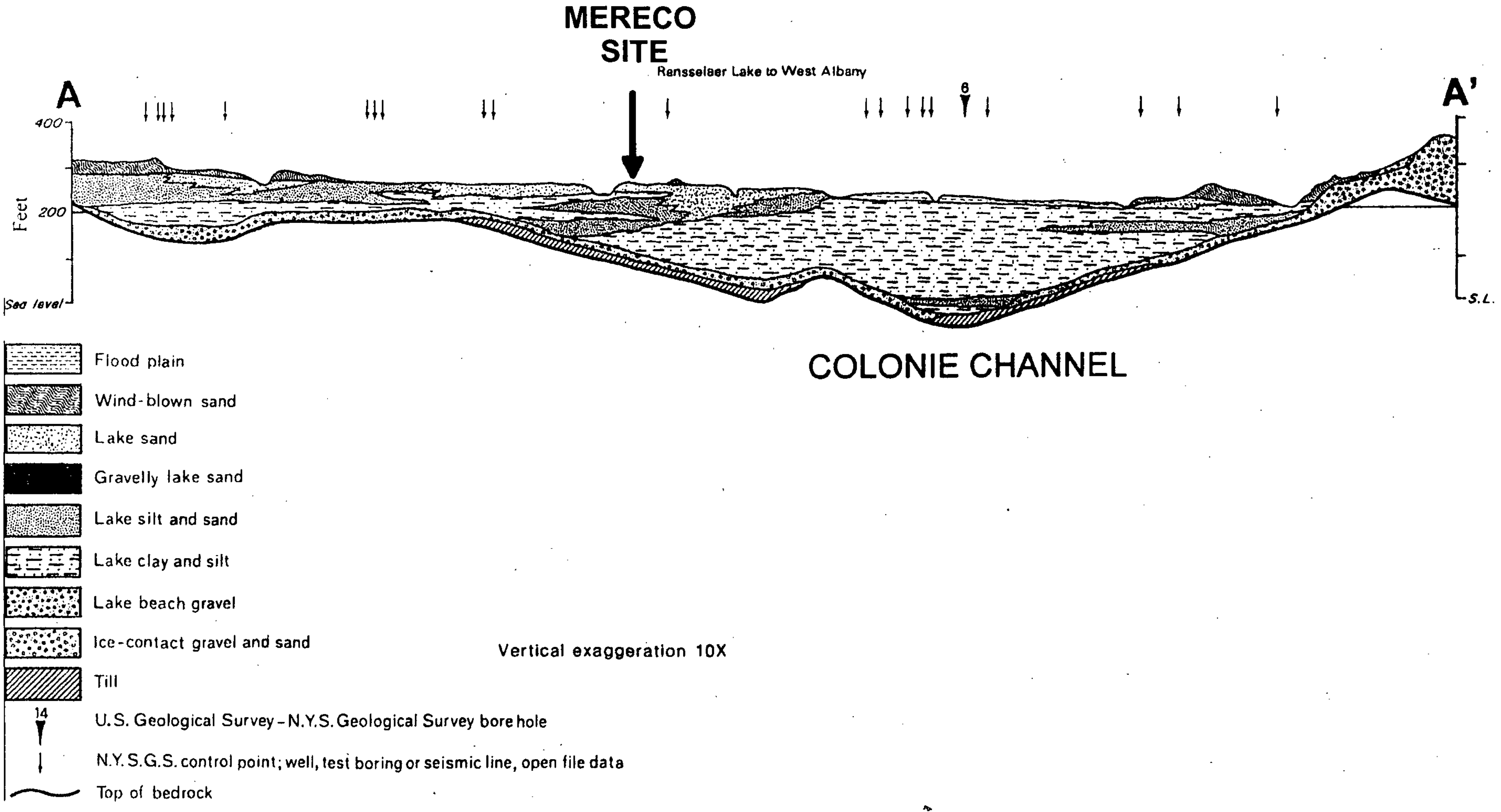
from Dineen & Hanson (1983)

Figure 3-8
TILLS AND ICE CONTACT SAND AND GRAVEL
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site



from Snavely (1983)

Figure 3-9
GENERALIZED WATER TABLE MAP OF THE SITE VICINITY
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

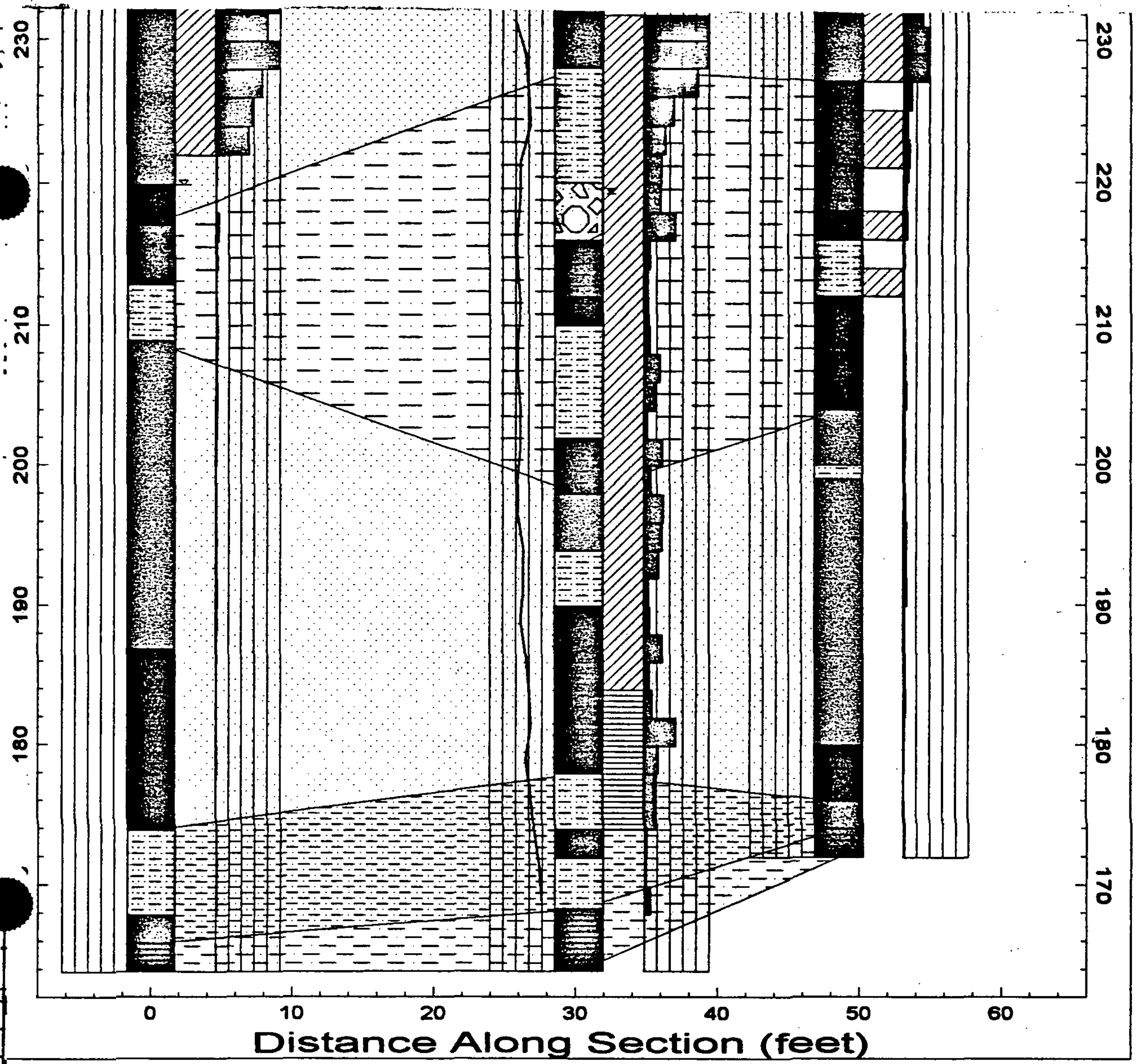


from Dineen and Hanson (1983)

Refer to Figure 3-6 for location of line of secion A-A'

CDM

Figure 3-10
CROSS-SECTION ACROSS THE COLONIE CHANNEL
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site



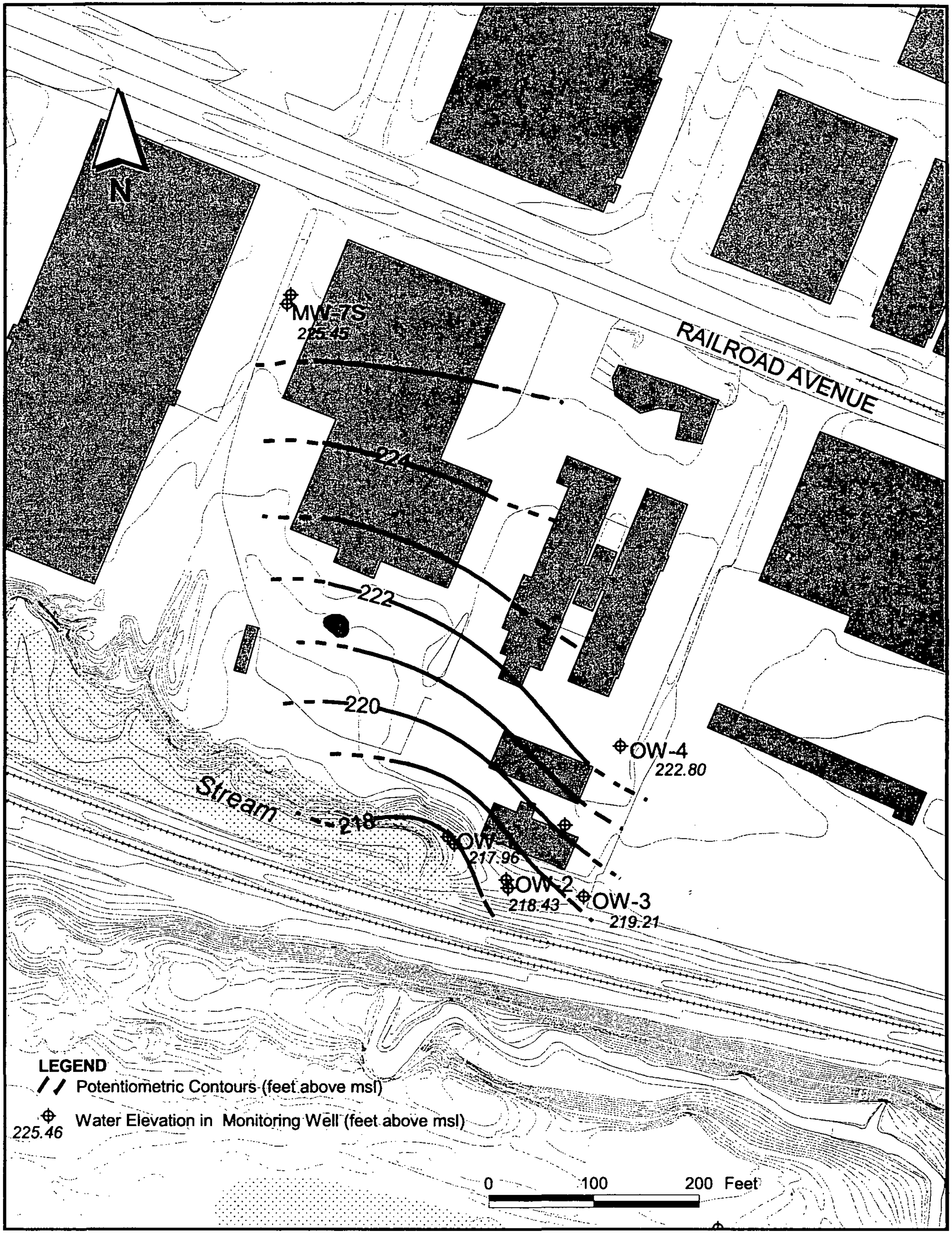
Vertical Exaggeration: 1

Figure 3-11
HYDROSTRATIGRAPHIC CROSS SECTIONS
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

CDM

THIS MAP IS AN OVERSIZED DOCUMENT. IT IS AVAILABLE FOR REVIEW AT THE U.S. EPA SUPERFUND RECORDS CENTER, 290 BROADWAY, 18TH FLOOR, NEW YORK, NY 10007

File Path: c:\egis\mercury\mercury_pot.apr

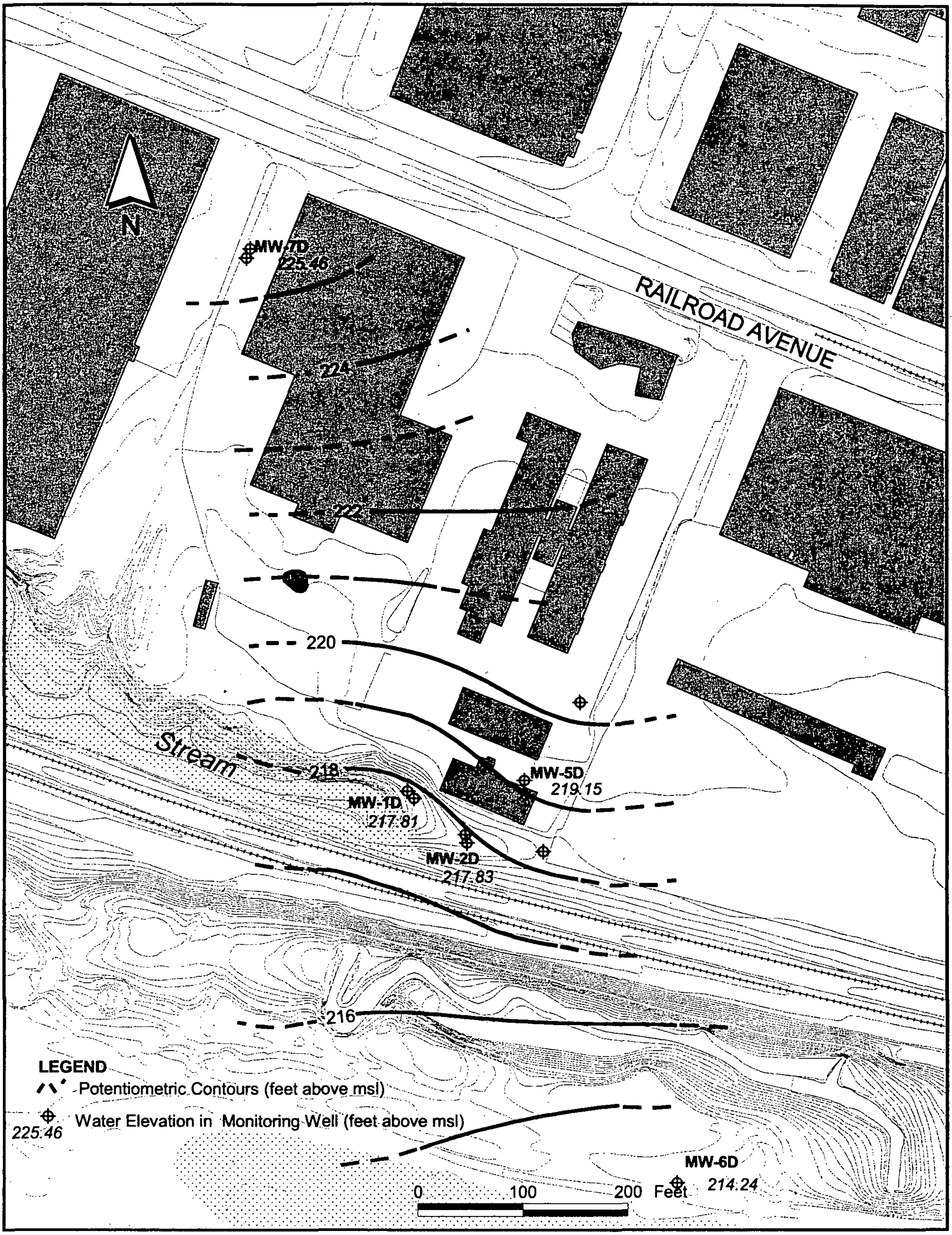


CDM

Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

Figure 3-12
Shallow Potentiometric Surface
(December 19, 2001 Synoptic Measurements)

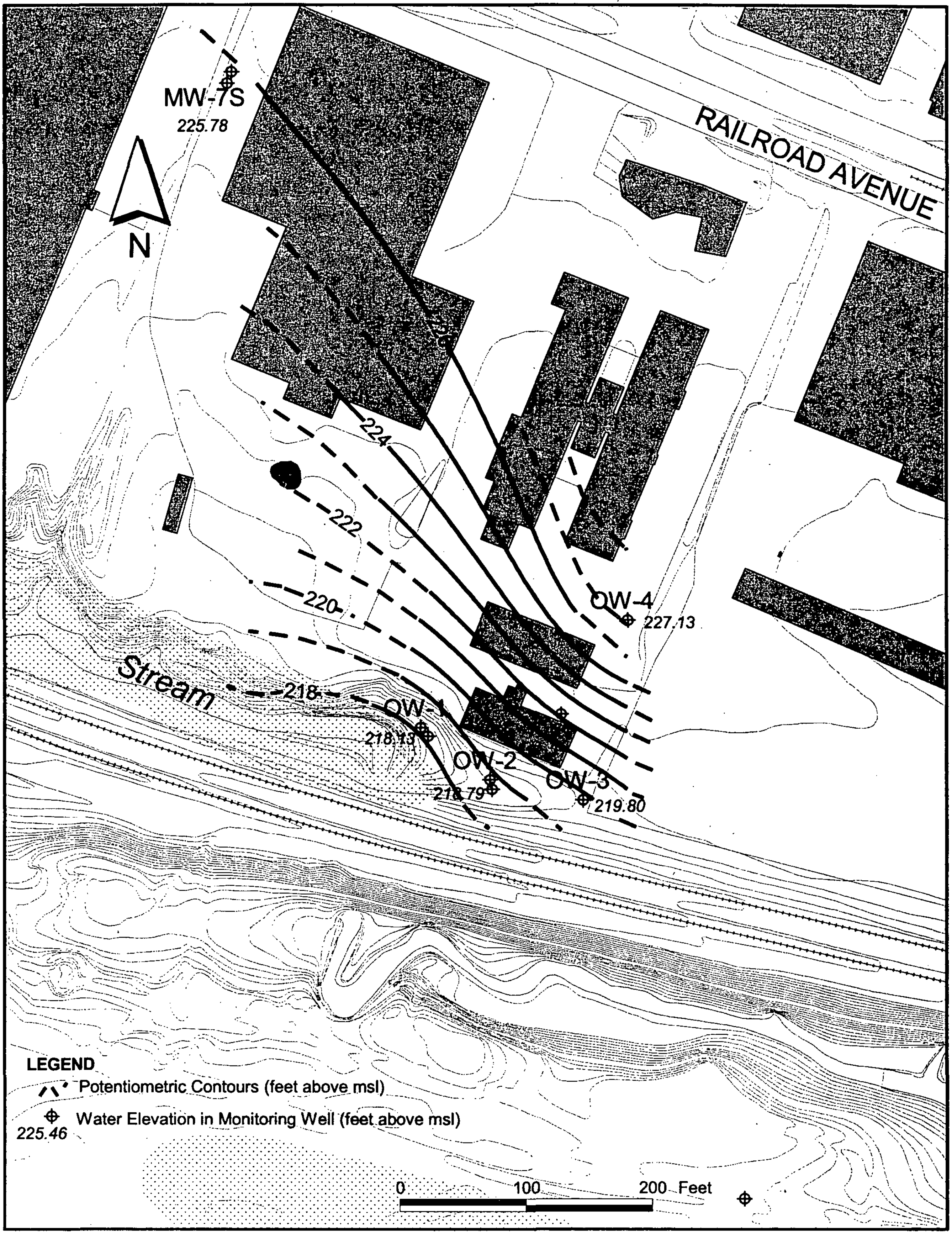
File Path: c:\egis\mercury\mercury_pot.apr



Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

Figure 3-13
Deep Potentiometric Surface
(December 19, 2001 Synoptic Measurements)

File Path: c:\egis\mercury\mercury_pot.apr



CDM

Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

Figure 3-14
Shallow Potentiometric Surface
(March 19, 2002 Synoptic Measurements)

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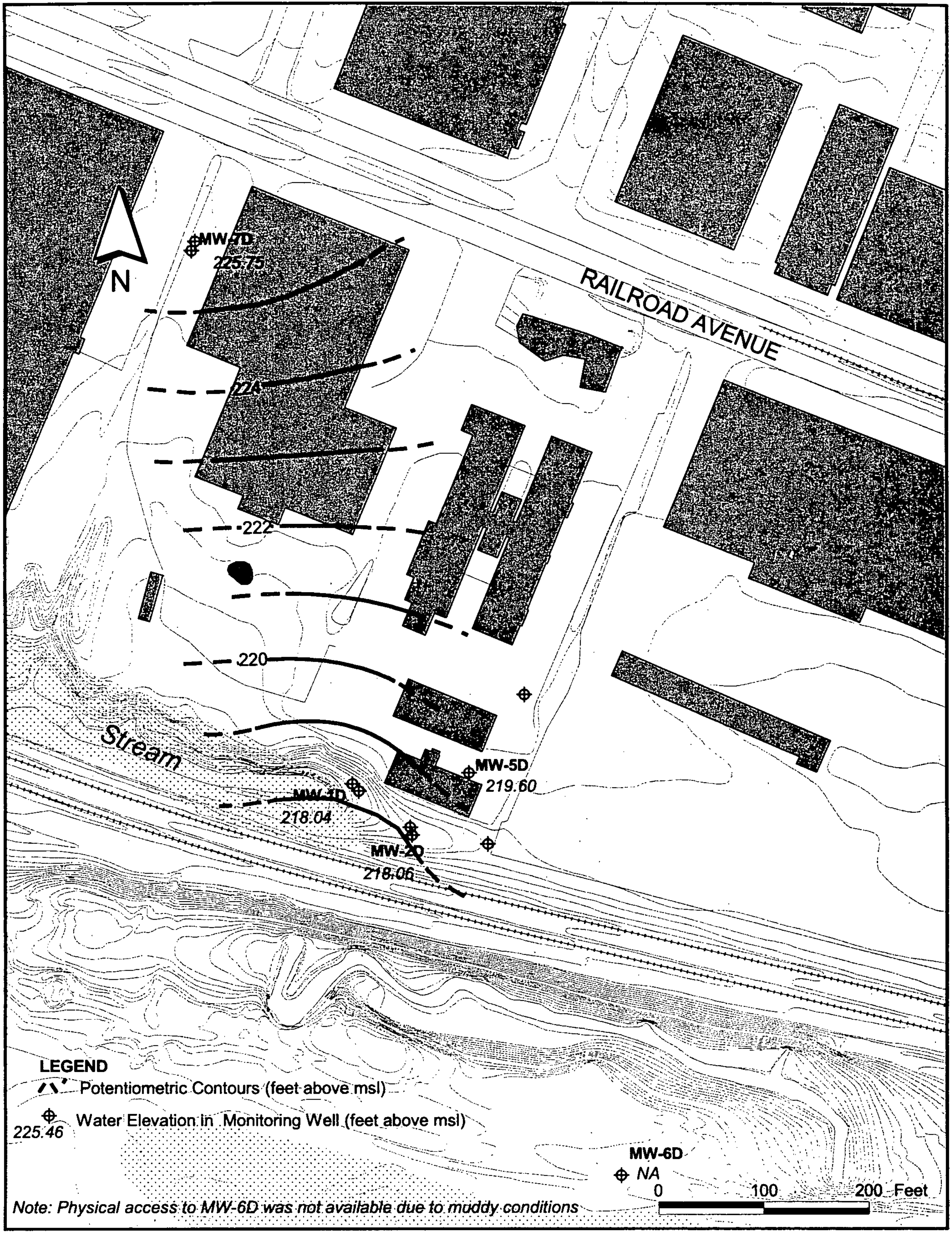


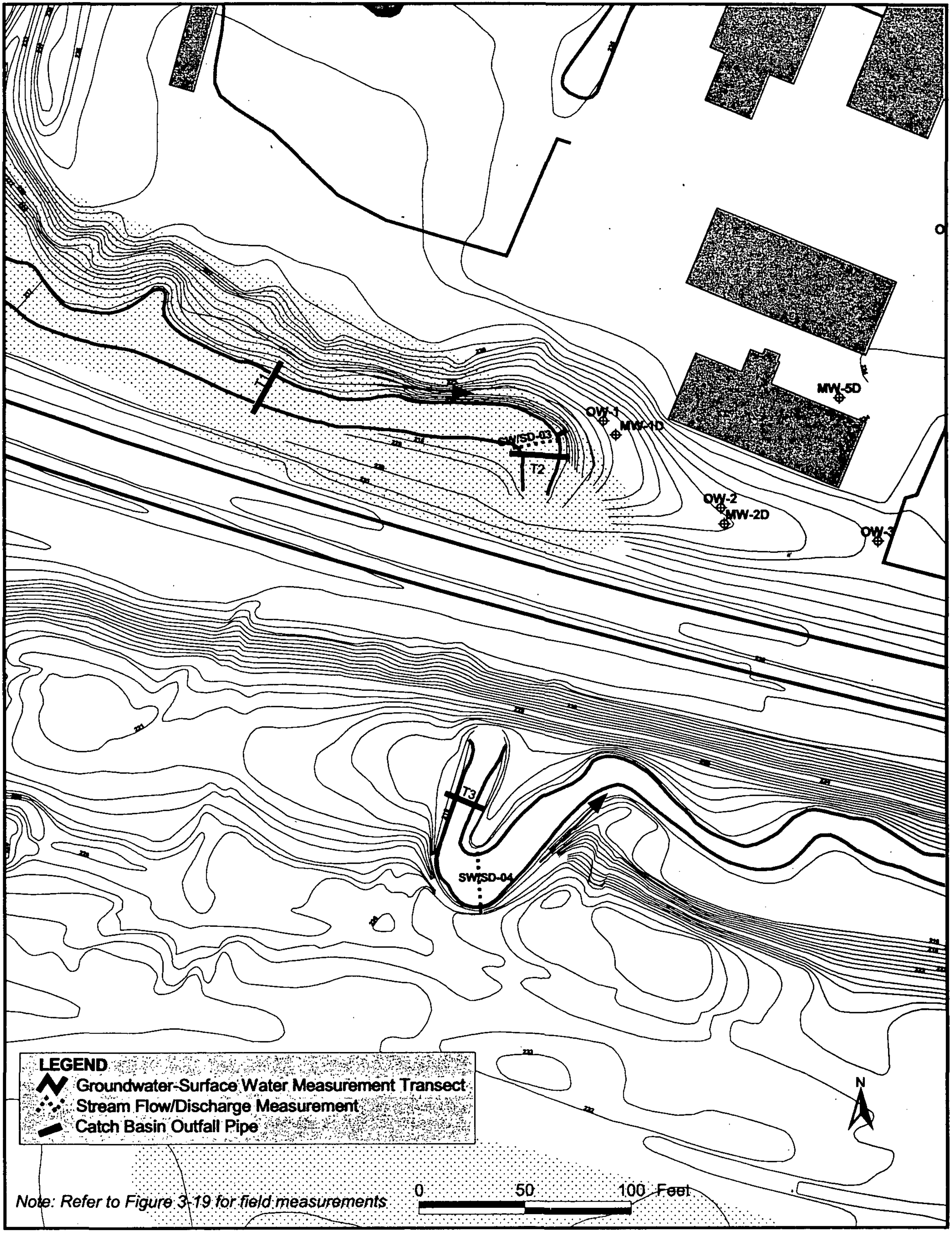
Note: Physical access to MW-6D was not available due to muddy conditions

CDM

Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

Figure 3-15
Deep Potentiometric Surface
(March 19, 2002 Synoptic Measurements)

File Path: c:\egis\mercury\mercury_gw_sw.apr

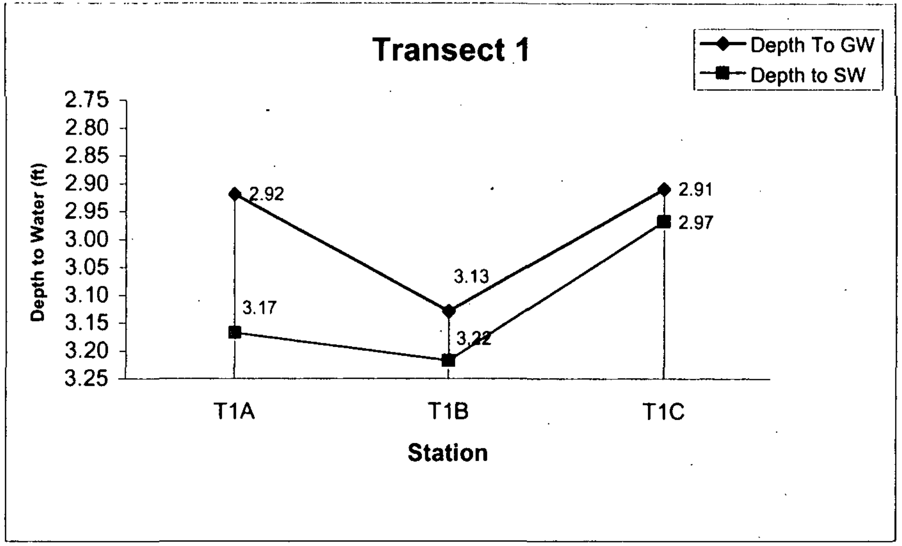


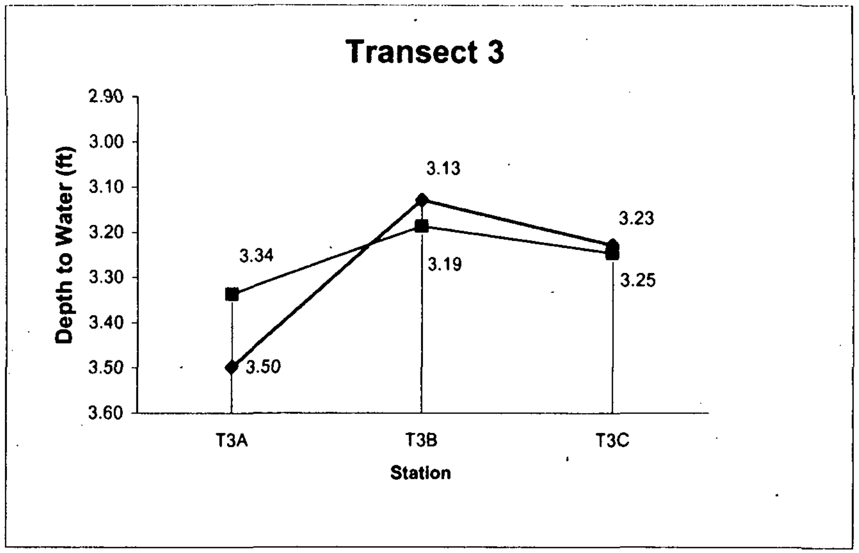
Note: Refer to Figure 3-19 for field measurements

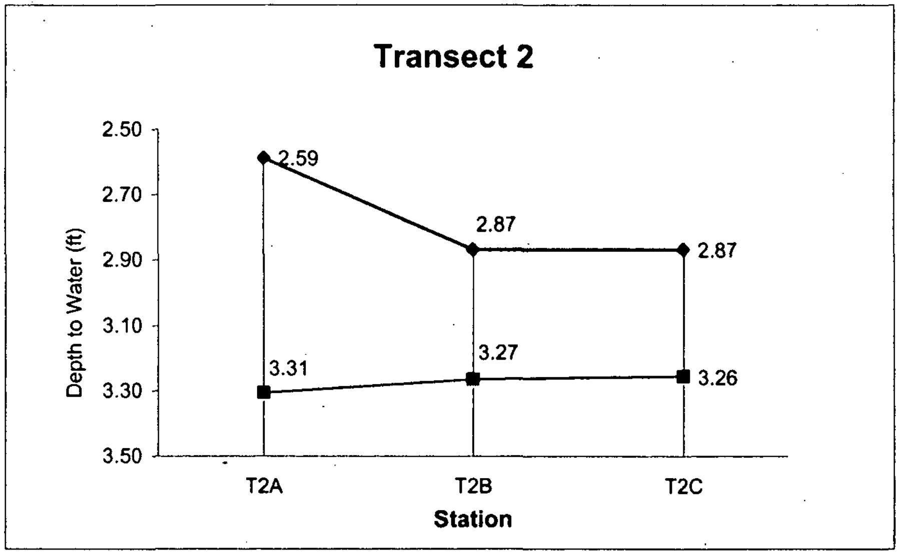
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

CDM

Figure 3-16
Groundwater-Surface Water
Interaction Evaluation Measurements





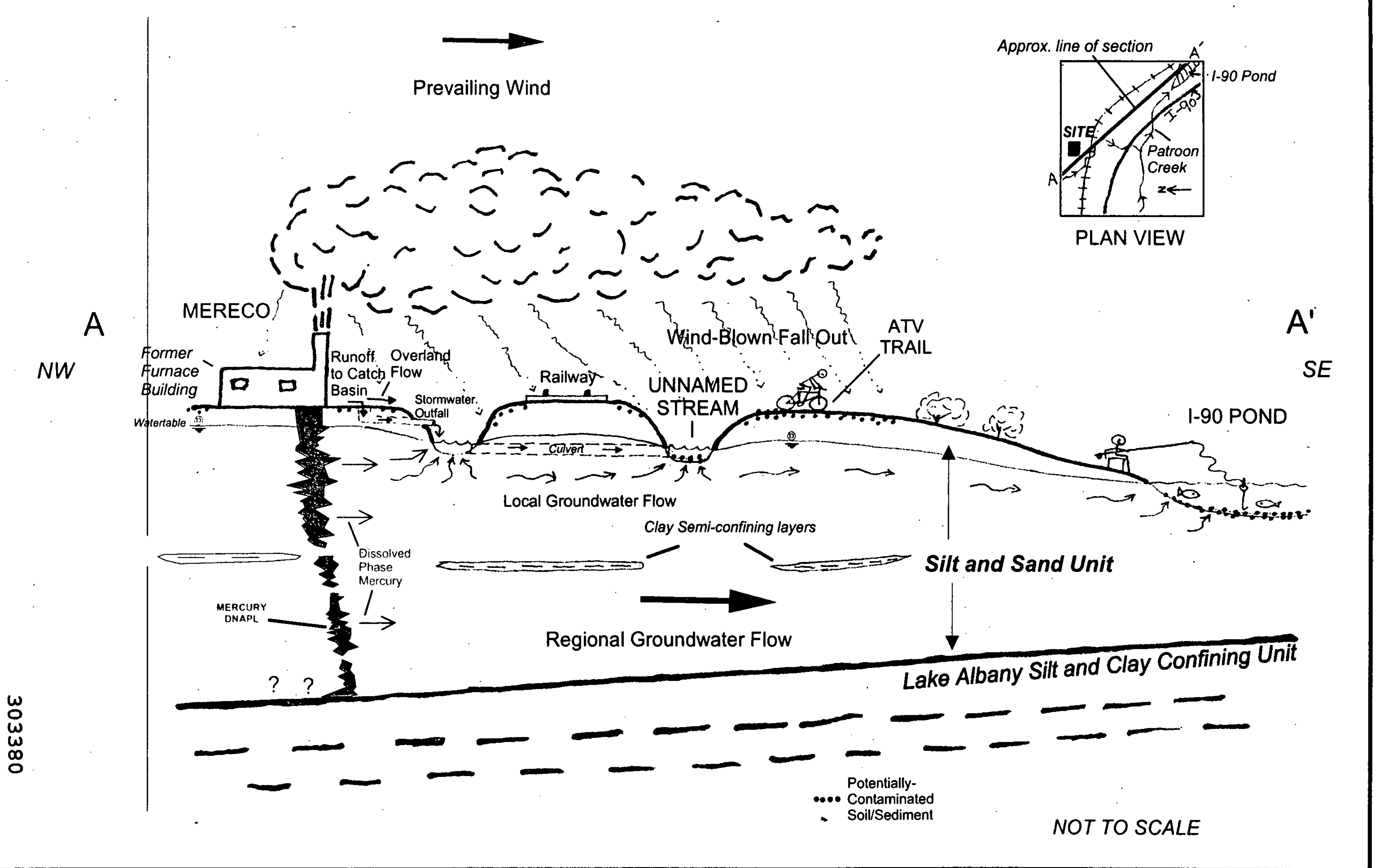


Station	Date	*Depth to GW (ft)	*Depth to SW (ft)
T1A	12/11/01	2.92	3.17
T1B	12/11/01	3.13	3.22
T1C	12/11/01	2.91	2.97
T2A	12/12/01	2.59	3.31
T2B	12/12/01	2.87	3.27
T2C	12/12/01	2.87	3.26
T3A	12/12/01	3.50	3.34
T3B	12/12/01	3.13	3.19
T3C	12/12/01	3.23	3.25

* Note: Depth below top of potentiomanometer riser

All Transects are Viewed from the Upstream side of the Transect

Figure 3-17
Groundwater-Surface Water Interaction Evaluation of Unnamed Stream
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site



CDM

Figure 3-18
SITE CONCEPTUAL MODEL FOR CONTAMINANT TRANSPORT
Remedial Investigation/Feasibility Study
Mercury Refining Superfund Site

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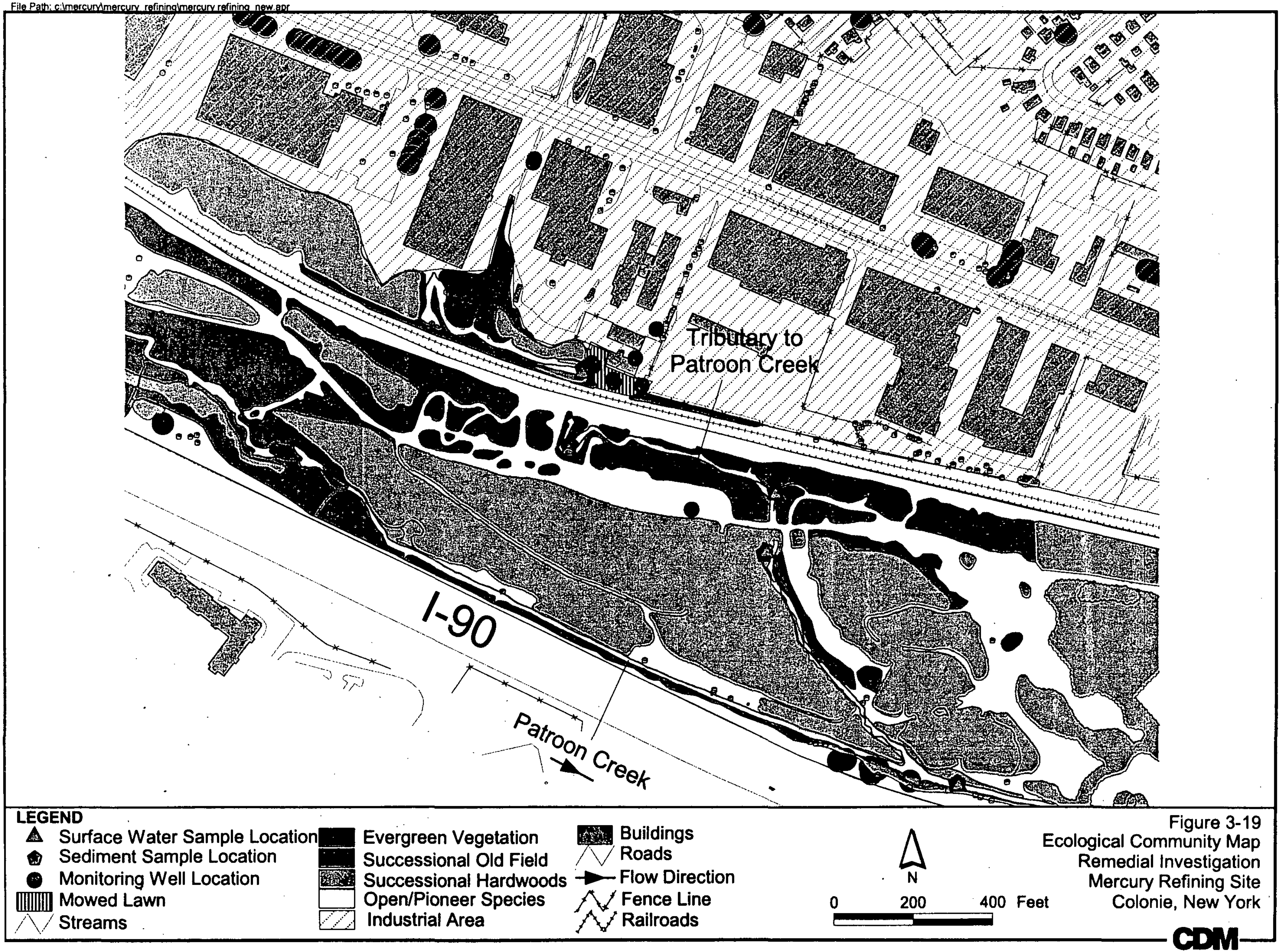

Figure 3-19
Ecological Community Map
Remedial Investigation
Mercury Refining Site
Colonie, New York

CDM

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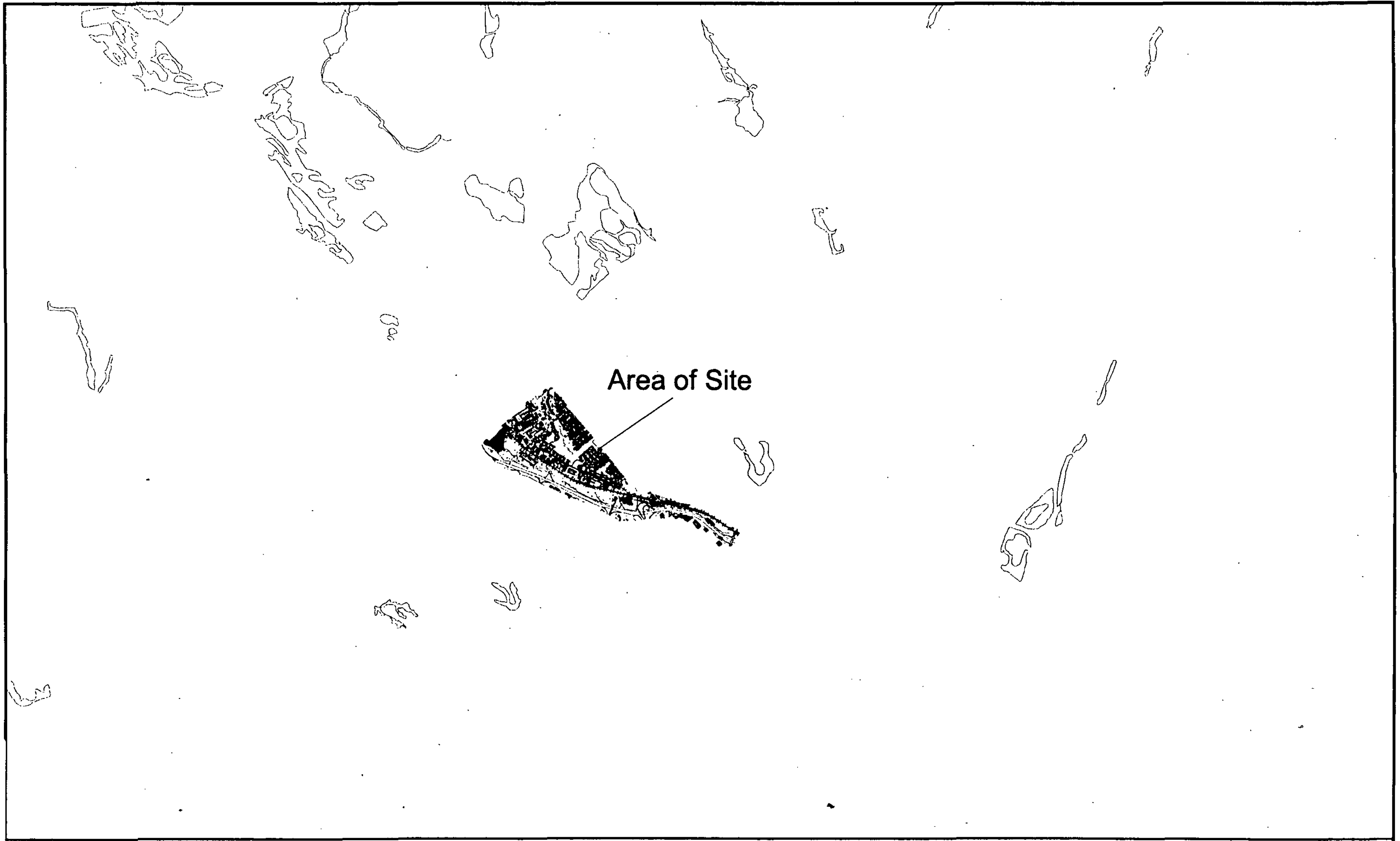

LEGEND

- ╱╲╱ State-mapped Wetlands
- ▨ Buildings
- ╱╲╱ Roads
- ■ Lakes
- ╱╲╱ Railroads

N

0 5000 10000 Feet

Figure 3-20
New York State Wetlands
Mercury Refining Site
Colonie, New York

CDM

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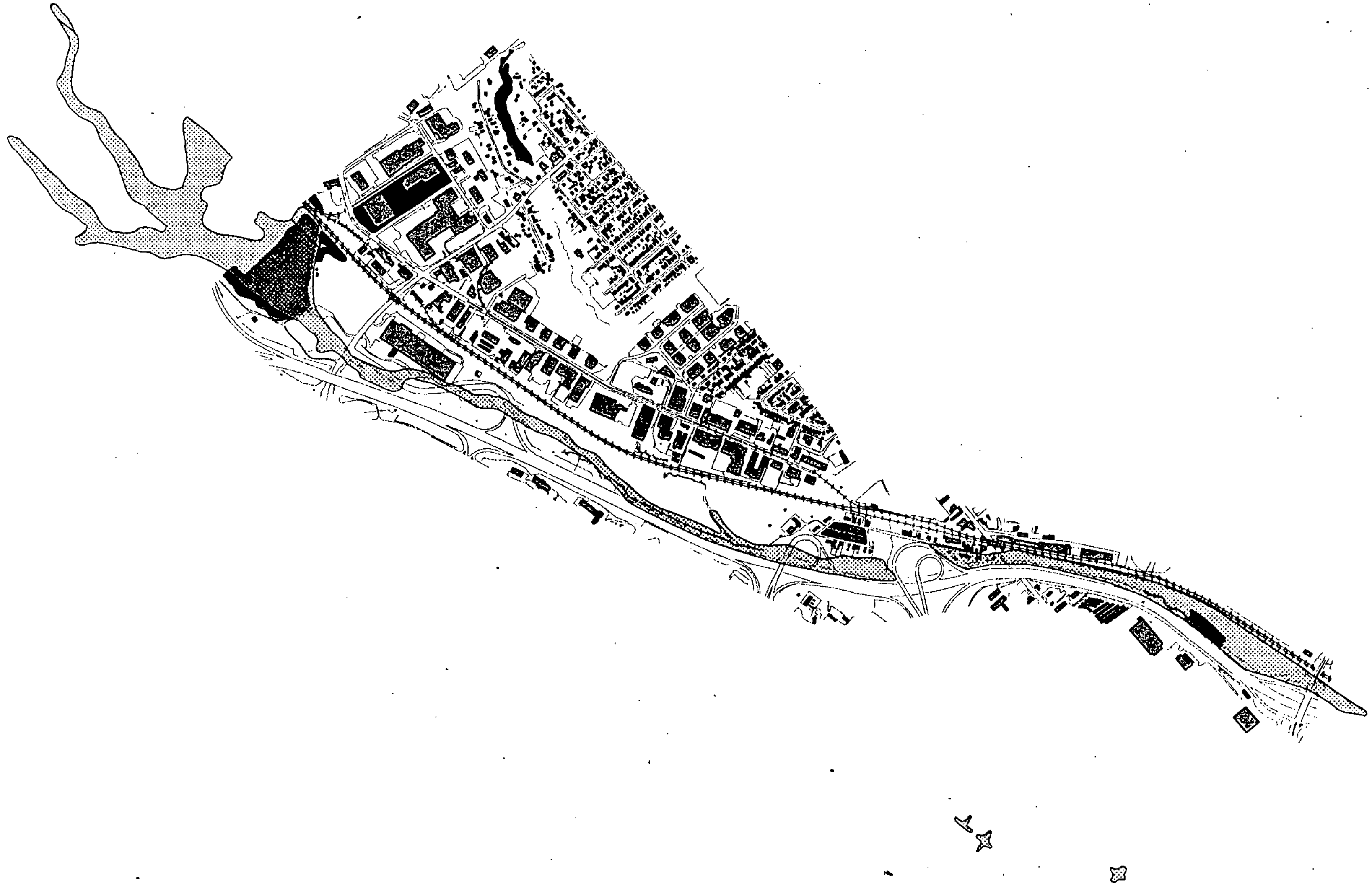

Figure 3-21
Flood Plain
FEMA Q3 Data
Mercury Refining Site
Colonie, New York

CDM

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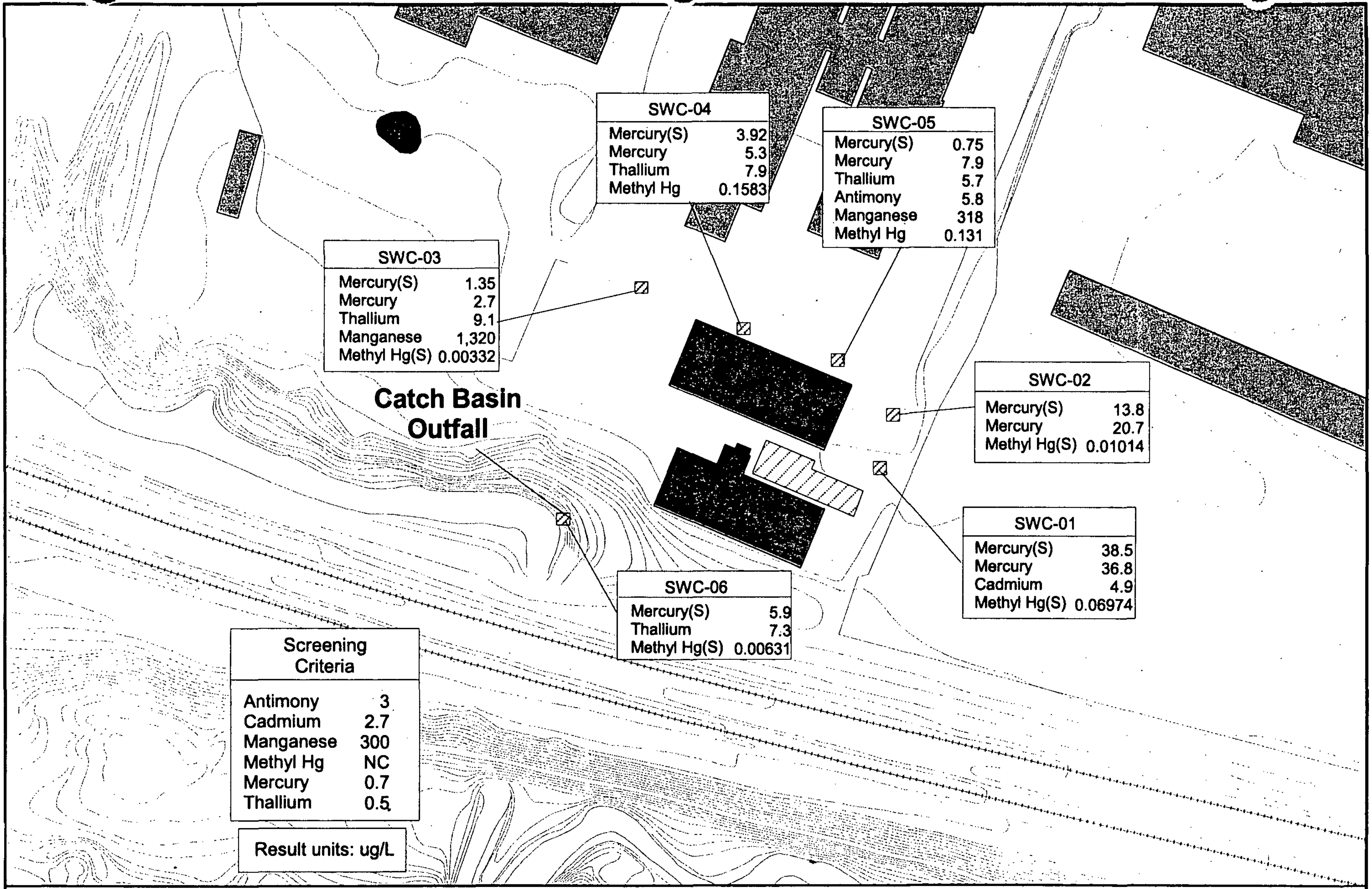

LEGEND

- ▨ Catch Basins
- ▦ Buildings
- /\/ Roads
- ■ Site Buildings
- /\/ Streams
- /\/ Railroads
- /\/ Topography
- ▨ Historical Site Building

Mercury(S) = Mercury Analysis by Subcontract Laboratory
Methyl Hg = Methyl Mercury
NC = No screening criteria available

N

0 50 100 Feet

Figure 4-1
Catch Basin Surface Water Samples
TAL Metals Exceeding Screening Criteria and Non CLP Mercury Results
Mercury Refining Site
Colonie, New York

CDM

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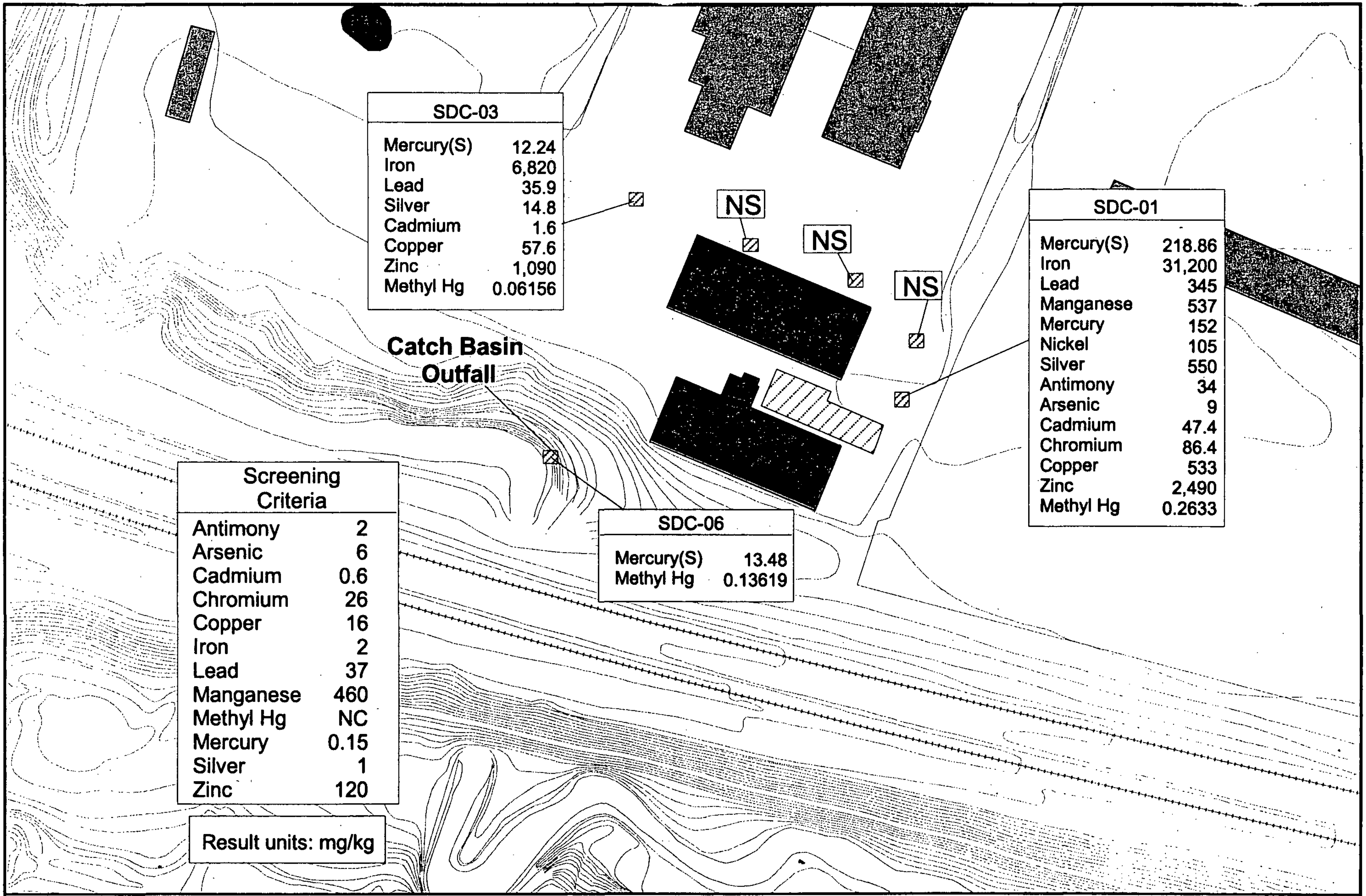

LEGEND

▩ Buildings	Railroads
Roads	Topography
■ Site Buildings	▨ Historical Site Buildings
Streams	
▨ Catch Basin Sediment Samples	

Mercury(S) = Mercury Analysis by Subcontract Laboratory
NS = Not Sampled
NC = No Screening Criteria

N

0 50 100 Feet

Figure 4-2
Catch Basin Sediment Samples
TAL Metals Exceeding Screening Criteria and Non CLP Mercury Results
Mercury Refining Site
Colonie, New York

CDM

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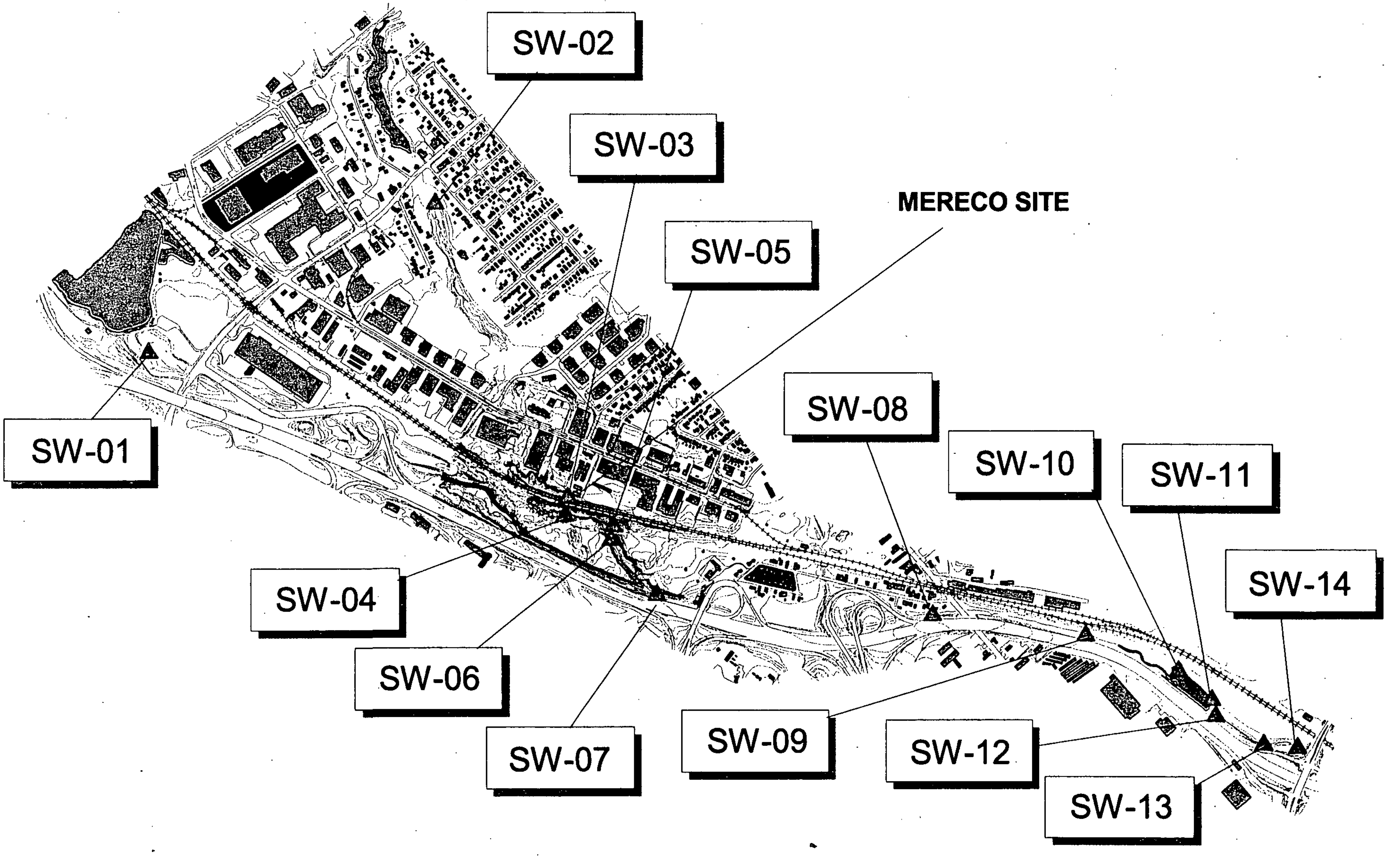

LEGEND

▲ Surface Water Samples
▨ Buildings
/\/ Roads
■ Pavement
▨ Lakes
/\/ Streams
/\/ Railroads
/\/ Topography
▨ Historical Site Building

SW = Surface Water Sample

Figure 4-3
Surface Water Sampling Locations
Mercury Refining Site
Colonie, New York

CDM

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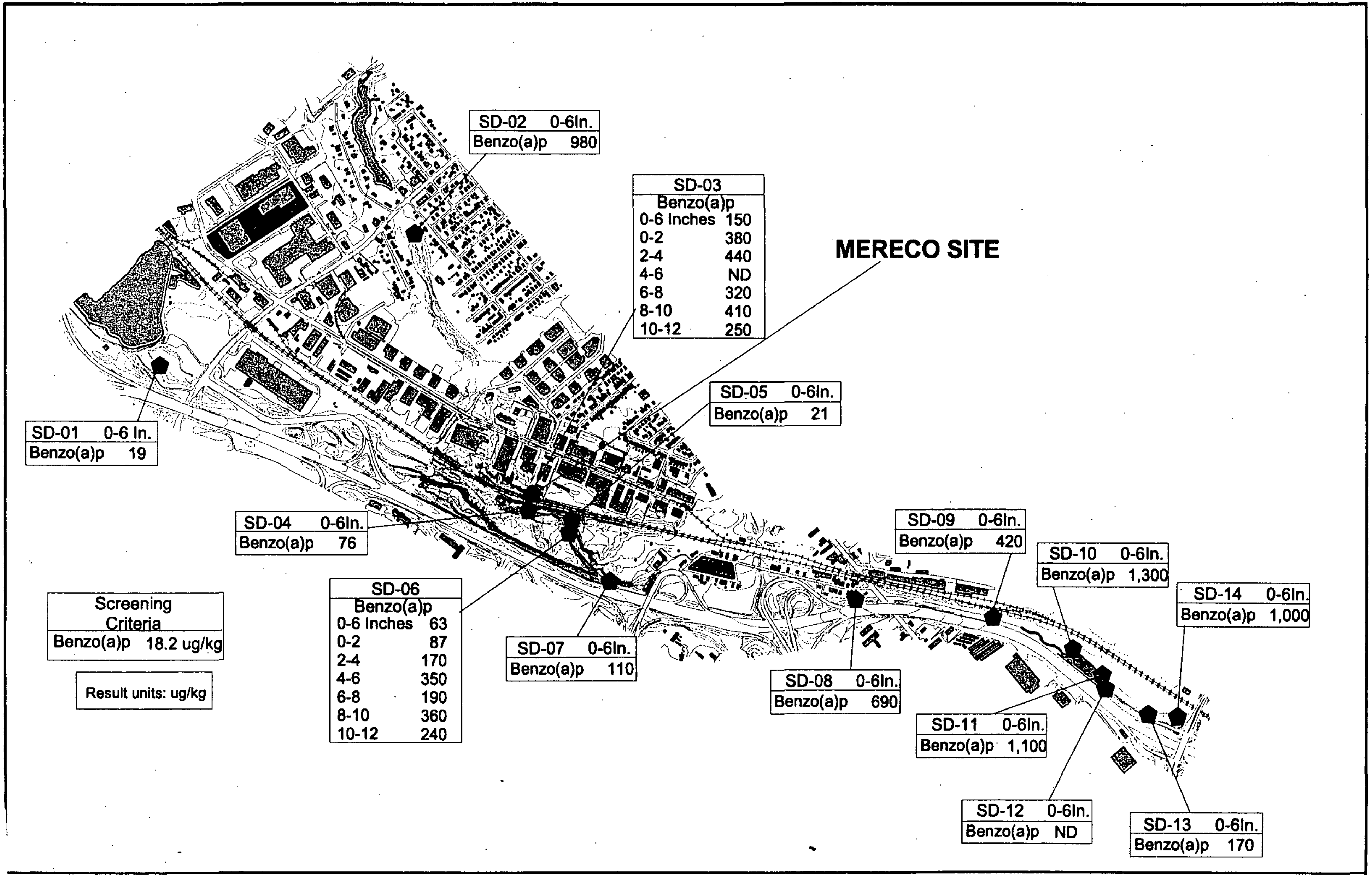


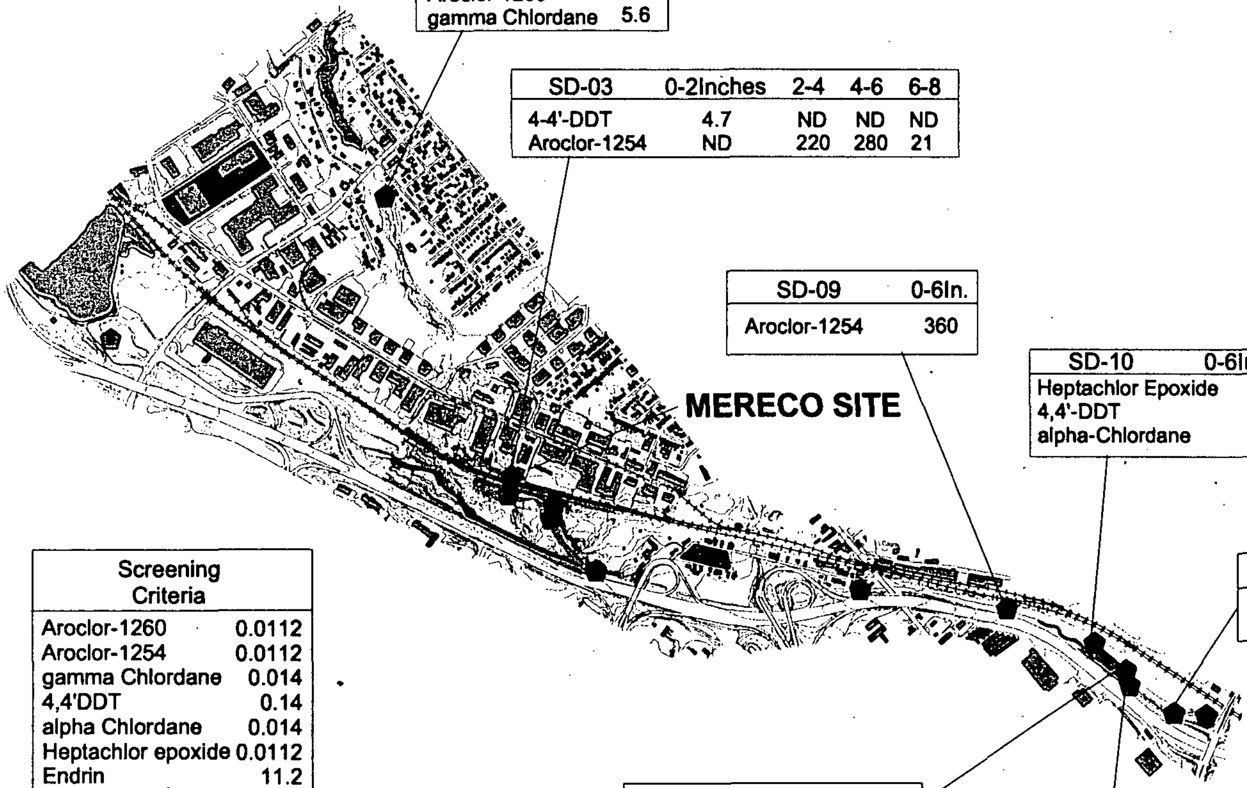
LEGEND
- ⬟ Stream Sediment Samples
- ▨ Buildings
- /\/ Roads
- ■ Pavement
- ■ Lakes
- /\/ Streams
- /\/ Railroads
- /\/ Topography

Benzo(a)p = benzo(a) pyrene
ND = Non-detect

N

0 1000 2000 Feet

Figure 4-4
Stream Sediment Samples
Benzo(a)pyrene Exceeding Screening Criteria
Mercury Refining Site
Colonie, New York



SD-02	0-6In.
Aroclor-1260	410
gamma Chlordane	5.6

SD-03	0-2Inches	2-4	4-6	6-8
4-4'-DDT	4.7	ND	ND	ND
Aroclor-1254	ND	220	280	21

SD-09	0-6In.
Aroclor-1254	360

SD-10	0-6In.
Heptachlor Epoxide	2.9
4,4'-DDT	9
alpha-Chlordane	8.4

SD-13	0-6In.
beta-BHC	7.5
4-4'-DDD	5.1

SD-11	0-6 Inches
Heptachlor	39
Endosulfan I	26
Dieldrin	380
4,4'-DDE	61
Endrin	310
alpha-Chlordane	1,100
gamma-Chlordane	770
Aroclor-1260	4,400

SD-12	0-6In.
beta-BHC	6.5
4-4'-DDD	5.4

Screening Criteria	
Aroclor-1260	0.0112
Aroclor-1254	0.0112
gamma Chlordane	0.014
4,4'DDT	0.14
alpha Chlordane	0.014
Heptachlor epoxide	0.0112
Endrin	11.2
4,4'-DDE	0.14
Dieldrin	1.4
Endosulfan I	0.42
Heptachlor	0.0112
4,4'-DDD	0.14
beta BHC	5

Result units: ug/kg

LEGEND

⬟ Stream Sediment Samples
▨ Buildings
/\/ Roads
■ Pavement
▨ Lakes
/\/ Topography
/\/ Streams
/\/ Railroads

ND = Non-detect

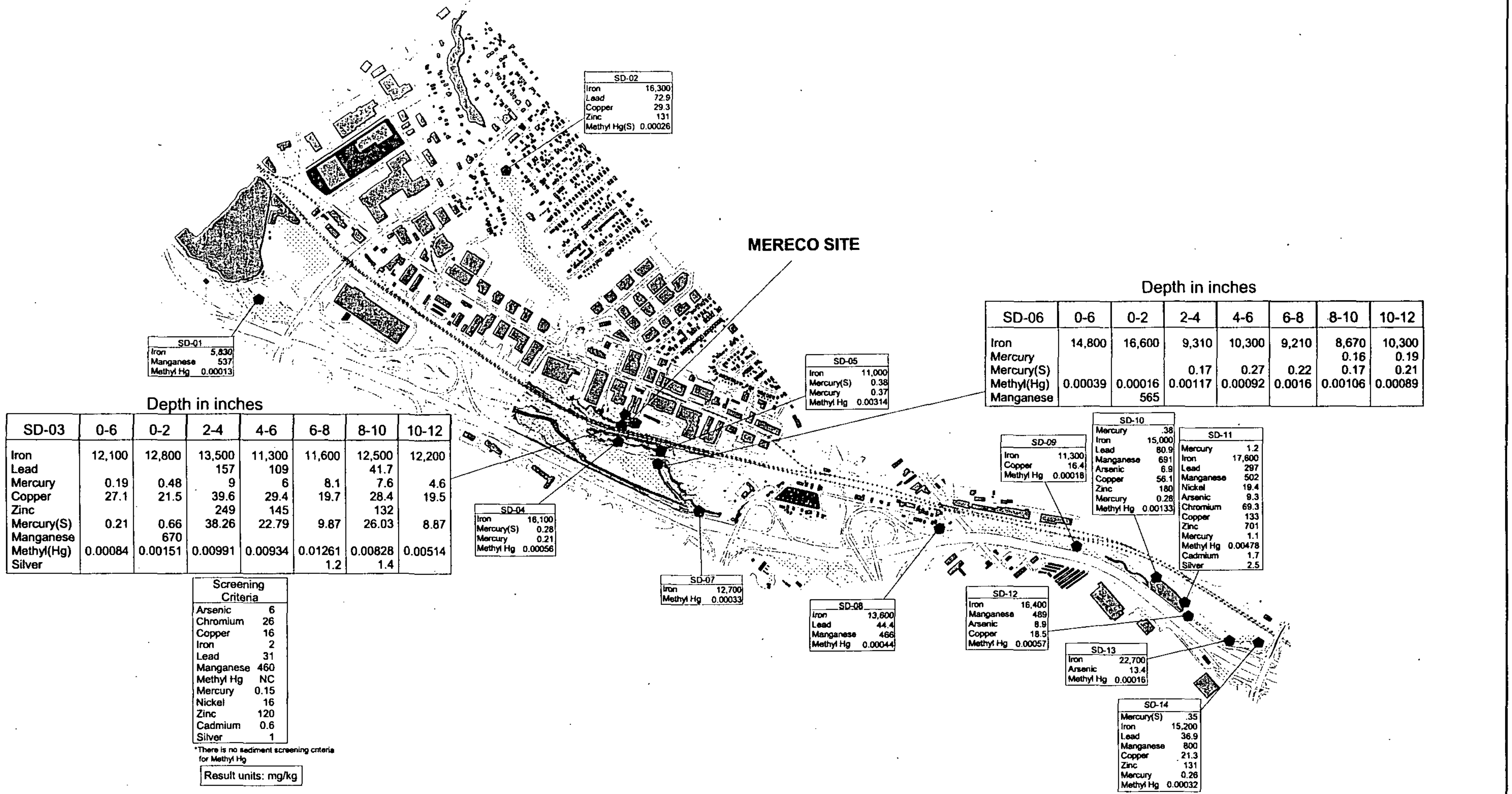
N

0 2000 4000 Feet

Figure 4-5
Stream Sediment Samples
Pesticides and PCBs Exceeding Screening Criteria
Mercury Refining Site
Colonie, New York

CDM

File Path: c:\egis\mercury\mercury.apr



SD-01	
Iron	5,830
Manganese	537
Methyl Hg	0.00013

SD-02	
Iron	16,300
Lead	72.9
Copper	29.3
Zinc	131
Methyl Hg(S)	0.00026

Depth in inches

SD-03	0-6	0-2	2-4	4-6	6-8	8-10	10-12
Iron	12,100	12,800	13,500	11,300	11,600	12,500	12,200
Lead			157	109		41.7	
Mercury	0.19	0.48	9	6	8.1	7.6	4.6
Copper	27.1	21.5	39.6	29.4	19.7	28.4	19.5
Zinc			249	145		132	
Mercury(S)	0.21	0.66	38.26	22.79	9.87	26.03	8.87
Manganese		670					
Methyl(Hg)	0.00084	0.00151	0.00991	0.00934	0.01261	0.00828	0.00514
Silver					1.2	1.4	

Screening Criteria	
Arsenic	6
Chromium	26
Copper	16
Iron	2
Lead	31
Manganese	460
Methyl Hg	NC
Mercury	0.15
Nickel	16
Zinc	120
Cadmium	0.6
Silver	1

*There is no sediment screening criteria for Methyl Hg

Result units: mg/kg

SD-04	
Iron	16,100
Mercury(S)	0.28
Mercury	0.21
Methyl Hg	0.00056

SD-05	
Iron	11,000
Mercury(S)	0.38
Mercury	0.37
Methyl Hg	0.00314

Depth in inches

SD-06	0-6	0-2	2-4	4-6	6-8	8-10	10-12
Iron	14,800	16,600	9,310	10,300	9,210	8,670	10,300
Mercury						0.16	0.19
Mercury(S)			0.17	0.27	0.22	0.17	0.21
Methyl(Hg)	0.00039	0.00016	0.00117	0.00092	0.0016	0.00106	0.00089
Manganese		565					

SD-07	
Iron	12,700
Methyl Hg	0.00033

SD-08	
Iron	13,600
Lead	44.4
Manganese	466
Methyl Hg	0.00044

SD-09	
Iron	11,300
Copper	16.4
Methyl Hg	0.00018

SD-10	
Mercury	.38
Iron	15,000
Lead	80.9
Manganese	691
Arsenic	6.9
Copper	56.1
Zinc	180
Mercury	0.28
Methyl Hg	0.00133

SD-11	
Mercury	1.2
Iron	17,600
Lead	297
Manganese	502
Nickel	19.4
Arsenic	9.3
Chromium	69.3
Copper	133
Zinc	701
Mercury	1.1
Methyl Hg	0.00478
Cadmium	1.7
Silver	2.5

SD-12	
Iron	16,400
Manganese	489
Arsenic	8.9
Copper	18.5
Methyl Hg	0.00057

SD-13	
Iron	22,700
Arsenic	13.4
Methyl Hg	0.00016

SD-14	
Mercury(S)	.35
Iron	15,200
Lead	36.9
Manganese	800
Copper	21.3
Zinc	131
Mercury	0.26
Methyl Hg	0.00032

LEGEND

- ● Stream Sediment Samples
- ▨ Buildings
- Roads
- ■ Pavement
- ▨ Lakes
- Topography
- Streams
- Railroads

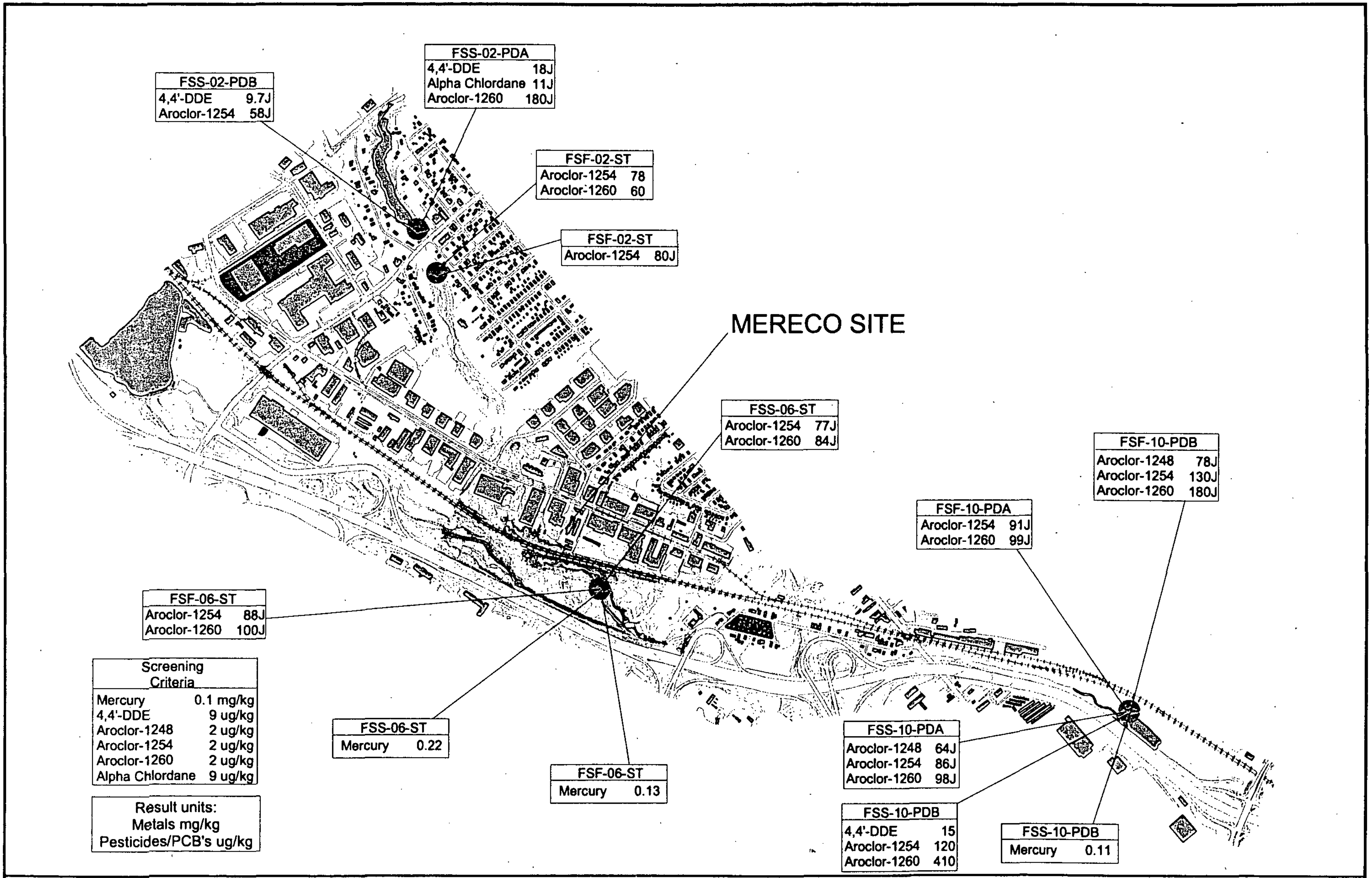
Methyl Hg = Methyl Mercury
Mercury(S) = Mercury Analysis by Subcontract Laboratory
SD = Sediment Sample
NC = No Screening Criteria

N

0 1000 2000 Feet

Figure 4-6
Stream Sediment Samples-TAL Metals Exceeding Screening Criteria and Non CLP Mercury Results 0 to 6 Inches
Mercury Refining Site
Colonie, New York

CDM



LEGEND

● Fish Tissue Samples
▨ Buildings
/\/ Roads
/\/ Railroads
■ Pavement
▨ Lakes
/\/ Streams

ST = Stream
FSF = Fish Sample Forage
FSS = Fish Sample Sport
PD = Pond

N

0 1000 2000 Feet

Figure 4-7
Fish Tissue Samples
Pesticides, PCBs and TAL Metals Exceeding Screening Criteria
Mercury Refining Site
Colonie, New York

CDM

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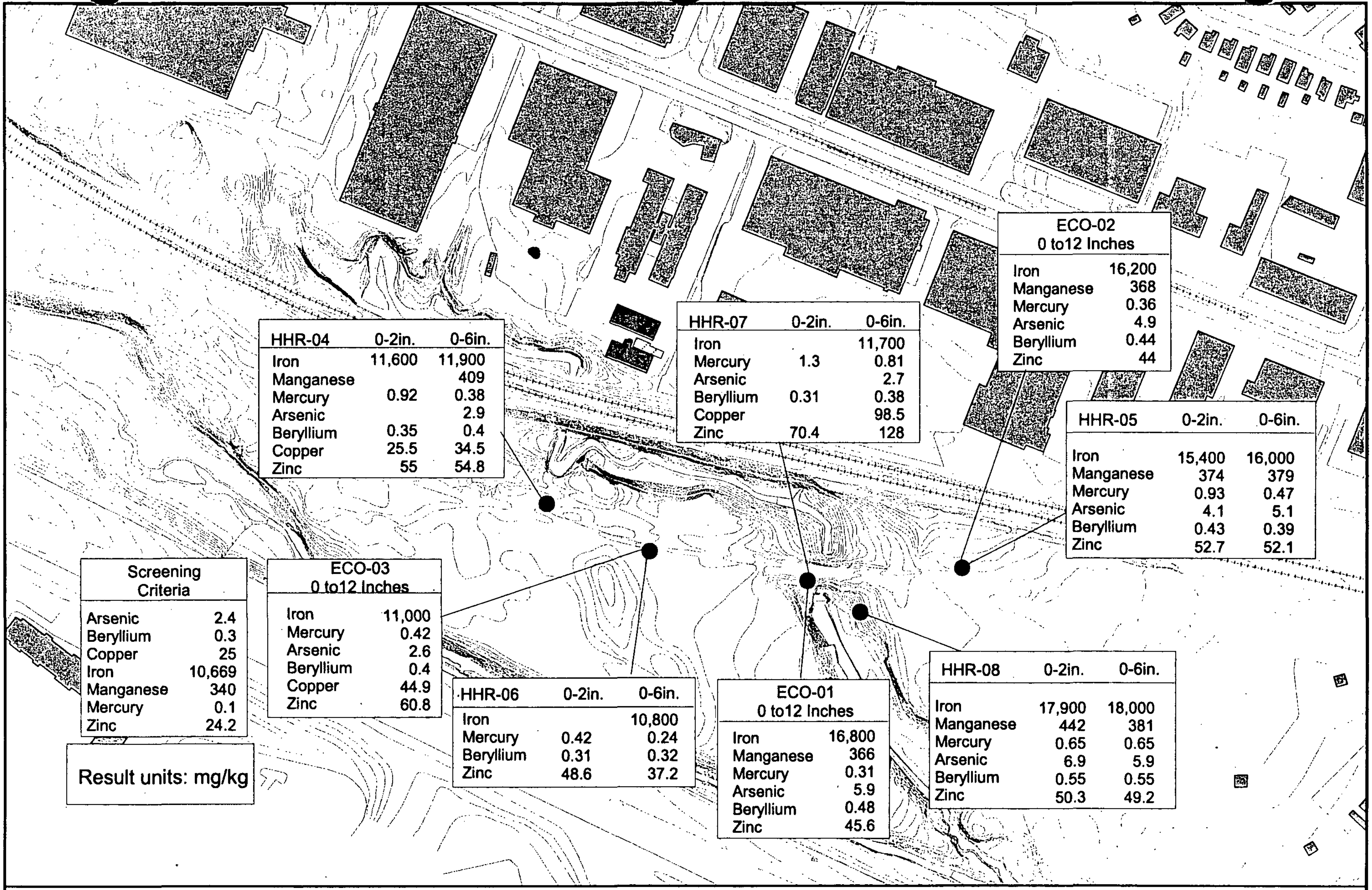


HHR-04	0-2in.	0-6in.
Iron	11,600	11,900
Manganese		409
Mercury	0.92	0.38
Arsenic		2.9
Beryllium	0.35	0.4
Copper	25.5	34.5
Zinc	55	54.8

HHR-07	0-2in.	0-6in.
Iron		11,700
Mercury	1.3	0.81
Arsenic		2.7
Beryllium	0.31	0.38
Copper		98.5
Zinc	70.4	128

ECO-02 0 to12 Inches	
Iron	16,200
Manganese	368
Mercury	0.36
Arsenic	4.9
Beryllium	0.44
Zinc	44

HHR-05	0-2in.	0-6in.
Iron	15,400	16,000
Manganese	374	379
Mercury	0.93	0.47
Arsenic	4.1	5.1
Beryllium	0.43	0.39
Zinc	52.7	52.1

Screening Criteria	
Arsenic	2.4
Beryllium	0.3
Copper	25
Iron	10,669
Manganese	340
Mercury	0.1
Zinc	24.2

Result units: mg/kg

ECO-03 0 to12 Inches	
Iron	11,000
Mercury	0.42
Arsenic	2.6
Beryllium	0.4
Copper	44.9
Zinc	60.8

HHR-06	0-2in.	0-6in.
Iron		10,800
Mercury	0.42	0.24
Beryllium	0.31	0.32
Zinc	48.6	37.2

ECO-01 0 to12 Inches	
Iron	16,800
Manganese	366
Mercury	0.31
Arsenic	5.9
Beryllium	0.48
Zinc	45.6

HHR-08	0-2in.	0-6in.
Iron	17,900	18,000
Manganese	442	381
Mercury	0.65	0.65
Arsenic	6.9	5.9
Beryllium	0.55	0.55
Zinc	50.3	49.2

LEGEND

- ● Surface Soil Samples
- ▨ Buildings
- /\/ Roads
- /\/ Railroads
- ▨ Historical Site Building
- ■ Site Buildings
- /\/ Streams

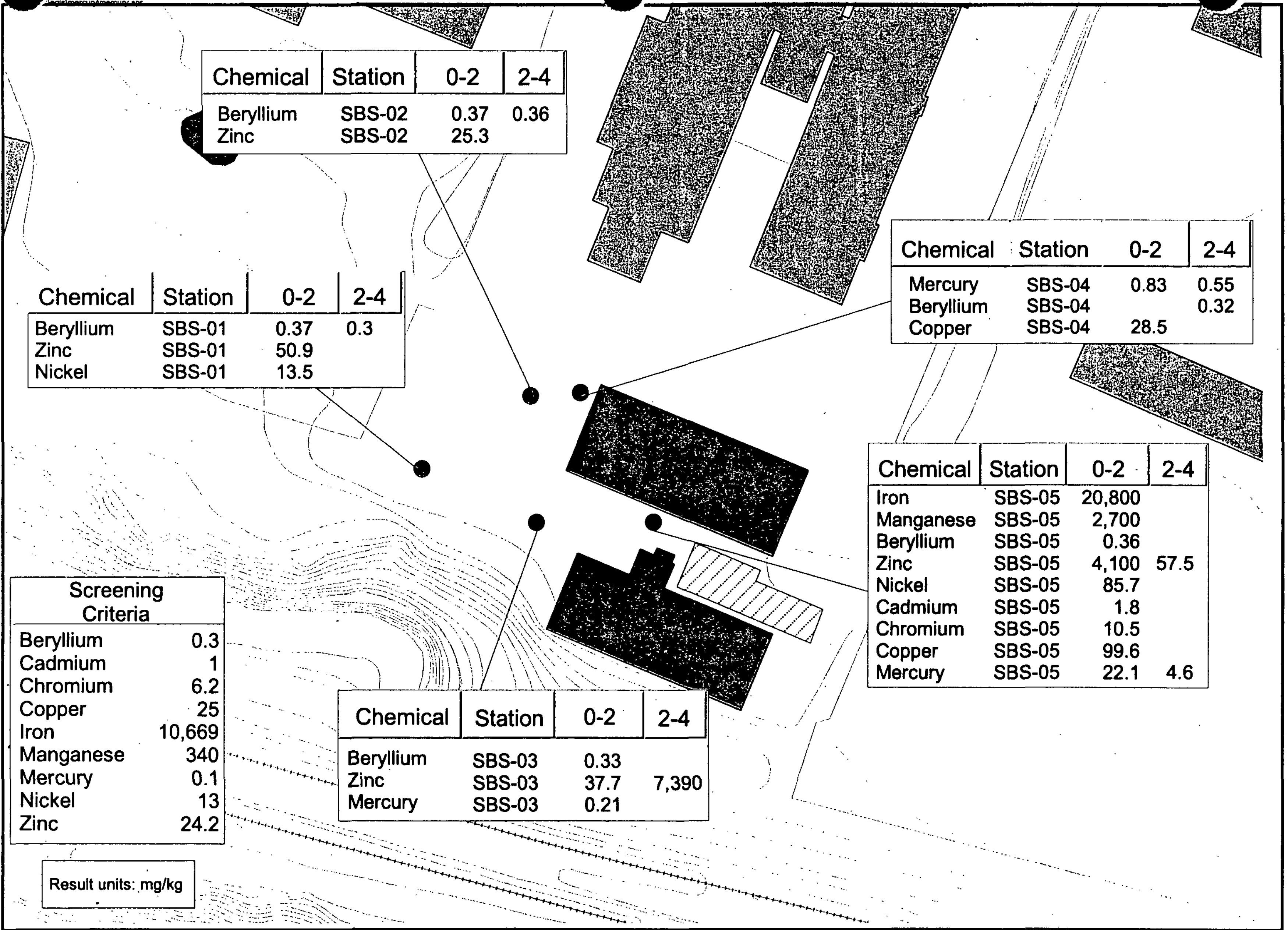
HHR = Human Health Risk Assessment Sample
ECO = Ecological Risk Assessment Sample

N

0 200 400 Feet

Figure 4-8
Surface Soil Samples
TAL Metals Exceeding Screening Criteria
Mercury Refining Site
Colonie, New York

CDM



Chemical	Station	0-2	2-4
Beryllium	SBS-02	0.37	0.36
Zinc	SBS-02	25.3	

Chemical	Station	0-2	2-4
Beryllium	SBS-01	0.37	0.3
Zinc	SBS-01	50.9	
Nickel	SBS-01	13.5	

Chemical	Station	0-2	2-4
Mercury	SBS-04	0.83	0.55
Beryllium	SBS-04		0.32
Copper	SBS-04	28.5	

Chemical	Station	0-2	2-4
Iron	SBS-05	20,800	
Manganese	SBS-05	2,700	
Beryllium	SBS-05	0.36	
Zinc	SBS-05	4,100	57.5
Nickel	SBS-05	85.7	
Cadmium	SBS-05	1.8	
Chromium	SBS-05	10.5	
Copper	SBS-05	99.6	
Mercury	SBS-05	22.1	4.6

Screening Criteria	
Beryllium	0.3
Cadmium	1
Chromium	6.2
Copper	25
Iron	10,669
Manganese	340
Mercury	0.1
Nickel	13
Zinc	24.2

Chemical	Station	0-2	2-4
Beryllium	SBS-03	0.33	
Zinc	SBS-03	37.7	7,390
Mercury	SBS-03	0.21	

Result units: mg/kg

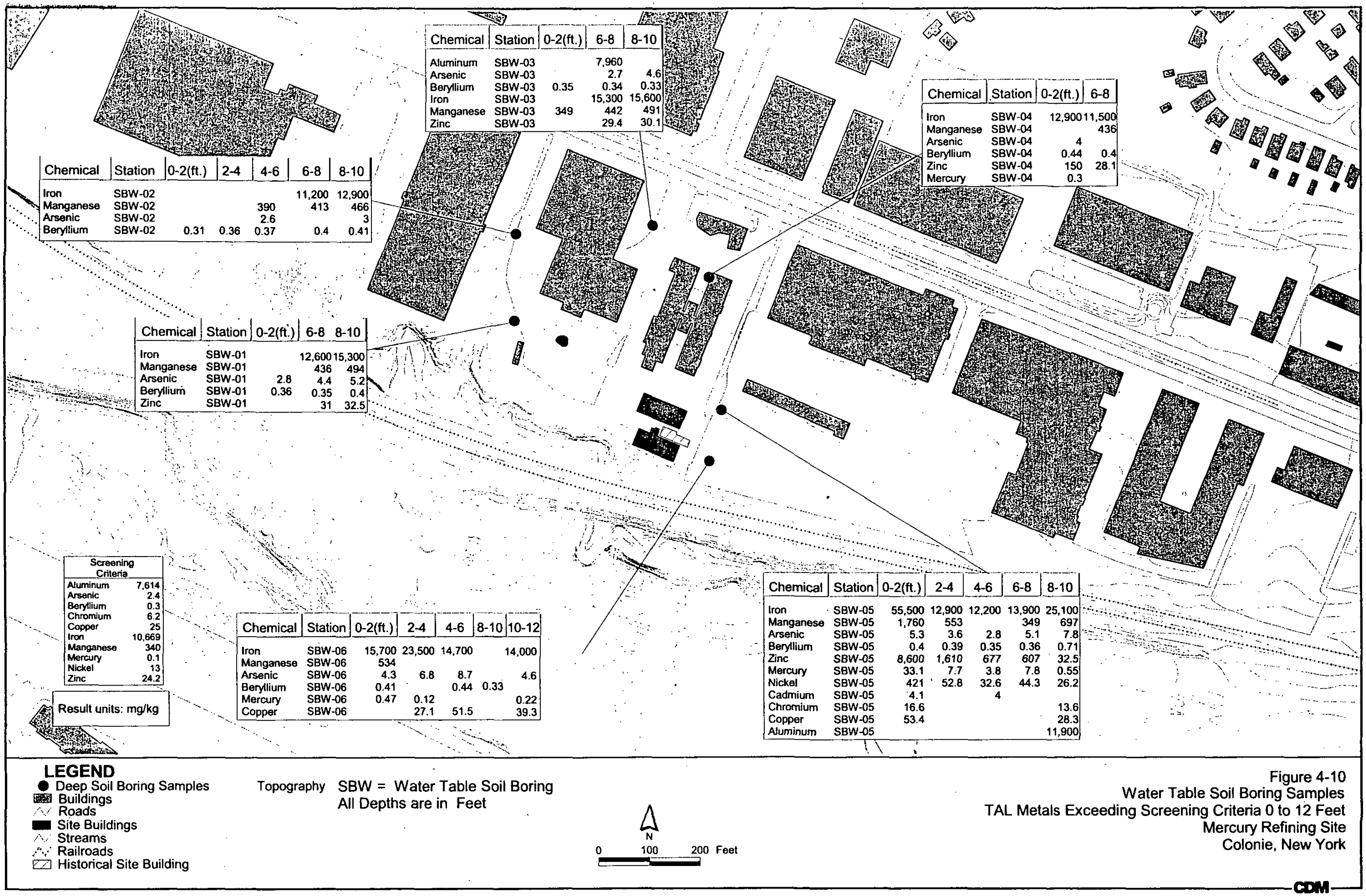
LEGEND

- ● Shallow Soil Boring Samples
- ▨ Buildings
- /\/ Roads
- ■ Pavement
- ▨ Site Buildings
- /\/ Topography
- /\/ Streams
- /\/ Railroads
- ▨ Historical Site Building

SBS = Shallow Soil Boring
All Depths are in Feet

Figure 4-9
Shallow Soil Boring Samples
TAL Metals Exceeding Screening Criteria 0 to 4 Feet
Mercury Refining Site
Colonie, New York

CDM



Chemical	Station	0-2(ft.)	2-4	4-6	6-8	8-10
Iron	SBW-02				11,200	12,900
Manganese	SBW-02			390	413	466
Arsenic	SBW-02			2.6		3
Beryllium	SBW-02	0.31	0.36	0.37	0.4	0.41

Chemical	Station	0-2(ft.)	6-8	8-10
Aluminum	SBW-03		7,960	
Arsenic	SBW-03		2.7	4.6
Beryllium	SBW-03	0.35	0.34	0.33
Iron	SBW-03		15,300	15,600
Manganese	SBW-03	349	442	491
Zinc	SBW-03		29.4	30.1

Chemical	Station	0-2(ft.)	6-8
Iron	SBW-04	12,900	11,500
Manganese	SBW-04		436
Arsenic	SBW-04	4	
Beryllium	SBW-04	0.44	0.4
Zinc	SBW-04	150	28.1
Mercury	SBW-04	0.3	

Chemical	Station	0-2(ft.)	6-8	8-10
Iron	SBW-01		12,600	15,300
Manganese	SBW-01		436	494
Arsenic	SBW-01	2.8	4.4	5.2
Beryllium	SBW-01	0.36	0.35	0.4
Zinc	SBW-01		31	32.5

Chemical	Station	0-2(ft.)	2-4	4-6	6-8	8-10
Iron	SBW-05	55,500	12,900	12,200	13,900	25,100
Manganese	SBW-05	1,760	553		349	697
Arsenic	SBW-05	5.3	3.6	2.8	5.1	7.8
Beryllium	SBW-05	0.4	0.39	0.35	0.36	0.71
Zinc	SBW-05	8,600	1,610	677	607	32.5
Mercury	SBW-05	33.1	7.7	3.8	7.8	0.55
Nickel	SBW-05	421	52.8	32.6	44.3	26.2
Cadmium	SBW-05	4.1		4		
Chromium	SBW-05	16.6				13.6
Copper	SBW-05	53.4				28.3
Aluminum	SBW-05					11,900

Chemical	Station	0-2(ft.)	2-4	4-6	8-10	10-12
Iron	SBW-06	15,700	23,500	14,700		14,000
Manganese	SBW-06	534				
Arsenic	SBW-06	4.3	6.8	8.7		4.6
Beryllium	SBW-06	0.41		0.44	0.33	
Mercury	SBW-06	0.47	0.12			0.22
Copper	SBW-06		27.1	51.5		39.3

Screening Criteria	
Aluminum	7,614
Arsenic	2.4
Beryllium	0.3
Chromium	6.2
Copper	25
Iron	10,669
Manganese	340
Mercury	0.1
Nickel	13
Zinc	24.2

Result units: mg/kg

LEGEND
- ● Deep Soil Boring Samples
- ▨ Buildings
- Roads
- ■ Site Buildings
- Streams
- Railroads
- ▨ Historical Site Building

Topography

SBW = Water Table Soil Boring
All Depths are in Feet

Figure 4-10
Water Table Soil Boring Samples
TAL Metals Exceeding Screening Criteria 0 to 12 Feet
Mercury Refining Site
Colonie, New York

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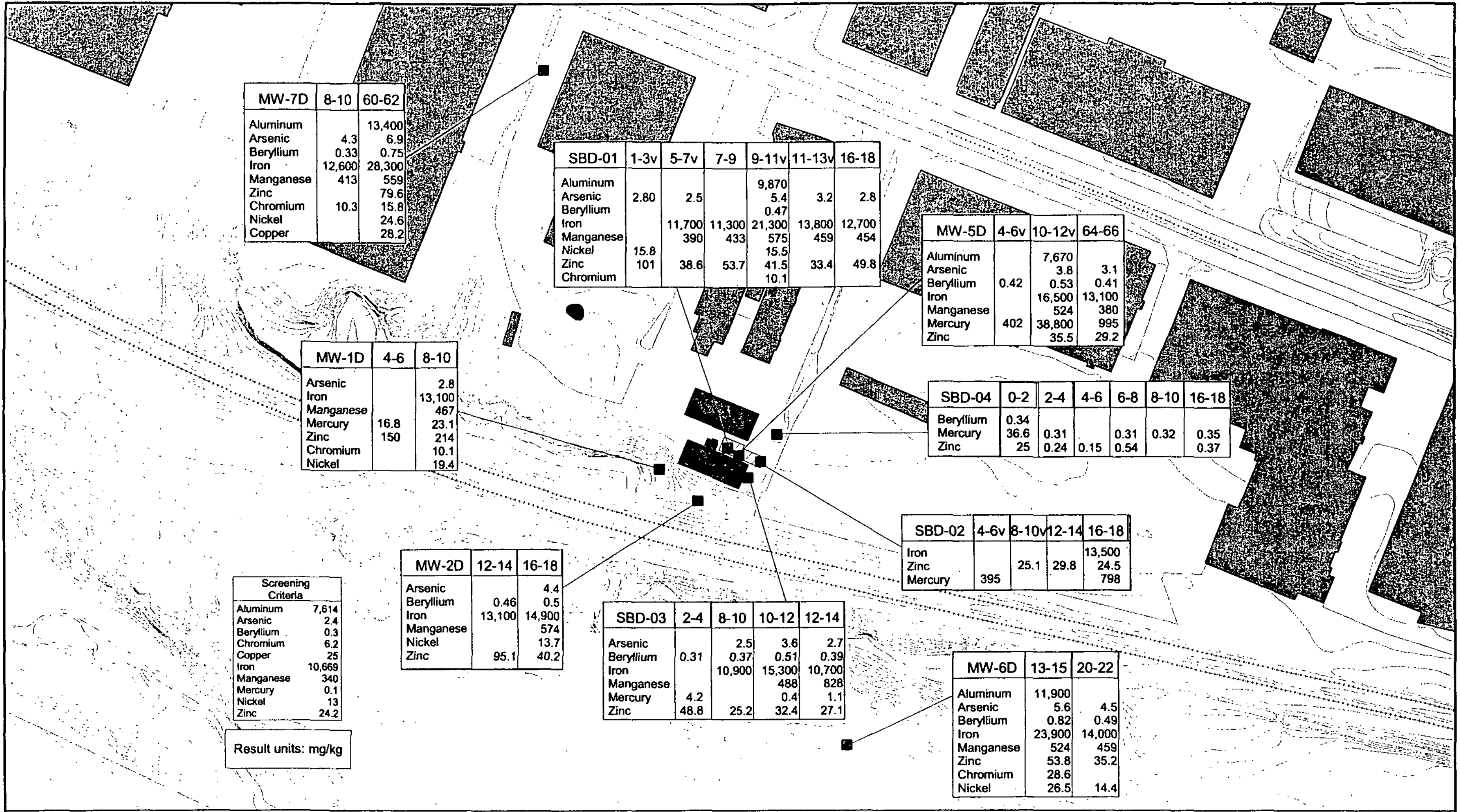


MW-7D	8-10	60-62
Aluminum		13,400
Arsenic	4.3	6.9
Beryllium	0.33	0.75
Iron	12,600	28,300
Manganese	413	559
Zinc		79.6
Chromium	10.3	15.8
Nickel		24.6
Copper		28.2

SBD-01	1-3v	5-7v	7-9	9-11v	11-13v	16-18
Aluminum				9,870		
Arsenic	2.80	2.5		5.4	3.2	2.8
Beryllium				0.47		
Iron		11,700	11,300	21,300	13,800	12,700
Manganese		390	433	575	459	454
Nickel	15.8			15.5		
Zinc	101	38.6	53.7	41.5	33.4	49.8
Chromium				10.1		

MW-5D	4-6v	10-12v	64-66
Aluminum		7,670	
Arsenic		3.8	3.1
Beryllium	0.42	0.53	0.41
Iron		16,500	13,100
Manganese		524	380
Mercury	402	38,800	995
Zinc		35.5	29.2

MW-1D	4-6	8-10
Arsenic		2.8
Iron		13,100
Manganese		467
Mercury	16.8	23.1
Zinc	150	214
Chromium		10.1
Nickel		19.4

SBD-04	0-2	2-4	4-6	6-8	8-10	16-18
Beryllium	0.34					
Mercury	36.6	0.31		0.31	0.32	0.35
Zinc	25	0.24	0.15	0.54		0.37

SBD-02	4-6v	8-10v	12-14	16-18
Iron				13,500
Zinc		25.1	29.8	24.5
Mercury	395			798

MW-2D	12-14	16-18
Arsenic		4.4
Beryllium	0.46	0.5
Iron	13,100	14,900
Manganese		574
Nickel		13.7
Zinc	95.1	40.2

Screening Criteria	
Aluminum	7,614
Arsenic	2.4
Beryllium	0.3
Chromium	6.2
Copper	25
Iron	10,669
Manganese	340
Mercury	0.1
Nickel	13
Zinc	24.2

Result units: mg/kg

SBD-03	2-4	8-10	10-12	12-14
Arsenic		2.5	3.6	2.7
Beryllium	0.31	0.37	0.51	0.39
Iron		10,900	15,300	10,700
Manganese			488	828
Mercury	4.2		0.4	1.1
Zinc	48.8	25.2	32.4	27.1

MW-6D	13-15	20-22
Aluminum	11,900	
Arsenic	5.6	4.5
Beryllium	0.82	0.49
Iron	23,900	14,000
Manganese	524	459
Zinc	53.8	35.2
Chromium	28.6	
Nickel	26.5	14.4

LEGEND

- ■ Well Soil Boring
- ■ Soil Boring Deep
- ▨ Buildings
- Roads
- ■ Site Buildings
- Streams
- Railroads
- Topography
- ▨ Historical Site Building

v = Mercury Visible In Sample
MW = Monitoring Well
SBD = Deep Soil Boring
All Depths Are In Feet

N

0 100 200 Feet

Figure 4-11
Deep Soil Boring Samples
TAL Metals Exceeding Screening Criteria
Mercury Refining Site
Colonie, New York

CDM

File Path: c:\egis\mercury\mercury.apr

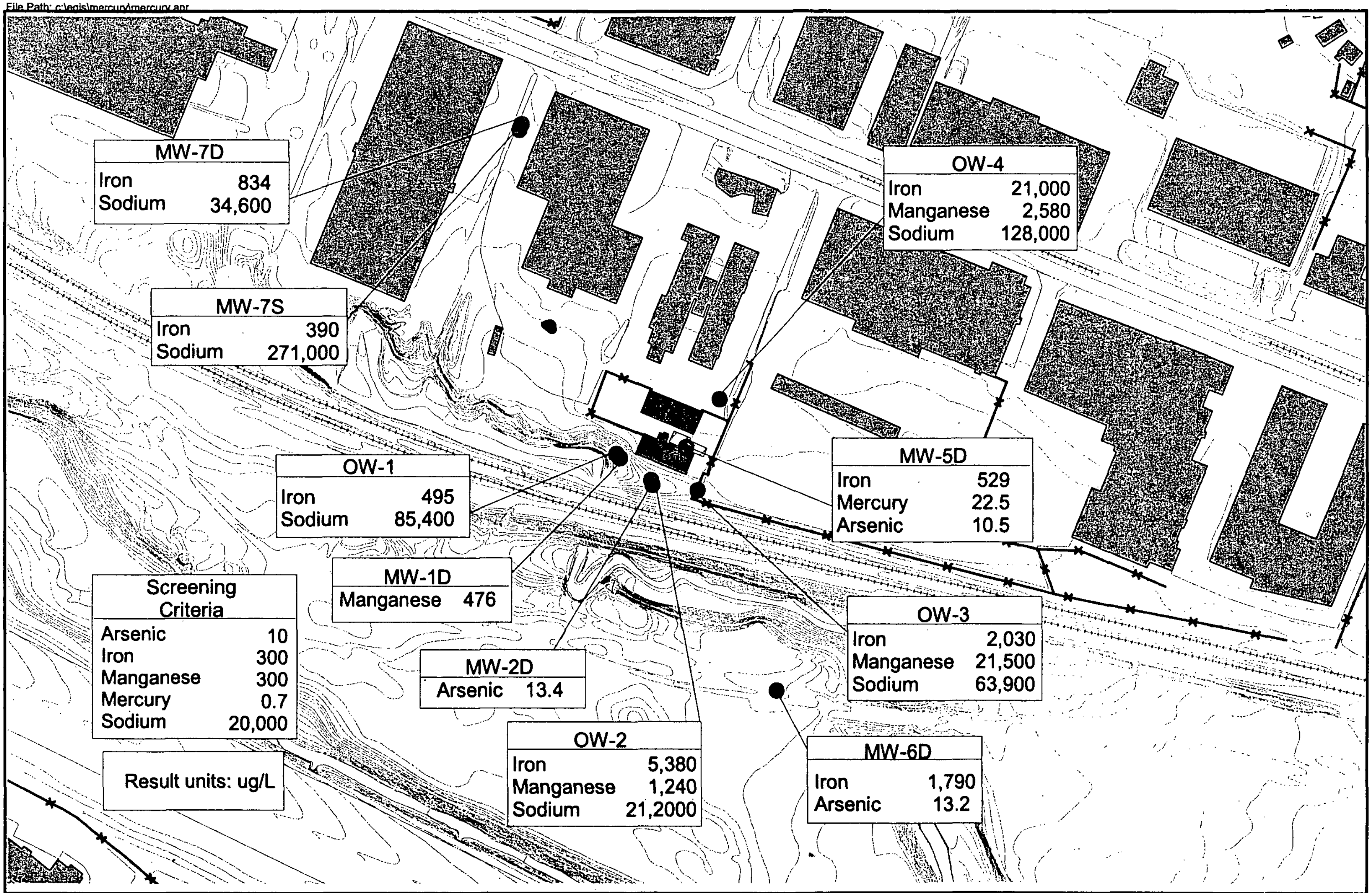
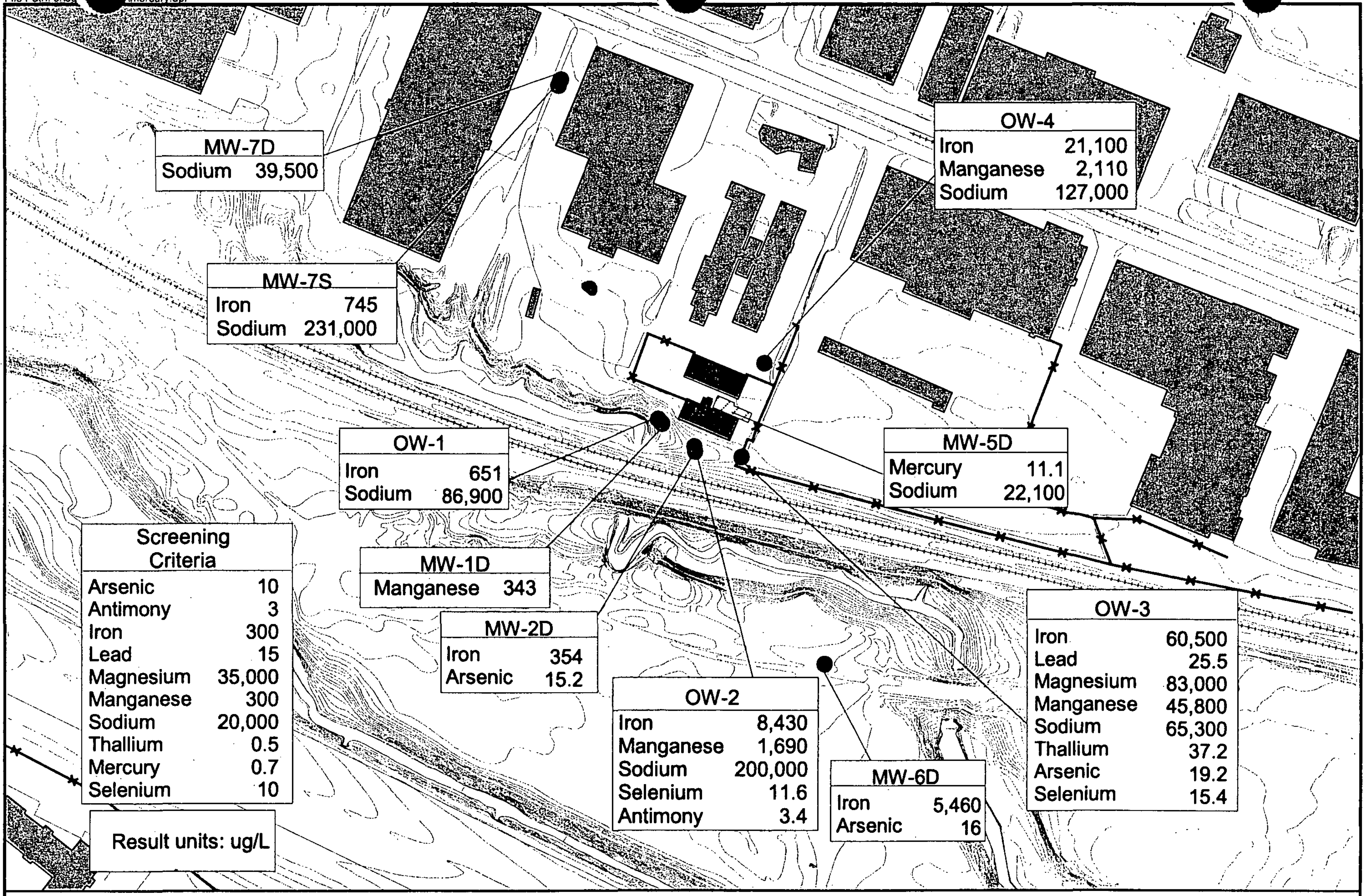


Figure 4-12
Round One Groundwater Sample Results
TAL Metals Exceeding Screening Criteria
Mercury Refining
Colonie, New York

CDM

File Path: c:\ec [illegible] mercury.apr



MW-7D	
Sodium	39,500

MW-7S	
Iron	745
Sodium	231,000

OW-4	
Iron	21,100
Manganese	2,110
Sodium	127,000

OW-1	
Iron	651
Sodium	86,900

MW-5D	
Mercury	11.1
Sodium	22,100

MW-1D	
Manganese	343

MW-2D	
Iron	354
Arsenic	15.2

OW-2	
Iron	8,430
Manganese	1,690
Sodium	200,000
Selenium	11.6
Antimony	3.4

MW-6D	
Iron	5,460
Arsenic	16

OW-3	
Iron	60,500
Lead	25.5
Magnesium	83,000
Manganese	45,800
Sodium	65,300
Thallium	37.2
Arsenic	19.2
Selenium	15.4

Screening Criteria	
Arsenic	10
Antimony	3
Iron	300
Lead	15
Magnesium	35,000
Manganese	300
Sodium	20,000
Thallium	0.5
Mercury	0.7
Selenium	10

Result units: ug/L

LEGEND

- ● Groundwater Samples
- ▨ Buildings
- /\/ Roads
- ■ Pavement
- ▩ Site Buildings
- /\/ Streams
- /\/ Railroads
- /\/ Topography
- ▧ Historical Site Building

MW = Monitoring Well
OW = Observation Well

N

0 100 200 Feet

Figure 4-13
Round 2 Groundwater Sample Results
TAL Metals Exceeding Screening Criteria
Mercury Refining Site
Colonie, New York

CDM