Contract No. 68-W-98-210

RAC II

Final Remedial Investigation Report
Volume I
Consolidated Iron and Metal Site
Remedial Investigation/Feasibility Study
Newburgh, New York

Work Assignment No.: 151-RICO-02LT

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

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Division of Environmental Remediation

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Volume I
Consolidated Iron and Metal Site
Remedial Investigation/Feasibility Study
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Work Assignment No.: 151-RICO-02LT

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PROJECT: RAC II Contract No.: 68-W-98-210
Work Assignment No.: 151-RICO-02LT

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SUBJECT: Final Remedial Investigation Report
Consolidated Iron and Metal Site
Remedial Investigation/Feasibility Study
Newburgh, New York

Dear Mr. Negrelli:

CDM Federal Programs Corporation (CDM) is pleased to submit the Final Remedial Investigation Report for the Consolidated Iron and Metal Site in Newburgh, New York. Comments received by various reviewers have been addressed in this document.

If you have any questions regarding this submittal, please contact Susan Schofield at (203) 262-6633.

Very truly yours,

J Litwin

Jeanne Litwin, REM
RAC II Technical Operations Manager

Attachment

cc:
F. Rosado (letter only)
S. Schofield, CDM
R. Goltz/PSO File, CDM
L. Campbell, CDM

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Acronyms

amsl	above mean sea level
BBL	Blasland, Bouck & Lee
bgs	below ground surface
BKSB	background soil boring
BKSS	background surface soil
BTEX	benzene, toluene, ethylbenzene, and xylene
CDM	CDM Federal Programs Corporation
CEC	cation exchange capacity
cfs	cubic feet per second
CHGE	Central Hudson Gas & Electric Corporation
CIM	Consolidated Iron and Metal
CLP	Contract Laboratory Program
COC	contaminant of concern
COPEC	contaminant of ecological concern
COPC	contaminant of potential concern
CRQL	Contract Required Quantitation Limit
CSM	conceptual site model
CT	central tendency
DESA	Division of Environmental Science and Assessment
DO	dissolved oxygen
DOC	dissolved oxygen content
DQO	Data quality objective
EGIS	Environmental geographic information system
EPA	Environmental Protection Agency
ERRS	Emergency and Rapid Response Services
ERT	Emergency Response Team
ESI	Environmental Simulations, Inc.
F	Fahernheit
FCR	field change request
FS	feasibility study
ft/d	feet per day
gpd	gallons per day
gpm	gallons per minute
GPS	Global Positioning System
HACH	HACH Company
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
HRS	Hazard Ranking System
HSA	hollow stem auger
HWSB	Hazardous Waste Support Branch
IC	indicator contaminant
ID	inner diameter

IDW	investigation derived waste
IRIS	Integrated Risk Information System
K	conductivity
LBG	Leggett, Brashears and Graham, Inc.
LDL	low detection limit
LNAPL	light non-aqueous phase liquid
m	meter
m/s	meters per second
MCL	maximum contaminant limit
MdC	Mardin Series soils
mg/kg	milligrams per kilogram
mg/L	milligram per liter
MGP	manufacture gas plant
ml	milliliter
mph	miles per hour
MTBE	methyl tert-butyl ether
mV	millivolts
MW	monitoring well
NCEA	National Center for Environmental Assessment
NCP	National Contingency Plan
ng/kg	nanogram per kilogram
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NTU	nephelometric turbidity units
NYS	New York state
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health Drinking
ORP	oxidation-reduction potential
OSWER	Office of Solid Waste and Emergency Response
PA/IA	Preliminary Assessment/Integrated Assessment
PAR	Pathway Analysis Report
PASB	process area soil boring
PASS	process area surface soil
PAH	polycyclic aromatic hydrocarbon
PC	personal computer
PCB	polychlorinated biphenyl
PID	photoionization detector
ppb	parts per billion
ppm	parts per million
PRG	preliminary remedial goal
psi	pounds per square inch
PVC	polyvinyl chloride
QAPP	quality assurance project plan
QA/QC	quality assurance/quality control
QC	quality control
RAC	Response Action Contract

RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
Redox	oxidation/reduction
RI	remedial investigation
RME	Reasonable Maximum Exposure
RSCO	Recommended Soil Clean-up Objectives
SCST	Superfund Contract Support Team
SLERA	Screening Level Ecological Risk Assessment
SOP	Standard Operating Procedure
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSL	soil screening level
SSGWSC	site-specific groundwater screening criteria
SSSSC	site-specific soil screening criteria
SSSDSC	site-specific sediment screening criteria
SSSWSC	site-specific surface water screening criteria
START	Superfund Technical Assessment and Response Team
STP	sewage treatment plant
SVOC	semivolatile organic compound
SWSB	site-wide soil boring
SWSS	site-wide surface soil
TAGM	Technical and Administrative Guidance Memorandum
TAL	target analyte list
TCL	target compound list
TCLP	toxicity characteristics leaching procedure
TDS	total dissolved solid
TEQ	toxicity equivalent
The site	Consolidated Iron and Metal Site
TOC	total organic compound
TPH	total petroleum hydrocarbon
TSDF	Transport, storage, or disposal facility
TSS	total suspended solid
UCL	upper confidence limit
USDA	United States Department of Agriculture
USDOI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	underground storage tank
VOC	volatile organic compound
XRF	X-ray fluorescence
μg/kg	microgram per kilogram
μg/L	microgram per liter

Executive Summary

Executive Summary

CDM Federal Programs Corporation (CDM) received Work Assignment 151-RICO-02LT under the Response Action Contract (RAC) to perform a remedial investigation/feasibility study (RI/FS), a human health risk assessment (HHRA), and a screening level ecological risk assessment (SLERA) at the Consolidated Iron and Metal (CIM) Site (the site), located in Newburgh, New York, for the Environmental Protection Agency (EPA). This Remedial Investigation (RI) Report was prepared in accordance with Task 9 of the CDM Final Work Plan Volume I, dated February 4, 2003 (CDM 2003). The purpose of this work assignment is to investigate the overall nature and extent of contamination at the site.

It is important to note that since the field investigation was conducted in accordance with EPA regulations, guidance and standards, the resultant data were found to be of high quality, fully defensible, and provide an accurate assessment of site conditions. Additionally, all data quality objectives developed during the ongoing project planning efforts, were met and adequately satisfied. As such, the findings of CDM's RI and Risk Assessment will allow EPA Region II to develop and evaluate effective remedial alternatives.

Purpose of Report

The purpose of the RI Report is to present the results of the geologic, hydrogeologic and ecological investigations, including surface and subsurface soil screening, surface and subsurface soil sampling, light non-aqueous phase liquid (LNAPL) delineation, geologic and water quality vertical profiling, monitoring well installation and sampling, sediment and surface water sampling, and topographic and cultural resource surveys. The goals of the source area, hydrogeologic, and surface/sediment investigations were to determine the nature and extent of site-related contamination.

Site Description

The CIM site is an inactive car and scrap metal junk yard and dealer located at the end of Washington Street, in Newburgh, Orange County, New York. The study area, which covers approximately seven acres, is bounded by a boat marina to the north, Conrail railroad tracks and South Water Street to the west, an inactive municipal incinerator and an active wastewater treatment plant to the south, and the Hudson River to the east.

Downtown Newburgh is located approximately 500 feet west of South Water Street. The City of Newburgh, which is 60 miles north of New York City, is located on the western side of the Hudson River in eastern Orange County. The City has a land area of 3.9 square miles and is bounded by the incorporated Town of Newburgh on the north and west, by the Town of New Windsor to the south, and by the Hudson River to the east.

Site History

From World War I until the early 1940s, the Eureka Shipyard operated at the site. Scrap metal processing and storage operations occurred at the site for approximately 40 years before the facility's closure (Weston 2000a). A smelter operated on site between 1975 and 1995 that was used primarily to melt aluminum-containing materials, including, but not limited to, transmissions and IBM scrap, to produce aluminum ingots. Other metallic materials also were smelted, creating a lead-contaminated ash and slag by-product. Other site operations included sorting ferrous and non-ferrous metal scrap for processing, including automobile batteries.

Historical aerial photographs taken since the mid-1940s show that standing liquids occupied large areas of the CIM site (Weston 2000a). Throughout the past 40 years, the site has been covered with piles of debris, scrap metal, numerous small and large mounds of dark-toned and light-toned materials, and numerous areas of dark-stained soil.

From 1997 to 1999, New York State Department of Environmental Conservation (NYSDEC) and EPA conducted several inspections at the site. Oil-stained soils and puddles with oil sheens were observed on site. In addition, an unpermitted storm water discharge to the Hudson River and an improperly constructed berm were noted. An oil sheen was observed by NYSDEC personnel on the storm water discharge and on the river. An unknown number of underground storage tanks (USTs) were noted to exist onsite; tightness testing of the tanks was required to determine their condition. The southern portion of the site was covered by more than 5,000 tires. Between 1998 and 1999, EPA's Hazardous Waste Support Branch (HWSB), Superfund Contract Support Team (SCST) and Region II Superfund Technical Assessment and Response Team (START) sampled waste piles, soils, and river sediment to delineate the horizontal and vertical extent of contamination.

Between 1996 and 1999, NYSDEC prosecuted CIM for five separate environmental violations. CIM pleaded guilty to all violations and paid fines. In 1999, the New York State Attorney General filed a lawsuit against CIM for Resource Conservation and Recovery Act (RCRA) and Clean Water Act (CWA) Violations, including illegal discharge to surface water without a State Pollutant Discharge Elimination System (SPDES) permit. The case was settled with a Consent Order in which CIM agreed to remove all scrap materials and cease operations.

A Hazard Ranking System (HRS) package was prepared in December 2000 by EPA Region II (Weston 2000b). CIM was added to the National Priorities List (NPL) June 14, 2001.

Waste Disposal Practices and Potential Sources

The source of site contamination is suspected to be the result of past improper metal waste handling and processing activities on the property. There is documentation that scrap metal containing hazardous substances and wastes were stored in piles during the past decades. In addition, discharge of site-derived contaminated storm water to the Hudson River was observed (Weston 2000a). Onsite source areas included an ash and slag pile generated by the former aluminum smelting operation, located on the southwestern portion of the site, and a former processed soil pile, which consisted of site surface soils that were mixed with process debris and then separated out, located on the northeastern portion of the site, southeast of the office building. Both contaminated waste piles were removed by EPA for offsite treatment and land filling subsequent to 1998. Limited surface and subsurface soil sampling at the former ash and soil pile locations indicated that the soils beneath the former piles had been impacted. Previous site inspections also noted oil-stained surface soils, oily sheens on puddles throughout the facility, and oily sheens on the Hudson River adjacent to the site.

The contaminants that were routinely released to the surface at the facility impacted surface and subsurface soils; some soluble contaminants also migrated vertically down through the vadose zone until they intercepted groundwater at the water table, at an estimated depth of approximately 5 to 10 feet below ground surface (bgs). The predominant eastwardly groundwater flow would have promoted the migration of contaminants eastward, discharging directly into the Hudson River.

In June 2003, Weston Remedial Services, under contract to EPA's Emergency Response Team (ERT), conducted clearing activities at the site. Removal activities included building demolition and removal of tires, scrap metal, concrete, soil piles, and wood debris for processing . During demolition of the metal shear building, standing liquid (including unknown oils) was removed. Subsequently, a second sub-basement of the building was discovered. Approximately 28,000 gallons of liquid was pumped from the two basements and disposed offsite.

Previous Investigations

In 1998, Region II START and EPA Region II Division of Environmental Science and Assessment (DESA) sampled the ash and slag pile (waste pile) located east of the compactor and metal shear (Weston 2000a). Soil screening analytical results identified the presence of lead at concentrations ranging from 1,590 to 2,420 milligrams per kilogram (mg/kg). The pile was removed for treatment, stabilization and land filling. On July 7, 1999, soil samples were collected from the processed soil pile by Region II START and analyzed for Target Compound List (TCL) organics, excluding pesticides, full Target Analyte List (TAL) inorganics, and toxicity characteristics leaching procedure (TCLP) including copper and zinc. Subsequently, during September and October 1999, an EPA Emergency and Rapid Response Services (ERRS) contractor removed the processed soil pile from the facility. The processed soil was taken to a RCRA-approved treatment, storage, and disposal facilities (TSDF) for stabilization and land filling.

START Field Screening Activities

In 1999, START collected surface and subsurface soil samples from the soils upon which the ash and slag pile was located. The samples were analyzed for lead and unvalidated concentrations ranged from 1,750 to 8,100 mg/kg in the surface soil samples. START also collected surface soil samples from 126 onsite locations and screened them utilizing an X-ray fluorescence (XRF) spectrophotometer. Lead concentrations in the surface soil samples collected for field screening analyses ranged from 754 to 4,210 mg/kg. The XRF lead results indicated that lead contamination is found above applicable screening criteria across the entire area of the site, typically found at concentrations of between 1,500 and 3,000 mg/kg (Weston 2000a). There were no definable areas of significantly-elevated lead concentrations that would indicate localized sources. Region II START also collected surface soil screening samples for polychlorinated biphenyl (PCB) analysis using immunoassay field test kits from 61 onsite locations. PCBs were detected in samples collected across the entire site; however, the greatest PCB concentrations above applicable screening criteria were found in the areas of the former ash and slag pile east of the compactor and the processed soil pile southeast of the office buildings.

START CLP Soil Sampling Activities

Based upon the surface soil field screening results, START collected surface soil samples for analysis of TCL organics and TAL inorganics under EPA's Contract Laboratory Program (CLP). Volatile organic compounds (VOCs) were detected in one surface soil sample southwest of the process soil pile at concentrations greater than applicable cleanup criteria. Semivolatile organic compounds (SVOCs) were identified in all of the surface soil samples collected from on-site locations, with several compounds at concentrations greater than applicable screening criteria. The highest polycyclic aromatic hydrocarbon (PAH) exceedances were found in and around the locations of the former soil piles. Pesticides were detected in surface soil samples at concentrations greater than applicable screening criteria in many samples collected across the site. All of the 23 surface soil sampling locations contained inorganic contaminants at concentrations above screening criteria.

On September 22, 1999, Region II START conducted subsurface soil sampling at the site, including background and subsurface soil samples from various on-site grid locations. VOCs were detected in subsurface soil samples and at both sample depths. A distinct petroleum odor was observed at approximately four feet bgs in the central portion of the site. SVOCs were identified in all of the subsurface soil samples collected from on-site locations, with several compounds at concentrations greater than applicable screening criteria. However, as with the surface soil samples, PAHs commonly were detected in soil samples above applicable screening criteria. Pesticides and PCBs were detected in subsurface soil samples at concentrations greater than applicable screening criteria, especially in and around the former waste piles. Inorganic analytes were detected in subsurface soil samples at concentrations above screening criteria.

START Groundwater Sampling Activities

On September 23, 1999, START conducted groundwater sampling at the site. Five groundwater samples were collected from water table screening points at various on-site locations; groundwater samples were analyzed for TCL and TAL parameters, excluding cyanide. VOCs were detected only in one location, SVOCs were detected in all samples, but were especially common in a groundwater sample collected immediately north of the former processed soil pile. Pesticides and PCBs were not detected in groundwater samples with the exception of one location, which contained 4-4'-DDT, Aroclor-1248, and Aroclor-1254, at 1.25, 63.3, and 28.9 times above their respective screening criteria. Inorganic analytes (iron, magnesium, and zinc) were detected in all groundwater samples above applicable screening criteria.

START Hudson River Sediment Sampling Activities

On November 23, 1999, Region II START conducted sediment sampling in the Hudson River adjacent to the site. Organic and inorganic compounds were detected in the sediment samples. None of the concentrations were greater than three times the background locations.

Previous Investigations at an Adjacent Site

A remedial investigation was conducted by Blasland, Bouch & Lee, Inc. (BBL) at an adjacent site, located south of the CIM site. Some VOCs, SVOCs, and metals detected at the adjacent site were similar to the contaminants found at the CIM site. In 1901, the Central Hudson Gas & Electric Corporation (CHGE) manufacture gas plant (MGP) property was conveyed to the Newburgh Light., Heat & Power Company. According to Brown's directories, MGP produced gas by the carbureted water gas method in the 1930s (Raidan 1985). The gas was cooled and purified prior to distribution. During cooling, an oily liquid commonly known as coal tar would condense from hot gas and settle in the bottom of the gas holders, pipes, and other structures. In the water gas process at the site, the tar was derived both from petroleum products and from coal. Consequently, the material is referred to as "MGP tar." In 1930, Central Hudson Gas & Electric Corporation reduced gas production at this MGP, and the facilities were only used for reserve gas production during peak periods until 1950 (Cantline 1997).

In 1951, demolition of the Newburgh MGP occurred. The generator room, including the boiler, were demolished. In 1951, CHGE decommissioned the buildings and gas and oil tanks at the Newburgh MGP (CHGE 1951). In 1959, at the natural gas regulator lines, soil was removed during construction of the regulator station (CHGE 1959). The disposition of the excavated soil was not documented.

Population and Land Use

According to the 2000 census data for Newburgh, the population increased from 26,454 in 1990 to 28,259 in 2000, a 6.8 percent growth. This population gain exceeded the growth rate of the state (5.5 percent), but lagged the Orange County growth rate of 11.0 percent and the US growth rate of 13.1 percent.

In 1997, the area had 2,782 establishments in operation including 1,173 firms in the services sector, 617 retail operations, 282 construction firms, and 165 wholesale establishments. By 2000, the area lost 7.5 percent of the total businesses. The number of construction firms decreased by almost one-quarter over this period, despite a relatively robust economy. According to the City of Newburgh tax assessors office, the CIM property is zoned Waterfront Mixed Use (W1), which includes parks, museums, restaurants, and residential use. According to the City of Newburgh, potential reuse for the site includes residential areas.

Ecology

Ecological reconnaissance for field characterization was conducted on August 20, 2004. The vegetative species at the CIM site mainly were herbaceous, such as poison ivy (*Toxicodendron radicans*), red clover (*Trifolium pratense*), goldenrod (*Solidago* spp.), field garlic (*Allium vincale*), grasses, thistle (*Cirsium* spp.) and Virginia creeper (*Parthenocissus quinquefolia*). In addition to the herbaceous vegetation, shrubs and trees were also observed at the perimeter of the site, including boxelder (*Acer negundo*), honeylocust (*Glenditsia tricanthos*), honeysuckle (*Lonicera* spp.), red maple (*Acer rubrum*), smooth sumac (*Rhus glabra*), staghorn sumac (*Rhus typhina*), sugar maple (*Acer saccharum*), tree of heaven (*Ailanthus altissima*), and willow (*Salix* spp.).

The avian and wildlife species observed or heard included American robin (*Turdus migratorius*), American crow (*Corvus brachyrhychos*), song sparrow (*Melospiza melodia*), gray squirrel (Sciurus carolinensis), cottontail (*Sylvilagus floridanus*), and mice. However, the species inhabiting or utilizing the CIM site or the vicinity of the site are likely to consist of common species typical of urbanized or disturbed areas in New York State. Thus, other species such as killdeer (*Charadrius vociferus*), house finch (*Passer domesticus*), starling (*Stumus vulgaris*), shrews (*Sorex* spp.) may also be present in this area.

The Hudson River at the CIM site averages approximately one mile in width and supports deep channels, freshwater intertidal mudflats, and freshwater tidal marshes. The river is fringed with both natural and disturbed vegetation within two miles of the area. The river bank consists of anthropomorphic (old jetties, piers, rip-rap, retaining walls, etc.) and natural (tidal mudflats, natural river banks) features. However, anthropomorphic features predominate. Natural vegetation growing along the Hudson River includes trees, shrubs and herbaceous vegetation. The river is used for transportation and can support fish propagation, fishing, and other recreational activities.

The United States Fish and Wildlife Services (USFWS) indicated that two federally endangered and one threatened species are known to occur in the vicinity of the site: the Indiana bat (*Myotis sodalis*), a federally endangered species, is reported to occur at a hibernaculum, approximately 20.7 miles from the site. The bald eagle (*Haliaeetus leucocephalus*), a federally listed threatened species is also reported to occur in the vicinity of the site. The shortnose sturgeon (*Acipenser brevirostrum*) is the only Federally-listed threatened or endangered species located in the project area; this species utilizes the Hudson River adjacent to the site as a summer habitat.

The NYSDEC reported that several endangered and threatened species are reported to occur within four miles radius of the site. However, none were observed during the ecological reconnaissance.

RI Field Activities

The RI field activities included a soil and source area investigation, a hydrogeological investigation, and a surface water/sediment investigation.

Surface and subsurface soil samples were collected at 10 background soil borings. Eleven surface soil and 10 subsurface soil samples were collected, for a total of 21 background samples. Background soils, located in areas north of the site, were collected for comparison with onsite soil sample data and to assess the impact of site-related activities to onsite soils. All surface and subsurface soil background samples were analyzed for TCL VOCs, TCL SVOCs, pesticides/PCBs, TAL inorganics, and dioxins through the EPA CLP. Of the 11 surface soil samples collected, 10 were analyzed for dioxins. Of the 10 subsurface soil samples collected, 1 sample was analyzed for dioxins.

The soil boring program included 21 process area borings and 37 site-wide borings. Five of the 37 borings were contingency borings, which were completed to delineate the horizontal and vertical extent of contamination of VOCs, PCBs, and lead along the eastern portion of the site, bordering the Hudson River. Field screening activities were conducted in continuous intervals at all soil borings to assist in the delineation of the horizontal and vertical extent of the contamination on site. Field screening results were evaluated to locate hot spots and were used to determine contingency borings. Field screening was conducted for VOCs, PCBs, and lead. In order to characterize the nature and extent of this contamination, CDM vertically delineated areas of visible LNAPL by advancing boreholes past the water table and collecting additional soil and groundwater samples.

All process area surface and subsurface soil samples were analyzed for TCL VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics through the CLP. Of the 23 surface soil samples collected within the process area, 15 were analyzed for dioxins. All site-wide surface and subsurface soil samples were analyzed for TCL VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics through the CLP. Approximately 10 percent of surface and subsurface soil samples in the site-wide area were also analyzed for total organic compound (TOC), pH, and grain size.

CDM selected three vertical geologic and water quality profile locations within the site to characterize the site-specific geology to the top of bedrock or to a significant clay layer and to assess the vertical extent of groundwater contamination. The three geologic and water quality vertical profiles were conducted at MW-01, MW-04, and MW-05. The name of each geologic and water quality vertical profile is associated with each monitoring well location. Based on the evaluation of the vertical geologic and water quality profiles, nine monitoring wells were installed. The purpose of the monitoring wells was to define the vertical and lateral extent of groundwater contamination and to provide a means for long-term monitoring.

Downhole gamma logging was conducted at MW-1, MW-4, and MW-5. The logs were correlated with the respective lithological boring logs. Slug tests were also conducted at each of the nine monitoring wells, to estimate hydraulic conductivity and specific capacity of the aquifer.

Two rounds of monitoring well samples were collected to delineate the vertical and lateral extent of groundwater contamination. Following the collection of synoptic water level measurements, groundwater samples were collected from the nine newly installed monitoring wells (MW-01 through MW-09). All samples were analyzed for low detection limit (LDL) VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics, including cyanide, through the EPA CLP.

Surface water and sediment sampling was conducted in the Hudson River in the vicinity of the site. The sampling program was designed to support a preliminary evaluation of the nature and extent of contamination resulting from potential overland migration of contaminated soils as well as from potentially contaminated groundwater discharge into the river. All surface water samples were co-located with sediment samples and analyzed for TCL VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics, including cyanide, through the CLP. All sediment samples were analyzed for TCL VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics, including cyanide, through the CLP. Sediment samples were also analyzed for TOC, pH, cation exchange capacity (CEC), and grain size through CDM's analytical laboratory subcontractor.

Site-Specific Geology and Hydrogeology

A detailed aquifer map of Newburgh prepared by Leggett, Braeshears and Graham (LBG) (1995) indicates the site is underlain by a stratified clay and silt unit with thin to absent layers of sand and gravel at the land surface and below the water table. The unconsolidated deposits are underlain by the Martinsburg Formation, which consists of shale and carbonate rocks (e.g., limestones and dolostones). The bedrock is cross-cut by faults in the site's vicinity (Lawler, Matusky & Skelly Engineers 1994).

Eleven borings contained a 1-4 foot layer of dark gray silty slurry. Within these borings, the slurry generally occurred within three approximate depths: 5-9 feet bgs, 10-14 bgs, and 15-18 bgs. The borings are scattered throughout the northern half of the site. Borings and approximate depths below ground surface in which the slurry was observed, include: SWSB-01 (5-9 feet), SWSB-05 (5-8.5 feet), SWSB-07 (11-12 feet), SWSB-10 (10-12.5 feet), SWSB-11 (15-18.5 feet), SWSB-12 (5-6 feet), SWSB-13 (12-13 feet), SWSB-17 (10-12 feet), PASB-10 (5-8.5 feet and 10 -13.5 feet), PASB-15 (8-12 feet and 15-17 feet), and PASB-19 (10-11 feet). Native deposits, which underlie fill deposits, consist of a mixture of yellow, brown, greyish green, and black, fine- to coarse-grained sand, gravel, and trace silt.

In some of the deeper borings, a thicker clay layer was observed below the native sand/gravel deposits. The clay was gray, loose to stiff, and plastic. Weathered bedrock was encountered at only one vertical profile boring in the northwest corner of the site (MW-1), at a depth of 38 feet bgs. Bedrock is a dark gray shale belonging to the middle Ordovician Martinsburg Formation (LBG 1995).

The underlying shale-dominated Martinsburg Formation likely exhibits low permeabilities based on the known low porosity of the bedrock unit. Secondary porosity caused by interconnecting fissures and fractures, yields only low to moderate permeabilities (LBG 1995). Yields for bedrock wells range from 3 to 225 gallons per minute (gpm). Higher yields would likely result from moderately to highly fractured units with a relatively high degree of interconnection. A bedrock fault zone has been mapped in the vicinity of the site, likely resulting in high secondary permeability (www.nysed.gov/data 2002b). This fault zone could be targeted for high yielding wells (Lawler, Matusky & Skelly Engineers 1994). Depending on the degree of interconnectivity between the bedrock fault zone and the shallow aquifer unit, contaminants could migrate preferentially into the bedrock aquifer.

Nature and Extent of Contamination

The characterization and evaluation of the nature and extent of contamination are focused on those constituents identified as indicator contaminants (ICs) in site media. A brief summary of the site-specific screening criteria, determination of ICs, and data interpretation is provided below.

Selection of Site-Specific Screening Criteria

Site-specific screening criteria are presented for all compounds for which samples were analyzed. However, the nature and extent of contamination discussion focuses on contaminants detected at levels that exceed site-specific screening criteria.

Surface/Subsurface Soil Screening Criteria

- EPA Region IX residential soil preliminary remediation goals (PRG), adjusted to a cancer risk of 1×10^{-6} and a non-cancer hazard index of 0.1
- EPA Generic Soil Screening Levels (SSLs) for commercial/industrial - ingestion/dermal scenarios
- EPA Generic SSLs for commercial/industrial - inhalation scenarios
- NYSDEC Recommended Soil Clean-up Objectives (RSCO) Technical and Administrative Guidance Memorandum (TAGM) #4046, adjusted for the site-specific soil TOC concentration of 4.85 percent

Groundwater Screening Criteria

- National Primary Drinking Water Standards
- New York State (NYS) Standards and Guidance Values and Groundwater Effluent Limitations for Class GA Groundwater (human water sources)
- NYS Department of Health (NYSDOH) Drinking Water Quality Standards

Sediment Screening Criteria

- NYS Sediment Screening Criteria for Human Health (bioaccumulation, freshwater), adjusted for the site-specific sediment TOC concentration of 3.985 percent
- NYS Sediment Screening Criteria for Benthic Aquatic Life (chronic toxicity, freshwater)
- NYS Sediment Screening Criteria, Aquatic Life (severe effect level for inorganics)
- MacDonald (2000) Consensus-based Probable Effect Concentrations
- EPA Region IX industrial/commercial soil

Surface Water Screening Criteria

- EPA Ambient Water Quality Criteria, Human Health (for Consumption of organisms only) and Aquatic Life (chronic fresh water) values
- NYS Standards and Guidance Values for Class B Surface Water, Human Health (fish consumption) and Aquatic Life (chronic) values

Determination of Site Indicator Contaminants

Selected ICs are used to focus the evaluation of the nature and extent of contamination in soil, groundwater, sediment, and surface water. CDM evaluated analytical data collected during the RI, reviewed the HHRA contaminant of potential concern (COPC) list, and reviewed the historical activities and analytical data for the site. Contaminants that exceeded the site specific soil screening criteria (SSSSC) in surface and subsurface soils were evaluated based on: the percentage of the total number of samples in which each contaminant was detected; the percentage of the total number of samples in which each contaminant exceeded the screening criteria, and the magnitude of the highest screening criteria exceedance. CDM also reviewed contaminants that are COPCs for the HHRA; the COPCs that contributed the most risk were included as ICs in the RI. Based on these evaluations, CDM selected the following contaminants as ICs:

- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(a)pyrene
- Indeno(1,2,3-c,d)pyrene
- Dibenz(a,h)anthracene
- Aroclor-1254
- Arsenic
- Cadmium
- Copper
- Lead
- Mercury
- Zinc

Data Interpretation

Soil Contamination

Indicator contaminants exceeded screening criteria in surface and subsurface soil samples in both process area and site-wide soil borings. In general, surface soils are contaminated with higher levels of ICs than subsurface soils. The PAH benzo(a)pyrene, which exceeded its screening criterion in the greatest number of samples, exemplifies the general trend of PAH contamination in site soils. PAH contamination is generally highest in areas surrounding the former metal shear building, and east of this area, along the Hudson River.

The highest concentrations of Aroclor-1254 were found in surface soils surrounding the former metal shear and compact/bailer buildings, as found in both screening and analytical samples.

The highest concentrations of the majority of metal ICs occur in the process area around the former metal shear, compactor/bailer, and smelter buildings, in both surface and subsurface soils. However, the highest levels of vanadium and lead in the surface are concentrated in the northeast corner of the site and along the Hudson River, respectively.

Sediment Contamination

The majority of site-specific ICs exceeded screening criteria in sediment samples adjacent to the site. However, many of these exceedances were below the calculated background values. Since the inorganic ICs are not considered to be naturally occurring, this suggests that either these contaminants migrated from the site to upstream background locations (during high tidal flow) or that they migrated from other sources unrelated to the site. The highest levels of PAH ICs are in SD-19, offshore of the southern boundary of the site; two of these ICs were above background values. It should be noted that the PAH ICs are also designated contaminants of concern (COCs) for the manufactured gas plant site located adjacent to the CIM site to the south.

Approximately half of the inorganic ICs exceeded both screening criteria and background. The highest levels of inorganic ICs are in samples offshore of the southern half of the site and one sample just north of the site. The highest levels are concentrated in one sample approximately due east of the former smelter/staging area and hydraulically downgradient of the former metal shear and compact/bailer buildings.

Surface Water Contamination

Iron and lead exceeded calculated background levels and screening criteria in surface water samples adjacent to the site. Lead exceedances occurred in two samples. Iron exceedances ranged from 1.2 to 2.5 times screening criteria. In general, iron and lead contamination does not exhibit a clear pattern of migration, and is likely influenced by tidal flow.

Groundwater Contamination

VOCs and inorganic ICs exceeded screening criteria in groundwater across the site. The highest levels of both VOCs and ICs are located adjacent to, and downgradient of the former compact/bailer and metal shear buildings, in the area of the former tire piles. The highest concentrations are found in MW-5, approximately 250 feet downgradient of the former metal shear building.

LNAPL Distribution

LNAPL was observed at four locations in two areas across the site; the amount is not sufficient for delineation purposes. Rather, LNAPL occurs in two small areas: the first area is adjacent to the former metal shear building on the northern and eastern side. The second area is near the Hudson River, just downgradient of the former compactor/bailer building. The latter building was found to contain free product in the two-level basement, which was removed in early 2004. Soil and groundwater samples collected for LNAPL delineation in these areas indicate that LNAPL, although observed, is minimal.

Contaminant Fate and Transport

Site contaminants derived from the on-site waste handling and smelting processes were routinely deposited on the ground and in piles. Liquid wastes such as petroleum oils were discharged to the ground, forming small pools. No containment structures, such as engineered covers, run-on control systems, runoff management systems, or liners, were used to prevent the washout of hazardous materials during floods or rain events. During rain events, rainwater percolated through the waste piles, eroded them, and may have mobilized contaminants into solutes and slurries that flowed with storm water downslope across the site.

Visual evidence of car battery fragments near the location of the former ash/slag pile suggests car battery acids may have been released to the site soils. The solubility of metal contaminants in soils would be increased by the acids, promoting their downward migration. Metals and other contaminants would be mobilized by downward percolation of rainwater, migrating down through the unsaturated zone.

Groundwater may discharge to the Hudson River; therefore, the potential exists for contamination from the groundwater to affect the quality of surface water and/or the sediments at (or downgradient from) the discharge points.

It is difficult to predict the mobility of ICs for the site because of the wide range of soil conditions in the environment and the 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 contaminants in solution to soils and no one mobility prediction holds for all environmental conditions. ICs at the site are relatively insoluble in water, and show high tendencies to adsorb to soil or organic matter in soil or sediment. Analytical results for the various media support this fate and transport scenario, since many of the ICs detected in soils and sediment do not exceed screening criteria in surface water or groundwater.

Risk Assessment Summaries

A baseline HHRA and a SLERA were completed as part of the RI for the site.

Human Health Risk Assessment

The Final HHRA for the Consolidated Iron and Metal site characterized the potential human health risks associated with exposure to soil, groundwater, sediment, and surface water impacted by the site in the absence of any remedial action.

COPCs were identified for evaluation in the HHRA based on criteria outlined in Risk Assessment Guidance for Superfund (RAGS) (EPA 1989), primarily through comparison to risk-based screening levels. The following human receptor groups and exposure routes were evaluated in the HHRA:

Current and Future Use

- Trespasser (Adolescent 12-18 years): exposure to surface soil through incidental ingestion, dermal contact, and inhalation of fugitive dust
- Recreational user (Adult and Adolescent [12-18 years]): exposure to sediment and surface water through incidental ingestion and dermal contact

Future Use

- Resident (Adult and Young Child [0-6 yrs]): exposure to surface soil through incidental ingestion and dermal contact, and inhalation of fugitive dust; exposure to groundwater through ingestion, dermal contact during showering and bathing, inhalation of volatile chemicals during showering and bathing, and inhalation of vapors from subsurface intrusion; and exposure to indoor air (vapor migration from subsurface groundwater) through inhalation of volatile chemicals, dermal contact, and inhalation of fugitive dust
- Site Worker (Adult): exposure to surface soil through incidental ingestion, dermal contact, and inhalation of fugitive dust and exposure to groundwater through ingestion and inhalation of vapors from subsurface intrusion
- Construction worker (Adult): exposure to surface and subsurface soil through incidental ingestion, dermal contact, and inhalation of fugitive dust
- Onsite Recreational User (Adult and Young Child [0-6 yrs]): exposure to surface soil through incidental ingestion, dermal contact and inhalation of fugitive dust

Quantitative estimates of the magnitude, frequency, and duration of exposure for each of these receptors were made using both reasonable maximum exposure (RME) and central tendency (CT) exposure scenarios. RME assumptions represent the highest exposure reasonably expected to occur at a site, while CT assumptions represent typical exposure levels. EPA recommends a target hazard index (HI) value of 1 or a target cancer risk range between 1×10^{-6} to 1×10^{-4} as threshold values for potential human health impacts. Risks for each receptor are summarized below.

For most receptors, lead is a COPC in surface soil, with a mean concentration of 3,180 mg/kg. This value exceeds both the health-based screening level of 400 mg/kg for children and 800 mg/kg adults. Therefore, exposure to site soils by this population may result in adverse health effects. However, exposure to lead in soil was not quantitatively calculated due to lack of toxicity values. The systemic toxic effects of lead in humans have been well documented. The evidence shows that lead is a multi-targeted toxicant and can affect almost every organ and system in the human body. The most sensitive system is the central nervous system, particularly in children. Irreversible brain damage occurs at blood lead levels greater than or equal to 100 micrograms per deciliter (μg/dl) in adults and at 80 -100 μg/dl in children; death can occur at the same blood levels in children. Children who survive these high levels of exposure suffer permanent severe mental retardation. Lead also damages kidneys and the reproductive system. At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may also cause anemia, a disorder of the blood. EPA has classified lead a Group B2, probable human carcinogen, based on sufficient animal studies showing that lead induces renal tumors in experimental animals.

<u>Current and Future Site Trespassers</u>: The total incremental lifetime cancer risk estimates under the RME is 2×10^{-5} which is within EPA's target range of 1×10^{-6} to 1×10^{-4}. The calculated HIs are 3 for RME and 0.7 for CT exposure. PCBs contribute most

of the potential noncarcinogenic hazards. Exposure to elevated levels of PCBs may adversely affect eyes, skin, nails, and developing fetus.

Current and Future Recreational User (Adult): The total incremental lifetime cancer risk estimate under the RME is 5 $\times 10^{-5}$ which is within EPA's target range of 1 × 10^{-6} to 1 × 10^{-4}. The calculated HI under the RME is 0.2 which is below EPA's threshold of unity (1).

Current and Future Recreational User (Adolescent): Under the RME, the total incremental lifetime cancer risk of 1 $\times 10^{-5}$ is within EPA's cancer target range and noncarcinogenic estimate of 0.2 is below noncancer target threshold.

Future Site Worker: The total incremental lifetime cancer risk estimates are 2 $\times 10^{-4}$ for RME and 4 $\times 10^{-5}$ for CT exposure. The RME estimate exceeds EPA's target range of 1 × 10^{-6} to 1 × 10^{-4}. PCBs and arsenic contribute most of the potential risk. PCBs are considered probable human carcinogens (Group B2) and arsenic is a known human carcinogens (Group A). However, the CT estimate is within the EPA target risk range. The calculated HIs for both RME (8) and CT (9) are above EPA's threshold of unity. PCBs, antimony, and thallium contribute most of the potential non-cancer health hazard. Exposure to elevated concentrations of these chemicals could possibly have adverse effects on the eyes, skin, nails, developing fetus, blood, whole body, and lungs.

Future Construction Worker: The total incremental lifetime cancer risk estimate is 8 × 10^{-6} which is within EPA's target range of 1 × 10^{-6} to 1 × 10^{-4}. The total HI (9) based on individual health endpoints is above EPA's acceptable threshold of 1, and could possibly have adverse effects on the eyes, skin, nails, developing fetus, blood, whole body, and lungs. PCBs, antimony, and thallium contribute most of the potential non-cancer hazard.

Future Residents: The total incremental lifetime cancer risk estimates for an adult are 2 × 10^{-4} for the RME and 5 × 10^{-5} for CT exposure. The total incremental lifetime cancer risk estimates for a child (0-6 years old) are 4 × 10^{-4} for RME and 2 × 10^{-4} for CT exposure. Except for the adult CT cancer risk estimate, these estimates of risk are above EPA's target range of 1 × 10^{-6} to 1 × 10^{-4} . Exposure to PCBs and PAHs in soil and to arsenic in soil and groundwater account for the majority of the risk. PCBs and PAHs are considered probable human carcinogens (Group B2) and arsenic is a known human carcinogens (Group A). The total HI based on individual health endpoints is above EPA's acceptable threshold of 1 for both an adult (HI=14 for RME and 8 for CT) and a child (HI=73 for RME and 31 for CT). PCBs, antimony, copper, manganese, mercury, and thallium contribute most of the potential non-cancer hazard. Exposure to elevated levels of these contaminants may have adverse effects on the eyes, skin, nails, developing fetus, blood, whole body, lungs, central nervous system, gastrointestinal tract, and kidney.

Future On-Site Recreational User (Adult): The total incremental lifetime cancer risk estimate for RME is 6 × 10^{-5} which is within EPA's target range of 1 × 10^{-6} to 1 × 10^{-4}.

The calculated HIs for noncarcinogenic health hazards are 3 for RME and 0.5 for CT exposure. The total HI based on individual health endpoints for RME scenario is above EPA's acceptable threshold of 1, and could possibly have adverse effects on the eyes, skin, nails, and developing fetus. PCBs contribute most of the potential non-cancer hazard. The total HI based on individual health endpoints for CT scenario is below EPA's acceptable threshold of 1.

Future On-Site Recreational User (Child): The total incremental lifetime cancer risk estimates are 1×10^{-4} and 3×10^{-5} for RME and CT exposure, respectively. The RME estimate is at the high end of EPA's target risk range, while the CT estimate is within EPA's target range of 1×10^{-6} to 1×10^{-4}. The calculated HIs for noncarcinogenic health hazards are 22 and 5 for RME and CT exposure, respectively. The total HI based on individual health endpoints is above EPA's acceptable threshold of 1, and could possibly have adverse effects on the eyes, skin, nails, developing fetus, central nervous system, gastrointestinal tract, and kidney. PCBs, antimony, copper, and thallium contribute for most of the potential non-cancer hazard.

Screening Level Ecological Risk Assessment

The Final Screening Level Ecological Risk Assessment for the CIM site identified the potential environmental risks associated with the site. Risks were calculated for aquatic receptors to surface water and sediment in the Hudson River and to terrestrial receptors exposed to surface soil on the site. The ecological risks are summarized below, as hazard quotients (HQs). An HQ equal to or below one indicates no potential for risk.

Surface Water Risks: Aluminum, iron, and lead had HQs above one; however, none of these inorganics is considered a major source of site-related risk to ecological receptors.

Sediment Risks: Bis(2-ethylhexyl)phthalate and 2-methylnaphthalene had HQs over one. Total PAHs yielded an HQ of 132.9 at sample location SD-19. The DDT HQ was 3.44. The highest HQ for 4,4'-DDD was 3.1 at sample location SD-17. Eleven inorganics (antimony, arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver, and zinc) had HQs greater than one, with copper at location SD-17 the highest with an HQ of 163.

Surface Soil Risks: Process Area - Bis(2-ethylhexyl) phthalate and butylbenzylphthalate had HQs of 78.8 and 39.7, respectively. Total PAHs had an HQ of 256.7 at sample location PASS-04-D. Six pesticides (4,4'-DDE, 4,4'-DDT, endosulfan sulfate, endrin, heptachlor, and methoxychlor) had HQs above one. The total DDT and total PCB HQs were 1,768 and 208,630, respectively. Seventeen inorganics (aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc) had HQs above one. The three highest inorganic HQs were cadmium (43,864 at sample location PASS-06-D), aluminum (2,940 at sample location PASS-15-D), and lead (86,667 at sample location PASS-11-D).

Non-Process Area - Three VOCs (benzene, ethylbenzene, and m,p-xylenes) had HQs above one. Total PAHs had an HQ of 285 at sample location SWSS-16-D. Thirteen pesticides (4,4'-DDE, 4,4'-DDT, aldrin, alpha-BHC, beta-BHC, endosulfan sulfate, endrin, endrin aldehyde, endrin ketone, gamma-BHC [lindane], heptachlor, heptachlor epoxide, and methoxychlor) had HQs above one. The total DDT and total PCB HQs were 968 and 140,843, respectively. Nineteen inorganics (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc) had HQs above one. The three highest inorganic HQs were for cadmium (14,682 at sample location SWSS-05-D), aluminum (1,828 at sample location SWSS-17-S), and lead (294,444 at sample location SWSS-24-D).

The following risk questions were identified as important to the SLERA. The results of the SLERA are used to respond to these questions and to help form conclusions.

(1) *Are site-related contaminants present in surface soil, sediment, or surface water where ecological receptors may be exposed?*

Response: YES. Available data cannot confirm that surface water COPCs are site-related. Sediment COPCs may or may not be site-related, but available data for on-site surface soil suggest that the site contributes to near-site sediment contamination. Similar contaminants were found in both on-site surface soil and near-site sediments.

(2) *Where present, are the concentrations of site-related contaminants sufficiently elevated to impair the survival, growth, or reproduction of sensitive ecological receptors?*

Response: YES (sediment and surface soil). Many of the sediment and surface soil COPCs have been measured at concentrations that may cause ecologically significant adverse effects in sensitive receptors. These include PAHs, pesticides, PCBs, and inorganic COPCs. Of most concern are higher molecular weight PAHs, PCBs, pesticides such as DDT or its metabolites, cadmium, copper, lead, mercury, and zinc.

Based on the findings of the SLERA, in which maximum detected concentrations of the contaminants were compared to conservatively derived published benchmarks, site related contaminants are present at concentrations found to potentially cause adverse ecological effects. However, limited habitat is available on site for ecological receptors, thereby limiting ecological exposure potential.

Conclusions

The significant findings of the RI are as follows:

- Indicator contaminants, which represent the highest levels and most extensive contamination in site media, include: benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, Aroclor-1254, arsenic, cadmium, copper, iron, lead, mercury, vanadium, and zinc.

- Site soils are contaminated from former site processing and waste disposal practices. Surface and subsurface soil to four feet bgs contain levels of all ICs that exceed screening criteria and calculated background values in the majority of soil samples, with the highest levels in the top foot of soils.

- Contamination in subsurface soil at depths greater than four feet is based on screening data, which indicate that PCBs and lead may extend to the water table (depths up to 14 feet bgs in some areas of the site). Screening data was obtained for VOCs, PCBs, and lead because they were the primary contaminants that were expected to be found at the site. The vertical extent of contamination from other ICs has not been defined.
  RECOMMENDATION: EPA may elect to collect subsurface soil samples below four feet, for analysis of all contaminants of concern, to refine the vertical extent of the soil excavation.

- The lateral extent of soil contamination has been delineated across the site, and contamination extends to the borders. Contamination beyond the borders of the site has not been defined.
  RECOMMENDATION: EPA may elect to collect soil samples at the peripheral areas of the site during pre-design activities, for analysis of all contaminants of concern, to determine if there is a need to extend the limits of the soil excavation.

- Hudson River sediments adjacent to the site contain ICs that exceed screening criteria. However, PAH ICs do not exceed calculated background values (95 percent UCL).

- Hudson River surface water adjacent to the site contains iron in all 10 samples and lead in 2 samples that exceed screening criteria and calculated background values.

- Groundwater in the unconsolidated water table aquifer has minor impact from former site waste disposal practices. Iron, lead, and zinc are present at levels that exceed screening criteria and background levels. Gasoline fraction VOCs (MTBE, benzene, ethylbenzene, and m,p-xylene) are also present at levels exceeding screening criteria in several monitoring wells. VOC contamination presumably originated from leaking USTs located along the western boundary of the site or from gasoline leaking from crushed cars.
  RECOMMENDATION: Due to the presence of VOCs at the water table at MW-1 during the VPMW screening event, EPA may elect to install a shallow monitoring well in the vicinity of MW-1 that is screened across the water table during pre-design activities.

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Section One

Section 1

Section 1
Introduction

CDM Federal Programs Corporation (CDM) received Work Assignment 151-RICO-02LT under the Response Action Contract (RAC) to perform a remedial investigation/feasibility study (RI/FS), a human health risk assessment (HHRA), and a screening level ecological risk assessment (SLERA) at the Consolidated Iron and Metal (CIM) Site (the site), located in Newburgh, Orange County, New York, for the Environmental Protection Agency (EPA). This RI report was prepared in accordance with Subtask 9.1 of the CDM Final Work Plan, dated February 4, 2003 (CDM 2003). The purpose of this work assignment is to investigate the overall nature and extent of contamination at the site.

It is important to note that since the field investigation was conducted in accordance with EPA regulations, guidance and standards, the resultant data were found to be of high quality, fully defensible, and provide an accurate assessment of site conditions. Additionally, all data quality objectives developed during the ongoing project planning efforts, were met and adequately satisfied. As such, the findings of the RI and Risk Assessments will allow EPA Region II to develop and evaluate effective remedial alternatives.

1.1 Purpose of Report

The purpose of the RI Report is to present the results of the geologic, hydrogeologic and ecological investigations, including surface and subsurface soil screening, surface and subsurface soil sampling, light non-aqueous phase liquid (LNAPL) delineation, geologic and water quality vertical profiling, monitoring well installation and sampling, sediment and surface water sampling, and topographic and cultural resource surveys. The human health and ecological risk assessments have been submitted under separate cover and are summarized in Section 6. The soil, hydrogeologic, and surface water/sediment investigations were conducted to determine the nature and extent of site-related contamination. Samples from each matrix were collected and analyzed; results of these analyses are compared with EPA-approved screening criteria.

1.2 Site Description

The CIM site is an inactive car and scrap metal junk yard and dealer located at the end of Washington Street, in Newburgh, Orange County, New York. The study area, which covers approximately seven acres, is bounded by a boat marina to the north, Conrail railroad tracks and South Water Street to the west, an inactive municipal incinerator and an active wastewater treatment plant to the south, and the Hudson River to the east. The site location map is presented as Figure 1-1 and the site map is presented as Figure 1-2.

Downtown Newburgh is located approximately 500 feet west of South Water Street. The City of Newburgh, which is 60 miles north of New York City, is located on the western side of the Hudson River in eastern Orange County. The City has a land area of 3.9 square miles and is bounded by the incorporated Town of Newburgh on the north and west, by the Town of New Windsor to the south, and by the Hudson River to the east.

1.3 Site History

The CIM property is approximately seven acres. From World War I until the early 1940s, the Eureka Shipyard operated at the site. Scrap metal processing and storage operations occurred at the site for approximately 40 years before the facility's closure (Weston 2000a). A smelter operated on site between 1975 and 1995 that was used primarily to melt aluminum-containing materials, including, but not limited to, transmissions, to produce aluminum ingots. Other metallic materials also were smelted, creating a lead-contaminated ash and slag by-product. Other site operations included sorting ferrous and non-ferrous metal scrap for processing, including automobile batteries.

Historical aerial photographs taken since the mid-1940s show that standing liquids have occupied large areas of the CIM site (Weston 2000a). Throughout the past 40 years, the site has been covered with piles of debris, scrap metal, numerous small and large mounds of dark-toned and light-toned materials, and numerous areas of dark-stained soil. From approximately 1960 to 1980, the area of land on which the CIM facility operated increased, by approximately 25 percent, as fill material was added to the Hudson River along the property's shoreline. Throughout the historical photographs, intermittent surface drainage pathways across the site were noted that appeared to discharge to the Hudson River, and were associated with discharge plumes visible in the river waters. During the late 1990s, the site operator constructed a surface water impoundment on the northeastern portion of the site with a berm of waste material along its eastern side.

From 1997 to 1999, the New York State Department of Environmental Conservation (NYSDEC) and EPA conducted several inspections at the site. Oil-stained soils and puddles with oil sheens were observed on site. In addition, an unpermitted storm water discharge to the Hudson River and an improperly constructed berm were noted. An oil sheen was observed by NYSDEC personnel on the storm water discharge and on the river. The southern portion of the site was covered by more than 5,000 tires.

An unknown number of underground storage tanks (USTs) were noted to exist onsite; tightness testing of the tanks was required to determine their condition. Several USTs were removed in the late 1990s. The USTs likely stored fuel oil for the process equipment when the facility was active. The size of the excavations suggested the USTs were at least 5,000 gallons capacity. Subsequent inquiries by the NYSDEC project manager to NYSDEC Region III did not reveal additional data regarding the size, contents, or conditions of the tanks when they were removed, whether they had lead product, and if any soil samples were collected from the tank pits to assess potential contamination.

Numerous violations were cited by NYSDEC, including, but not limited to, not notifying EPA of its Resource Conservation and Recovery Act (RCRA) status. The aluminum slag pile was determined to be hazardous waste. In addition, the site owner was in violation because of a failure to remove and legally dispose of the tire piles.

Between 1998 and 1999, EPA's Hazardous Waste Support Branch (HWSB), Superfund Contract Support Team (SCST) and Region II Superfund Technical Assessment and Response Team (START) sampled waste piles, soils, and river sediment, analyzed by Region II's Division of Environmental Science and Assessment (DESA) laboratory, to delineate the horizontal and vertical extent of contamination. Section 1.3.2 details the EPA HWSB and START investigation.

Between 1996 and 1999, NYSDEC prosecuted CIM for five separate environmental violations. CIM pleaded guilty to all violations and paid fines. In 1999, the New York State Attorney General filed a lawsuit against CIM for RCRA and Clean Water Act (CWA) violations, including illegal discharge to surface water without a Sate Pollutant Discharge Elimination System (SPDES) permit. The case was settled with a Consent Order in which CIM agreed to remove all scrap materials and cease operations.

A Hazard Ranking System (HRS) package was prepared in December 2000 by EPA Region II (Weston 2000b). CIM was added to the National Priorities List (NPL) June 14, 2001.

1.3.1 Waste Disposal Practices and Potential Sources

The source of site contamination is suspected to be the result of past improper metal waste handling and processing activities on the property. There is documentation that during the past decades, scrap metal containing hazardous substances and wastes were stored in piles. In addition, discharge of site-derived contaminated storm water to the Hudson River was observed (Weston 2000a). Onsite source areas included an ash and slag pile generated by the former aluminum smelting operation, located on the southwestern portion of the site, and a former processed soil pile, which consisted of site surface soils that were mixed with processed debris and then separated out. The soil pile was located on the northeastern portion of the site, southeast of the office building. Both contaminated waste piles were removed by EPA for offsite treatment and land filling subsequent to 1998. Limited surface and subsurface soil sampling at the former ash and soil pile locations indicated that the soils beneath the former piles had been impacted. Previous site inspections also noted oil-stained surface soils, oily sheens on puddles throughout the facility, and oily sheens on the Hudson River adjacent to the site.

The contaminants that were routinely released to the surface at the facility impacted surface and subsurface soils; some soluble contaminants also migrated vertically down through the vadose zone until they intercepted groundwater at the water table, at an estimated depth of approximately 5 to 10 feet below the ground surface (bgs). The predominant eastwardly groundwater flow would have promoted the migration of contaminants eastward, discharging directly into the Hudson River.
Prior to the RI, EPA, NYSDEC, the City of Newburgh, and CDM personnel observed

site conditions and the surrounding area. Evidence was present of past poor waste management practices, including stained soil, free-phase petroleum liquid in an open well, and improper storage of tires. In addition, two large excavations were observed along the western side of the site, west of the former scrap metal processing and smelting equipment, where USTs had been removed.

In June 2003, Weston Remedial Services, under contract to EPA's Emergency Response Team (ERT), conducted clearing activities at the site. Removal activities included building demolition and removal of tires, scrap metal, concrete, soil piles, and wood debris for processing. During demolition of the metal shear building, standing liquid (including unknown oils) was removed. Subsequently, a second sub-basement of the building was discovered. Approximately 28,000 gallons of liquid was pumped from the two basements and disposed offsite.

1.3.2 Previous Investigations

The following sections describe the investigations conducted by EPA's HWSB and START from 1998 to 1999.

1.3.2.1 START Source Sampling and Removal Activities

On August 11, 1998, Region II START and EPA Region II DESA sampled the ash and slag pile (waste pile) located east of the compactor and metal shear building (Weston 2000a). Soil screening analytical results identified the presence of lead at concentrations ranging from 1,590 to 2,420 milligrams per kilogram (mg/kg). Lead levels exceeded the toxicity characteristics leaching procedure (TCLP) hazardous waste classification limit for lead of 5 milligrams per liter (mg/L), with values ranging from 5.70 to 13.4 mg/L. Polychlorinated biphenyls (PCBs) also were detected in the ash and slag pile. Aroclor-1248 and -1254 were detected at concentrations ranging from an estimated (J) value of 37 to 27,000 micrograms per kilogram (μg/kg) and 70 to 27,000 μg/kg, respectively. The pile was removed for treatment, stabilization, and land filling.

During July and August 1998, a soil pile, not related to the former smelting operation, was segregated and processed. The resulting processed soil of approximately 7,040 cubic yards was located along the northern boundary of the facility, southeast of the office and garage. On July 7, 1999, 12 soil samples were collected from the processed soil pile by Region II START and analyzed for Target Compound List (TCL) organics, excluding pesticides, full Target Analyte List (TAL) inorganics, and TCLP including copper and zinc. Analytical results indicated that estimated concentrations of lead in the soil pile ranged from 2,100 to 4,000 mg/kg. Lead levels for the soil pile exceeded the TCLP hazardous waste classification limit for lead with values ranging from 2.80 to 12.00 mg/L. Aroclor-1016 and -1254 were detected at concentrations ranging from 1,800 to 26,000 μg/kg and 3,000 to 39,000 μg/kg, respectively. Arsenic was detected at a maximum concentration of 35 mg/kg in the soil pile. Copper and mercury also were detected in the soil pile at maximum concentrations of 5,200 mg/kg and 6.4 mg/kg, respectively. Chromium, cadmium, and nickel were detected at maximum estimated concentrations of 480 mg/kg, 66 mg/kg, and 250 mg/kg, respectively.

Subsequently, during September and October 1999, an EPA Emergency and Rapid Response Services (ERRS) contractor removed the processed soil pile from the facility. The processed soil was taken to a RCRA-approved transport, storage, or disposal facility (TSDF) for stabilization and land filling.

On August 10, 1999, START collected 19 soil samples, including surface and subsurface samples, from the site soils upon which the ash and slag pile was located. The samples were analyzed for lead and unvalidated concentrations ranged from 1,750 to 8,100 mg/kg in the surface soil.

1.3.2.2 START Field Screening Activities

From September 20 to 22, 1999, START's Preliminary Assessment/Integrated Assessment (PA/IA) included field screening for lead and PCBs (Weston 2000a). Surface soil screening sample locations were established on a 30-foot by 30-foot grid over the southern and eastern portions of the site (Appendix B, Figure 5). Fifteen-foot by 15-foot grids were established north of the processed soil pile and north of the metal shear building. START collected surface soil samples from 126 onsite locations and screened them utilizing an x-rayfluorescence (XRF) spectrophotometer. Approximately 10 percent of the total number of soil samples collected for XRF screening were submitted to a laboratory for total lead analysis. Lead concentrations in the surface soil samples collected for field screening analyses ranged from 754 to 4,210 mg/kg (Appendix A). The XRF lead results indicated that lead contamination is found above applicable screening criteria across the entire area of the site, typically at concentrations between 1,500 and 3,000 mg/kg (Weston 2000a). There were no definable areas of significantly-elevated lead concentrations that would indicate localized sources.

Region II START also collected 61 surface soil screening samples for PCB analysis using immunoassay field test kits from 61 onsite locations. Total PCB concentrations in the surface soil samples ranged from less than 1 mg/kg to greater than 20 mg/kg. Confirmatory laboratory analyses ranged in concentrations from 0.37 mg/kg to an estimated 57 mg/kg. The analytical results from the PCB field screening activities and confirmatory laboratory results are presented in Weston's report (2000a) and in Appendix A. PCBs were detected in samples collected across the entire site; however, the greatest PCB concentrations above applicable screening criteria were found in the areas of the former ash and slag pile east of the compactor and the processed soil pile southeast of the office buildings.

1.3.2.3 START CLP Sampling Activities

<u>Surface Soil Sampling</u>

Based on the surface soil field screening results, START collected surface soil samples for analysis of TCL organics and TAL inorganics under EPA's Contract Laboratory Program (CLP). In addition, subsurface soil samples collected with a Geoprobe sampling device were analyzed for TCL organics and TAL inorganics by EPA's CLP. The tabulated results of the surface and subsurface soil sampling program are presented in Appendix A (Tables A-1 and A-2, respectively). Figure 3 in Appendix B shows surface and subsurface soil CLP sampling locations.

Volatile organic compounds (VOCs) were detected in one surface soil sample southwest of the process soil pile (SAD210) at concentrations greater than applicable cleanup criteria (Table A-1a). Semivolatile organic compounds (SVOCs) were identified in all of the surface soil samples collected from on-site locations, with several compounds at concentrations greater than applicable screening criteria. Phenol and dimethylphthalate exceeded screening criteria in many samples collected across the site. However, polyaromatic hydrocarbons (PAHs) were detected in all soil samples above applicable screening criteria (Table A-1b). The highest PAH exceedances were found in and around the former soil piles. For example, benzo(a) pyrene was detected at concentrations ranging from 4,100 μg/kg (at S3H30, north of the metal shear building) to 18,000 μg/kg (at SP2, at the former processed soil pile). Figure 3 in Appendix B shows the results.

Pesticides were detected in surface soil samples at concentrations greater than applicable screening criteria in many samples collected across the site (Table A-1c). In particular, dieldrin was detected in almost all surface soil samples at concentrations up to 960 μg/kg at SP2, the former processed soil pile. PCBs were detected above applicable screening criteria in all surface soil samples, specifically Aroclor-1248 and Aroclor-1254 (Appendix B, Figure 3). Aroclor-1248 was identified in 18 soil samples at concentrations ranging from 1,600 μg/kg (at SH240 on the southeastern corner of the site) to 25,000 μg/kg (at SAA30, the former ash and slag pile). Aroclor-1254 was detected in 14 surface soil samples at concentrations ranging from 4,000 μg/kg (SF240) to 18,000 μg/kg (SAE240).

All of the 23 surface soil sampling locations contained inorganic contaminants at concentrations above screening criteria (Table A-1d). Applicable screening criteria consistently were exceeded for arsenic, beryllium, cadmium, chromium, iron, lead, mercury, nickel, silver, and zinc. For example, cadmium was detected in each of the surface soil samples at concentrations ranging from 7.8 mg/kg (at SH240 on the southeastern corner of the site) to 47 mg/kg (at SAA30, the former ash and slag pile). Copper, nickel, and zinc were detected in all 23 surface soil samples at concentrations ranging from 1,120 to 15,300 mg/kg, 78.5 mg/kg to 318 mg/kg, and 1,620 mg/kg to 5,640 mg/kg, respectively. Twenty-one surface soil samples contained lead in concentrations ranging from 1,740 mg/kg (S3E30) to an estimated 36,200 mg/kg (SF280).

<u>Subsurface Soil Sampling</u>
On September 22, 1999, Region II START conducted subsurface soil sampling at the site. A total of 27 subsurface soil samples, including background samples, were collected from various on-site grid locations (Figure 3, Appendix B). Sample SS01A was collected at a depth of 2.5 to 4 feet bgs, SS01B was collected at 4 to 5 feet bgs. Samples SS02A through SS13A were collected at a depth of 2 to 4 feet bgs, and SS02B through SS13B were collected at 4 to 6 feet bgs. Sample SS14A was collected at a

depth of 2 to 3 feet. Soil samples were analyzed for TCL and TAL parameters, excluding cyanide, through EPA's CLP.

VOCs were detected in subsurface soil samples, at both sample depths (Table A-2a). Benzene was detected in four subsurface soil samples (2-4 feet bgs) at concentrations ranging from 16 μg/kg (at SS08, on the eastern portion of the site) to an estimated 780 μg/kg (at SS05, the former ash and slag pile) and exceeded applicable screening criteria in samples at the former ash and slag pile. Toluene showed a similar pattern of detections, with exceedances at the former ash and slag pile, with concentrations at 2-4 feet ranging from an estimated 69 μg/kg to 9,300 μg/kg. At a depth of 4 to 6 feet, toluene was detected in subsurface soil sample SS10B at an estimated concentration of 2,000 μg/kg. Xylene ranged from concentrations of 54 μg/kg to 31,000 μg/kg and exceeded screening criteria for 2-4 foot samples in the area of the former ash and slag pile. The greatest concentration of xylene in soil samples from 4-6 feet was 130,000 μg/kg (collected from SS10B on the southeastern corner of the site). A distinct petroleum odor was observed by EPA at approximately 4 feet bgs in the central portion of the site.

SVOCs were identified in all subsurface soil samples collected from on-site locations, with several compounds at concentrations greater than applicable screening criteria. Notably, phenol and dimethylphthalate exceeded screening criteria in many samples collected across the site. However, as with the surface soil samples, PAHs commonly were detected in soil samples above applicable screening criteria (Table A-2b). The highest PAH exceedances were found in and around the locations of the former processed soil piles. Figure 3 in Appendix B shows benzo(a)pyrene results.

Pesticides and PCBs were detected in subsurface soil samples at concentrations greater than applicable screening criteria, especially in and around the former waste piles (Table A-2c). Dieldrin was detected in almost all subsurface soil samples at concentrations up to 1,100 μg/kg in the 2-4 foot sample from SS02, at the former ash and slag pile. Other pesticides exceeding criteria were commonly-identified in subsurface samples from the ash and slag pile, including alpha-BHC, heptachlor, and endosulfan I. PCBs were detected above applicable screening criteria in most subsurface soil samples, specifically Aroclor-1248 and Aroclor-1254. Aroclor-1248 ranged from concentrations of 3,300 μg/kg (SS06A) to 24,000 μg/kg (SS03A) in three subsurface soil samples (2-4 feet), and from concentrations of 2,100 μg/kg (SS07B) to 31,000 (SS03B) μg/kg in three subsurface soil samples (4-6 feet). Aroclor-1254 was detected in four soil samples (2-4 feet) at concentrations ranging from 2,700 (SS06A north of the processed soil pile) to 420,000 μg/kg (SS05A within the former ash and slag pile). Samples collected from 4-6 feet beneath the former ash and slag pile (SS03B and SS05B) contained concentrations of Aroclor-1254 at 16,000 and 4,700 μg/kg, respectively (Figure 3, Appendix B).

Inorganic analytes were detected in subsurface soil samples at concentrations above screening criteria (Table A-2d). As with the surface soil sampling results, subsurface sampling results, in both 2-4 foot bgs and 4-6 foot bgs samples, consistently exceeded applicable screening criteria for arsenic, beryllium, cadmium, chromium, iron, lead, mercury, nickel, silver, and zinc.

Groundwater Sampling

On September 23, 1999, START conducted groundwater sampling at the site. A total of five groundwater samples, including background and duplicate samples, were collected from water table screening points at various on-site locations (Appendix B, Figure 3). Groundwater samples were analyzed for TCL and TAL parameters, excluding cyanide, through the EPA's CLP.

Contaminants were detected principally in the groundwater sample collected from GW03 located within the footprint of the former ash and slag waste pile (Appendix A, Table A-3). VOCs were detected only in GW03; xylene (7 micrograms per liter [μg/L]) was the only VOC that exceeded applicable screening criteria. SVOCs were detected in all samples, but were especially common in GW03 and GW04, collected immediately north of the former processed soil pile (Appendix B, Figure 3). 2,4-dimethylphenol, bis(2-ethylhexyl)phthalate, and benzo(a)pyrene were detected above screening criteria in sample GW03; bis(2-ethylhexyl)phthalate exceeded its applicable screening criterion by 15 times. Benzo(a)pyrene also exceeded its screening criterion by 15 times in sample GW04. Both the background sample (GW01) and sample GW02 had elevated concentrations bis(2-ethylhexyl)phthalate.

Pesticides and PCBs were not detected in groundwater samples with the exception of GW03, which contained 4-4'-DDT, Aroclor-1248, and Aroclor-1254, detected 1.25, 63.3, and 28.9 times above their respective screening criteria. PCB results are presented Appendix B, Figure B-4.

Inorganic analytes (iron, magnesium, and zinc) were detected in all groundwater samples above applicable screening criteria; however, sample GW03 also contained elevated concentrations of cadmium, lead, and mercury at 9.2, 355, and 0.9 μg/L, respectively, exceeding their respective screening criteria by 1.84, 23.7, and 1.29 times. The greatest exceedance of zinc in groundwater also was found in GW03 at 1,140 μg/L, 228 times its screening criterion. Analytical results for inorganic analytes are summarized in Appendix A, Table A-3d.

Hudson River Sediment Sampling

On November 23, 1999, Region II START conducted sediment sampling in the Hudson River adjacent to the site. A total of 18 sediment samples, including background and duplicate samples, were collected from the river. Sample locations and results are presented in Appendix B (Figures 4, 8, and 9). Sediment samples were analyzed for TCL and TAL parameters, excluding cyanide, through EPA's CLP.

Organic and inorganic compounds were detected in the sediment samples collected. However, none of the concentrations reported in the sediment samples were greater than three times the background locations (the screening criteria used by START)

(SD16, SD17, and SD18). Weston's report (2000a) presents the sediment sampling results.

1.4 Current Site Conditions

The only building remaining onsite is the former garage, which is empty. Building foundations remain from the former office, metal shear, compactor bailer, and smelter buildings. The former metal shear building foundation contains a sub-basement, which is currently covered by metal plates to prevent access. The former compactor/bailer building foundation is currently open and filled with rain water; the foundation is surrounded by orange fencing to prevent access. Two pits remain along the western side of the site from UST removal activities. The site drainage direction is northeast, toward the Hudson River. A storm water retention basin on the northeastern portion of the site was constructed by EPA contractors; the berm surrounding the basin is of site-derived soils. The retention basin was constructed to intercept storm water flowing toward the river, preventing direct discharge to the Hudson. A small pile of debris with tires, left over from removal activities, is located in the southern part of the site. Rip-rap and vegetation, in the form of trees and shrubs, are present on the eastern border of the site, along the Hudson River.

1.5 Previous Investigation at an Adjacent Site

A remedial investigation was conducted by Blasland, Bouck & Lee, Inc. (BBL) at an adjacent site, located south of the CIM site. Contaminants of concern (COCs) at the adjacent site include some of the indicator contaminants selected for the CIM site. Wastes from the manufacture gas plant (MGP) site, in the form of dense, oily liquid known as "MGP tar," have spread beneath the ground surface for several hundred feet to the east, beyond the property line, passing beneath Water Street, two sets of railroad tracks, the City of Newburgh Sewage Treatment Plant (STP), and into the sediments beneath the Hudson River. Cross sections from the BBL RI report (1999) were used in this CIM RI report to compare concentrations from both sites. The following sections describe the site history, previous site investigations, and an evaluation of the sample results, as presented in the RI Report prepared by BBL in June 1999.

1.5.1 Adjacent Site History

In 1901, the Central Hudson Gas & Electric Corporation (CHGE) MGP property was conveyed to the Newburgh Light, Heat & Power Company. From 1902 to 1911, tar storage tanks, tar extractors, a tar exhauster, water gas generating sets, condensers and scrubbers, an oil storage tank, new boilers, a relief holder, a meter, and a storage tank were added to the MGP property. In 1913, the boiler room, the building addition which became the coal shed and purifier area, were expanded. In 1925, a 4-inch gas main was built between the Newburgh and Beacon MGP, and a fuel line was installed from a dock at the end of South William Street to the former MGP. In 1927 and 1928, the Newburgh MGP operators reconfigured the facilities, which included cleaning and cooling facilities such as the wash box between gas generation facilities and the relief holder and washer/cooler (woods grids and cooling coils) between the relief holder and the purifiers. In 1929, an 8-inch gas pipeline was built to supplement the existing 4-inch gas pipeline that connected the Newburgh and Beacon manufactured gas plants.

In 1929, there were two complaints to CHGE regarding boat damage at the Cornell Steamboat Company dock from an oily substance potentially emanating from the effluent associated with the MGP discharging at the Hudson River and an black oily material observed from the gas works sewer. A decision was made to reduce gas production. Industries to the west, which may have used this sewer, included the I.P. Delaney Boiler Works, and Shaw's Sons Moulding and Planing Mill. Due to possible industrial usages of this brook/sewer, CHGE believed the oil discharged could not solely be attributed to the former MGP site.

According to the Brown's Directory of American Gas Companies 1929-1931, MGP produced gas by the carbureted water gas method in the 1930s. The gas was cooled and purified prior to distribution. During cooling, an oily liquid commonly known as coal tar, which became known as "MGP tar," would condense from hot gas and settle in the bottom of the gas holders, pipes, and other structures. In the water gas process at the site, the tar was derived both from petroleum products and from coal.

In 1930, CHGE reduced gas production at this MGP, and the facilities were only used for reserve gas production during peak periods until 1950. In 1951, the Newburgh MGP was demolished, including the boiler. In 1951, CHGE decommissioned the buildings and gas and oil tanks at the Newburgh MGP. In 1959, at the natural gas regulator lines, soil was removed during construction of the regulator station. The disposition of the excavated soil was not documented.

In 1985, CHGE constructed a propane air peak shaving plant in the southern portion of the former MGP site. The compressor building was removed in 1993; the concrete foundation of the former MGP is currently present at the site.

1.5.2 Adjacent Study Area Investigations

CHGE hired BBL to complete the remedial investigation for the Newburgh Project, which was conducted in accordance with NYSDEC protocols. From 1996 through 1998, BBL performed field investigations, which included surface and subsurface soil sampling, groundwater sampling, surface water sampling, surface and subsurface sediment sampling, air sampling, and drain sampling on and around the CHGE property.

<u>Surface and Subsurface Soil Sampling</u>

A total of 10 surface soil and 25 subsurface soil samples were collected from the property in order to determine the horizontal and vertical extent of LNAPLs. A total of five rock cores were also taken in order to delineate the vertical and horizontal extent of LNAPLs in bedrock. The results of these samples determined that LNAPLs were present in the central portion of the property, near the former tar tanks and tar separator.

Surface Soil Results
The highest PAH concentrations were found in the background sample, collected to the west of the MGP site along Colden Street. On the MGP site, the highest PAH concentrations were found in the southwest corner. PAH compounds were also detected in soils within the City of Newburgh's STP; however, the PAH levels were low and do not appear to be related to MGP contamination. Shallow soils at the MGP site largely consist of fill materials not related to the MGP operations.

Organics that were detected in the surface soil included: acetone, 2-hexanone, methylene chloride, toluene, PAHs, bis(2-ethylhexyl)phthalate, di-n-butylphthate, butylbenzyphthalate, carbazole, and dibenzofuran. Several metals were also detected but concentrations were not above background concentrations for the MGP site.

Subsurface Soil Results
Most of the movement of tar takes place below the water table, approximately 5-15 feet bgs. Subsurface soils throughout the site have been contaminated by the movement of the MGP tar.

Organics detected in the subsurface soil included: benzene, toluene, ethylbenzene and xylenes (BTEX), acetone , 2-butanone, carbon disulfide, chloroform, chloromethane, methylene chloride, carbazole, dibenzofuran, 4-nitrophenol, 2-chloronaphthalene, hexachlorobenzene, 1,2,4-trichlorobenzene, dibenzofuran, and di-n-butyl phthalate. Several metals were also detected but concentrations were not above background concentrations for the MGP site.

Monitoring Well Installation
A total of 23 monitoring wells were installed and two rounds of groundwater samples were collected at the project area. LNAPL was present in 10 wells.

Groundwater Results
Groundwater that comes into contact with the MGP tar dissolves some of the more soluble contaminants; the most notable were BTEX compounds. Because the source of the groundwater contamination (MGP tar) has spread throughout the MGP investigation area, groundwater contamination is similarly distributed. Groundwater in both bedrock and overburden aquifers is contaminated.

Organics detected in the monitoring wells included BTEX, styrene, acetone, 2-butanone, trichloroethene, chloroform, bromodichloromethane, phenol, 2,4-dimethylphenol, 2-methylphenol, bis-(2-ethylhexyl)phthalate, benzoic acid, carbazole, and dibenzofuran. Inorganics that were detected at higher concentrations than background samples included: aluminum, antimony, arsenic, cobalt, chromium, copper, lead, manganese, mercury, nickel, vanadium, and zinc. In general, BBL associated groundwater contamination with groundwater flow through soils containing LNAPL. After contaminants enter the groundwater flow system, they are generally observed throughout the flow system.

Surface Water Sampling

Eight surface water samples were collected from the Hudson River from areas adjacent to the property as well as north and south of the property.

Surface Water Results

There is visual evidence that MGP wastes are impacting water quality in the Hudson River. Slicks and sheens of MGP tar have been observed on the surface of the Hudson River at low tide, in the vicinity of the most grossly-contaminated sediments.

No VOCs were detected in the surface water samples. Several PAHs were detected in two water samples collected in the vicinity of the known sediment contamination. All inorganics detected were at similar concentrations to the background concentrations for the MGP site.

Sediment Sampling

A total of 13 surface and 27 subsurface sediment samples were collected from the Hudson River from areas adjacent to the property as well as north and south of the property.

Sediment Results

Most of the tar contamination was found at relatively shallow depths beneath the sediment surface; however, some visible contamination was found as far as 10 to 15 feet down into the sediment column.

Organics detected in the sediment samples included: BTEX, acetone, 2-butanone, chlorobenzene, 1,4-dichlorobenzene, methylene chloride, trichloroethene, PAHs, carbazole, butylbenzlphthalate, di-n-butyl phthalate, and dibenzofuran. Inorganics detected above MGP background concentrations included: lead, mercury, and zinc.

LNAPLs in sediments were observed in the area adjacent to the shoreline within the upper 0 to 7.5 feet. The following is excerpted from the Revised FS Report, Newburgh Project (adjacent CHGE MGP site), regarding NAPL observed in site sediments during the RI field program: "NAPLs in sediment were generally observed at and near the surface, and associated with sandier seams or organic material. These NAPLs appear to be associated with discharges from the former sewers along and just north of Renwick Street; they could also have resulted from the redistribution of the excavated fill during construction of the sewage treatment plant (STP). During the RI shoreline reconnaissance, sheens were observed in the sediments at six dime-sized areas along the shoreline. Of these six areas, only one revealed NAPL droplets upon digging below the sediment surface."

The LNAPLs could have resulted from the redistribution of excavated fill during the construction of the sewage treatment plant located to the west of the property. Trichloroethene was only detected in the surface sediment.

1.6 Report Organization

The RI report organization is described below. The tables and figures are presented at the end of the report.

Executive Summary	Provides a synopsis of the investigations conducted and their results.
Section 1	Introduction - presents the regulatory framework for performing the RI and summarizes the objectives of the RI. It provides an overview of the study area and site, including summaries of previous investigations.
Section 2	Study Area Investigations - describes the methodology and sampling rationale for the 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, and hydrogeology. Sections on demography, land use, and ecology describe the potential populations and habitats of human and ecological receptors.
Section 4	Nature and Extent of Contamination - lists the soil and groundwater screening criteria and/or standards against which site data were screened to determine the extent of contamination. The type and extent of contamination in each media at the site are described.
Section 5	Contaminant Fate and Transport - evaluates the persistence and mobility in the environment of the contaminants identified and summarizes the fate and transport mechanisms that apply to the site.
Section 6	Risk Assessment Summary - Summarizes the identified receptors, the contaminants of potential concern (COPCs), exposure pathways, and exposure assumptions. The human health risks associated with soil and groundwater impacted by the site are presented. The SLERA evaluated risks to ecological receptors. The HHRA and SLERA have been submitted as separate volumes.
Section 7	Summary and Conclusions - summarizes the findings of the RI and presents conclusions.
Section 8	References

2

Section Two

Section 2
Study Area Investigations

The RI field activities included a soil and source area investigation, a hydrogeological investigation, and a surface water/sediment investigation. All work, except where noted, was performed in accordance with the following documents:

- Final Work Plan, Consolidated Iron and Metal Superfund Site, Remedial Investigation/Feasibility Study, Newburgh, New York, dated February 4, 2003.
- Final Quality Assurance Project Plan (QAPP), Consolidated Iron and Metal Superfund Site, Remedial Investigation/Feasibility Study, Newburgh, New York, dated February 20, 2004.

Activities performed during these investigations are described in this section and listed below:

Soil and Source Area Investigation
- Collected surface and subsurface soil samples for onsite screening of lead, PCBs, and VOCs
- Collected surface and subsurface soil samples for offsite analysis
- Collected subsurface soil and groundwater samples for LNAPL delineation

Hydrogeological Investigation
- Collected groundwater screening samples for 24-hour turnaround VOC analysis
- Installed and developed monitoring wells
- Collected monitoring well samples
- Collected synoptic water level measurements
- Conducted downhole geophysical logging in monitoring wells
- Conducted slug tests in monitoring wells

Surface Water/Sediment Investigation
- Collected surface water and sediment samples in the Hudson River

The RI field investigation was designed to characterize the nature and extent of contamination in site media. The soil investigation also served to characterize the nature and extent of LNAPL observed during previous investigations, just above and below the water table. A summary of these activities is presented in Table 2-1.

Except where noted, RI field investigation activities were conducted in accordance with the EPA-approved QAPP. During the field investigation, deviations from the QAPP were documented on field change request (FCR) forms, and are presented in Appendix C. The forms describe deviations to the QAPP, the reason for the deviation, and the recommended modification. The deviations were discussed with the EPA remedial project manager, and were agreed upon by the CDM site manager and the CDM field team leader. None of the changes affected the project objectives or the representativeness, completeness, precision, or accuracy of the data collected in the field. The FCRs are discussed in the following sections, as appropriate.

2.1 Topographic Survey

Prior to beginning field activities, a topographic survey was performed from April 5 through 9, 2004 to create a base map for the site and its immediate vicinity. The site base map was created at a scale of 1 inch equals 50 feet with a 2-foot contour interval. Each five-foot contour interval is indicated with a bold line. Property boundaries from tax maps and all physical features, such as buildings, driveways, roads, railroads, woodlands, and creeks, were identified on the map, as well as topographic contours.

In preparation for the onsite soil boring program, the surveyor marked out a sampling grid to locate the proposed process area and site-wide soil borings. Process area soil boring locations, where scrap metal processing occurred, near the locations of the metal sheer, compactor/bailer, and smelter area, were marked with wooden stakes in a sampling grid of 50 feet. Site-wide soil boring locations were marked with wooden stakes on a sampling grid of 100 feet. FCR No. 3, dated June 7, 2004, describes a scale miscalculation on the original grid area; although some boring locations were moved based on a subsequent change to the grid, the overall number of sampling points did not change.

During the April 2004 survey, the proposed background soil boring locations were surveyed.

Surface water and sediment sampling locations were surveyed at the time of sampling using a mobile Global Positioning System (GPS). The GPS vertical elevations were referenced to a United States Geological Survey (USGS) bench mark.

2.2 Soil and Source Area Investigation Activities

As part of the RI field activities, surface and subsurface soil samples were collected from process area and site-wide soil boring locations. Results from the screening portion of the field program, which included continuous soil sampling for lead, PCBs and VOCs, were evaluated to locate hot spots and clean areas within the site. Additional borings were added to the soil boring program based on field screening results.

All surface and subsurface samples were collected in accordance with the EPA-approved QAPP, with the following exceptions: VOCs were collected in 40 milliliter (ml) pre-weighed vials instead of Encore samplers (FCR No. 1); dioxin soil samples were held on ice until CLP laboratory procurement was finalized (FCR No. 2); soil samples with sheen were sent for total petroleum hydrocarbon (TPH) analysis (FCR No. 4); and VOC head-space field screening was not performed, levels were recorded as soon as split spoons were opened (FCR No. 5). The dioxin samples were placed on ice and held until the CLP laboratory procurement was finalized. The samples were analyzed before the limits of their holding time. FCRs are included in Appendix C.

2.2.1 Background Soil Borings

CDM collected surface and subsurface soil samples at 10 background soil borings on April 1, 7, and 8, 2004. Eleven surface soil and 10 subsurface soil samples were collected, for a total of 21 background samples, from areas north of the site that were determined to be free of site impacts. Background soils were collected in order to develop site-specific screening criteria for comparison with onsite soil sample data and to assess the impact of site-related activities to onsite soils. Background soil borings are shown on Figure 2-1 and are summarized in Table 2-2. Surface soil samples were collected from the 0 - 12 inch interval in all but one sample. One sample was collected from the 0 - 2 inch interval, as requested by EPA. Subsurface soil samples were collected from the 2 - 4 foot interval. All soil borings were advanced by hand with a hand auger. Background soil samples are denoted by the prefix "BK" followed by "SS" (denoting surface soil) or "SB" (denoting subsurface soil). A sequential number ranging from 01 to 10 was assigned to each surface and subsurface location. Finally, a "D" was added to the end of each soil sample name from the 0 - 12 inch interval, and a "S" from the 0 - 2 inch interval.

All surface and subsurface soil samples were analyzed for TCL VOCs, TCL SVOCs, pesticides/PCBs, TAL inorganics, and dioxins through the EPA CLP. Ten of the 11 surface soil samples were analyzed for dioxins. One of the 10 subsurface soil samples was analyzed for dioxins. All surface and subsurface samples were collected in accordance with the EPA-approved QAPP.

2.2.2 Process Area and Site-Wide Soil Borings

The soil boring program included 21 process area borings and 37 site-wide borings. Five of the 37 borings were contingency borings, which were added to the soil boring program to delineate the horizontal and vertical extent of contamination of VOCs, PCBs, and lead along the eastern portion of the site.

Process area borings were located in the western portion of the site. Samples were collected from a 50-foot by 50-foot grid to delineate the process area since former site activities significantly impacted this area. Site-wide borings were located along the southern boundary of the site, along the northern boundary of the site, and east of the process area to the property's shore line (west of the trees along the river bank). Samples were collected from a 100-foot by 100-foot grid. A larger grid system was used to delineate the site-wide area since site activities were less significant in these areas. All soil borings were advanced with a Geoprobe outfitted with 5-foot long, 2-inch diameter soil samplers and acetate liners.

Surface and subsurface soil samples were collected at 0-1 foot bgs and 2-4 feet bgs, respectively, for off site laboratory analysis of TCL/TAL parameters. Select process area surface soil samples were also analyzed for dioxin. In order to assist in delineating the horizontal and vertical extent of contamination below four feet bgs, CDM also collected continuous field screening samples, from the ground surface to the water table, and performed onsite analysis for VOCs, PCBs, and lead. Samples for onsite screening and off site laboratory analyses were collected concurrently. Four of soil borings were advanced past the water table to collect additional field screening and laboratory samples to investigate the nature and extent of observed LNAPL.

Boring depths ranged from 5 to 30 feet bgs. A CDM geologist logged lithologic data at each boring. The soil boring logs for the process area and site-wide area are located in Appendix D. All soil borings were advanced with a Geoprobe™ using a 2-inch core barrel with acetate liners. All screening and sampling activities were conducted according to the approved QAPP.

2.2.2.1 Process Area and Site-Wide Soil Boring Screening

CDM collected 133 continuous samples from 21 process area soil borings and 208 continuous samples from 37 site-wide area soil borings. The samples were collected at 2-foot intervals, except at intervals where there was no recovery. All process area soil samples are denoted by the prefix "PA" and site-wide area soil samples are denoted by the prefix "SW". A sequential number ranging from 01 to 21 was assigned to soil borings in the process area and a range of 01 to 37 was assigned to soil borings in the site-wide area. Samples in both areas were collected continuously from each 2-foot interval and were denoted as "A" for the first 0 to 2 foot interval, "B" for the 2 to 4 foot interval and subsequently through the alphabet until the bottom of the boring. Samples were screened for VOCs, PCBs, and lead as detailed below.

VOCs

CDM field crews conducted onsite VOC field screening with a photoionization detector (PID) meter; however, due to weather conditions on various days, the PID malfunctioned and VOC data could not be recorded. VOC screening data are summarized in Table 2-3.

PCBs

CDM field crews performed onsite PCB screening using a RaPID Assay® PCB Test Kit. Samples were collected from continuous intervals, except at those intervals that were deemed super-saturated or from intervals that contained only clay material because the RaPID Assay® PCB Test Kit requires dry or nearly dry soil. All samples were collected in accordance with the EPA-approved QAPP. PCB screening samples were held on ice prior to analysis. PCB screening data are summarized in Table 2-3.

Lead

Lead screening was performed by an onsite laboratory utilizing the Field Portable XRF spectroscopy method. All samples were collected in accordance with the EPA-approved QAPP. The onsite laboratory was not able to process all samples collected each day; therefore; lead samples were held on ice for the subcontractor. Lead screening data are summarized in Table 2-3.

Sample Notation

2.2.2.2 Process Area and Site-Wide Soil Boring Sampling

Process Area Soil Borings

CDM collected 23 surface and 24 subsurface soil samples from 21 locations in the process area. Surface soil samples were collected on April 6 and 7, 2004 and subsurface soil samples were collected on April 9 and 10, 2004. Process area surface and subsurface soil borings are shown on Figure 2-2 and summarized in Table 2-4. Surface soil samples were collected from the 0 - 12 inch interval in all but 3 samples. Three samples were collected from the 0 - 2 inch interval, as requested by EPA. Subsurface soil samples were collected from the 2 - 4 foot interval, except for one sample, which was collected from the 17 - 19 foot interval, due to the presence of oily product. All surface and subsurface process area soil samples are denoted by the prefix "PA" and are either followed by "SS" denoting surface soil or "SB" denoting subsurface soil. For surface soils, the 0 - 2 inch interval was denoted with an additional "S" and the 0 - 12 inch interval was denoted with an additional "D". A sequential number ranging from 01 to 21 was assigned to each surface and subsurface location.

All surface and subsurface soil samples were collected for TCL VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics analysis by CLP. Of the 23 surface soils collected within the process area, 15 were analyzed for dioxins. Approximately 10 percent of surface and subsurface soil samples in the process area were also analyzed for total organic carbon (TOC), pH, and grain size.

Site-Wide Soil Borings

CDM collected 39 surface and 40 subsurface soil samples at 37 locations in the site-wide area. Site-wide area surface and subsurface soil borings are shown on Figure 2-2 and summarized in Table 2-5. Surface soil samples were collected from the 0 - 12 inch interval except for 8 samples which were collected from the 0 - 2 inch interval. All subsurface soils were collected from the 2 - 4 foot interval. All surface and subsurface site-wide soil samples are denoted by the prefix "SW" and are either followed by "SS" denoting surface soil or "SB" denoting subsurface soil. For surface soils, the 0 - 2 inch interval was denoted with an additional "S" and the 0 - 12 inch interval was denoted with an additional "D". A sequential number ranging from 01 to 37 was assigned to each surface and subsurface location.

All surface and subsurface soil samples were analyzed for TCL VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics through EPA's CLP. Approximately 10 percent of surface and subsurface soil samples in the site-wide area were also analyzed for TOC, pH, and grain size. All surface and subsurface samples were collected in accordance with the EPA-approved QAPP.

2.2.2.3 LNAPL Delineation

Several petroleum product USTs were located throughout the site (Figure 1-2). In addition, previous investigations identified oil-saturated soils in the vicinity of the compactor bailer. The LNAPL program was designed to delineate the vertical and horizontal extent of observed LNAPL at the site. During the soil boring program, four borings contained visible LNAPL or heavy sheen: PASB-02, PASB-05, SWSB-15, and SWSB-16 (Figure 2-3); these borings were initially advanced to 10 - 15 feet bgs. At the end of the soil boring program, CDM returned to these locations to advance boreholes past the water table, to note observed LNAPL or heavy staining, and to collect groundwater and additional soil samples. These LNAPL borings were advanced to 15 - 27 feet bgs. LNAPL observations in these four borings include: 9-27 feet bgs in PASB-02, 6-8 feet bgs in PASB-05, 1-27 feet bgs in SWSB-15, and 14-15 feet bgs in SWSB-16. Borings were not advanced deeper than 27 feet bgs due to the presence of a clay layer.

Groundwater samples were collected in each of the four soil borings with visible LNAPL or heavy sheen. Soil samples were collected at PASB-02 and SWSB-15 at the interval of the most visible LNAPL or heavy sheen. All soil borings were immediately grouted upon completion to prevent vertical migration of contamination.

All groundwater and soil LNAPL samples were analyzed for TCL VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics through EPA's CLP. In each of these samples, TPH was also analyzed through CDM's analytical laboratory subcontractor, GPL Laboratories, LLLP. LNAPL delineation activities were performed in accordance with the EPA-approved QAPP, with the exception of the additional soil sample collection described in FCR #4, "TPH soil samples".

LNAPL Soil Samples

LNAPL soil samples were collected using a Geoprobe outfitted with 5-foot long, 2-inch diameter soil samplers with acetate liners. Samples are named with the same codes as the shallow soil boring subsurface soil samples, but with the identifier "LNAPL" at the end. Two additional subsurface soil samples were collected: PASB-02-LNAPL was collected from 17-19 feet bgs and SWSB-15-LNAPL was collected from 8-10 feet bgs. No soil samples were collected in PASB-05 and SWSB-16 because no soil was recovered in the split spoon samplers. Soil LNAPL samples are summarized in Table 2-6.

LNAPL Groundwater Samples

At each LNAPL soil boring location, a geoprobe drive-point sampler with a 5-foot screen was advanced to the point where LNAPL or heavy sheen was no longer observed, as specified in the QAPP. In PASB-02 and SWSB-15, observed LNAPL or heavy staining extended to the top of the clay layer at 27 feet bgs; these borings were not advanced past this depth and the groundwater samples were collected at the bottom of the boring. At each sample depth, the screened interval was developed briefly using a peristaltic pump to remove any large-fraction sediment. Groundwater samples were collected at the midpoint of the screened interval using a peristaltic pump with dedicated polyethylene tubing.

Groundwater samples for LNAPL characterization are denoted by the prefix "GWS", followed by the soil boring location number. The identifier "LNAPL" was assigned to each groundwater sample at the end of the location name. The groundwater samples collected for LNAPL were GWS-02-LNAPL, GWS-05-LNAPL, GWS-15-LNAPL, and GWS-16-LNAPL. Groundwater samples for LNAPL characterization are summarized in Table 2-6.

2.3 Hydrogeological Investigation

As part of the RI field activities, geologic and water quality vertical profiling was performed at three monitoring well locations where lithologic logging and groundwater screening samples were collected. Installation activities included a field screening program, which included the collection of groundwater samples from the three locations and sampling for TCL VOCs with 24-hour turnaround. Groundwater screening sample results were one of the criteria used to determine monitoring well screen intervals. Additionally, two rounds of groundwater samples were collected at each of the newly installed monitoring wells. All geologic vertical profiling was performed in accordance with the EPA-approved QAPP.

2.3.1 Geologic and Water Quality Vertical Profiling

CDM selected three vertical geologic and water quality profile locations within the site to characterize the site-specific geology to the top of bedrock or to a significant clay layer and to assess the vertical extent of groundwater contamination. The three geologic and water quality vertical profiles were conducted at MW-01, MW-04, and MW-05. The name of each geologic and water quality vertical profile is associated with each monitoring well location. The geologic and water quality vertical profiling locations are depicted in Figure 2-2.

2.3.1.1 Geologic Vertical Profiling

Continuous 2-foot soil samples were collected with a hollow-stem auger (HSA) rig to characterize the site-specific stratigraphy to the top of bedrock at MW-01 and to a significant clay layer at MW-04 and MW-05. Immediately upon opening the dedicated acetate liners at each location, the sample was field-screened for VOCs using a PID and inspected for sensory evidence of contamination. In addition, each sample was lithologically logged by the CDM field geologist. Appendix D includes the boring logs for the vertical profile locations. Lithology of the geologic vertical profiles is discussed in Section 3.3.2.1.

2.3.1.2 Water Quality Vertical Profiling

In addition to geologic profiles, groundwater screening activities were performed at the three locations shown in Figure 2-2. To establish vertical contaminant profiles at each location, CDM collected groundwater samples with the HSA rig. Table 2-7 summarizes samples collected during the water quality profiling event. Geologic water quality samples were collected at 10-foot intervals from the terminal depth of the boring (the terminal depth was determined during the soil screening program, as the depth at which the groundwater was not impacted by site contaminants) to the top of the water table.

At each location, the drive-point sampler was advanced ahead of the auger to collect a discrete groundwater sample from undisturbed formation. At each discrete depth, the screened interval was developed briefly using a peristaltic pump to remove any large fraction sediment. Water quality readings for dissolved oxygen (DO), pH, oxidation-reduction potential (ORP), temperature, turbidity, and conductivity were collected when possible. An inconsistent purge water flow rate, caused by slow aquifer recharge, prevented the measurement of water quality readings at some intervals. The sampling intervals were considered developed when the water quality parameters stabilized within 10 percent. Groundwater samples were collected from the screened interval using a peristaltic pump with dedicated polyethylene tubing.

The vertical water quality profile locations are identified on figures and tables by the prefix "VPMW-". The number of the vertical profile location was assigned to each name, followed by the depth at which the sample was collected.

A total of 12 vertical profile groundwater samples (excluding duplicates or quality control [QC] samples) were collected for TCL VOC analysis by CDM's analytical laboratory subcontractor, GPL Laboratories, LLLP, for 24-hour turnaround time analysis. The two most contaminated groundwater samples from each profile location (a total of six samples excluding duplicates or QC samples), were recollected and sent to a CLP laboratory for analysis of TCL VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics.

Results from the vertical profile groundwater samples are discussed in Section 4.3.4.2.

2.3.2 Monitoring Well Installation

Based on evaluation of the vertical geologic and water quality profiles, CDM installed a total of nine monitoring wells, as shown in Figure 2-2. Well construction details are presented in Table 2-8. Monitoring wells were installed to define the vertical and lateral extent of groundwater contamination and to provide a means for long-term monitoring of groundwater quality. Continuous split-spoon samples were only collected in the geologic vertical profile locations for lithologic logging MW-01, MW-04, and MW-05), and not at every monitoring well location (FCR No. 6). The following wells were installed:

- MW-01 was installed north of the site's former process equipment and former USTs.
- MW-02 was installed immediately downgradient of the compacter/bailer.
- Four wells were installed across the center of the site: downgradient of the tire piles (MW-03), smelter (MW-04), compactor/bailer (MW-05), and maintenance building (MW-06).
- MW-07 and MW-08 were installed along the river bank, further downgradient from the smelter and compactor/bailer, respectively.

- MW-09 was installed near the southwestern portion of the site for background monitoring purposes.

Given access issues and subsurface conditions (i.e., the lack of sufficient overburden material for installation of a monitoring well west of the site), a background monitoring well upgradient of the site was not possible. As a result, the original background well, MW-1, was planned for the most upgradient area (northwest corner) of the site. However, due to high VOC exceedances in the VPMW groundwater screening samples at this location, the background piezometer was changed to a 4-inch ID monitoring well, relocated to the southwest corner of the property, and named MW-09. MW-09 is sidegradient/upgradient of contaminant sources at the site, and is the closest approximation of a background well at the site. Under these circumstances, the rationale for using MW-09 as the background well, even though it is not fully upgradient of the site include:

- MW-09 is located in the southwest corner of the site, upgradient and sidegradient of contaminant sources at the site. This is supported by groundwater flow diagrams (Figures 3-9 and 3-10) which show groundwater flow to the east/southeast.

- The majority of contaminant levels in MW-09 are either non-detect or significantly lower than those in the eight downgradient wells. Only four contaminants exceeded screening criteria in MW-09 during the first groundwater sampling event (benzene, iron, manganese, and sodium). These same four contaminants, plus thallium, exceeded screening criteria during the second round. Of these contaminants, only iron and benzene are considered site-related. Iron levels in MW-1 were 7.5 to 117 times lower than downgradient wells during Round 1, and 7 to 109 times lower during Round 2. Benzene levels in MW-9 were higher than some downgradient results: levels during Round 1 and Round 2 were 9.6 and 13 ug/L, respectively; exceedances in downgradient wells ranged from 3.8 to 18 ug/L during Round 1 and from 1.9 J to 4.9 ug/L. Benzene levels may be site-related or attributable to runoff from the nearby railroad and street. It should be noted that other VOCs detected in downgradient wells (MTBE and toluene, ethylbenzene, and xylene (TEX) compounds) were not detected in MW-09.

Monitoring wells were drilled using a Mobile Drill rig with 6 ⅝-inch inner diameter (ID) hollow stem augers with a center plug and constructed with 4-inch ID polyvinyl chloride (PVC) casing and screen. All wells were installed with 10-foot screens in accordance with EPA Region II low-flow, minimum drawdown sampling protocols and for tidally-influenced and seasonal water table fluctuations. Monitoring wells were installed in accordance with EPA and NYSDEC procedures for drilling and well construction as detailed in the Final QAPP. Well construction diagrams for the monitoring wells are in Appendix E.

The purpose of the monitoring wells was to define the vertical and lateral extent of groundwater contamination and provide a means for long-term monitoring. Monitoring well screen intervals were based on the following: 1) observations of visible free phase LNAPL in split spoon samples, 2) field screening results, 3) vertical groundwater profile sample results, 4) downhole geophysical gamma logging data, and 5) vertical profile lithologic observations. Table 2-8 presents monitoring well construction details and rationale.

Monitoring well development was performed at each well location to remove silt and well construction materials from the well screen and sand pack and to provide a good hydraulic connection between the well and the aquifer materials, as described in the QAPP. Development was complete when a visually sediment-free discharge was achieved and pH, specific conductivity, turbidity, and temperature stabilized within a ±10 percent range. Once the monitoring wells were developed, they were allowed to equilibrate for at least two weeks prior to sampling.

2.3.3 Downhole Geophysical Logging

CDM conducted downhole gamma logging at MW-01, MW-04, and MW-05. The logs were correlated with the respective lithological boring logs. The gamma logs were conducted inside hollow-stem augers prior to the installation of each well, using a Mount Sopris downhole gamma logger, Model MGX-II and gamma probe Model PGA-1000. Two logging runs were performed at each location; one log was run as the probe was lowered to total depth, and a second log was run as the probe was raised to the ground surface. The downhole logging instrument was calibrated by the equipment supplier in accordance with the manufacturer's instructions. A computer software program, provided by the manufacturer, was used to plot and interpret the collected data. Downhole gamma logs are presented in Appendix F. Downhole gamma logging was conducted in accordance with the methods and protocols defined in the Final QAPP. Results of the downhole gamma logs are presented in Section 3.3.2.2.

2.3.4 Slug Testing

CDM conducted slug tests in August 2004, at each of the nine monitoring wells, to estimate hydraulic conductivity and specific capacity of the aquifer. During slug testing, each monitoring well was outfitted with an In-Situ, Inc. miniTROLL Pro™ data logger. A solid PVC slug was lowered into the monitoring well to simulate a falling head slug test. Once the water level stabilized, the slug was withdrawn from the well, simulating a rising head slug test. Both sets of tests were used to calculate hydraulic conductivity.

Each miniTROLL Pro™ consisted of a submersible probe containing the pressure sensor, data logger, memory and battery, all of which were connected to a communications and support cable. Pressure sensors were designed to withstand up to 30 pounds per square inch (psi) of water pressure. At the start of the monitoring period, the miniTROLL Pro™ was suspended in each well to position the pressure transducer no more than 10 feet below the water surface. Once the miniTROLL Pro™

was installed, a hand-held iPAQ™ pocket personal computer (PC) was connected to a communications cable attached to an open port at the top of the well to load the correct pressure transducer specifications from the operator manual. During each test, manual static water levels were simultaneously collected to establish a reference point for subsequent water level readings. The data logger was then programmed to record water level readings for the duration of the test period. The data were downloaded onto a laptop computer, and a computer software program, provided by the manufacturer, was used to plot and interpret the data for presentation; these data are included in Appendix G. Results of the slug tests are presented in Section 3.4.2.2.

2.3.5 Synoptic Water Level Measurement

Synoptic water levels are water levels taken over a short period of time that display conditions as they exist simultaneously over a broad area (i.e., the site). CDM collected two rounds of synoptic water level measurements prior to each monitoring well sampling round. Measurements were collected with an electronic water level indicator, and measured to the nearest 0.01 foot from the surveyors mark, a groove filed into the top of the inner riser casing, which was surveyed by CDM's surveying subcontractor.

Round 1 synoptic water levels were collected on August 16, 2004 between 10:56 and 11:40; this time period generally fell between the low and high tides for that day, which occurred at 7:35 and 13:16, respectively. Round 2 synoptic water levels were collected on November 8, 2004 between 14:45 and 15:45; this time period coincided with the low tide for that day, which occurred at 14:56. Section 3.4.2.1 presents results of the water level measurement activities.

2.3.6 Monitoring Well Sampling

Two rounds of monitoring well sampling were conducted to delineate the vertical and lateral extent of groundwater contamination. Following the collection of synoptic water level measurements, groundwater samples were collected from the nine newly installed monitoring wells (MW-01 through MW-09).

Monitoring wells were purged and sampled using a 2-inch submersible Grundfos pump with dedicated ¾-inch Teflon™-lined polyethylene tubing, following the site-specific, low-flow, minimum drawdown sampling procedure stated in the Final QAPP. This procedure follows the EPA standard operating procedure (SOP), "Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling," dated March 16, 1998 (final version). DO, ORP, turbidity, pH, temperature, and conductivity measurements were collected at three- to five-minute intervals during the low-flow well purging until parameter stabilization was achieved as specified in the Final QAPP. Monitoring well samples for Rounds 1 and 2 are summarized in Table 2-9. Low-flow groundwater sampling sheets are included in Appendix H.

Eighteen groundwater samples (2 rounds) were collected (excluding duplicates or QC samples). All samples were analyzed for low detection limit (LDL) VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics, including cyanide, through the EPA

CLP. LDL VOCs were analyzed via EPA Statement of Work (SOW) OLC03.2. TCL SVOC and pesticide/PCBs were analyzed via EPA SOW OLM04.3 (regular concentration) and TAL inorganics and cyanide were analyzed by EPA SOW ILM05.3 ICP-AES method. Ferrous iron samples were analyzed on site using the HACH Test Kit Method 8146.

Results from the groundwater samples are discussed in Section 4.3.4.

2.4 Surface Water/Sediment Investigation

Surface water and sediment sampling was conducted in the Hudson River in the vicinity of the site. Surface water and sediment sampling was designed to support an evaluation of the nature and extent of contamination resulting from potential overland migration of contaminated soils as well as from groundwater discharge into the river. The surface water and sediment locations are shown on Figure 2-4. Locations were presented in a memorandum entitled "Proposed Locations for Hudson River Surface Water and Sediment Samples", dated July 9, 2004 and approved by EPA; this memorandum is included as Appendix N.

2.4.1 Surface Water Sampling

CDM collected surface water environmental samples from 20 locations in the Hudson River. The surface water samples were collected prior to sediment samples at each location. All surface water samples were co-located with sediment samples. Ten background surface water samples were collected upstream of the site to represent background conditions. Ten downgradient (i.e., within 20 feet of the site, when feasible) surface water samples were collected in the shoreline area adjacent to the site. Surface water samples and rationale are summarized in Table 2-10.

Prior to beginning surface water sampling, CDM collected water quality measurements, which included pH, conductivity, turbidity, DO, temperature, and ORP and surface water flow measurements at three depths in the water column at each sampling location (Table 2-11). Surface water flow measurements and tidal flow measurements were used to qualitatively assess the effects of dilution, as it relates to the discharge of groundwater and surface water from the site into the Hudson River. The flow measurements were also used to qualitatively assess the particle settling time and dispersion associated with any contaminated suspended solids that were historically discharged to the river via surface water runoff. Surface water sampling sheets are included in Appendix I.

The surface water samples are identified on figures and tables by the prefix "SW" followed by the location number (01 through 20). All surface water samples were analyzed for TCL VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics, including cyanide, through the EPA CLP. Surface water samples were also analyzed for hardness, total suspended solids (TSS), total dissolved solids (TDS), dissolved oxygen content (DOC), and sulfate through CDM's analytical laboratory subcontractor, GPL Laboratories, LLLP. All samples were analyzed using the most current EPA-approved method as detailed in the Final QAPP.

Results from the surface water samples are discussed in Section 4.3.3.

2.4.2 Sediment Sampling

CDM collected sediment samples from 20 locations in the Hudson River, co-located with the surface water samples. After collecting the surface water samples, CDM collected a sediment sample at each location. Ten background sediment samples were collected upstream of the site to represent background conditions (outside of any influence from the site). Ten downgradient (i.e., within 20 feet of the site, when feasible) sediment samples were collected in the shoreline area adjacent to the site. Sediment samples and rationale are summarized in Table 2-10. In addition, water quality measurements, flow measurements, and tidal information was collected by CDM's subcontractor, Normandeau Associates and is shown on Table 2-11.

To be comparable with the previous river sediment sampling efforts conducted in 1999 by START (Weston 2000a), all sediment samples were collected with a ponar dredge. As specified by risk assessment guidelines, samples were collected from 0-6 inches.

The sediment samples are identified on figures and tables by the prefix "SD" followed by the location number (01 through 20). All sediment samples were analyzed for TCL VOCs, TCL SVOCs, pesticides/PCBs, and TAL inorganics, including cyanide, through the EPA CLP. Sediment samples were also analyzed for TOC, pH, cation exchange capacity (CEC), and grain size through CDM's analytical laboratory subcontractor, GPL Laboratories, LLLP. All samples were analyzed using the most current EPA-approved methods.

All sediment sampling locations were surveyed with the GPS system at the time of collection by CDM's subcontractor, Normandeau Associates.

Results from the sediment samples are discussed in Section 4.3.2.

2.5 Ecological Characterization

An ecological characterization was performed for the CIM site in accordance with the CDM Final Work Plan. For this characterization, USGS topographic maps (Farmingdale and Asbury Park quadrangles), National Wetland Inventory map (Asbury Park quadrangle) (United States Department of the Interior [USDOI] 1972), and aerial photographs of the site were initially viewed to identify the general physical and ecological features of the site. In addition, state and federal agencies were contacted to provide rare, threatened and endangered species information for the site and immediate vicinity. The ecological characterization is discussed in Section 3.8.

2.6 Control of Investigation-Derived Waste

CDM procured the services of an investigation-derived waste (IDW) disposal subcontractor to dispose of all site wastes. Soil generated during drilling was stored in

55-gallon drums at the decontamination/staging area. All monitoring well development water and sample purge water was stored in a 4,000 gallon tank. The IDW subcontractor sampled all soil-filled drums and purge water to determine RCRA characteristics for disposal. All soil and purge water generated during the investigation were determined to be non-hazardous and were properly disposed by the IDW subcontractor.

3

Section Three

Section 3
Physical Characteristics of the Study Area

3.1 Surface Features

The site lies in the Lower Hudson Valley, on the west bank of the Hudson River, and is approximately 500 feet east of the central business district of Newburgh. The site is located on an area of relatively low topographic relief known as the Hudson-Champlain Lowlands of eastern New York. The Taconic Mountains are to the east, across the Hudson River; the Catskill Mountains are to the northwest, and the northern extension of the Palisades Ridge is to the south.

According to the *Newburgh* 1:24,000 USGS topographic map (USGS 1957), the CIM site is located on a relatively flat area at an elevation of approximately 40 feet above mean sea level (amsl) and about 10 feet above the adjacent Hudson River (at mean low tide elevation). From the Conrail line to the west, a moderate to steep slope rises to a generally flat plateau at an elevation of 100 to 200 feet amsl that continues west to the City limits (Figure 3-1). The ground is rolling to the west of the City. According to the site's Flood Insurance Rate Map (Panel # 360626-0002 B), the eastern portion of the site next to the Hudson River is located within Zone B, an area between the limits of 100-year floods and 500-year floods; the western portion of the site is within Zone C, an area of minimal flooding (National Flood Insurance Program 1980). The 100-year flood plain is confined to a narrow band along the Hudson River, although along the southern edge of the City, the flood plain is a wider area.

3.2 Soils

The predominant soils in the site's vicinity are well drained, coarse textured, and have high infiltration rates (Weston 2000a). According to the Orange County Soil Survey (United States Department of Agriculture [USDA] 1981), most site soils are designated as Urban Land: areas in which the original native soils have been modified, disturbed, reworked, removed, and/or covered by man-made structures such as buildings, roads, and asphalt parking lots. The western edge of the site is underlain by Mardin Series soils (MdC): a 42 to 72 inch-thick, light olive brown, silt loam which is massive, firm, and moderately acidic. Figure 3-2 illustrates the soils in the site's vicinity. Historical aerial photographs suggest much of the site is composed of fill material. Onsite soil boring logs indicate that the soil is composed of dark brown sand with silt lenses and with bricks, gravel, glass, metal wires, auto fluff, some clay, and other debris.

3.3 Geology

The sections below describe the regional and site-specific geology.

3.3.1 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 "Taconics", created during the late Ordovician (about 440 million years ago), are a chain of mountains forming the northern-most segment of the Appalachian mountain chain. They were formed along the eastern United States during a succession of mountain building events during the early Paleozioc Era, during the collision of New England and the ancient eastern continental passive margin of North America. Deep water, fine-grained sediments had been deposited on the passive margin prior to the collision and were pushed westwards, creating a complex zone of highly deformed rocks ahead (west) of the crystalline rocks of New England. The site is located within this area of deformed Paleozioc rocks.

The bedrock underlying the Newburgh area is of Lower Paleozoic age and part of an approximately 4,500-foot-thick succession of Cambro-Ordovician-age fine-grained sandstones, dolostones, and limestones called the Wappinger Group (Friedman 1994; Guo 1994; Guo *et al* 1996a; Guo *et al* 1996b) and Middle Ordovician dark grey shales of the Martinsburg Formation (Jaffe and Jaffe 1973; Leggett, Brashears & Graham, Inc. [LBG] 1995). Figure 3-3 presents the generalized stratigraphy for southeastern New York (Isachsen *et al.* 2000).

During the last glaciation, the study area, 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 Age (200,000 years ago). 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 340 feet above present sea level, forming glacial Lake Albany which extended from Glens Falls, NY to Newburgh (Dineen 1975, 1982; Smith *et al.* 1995).

The glaciers and succeeding meltwaters deposited a thick accumulation of sediments, filling the former bedrock valleys. Figure 3-4 presents a generalized map of glacial deposits recognized in the Newburgh area (www.nysm.nysed.gov/data/surficial.html) (NYSM 2002a).

3.3.2 Site-Specific Geology

The site is underlain by a stratified clay and silt unit with thin to absent layers of sand and gravel at the land surface and below the water table (Figure 3-5) (LBG 1995). The unconsolidated deposits are underlain by the Martinsburg Formation, which consists of shale and carbonate rocks (e.g., limestones and dolostones). The bedrock is cross cut by faults in the site's vicinity (Lawler, Matusky & Skelly Engineers 1994). Figure 3-6 indicates a dextral (right lateral) strike slip fault trending west northwest-east southeast is located beneath or close to the CIM site (www.nysm.nysed.gov/data.html) (NYSM 2002b).

During the RI, 62 process area and site-wide soil borings were advanced. Downhole gamma logs were run in three of the vertical profile boreholes to correlate with lithologic descriptions in the boring logs. The lithologic results of these activities are documented in the following subsections.

3.3.2.1 Vertical Profile Well and Soil Boring Lithology

Twenty-five process area and 37 site-wide soil borings were advanced to approximately 15 feet bgs and four vertical profile borings were advanced to depths up to 37 feet bgs. Soil boring logs are presented in Appendix D. The lithologic descriptions from soil borings indicate the following deposits are present.

<u>Fill</u>

Fill deposits are primarily confined to the top 20 feet of material at the site. The lithology includes a mixture of yellow, brown, greyish green, and black, fine- to coarse-grained sand, gravel, and trace silt with bricks, concrete, rebar, metal, glass, wood, ash, cinders, and plastic.

Eleven borings contained a 1- to 4-foot layer of dark gray silty slurry. The slurry did not have an odor, and PID readings did not indicate elevated levels of VOCs in the slurry. The origin and chemical nature of the slurry is unknown; no samples were collected. The slurry generally occurred at three approximate depths: 5-9 feet bgs, 10-14 bgs, and 15-18 bgs. The borings are scattered throughout the northern half of the site. Borings and approximate depths where the slurry was observed include: SWSB-01 (5-9 feet), SWSB-05 (5-8.5 feet), SWSB-07 (11-12 feet), SWSB-10 (10-12.5 feet), SWSB-11 (15-18.5 feet), SWSB-12 (5-6 feet), SWSB-13 (12-13 feet), SWSB-17 (10-12 feet), PASB-10 (5-8.5 feet and 10 -13.5 feet), PASB-15 (8-12 feet and 15-17 feet), and PASB-19 (10-11 feet).

It should be noted that the slurry is not believed to be related to either the LNAPL observed at the site, or the coal tar from the adjacent MGP site, for the following reasons: 1) observed slurry locations do not correlate with observed LNAPL locations, 2) PID readings indicated no VOC odors emanating from the slurry, 3) the slurry was not observed in soil borings closer to the MGP site, and 4) the slurry did not have the distinct naphthalene odor characteristic of coal tar.

<u>Sand/Gravel</u>

Native deposits, which underlie fill deposits, consist of a mixture of yellow, brown, greyish green, and black, fine- to coarse-grained sand, gravel, and trace silt.

<u>Clay</u>

Clay lenses occur as thin, non-continuous layers within the fill and native sand and gravel deposits. The lenses are made up of a tan to dark greenish gray, medium to stiff clay. In some instances, these layers cause perched water table conditions.

A thicker clay layer was observed below the native sand/gravel deposits, in some of the deeper borings. The clay was gray, loose to stiff, and plastic. The top of the clay was observed in two soil borings and three monitoring well borings at depths that increased from west to east. Depths ranged from 22.5 feet in the southwest corner of the site (MW-9) to 31 feet bgs at MW-5, which is the eastern-most location in which the clay was observed. Other observations were noted at PASB-02 at 27 feet bgs, at PASB-15 at 27.5 bgs, and at MW-4 at 29.5 bgs.

Bedrock

Weathered bedrock was encountered at only one vertical profile boring in the northwest corner of the site (MW-1), at a depth of 38 feet bgs. Although drilling did not advance through the bedrock at this location, the depth is consistent with those encountered during investigations at the adjacent MGP site along its western boundary. Depth to bedrock across the rest of the CIM site has not been defined. Bedrock is a dark gray shale belonging to the middle Ordovician Martinsburg Formation (LBG 1995).

Cross Sections

Geologic information from soil boring logs was used to create a geologic cross-section through the center of the site. The cross section location is shown on Figure 3-7, and the geologic cross section is presented as Figure 3-8. Additional data from geologic investigations at a facility bordering the CIM site to the south were used to extrapolate the geology in the deeper parts of the cross section (BBL 1999). As illustrated on the geologic cross section, the stratigraphic units dip to the east, toward the Hudson River. Fill deposits thicken toward the east, and range from approximately 17 feet in the east (near PASB-7) to over 25 feet closer to the Hudson River (near SWSB-16). Minor clay lenses occur within this unit. The slurry, observed in three distinct layers, is shown in soil borings PASB-10 and PASB-15. Sand and gravel deposits, underlying the fill, extend an additional 8 to 13 feet below the fill. The alternating clay/silt and sand/gravel layers also thicken to the east. Bedrock, which was not observed in any of the cross section borings, occurs at depths greater than 38 feet bgs.

3.3.2.2 Downhole Gamma Logs

CDM conducted downhole gamma logging at MW-1, MW-4, and MW-5. Lithologic data from the gamma logs were correlated with the lithologic information on the respective lithological boring logs. In general, the gamma logs corresponded well with the lithologic logs prepared for the respective vertical profile borings. The contact between the sand/gravel layer and the clay/silt layer was not observed in the three gamma logs due to flowing sands. The drilling subcontractor attempted to use a bottom plug on the lead auger, but had problems dislodging it, which allowed sands to flow up approximately four feet into the augers. Refer to Appendix F for the downhole gamma logs.

3.4 Hydrogeology

The sections below describe the regional and site-specific hydrogeology.

3.4.1 Regional Hydrogeology

Groundwater in Orange County occurs in both unconsolidated sand and gravel aquifers and consolidated bedrock aquifers (LBG 1995). Sand and gravel aquifers exist in both unconfined and confined environments. The bedrock aquifers are almost always considered confined or semi-confined and are generally overlain by confining layers of glacial till or low permeability deposits. The available groundwater in both sand and gravel and bedrock aquifers is a renewable resource that is continuously replenished by precipitation on the local watersheds of Orange County. Estimated recharge rates to the sand and gravel aquifers can be from 500,000 gallons per day (gpd) to 1,000,000 gpd per square mile. An estimated recharge rate for sedimentary bedrock wells is 400,000 gpd per square mile (Snavely 1983).

The water table roughly parallels the land surface, although local variations may alter the direction of flow. Groundwater flows downgradient, where the aquifer is dissected by river or stream channels, groundwater discharges into the channels. All streams receive groundwater during periods without precipitation or direct runoff, streams are sustained by groundwater inflow (Snavely 1983).

The potable water source for the City of Newburgh is surface water drawn from Washington Lake located in the towns of New Windsor and Newburgh, west of the city. Two additional sources of water are available to the City, including Brown's Pond (also known as Silver Stream Reservoir) and New York City's Catskill Aqueduct.

According to the Newburgh Water Department, no potable water supply wells are active within the City of Newburgh (CDM 2004). The nearest public supply wells are located over two miles to the northeast of the site, across the Hudson River in Dutchess County and unlikely to be impacted by site-derived contamination.

3.4.2 Site-Specific Hydrogeology

The unconsolidated water table aquifer, which overlies the bedrock aquifer, is comprised of fill material underlain by native sand and gravel with localized silt lenses. The water table aquifer is approximately 20 feet thick. All of the monitoring wells are installed within this aquifer. Slug tests were completed for each well, and are discussed in Section 3.4.2.2.

The underlying shale-dominated Martinsburg Formation likely exhibits low permeabilities based on the low porosity of the bedrock unit. Secondary porosity caused by interconnecting fissures and fractures yield only low to moderate permeabilities (LBG 1995). Yields for bedrock wells range from 3 to 225 gallons per minute (gpm). Higher yields would likely result from moderately to highly fractured units with a relatively high degree of interconnection. A bedrock fault zone has been mapped in the vicinity of the site, likely resulting in high secondary permeability (www.nysm.nysed.gov/data 2002b). This fault zone could be targeted for high yielding wells (Lawler, Matusky & Skelly Engineers 1994). Depending on the degree of interconnectivity between the bedrock fault zone and the shallow aquifer unit, groundwater can migrate from the unconsolidated units into the bedrock aquifer.

3.4.2.1 Synoptic Water Level Measurements

CDM collected synoptic water level measurements prior to each round of monitoring well sampling. Table 3-1 presents water level measurements and elevations for the two rounds of data. Round 1 (August 2004) water levels were collected in between the low and high tides; Round 2 (November 2004) water levels were collected at low tide. Based on the two rounds of synoptic water level measurements, groundwater flows to the east/southeast toward the Hudson River. The water table at the site is generally flat, with elevations in August 2004 ranging from 3.18 feet amsl (14.43 feet bgs) at MW-1 in the northwest corner of the site, to 0.44 feet amsl (11.97 feet bgs) at MW-7 in the southeastern part of the site. A second round of measurements in November 2004 followed the same pattern, with flow to the east/southeast, toward the Hudson River. Figures 3-9 and 3-10 illustrate water table contours for measurements collected in August and November 2004, respectively.

Groundwater flow gradients vary across the site; overall gradients from the two rounds of data ranged from 0.0036 to 0.0107. Steeper gradients are present at the northern and southern ends of the site, with a shallower gradient across the center of the site. Groundwater flow gradients were calculated for the two rounds of water level data, for areas in the north, central, and southern sections of the site. Gradients calculated from the first round ranged from 0.0082 at the southern end of the site, to 0.0052 in the center of the site; the northern gradient fell within that range, at 0.0069. During Round 2, the gradients ranged from 0.0036 at the southern end, to 0.0107 in the center; the northern gradient again fell within that range, at 0.0099.

3.4.2.2 Slug Tests and Hydraulic Conductivity Measurements

CDM conducted slug tests in August 2004, at each of the nine monitoring wells, to estimate hydraulic conductivity and specific capacity of the aquifer. Slug test logs are presented in Appendix G.

CDM performed rising head and falling head slug tests in August 2004, at each of the nine monitoring wells, to estimate hydraulic conductivity of the aquifer. Slug test logs and solution graphs are presented in Appendix G. Based upon the unconfined nature of the aquifer in the site area, the Bouwer and Rice (1976) method was used to derive hydraulic conductivity estimates.

CDM selected the Aquifer$^{\mathrm{Win32}}$- WinFlow-WinTran Version 3 software to analyze the data (Environmental Simulations, Inc. [ESI] 2003). In addition, CDM assumed that the aquifer is isotropic. The static water level was above the top of the screen for all of the monitoring wells so a correction for filter pack porosity was not necessary.

The slug test data were analyzed using Aquifer$^{\mathrm{Win32}}$- WinFlow-WinTran to determine hydraulic conductivity (K). The results of the analysis of the data from the nine wells, MW-1 to MW-9, are listed in Table 3-2 . The average conductivity was calculated from both the falling head and rising head slug test solutions. The hydraulic conductivity values range from a minimum of 0.33 foot per day (ft/d) at monitoring well MW-8 to a maximum of 78.2 ft/d at MW-6. The average hydraulic conductivity from all site wells is 18.9 ft/d.

Groundwater flow velocity across the site was calculated using the site average hydraulic conductivity of 18.9 ft/d, the hydraulic head gradient of 0.0066 from the second round of groundwater elevation measurements, and an assumed porosity for a medium sand of 0.3 (Fetter 1994). The average groundwater flow velocity across the site is 0.42 ft/d.

3.4.2.3 Estimate of Groundwater Movement

Groundwater movement across the site can be estimated using the above calculated hydraulic conductivity measurements and gradient ranges in the following equation:

$$V = \frac{K\iota}{\eta}$$

where:
V = groundwater velocity (ft/d)
K = average hydraulic conductivity: 18.9 ft/d
ι = hydraulic gradient range: 0.0036 - 0.0107
η = effective porosity: assumed to be 30 percent, for a gravel and sand aquifer
Soil bulk density of 1.57 grams per milliliter (g/mL)

The estimated average groundwater velocity, given the range of hydraulic gradients, ranges from 0.23 - 0.67 foot per day, or 82.8 to 246 feet per year. In all cases, there is substantial movement of the groundwater through the aquifer.

Estimates of groundwater movement from the time the Eureka Shipyard began operations during World War 1 (1914), to the present (2006) range from 7,618 to 22,190 feet. Contamination in the groundwater, however, would likely move at a slower rate than the groundwater itself. Estimated distances traveled by individual contaminants were obtained by dividing the groundwater movement by the contaminant retardation factor; these distances are presented for the range of hydraulic gradients as shown in Table 3-3. The travel range for lead was from 2.96 to 4.80 feet from 1914 to 2006, using literature Kd values only. The results indicate that PAHs and PCBs are relatively immobile, whereas lead, zinc, and iron have a wide range of travel distances in groundwater

3.5 Meteorology

The climate in the New York area is typical of the northeastern North American continent and can be classified as Polar Continental. This climate includes alternating air masses of cold dry polar air and moist warm tropical air. Temperatures for the area range from an average minimum in January of 24 degrees Fahrenheit (F) to an average maximum in July of 72 degrees 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.

The RI field program was completed during the summer months and temperatures ranged from the low 80s to the upper 90s. Precipitation was normal, averaging approximately 12 inches throughout the program.

3.6 Surface Water Hydrology

The Hudson River drains a total of 13,390 square miles in northeastern New York, and parts of Vermont, Massachusetts, Connecticut, and New Jersey. The basin contains three drainage areas: the upper Hudson from Mt. Marcy to Troy, the Mohawk from Rome to Troy, and the lower Hudson (in which the site is located) from Troy to New York Bay. The Hudson and Mohawk drainage basins are fresh water; the lower Hudson is an estuary.

The Hudson River Estuary is a drowned river valley rising only 1.5 feet along 150 miles between New York City and Troy. The estuary is maintained as a shipping channel, and dredged to maintain a minimum depth of 9-11 meters (m), although portions of the river are much deeper, (e.g., 66 m at West Point). Slightly more than half the estuary is covered by marshes and wooded swamps; the remainder consists of mud flats that are flooded at high tide. Wetlands are in greatest abundance in the upper third of the estuary. No wetland areas are present between the site and the Hudson River (Weston 2000a).

The Hudson River Estuary is tidally influenced from the Battery to the Federal Dam at Troy. Mean tidal flow varies from 425,000 cubic feet/second (cfs) (12,040 cubic meters/second [m^3/s]) at the Battery to 0 cfs at the Federal Dam. Two high and two low tides occur daily; the average tidal range is 1.4 m (approximately five feet), and is approximately 3.5 feet at Newburgh (http://www.co-ops.nos.noaa.gov/tides, National Oceanic and Atmospheric Administration [NOAA] 2002). Strong winds from the south and north can push water into or out of the estuary, obscuring the true tidal regime. Mean flood and ebb current velocities are 0.36 and 0.40 meters per second (m/s), respectively. Tidal flow can be 10 - 100 percent greater than fresh water flow; fresh water flow varies seasonally. The highest fresh water flows into the estuary occur in spring and fall, associated with snow melt and rains; the lowest input occurs in late summer. Most of the fresh water enters the estuary above Troy; the remainder joins the Hudson from tributaries. A rough approximation of flushing time, based on the ratio between water volume to annual fresh water flow is 0.35 year (126 days). The Hudson River at Newburgh is a fresh water body. However, during drought conditions salinity increases such that the water becomes brackish (Weston 2000b).

The NYSDEC classifies the Hudson River in the site's vicinity as a Class B surface water (Weston 2000b). The best usages of Class B waters are primary and secondary contact, recreation, and fishing. The Class B classification also indicates that the Hudson River is suitable for fish propagation and survival in the area of the CIM site. Therefore, the Hudson River adjacent to the CIM site is considered a sensitive environment under Section 305(a) of the Clean Water Act (1990). The Hudson River in the vicinity of the site is used for commercial and recreational fishing (Weston 2000b). Shad are caught by commercial fisheries. Recreational catches include blue claw crab, eel, catfish, white perch, and sturgeon.

As a result of Hurricane/Tropical Storm Floyd in September 1999, the Hudson River flooded the northwest corner of the site, an area around a former processed soil pile and an area of contaminated fill. According to Weston (2000b), the Hudson River has periodically risen, causing occasional flooding in the northeast corner of the site.

As the site is unpaved, storm water from the site discharges directly into surface soils. Prior to START constructing an earthen berm and detention basin on the eastern side of the site in 1999, storm water runoff was able to flow across the site, around a previously-existing berm (constructed by the owner) directly into the Hudson River.

3.7 Population and Land Use

CDM's review of the 2000 census data for Newburgh revealed the population increased from 26,454 in 1990 to 28,259 in 2000, a 6.8 percent growth. This population gain exceeded the growth rate of the state (5.5 percent), but lagged the Orange County growth rate of 11.0 percent and the US growth rate of 13.1 percent.

Unemployment in Newburgh has been a persistent problem. Even as state and national unemployment percentages declined to four percent and below, the rate for the City has seldom gone below six percent.

The Newburgh City percentage of persons without a high school diploma is two and one-half times the national percentage; 62.1 percent of the population in 2000 either had no diploma or only a high school diploma. The City of Newburgh lags state and national income figures, and has had slower growth among the measures of income and economic strength. The local retail market does not appear to be strong, although the County and the general region are relatively affluent.

In 1997, the area had 2,782 establishments in operation, including 1,173 firms in the services sector, 617 retail operations, 282 construction firms, and 165 wholesale establishments. By 2000, the area lost 7.5 percent of the total businesses. The number of construction firms decreased by almost one-quarter over this period, despite a relatively robust economy. Figure 3-11 illustrates land use around the site in the City of Newburgh. According to the City of Newburgh tax assessors office, the CIM property is zoned Waterfront Mixed Use (W1), which includes parks, museums, restaurants, and residential use. According to the Town of Newburgh, potential reuses for the site include residential areas.

The federal government has not completed a current review of the census data since 2000. In 2003, the estimated population was 28,412. In 2002, the per capita personal income in Orange County was $29,013 and at the time of the 2000 census, Newburgh's per capita income was $13,360, compared with $21,587 nationally. Thirty percent of Newburgh residents age 25 and older have college degrees. Unemployment and crime remains a persistent problem in Newburgh.

3.8 Ecological Characterization

An ecological characterization was performed for the CIM site in accordance with the CDM Final Work Plan (CDM 2003). For this characterization, USGS topographic maps (Newburgh, Wappinger Falls, Cornwall and West Point 1:24,000 quadrangles), National Wetland Inventory map (Newburgh quadrangle) (USDOI 1972), and aerial photographs of the site were initially viewed to identify the general physical and ecological features of the site. In addition, state and federal agencies were contacted to provide rare, threatened and endangered species information for the site and immediate vicinity.

Ecological reconnaissance for field characterization was conducted on August 20, 2004. The results of the ecological characterization are summarized below.

3.8.1 Ecological Habitat

Vegetative, wildlife, and avian species observed at and in the vicinity of the CIM site are discussed in this section. The aquatic habitat is also presented.

3.8.1.1 Vegetative Species

Vegetative species observed at and in the vicinity of the CIM site during the ecological reconnaissance conducted in August 2004 are listed in Table 3-4. Limited vegetation was observed at the CIM site, an inactive car and scrap metal junk yard with one unoccupied standing building. The vegetative species mainly were herbaceous, such as poison ivy (*Toxicodendron radicans*), red clover (*Trifolium pratense*), goldenrod (*Solidago* spp.), field garlic (*Allium vincale*), grasses, thistle (*Cirsium* spp.), and Virginia creeper (*Parthenocissus quinquefolia*).

In addition to the herbaceous vegetation, shrubs and trees were also observed at the perimeter of the site, including boxelder (*Acer negundo*), honeylocust (*Glenditsia tricanthos*), honeysuckle (*Lonicera* spp.), red maple (*Acer rubrum*), smooth sumac (*Rhus glabra*), staghorn sumac (*Rhus typhina*), sugar maple (*Acer saccharum*), tree of heaven (*Ailanthus altissima*), and willow (*Salix* spp.).

3.8.1.2 Avian and Wildlife

Avian and wildlife species observed or heard at and in the vicinity of the site during the ecological reconnaissance are listed in Table 3-4.

Observed or heard species included American robin (*Turdus migratorius*), American crow (*Corvus brachyrhychos*), song sparrow (*Melospiza melodia*), gray squirrel (*Sciurus* *carolinensis*), cottontail (*Sylvilagus floridanus*), and mice. However, species inhabiting or utilizing the site or the vicinity of the site are likely to consist of common species typical of urbanized or disturbed areas in New York State. Thus, other species such as killdeer (*Charadrius vociferus*), house finch (*Passer domesticus*), starling (*Stumus vulgaris*), and shrews (*Sorex* spp.) may also be present.

3.8.1.3 Aquatic Habitat

The main surface water feature at the site is the Hudson River which forms the eastern border of the site and flows to the south. The Hudson River at the CIM site averages approximately one mile in width and supports deep channels, freshwater intertidal mudflats, and freshwater tidal marshes. The river is fringed with both natural and disturbed vegetation within two miles of the area. The river bank consists of anthropomorphic (old jetties, piers, rip-rap, retaining walls, etc.) and natural (tidal mudflats, natural river banks) features. However, anthropomorphic features predominate. Natural vegetation growing along the Hudson River includes trees, shrubs and herbaceous vegetation. The river is used for transportation, and can support fish propagation, fishing and other recreational activities (BBL 1999).

A list of fish species typical of the Hudson River in the site area is presented in Table 3-5.

3.8.2 Threatened, Endangered Species and Sensitive Environments

CDM contacted the U. S. Fish and Wildlife Service (USFWS) and the NYSDEC Natural Heritage Program regarding the presence of threatened and endangered species and ecologically sensitive environments that may exist on and in the vicinity of the site.

The USFWS indicated that two federally endangered and one threatened species are known to occur in the vicinity of the site. Indiana bat (*Myotis sodalis*), a federally endangered species, is reported to occur at a hibernaculum, approximately 20.7 miles from the site. The bald eagle (*Haliaeetus leucocephalus*), a federally listed threatened species, is also reported to occur in the vicinity of the site. The shortnose sturgeon (*Acipenser brevirostrum*) is the only Federally-listed endangered species located in the project area; this species utilizes the Hudson River adjacent to the site as a summer habitat.

The NYSDEC indicated the following endangered and threatened species are reported to occur within a four mile radius of the site:

- Endangered Species - Fish
  - Shortnose sturgeon (*Acipenser brevirostrum*)

- Endangered Species - Plant
  - American waterwort (*Elatine americana*)
  - Riverband quillwort (*Isoetes riparia*)
  - Seaside goldenrod (*Solidago sempervirens* var. Mexicana)

  - Slender marsh-pink (*Sabatia campanulata*)

- Endangered Species - Avian
  - Peregrine falcon (*Falco peregrinus*)

- Threatened Species - Plant
  - Smooth bur-marigold (*Bidens laevis*)
  - Heartleaf plantain (*Plantago cordata*)
  - Spongy arrowhead (*Sagittaria montevidensis* var. spongiosa)
  - Woodland agrimony (*Agrimonia rostellata*)

- Threatened Species - Avian
  - Bald eagle (*Haliaeetus leucocephalus*)
  - Least bittern (*Ixobrychus exilis*)
  - Upland sandpiper (*Bartramia longicauda*)

- Rare Species - Plant
  - Esturary beggar-ticks (*Bidens bidentoides*)

None of these species were observed during the ecological reconnaissance to the CIM site. No wetlands or sensitive habitats were observed at or adjacent to the site.

4

Section Four

Section 4

Nature and Extent of Contamination

This section discusses the nature and extent of soil and groundwater contamination at the site. Section 4.1 presents the approach to the contamination evaluation, including the selection of site-specific screening criteria for soil, sediment, surface water, and groundwater, the selection of indicator contaminants (IC), and data presentation. Section 4.2 presents the background analytical data obtained during the RI field program for surface soil, subsurface soil, sediment, and surface water and site-specific background value concentrations. Section 4.3 presents screening and analytical data obtained during the RI field program, and includes a discussion of the nature and extent of soil, sediment, surface water, and groundwater contamination. Section 4.4 presents the LNAPL delineation for soil and groundwater contamination. A complete set of analytical data is provided in Appendix J. All analytical data were reviewed to ensure that they meet the project quality requirements for representativeness, completeness, precision, and accuracy. All project data quality objectives were met. This review, along with a summary of data quality assurance/quality control (QA/QC) measures, is documented in the Data Usability Reports for all analytical data collected during the field investigation (Appendix K).

4.1 Approach to the Evaluation of Contamination

The characterization and evaluation of the nature and extent of contamination are focused on those constituents identified as ICs in site media. ICs were generally determined by evaluating exceedances of screening criteria or naturally occurring background levels; the frequency of the exceedances; and the magnitude of the exceedances. 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 ICs in site media. However, contaminant concentrations that exceed the applicable screening criteria, for both ICs and non-ICs, are summarized in this section of the report.

4.1.1 Selection of Site-Specific Screening Criteria

Site-specific screening criteria are presented for all compounds for which samples were analyzed. The nature and extent of contamination discussion focuses on contaminants that exceed site-specific screening criteria.

A screening criteria technical memorandum was submitted to EPA on November 18, 2004 with proposed site-specific screening criteria to be used in the RI. CDM revised the site-specific screening, based on EPA's comments, as documented in the response to comments letter, dated February 15, 2005 and a conference call on March 17, 2005. Site-specific screening criteria for each medium are described in the following sections. Generally, for each medium, the site-specific screening criteria is the most conservative value of the Federal or State value, as described in the following sections. The EPA-approved site-specific screening criteria are presented in Tables 4-1 through 4-4.

4.1.1.1 Soil Screening Criteria

Site-specific soil screening criteria (SSSSC) for surface and subsurface soil are presented in Table 4-1. The SSSSC is the most conservative of Federal and State standards, which include the following:

Surface/Subsurface Soil Screening Criteria

- EPA Region IX residential soil PRGs, adjusted to a cancer risk of $1x10^{-6}$ and a non-cancer hazard index of 0.1
- EPA Generic Soil Screening Levels (SSLs) for commercial/industrial - ingestion/dermal scenarios
- EPA Generic SSLs for commercial/industrial - inhalation scenarios
- NYSDEC Recommended Soil Clean-up Objectives (RSCO) Technical and Administrative Guidance Memorandum (TAGM) #4046, adjusted for the site-specific TOC concentration of 4.85 percent

NYSDEC-RSCO inorganic values require the use of background data for certain analytes. For this reason, background soil samples were only analyzed for inorganics and dioxins. Inorganic results for background surface soil samples (BKSS-01 through BKSS-10) and background subsurface soil samples (BKSB-01 through BKSB-10) were tabulated for comparison to the site-specific soil screening criteria. The maximum, minimum, average, and the 95 percent upper confidence limit (UCL) on the arithmetic mean concentration values were calculated for each inorganic analyte. Table 4-6 presents these data for both organic and inorganic background surface soil samples and Table 4-7 presents data for both organic and inorganic background subsurface soil samples. The 95 percent UCL of the average (mean) values are included in Table 4-1 for comparison with the SSSSC.

4.1.1.2 Sediment Screening Criteria

The site-specific sediment screening criteria (SSSDSC) are presented in Table 4-2. The SSSDSC is the most conservative of Federal and State standards, which include the following:

Sediment Screening Criteria

- NYS Sediment Screening Criteria for Human Health (bioaccumulation, freshwater)
- NYS Sediment Screening Criteria for Benthic Aquatic Life (chronic toxicity, freshwater)
- NYS Sediment Screening Criteria, Aquatic Life (severe effect level for inorganics)
- MacDonald (2000) Consensus-based Probable Effect Concentrations
- EPA Region IX industrial/commercial soil

Organic and inorganic results for background sediment samples (SD-01 through SD-10) were tabulated for comparison with the site-specific sediment screening criteria. Maximum, minimum, average, and the 95 percent UCL of the average (mean) values were calculated for each compound and analyte. Table 4-8 presents these data for background sediment samples. The 95 percent UCL of the average (mean) values are included in Table 4-2 for comparison with the SSSDSC

4.1.1.3 Surface Water Screening Criteria

The site-specific surface water screening criteria (SSSWSC) are presented in Table 4-3. The SSSWSC is the most conservative of Federal and State standards, which include the following:

Surface Water Screening Criteria

- EPA Ambient Water Quality Criteria, Human Health (for Consumption of organisms only) values
- Aquatic Life (chronic fresh water) values
- NYS Standards and Guidance Values for Class B Surface Water and Human Health (fish consumption) values
- Aquatic Life (chronic) values

Organic and inorganic results for background surface water samples (SW-01 through SW-10) were tabulated for comparison with the site-specific surface water screening criteria. Maximum, minimum, average, and the 95 percent UCL of the average (mean) values were calculated for each compound and analyte. Table 4-9 presents these data for background surface water samples. The 95 percent UCL of the average (mean) values are included in Table 4-3 for comparison with the SSSWSC.

4.1.1.4 Groundwater Screening Criteria

The site-specific groundwater screening criteria (SSGWSC) are presented in Table 4-4. The SSGWSC are the most conservative of Federal and State standards, which include the following:

Groundwater Screening Criteria

- National Primary Drinking Water Standards
- NYS Standards and Guidance Values and Groundwater Effluent Limitations for Class GA Groundwater (human water sources)
- NYS Department of Health (NYSDOH) Drinking Water Quality Standards

Results from the background well (MW-9) from both Round 1 and Round 2 sampling activities have been included in Table 4-4 for comparison with the SSGWSC.

4.1.2 Selection of Site Indicator Contaminants

Selected ICs are used to focus the evaluation of the nature and extent of contamination in soil, sediment, surface water and groundwater. As a first step in the IC selection process, CDM evaluated analytical data collected during the RI, reviewed the HHRA COPC list, and reviewed the historical activities and analytical data for the site. Soils, including soils within former source areas, appear to be the media for which contamination is most prevalent. As a result, contaminants that exceeded the SSSSC in surface and subsurface soils were evaluated based on the following:

- Percentage of the total number of samples in which each contaminant was detected
- Percentage of the total number of samples in which each contaminant exceeded the screening criteria
- Magnitude of the highest screening criteria exceedance

CDM also reviewed contaminants that are COPCs for the HHRA; the COPCs that contributed the most risk were included as ICs in the RI. Based on these evaluations, CDM selected five PAHs, one PCB, and eight metals as indicators representative of site-related contamination for all media. Table 4-5 presents the statistics for each selected IC. The ICs include:

- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(a)pyrene
- Indeno(1,2,3-c,d)pyrene
- Dibenzo(a,h)anthracene
- Aroclor-1254
- Arsenic
- Cadmium
- Copper
- Iron
- Lead
- Mercury
- Vanadium
- Zinc

In addition, VOCs will be considered ICs for groundwater media. The nature and extent of contamination discussions will focus on the listed ICs.

4.1.3 Data Presentation

Analytical data from RI sampling activities were entered into the site database for evaluation purposes, and were exported to an Environmental Geographic Information System (EGIS) for evaluation and graphical presentation. The data presented on the figures in this section are in units consistent with data tables in Appendix J, including: organic and inorganic data for aqueous samples are presented in μg/L; organic data for solid samples are presented in μg/kg; and inorganic data for solid samples are presented in mg/kg. Aqueous wet chemistry parameters are presented in mg/L.

4.2 Calculation of Background Concentrations

Site-specific background values for each chemical were calculated for surface soil, subsurface soil, sediment, and surface water. Site-specific background values were not used for screening purposes, but rather for comparison purposes only. Site-specific background values are the calculated 95 percent UCL on the arithmetic mean concentration. The 95 percent UCLs were calculated using the statistical procedures recommended by EPA, based on the findings of Singh, Singh, and Engelhardt (1997, 1999) (EPA 2004).

Several statistical methods can be used to estimate the 95 percent UCL of a data set, depending upon the data distribution. Therefore, two key steps are required to estimate the 95 percent UCL.

1. Determine the distribution of the data (i.e., normal, lognormal, gamma, or non-parametric).

2. Compute the 95 percent UCL using the appropriate procedure for the selected data distribution.

In this assessment, both steps were performed with the ProUCL statistical software developed for EPA (EPA 2004). Based on EPA guidance (1989) and EPA Region 2 direction, these steps were performed with the background data assuming that non-detect data have a concentration equal to one half the laboratory-reported contract required quantitation limit (CRQL) (i.e., one half the value reported with a "U" qualifier). ProUCL calculates the UCL with several computation methods and provides a recommended UCL value based on the distribution of the data. The UCLs shown in Tables 4-6 through 4-9 are the values recommended by ProUCL.

The ProUCL program tests the normal, lognormal, gamma, and non-parametric distributions of each data set and the 95 percent UCLs were calculated with the statistical procedures recommended by EPA, based on the findings of Singh, Singh, and Engelhardt (1997, 1999) (EPA 2004). ProUCL computes the 95%UCL using 5 parametric and 10 non-parametric methods, depending on the distribution. For normal distributions, the t-statistic is used to calculate the UCL. For lognormal distributions, one of four different computation methods is used depending on the skewness of the data (as indicated by the standard deviation of the log-transformed data) and the sample size. For gamma distributions, one of two computation methods is used based on a k value, the shape parameter of a gamma distribution. For data sets (of all sizes) following a gamma distribution, the exposure point concentration term is computed using an adjusted gamma UCL of the mean (when $0.1 \leq k \leq 0.5$) or an approximate gamma UCL of the mean (when $k > 0.5$). For values of $k < 0.1$, a 95% UCL may be obtained using either the bootstrap-t method or Hall's bootstrap method when the sample size is small (less than 15), or the approximate gamma for larger data sets. For data sets that do not fit a normal, a lognormal, or a gamma distribution, the ProUCL program calculates and recommends a 95% UCL from 1 of the 10 non-parametric methods (EPA 2004). These calculations are presented as Appendix M.

4.2.1 Background Soil Samples

CDM collected surface and subsurface soil samples from background soil borings located north of the site. Numerous contaminants were detected in background soil samples: 7 SVOCs, 1 pesticide, and 13 inorganics exceeded screening criteria. However, background levels were generally lower than levels in process area and site-wide soil boring samples. Background surface and subsurface soil sample exceedances are presented in Table 4-10; background calculations and full data results are presented in Tables 4-6 and 4-7. The calculated background values for ICs in surface and subsurface soil are as follows:

	Surface Soil	Subsurface Soil
Benzo(a)anthracene	2,229.72 ug/kg	4,853.51 ug/kg
Benzo(b)fluoranthene	2,650.88 ug/kg	4,267.89ug/kg
Benzo(a)pyrene	1,714.72 ug/kg	2,180.38ug/kg
Indeno(1,2,3-c,d)pyrene	1,321.04 ug/kg	2,257.71ug/kg
Dibenz(a,h)anthracene	957.04 ug/kg	993.17ug/kg
Aroclor-1254	101.82 ug/kg	110.33ug/kg
Arsenic	7.1 mg/kg	5.95 mg/kg
Cadmium	1.57 mg/kg	1.11 mg/kg
Copper	154 mg/kg	184.44 mg/kg
Iron	25,962 mg/kg	24,031 mg/kg
Lead	365 mg/kg	206 mg/kg
Mercury	0.54 mg/kg	0.34 mg/kg
Vanadium	22.9 mg/kg	18.6 mg/kg
Zinc	152 mg/kg	147 mg/kg

4.2.2 Background Sediment Samples

Ten background sediment samples were collected upstream of the site to represent background conditions (outside of any influence from the site). Background sediment sample results were below screening criteria, with the following exceptions: acenaphthlene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, 4,4-DDD, 4,4-DDE, aroclor-1248, antimony, barium, chromium, copper, cyanide, lead, manganese, nickel, and zinc. A majority of the compounds exceeded the screening criteria by less than 10 times. Both benzo(a)pyrene and benzo(b)fluoranthene had 95 percent UCL's approximately 300 times the screening criteria. Both benzo(a)anthracene and chrysene had 95 percent UCL about 400 times the screening criteria. Background sediment sample results and background calculations are presented in Table 4-8. The calculated background values for ICs in sediment are as follows:

- Benzo(a)anthracene - 20,000 ug/kg
- Benzo(b)fluoranthene - 16,000 ug/kg
- Benzo(a)pyrene - 15,000 ug/kg
- Indeno(1,2,3-c,d)pyrene - 7,400 ug/kg
- Dibenz(a,h)anthracene - 1,490.8 ug/kg
- Aroclor-1254 - Not detected
- Arsenic - 6.4 mg/kg
- Cadmium - 1.1 mg/kg
- Copper - 92.7 mg/kg
- Iron - 33,594.2 mg/kg
- Lead - 83.5 mg/kg
- Mercury - 0.3 mg/kg
- Vanadium - 27.9 mg/kg
- Zinc - 195.5 mg/kg

The calculated background values for PAHs may be biased high due to elevated concentrations at SD-03. This may indicate that the levels in SD-03 could be from another source.

4.2.3 Background Surface Water Samples

Ten background surface water samples, co-located with background sediment samples, were collected upstream of the site to represent background conditions (outside of any influence from the site). Ten downgradient (i.e., within 20 feet of the site, when feasible) surface water samples were collected within the shoreline area adjacent to the site. Background surface water sample results were below screening criteria, with the following exceptions: 1,4-dichlorobenzene, bis(2-ethylhexyl) phthalate, aluminum, iron, and lead. All compounds slightly exceeded the screening criteria except for aluminum and iron, which were four and five times the screening criteria, respectively. The calculated background values for ICs in background surface water samples are as follows: iron - 412.1 μg/L and lead - 8.3 μg/L. The remaining ICs were not detected in any background surface water samples, and therefore do not have calculated background values. Background surface water sample results and background calculations are presented in Table 4-9.

4.2.4 Background Groundwater Samples

CDM installed and sampled a hydraulically upgradient background monitoring well (MW-09) located in the southwest corner of the site, for comparison with downgradient monitoring well sample results. See Table 4-20 for screening criteria exceedances in the background well. Nine VOCs were detected in the background well, although benzene was the only VOC that exceeded screening criteria. Benzene was detected at 9.6 μg/L during Round 1 and at 13 μg/L during Round 2; benzene's screening criteria is 1 μg/L. The following VOCs were detected during Round 1 below screening criteria: chloromethane (0.23 J μg/L), vinyl chloride (0.24 J μg/L), trans-1,2-DCE (0.83 μg/L), cis-1,2-DCE (1.3 μg/L), and toluene (0.16 J μg/L). The following VOCs were detected during Round 2, also below screening criteria: TCE (0.13 J μg/L, vinyl chloride (0.3 J μg/L), trans-1,2-DCE (1.0 μg/L), cis-1,2-DCE (1.7 μg/L), toluene (0.12 J μg/L), carbon disulfide (0.14 J μg/L), and methyl-tert-butyl ether (MTBE) (0.12 J μg/L).

Four inorganic analytes exceeded screening criteria in both rounds of groundwater samples. The IC iron was detected during both rounds, at 590 and 773 μg/L, respectively. Manganese exceeded screening criteria at 890 and 954 μg/L, respectively, and sodium exceeded screening criteria at 80,000 and 83,900 J μg/L. Thallium exceeded screening criteria during Round 2, at 7.1 J μg/L. Seven analytes were detected, but at levels below screening criteria: barium, calcium, chromium, copper, magnesium, potassium, and cyanide.

4.3 Nature and Extent of Contamination

This section presents a summary and interpretation of surface and subsurface soil screening and sampling results, sediment and surface water sampling results, and vertical profile and groundwater sampling results. Numerous contaminants were detected in the site media; however, this section focuses on contaminants that exceed the site-specific screening criteria.

4.3.1 Soil Contamination

CDM collected soil boring screening and sampling data at onsite and off site areas to characterize the surface and subsurface soils at the site, including:

Off Site (Background) Samples
Analytical Samples:

- 11 surface soil (0-1 foot bgs) and 10 subsurface soil (2-4 feet bgs) samples from 10 background boring locations, for a total of 21 background soil samples. Background samples were analyzed for TCL organics, TAL inorganics, and dioxins (all surface and 1 subsurface sample).

Onsite Samples
Screening Samples:

- 133 continuous samples for onsite screening from 21 process area soil boring locations and 208 continuous samples from 37 site-wide area soil boring locations, for a total of 341 soil screening samples; onsite screening was performed for VOCs, PCBs, and lead.

Analytical Samples:

- 23 surface (0-1 foot bgs) and 24 subsurface soil (2-4 feet bgs) samples from 21 locations in the process area, and 39 surface and 40 subsurface soil samples from 37 locations in the site-wide area, for a total of 126 soil samples. Process area and site-wide soil boring samples were analyzed for TCL organics, TAL inorganics, pH, TOC, and grain size; process area surface soils were also analyzed for dioxins.

4.3.1.1 Distribution of Indicator Contaminants in Soil

Indicator contaminants were found at levels far exceeding screening criteria in surface and subsurface soil samples in both process area and site-wide soil borings. In general, surface soils are contaminated with higher levels of ICs than subsurface soils. The PAH benzo(a)pyrene, which exceeded the screening criterion in the greatest number of samples, represents the general trend of PAH contamination in site soils. PAH contamination is generally highest in areas surrounding the former metal shear building, and east of this area, along the Hudson River.

The highest concentrations of Aroclor-1254 in laboratory samples were found in surface soils surrounding the former metal shear and compact/bailer buildings, as found in both screening and analytical samples.

The highest concentrations of the majority of metal ICs in laboratory samples occur in the process area around the former metal shear, compactor/bailer, and smelter buildings, in both surface and subsurface soils. However, the highest levels of vanadium in the surface soils are concentrated in the northeast corner of the site. The highest levels of lead in the surface soils are located east of the former buildings and in the southwestern part of the site, and in subsurface soils at the former smelter/staging area and in the southwest corner of the site.

Based on the lead screening results, the extent of lead contamination can be delineated in the unsaturated zone below 4 feet bgs. Lead levels in subsurface soils from 4-14 feet bgs exceeded screening criteria in many samples. The levels generally decreased with depth; lead levels exceeded criteria by the following factors 35 times (4-6 feet), 39 times (6-8 feet), 15 times (8-10 feet), 7 times (10-12 feet), and under 6 times (12-14 feet).

4.3.1.2 Results of Onsite Soil Screening

Process area and site-wide soil boring samples were collected at 2-foot intervals for onsite screening of total VOCs using a PID, PCBs using immunoassay test kits, and lead using XRF technology. Occasionally, split spoons did not contain enough volume for all three screening samples. In these cases, priority was given to lead screening, followed by VOC screening, and finally, PCB screening. Results of soil screening samples are presented below.

Lead Screening Results

Lead screening was conducted on 133 samples from process area soil borings and on 209 samples from site-wide soil borings. Split spoon recovery in the deeper intervals in the site-wide soil borings was generally poor due to increased amounts of fill containing scrap metal, broken concrete, wood, plastic, and rubber. Lead was detected in approximately 96 percent of all screening samples across the site; concentrations exceeded the SSSSC of 400 mg/kg in 68 percent of all samples. The calculated background value for lead in surface and subsurface soil is below the SSSSC, and therefore, the majority of all samples also exceeded background values. Lead contamination exceeding the screening criterion occurs in all soil borings and at all depth intervals. Table 4-13 presents lead soil screening results for the process area and site-wide soil boring samples.

In general, the highest lead concentrations in the process area soil borings occur in the top 4 feet of soil. Levels in the 0-2 foot interval ranged from 280.5 mg/kg to 8,517 mg/kg. Levels in the 2-4 foot interval ranged from 400.7 mg/kg to 19,798.4 mg/kg, with the highest concentration at PASB-05; this concentration is approximately 50 times the site-specific screening criterion. PASB-10c contained the second highest concentration in the 2-4 foot interval, at 17,565.3 mg/kg. PASB-05 and PASB-10c are located in the area of the former ash/slag pile by the former metal shear and compact/bailer buildings.

Lead concentrations in the site-wide soil borings are generally lower than those in the process area soil borings; however, concentrations in the deeper intervals tend to be higher than those in the process area. Higher concentrations also tend to occur in the southern part of the site, near the former scrap metal and tire piles. The highest levels in site-wide soil borings occur in SWSB-30 (15,714 mg/kg in the 6-8 foot interval) and SWSB-33 (14,200.9 mg/kg in the 4-6 foot interval).

Lead contaminant levels by interval are summarized below:

- 0-2 foot interval: 88 percent of samples exceeded screening criteria; the highest concentration (13,900 mg/kg in SWSB-17) exceeded screening criteria by 35 times, and is located southeast of the former compactor/bailer building
- 2-4 foot interval: 83 percent of samples exceeded screening criteria; the highest concentration (17,565.3 mg/kg in PASB-10c) exceeded criteria by 44 times, and is located east of the former compactor/bailer building
- 4-6 foot interval: 66 percent of samples exceeded screening criteria; the highest concentration (14,200.9 mg/kg at SWSB-33) exceeded criteria by 35 times, and is located in the southeast corner of the site
- 6-8 foot interval: 63 percent of samples exceeded screening criteria; the highest concentration (15,714.9 mg/kg in SWSB-30) exceeded criteria by 39 times, and is located along the southern boundary of the site
- 8-10 foot interval: 60 percent of samples exceeded screening criteria; the highest concentration (5,819.0 mg/kg in SWSB-17) exceeded criteria by 14 times, and is located southeast of the compactor/bailer building
- 10-12 foot interval: 77 percent of samples exceeded screening criteria (note that approximately half of the locations were sampled due to lack of sample recovery); the highest concentration (2,848.9 mg/kg in PASB-04) exceeded screening criteria by 7 times, and is located adjacent to the former metal shear building
- 12-14 foot interval: 28 percent of samples exceeded screening criteria (note that approximately one third of the locations were not sampled due to lack of sample recovery); the highest concentration (2,290.2 mg/kg in PASB-04) exceeded criteria by almost 6 times, and is also located adjacent to the former metal shear building

VOC Screening Results

VOC screening for total VOCs was conducted on 153 samples from process area soil borings and on 164 samples from site-wide soil borings. Samples from 15 soil borings located in the southern half of the site (PASB-20, PASB-21, and SWSB-20 through SWSB-32) were not screened due to instrument malfunction caused by humidity. An additional 14 samples were not screened because of low sample volume. Table 4-11 presents total VOC soil screening results for the process area and site-wide soil boring samples.

Approximately 64 percent of the process area soil boring samples indicated the presence of VOCs. Concentrations ranged from non-detect to 129 parts per million (ppm), with the highest reading in the surface at PASB-05, located in the area of the former metal shear building. In general, the highest concentrations in each boring were observed in the top six feet of soil. However, several borings had VOCs at the deepest sample interval, indicating that contamination may extend below the terminal depth of these borings. Of particular note is PASB-15, which extended to 30 feet bgs, approximately 15 feet deeper than the majority of the process area soil borings. VOCs were detected at PASB-15 in every sample interval, including 8 ppm in the 28-30 foot interval.

Total VOCs were detected at approximately 35 percent of the site-wide soil boring samples. Although total VOCs were detected in a lower percentage of site-wide soil samples than process area soil samples, the highest overall concentrations were located in site-wide soil borings. The highest concentrations were detected in the surface at SWSB-15, located approximately 220 feet east of the former compact/bailer building; total VOCs were detected at 1,835 ppm in the 0-2 foot interval and at 1,054 ppm in the 2-4 foot interval. The next highest levels were detected in SWSB-08 (648 ppm at 2-4 feet bgs), SWSB-07 (470 ppm at 6-8 feet bgs), SWSB-17 (390 ppm at 2-4 feet bgs), and SWSB-16 (351 ppm at 4-6 feet bgs). SWSB-17 and SWSB-18 are located downgradient of the former compact/bailer building. SWSB-07 through SWSB-09 are located downgradient of a former UST.

It should be noted that screening results are for total VOCs, and therefore cannot be correlated with individual VOC results from analytical laboratories.

PCB Screening Results

PCB screening was conducted on 87 samples from process area soil borings and on 181 samples from site-wide soil borings. The majority of samples from 10 to 15 feet bgs were not screened for PCBs due to low sample volume. Available soil volume was given lower priority for PCB screening than for lead or VOC screening. In general, PCB screening results indicate total PCBs in the majority of the screened soil samples. Table 4-12 presents PCB soil screening results for the process area and site-wide soil boring samples. The immunoassay test kit provides a measurement of total PCBs measured in mg/kg, based on the PCB Aroclor-1254; the site-specific screening criterion for Aroclor-1254 is 110 ug/kg (equivalent to ppb) or 0.110 mg/kg (equivalent to ppm). All detections exceeded this criterion. The majority of detections also exceeded the calculated background values for Aroclor-1254 in surface and subsurface soil.

The majority of process area soil screening samples exceeded criteria. In general, the highest concentrations of total PCBs in the process area soil samples are in surface soils located east of the former compactor/bailer building and south of the former metal shear building. The highest overall concentration was 52.87 mg/kg, detected in the surface at PASB-10, located approximately 50 feet east of the former compactor/bailer building, and in the former ash/slag pile. Four contingency borings (PASB-10a through PASB-10d) were located around PASB-10 to tighten the grid and further delineate contamination in the area due to the presence of an unidentified oily slurry. Additional samples were collected from these contingency borings for screening purposes from 0-2 feet and 2-4 feet bgs. Each of the additional eight samples contained total PCBs, with higher levels in the surface intervals. Surface concentrations in the four surrounding samples ranged from 11.8 mg/kg to 14.8 mg/kg. PCBs were observed in surface soils at PASB-09 (12.84 mg/kg) and PASB-14 (10.78 mg/kg). Two soil borings south of the metal shear building also had PCBs: PASB-04 at 12.58 mg/kg in the 0-2 foot interval, and PASB-05 at 12.28 mg/kg in the 2-4 foot interval.

The majority of site-wide soil borings contained PCBs at levels exceeding screening criteria. In general, total PCB levels in samples from site-wide soil borings were lower than those from process area soil borings. Higher levels were also found at deeper depths than in process area soil borings. The highest PCB levels in site-wide soil borings were generally found in two areas: in the northeast corner of the site, in the area of a former processed soil pile, and in the southeast, downgradient of the former smelter and staging area. These areas are both along the Hudson River, and are further downgradient of source areas than process area soil borings. The highest levels were detected at the 8-10 foot intervals at SWSB-28 (45.6 mg/kg) and SWSB-34 (20.81 mg/kg), both located in the southeast corner. These are the second and third highest detections of PCBs across the site. The highest concentrations from nearby borings SWSB-22, SWSB-24, SWSB-25, and SWSB-27 ranged from 7.42 mg/kg to 8.02 mg/kg, but were in the top 4 feet of soil. SWSB-05 and SWSB-37, both located in the northeastern corner, had PCBs at 14.16 mg/kg (0-2 feet) and 8.49 mg/kg (4-6 feet), respectively.

4.3.1.3 Results of Indicator Contaminants in Soil Samples

Samples were collected from surface (0-1 foot bgs) and subsurface (2-4 feet bgs) soils at each process area and site-wide soil boring. Screening criteria exceedances for all contaminants in process area soil boring samples, including ICs, are presented in Table 4-14. Screening criteria exceedances for all contaminants in site-wide soil boring samples, including ICs, are presented in Table 4-15.

PAHs

All five PAH ICs were detected in soil samples in both the process area and site-wide soil borings. Levels were generally higher in the surface soils. Of the PAH ICs, benzo(a)pyrene exceedances were the most prevalent. Isoconcentration maps illustrate the distribution of benzo(a)pyrene in surface and subsurface soils, and are presented as Figures 4-1a and 4-1b, respectively. Benzo(a)pyrene exceeded screening criteria in every surface and subsurface soil sample across the site. Concentrations exceeded the calculated background values in over half the surface soil samples, and just under half of the subsurface soil samples. Surface soil exceeded the screening criterion up to 371 times, with concentrations ranging from 240 J ug/kg to 23,000 ug/kg. As shown in Figure 4-1a, the highest levels in surface soils are concentrated around the former metal shear building (PASS–04 and PASS-02), northeast of the former metal shear building (SWSS-06) and on the eastern side of the site along the Hudson River (SWSS-16). Subsurface soil levels exceeded the screening criterion up to 355 times, with levels ranging from 120 J ug/kg to 22,000 J ug/kg. The highest levels in subsurface soils (Figure 4-1b) are located northwest (SWSB-06) and adjacent to the Hudson River, east of the former metal shear building (SWSB-13 and SWSB-36).

Benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene were also detected in every surface soil sample across the site, with exceedances in the majority of locations (Table 4-15). The levels and distribution of these ICs are similar to benzo(a)pyrene, although there are fewer screening criteria exceedances and lower magnitudes of exceedances. The highest levels in surface soil were in the process area

(PASS-04); however, in subsurface soil, the highest levels were northwest and east of the process area (SWSB-06 and SWSB-36, respectively). Benzo(a)anthracene exceedances ranged from 930 J ug/kg to 25,000 ug/kg in surface soil, up to 40 times the screening criterion, and from 830 J ug/kg - 22,000 ug/kg (35 times the screening criterion) in subsurface soil. Benzo(b)fluoranthene exceedances ranged from 730 J ug/kg to 22,000 ug/kg in surface soil, with the highest level 35 times the screening criterion, and in subsurface soil from 710 ug/kg - 19,000 ug/kg (31 times the screening criterion). Indeno(1,2,3-c,d)pyrene exceedances ranged from 650 J ug/kg to 17,000 ug/kg in surface soil, with the highest level 27 times the screening criterion, and from 680 J- 15,000 ug/kg in the subsurface (24 times the screening criterion).

Dibenz(a,h)anthracene was detected and exceeded screening criteria in the majority of surface soil samples (Table 4-15). Exceedances in the surface soil ranged from 51 J ug/kg to 5,500 ug/kg, up to 89 times the screening criterion. Exceedances in subsurface soils ranged from 73 J ug/kg - 4,300 ug/kg, with the highest concentration exceeding the screening criterion by 69 times.

Aroclor-1254

Aroclor-1254 exceeded screening criteria in all but one surface soil location across the site, with concentrations ranging from 70 J ug/kg to 35,000 ug/kg. The majority of surface and subsurface concentrations also exceeded calculated background values. The PCB exceeded the screening criterion in all process area soil boring locations and 89 percent of the site-wide soil boring locations (Table 4-15). Exceedances in the subsurface soil were generally lower, with ranges from 140 ug/kg to 27,000 ug/kg. The highest levels in both surface and subsurface soil were in PASS/PASB-05 and surrounding areas, near the former metal shear building. Figures 4-2a and 4-2b show isoconcentration contours for Aroclor-1254 in the surface and subsurface soils, respectively. Isoconcentration contour maps for total PCBs are also presented, as Figures 4-2c and 4-2d.

Inorganics

Five of the inorganic ICs (arsenic, copper, iron, vanadium, and zinc) exceeded screening criteria in every surface and subsurface soil sample that had usable data (Table 4-15). However, arsenic, copper, and lead results for eight site-wide soil boring locations in the northern part of the site were rejected for the following reasons: lead results were rejected because the absolute difference between the sample and duplicate results were greater than 4 times CRQL; arsenic and copper results were rejected because the percent recovery was outside of control limits.

Arsenic levels exceeded the screening criterion up to 102 times in surface soils and up to 187 times in subsurface soils. Levels exceeded the calculated background values in nearly all surface and subsurface soil samples. Exceedances ranged from 7 to 39.8 mg/kg in surface soils, with elevated levels around the former metal shear and compactor/bailer buildings. In subsurface soils, exceedances ranged from 4.8 to 73.1 mg/kg, with the highest concentration located at the southwest corner of the former smelter building. Elevated levels were also found near the former metal shear and compactor/bailer buildings. Figures 4-3a and 4-3b show arsenic distribution in the surface and subsurface soil, respectively. The vast majority of arsenic concentrations in both surface and subsurface soil samples also exceeded the calculated background value.

Copper exceeded the screening criterion by up to 440 times in the surface and by up to 266 times in subsurface soils. The majority of the exceedances were also above calculated background values. The highest copper concentration in the surface was 11,000 mg/kg, in PASS-19, between the former compactor/bailer and smelter buildings. The highest concentration in the subsurface was 6,650 mg/kg, in PASS-11, located near the northeast corner of the former metal shear building.

Iron exceedances in the surface soil were up to 56 times the screening criterion. The majority of the exceedances were also above calculated background values. The highest level (111,999 mg/kg) was in SWSS-11-D, on the north side of the former metal shear building. Subsurface soil exceedances ranged to 153,000 mg/kg, or 77 times screening criteria; the highest concentration was at PASB-05, adjacent to SWSS-11.

Vanadium concentrations in surface soils ranged from 33.5 - 760 mg/kg, 3.5 to 97 times the screening criterion. SWSS-37-D, in the northeast corner of the site, contained the highest levels in the surface. In the subsurface, levels ranged from 17.6 - 380 mg/kg, 2.5 to 49 times the screening criterion. The vast majority of these levels also exceeded calculated background values. The highest level was at SWSB-21-D, on the east side of the former smelter building.

Of all the inorganic ICs, zinc displayed the highest magnitude of exceedances, up to 545 times the screening criterion in surface soils, and up to 1,665 times the screening criterion in subsurface soils. The majority of surface and subsurface soil concentrations also exceeded calculated background values. PASB-05, near the southeast corner of the former metal shear building, contained the highest levels of zinc in both the surface (10,900 J mg/kg) and the subsurface soil (33,300 J mg/kg).

Cadmium exceedances ranged from 2 - 96.5 mg/kg in surface soils and exceeded the screening criterion by 2 to 96.5 times. Surface soil levels were highest east of the former compactor/bailer building and near the northeast corner of the former smelter building; the highest concentration was detected at PASS-06. In subsurface soils, cadmium exceeded the screening criterion from 3.3 to 143 times. Exceedances ranged from 3.3 to 143 J mg/kg, with magnitudes from 3 to 143 times. Similar to the surface contamination, the highest levels in the subsurface are concentrated on the eastern side of the former compactor/bailer building; the highest concentration was at PASB-14, near the southwest corner of the building footprint. Figures 4-4a and 4-4b illustrate cadmium distribution in surface and subsurface soil, respectively.

Lead contamination, unlike arsenic, is highest in the southern half of the site for both surface and subsurface soils, as shown in Figures 4-5a and 4-5b. Surface soil exceedances ranged from 1.5 to 40 times the screening criterion. The highest concentration of lead in surface soils, 15,900 mg/kg in SWSS-24, is adjacent to the Hudson River, east of the former smelter building and staging area. Lead concentrations in subsurface soils ranged from 134 - 9,970 mg/kg, from below the screening criterion to 25 times the criterion. The highest levels were concentrated on the southwest corner of the former smelter building (SWSB-20) and in the southeast corner of the site (SWSB-31), near the former tire piles. All surface and subsurface soil levels exceeded calculated background values.

Mercury exceedances in surface soils ranged from 0.8 to 15.2 mg/kg, exceeding the screening criterion by 8 to 152 times. The highest surface soil levels were between and east of the former metal shear and compactor/ bailer buildings, with the highest concentration at PASS-09. Subsurface soil exceedances ranged from 0.23 J - 9.1 mg/kg, with the highest concentration exceeding the screening criterion by 91 times. Over half of the concentrations exceeded calculated background values for surface and subsurface soil.

4.3.1.4 Non-Indicator Contaminant Screening Criteria Exceedances in Soil Samples

Several non-ICs exceeded screening criteria in surface and subsurface soil samples.

4.3.1.5 Dioxin Data

CDM submitted preliminary dioxin data in a letter (Background and Process Area Surface Soil Sample Results for Dioxin) to EPA, dated June 7, 2004. CDM collected 10 surface and 1 subsurface soil samples for dioxin analysis on April 3 and 4, 2004 from background locations and 15 surface soil samples from process area soil borings.

As per EPA's Office of Solid Waste and Emergency Response (OSWER) Directive 9200.4-26, dated April 13, 1998, it is EPA's policy that a preliminary remediation goal (PRG) of 1 part per billion (i.e., 1,000 nanograms per kilogram [ng/kg]) toxicity equivalents (TEQs) be used for dioxin in residential soils, unless extenuating site-specific circumstances warrant a different level. The highest dioxin detection in the background soil samples was at BKSS-09D (13.5 ng/kg) and the highest detection in the process area surface soil samples was at PASS-14-D (187.7 ng/kg).

Since the detected levels were below EPA's PRG for the compound, no additional samples were collected for dioxin analysis as part of the subsurface soil process area program and the surface/subsurface site-wide soil boring program. This decision is consistent with the scope of work and data quality objectives (DQOs) detailed in the EPA-approved QAPP for this project.

4.3.2 Sediment Contamination

CDM collected 10 sediment samples adjacent to the site (SD-11 through SD-20), in the Hudson River. Table 4-16 and Figure 4-6 show all sediment screening criteria exceedances, including ICs, for the adjacent environmental samples.

4.3.2.1 Distribution of Indicator Contaminants in Sediment

The majority of site-specific ICs exceeded screening criteria in sediment samples adjacent to the site. However, many of these exceedances were below the calculated background values. Since the inorganic ICs are not considered to be naturally occurring, this suggests that either these contaminants migrated from other sources unrelated to the site or from sources at the site. Since there are many sources of PAHs to the Hudson River, it is difficult to determine exactly where these contaminants originated from. The highest levels of PAH ICs were found in SD-19, located offshore of the southern boundary of the site; two of these ICs were above background values. It should be noted that the PAH ICs are also designated COCs for the manufactured gas plant site located adjacent to and downstream of to the CIM site.

Approximately half of the inorganic ICs exceeded both screening criteria and background calculations. The highest levels of inorganic ICs are in samples offshore of the southern half of the site and one sample just north of the site. The highest levels are concentrated in one sample (SD-17) located approximately due east of the former smelter/staging area and hydraulically downgradient (based on groundwater flow) of the former metal shear and compact/bailer buildings. SD-17 is located approximately 125 feet from the river bank. Elevated levels of inorganic analytes may be present between the shoreline and the sample location, and possibly beyond.

4.3.2.2 Results of Indicator Contaminants in Sediment Samples

PAHs

The highest levels of PAH ICs were detected in SD-19, located offshore of the southern boundary of the site. Indeno(1,2,3-c,d)pyrene and dibenz(a,h)anthracene were detected at 7,700 ug/kg and 2,400 J ug/kg, respectively; these levels exceed calculated background levels and screening criteria. Benzo(a)anthracene (16,000 ug/kg), benzo(b)fluoranthene (15,000 ug/kg) and benzo(a)pyrene (12,000 ug/kg) also exceeded screening criteria, but were below background levels. PAH ICs exceeded screening criteria in the majority of the remaining adjacent sediment samples, but were significantly lower, with overall PAH levels ranging from non-detect to 3,900 J (benzo(a)pyrene and benzo(a) anthracene in SD-20).

PCBs

Aroclor-1254 was not detected in any sediment samples. However, Aroclor-1248 exceeded screening criteria at four locations: SD-11 (520 J ug/kg), SD-13 (220 J ug/kg), SD-16 (260 J and 290 J ug/kg) and SD-18 (230 J).

Inorganics

Six inorganic ICs exceeded screening criteria and background levels in adjacent sediment samples: arsenic, cadmium, copper, iron, lead, and zinc. The highest levels by far were detected in SD-17, approximately due east of the former smelter/staging area and hydraulically downgradient of the former metal shear and compactor/bailer buildings. All six inorganic ICs exceeded background levels and screening criteria in this sample. Iron and zinc exceeded screening criteria in all adjacent sediment samples, but exceeded background levels in six and seven samples, respectively. Iron levels ranged from 25,000 mg/kg to 69,000 mg/kg; zinc levels ranged from 160 mg/kg to 1,100 mg/kg. Copper and lead exceeded screening criteria and background levels in three samples, SD-11, SD-17 and SD-20, Cadmium exceeded screening criteria in two samples, at 1.4 mg/kg (SD-11) and 1.7 mg/kg (SD-17. Arsenic exceeded screening criteria in only one sample, SD-17, at 14 mg/kg.

4.3.2.3 Non-Indicator Contaminant Screening Criteria Exceedances in Sediment Samples

The non-ICs found at levels exceeding screening criteria in sediment samples adjacent to the site include eight SVOCs, two pesticides, one PCB, and five inorganic analytes. SVOCs include: 4-methylphenol (exceeded by 3.5 times in 1 sample), naphthalene (exceeded by just over one time in one sample), fluorene (exceeded by just over one to 15 times in 3 samples), phenanthrene (exceeded by 1.5 to 24 times in 5 samples), anthracene (exceeded by just over 1 to 10 times in 2 samples), fluoranthene (exceeded by 2 to 18 times in 5 samples), pyrene (exceeded by 2 to 26 times in 5 samples), and chrysene exceeded by 4 to 308 times in all samples). The two pesticides, 4,4-DDE and 4,4-DDT, exceeded screening criteria by 9 to 30 times in all samples, and by 8 to 27 times, respectively. Aroclor-1248 screening criteria exceedances ranged from 6,900 to 16,311 times.

Inorganic exceedances included antimony, chromium, manganese, nickel, and silver. Antimony exceeded criteria in 1 sample by 7.5 times. Chromium and manganese exceedances were found in all but one sediment sample; chromium's exceedances ranged from just over one to three times and manganese's exceedances ranged from just over one to four times. Nickel exceeded screening criteria in all samples, by just over one to five times. Silver exceeded screening criteria in five samples, by two to seven times.

4.3.3 Surface Water Contamination

CDM collected 10 surface water samples in the Hudson River adjacent to the site (SW-11 through SW-20), co-located with sediment samples. Table 4-17 and Figure 4-7 show all surface water screening criteria exceedances, including ICs, for the adjacent environmental samples.

4.3.3.1 Distribution of Indicator Contaminants in Surface Water

Iron and lead exceeded calculated background levels and screening criteria in surface water samples adjacent to the site. Lead exceedances occurred in only two samples. Iron exceedances ranged from 1.2 to 2.5 times screening criteria. In general, iron and lead contamination does not exhibit a clear pattern of migration, and are likely influenced by tidal flow.

4.3.3.2 Results of Indicator Contaminants in Surface Water Samples

Figure 4-7 shows the results of IC exceedances in samples adjacent to the site. Iron exceedances occurred in all but one sample (SW-12), and exceeded the calculated background value in all but two samples (SW-11 and SW-12). Iron exceedances ranged from 360 ug/L to 740 ug/L. The highest iron concentration was in SW-15, east of the former compactor/bailer building. Lead exceeded screening criteria and the calculated background value in SW-12 (12 ug/L) and SW-14 (10 ug/L), east of the northeastern corner of the site.

4.3.3.3 Non-Indicator Contaminant Screening Criteria Exceedances in Surface Water Samples

Aluminum was the only non-IC to exceed screening criteria in surface water samples. Aluminum exceeded screening criteria in all surface water samples, at levels ranging from two to seven times screening criteria.

4.3.4 Groundwater Contamination

Prior to installing the monitoring wells, CDM collected groundwater samples from three vertical profile borings located downgradient of the process area and former USTs, to help determine screen depths for monitoring wells. Vertical profile samples were collected at the water table, where LNAPL contamination would likely be present, and at 5-foot intervals through the water column, and included screening samples for VOCs and laboratory samples for TCL/TAL analyses. Once the monitoring wells were installed, two rounds of samples were collected from each of the nine wells, to determine the nature and extent of groundwater contamination at the site. The VOCs detected in onsite wells are commonly found in gasoline, and are likely a result of leaking USTs or gasoline leaking from crushed vehicles. Groundwater samples collected to delineate LNAPL are discussed in Section 4.3.5.

4.3.4.1 Distribution of VOCs and Indicator Contaminants in Groundwater

VOCs and inorganic ICs exceeded screening criteria in groundwater across the site. VOCs commonly found in gasoline (methyl tert-butyl ether [MTBE], benzene, ethylbenzene, and m,p-xylene) were detected above screening criteria in the majority of vertical profile groundwater samples and monitoring wells. In general, the vertical profile groundwater samples contained more and higher levels of inorganic ICs than monitoring well samples. This is likely due to higher levels of particulates in the profile samples, onto which inorganics adhere. Monitoring wells were fully developed prior to sampling, reducing the amount of particulates and, therefore, the concentration of inorganics.

The majority of exceedances are located downgradient (east) of former USTs located along the western border of the site. The highest levels of ICs are located adjacent to and downgradient of the former compactor/bailer and metal shear buildings, near the former tire piles. The highest concentrations are found in MW-5, approximately 250 feet downgradient of the former metal shear building. Turbidity readings were relatively low during both rounds of groundwater samples, and were not likely to affect inorganic results.

4.3.4.2 Results of VOCs and Indicator Contaminants in Vertical Profile Wells

<u>VOCs in Screening and Laboratory Vertical Profile Well Samples</u>

In general, VOC results from screening samples and laboratory samples are not comparable; the screening VOC results obtained with a PID are not compound-

Vertical
Profile
Results

specific (i.e., they are for total VOCs only) . Therefore, screening VOC results cannot be compared with VOC data from laboratory samples. In addition, sample locations that indicated higher total VOC levels in screening samples did not contain levels of specific VOCs that exceed screening criteria in laboratory samples. For example, in VPMW-1, screening results indicated VOC exceedances only in the 15-20-foot and the 20-25-foot intervals; however, laboratory results indicated exceedances in the 10-15-foot and the 25-30-foot intervals.

Four VOCs exceeded screening criteria in both the screening and laboratory samples (benzene, ethylbenzene, m,p-xylene, and MTBE). Two additional VOCs (toluene and isopropylphenol) exceeded screening criteria in laboratory samples. Methylene chloride, which also exceeded screening criteria in screening samples, was detected in associated rinsate blanks, and is considered a laboratory contaminant. Table 4-18 presents screening criteria exceedances in screening samples and Table 4-19 presents exceedances in laboratory samples.

The highest levels of VOCs, in both screening and laboratory samples, were detected in VPMW-1, in the northwest corner of the site, just north of a former UST; this location was originally planned as the background well location until screening results indicated VOC contamination. With the exception of MTBE, all of the above-mentioned VOCs were detected at this location. At VPMW-1, the highest levels were in the 10-15 foot interval, and generally decreased in subsequent intervals. For example, m,p-xylenes were detected at the 10-15-foot interval at 8,900 ug/L. Levels in the 15-20-, 20-25-, and 25-30-foot intervals were 350 ug/L, 25 ug/L and 190 ug/L, respectively. These results reflect both screening and laboratory sample results. One VOC (MTBE) exceeded screening criteria in VPMW-4, and ranged from 11 ug/L to 12 ug/L in intervals from 13 to 28 feet bgs. Five VOCs were detected in VPMW-5, with the majority and highest levels in the 26-31 foot interval.

Indicator Contaminants in Laboratory Vertical Profile Well Samples

It should be noted that the VPMW groundwater samples generally contained more and higher levels of ICs (inorganics only) than monitoring well samples. This may be attributable to the fact that monitoring wells were developed thoroughly to clear the well of sediment and particulates, whereas vertical profile sampling intervals were not. As a result, it is likely that the higher levels of particulates in the profile samples led to higher concentrations during analysis because inorganic analytes tend to adhere to particulates.

Six ICs exceeded screening criteria in the laboratory vertical profile samples: arsenic, copper, iron, lead, mercury, and zinc. Levels in VPMW-1 and VPMW-4 generally increased with depth, whereas levels in VPMW-5 decreased with depth. Iron, lead, and zinc exceeded screening criteria in all seven of the VPMW samples. The highest iron levels were found from 25-30 feet bgs in VPMW-1 (4,500,000 mg/L). The highest lead and zinc levels were found from 23-38 feet bgs in VPMW-4 (20,000 mg/L and 35,000 mg/L, respectively).

4.3.4.3 Results of VOCs and Indicator Contaminants in Monitoring Wells

Table 4-20 and Figure 4-8 present monitoring well screening criteria exceedances for all contaminants, including VOCs and ICs. As noted above, monitoring wells contained lower levels of ICs than VPMWs. This is most likely because the monitoring wells were fully developed prior to sampling, thereby reducing the amount of suspended solids in the samples. This is evident in the relatively low turbidity levels during the groundwater monitoring well samples. Turbidity levels during the first round of groundwater samples ranged from 3 to 95 NTUs, with the majority of samples under 30 NTUs. Turbidity levels in the second round of groundwater samples ranged from less than 1 to 65 NTUs, with the majority of samples below 40 NTUs. As a result, the concentrations of inorganics in monitoring well samples are more representative of the aquifer. Turbidity does not affect VOC results.

Round 1

VOCs were detected above background levels and screening criteria in five of the Round 1 groundwater samples (not including the duplicate sample, MW-05-R1-Dup) (Table 4-20). MTBE exceeded the screening criterion in MW-04 (14 ug/L), MW-05 (14 ug/L), MW-07 (19 ug/L), and MW-08 (15 ug/L). Other VOCs that exceeded screening criteria are benzene in MW-09 (9.6 ug/L), MW-04 (3.8 ug/L) and MW-05 (18 ug/L); toluene (9.8 ug/L) and ethylbenzene in MW-05 (62 ug/L); and m,p-xylenes in MW-04 (6.6 ug/L) and MW-05 (260 ug/L).

Three ICs, (iron, lead, and zinc) exceeded screening criteria and background levels in the majority of monitoring wells during the round 1 sampling event. The highest levels of these three analytes were found in MW-05. Iron exceeded screening criteria in all nine monitoring wells, including the background well (MW-09). Iron levels in downgradient wells ranged from 4,500 ug/L to 70,000 ug/L. Lead exceeded screening criteria in two monitoring wells, MW-03 (38 ug/L) and MW-05 (91 and 89 ug/L). Zinc exceeded screening criteria in one location, MW-05 (150 and 140 ug/L).

Round 2

VOCs were detected above background levels and screening criteria in six of the Round 2 groundwater samples (not including the duplicate sample, MW-05-R1-Dup) (Table 4-20). MTBE exceeded the screening criterion in MW-03 (16 ug/L), MW-04 (47 J ug/L), MW-07 (26 ug/L), and MW-08 (14 ug/L). Other VOCs that exceeded screening criteria are benzene in MW-09 (13 ug/L), MW-04 (1.9 J ug/L), and MW-05 (4.9 ug/L); ethylbenzene in MW-05 (19 ug/L); and m,p-xylenes in MW-05 (61 ug/L).

During the Round 2 sampling event, the ICs iron and zinc exceeded screening criteria, but lead did not. Iron levels were distributed similarly during Round 2, but were higher; levels in downgradient wells ranged from 5,550 ug/L to 87,200 ug/L. Zinc exceeded screening criteria in seven wells during Round 2 (compared to two wells during Round 1); results were rejected in the remaining two wells. Zinc levels ranged from 25.6 J ug/L to 105 ug/L.

4.3.4.4 Non-Indicator Contaminant Screening Criteria Exceedances in Monitoring Well Samples

Non-ICs that exceeded screening criteria in monitoring wells include the inorganic analytes antimony, magnesium, manganese, sodium, and thallium. Magnesium, manganese, and sodium exceeded screening criteria during Round 1. Magnesium exceeded screening criteria by one to two times in five of the monitoring wells. Manganese and sodium exceeded screening criteria in all wells, by 1 to 10 times, and by 1.5 to 7.5 times, respectively.

All five of the above-listed analytes exceeded screening criteria during Round 2, including antimony by 11 times in 1 well; magnesium by 1 to 2.5 times in 5 wells; manganese by 1.5 to 9 times in all wells; sodium by 1.5 to 10 times in all wells; and thallium by 9 to 18 times in 8 wells.

4.3.5 LNAPL Delineation

CDM collected soil samples and groundwater samples to delineate areas of visible LNAPL.

4.3.5.1 Distribution of LNAPL

LNAPL is found in two areas (see Figure 4-9a). The first area, which includes soil boring locations PASB-02 and PASB-05, is adjacent to the former metal shear building on the northern and eastern side, respectively. The second area, which includes soil boring locations SWSB-15 and SWSB-16, is located near the Hudson River, just downgradient of the former compactor/bailer building. The latter building was found to contain free product in the two-level basement; the product was removed in early 2004. A cross section through these four borings was prepared to illustrate the vertical extent of observed LNAPL or heavy staining in relation to LNAPL sample data. The cross section location is shown on Figure 4-9a and the cross section is presented as Figure 4-9b. LNAPL observations in the four borings include: 9-27 feet bgs in PASB-02, 6-8 feet bgs in PASB-05, 1-27 feet bgs in SWSB-15, and 14-15 feet bgs in SWSB-16. These limited observations of LNAPL and/or staining are insufficient to map a floating LNAPL product plume.

4.3.5.2 LNAPL Soil Sample Results

Results of the LNAPL soil samples are presented in Table 4-21a. VOCs were detected in LNAPL soil samples, but at levels below background levels and screening criteria. TPH (motor oil and terphenyl-D14) were detected in PASB-02 at 92 and 310 mg/kg, respectively, and in SWSB-15 at 85 and 71 mg/kg, respectively.

SVOCs were detected above background levels and screening criteria in both LNAPL soil samples. Table 4-21 shows the screening criteria exceedances for soil. Benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene exceeded screening criteria in process area soil boring PASB-02, and in site-wide soil boring SWSB-15.

Sixteen inorganic analytes exceeded screening criteria: aluminum, antimony, arsenic, beryllium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc in soil LNAPL samples. The highest iron concentration was in PASB-02 (91,800 mg/kg), located north of the former metal shear and compactor/bailer buildings.

4.3.5.3 LNAPL Groundwater Sample Results

Results of the LNAPL groundwater samples are presented in Table 4-21b. VOCs were detected above background levels and screening criteria in three of the LNAPL groundwater samples (excluding duplicate sample, GWS-16-LNAPL) (Table 4-21). The highest MTBE groundwater exceedance was in GWS-16 (58 ug/L) (site-wide soil boring location, SWSB-16). BTEX exceeded screening criteria in GWS-15 (site-wide soil boring SWSB-15). TPH results for the gasoline range organics ranged from 4.4 ug/L to 9.7 ug/L; diesel range organics ranged from 0.78 ug/L to 3.3 J ug/L. The PCB Aroclor-1254 exceeded screening criteria in GWS-02.

The inorganic ICs iron, lead, mercury, and zinc exceeded screening criteria in the groundwater LNAPL samples. The highest lead concentration was in GWS-16 (380 ug/L), east of the former metal shear and compact/bailer buildings. It should be noted that the sampling method used to collect LNAPL groundwater samples (i.e., with a Geoprobe drive-point sampler and peristaltic pump) may result in inorganic levels that are biased high due to the increased presence of fine sediment in the samples.

A strong correlation was not observed between LNAPL soil and groundwater samples in the same boring because samples were collected from different zones of each of the borings.

5

Section
Five

Section 5

Section 5
Contaminant Fate and Transport

This section examines the chemical and physical processes that affect the fate and transport of contaminants in the soils, sediments, surface water, and groundwater at the site. The focus will be on the ICs, as described in Section 4. 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 ICs for the site
- A summary of the relevant physical-chemical and mobility-related properties of the ICs, as needed to describe their fate and transport
- A discussion of processes that affect contaminant fate and the fate of the IC contaminants in the environment
- A discussion of processes that affect contaminant transport and the transport potential of the IC contaminants
- A description of the conceptual site model (CSM)
- A summary of the fate and transport evaluation

5.1 Contaminants

Contaminants detected in site media are discussed below, including COPCs evaluated in the HHRA and the ICs presented in Section 4. The contaminants of potential ecological concern (COPECs) were selected during the SLERA evaluation.

5.1.1 Contaminants of Potential Concern

COPCs are identified for the HHRA based on several criteria, including their toxicity characteristics, frequency, and the maximum concentration at which they were detected in the various media at the site. The human health COPCs are listed on Table 6-1. Shown below by media are the ICs discussed in this section and the media for which they are COPCs.

- Surface Soil - benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1254, arsenic, cadmium, copper, iron, lead, mercury, vanadium, and zinc

- Subsurface Soil - benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, Aroclor-1254, arsenic, cadmium, copper, iron, lead, mercury, vanadium, and zinc

- Sediment - benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, arsenic, copper, iron, lead, and vanadium

- Surface water - none

- Groundwater - arsenic, copper, iron, lead, mercury, and vanadium

5.1.2 Contaminants of Potential Ecological Concern

A listing of COPECs were developed for in the SLERA, and are discussed in Section 6.2.

5.1.3 Indicator Contaminants

A list of ICs was developed for the RI report as discussed in Section 4.1.2 and are listed in Section 5.1.1. The fate and transport of these ICs are evaluated in the following subsections; other compound detections in site media are not discussed.

5.1.4 Chemical and Physical Properties of Indicator Contaminants

To predict the fate or persistence and potential transport of ICs that are present in soils, sediments, surface water, and groundwater, it is necessary to identify which contaminants are likely to leach or degrade. This depends on a given chemical's physical and chemical properties and the properties of the media through which it migrates. Table 5-1 presents the chemical and physical properties of the ICs. The properties are defined in the following paragraphs and discussed in the next section.

The solubility of a chemical is the upper limit of its dissolved concentration in water at a specified temperature. Concentrations in excess of solubility may indicate sorption onto sediments, a co-solvent effect, or the presence of a non-aqueous phase liquid. As shown in Table 5-1, the PAHs have moderate water solubility, ranging from 1.0E-2 mg/L (benzo(a)anthracene) to 5.0E-4 mg/L (dibenz(a,h)anthracene); Aroclor-1254 solubility also falls in this range 6E-2 mg/L. The solubility of metals is dependent on the anion to which it is bonded. All IC metals are insoluble in water with some having soluble salts.

Vapor pressure is the pressure exerted by a chemical vapor in equilibrium with its solid or liquid form at any given temperature. It is used to calculate the rate of volatilization of a pure substance from a surface or to estimate a Henry's Law constant for chemicals with low water solubility. The higher the vapor pressure, the more likely a chemical is to exist in a gaseous state. At the facility, the ICs have relatively low vapor pressure, ranging from 7.7E-5 (Aroclor-1254) to 1.0E-10 millimeters (mm) of mercury (Hg) (dibenz(a,h)anthracene) and indeno(1,2,3,-c,d)pyrene. These values indicate that these PAHs and PCBs will not evaporate from near-surface soil or water. The metals also exert very little or no vapor pressure at normal temperatures and pressure. These ICs exert very low vapor pressure so volatility is not of importance to these chemicals.

Henry's Law constant provides a measure of the extent of chemical partitioning between air and water at equilibrium. The higher the Henry's Law constant, the more likely a chemical is to volatilize rather than to remain in water. At the site, the PAHs have Henry's Law constant less than 10-3atmosphere-m3/mole (atm-m3/mol), indicating they are not volatile in water. The Henry's Law constant for PCB Aroclor-1254 indicates it may be somewhat volatile. In contrast, the PAHs are less likely to partition to air. Little data is available for Henry's Law constants of metals.

The organic carbon partition coefficient (Koc) provides a measure of the extent of chemical partitioning between organic carbon and water at equilibrium. The higher the Koc, the more likely a chemical is to bind to soil or sediment rather than to remain dissolved in water. At the site, the PAHs Koc values are high, ranging in the hundred thousands; for example, 9.69E+5 mL/g for benzo(a)pyrene, and 3.1E+5 mL/g for Aroclor-1254, indicating that these ICs are more likely to bind to soil or sediment and have low to moderate mobility in water.

The soil distribution coefficient (Kd) provides a soil- or sediment-specific measure of the extent of chemical partitioning between soil or sediment and water, adjusted for dependence upon organic carbon. Kd is adjusted using the fraction of organic carbon (Foc) of the soil/sediment as shown in the formula Kd = Koc x Foc. A higher Kd indicates that a chemical is more likely to bind to soil or sediment rather than to remain in the dissolved phase, thereby reducing the transport capability. Site-specific Kd values were calculated for organic ICs (Table 5-1) using the average total organic carbon (35,200 mg/kg) determined for soil samples.

The octanol-water partition coefficient (Kow) provides a measure of the extent of chemical partitioning between water and octanol at equilibrium. The greater the Kow, the more likely a chemical is to partition to octanol rather than to remain in water. Octanol is used as a surrogate for lipids, and Kow is used to predict bioconcentration in living organisms. At the site, all PAHs and Aroclor-1254 have relatively high Kow indicating that they have a high potential to bioconcentrate in living organisms. No data is available for the IC metals. The organic ICs are not mobile; however, any of these contaminants transported offsite have high Kow values so bioconcentration in organisms living in the Hudson River would be important.

5.2 Contaminant Fate

The selected contaminants fall into two main contaminants classes, PAHs/PCB and metals. Contaminant fate describes the length of time that a contaminant will remain in its original chemical state in the environment. Chemicals that persist in a given medium are those that form insoluble precipitates, or resist biodegradation, hydrolysis, and volatilization. The fate of metals depends on partitioning between soluble and insoluble particulate solid phases. Partitioning is affected by adsorption, precipitation, co-precipitation, and complexation. These processes are governed by pH, Eh, ionic strength of the water, concentration of the complexing ions, and the concentration and type of metals.

5.2.1 Processes That Affect Fate

The major processes affecting the fate, or persistence, of the site's ICs are dissolution and precipitation. Redox conditions and pH govern the stability of metal species and determine whether a metal will precipitate from solution and what ionic species (or phase) of dissolved metals will be present. The most persistent chemicals are those that form insoluble compounds, precipitate, or do not hydrolyze or biodegrade.

Dissolution - Dissolution is the process of dissolving, changing, or separating a substance into component parts or changing it from a solid to a fluid state. Mechanisms that cause or enhance dissolution include solution by heat, moisture liquefaction, melting, or decomposition.

Precipitation - In chemistry, precipitation is the condensation of a solid from a solution. This occurs when the solution is saturated, whereupon the solid forms, and usually sinks to the bottom of the solution. Chemical precipitation is commonly used to remove dissolved (ionic) metals from solutions. The ionic metals are converted to an insoluble form (particle) by the chemical reaction between the soluble metal compounds and the precipitating reagent. The particles formed by this reaction are removed from solution by settling and/or filtration. The effectiveness of chemical precipitation is dependent on several factors, including the type and concentration of ionic metals present in solution, the precipitant used, the reaction conditions (especially the pH of the solution), and the presence of other constituents that may inhibit the precipitation reaction.

Hydrolysis - Hydrolysis is a chemical decomposition process that uses water to split chemical bonds of substances. There are two types of hydrolysis, acidic and enzymatic. Hydrolysis occurs in certain inorganic salts in solution, in nearly all non-metallic chlorides, in esters, and in other organic substances.

Biodegradation - Biodegradation is the breakdown of organic contaminants by microbial organisms into smaller compounds. The microbial organisms transform the contaminants through metabolic or enzymatic processes. Biodegradation processes vary greatly, but frequently the final product of the degradation is carbon dioxide or methane. Biodegradation can occur under aerobic conditions, where oxygen is present, or under anaerobic conditions, where oxygen is absent.

5.2.2 Fate of PAHs

PAHs are a group of chemicals formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances. PAHs generally occur as complex mixtures, not as single compounds. They are found throughout the environment in air, soil, and water. They frequently are attached to dust particles or as solids in soil or sediment.

The degree of persistence of PAHs increases with the size of the compound's chemical structure. The relatively high octanol/water coefficients of PAHs 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. Some PAHs can readily evaporate into the air from soil or surface waters. PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks. Most PAHs do not dissolve easily in water. They adhere to solid particles and settle to the bottoms of lakes or rivers. Microorganisms can break down PAHs in soil or water after a period of weeks to months. In soils, PAHs are most likely to adhere tightly to particles.

5.2.3 Fate 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 likely found in some of the electrical equipment in the materials at the Consolidated Iron site.

PCBs are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as vapor in air. PCBs do not readily break down in the environment and thus may remain for very long periods of time. In water, a small amount of PCBs may remain dissolved, but most adhere to organic particles and bottom sediments. PCBs also bind strongly to soil. PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

Biodegradation of PCBs is very slow and occurs under aerobic or 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. Aroclor-1254 does not biodegrade readily under aerobic conditions and is persistent (Abramowicz 1990). In addition, TOC in the soil and sediments makes this a less important mechanism for the transformation of PCBs. Reductive dechlorination is known to occur on a limited basis under soil anaerobic conditions.

5.2.4 Fate of Inorganic ICs

The physical characteristics of metals 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 sources of inorganic ICs at the site are presumed to originate from the highly variable types of metal wastes that were processed at the site.

<u>Arsenic</u> - In soils, arsenic typically exists as the arsenate (As[V]) or the arsenite (As [III]). The chemical species is dependent on soil pH and redox potential. The fate of arsenic is affected by the iron content, and to some extent, the manganese content of the soil. Under oxidizing conditions, arsenic will remain sorbed to iron and manganese oxides in the soil. Under reducing conditions, such as exist in sediments or under flooding conditions, absorbed arsenic may be released and available for

transport. Microbial action can also cause release of arsenic through reductive dissolution.

In the aqueous matrix, arsenic adsorption is the main controlling factor. The Kd value reflects the level of adsorption, and is affected by pH, temperature, and the arsenic oxidation state.

Cadmium - Cadmium is an element that occurs naturally in the earth's crust. It is usually found as a mineral combined with other elements such as oxygen (cadmium oxide), chlorine (cadmium chloride), or sulfur (cadmium sulfate, cadmium sulfide). These compounds are solids that may dissolve in water but do not evaporate or disappear from the environment. All soils and rocks contain some cadmium. Cadmium does not break down in the environment but can change into different forms. Some of the cadmium that enters water will bind to soil but some will remain dissolved in the water. Cadmium in soil can enter water or be taken up by plants. Fish, plants, and animals take up cadmium from the environment.

Copper - Copper occurs naturally in rock, soil, water, sediment, and air. It also occurs naturally in plants and animals, and it is an essential element for all organisms. Copper may exist in two oxidation states: +1 or +2. Copper (+1) is unstable. In aerated water over the pH range of most natural waters (6 to 8), copper (+1) oxidizes to the +2 state. Most copper in water is found as particulate matter and eventually settles out, precipitates out, or adsorbs to organic matter, hydrous iron or manganese, oxides and clay in sediment or in the water column. The amount of copper able to remain in solution is directly dependent on water chemistry, especially pH, temperature and the concentration of other chemical species. Bioconcentration of copper in aquatic organisms is relatively low, probably mediated by natural regulatory mechanisms (EPA 1998).

Iron - Iron is a relatively abundant element in the universe. Iron nuclei are very stable although pure iron is very reactive chemically, and rapidly corrodes, especially in moist air or at elevated temperatures. Iron metal reacts in moist air by oxidation to give a hydrated iron oxide. This does not protect the iron surface to further reaction since it flakes off, exposing more iron metal to oxidation. On heating with oxygen, the result is formation of the iron oxides Fe_2O_3 and Fe_3O_4. Chemical reactions also occur when iron is exposed to acidic conditions.

Lead - Lead is a naturally occurring metal found in small amounts in the earth's crust. Metallic lead does not dissolve in water. Lead can combine with other chemicals to form lead compounds or lead salts. Some lead salts dissolve in water better than others. The lead (II) oxidation state is the more stable, and there is a strong tendency for lead (IV) compounds to react to give lead (II) compounds. Lead (IV) chloride decomposes at room temperature to give lead (II) chloride and chlorine gas. Lead (IV) oxide decomposes on heating to give lead (II) oxide and oxygen. Lead (IV) oxide also reacts with concentrated hydrochloric acid, oxidizing some of the chloride ions in the acid to chlorine gas. Overall, chemically lead tends to reduced from the +4 to the more stable +2 state.

Mercury - Mercury is an element that occurs naturally in the environment in several forms. In the metallic or elemental form, mercury is a shiny, silver-white, odorless liquid with a metallic taste. Mercury can also combine with other elements, such as chlorine, carbon, or oxygen, to form mercury compounds. One organic form of mercury, methylmercury, is of particular concern because it can bioaccumulate. Mercury in the environment can slowly change from organic to inorganic forms and vice versa by microorganisms and natural chemical processes.

Vanadium - Vanadium is naturally occurring and frequently combines with elements such as oxygen, sodium, sulfur, or chloride. It does not dissolve well in water, so it generally adheres to soils or sediments. Vanadium oxide is a component in special kinds of steel used for automobile parts, springs, and ball bearings.

Zinc - Zinc is one of the most common elements in the earth's crust. Metallic zinc is mixed with other metals to form alloys such as brass and bronze and is also used to make dry cell batteries. Zinc also combines with elements such as chlorine, oxygen, and sulfur to form zinc compounds including zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide. The level of dissolved zinc in water may increase as the acidity of water increases.

5.3 Contaminant Transport

This section discusses the conditions at the site that may affect contaminant transport, potential contaminant transport pathways, potential contaminant transport mechanisms, and transport properties of each IC for the site.

5.3.1 Properties of Site Media Influencing Contaminant Transport

5.3.1.1 Topography

The site is in the Lower Hudson Valley, on the west bank of the Hudson River. The site has relatively low topographic relief, with elevations ranging from approximately 20 feet amsl to less than 7 feet amsl adjacent to the Hudson River (at mean low tide elevation). Surface water runoff into the Hudson River occurred in the past on the northeastern side of the site. A small berm constructed of site soils currently minimizes surface runoff into the river.

5.3.1.2 Groundwater

Groundwater in Orange County occurs in both unconsolidated sand and gravel aquifers and consolidated bedrock aquifers. Sand and gravel aquifers exist in both unconfined and confined environments. The bedrock aquifers are almost always considered confined or semi-confined and are generally overlain by confining layers of glacial till or low permeability deposits. The unconsolidated water table aquifer, which overlies the bedrock aquifer, is comprised of fill material underlain by native sand and gravel with localized silt lenses. The water table aquifer is approximately 20 feet thick. All of the monitoring wells are installed within this aquifer. The water table at the site is generally flat, with elevations ranging from 3.18 feet amsl (14.43 feet bgs) at MW-1 in the northwest corner of the site, to 0.44 feet amsl (11.97 feet bgs) at MW-7 in the southeastern part of the site. Flow is to the east/southeast, toward the Hudson River. Groundwater flow velocity, based on hydraulic conductivity values, is estimated to be 0.42 ft/d.

5.3.1.3 Soil and Groundwater Chemistry

A variety of factors affect the mobility of metals in soil/water systems, including:

- The pH and oxidation/reduction (redox) potential, which affect the speciation of all metals and complexing agents
- The amount of organic matter present in the soil and the distribution of soil particles
- The presence of water (soil moisture content)
- The presence of other complexing chemicals in solution
- The temperature
- Soil properties, such as cation exchange capacity, the presence of hydrous oxides of iron and magnesium

The RI included measurements for pH, redox, and TOC, as summarized below.

pH

The pH of soils and groundwater affects the hydrolysis rate, partitioning equilibrium, and contaminant solubility. Soil, sediment, surface water, and groundwater pH values collected during the RI are summarized below.

Medium	pH low	pH high	pH average
Surface soil	7.5	8.2	7.8
Subsurface soil	8.0	9.5	8.58
Sediment	6.3	9.6	6.91
Surface water	7.53	8.23	7.99
Groundwater	5.89	7.95	7.34

Redox Potential

Redox potential determines the chemical species that predominate and, therefore, the mobility and fate in the environment. High redox potential values favor the existence of oxidized species, whereas, low redox favors reduced species and those compounds without oxygen or multiple bonds. The site redox values in surface water ranged from 170.2 to 268 millivolts (mV). The groundwater redox values ranged from –10.9 to -269.6 mV. In general, the ICs should be relatively immobile in surface water and/or groundwater. This is confirmed by the presence of metals in sediments but limited detections in water samples.

TOC

High organic content in soil increases contaminant absorption and hinders the movement of contaminants through the soil. Soil and sediment TOC results (in mg/kg) are summarized below.

Medium	TOC average	Foc (TOC*10^{-4})
Soil	48,500	4.85 %
Sediment	39,850	3.98 %

The TOC values suggest that those site contaminants subject to retardation will likely be trapped by the soils or sediment. This condition is generally supported by the limited exceedances of screening criteria in surface water and groundwater.

5.3.1.4 Potential Contaminant Transport Pathways

Potential contaminant transport pathways as mechanisms for soil contamination to reach surface water and/or groundwater are outlined below.

- Atmospheric release of metals and PAHs from smelter and subsequent precipitation and adsorption to soil particles on the ground surface
- Release of chemicals from underground storage tank to the groundwater
- Rainwater flow through contaminated soils and subsequent flushing through dissolution of ICs into the groundwater
- Migration and re-distribution of contaminants present in soil via surface runoff, especially at the northeastern end of the site, to the Hudson River sediments and surface water
- Direct migration of contaminants through unconsolidated soils to the water table
- Discharge of groundwater to the Hudson River

and to a lesser extent:

- Volatilization of organic chemicals from the ground to the atmosphere
- Volatilization of organic chemicals at groundwater discharge points in the Hudson River

5.3.2 General Transport Mechanisms

The major processes that affect the transport, or mobility, of ICs in soils, sediment, and liquid media include surface runoff and transport, advection, dissolution/precipitation, bio-accumulation and bioconcentration.

Dissolution/precipitation. Whether a chemical is transported in a dissolved state in infiltrating water or is precipitated out of solution depends on the solubility of that chemical in water, and competition or interference with other chemicals being transported. The IC metals are relatively insoluble and the PCB Aroclor-1254 is slightly soluble, but solubility, especially for metals, is dependent upon redox conditions and pH.

Bioaccumulation and bioconcentration. Some chemicals, such as lead, mercury, and PCBs, tend to bioaccumulate or bioconcentrate in animal or plant tissue. In fact, plant uptake is sometimes used as a remedial strategy to remove these contaminants from soils and sediments. Bioaccumulation represents an uptake and buildup rate in a species that ingests or uptakes the contaminant that is faster than its elimination rate. This can be a concern for higher-level biota, including the human population, for contaminants such as lead, mercury, or PCBs. Higher concentrations can occur in predatory species, especially those at the top of the food chain.

Air Dispersion and Transport. If site-related contaminants became entrained in the atmosphere, they might be transported to other locations, due to local meteorological patterns. Smelter operations on-site possibly enabled this transport mechanism. The dispersion meteorology of an area is the ability of the atmosphere to disperse air-entrained constituents released from a source. Dispersion meteorology is expressed as several atmospheric variables including wind speed, wind direction, ambient temperature, level of mixing height, surface roughness, and ambient turbulence level. These variables change considerably with location and time.

Originating from ground sources, they are not expected to penetrate the atmosphere to any extent. The exposed surface contamination at the site could facilitate air transport of Aroclor-1254 and most metals.

Dust Emissions. In general, surface soil contaminants could be released to the atmosphere through the generation of dust during construction/excavations, redistribution of excavated fill during the construction of the sewage treatment plant that is located to the west of the property, sampling, travel over unpaved roads, or from wind-blown fugitive dust. All ICs in surface soils exceeded their respective screening levels; therefore, dust emission is a potential transport pathway.

Volatilization. Volatilization onsite is limited to surface soil contaminants. PCBs will volatilize from surface soils. Volatilization of VOCs from soils and groundwater is/was high due to their high Henry's law constant. The limited detections of VOCs in soil samples indicates that volatilization was a predominant process in that medium. Volatilization of VOCs from groundwater occurs at the water table, likely releasing vapors into the overlying unsaturated zone.

5.3.2.1 Groundwater Transport Processes

The mechanisms which govern contaminant transport in the groundwater flow regime (i.e., solute transport) include various physical and chemical processes. These transport processes include advection, hydrodynamic dispersion, retardation (primarily via adsorption), and biodegradation. Each of these processes and how they influence contaminant migration are described below and in Section 5.5.

Advection. Advection describes the process of solute migration due to the average bulk movement of groundwater and typically is the most important factor governing the transport of contaminants in groundwater. Advection defines the direction and velocity of a plume's center of mass. The rate of transport, on average, is equal to the flow rate of the water or wind. The advective transport term is computed using velocities determined by solving the groundwater flow equation, which is a function of hydraulic conductivity, hydraulic gradient, and flow cross-sectional area. Average linear groundwater velocity (v) is a function of hydraulic conductivity, hydraulic gradient, and effective porosity (η). Effective porosity values typically fall within the range of values of specific yield and total porosity. Specific yield (i.e., the amount of water released from storage per unit drop in piezometric head) represents the lower limit of reasonable effective porosity values.

Dispersion and subsequent related dilution of concentrations occurs and is directly related to the advective flow rate.

Hydrodynamic Dispersion. Hydrodynamic dispersion describes the spread of contaminants around an average groundwater flow path, beyond the region they would normally occupy due to advection alone. Hydrodynamic dispersion is the sum of two processes: mechanical dispersion and molecular diffusion. Mechanical dispersion results from mixing that occurs as a consequence of local variations in groundwater velocity and the aquifer's matrix. Molecular diffusion results from variations in solute concentrations within the groundwater system. However, this effect is generally secondary to and negligible compared to the mechanical dispersion effect (Zheng 1992).

A dispersion term is incorporated to account for variability of flow (Reilly et al. 1987). The most important variable in this respect is hydraulic conductivity (Domenico and Schwartz 1997). The coefficient of hydrodynamic dispersion is, therefore, typically reduced to the following equation:

$$D = \alpha v$$

where:

D = coefficient of hydrodynamic dispersion
α = dispersivity
v = average linear groundwater velocity

In evaluating solute transport, dispersion is quantified by specifying longitudinal dispersivity and transverse dispersivity. Longitudinal dispersion (i.e., the magnitude of dispersion along, or parallel, to the average direction of groundwater flow in the horizontal plane) depends on longitudinal dispersivity [multiplied by advective velocity (v)]. Similarly, transverse dispersion, or the magnitude of dispersion perpendicular to the average direction of groundwater flow, depends on transverse dispersivity. Typically, for fully three-dimensional solute transport evaluations involving dispersion, values are specified for longitudinal dispersivity (αL), and the ratios of both horizontal transverse dispersivity (αTh) and vertical transverse dispersivity (αTv) to the longitudinal dispersivity are specified.

Retardation. Dissolved contaminants may interact with aquifer solids encountered along the flow path via adsorption, partitioning, ion-exchange reactions, and other chemical and physical processes which remove the dissolved constituent from groundwater. These interactions distribute the contaminant between the aqueous phase and the aquifer solids, diminish concentrations of the contaminants in the aqueous phase, and retard the movement of the contaminant relative to groundwater flow (MacKay et al. 1985). The higher the fraction of contaminant sorbed, the more its transport is retarded. Due to the various physical and chemical removal processes (primarily adsorption), a solute may move more slowly than the groundwater. A typical method of generally describing this phenomenon in solute transport evaluations is by using a retardation factor. This factor, which has the form of a correction of the velocity of the movement of groundwater, is shown in the following equation (Freeze and Cherry 1979):

$$R = 1 + (\rho b / \eta)\, Kd$$

where:
ρb = soil bulk density
η = effective porosity
Kd = distribution coefficient
R = retardation factor

The distribution coefficient is a function of the soil's and solute's chemistry, and therefore, is compound-specific. The amount of organic carbon present in the aquifer matrix is a key factor. The distribution coefficient is defined by:

$$Kd = Cs / Cw = foc\ Koc$$

where:
Cs = concentration by weight in soil
Cw = concentration by volume in water
Foc = fraction of organic carbon
Koc = partitioning coefficient

These equations assume rapid reversible adsorption with a linear isotherm. Generally, the larger the Kd value, the greater the compound's affinity for the solid matrix (Rutgers University 1993). Some contaminants are described as being conservative, indicating very low Kd. For plumes characteristic of these contaminants, the contaminant's mass moves at essentially the same rate as the average linear groundwater velocity.

For the CIM Site the retardation factor for each contaminant was calculated and presented in Table 5-1. An effective soil bulk density of 1.57 gram per milliliter (g/mL) and an effective porosity of 30% were used in the calculation. As shown in Table 5-1, retardation factors of PAHs at the site and Aroclor-1254 range from 5.7E+4 to 6.4E+5 (lower values obtained from calculations using literature Kd values), indicating that these PAHs are highly retarded in soils at the site. The metals have relatively lower retardation factors indicating that they are more mobile and have potential to sorb to suspended solids in groundwater.

5.3.3 Mobility of PAHs

The movement of PAHs in the environment depends on properties such as how easily they dissolve in water, and how easily they evaporate into the air. PAHs in general do not easily dissolve in water. As a result of combustion activities, they are present in air as vapors or adhered to the surface of small solid particles. They can travel long distances before they return to earth in rainfall or by particle settling. Some PAHs evaporate into the atmosphere from surface waters or soils, but most adhere to solid particles and settle to the bottoms of rivers or lakes. In soils, PAHs are most likely to adhere tightly to particles. PAHs can breakdown to longer-lasting products by reacting with sunlight and other chemicals in air, generally over a period of days to weeks. Breakdown in soil and water generally takes weeks to months and is caused primarily by the actions of microorganisms.

PAHs were widely present in process area and site-wide soils, with screening criteria exceedances ranging from 57 percent to 100 percent of samples. Numerous PAHs were also detected in sediment samples. PAHs did not exceed screening criteria in surface water or groundwater.

Table 5-1 calculations, from site Foc values and from literature Kd values, show that the IC PAHs are highly retarded and have low mobility. The lack of exceedances in the surface water and groundwater detections also indicate they are being retarded.

5.3.4 Mobility of PCBs

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). Some PCBs may volatilize to the air and can be carried long distances. PCBs adhered to soil or sediment can be transported long distances by movement of particulates by wind-blown air, surface water runoff, or stream/river sediments.

Aroclor-1254 was detected in all surface soils, in 90 percent of subsurface samples, and less frequently in sediments. Screening criterion exceedances ranged from 78 to 100 percent of samples. There were no exceedances in surface water or groundwater The Henry's law constant of 2E^{-3} atm-m^3/mol indicates high volatility. These data suggest that Aroclor-1254 at the site is mobile from soil/sediment media to the atmosphere with subsequent redeposition to soil but is immobile from soil to the aqueous media, being retarded by the high organic content soils and sediment.

5.3.5 Mobility of Inorganic ICs

The expected mobility of the inorganic ICs are discussed first, followed by a discussion of site findings. Mobilities of the ICs are also predicted on Table 5-1 based on literature Kd values. Site determined mobilities in groundwater are presented on Table 5-2; they are based on collected groundwater data and duration of site activities and are compared to actual sample result exceeding criteria in all site media.

Expected Mobilities

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 - Hg>As>Cd>Zn>Pb>Cu - 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 inorganic ICs are described below.

Expected Arsenic Mobility - Arsenic is generally mobile and is known to volatilize when biological activity or highly reducing conditions produce arsine or methylarsines. Iron oxide, pH, and, redox control the extent of 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. Deutsch (1997) summarizes the geochemical mobility of arsenic as follows:

"... the mobility of arsenic under oxidizing conditions is primarily affected by the adsorption of As(V) onto metal oxyhydroxides surfaces. If the appreciable adsorption capacity of these surfaces is not surpassed, then arsenic movement will be strongly retarded because of the high affinity of these surfaces for As(V). Under reducing conditions, the dominant arsenic redox species will be As(III), which is not as strongly adsorbed. Furthermore, the primary adsorbing solids may not be stable if the redox potential is low enough. As a consequence, arsenic is expected to be much more mobile under reducing conditions. This mobility may be significantly reduced if arsenic sulfide minerals become saturated and precipitate."

Detected Arsenic Mobility - Arsenic was found in all process area and site-wide soils; all detections exceeded the screening criterion. It was transported to the sediment through windblown dust dispersion and/or surface runoff during storm events. Arsenic exceeded the sediment screening criterion in 1 of 10 environmental samples.

Arsenic did not exceed screening criteria in surface water or groundwater.

Table 5-1 predicts moderate arsenic mobility in soil. The sampling results indicate low mobility. The redox level in surface water is relatively high (Section 5.3.1.3) suggesting low mobility for arsenic. Arsenic may be sorbed to iron or manganese oxide since it has not moved into the groundwater or surface water at levels above its screening criteria. Arsenic's mobility from onsite soils is low to moderate.

<u>Expected Cadmium Mobility</u> - Cadmium is relatively mobile in the aquatic environment. It complexes with organic materials and subsequently adsorbs to sediments.

<u>Detected Cadmium Mobility</u>– Cadmium was detected in nearly all process area and site-wide soil samples; all but 16 percent of site-wide subsurface soil samples exceeded the screening criterion. It was transported to the sediment through windblown dust dispersion and/or surface runoff during storm events. Cadmium was slightly above the sediment screening criterion in 2 of 10 samples and did not exceed criteria in surface water or groundwater.

Table 5-1 predicts moderate cadmium mobility in soil. Cadmium may also be adsorbed to sediment material, lowering its mobility. Cadmium's mobility from onsite soils is low to moderate.

<u>Expected Copper Mobility</u> - Copper is one of the least mobile metals. Processes that render it relatively immobile in soils are adsorption, precipitation, and organic complexation. The solubility of copper decreases in the pH 7 to 8 range. Below pH 7, copper hydroxide cations are formed, and above pH 8, anionic complexes are formed. Copper mobility is enhanced when organic compounds, such as fulvic and humic acid, complex with copper.

<u>Site Detected Copper Mobility</u> - Copper was detected in all soil samples; all detections exceeded the screening criterion. It was transported to the sediment through windblown dust dispersion and/or surface runoff during storm events. Copper was also detected in all sediment samples; all exceeded the screening criterion. Copper did not exceed screening criteria is surface water or groundwater.

Site soil and sediment had average pH values between 6.91 and 8.58. Copper has lower solubility in this pH range. Based on literature Kd, copper's mobility is predicted to be moderate on Table 5-1. This information suggests that copper is moderately mobile; some unavailable due to sorption, precipitation or bound to organic complexes.

<u>Expected Iron Mobility</u> - Iron is very reactive chemically, and rapidly corrodes, especially in moist air or at elevated temperatures, to give a hydrated iron oxide. Chemical reactions also occur when iron is exposed to acidic conditions, making it more likely to be dissolved into surface water or groundwater.

Detected Iron Mobility - Iron was detected in all soil samples; all detections exceeded the screening criterion. It was transported to the sediment through windblown dsut dispersion and/or surface runoff during storm events. Iron was detected in all sediment samples, with all detections exceeding the screening criterion. Iron in surface water and groundwater also exceeded criteria in all samples.

Table 5-1 also predicts moderate solubility for iron in soil; Table 5-2 indicates iron is very mobile in groundwater. The sampling data indicates that iron is mobile at the site, but high levels still remain in soils and sediments.

Expected Lead Mobility - Lead is mostly immobile in all but sandy soils. Its predominant fate in the environment is sorption to soils and organic matter, especially iron and manganese oxides and hydroxides. 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. It should be noted, however, that lead can be transported in water by attachment to small colloidal particles or to suspended solids as undissolved lead oxide, lead hydroxide, lead carbonate or other lead compounds; by surface run-off during rains; or by slow leaching where the sorption capacity of the soil is exceeded.

Detected Lead Mobility – Lead was detected in all soil samples, all surface soil samples exceeded the screening criterion while the majority of subsurface soil samples exceeded the criterion. It may have been transported to the sediment through windblown dust dispersion, surface runoff during storm events or air emission and precipitation during smelting operations. Lead exceeded its screening criterion in all sediment samples. One surface water sample had a lead level that exceeded the screening criterion, while three monitoring well samples in Round 1 exceeded the lead maximum contaminant level (MCL). Lead is considered one of the most important ICs. Lead is used in the production of some types of batteries.

Lead is predicted to have low mobility based on its Kd value (Table 5-1) and also low mobility in groundwater (Table 5-2). The exceedances detected in one surface soil and three monitoring well samples, however, shows that lead is not completely immobile at the site.

Expected Mercury Mobility - 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 (0, +1, and +2). Several species of mercury are unstable and, therefore, more likely to be transferred between different environmental media.

Detected Mercury Mobility – Mercury was detected in all surface soil samples and all but three percent of subsurface soil samples. The screening criterion was exceeded in 95 to 100 percent of samples analyzed. Mercury screening criteria were not exceeded in sediment, surface water, and groundwater samples.

Mercury is not very mobile based on sampling results and is also predicted to have low mobility (Tables 5-1 and 5-2).

Expected Vanadium Mobility - Vanadium is highly mobile in the environment; it is readily leached from soil columns to which it is sorbed as an anion. The behavior is probably similar to that of phosphate, which is adsorbed to ferric oxides and clays. The sorption of vanadium can be correlated with clay, free iron oxides, and surface area of the soil, with pH a major factor in controlling vanadium's mobility.

Detected Vanadium Mobility - Vanadium was detected in all soil samples; all detections exceeded the screening criterion. Vanadium screening criteria were not exceeded in sediment, surface water, and groundwater samples.

In contrast with the expected mobility, vanadium is also not mobile in site soils. This is consistent with Tables 5-1 and 5-2.

Expected Zinc Mobility - Suspended zinc may dissolve or sorb to suspended matter, whereas, dissolved zinc may occur as free zinc ions or as dissolved complexes or compounds varying in stability and toxicity. Adsorption to iron and manganese oxides and hydroxides, and the formation of minerals will reduce the zinc levels in the groundwater. Low pH values will mobilize zinc.

Detected Zinc Mobility - Zinc was detected in all soil samples; all detections exceeded the screening criterion. It was transported to the sediment through windblown dust dispersion and/or surface runoff during storm events. Zinc was detected in all sediment samples; all exceeded the screening criterion. Zinc did not exceed the surface water screening criterion. In groundwater, two samples in Round 1 and eight samples in Round 2 exceeded the zinc screening criterion.

The detected zinc results show that zinc is moderately mobile, consistent with Tables 5-1 and 5-2.

Table 5-1 shows mobility for each metal, from low to moderate mobility. The retardation factors were calculated from literature Kd values. Copper and vanadium mobilities are predicted to range from low/moderate and sampling results indicate they are immobile. This indicates that the literature Kd values for these metals (low mobility) align closely with the CIM site data results. The iron, lead, mercury, and zinc predictions of mobility from the site-specific calculated Rfs are also borne out by the sampling data showing moderate or low mobility for iron, lead, and zinc from soils to groundwater at levels exceeding the site criteria and low movement of mercury into the groundwater at levels below the site criterion.

The above mobilities are based on solubilities and adsorption characteristic of the metals; however, the most dominant transport mechanism at this site is through surface erosion of waste materials or contaminated soil during rain or storm events that carried contaminants to the sediment in Hudson River.

5.4 Conceptual Site Model

The CSM was developed to integrate all the different types of information collected during the remedial investigation, including geology, hydrogeology, site background and setting, and the fate and transport of contamination associated with the site. In addition, the CSM considered potential receptors of the observed contamination at the site. A schematic diagram of the CSM is shown in Figure 5-1.

5.4.1 Potential Contaminant Sources

From World War I until the early 1940s, Eureka Shipyard operated at the site. Scrap metal processing and storage operations occurred at the site for approximately 40 years before the facility's closure. Past sources of contamination include: lead-contaminated ash and slag piles from smelting operations; processed soil piles; piles of scrap metal, tires, and batteries from processing operations; and USTs which likely stored fuel oil. In addition to the piles, previous site inspections noted oil-stained surface soils, oily sheens on puddles throughout the facility, standing oily liquids in the basement of the former metal/shear building, and oily sheens on the Hudson River adjacent to the site. Although the sources were removed during EPA removal activities, surface and subsurface soils that have been heavily impacted by former waste disposal practices, may continue to act as sources of contamination to soil, sediment, groundwater, and surface water.

The contaminants that were routinely released to the surface at the facility have impacted surface and subsurface soils, resulting in PAH, PCB, and metal contamination. Soil removal operations may also have redistributed contamination. A small portion of these contaminants also migrated vertically down through the vadose zone until they intercepted groundwater at the water table, at an estimated depth of approximately 12 to 14 feet bgs. The predominant eastwardly groundwater flow would have promoted the migration of contaminants eastward, discharging directly into the Hudson River. The Hudson River also received contaminants from overland runoff of storm water and redeposition of airborne contaminants from site operations. The main contaminant transport mechanism at the site is surface runoff.

5.4.2 Expected Transport and Fate of Site Contaminants

Site contaminants derived from waste handling and smelting processes were routinely deposited on the ground and in piles. Smelting operations also released contaminants to the air. Liquid wastes such as petroleum oils were discharged to the ground, forming small pools. No containment structures, such as engineered covers, run-on control systems, runoff management systems, or liners, were used to prevent the washout of hazardous materials during floods or rain events. During rain events, rainwater percolated through the waste piles, eroded them, and may have mobilized contaminants into solutes and slurries that flowed with storm water downslope across the site.

Visual evidence of car battery fragments near the location of the former ash/slag pile suggests car battery acids may have been released to the site soils. The solubility of metal contaminants in soils would be increased by the acids, promoting their downward migration. Metals and other contaminants would be mobilized by percolation of rainwater, migrating down through the unsaturated zone (Figure 5-1).

Groundwater may discharge to the Hudson River; therefore, the potential exists for the limited contamination in the groundwater to affect the quality of surface water and/or the sediments at (or downgradient from) the discharge points. However, the low to moderate solubility and high retardation factors (Table 5-2) suggest that transfer of contamination from soil to the groundwater and into surface water and/or sediment is unlikely. This is supported by the general distribution of contaminants detected in soil and sediment as compared to those detected in groundwater. For example, many of the contaminants commonly detected in soils and/or sediments (e.g, PAHs, PCBs and inorganic analytes) are not detected in groundwater samples. Conversely, the VOCs detected in some groundwater samples (primarily BTEX compounds) were not detected in soil or sediment samples. Ecological exposure to higher levels of the food chain are not expected to occur via a groundwater to surface water pathway.

5.5 Fate and Transport Summary

ICs at the site are relatively insoluble in water, and show high tendencies to adsorb to soil or organic matter in soil or sediment. The contaminants were transported through surface transport mechanisms (dust dispersion, surface runoff, air emissions) from onsite soil to the sediment. Analytical results for the various media support this fate and transport scenario, since many of the ICs detected in soils and sediment do not exceed screening criteria in surface water or groundwater.

6

Section
Six

Section 6
Risk Assessment Summaries

A baseline HHRA and a SLERA were completed as part of the RI for the site. The Final Baseline Human Health Risk Assessment Report (CDM 2006a) and the Final Screening-Level Ecological Risk Assessment Report (CDM 2006b) were submitted as separate documents. Section 6.1 and Section 6.2 summarize the HHRA and SLERA, respectively.

6.1 Human Health Risk Assessment

The Final Baseline Human Health Risk Assessment for the Consolidated Iron and Metal site characterized the potential human health risks associated with exposure to soil, groundwater, sediment, and surface water impacted by the site in the absence of any remedial action.

6.1.1 Methodology

COPCs were identified for evaluation in the HHRA based on criteria outlined in Risk Assessment Guidance for Superfund (RAGS) (EPA 1989), primarily through comparison to risk-based screening levels. Selection of a chemical as a COPC does not automatically indicate that the chemical poses a health risk, but rather that the chemical is present in sufficient quantity to warrant further evaluation in the HHRA, where potential risks are estimated. The COPCs include several VOCs and inorganics, but also include several SVOCs and PCBs. COPCs from the HHRA are listed in Table 6-1. Exposure point concentrations for each of the COPCs were estimated using the minimum of the 95 percent UCL on the mean and the maximum detected concentration.

The list of COPCs used for the HHRA is different from the site-related ICs discussed in Section 4. The site-related ICs were selected to assist with the delineation of the nature and extent of contamination.

The following human receptor groups and exposure routes were evaluated in the HHRA:

Current and Future Use

- Trespasser (Adolescent 12-18 years)
  - Surface Soil
    - incidental ingestion
    - dermal contact
    - inhalation of fugitive dust

- Recreational user (Adult and Adolescent [12-18 years])
  - Sediment
    - Incidental ingestion
    - Dermal contact

Surface Water
  - Incidental ingestion
  - Dermal contact

Future Use

- Resident (Adult and Young Child [0-6 yrs])
  - Surface Soil
    - Incidental ingestion
    - Dermal contact
    - Inhalation of fugitive dust
  - Groundwater
    - Ingestion
    - Dermal contact during showering and bathing
    - Inhalation of volatile chemicals during showering and bathing
    - Inhalation of vapors from subsurface intrusion
  - Indoor Air (vapor migration from subsurface groundwater)
    - inhalation of volatile chemicals
    - dermal contact
    - inhalation of fugitive dust

- Site Worker (Adult)
  - Surface Soil
    - Incidental ingestion
    - Dermal contact
    - Inhalation of fugitive dust
  - Groundwater
    - Ingestion
    - Inhalation of vapors from subsurface intrusion

- Construction worker (Adult)
  - Surface and Subsurface Soil
    - Incidental ingestion
    - Dermal contact
    - Inhalation of fugitive dust

- Onsite Recreational User (Adult and Young Child [0-6 yrs])
  - Surface Soil
    - Incidental ingestion
    - Dermal contact
    - Inhalation of fugitive dust

Quantitative estimates of the magnitude, frequency, and duration of exposure for each of these receptors were made using both reasonable maximum exposure (RME) and central tendency (CT) exposure scenarios. RME assumptions represent the highest exposure reasonably expected to occur at a site, while CT assumptions represent typical exposure levels. The comparison of RME risks and CT risks provides information about the degree to which variability in and uncertainty about receptor behavior (e.g., amount of water an individual ingests per day) influence the risk estimates.

In the toxicity assessment, current toxicological human health data (i.e., reference doses and slope factors) were obtained for each of the COPCs from EPA's Integrated Risk Information System (IRIS) and EPA's Provisional Peer Reviewed Toxicity values (PPRTVs) developed by the Office of Research and Development/National Center for Environmental Assessment (NCEA)/Superfund Health Risk Technical Support Center.

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.

The potential for noncarcinogenic effects was evaluated by comparing an exposure level over a specified time period with a reference dose derived for a similar exposure period. This ratio of exposure to toxicity is referred to as a hazard quotient (HQ). The hazard index (HI) is the sum of the HQs from individual chemicals. This HI assumes that there is a level of exposure below which it is unlikely even for sensitive populations to experience adverse health effects. If the HI exceed unity (1), there may be concern for potential noncarcinogenic effects; however, this value should not be interpreted as a probability. Generally, the greater the HI above unity, the greater the level of concern.

Carcinogenic risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The upper-bound excess lifetime cancer risk is estimated by multiplying the lifetime exposure by the cancer slope factor. Excess lifetime cancer risks are generally expressed in scientific notation and are probabilities. An excess lifetime cancer risk of 1×10^{-6} (one in one million), for example, represents the incremental probability that an individual will develop cancer as a result of exposure to a carcinogenic chemical over a 70-year lifetime under specified exposure conditions.

In general, EPA recommends a target hazard index value or a target cancer risk range (i.e., HI = 1 or risk = 1×10^{-6} to 1×10^{-4}) as threshold values for potential human health impacts. These values aid in determining whether additional response action is necessary at the site.

6.1.2 Risk Estimates

Risk estimates for potential receptors are summarized in Table 6-2 and Table 6-3 for RME and CT exposure, respectively and discussed below.

6.1.2.1 Current and Future Site Trespassers

Risks and hazards were evaluated for incidental ingestion of, dermal contact with, and inhalation of particulates released from surface soil. The total incremental lifetime cancer risk estimates under the RME is 2 $\times 10^{-5}$ which is within EPA's target range of 1 $\times$ 10^{-6} to 1 $\times$ 10^{-4}.

The calculated HIs are 3 for RME and 0.7 for CT exposure. HIs greater than 1 indicate the potential for noncarcinogenic hazards. The total HI based on individual health endpoints for RME scenario is above EPA's acceptable threshold of 1 and PCBs contribute most of the potential noncarcinogenic hazards. Exposure to elevated levels of PCBs may adversely affect eyes, skin, nails, and developing fetus. However, the total HI (0.7) based on individual health endpoints for CT scenario is below EPA's acceptable threshold of unity (1).

Lead is a COPC in surface soil, with a mean concentration of 3,180 mg/kg. This value exceeds both the health-based screening level of 400 mg/kg for children and 800 mg/kg adults. Therefore, exposure to site soils by this population may result in adverse health effects. However, exposure to lead in soil was not quantitatively calculated due to lack of toxicity values. The systemic toxic effects of lead in humans have been well documented. The evidence shows that lead is a multi-targeted toxicant and can affect almost every organ and system in the human body. The most sensitive system is the central nervous system, particularly in children. Irreversible brain damage occurs at blood lead levels greater than or equal to 100 micrograms per deciliter (μg/dl) in adults and at 80 -100 μg/dl in children; death can occur at the same blood levels in children. Children who survive these high levels of exposure suffer permanent severe mental retardation. Lead also damages kidneys and the reproductive system. At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may also cause anemia, a disorder of the blood. EPA has classified lead a Group B2, probable human carcinogen, based on sufficient animal studies showing that lead induces renal tumors in experimental animals.

6.1.2.2 Current and Future Recreational User (Adult)

Risks and hazards were evaluated for incidental ingestion and dermal contact with sediment in the Hudson River. The total incremental lifetime cancer risk estimate under the RME is 5 $\times 10^{-5}$ which is within EPA's target range of 1 $\times$ 10^{-6} to 1 $\times$ 10^{-4}. The calculated HI under the RME is 0.2 which is below EPA's threshold of unity (1).

6.1.2.3 Current and Future Recreational User (Adolescent)

Risks and hazards were evaluated for incidental ingestion and dermal contact with sediment in the Hudson River. Under the RME, the total incremental lifetime cancer risk of 1 $\times 10^{-5}$ is within EPA's cancer target range and noncarcinogenic estimate of 0.2 is below noncancer target threshold.

6.1.2.4 Future Site Worker

Risks and hazards were evaluated for incidental ingestion of, dermal contact with, and inhalation of particulates released from surface soil; inhalation of VOCs in indoor air from vapor intrusion from subsurface groundwater; and ingestion of tap water. The total incremental lifetime cancer risk estimates are 2 $\times 10^{-4}$ for RME and 4 $\times 10^{-5}$ for CT exposure. The RME estimate exceeds EPA's target range of 1 $\times$ 10^{-6} to 1 $\times$ 10^{-4}. PCBs and arsenic contribute most of the potential risk. PCBs are considered probable human carcinogens (Group B2) and arsenic is a known human carcinogens (Group A). However, the CT estimate is within the EPA target risk range.

The calculated HIs for both RME (8) and CT (9) are above EPA's threshold of unity. PCBs, antimony, and thallium contribute most of the potential non-cancer health hazard. Exposure to elevated concentrations of these chemicals could possibly have adverse effects on the eyes, skin, nails, developing fetus, blood, whole body, and lungs.

Lead is a COPC in surface soil, with a mean concentration of 3,180 mg/kg. This value exceeds both the health-based screening level of 400 mg/kg for children and 800 mg/kg adults. Therefore, exposure to site soils by this population may result in adverse health effects. However, exposure to lead in soil was not quantitatively calculated due to lack of toxicity values. The systemic toxic effects of lead in humans have been well documented. The evidence shows that lead is a multi-targeted toxicant and can affect almost every organ and system in the human body. The most sensitive system is the central nervous system, particularly in children. Irreversible brain damage occurs at blood lead levels greater than or equal to 100 μg/dl in adults and at 80 -100 μg/dl in children; death can occur at the same blood levels in children. Children who survive these high levels of exposure suffer permanent severe mental retardation. Lead also damages kidneys and the reproductive system. At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may also cause anemia, a disorder of the blood. EPA has classified lead a Group B2, probable human carcinogen, based on sufficient animal studies showing that lead induces renal tumors in experimental animals.

6.1.2.5 Future Construction Worker

Risks and hazards were evaluated for incidental ingestion of, dermal contact with, and inhalation of particulates released from surface and subsurface soil. The total incremental lifetime cancer risk estimate is 8 $\times$ 10^{-6} which is within EPA's target range of 1 $\times$ 10^{-6} to 1 $\times$ 10^{-4}. The total HI (9) based on individual health endpoints is above EPA's acceptable threshold of 1, and could possibly have adverse effects on the eyes, skin, nails, developing fetus, blood, whole body, and lungs. PCBs, antimony, and thallium contribute most of the potential non-cancer hazard.

Lead is a COPC in surface soil, with a mean concentration of 3,180 mg/kg, and subsurface soil, with a mean concentration of 1,690 mg/kg. These values exceed both the health-based screening level of 400 mg/kg for children and 800 mg/kg adults. Therefore, exposure to site soils by this population may result in adverse health effects. However, exposure to lead in soil was not quantitatively calculated due to lack of toxicity values. The systemic toxic effects of lead in humans have been well documented. The evidence shows that lead is a multi-targeted toxicant and can affect almost every organ and system in the human body. The most sensitive system is the central nervous system, particularly in children. Irreversible brain damage occurs at blood lead levels greater than or equal to 100 μg/dl in adults and at 80 -100 μg/dl in children; death can occur at the same blood levels in children. Children who survive these high levels of exposure suffer permanent severe mental retardation. Lead also damages kidneys and the reproductive system. At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may also cause anemia, a disorder of the blood. EPA has classified lead a Group B2, probable human carcinogen, based on sufficient animal studies showing that lead induces renal tumors in experimental animals.

6.1.2.6 Residents

Risks and hazards were evaluated for incidental ingestion of, dermal contact with, and inhalation of particulates released from surface soil; inhalation of VOCs in indoor air from vapor intrusion from subsurface groundwater; and ingestion of tap water. The total incremental lifetime cancer risk estimates for an adult are 2×10^{-4} for the RME and 5×10^{-5} for CT exposure. The total incremental lifetime cancer risk estimates for a child (0-6 years old) are 4×10^{-4} for RME and 2×10^{-4} for CT exposure. Except for the adult CT cancer risk estimate, these estimates of risk are above EPA's target range of 1×10^{-6} to 1×10^{-4} . Exposure to PCBs and PAHs in soil and to arsenic in soil and groundwater account for the majority of the risk. PCBs and PAHs are considered probable human carcinogens (Group B2) and arsenic is a known human carcinogens (Group A).

The total HI based on individual health endpoints is above EPA's acceptable threshold of 1 for both an adult (HI=14 for RME and 8 for CT) and a child (HI=73 for RME and 31 for CT). PCBs, antimony, copper, manganese, mercury, and thallium contribute most of the potential non-cancer hazard. Exposure to elevated levels of these contaminants may have adverse effects on the eyes, skin, nails, developing fetus, blood, whole body, lungs, central nervous system, gastrointestinal tract, and kidney.

Lead is a COPC in surface soil, with a mean concentration of 3,180 mg/kg. This value exceeds both the health-based screening level of 400 mg/kg for children and 800 mg/kg adults. Therefore, exposure to site soils by this population may result in adverse health effects. However, exposure to lead in soil was not quantitatively calculated due to lack of toxicity values. The systemic toxic effects of lead in humans have been well documented. The evidence shows that lead is a multi-targeted toxicant and can affect almost every organ and system in the human body. The most sensitive system is the central nervous system, particularly in children. Irreversible brain damage occurs at blood lead levels greater than or equal to 100 μg/dl in adults and at 80 -100 μg/dl in children; death can occur at the same blood levels in children. Children who survive these high levels of exposure suffer permanent severe mental retardation. Lead also damages kidneys and the reproductive system. At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may also cause anemia, a disorder of the blood. EPA has classified lead a Group B2, probable human carcinogen, based on sufficient animal studies showing that lead induces renal tumors in experimental animals.

6.1.2.7 Future On-Site Recreational User (Adult)

Risks and hazards were evaluated for incidental ingestion of, dermal contact with, and inhalation of particulates released from surface soil. The total incremental lifetime cancer risk estimate for RME is 6×10^{-5} which is within EPA's target range of 1×10^{-6} to 1×10^{-4}.

The calculated HIs for noncarcinogenic health hazards are 3 for RME and 0.5 for CT exposure. The total HI based on individual health endpoints for RME scenario is above EPA's acceptable threshold of 1, and could possibly have adverse effects on the eyes, skin, nails, and developing fetus. PCBs contribute most of the potential non-cancer hazard. The total HI based on individual health endpoints for CT scenario is below EPA's acceptable threshold of 1.

Lead is a COPC in surface soil, with a mean concentration of 3,180 mg/kg. This value exceeds both the health-based screening level of 400 mg/kg for children and 800 mg/kg adults. Therefore, exposure to site soils by this population may result in adverse health effects. However, exposure to lead in soil was not quantitatively calculated due to lack of toxicity values. The systemic toxic effects of lead in humans have been well documented. The evidence shows that lead is a multi-targeted toxicant and can affect almost every organ and system in the human body. The most sensitive system is the central nervous system, particularly in children. Irreversible brain damage occurs at blood lead levels greater than or equal to 100 μg/dl in adults and at 80 -100 μg/dl in children; death can occur at the same blood levels in children. Children who survive these high levels of exposure suffer permanent severe mental retardation. Lead also damages kidneys and the reproductive system. At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may also cause anemia, a disorder of the blood. EPA has classified lead a Group B2, probable human carcinogen, based on sufficient animal studies showing that lead induces renal tumors in experimental animals.

6.1.2.8 Future On-Site Recreational User (Child)

Risks and hazards were evaluated for incidental ingestion of, dermal contact with, and inhalation of particulates released from surface soil. The total incremental lifetime cancer risk estimates are 1×10^{-4} and 3×10^{-5} for RME and CT exposure, respectively. The RME estimate is at the high end of EPA's target risk range, while the CT estimate is within EPA's target range of 1×10^{-6} to 1×10^{-4}.

The calculated HIs for noncarcinogenic health hazards are 22 and 5 for RME and CT exposure, respectively. The total HI based on individual health endpoints is above EPA's acceptable threshold of 1, and could possibly have adverse effects on the eyes, skin, nails, developing fetus, central nervous system, gastrointestinal tract, and kidney. PCBs, antimony, copper, and thallium contribute for most of the potential non-cancer hazard.

Lead is a COPC in surface soil, with a mean concentration of 3,180 mg/kg. This value exceeds both the health-based screening level of 400 mg/kg for children and 800 mg/kg adults. Therefore, exposure to site soils by this population may result in adverse health effects. However, exposure to lead in soil was not quantitatively calculated due to lack of toxicity values. The systemic toxic effects of lead in humans have been well documented. The evidence shows that lead is a multi-targeted toxicant and can affect almost every organ and system in the human body. The most sensitive system is the central nervous system, particularly in children. Irreversible brain damage occurs at blood lead levels greater than or equal to 100 μg/dl in adults and at 80 -100 μg/dl in children; death can occur at the same blood levels in children. Children who survive these high levels of exposure suffer permanent severe mental retardation. Lead also damages kidneys and the reproductive system. At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may also cause anemia, a disorder of the blood. EPA has classified lead a Group B2, probable human carcinogen, based on sufficient animal studies showing that lead induces renal tumors in experimental animals.

6.2 Screening Level Ecological Risk Assessment

The Final Screening Level Ecological Risk Assessment for the CIM site identified the potential environmental risks associated with the site. Conservative assumptions were used in the SLERA to indicate which contaminants and exposure pathways present at the site may present potential ecological risks.

6.2.1 Methodology

Risks to aquatic receptors from exposure to contaminants in surface water at the site were evaluated by comparing contaminant concentrations in surface water to screening benchmark values. Relative risks to these receptors were qualitatively assessed using HQs, which were calculated for each COPC by dividing the maximum contaminant concentrations measured in surface water by benchmark values derived for the protection of fish propagation, aquatic life, or wildlife.

Risks to aquatic and riparian receptors from exposure to sediment were evaluated by comparing sediment contaminant concentrations to sediment screening benchmark values. Relative risks to these receptors were qualitatively assessed using HQs, which were calculated for each COPC by dividing the maximum contaminant concentrations measured in sediment by benchmark values derived for the protection of benthic and/or wildlife species.

Risks to terrestrial receptors from exposure to soil were evaluated by comparing soil in each area (Process and Non-process areas) contaminant concentrations to soil screening benchmark values. Relative risks to these receptors were qualitatively assessed using HQs, which were determined for each COPC by dividing maximum contaminant concentrations measured in soil by benchmark values derived for the protection of wildlife, plants, soil microorganisms, or soil invertebrates.

When the value of HQ is equal to or below one, it indicates that there are no potential ecological adverse effects. If the value of HQ is above one, it indicates that there are potential ecological adverse effects. It is important to note that the HQ methodology used in the SLERA is not a measure of, and cannot be used to determine, absolute quantitative risk. It can be, however, used to evaluate the potential for ecological receptors to be at risk of an adverse effect from exposure to COPCs at the site.

6.2.2 Evaluation of Aquatic Risk

Potential ecological risks from 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 or wildlife ecotoxicity.

The potential risks to aquatic and riparian receptors from exposure to surface water and sediments as determined by the SLERA are summarized below.

6.2.2.1 Surface Water Risks

Four COPCs identified in surface water are identified and presented in Table 6-4. They are aluminum, iron, lead and manganese. Manganese was retained because no ecological screening level (ESL) was available. Aluminum, iron, and lead were retained because they had HQs above one.

These risk estimates are probably very conservative (over-estimated) for several reasons. Aluminum and iron are rarely toxic at near neutral pH levels, and the pH of the Hudson River samples averaged 8.1 units, slightly above neutral. Aluminum and iron toxicity are of most concern in acidic waters (pH <5.5). Aquatic toxicity data for iron are very sparse, and the ESL for iron in water (300 μg/L) is very conservative, well below the EPA chronic value for iron in surface water (1,000 μg/L).

The maximum detected concentration of lead in surface water (12 μg/L) exceeds the hardness-adjusted ESL of 2.79, but is not highly elevated relative to commonly observed levels in surface water. In addition, the lowest measured hardness value (110 mg/L) is used to adjust the lead standard. This conservative step results in a very low ESL for lead in surface water. Finally, the surface water ESL for lead is based on the dissolved concentration, yet the maximum measured value in Hudson River surface water is based on total recoverable lead. Lead is among the least soluble of the potentially toxic heavy metals, and the dissolved fraction is unlikely to be the dominant fraction in surface water.

In summary, none of the surface water COPCs is considered a major source of site-related risk to ecological receptors.

6.2.2.2 Sediment Risks

COPCs identified in sediment are also summarized in Table 6-4. Two VOCs (acetone and 2-butanone) were retained due to the lack of an ESL. All detected SVOCs, including PAHs, were retained due to either no ESL available or the HQs were over one. PAHs have the potential to significantly bioaccumulate in benthic invertebrates but vertebrates have the ability to eliminate PAHs, thereby preventing significant bioaccumulation. Risks to vertebrate consumers of PAH-contaminated invertebrates, therefore, are not likely to be significant.

Two pesticides (4,4'-DDD and 4,4'-DDE) were retained because of HQs over one while two other pesticides (endrin aldehyde and endrin ketone) and one Aroclor (Aroclor-1248) were retained because ESLs were not available. 4,4'-DDD and 4,4'-DDE have a high potential to bioaccumulate in the upper trophic-level ecological receptors.

Eight inorganics (aluminum, barium, cobalt, cyanide, iron, selenium, thallium, and vanadium) were retained because no chemical specific ESLs were available. Eleven inorganics with HQs greater than one (antimony, arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver, and zinc) were retained. Cadmium has a high potential to bioaccumulate in upper trophic-level ecological receptors, while copper and zinc have a moderate to high potential to bioaccumulate.

6.2.2.3 Surface Soil Risks

<u>Process Area</u>

COPCs identified in the Process Area are summarized in Table 6-4. No VOCs were identified as COPCs. Among SVOCs, carbazole, dibenzofuran, and di-n-octylphthalate were retained because no ESLs were available. Bis(2-ethylhexyl) phthalate and butylbenzylphthalate were also retained because of high HQs. All PAHs, except acenaphthene and benzo(g,h,i)perylene were retained due to high HQs.

Among detected pesticides, 4,4'-DDE, 4,4'-DDT, endosulfan sulfate, endrin, heptachlor, and methoxychlor were retained with HQs above one. The four detected Aroclors were also retained because no ESLs were available. 4,4'-DDE, 4,4'-DDT and PCBs have a high potential to bioaccumulate in the upper trophic-level ecological receptors.

Seventeen inorganics (aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc) were retained because of HQs above one. Cyanide was retained because no ESL was available.

Cadmium has a high potential to bioaccumulate in upper trophic-level ecological receptors, while aluminum and lead have a low to moderate potential to bioaccumulate.

<u>Non-Process Area</u>

COPCs identified in Non-process area are also presented in Table 6-4. Six VOCs were retained. Among them, isopropylbenzene, MTBE, and methylcyclohexane were retained because no ESLs were available. Benzene, ethylbenzene, and m,p-xylenes were also retained because HQs were above one.

PAHs, except acenaphthene, acenaphthylene, and benzo(g,h,i)perylene, were retained due to HQs above one. For the remaining SVOCs, methylnapthalene, bis(2-ethylhexyl)phthalate, and butylbenzylphthalate were retained because HQs were above one.

All detected pesticides/PCBs, except 4,4'-DDD, alpha-chlordane, delta-BHC, endosulfan I, and gamma-chlordane, were retained with HQs above one or lack of ESLs (Aroclors). Pesticides and PCBs have a high potential to bioaccumulate in the upper trophic-level ecological receptors. Aroclors detected in more than 67 percent of Non-Process Area soil samples include Aroclor-1248, Aroclor-1254, and Aroclor-1260. These Aroclors are highly toxic and bioaccumulative.

Nineteen inorganics (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc) were retained because of HQs above one. Cadmium has a high potential to bioaccumulate in upper trophic-level ecological receptors, while aluminum and lead have a low to moderate potential to bioaccumulate.

6.2.3 Risk Summary

The discussion of ecological significance considers the limitations and uncertainties with the quantitative HQ risk estimates, and modifies these risk estimates with information based on experience with similar sites and professional judgment. Answering the risk questions initially presented in the Problem Formulation phase of the SLERA is an important first step in understanding the results of the SLERA.

The following risk questions were initially identified as important to the SLERA. The initial results of the SLERA are used to respond to these questions and to help form conclusions. The risk questions and associated responses follow.

(1) *Are site-related contaminants present in surface soil, sediment, or surface water where ecological receptors may be exposed?*

<u>Response:</u> YES. Available data cannot confirm that surface water COPCs are site-related. Sediment COPCs may or may not be site-related, but available data for on-site surface soil suggest that the site contributes to near-site sediment contamination. Similar contaminants were found in both on-site surface soil and near-site sediments.

(2) *Where present, are the concentrations of site-related contaminants sufficiently elevated to impair the survival, growth, or reproduction of sensitive ecological receptors?*

<u>Response:</u> YES (sediment and surface soil). Many of the sediment and surface soil COPCs have been measured at concentrations that may cause ecologically significant adverse effects in sensitive receptors. These include PAHs, pesticides, PCBs, and inorganic COPCs. Of most concern are higher molecular weight PAHs, PCBs, pesticides such as DDT or its metabolites, cadmium, copper, lead, mercury, and zinc.

6.2.4 Conclusions and Recommendations

Based on the findings of the SLERA, in which maximum detected concentrations of the contaminants were compared to conservatively derived published benchmarks, site related contaminants are present at concentrations found to potentially cause adverse ecological effects. However, limited habitat is available on site for ecological receptors, thereby limiting ecological exposure potential.

For the CIM site, CDM recommends that a BERA not be conducted, for the following reasons:

- The on-site area is not an ecological habitat and the potential for exposure is very limited.
- For the Hudson River, a BERA is not recommended because contamination of the river (water and/or sediments) is potentially a wide-spread issue, since numerous sources of contamination may be present in areas both upriver and downriver from the CIM site. As such, it would be nearly impossible to determine if adverse effects from exposure to sediments were due to contaminants at the CIM site or to contaminants from other locations.

7

Section Seven

Section 7
Summary and Conclusions

The summary and conclusions of the RI investigations and data evaluation are presented in the following sections.

7.1 Summary of Soil Contamination

Screening and analytical results indicate that soil contamination of ICs is extensive across the site. Although some ICs are concentrated in former source areas such as the former metal shear, compactor/bailer, and smelter buildings, overall contamination extends to all areas of the site. Indicator contaminants are present at levels exceeding screening criteria in analytical samples collected from the first foot of surface soil and from the subsurface from 2 - 4 feet bgs. Based on screening sample results, lead and PCBs are present as deep as 14 feet bgs.

7.2 Summary of Sediment Contamination

The majority of site-specific ICs exceeded screening criteria in sediment samples adjacent to the site, but did not exceed calculated background values. The highest levels of PAH ICs are in SD-19, offshore of the southern boundary of the site. Approximately half of the inorganic ICs exceeded both screening criteria and background calculations. The highest levels of inorganic ICs are located in samples offshore of the southern half of the site and one sample just north of the site. One sample had the highest levels, approximately due east of the former smelter/staging area and hydraulically downgradient of the former metal shear and compact/bailer buildings.

7.3 Summary of Surface Water Contamination

Iron and lead exceeded calculated background levels and screening criteria in surface water samples adjacent to the site. Iron exceeded screening criteria in seven locations and lead exceeded screening criteria in two locations. In general, iron and lead contamination does not exhibit a clear pattern of migration, and is likely influenced by tidal flow.

7.4 Summary of Groundwater Contamination

Iron, lead, and zinc exceeded screening criteria in groundwater downgradient of source areas across the site. Levels were slightly higher in the second round of groundwater samples. The highest levels are located adjacent to, and downgradient of, the former compactor/bailer and metal shear buildings, and in the area of the former tire piles. The highest concentrations are found in MW-5, located approximately 250 feet downgradient of the former metal shear building.

VOCs common in gasoline (MTBE, benzene, ethylbenzene, and m,p-xylene) also exceeded screening criteria in many of the monitoring wells.

7.5 Summary of LNAPL Distribution

LNAPL was observed in two areas, located adjacent to the former metal shear building on the northern and eastern side, and near the Hudson River, just downgradient of the former compactor/bailer building. VOC and TPH levels in these areas were relatively low. Since LNAPL was only observed in four locations in two areas , the amount is insufficient to delineate. The slurry observed in the site-wide soil borings, is not believed to be related to the LNAPL observed at the site. The origin and chemical nature of the slurry is unknown. The slurry is dark gray, did not have an odor, and readings from the PID were zero. Based on observations of the material at various depths and locations in the northern half of the site, it does not appear to be continuous, and therefore not suitable for delineation.

7.6 Conclusions

The significant findings of the RI are as follows:

- Indicator contaminants, which represent the highest levels and most extensive contamination in site media, include: benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, Aroclor-1254, arsenic, cadmium, copper, iron, lead, mercury, vanadium, and zinc.

- Site soils are contaminated from former site processing and waste disposal practices. Surface and subsurface soil to four feet bgs contain levels of all ICs that exceed screening criteria and calculated background values in the majority of soil samples, with the highest levels in the top foot of soils.

- Contamination in subsurface soil at depths greater than four feet is based on screening data, which indicate that PCBs and lead may extend to the water table (depths up to 14 feet bgs) in some areas of the site. Screening data was obtained for VOCs, PCBs, and lead because they were the primary contaminants that were expected to be found at the site. The vertical extent of contamination from other ICs has not been defined .
  RECOMMENDATION: EPA may elect to collect subsurface soil samples below four feet, for analysis of all contaminants of concern, to refine the vertical extent of the soil excavation.

- The lateral extent of soil contamination has been delineated across the site, and contamination extends to the borders. Contamination beyond the borders of the site has not been defined.
  RECOMMENDATION: EPA may elect to collect soil samples at the peripheral areas of the site during pre-design activities, for analysis of all contaminants of concern, to determine if there is a need to extend the limits of the soil excavation.

- Hudson River sediments adjacent to the site contain ICs that exceed screening criteria. However, PAH ICs do not exceed calculated background values (95 percent UCL).

- Hudson River surface water adjacent to the site contains iron in all 10 samples and lead in 2 samples that exceed screening criteria and calculated background values.

- Groundwater in the unconsolidated water table aquifer has minor impacts from former site waste disposal practices. Iron, lead, and zinc are present at levels that exceed screening criteria and background levels. Gasoline fraction VOCs (MTBE, benzene, ethylbenzene, and m,p-xylene) are also present at levels exceeding screening criteria in several monitoring wells. VOC contamination presumably originated from leaking USTs located along the western boundary of the site or from gasoline leaking from crushed vehicles.
  RECOMMENDATION: Due to the presence of VOCs at the water table at MW-1 during the VPMW screening event, EPA may elect to install a shallow monitoring well in the vicinity of MW-1 that is screened across the water table during pre-design activities.

8

Section Eight

Section 8
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Tables

Table 2-1

RI Field Program Summary
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Field Task		Task Summary	Dates
Soil and Source Area Assessment	Background Soil Borings - Surface and Subsurface Soil Sampling	Collected surface and subsurface soil samples from 10 background soil borings.	4/7/04 - 4/8/04
	Process Area Soil Borings - Surface Soil Sampling	Collected surface soil samples from 21 process area soil borings.	4/6/04 - 4/7/04
	Process Area Soil Borings - Subsurface Soil Sampling	Collected subsurface soil samples from 21 process area soil borings. Collected field screening samples for lead, PCBs and VOCs.	6/7/04 - 6/10/04
	Site-Wide Soil Borings - Surface and Subsurface Soil Sampling	Collected surface and subsurface soil samples from 32 site-wide soil borings and 5 contingency soil borings. Collected field screening samples for lead, PCBs and VOCs.	6/14/04 - 6/24/04
	LNAPL Delineation	Collected groundwater samples from 1 process area soil borings and 2 site-wide soil borings. Collected soil samples from 1 process area soil boring and 1 site-wide soil boring.	6/11/04, 6/16/04 & 6/23/04
Hydrogeological Assessment	Vertical Profile Wells- Geologic and Water Quality Profiling	Collected groundwater samples from 3 vertical profile locations (MW-01, MW-04, and MW-05).	6/30/04 - 7/14/04
	Downhole Gamma Logging	Conducted downhole gamma logs at 3 vertical profile locations (MW-01, MW-04, and MW-05).	7/15/04 - 7/16/04
	Monitoring Well Installation and Development	Installed and developed 9 monitoring wells.	7/16/04 - 8/6/04
	Monitoring Well Sampling - Round 1 and Synoptic Water Level Measurements	Collected 9 groundwater samples from newly installed monitoring wells.	8/16/04 - 8/18/04
	Slug Testing	Conducted slug tests at 9 monitoring wells.	8/19/04
	Monitoring Well Sampling - Round 2 and Synoptic Water Level Measurements	Collected 9 groundwater samples from monitoring wells.	11/01/04 - 11/04/04
Hudson River Sampling	Sediment and Surface Water Sampling	Collected co-located surface water and sediment samples from 21 locations in the Hudson River.	8/16/04 - 8/19/04
Ecological Assessment	Ecological Characterization	Conducted an ecological investigation of the site and surrounding areas.	8/20/04

Table 2-2

Background Soil Borings: Summary of Surface and Subsurface Soil Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample Type	Sample ID	Interval (feet bgs)	Date	Analysis	Comments
Surface Soil	BKSS-01-S	0 - 0.2	4/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSS-02-D	0 - 1	4/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSS-03-D	0 - 1	4/1/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSS-04-S	0 - 0.2	4/1/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSS-05-D	0 - 1	4/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSS-06-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSS-07-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSS-08-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSS-09-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSS-10-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSS-10-D-Dup	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	Duplicate of BKSS-10-D
Subsurface Soil	BKSB-01	2 - 4	4/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	BKSB-02	2 - 4	4/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	MS/MSD
	BKSB-03	2 - 4	4/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	BKSB-04	2 - 4	4/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	BKSB-05	2 - 4	4/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	BKSB-06	2 - 4	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	BKSB-07	2 - 4	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	BKSB-08	2 - 4	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	BKSB-09	2 - 4	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	BKSB-10	2 - 4	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	

Table 2-2

Background Soil Borings: Summary of Surface and Subsurface Soil Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Notes:
bgs = below ground surface
BKSS = background surface soil
BKSB = background subsurface soil
CN = cyanide
Hg = mercury
MS/MSD = matrix spike/matrix spike duplicate
P/PCB = pesticides/polychlorinated biphenyls
SVOC = semivolatile organic compounds
TCL = Target Compound List
TAL = Target Analyte List
VOC = volatile organic compounds

Table 2-3
Process Area and Site-Wide Soil Borings: Summary of Onsite Soil Screening Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Area	Sample ID	Sample by Vertical Horizon (feet bgs)																													
		0-2 (A)			2-4 (B)			4-6 (C)			6-8 (D)			8-10 (E)			10-12 (F)			12-14 (G)			14-16 (H)			16-18 (I)			18-20 (J)		
		L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V
Process Area Soil Borings	PASB-01	●	●	●	●	●	●	●	●	●	●	●	●	●		●			●	●		●			●						
	PASB-02	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●			●						
	PASB-03	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●	●		●			●						
	PASB-04	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●			●						
	PASB-05	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●			●			●						
	PASB-06	●		●	●		●	●		●	●		●	●		●	●		●	●		●			●						
	PASB-07	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●			●						
	PASB-08	●	●	●	●	●	●	●	●	●	●	●	●			●			●			●			●						
	PASB-09	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●	●		●			●						
	PASB-10	●	●	●	●	●	●			●				●	●	●				●					●						
	PASB-10a	●	●	●	●	●	●																								
	PASB-10b	●	●	●	●	●	●																								
	PASB-10c	●	●	●	●	●	●																								
	PASB-10d	●	●	●	●	●	●																								
	PASB-11	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●									
	PASB-12	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●			●						
	PASB-13	●	●		●	●	●	●	●	●	●		●	●		●	●		●	●		●			●						
	PASB-14	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●			●		●									
	PASB-15	●			●	●	●			●			●									●			●			●			●
	PASB-16	●	●	●	●	●	●	●	●	●	●	●	●	●		●				●		●			●						
	PASB-17	●	●	●	●	●	●	●	●	●	●	●	●	●		●				●		●									
	PASB-18	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●	●		●			●						
	PASB-19			●	●	●	●	●	●	●			●	●		●	●		●	●					●						
	PASB-20	●	●			●		●	●		●	●		●			●			●											
	PASB-21	●	●		●	●		●	●			●		●						●											
Site-Wide Soil Borings	SWSB-01	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●		●	●			●	●					
	SWSB-02	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●			●						
	SWSB-03	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●			●						
	SWSB-04	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●			●			●						
	SWSB-05	●	●	●	●	●	●	●	●	●	●		●			●															
	SWSB-06	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●						

Table 2-3
Process Area and Site-Wide Soil Borings: Summary of Onsite Soil Screening Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Area	Sample ID	Sample by Vertical Horizon (feet bgs)																													
		0-2 (A)			2-4 (B)			4-6 (C)			6-8 (D)			8-10 (E)			10-12 (F)			12-14 (G)			14-16 (H)			16-18 (I)			18-20 (J)		
		L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V
Site-Wide Soil Borings (Con't)	SWSB-08	●	●	●	●	●	●	●	●	●	●	●	●	●		●															
	SWSB-09	●	●		●	●	●	●	●	●	●	●	●	●		●															
	SWSB-10				●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●			●						
	SWSB-11	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●			●						
	SWSB-12	●	●	●	●	●	●	●	●	●	●	●	●	●		●															
	SWSB-13	●	●	●	●	●	●	●	●	●			●	●	●	●			●	●	●	●			●						
	SWSB-14	●	●	●	●	●	●	●	●	●	●		●	●	●	●			●	●	●	●	●	●	●	●		●	●		●
	SWSB-15	●	●	●	●	●	●	●	●	●	●	●	●	●		●															
	SWSB-16	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●	●	●	●			●						
	SWSB-17	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●	●		●			●						
	SWSB-18	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●															
	SWSB-19	●	●		●	●	●	●	●	●	●	●	●																		
	SWSB-20	●	●		●	●		●	●		●	●		●	●																
	SWSB-21	●	●		●	●		●	●		●	●		●	●																
	SWSB-22	●	●		●	●		●	●		●	●		●	●																
	SWSB-23				●	●		●	●		●	●		●	●		●	●		●											
	SWSB-24	●	●		●	●		●	●		●	●		●	●		●	●		●											
	SWSB-25	●	●		●	●		●	●		●	●		●																	
	SWSB-26	●	●		●	●		●	●		●	●		●			●				●										
	SWSB-27	●	●		●	●		●	●		●	●		●	●																
	SWSB-28	●	●		●	●		●	●		●	●		●	●																
	SWSB-29	●	●		●	●		●	●		●	●		●																	
	SWSB-30	●	●		●	●		●	●		●	●		●	●																
	SWSB-31	●	●		●	●		●	●		●	●		●	●																
	SWSB-32				●	●		●	●					●	●																
	SWSB-33	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●															
	SWSB-34	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●															
	SWSB-35	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●									
	SWSB-36	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									
	SWSB-37	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●															

Table 2-3
Process Area and Site-Wide Soil Borings: Summary of Onsite Soil Screening Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Area	Sample ID	Sample by Vertical Horizon (feet bgs)																													
		0-2 (A)			2-4 (B)			4-6 (C)			6-8 (D)			8-10 (E)			10-12 (F)			12-14 (G)			14-16 (H)			16-18 (I)			18-20 (J)		
		L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V	L	P	V

Notes:

- indicates onsite screening performed

L= Lead screening via onsite XRF

P= Polychlorinated biphenyls (PCBs) screening via immunoassay test kit

V- Volatile Organic Compound (VOC) screening using a photoionization detector

PASB = process area soil boring

SWSB = site-wide soil boring

bgs = below ground surface

XRF = X-ray fluorescence

Table 2-4
Process Area Soil Borings: Summary of Surface and Subsurface Soil Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample Type	Sample ID	Interval (feet bgs)	Date	Analysis	Comments
Surface Soil	PASS-01-S	0 - 0.2	4/6/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASS-02-D	0 - 1	4/6/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-03-D	0 - 1	4/6/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASS-04-D	0 - 1	4/6/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Grain Size, pH, TOC; Dioxin	MS/MSD
	PASS-05-S	0 - 0.2	4/6/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-06-D	0 - 1	4/6/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASS-07-D	0 - 1	4/6/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-08-D	0 - 1	4/6/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-09-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-10-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-11-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASS-12-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASS-13-S	0 - 0.2	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-14-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-15-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Grain Size, pH, TOC; Dioxin	
	PASS-16-S	0 - 0.2	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-17-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASS-18-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	MS/MSD
	PASS-19-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-20-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASS-21-D	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Dioxin	
	PASS-15-D-Dup	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Grain Size, pH, TOC; Dioxin	Duplicate of PASS-15-D
	PASS-20-D-Dup	0 - 1	4/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	Duplicate of PASS-20-D
Subsurface Soil	PASB-01	2 - 4	6/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-02	2 - 4	6/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-03	2 - 4	6/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	

Table 2-4
Process Area Soil Borings: Summary of Surface and Subsurface Soil Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample Type	Sample ID	Interval (feet bgs)	Date	Analysis	Comments
Subsurface Soil (continued)	PASB-04	2 - 4	6/7/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-05	2 - 4	6/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-06	2 - 4	6/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Grain Size, pH, TOC	
	PASB-07	2 - 4	6/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-08	2 - 4	6/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-09	2 - 4	6/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	MS/MSD
	PASB-10	2 - 4	6/8/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-11	2 - 4	6/9/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-12	2 - 4	6/9/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-13	2 - 4	6/9/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-14	2 - 4	6/9/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-15	2 - 4	6/9/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-16	2 - 4	6/10/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-17	2 - 4	6/10/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-18	2 - 4	6/10/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Grain Size, pH, TOC	
	PASB-19	2 - 4	6/10/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	MS/MSD
	PASB-20	2 - 4	6/10/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-21	2 - 4	6/10/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	PASB-11 -Dup	2 - 4	6/9/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	Duplicate of PASB-11
	PASB-18-Dup	2 - 4	6/10/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Grain Size, pH, TOC	Duplicate of PASB-18

Table 2-4
Process Area Soil Borings: Summary of Surface and Subsurface Soil Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Notes:

bgs= below ground surface
Hg = mercury
CN = cyanide
Dup = duplicate
LNAPL = light non-aqueous phase liquid
MS/MSD = matrix spike/matrix spike duplicate
P/PCB = pesticides/polychlorinated biphenyls
PASS = process area surface soil
PASB = process area subsurface soil
SVOC = semivolatile organic compounds
TAL = Target Analyte List
TCL = Target Compound List
TOC= total organic carbon
TPH= total petroleum hydrocarbons
VOC = volatile organic compounds

Table 2-5
Site-Wide Soil Borings: Summary of Surface and Subsurface Soil Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample Type	Station Location	Interval (feet bgs)	Sampling Date	Analysis	Comments
Surface Soil	SWSS-01-D	0 - 1	6/14/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-02-D	0 - 1	6/14/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-03-D	0 - 1	6/14/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-04-D	0 - 1	6/14/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-05-D	0 - 1	6/14/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-06-D	0 - 1	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-07-D	0 - 1	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-08-S	0 - 0.2	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-09-D	0 - 1	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metal, Hg, CN; Grain Size, pH, TOC	
	SWSS-10-D	0 - 1	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-11-D	0 - 1	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-12-D	0 - 1	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-13-D	0 - 1	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-14-S	0 - 0.2	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-15-S	0 - 0.2	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-16-D	0 - 1	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-17-S	0 - 0.2	6/17/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-18-D	0 - 1	6/17/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-19-D	0 - 1	6/17/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-20-S	0 - 0.2	6/17/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-21-D	0 - 1	6/18/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-22-D	0 - 1	6/18/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-23-D	0 - 1	6/18/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-24-D	0 - 1	6/18/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-25-D	0 - 1	6/21/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-26-S	0 - 0.2	6/21/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-27-D	0 - 1	6/21/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-28-D	0 - 1	6/21/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-29-D	0 - 1	6/22/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-30-S	0 - 0.2	6/22/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-31-D	0 - 1	6/22/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-32-D	0 - 1	6/22/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-33-D	0 - 1	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	

Table 2-5
Site-Wide Soil Borings: Summary of Surface and Subsurface Soil Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample Type	Station Location	Interval (feet bgs)	Sampling Date	Analysis	Comments
Surface Soil (Con't)	SWSS-34-S	0 - 0.2	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-35-D	0 - 1	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-36-D	0 - 1	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-37-D	0 - 1	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSS-13-D-Dup	0 - 1	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	Duplicate of SWSS-13-D
	SWSS-35-D-Dup	0 - 1	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	Duplicate of SWSS-35-D
Subsurface Soil	SWSB-01	2 - 4	6/14/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-02	2 - 4	6/14/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-03	2 - 4	6/14/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-04	2 - 4	6/14/2004	TCL VOC, SVOC, P/PCB; TAL Metal, Hg, CN; Grain Size, pH, TOC	
	SWSB-05	2 - 4	6/14/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-06	2 - 4	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-07	2 - 4	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-08	2 - 4	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	MS/MSD
	SWSB-09	2 - 4	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-10	2 - 4	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-11	2 - 4	6/15/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-12	2 - 4	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-13	2 - 4	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metal, Hg, CN; Grain Size, pH, TOC	
	SWSB-14	2 - 4	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-15	2 - 4	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-16	2 - 4	6/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-17	2 - 4	6/17/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-18	2 - 4	6/17/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	MS/MSD
	SWSB-19	2 - 4	6/17/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-20	2 - 4	6/17/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-21	2 - 4	6/18/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-22	2 - 4	6/18/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-23	2 - 4	6/18/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-24	2 - 4	6/18/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-25	2 - 4	6/21/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-26	2 - 4	6/21/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	

Table 2-5
Site-Wide Soil Borings: Summary of Surface and Subsurface Soil Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample Type	Station Location	Interval (feet bgs)	Sampling Date	Analysis	Comments
Subsurface Soil (Con't)	SWSB-27	2 - 4	6/21/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-28	2 - 4	6/21/2004	TCL VOC, SVOC, P/PCB; TAL Metal, Hg, CN; Grain Size, pH, TOC	MS/MSD
	SWSB-29	2 - 4	6/22/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-30	2 - 4	6/22/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-31	2 - 4	6/22/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-32	2 - 4	6/22/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-33	2 - 4	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-34	2 - 4	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	MS/MSD
	SWSB-35	2 - 4	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-36	2 - 4	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-37	2 - 4	6/24/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	
	SWSB-21-Dup	2 - 4	6/18/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	Duplicate of SWSB-21
	SWSB-31-Dup	2 - 4	6/22/2004	TCL VOC, SVOC, P/PCB; TAL Metals,Hg,CN	Duplicate of SWSB-31

Notes:

bgs= below ground surface
CN = cyanide
D = deep (0-12 inches)
Dup = duplicate
S = shallow (0-2 inches)
Hg = mercury
MS/MSD = matrix spike/matrix spike duplicate
VOC = Volatile organic compounds
SVOC = Semivolatile organic compounds
P/PCB = Pesticides/polychlorinated biphenyls
SWSS = site-wide surface soil
SWSB = site-wide subsurface soil
TAL = Target Analyte List
TCL = Target Compound List
TOC= Total Organic Carbon
TPH= Total Petroleum Hydrocarbons

Table 2-6
LNAPL Delineation: Summary of Soil and Groundwater LNAPL Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

GROUNDWATER LNAPL SAMPLES:

Sample Location	Sample ID	Depth (feet bgs)	Date	Analysis	Comment
PASB-02	GWS-02-LNAPL	27	06/11/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN, TPH	
PASB-05	GWS-05-LNAPL	8.5	06/14/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN, TPH	MS/MSD
SWSB-15	GWS-15-LNAPL	26	06/23/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN, TPH	MS/MSD
SWSB-16	GWS-16-LNAPL	13	06/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN, TPH	
	GWS-57-LNAPL	13	06/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN, TPH	Duplicate of SWSB-16

SOIL LNAPL SAMPLES:

Sample Location	Sample ID	Depth (feet bgs)	Date	Analysis	Comment
PASB-02	PASB-02-LNAPL	17-19	06/11/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN, TPH	
SWSB-15	SWSB-15-LNAPL	8-10	06/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN, TPH	

Notes:
bgs = below ground surface
CN = cyanide
Dup = duplicate
Hg = mercury
LNAPL= Light Non-Aqueous Phase Liquid
MS/MSD = matrix spike/matrix spike
P/PCB = pesticides/polycholrinated biphenyls
SVOC = semi volatile organic compounds
TAL = Target Analyte List
TPH = total petroleum hydrocarbon
TCL = Target Compound List
VOC = volatile organic compound

Table 2-7
Vertical Profile Wells: Summary of Groundwater Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample Location	Sample ID	Interval (feet bgs)	Date	Screening Analysis	Laboratory Analysis	Comment
VPMW-01	VPMW-1-25-30	25 - 30	06/30/2004	TCL VOC (24 hour TAT)	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	VPMW-1-20-25	20 - 25	07/01/2004	TCL VOC (24 hour TAT)		
	VPMW-1-15-20	15 - 20	07/01/2004	TCL VOC (24 hour TAT)		
	VPMW-1-10-15	10 - 15	07/01/2004	TCL VOC (24 hour TAT)	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
VPMW-04	VPMW-4-23-28	23 - 28	07/06/2004	TCL VOC (24 hour TAT)	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	VPMW-4-18-23	18 - 23	07/06/2004	TCL VOC (24 hour TAT)		
	VPMW-4-13-18	13 - 18	07/07/2004	TCL VOC (24 hour TAT)	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	MS/MSD
	VPMW-4-8-13	8 - 13	07/07/2004	TCL VOC (24 hour TAT)		Not analyzed due to breakage
VPMW-05	VPMW-5-26-31	26 - 31	07/13/2004	TCL VOC (24 hour TAT)	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	VPMW-5-21-26	21 - 26	07/14/2004	TCL VOC (24 hour TAT)		
	VPMW-5-16-21	16 - 21	07/14/2004	TCL VOC (24 hour TAT)		
	VPMW-5-11-16	11 - 16	07/14/2004	TCL VOC (24 hour TAT)	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	
	VPMW-5-11-16-Dup	11 - 16	07/14/2004	TCL VOC (24 hour TAT)	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN	Duplicate of VPMW-5-11-16
	VPMW-5-6-11	6 - 11	07/14/2004	TCL VOC (24 hour TAT)		

Notes:

TAT = turnaround time
bgs = below ground surface
CN = cyanide
Dup = duplicate
Hg = mercury
MS/MSD = matrix spike/matrix

VOC = volatile organic compound
P/PCB = pesticides/polycholrinated biphenyls
SVOC = semi volatile organic compounds
TAL = Target Analyte List
TCL = Target Compound List
VPMW = vertical profile monitoring well

What are they
using for VOC
data to
satisfy ROD

Table 2-8
Monitoring Well Construction Details
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Well ID	Date Installed	Construction	Approximate Screen Interval (feet btic)	Measured Total Depth (feet btic)	Rationale for Location and Screen Interval
MW-01	07/19/04	4 inch diameter PVC	18.6 - 28.6	28.6	Originally planned as background well (background location subsequently moved to MW-09); located in NW corner of site, thought to be upgradient of contaminant sources, according to groundwater flow diagrams (Figures 3-9 and 3-10). VOCs detected during VPW screening prohibited this location from remaining the background well. Screen set approximately 2-3 feet below water table to account for tidal fluctuations.
MW-02	07/29/04	4 inch diameter PVC	21.2 - 31.2	31.2	Located immediately downgradient of compactor/bailer. Screen approximately 5 feet below water table to account for tidal fluctuations.
MW-03	07/30/04	4 inch diameter PVC	18.09 - 28.09	28.09	Located downgradient of tire piles. Screen approximately 5 feet below water table to account for tidal fluctuations.
MW-04	07/15/04	4 inch diameter PVC	18.03 - 28.03	28.03	Located downgradient of smelter. Screen approximately 5 feet below water table to account for tidal fluctuations.
MW-05	07/19/04	4 inch diameter PVC	23.8 - 33.8	33.8	Located downgradient of compactor/bailer. Screen approximately 5 feet below water table to account for tidal fluctuations.
MW-06	07/27/04	4 inch diameter PVC	16.50 - 26.50	26.50	Located downgradient of maintenance building. Screen approximately 5 feet below water table to account for tidal fluctuations.
MW-07	08/03/04	4 inch diameter PVC	14.79 - 24.79	24.79	Located further downgradient of smelter, along river bank. Screen approximately 5 feet below water table to account for tidal fluctuations.
MW-08	08/02/04	4 inch diameter PVC	22.18 - 32.18	32.18	Located further downgradient of compactor/bailer, along river bank. Screen approximately 5 feet below water table to account for tidal fluctuations.
MW-09	07/20/04	4 inch diameter PVC	17.42 - 27.42	27.42	Background well (moved from MW-01); located in SW corner of site, upgradient and sidegradient of contaminant sources, as supported by groundwater flow diagrams (Figures 3-9 and 3-10). Majority of contaminant levels are either non-detect or significantly lower than those in downgradient wells. Screen approximately 5 feet below water table to account for tidal fluctuations.

Notes:

btic = below top of inner casing
MW = monitoring well
PVC = polyvinyl chloride
All monitoring well locations and screen intervals were approved by EPA.
All monitoring wells are stick-up with protective stainless steel outer casing.

Table 2-9
Summary of Monitoring Well Samples - Round 1 and Round 2
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample Location	Sample ID	Date	Analysis	Comment
MW-01	MW-01-R1	08/18/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
	MW-01-R2	11/11/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
MW-02	MW-02-R1	08/17/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
	MW-02-R2	11/10/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
MW-03	MW-03-R1	08/16/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	MS/MSD
	MW-03-R2	11/09/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
MW-04	MW-04-R1	08/18/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
	MW-04-R2	11/11/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
MW-05	MW-05-R1	08/18/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
	MW-50-R1-Dup	08/18/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	Duplicate of MW-05-R1
	MW-05-R2	11/11/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
	MW-51-R2-Dup	11/11/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	Duplicate of MW-05-R2
MW-06	MW-06-R1	08/17/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
	MW-06-R2	11/10/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	MS/MSD
MW-07	MW-07-R1	08/17/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
	MW-07-R2	11/10/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
MW-08	MW-08-R1	08/17/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
	MW-08-R2	11/10/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
MW-09	MW-09-R1	08/16/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	
	MW-09-R2	11/09/2004	LDL VOC, TCL SVOC, P/PCB, TAL Metals/Hg/CN	

Notes:
CN = cyanide
Hg = mercury
Dup = duplicate
LDL = low detection limit
MS/MSD = matrix spike/matrix spike duplicate
MW = monitoring well
P/PCB = pesticides/polychlorinated biphenyls
R1 = round 1
R2 = round 2
SVOC = semivolatile organic compounds
TAL = Target Analyte List
TCL = Target Compound List
VOC = volatile organic compounds

Table 2-10
Summary of Sediment and Surface Water Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample Type	Sample ID	Interval (inches bgs)	Date	Analysis	Comment	Location and Rationale
Sediment	SD-01	0 - 6	08/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; Grain Size pH, TOC; CEC		North of site; background location
	SD-02	0 - 6	08/16/2004			North of site; background location
	SD-03	0 - 6	8/16/2004			North of site; background location
	SD-04	0 - 6	8/16/2004			North of site; background location
	SD-05	0 - 6	8/16/2004			North of site; background location
	SD-06	0 - 6	8/17/2004			North of site; background location
	SD-07	0 - 6	8/17/2004			North of site; background location
	SD-08	0 - 6	8/17/2004		MS/MSD	North of site; background location
	SD-09	0 - 6	8/17/2004			North of site; background location
	SD-10	0 - 6	8/17/2004			North of site; background location
	SD-11	0 - 6	8/17/2004			North end of site by marina boat ramp
	SD-12	0 - 6	8/17/2004			Due east of former surface water runoff from site
	SD-13	0 - 6	8/18/2004			Due east of former surface water runoff from site
	SD-14	0 - 6	8/18/2004			Due east of former metal shear building
	SD-15	0 - 6	8/18/2004		MS/MSD	Due east of former compactor bailer building
	SD-16	0 - 6	8/18/2004			Due east of former smelter
	SD-17	0 - 6	8/18/2004			Due east of former scrap metal piles
	SD-18	0 - 6	8/18/2004			Due east of former tire piles
	SD-19	0 - 6	8/19/2004			At southern border of site; at outlet from stream that runs along southern border
	SD-20	0 - 6	8/19/2004			Due east of outlet from stream
	SD-21-Dup	0 - 6	8/18/2004		Duplicate of SD-16	Due east of former smelter
Surface Water	SW-01	Surface	08/16/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; TDS, TSS, Hardness, DOC; Sulfate		North of site; background location
	SW-02	Surface	08/16/2004			North of site; background location
	SW-03	Surface	08/16/2004			North of site; background location
	SW-04	Surface	08/16/2004			North of site; background location
	SW-05	Surface	08/16/2004			North of site; background location
	SW-06	Surface	08/17/2004			North of site; background location
	SW-07	Surface	08/17/2004			North of site; background location
	SW-08	Surface	08/17/2004			North of site; background location
	SW-09	Surface	08/17/2004			North of site; background location
	SW-10	Surface	08/17/2004		MS/MSD	North of site; background location
	SW-11	Surface	08/17/2004			North end of site by marina boat ramp

Table 2-10
Summary of Sediment and Surface Water Samples
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample Type	Sample ID	Interval (inches bgs)	Date	Analysis	Comment	Location and Rationale
Surface Water (Con't)	SW-12	Surface	08/17/2004	TCL VOC, SVOC, P/PCB; TAL Metals, Hg, CN; TDS, TSS, Hardness, DOC; Sulfate		Due east of former surface water runoff from site
	SW-13	Surface	08/18/2004			Due east of former surface water runoff from site
	SW-14	Surface	08/18/2004			Due east of former metal shear building
	SW-15	Surface	08/18/2004			Due east of former compactor bailer building
	SW-16	Surface	08/18/2004			Due east of former smelter
	SW-17	Surface	08/18/2004			Due east of former scrap metal piles
	SW-18	Surface	08/18/2004		MS/MSD	Due east of former tire piles
	SW-19	Surface	08/19/2004			At southern border of site; at outlet from stream that runs along southern border
	SW-20	Surface	08/19/2004			Due east of outlet from stream
	SW-21-Dup	Surface	08/18/2004		Duplicate of SW-16	Due east of former smelter

Notes:

bgs= below ground surface
CEC = cation exchange capacity
CN = cyanide
DOC = dissolved oxygen content
Dup = duplicate
Hg = mercury
MS/MSD = matrix spike/matrix spike duplicate
P/PCB = pesticides/polycholrinated biphenyls
SWSS = site-wide surface soil
SWSB = site-wide subsurface soil
SVOC = semivolatile organic compounds
TAL = Target Analyte List
TCL = Target Compound List
TDS = total dissolved solids
TOC = total organic carbon
TSS = total suspended solids
VOC = volatile organic compounds

Table 2-11
Surface Water Sample Water Quality Measurements, Flow Measurements and Tidal Information
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Water Depth (feet)	Flow Velocity		Tidal Information	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Temperature (°C)	ORP (mV)
		Depth (feet)	Velocity (feet/sec)							
SW-01	25.2	0	1.10	Flood	8.14	0.311	-	6.60	24.96	184.9
		12.5	0.91							
		25	0.62							
SW-02	22.6	0	0.82	Flood	8.15	0.310	-	6.54	24.96	197.8
		11	0.81							
		22	0.24							
SW-03	21.7	0	0.10	High Slack	8.18	0.309	-	6.55	24.95	206.6
		10	0.30							
		20	0.00							
SW-04	22.5	0	0.57	Ebb	8.17	0.309	-	6.56	24.95	206.4
		11	0.35							
		22	0.49							
SW-05	17.5	0	0.91	Ebb	8.20	0.309	-	6.51	24.97	205.9
		8.5	1.00							
		17	0.80							
SW-06	33.6	0	1.41	Ebb	8.18	0.310	-	6.49	24.98	196.6
		16.5	0.70							
		29	0.81							
SW-07	35.8	0	0.41	Ebb	8.20	0.311	-	6.59	25.00	201.5
		18	0.33							
		29	0.10							
SW-08	24.2	0	0.30	Low Slack	8.19	0.311	-	6.90	25.04	169.4
		12	0.58							
		24	0.39							
SW-09	39.1	0	1.09	Flood	8.07	0.309	-	6.80	25.17	171.1
		18	1.15							
		29	1.03							

Table 2-11
Surface Water Sample Water Quality Measurements, Flow Measurements and Tidal Information
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Water Depth (feet)	Flow Velocity		Tidal Information	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Temperature (°C)	ORP (mV)
		Depth (feet)	Velocity (feet/sec)							
SW-10	25.5	0	0.62	Flood	7.93	0.310	-	7.32	25.26	192.6
		12.5	0.51							
		25	0.63							
SW-11	6.7	0	0.20	Flood	8.23	0.311	-	7.20	25.46	191.4
		3	0.12							
		6	0.10							
SW-12	7.0	0	0.19	Flood	8.23	0.312	-	7.46	25.51	189.9
		3.5	0.10							
		7	0.11							
SW-13	7.4	0	0.27	Flood	7.90	0.245	-	6.56	25.04	260.0
		3.5	0.30							
		7	0.28							
SW-14	15.4	0	0.37	Low Slack	7.92	0.246	-	6.50	24.99	247.7
		7.5	0.50							
		15	0.41							
SW-15	11.6	0	0.75	Flood	7.91	0.247	-	7.13	25.12	264.5
		6	0.83							
		11.5	0.21							
SW-16	6.8	0	0.60	Flood	7.97	0.248	-	6.87	25.29	241.5
		3	0.41							
		6.5	0.32							
SW-17	4.5	0	0.00	Flood	7.90	0.250	-	7.06	25.39	258.5
		2	0.09							
		4	0.08							
SW-18	8.0	0	0.10	High Slack	7.81	0.291	8.4	4.67	24.91	193.3
		4	0.21							
		6.5	0.18							

Table 2-11
Surface Water Sample Water Quality Measurements, Flow Measurements and Tidal Information
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Water Depth (feet)	Flow Velocity		Tidal Information	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Temperature (°C)	ORP (mV)
		Depth (feet)	Velocity (feet/sec)							
SW-19	2.0	0 1 2	0.20 0.15 0.19	Low Slack	8.04	0.293	10.0	6.30	24.90	260.9
SW-20	5.0	0 2.5 5	0.59 0.60 0.42	Flood	8.16	0.291	8.5	5.32	24.98	182.9

Notes:
°C = degrees Celcius
Ebb = tide moving to sea towards low tide
Flood = tide moving inland towards high tide
High slack = tide/water stops moving and maximum high tide has been attained
Low slack = tide/water stops moving and minimum low tide has been attained
mg/l = milligrams per liter
mS/cm = millisiemens per centimeter
mV = millivolts
NTU = nephelometric turbidity units
ORP = oxidation-reduction potential
sec = second
SW = surface water

Table 3-1

Groundwater Elevation Data - Round 1 and Round 2
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Well ID	Inner Casing Elevation	08/16/04			11/08/04		
		Depth to Water (feet btic)	Water Elevation	Time	Depth to Water (feet btic)	Water Elevation	Time
MW-01	17.61	14.43	3.18	11:40	14.09	3.52	15:30
MW-02	12.60	10.52	2.08	11:25	12.04	0.56	15:10
MW-03	13.21	12.67	0.54	11:03	13.23	-0.02	14:50
MW-04	10.96	10.40	0.56	11:14	10.84	0.12	15:40
MW-05	10.36	9.80	0.56	11:22	10.46	-0.10	15:45
MW-06	7.22	6.68	0.54	11:30	7.52	-0.30	15:00
MW-07	12.41	11.97	0.44	11:05	12.75	-0.34	15:20
MW-08	10.88	10.37	0.51	11:10	11.41	-0.53	15:15
MW-09	15.99	13.76	2.23	10:56	13.86	2.13	14:45

Newburgh Tidal Information:

8/16/04:	Low tide recorded at 7:35; high tide recorded at 13:16
11/08/04:	Low tide recorded at 14:56

Notes:

btic = below top of inner casing

Depth to water measurements were made at the surveyors mark.

Water elevation data are relative to mean sea level; a negative number indicates a water elevation below mean sea level.

Table 3-2
Hydraulic Conductivity Values Calculated from Slug Test Data
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Well	K (ft/sec)	K (ft/day)	K (cm/sec)
MW-1in	3.12E-05	2.69E+00	9.50E-04
MW-1 out	1.74E-05	1.50E+00	5.30E-04
MW-1 Average	**2.43E-05**	**2.10E+00**	**7.40E-04**
MW-2 in	1.87E-05	1.61E+00	5.68E-04
MW-2 out	1.69E-05	1.46E+00	5.15E-04
MW-2 Average	**1.78E-05**	**1.54E+00**	**5.42E-04**
MW-3 in	3.84E-05	3.32E+00	1.17E-03
MW-3 out	3.57E-05	3.08E+00	1.09E-03
MW-3 Average	**3.71E-05**	**3.20E+00**	**1.13E-03**
MW-4 in	3.44E-04	2.97E+01	1.05E-02
MW-4 out	2.36E-04	2.04E+01	7.19E-03
MW-4 Average	**2.90E-04**	**2.50E+01**	**8.84E-03**
MW-5 in	1.43E-05	1.24E+00	4.36E-04
MW-5 out	2.35E-05	2.03E+00	7.16E-04
MW-5 Average	**1.89E-05**	**1.63E+00**	**5.76E-04**
MW-6 in	1.39E-03	1.20E+02	4.25E-02
MW-6 out	4.16E-04	3.59E+01	1.27E-02
MW-6 Average	**9.05E-04**	**7.82E+01**	**2.76E-02**
MW-7 in	4.13E-04	3.57E+01	1.26E-02
MW-7 out	7.12E-04	6.15E+01	2.17E-02
MW-7 Average	**5.62E-04**	**4.86E+01**	**1.71E-02**
MW-8a in	1.63E-06	1.41E-01	4.98E-05
MW-8a out	5.10E-06	4.41E-01	1.55E-04
MW-8 in	4.49E-06	3.88E-01	1.37E-04
MW-8 out	4.19E-06	3.62E-01	1.28E-04
MW-8 Average	**3.85E-06**	**3.33E-01**	**1.17E-04**
MW-9 in	9.40E-05	8.12E+00	2.87E-03
MW-9 out	1.30E-04	1.12E+01	3.96E-03
MW-9 Average	**1.12E-04**	**9.68E+00**	**3.41E-03**
SITE AVERAGE	**2.19E-04**	**1.89E+01**	**6.68E-03**

Notes:
*8a is the duplicate of MW-8
cm = Centimeter
ft = Feet
K - Hydraulic Conductivity
in - Falling Head Slug Test
MW = Monitoring Well
out - Rising Head Slug Test
sec = Second

Table 3-3
Estimates of Groundwater Movement
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Range of Hydraulic Gradients	GW Velocity = Ki/n	feet/ day	feet/ year	Distance (ft) traveled 1914-2006	Contaminant Travel Distance from 1914-2006 (feet)											
					Using Rf from Site-Specific Calculation		Using Rf from Literature Kd Calculation									
					Ar-1254	BaP	Ar-1254	BaP	Arsenic	Cadmium	Copper	Iron	Lead	Mercury	Vanadium	Zinc
Lower End of Hydraulic Gradient	18.9 x 0.0066 0.3	0.42	151.77	13,963	0.25	0.08	0.03	0.28	85.54	35.48	0.27	105.91	2.96	2.67	2.67	42.90
Upper End of Hydraulic Gradient	18.9 x 0.0107 0.3	0.67	246.05	22,636	0.40	0.13	0.04	0.45	138.67	57.53	0.43	171.70	4.80	4.32	4.32	69.55

Notes:

K = average hydraulic conductivity: 18.9 ft/d
i = hydraulic gradient: lower end of range = 0.0036; upper end of range = 0.107
η = effective porosity: assumed to be 30 %
BaP = benzo(a)pyrene
Ar = Aroclor

Table 3-4
Vegetative, Avian, and Wildlife Species Observed
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Species	Common Name	Scientific Name
Vegetative Species		
Herbaceous	American pokeweed	*Phytolacca americana*
	Aster	*Aster spp.*
	Common fleabane	*Erigeron philadelphicus*
	Common Plantain	*Plantago major*
	Common ragweed	*Ambrosia artemisiifolia*
	Common reed	*Phragmites communis*
	Field bindweed	*Convolvulus arvensis*
	Field garlic	*Allium vincale*
	Goldenrod	*Solidago* spp.
	Knapweed	*Centauria* spp.
	Leafy spurge	*Euphorbia esula*
	Mullein	*Verbascum thapsus*
	Multifloral rose	*Rosa multiflora*
	Poison ivy	*Toxicodendron radicans*
	Purple loosestrife	*Lythrum salicaria*
	Red clover	*Trifolium pratense*
	Thistle	*Cirsium* spp.
	Virginia creeper	*Parthenocissus quinquefolia*
	Wild madder	*Galium mollugo*
Shrubs and Trees	Boxelder	*Acer negundo*
	Honeylocust	*Glenditsia tricanthos*
	Honeysuckle	*Lonicera spp.*
	Red maple	*Acer rubrum*
	Smooth sumac	*Rhus glabra*
	Staghorn sumac	*Rhus typhina*
	Sugar maple	*Acer saccharum*
	Tree of heaven	*Ailanthus altissima*
	Willow	*Salix spp.*
Avian Species		
	American robin	*Turdus migratorius*
	American crow	*Corvus branchyrhychos*
	Song sparrow	*Melospiza melodia*
Wildlife Species		
	Cottontail	*Sylvilagus floridanus*
	Gray squirrel	*Sciurus carolinensis*
	Woodchuck	*Marmota monax*
	Shrews	*Sorex spp.*
	Mice	
	Vole	

Table 3-5
Hudson River Fish Species Reported Near the Site
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Common Name	Scientific Name
Acipenseridae	
Shortnose sturgeon*	*Acipenser brevirostrum*
Atlantic sturgeon	*Acipeeenser oxyrinchus*
Anguilidae	
American eel	*Anguilla rostrata*
Clupeidae	
Blueback herring	*Alosa aestivalis*
Alewife	*Alosa pseudoharengus*
American shad	*Alosa sapidissima*
Atlantic menhaden	*Brevoortia tyrannus*
Gizzard shad	*Dorosoma cepedianum*
Engraulidae	
Bay anchovy	*Anchoa mitchilli*
Salmonidae	
Sockeye salmon	*Oncorhynchus nerka*
Brown trout	*Salmo trutta*
Brook trout	*Salvelinus fontinalis*
Osmeridae	
Rainbow smelt	*Osmerus mordax*
Umbridae	
Eastern mudminnow	*Umbra pygmaea*
Central mudminnow	*Umbra limi*
Esocidae	
Chain pickerel	*Esox niger*
Northern pike	*Esox lucius*
Cyprinidae	
Goldfish	*Carassius auratus*
Common carp	*Cyprinus carpio*
Cutlips minnow	*Exoglossum maxillingua*
Eastern silvery minnow	*Hybognathus nuchalis*
Golden shiner	*Notemigonus crysoleucas*
Satinfin shiner	*Notropis analastanus*
Emerald shiner	*Notropis atherinoides*
Common shiner	*Notropis cornutus*
Spottail shiner	*Notropios hudsonius*
Spotfin shiner	*Notropis spilopterus*
Fathead minnow	*Pimephales promelas*
Blacknose dace	*Rhinichthys atratuslus*
Creek chub	*Semotilus atromaculatus*
Fallfish	*Semotilus corporalis*

Table 3-5
Hudson River Fish Species Reported Near the Site
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Common Name	Scientific Name
Catostomidae	
White sucker	*Catostomus commersoni*
Ictaluridae	
White catfish	*Ameirus catus*
Yellow bullhead	*Ameirus natalis*
Brown bullhjead	*Ameirus nebulosus*
Channel catfsih	*Ictalurus punctatus*
Gadidae	
Atlantic tomcod	*Microgadus tomcod*
Red hake	*Urophycis chuss*
Belonidae	
Atlantic needlefish	*Strongylura marina*
Cyprinodontidae	
Sheepshead minnow	*Cyrprinodon variegatus*
Banded killifish	*Fundulus disphanus*
Mummichog	*Fundulus heteroclitus*
Antherinidae	
Rough silverside	*Membras martinica*
Atlantic silverside	*Menidia menidia*
Gasterosteidae	
Fourspine stickleback	*Apeltes quadracus*
Threespine stickleback	*Gasterosteus aculeatus*
Syngnathidae	
Northern pipefish	*Syngnathus fuscus*
Percichtyidae	
White perch	*Morone americana*
White bass	*Morone chrysops*
Striped bass	*Morone saxatilis*
Centrarchidae	
Rockbass	*Amblopites rupestris*
Redbreast sunfish	*Lepomis auritus*
Pumpkinseed	*Lepomis gibbosus*
Warmouth	*Lepomis gulosus*
Bluegill	*Lepomis macrochirus*
Smallmouth bass	*Micropterus dolomieu*
Largemouth bass	*Micropterus salmoides*
White crappie	*Pomoxis annularis*
Black crappie	*Pomoxis nigromaculatus*
Percidae	
Tessellated darter	*Etheostoma olmstedi*
Yellow perch	*Perca flavescens*

Table 3-5
Hudson River Fish Species Reported Near the Site
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Common Name	Scientific Name
Pomatomidae	
Bluefish	*Pomatomus saltatrix*
Carangidae	
Crevalle jack	*Caranx hippos*
Atlantic moonfish	*Selene setapinnis*
Sciaenidae	
Weakfish	*Cynosion regalis*
Freshwater drum	*Aplodinotus grunniens*
Ammodytidae	
American sand lance	*Ammodytes americanus*
Triglidae	
Striped searobin	*Prionotus evolans*
Bothidae	
Summer flounder	*Paralichthys dentatus*
Pleuronectidae	
Winter flounder	*Pseudopleuronectes americanus*
Lutjanidae	
Gray snapper	*Lutjanus griseus*
Eleotridae	
Fat sleeper	*Dormitator maculatus*
Soleidae	
Hogchoker	*Trinectes maculatus*

Notes:
* New York State endangered species
Source: Table 50 Newburgh Project Remedial Investigation Report, BBL 1999

Table 4-1
Surface and Subsurface Soil Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Adjusted EPA Region IX PRGs: Residential Soil (1)		EPA Generic SSLs for Commercial/ Industrial - Ingestion/ Dermal		EPA Generic SSLs for Commercial/ Industrial - Inhalation		NYSDEC RSCO Adjusted for Site TOC of 4.85% (2)		Site-Specific Soil Screening Criteria (SSSSC) (3)	Site-Specific Background Value (4)	
										Surface Soil	Subsurface Soil
VOCs											
1,1,1-Trichloroethane	200,000	nc	NL	c,e	1,200,000	d	3,876	A,E	**3,876**	ND	ND
1,1,2,2-Tetrachloroethane	410	ca	16,000	c,e	1,000	e	2,907	A,E	**410**	ND	ND
1,1,2-Trichloroethane	730	ca	56,000	c,e	2,000	e	NL	A	**730**	ND	ND
1,1,2-Tricholoro-1,2,2-trifluoroethane	NL		NL		NL		13,778	A,E,V	**13,778**	ND	ND
1,1-Dichloroethane	51,000	nc	110,000,000	b,c	1,700,000	d	969	A,E	**969**	ND	ND
1,1-Dichloroethene	12,000	nc	5,000	c,e	100	e	1,938	A,E	**100**	ND	ND
1,2,3-Trichlorobenzene	NL		NL		NL		NL	A	**NA**	ND	ND
1,2,4-Trichlorobenzene	6,200	nc	6,800,000	b	3,200,000	d	13,778	A,E,V	**6,200**	ND	ND
1,2-Dibromo-3-chloropropane	210	nc	NL		NL		NL	A	**210**	ND	ND
1,2-Dibromoethane	32	ca	NL		NL		NL	A	**32**	ND	ND
1,2-Dichlorobenzene	110,000	nc	62,000,000	b	600,000	d	13,778	A,E,V	**13,778**	ND	ND
1,2-Dichloroethane	280	ca	35,000	c,e	600	e	484	A,E	**280**	ND	ND
1,2-Dichloropropane	340	ca	47,000	c,e	21,000	b	NL	A,E	**340**	ND	ND
1,3-Dichlorobenzene	53,000	nc	NL		NL		7,751	A,E	**7,751**	ND	ND
1,4-Dichlorobenzene	3,400	ca	80,000	e	NL	g	13,778	A,E,V	**3,400**	ND	ND
2-Butanone	2,200,000	nc	NL		NL		1,453	A,E	**1,453**	ND	ND
2-Hexanone	NL		NL		NL		NL	A	**NA**	ND	ND
4-Methyl-2-pentanone	NL		NL		NL		4,844	A,E	**4,844**	ND	ND
Acetone	1,400,000	nc	110,000,000	b,c	NL	c	969	A,E	**969**	5 J	ND
Benzene	640	ca	58,000	c,e	1,000	e	291	A,E	**291**	ND	ND
Bromochloromethane	NL		NL		NL		NL	A	**NA**	ND	ND
Bromodichloromethane	820	ca	51,000	c,e	NL	c	NL	A	**820**	ND	ND
Bromoform	62,000	ca	400,000	c,e	88,000	e	NL	A	**62,000**	ND	ND
Bromomethane	390	nc	1,600,000	b,c	13,000	b	NL	A	**390**	ND	ND
Carbon Disulfide	36,000	nc	110,000,000	b,c	720,000	d	13,080	A,E,V	**13,080**	ND	ND
Carbon Tetrachloride	220	nc	24,000	c,e	600	e	2,907	A,E	**220**	ND	ND
Chlorobenzene	15,000	nc	23,000,000	b,c	180,000	b	8,236	A,E	**8,236**	ND	ND
Chloroethane	3,000	ca	NL		NL		9,205	A,E	**3,000**	ND	ND

Table 4-1
Surface and Subsurface Soil Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Adjusted EPA Region IX PRGs: Residential Soil (1)		EPA Generic SSLs for Commercial/ Industrial - Ingestion/ Dermal		EPA Generic SSLs for Commercial/ Industrial - Inhalation		NYSDEC RSCO Adjusted for Site TOC of 4.85% (2)		Site-Specific Soil Screening Criteria (SSSSC) (3)	Site-Specific Background Value (4)	
										Surface Soil	Subsurface Soil
Chloroform	220	ca	520,000	c,e	500	e	1,453	A,E	**220**	ND	ND
Chloromethane	4,700	nc	NL		NL		NL	A	**4,700**	ND	ND
cis-1,2-Dichloroethene	4,300	nc	11,000,000	b,c	NL	c	NL	A	**4,300**	7	3 J
cis-1,3-Dichloropropene	780	ca	NL		NL		NL	A	**780**	ND	ND
Cyclohexane	140,000	sat	NL		NL		NL	A	**140,000**	ND	ND
Dibromochloromethane	1,100	ca	38,000	c,e	NL	c	NL	A	**1,100**	ND	ND
Dichlorodifluoromethane	9,400	nc	NL		NL		NL	A	**9,400**	ND	ND
Ethylbenzene	190,000	nc	110,000,000	b,c	400,000	d	13,778	A,E,V	**13,778**	ND	ND
Isopropylbenzene	57,000	nc	NL		NL		NL	A	**57,000**	ND	ND
Methyl Acetate	2,200,000	nc	NL		NL		NL	A	**2,200,000**	ND	ND
Methyl Tert-Butyl Ether	17,000	ca	NL		NL		NL	A	**17,000**	ND	ND
Methylcyclohexane	260,000	nc	NL		NL		NL	A	**260,000**	ND	ND
Methylene Chloride	9,100	ca	420,000	c,e	22,000	e	484	A,E	**484**	7	ND
Styrene	440,000	nc	230,000,000	b,c	1,500,000	d	NL	A	**440,000**	ND	ND
Tetrachloroethene	480	ca	61,000	c,e	18,000	e	6,782	A,E	**480**	7 J	2 J
Toluene	66,000	nc	230,000,000	b,c	650,000	d	7,267	A,E	**7,267**	ND	ND
trans-1,2-Dichloroethene	6,900	nc	23,000,000	b,c	NL	c	1,453	A,E	**1,453**	ND	ND
trans-1,3-Dichloropropene	780	ca	NL		NL		NL	A	**780**	ND	ND
Trichloroethene	53	ca	290,000	c,e	8,000	e	3,391	A,E	**53**	8 J	2 J
Trichlorofluoromethane	39,000	nc	NL		NL		NL	A	**39,000**	ND	ND
Vinyl Chloride	79	ca	4,000	c,e	1,000	e	969	A,E	**79**	ND	ND
Xylenes (Total)	27,000	nc	1,000,000,000	b,c	NL	c	5,813	A,E	**5,813**	ND	ND
SVOCs											
1,1-Biphenyl	300,000	nc	NL		NL		NL	D	**300,000**	ND	110 J
1,2,4,5-Tetrachlorobenzene	1,800	nc	NL		NL		NL	D	**1,800**	ND	ND
2,2'-oxybis(1-Chloropropane)	NL		NL		NL		NL	D	**NA**	ND	ND
2,4,5-Trichlorophenol	610,000	nc	68,000,000	b	NL	c	484	D,E	**484**	ND	ND
2,4,6-Trichlorophenol	610	nc	170,000	e	340,000	e	NL	D	**610**	ND	ND
2,4-Dichlorophenol	18,000	nc	2,100,000	b	NL	c	1,938	D,E	**1,938**	ND	ND

Table 4-1
Surface and Subsurface Soil Screening Criteria
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Newburgh, New York

Chemical Name	Adjusted EPA Region IX PRGs: Residential Soil (1)		EPA Generic SSLs for Commercial/ Industrial - Ingestion/ Dermal		EPA Generic SSLs for Commercial/ Industrial - Inhalation		NYSDEC RSCO Adjusted for Site TOC of 4.85% (2)		Site-Specific Soil Screening Criteria (SSSSC) (3)	Site-Specific Background Value (4)	
										Surface Soil	Subsurface Soil
2,4-Dimethylphenol	120,000	nc	14,000,000	b	NL	c	NL	D	**120,000**	ND	ND
2,4-Dinitrophenol	12,000	nc	1,400,000	b	NL	c	969	D,E	**969**	ND	ND
2,4-Dinitrotoluene	12,000	nc	3,000	e	NL	c	NL	D	**3,000**	ND	ND
2,6-Dinitrotoluene	6,100	nc	3,000	e	NL	c	4,844	D,E	**3,000**	ND	ND
2-Chloronaphthalene	490,000	nc	NL		NL		NL	D	**490,000**	ND	ND
2-Chlorophenol	6,300	nc	3,400,000	b	NL	c	3,876	D,E	**3,876**	ND	ND
2-Methylnaphthalene	NL		NL		NL		68,892	D,E,S	**68,892**	ND	450
2-Methylphenol	310,000	nc	34,000,000	b	NL	c	484	D,E	**484**	ND	ND
2-Nitroaniline	18,000	nc	NL		NL		2,083	D,E	**2,083**	ND	ND
2-Nitrophenol	NL		NL		NL		1,599	D,E	**1,599**	ND	ND
3,3'-Dichlorobenzidine	1,100	ca	4,000	e	NL	c	NL	D	**1,100**	ND	ND
3-Nitroaniline	1,800	nc	NL		NL		2,422	D,E	**1,800**	ND	ND
4,6-Dinitro-2-methylphenol	NL		NL		NL		NL	D	**NA**	ND	ND
4-Bromophenyl-phenylether	NL		NL		NL		NL	D	**NA**	ND	ND
4-Chloro-3-methylphenol	NL		NL		NL		1,163	D,E	**1,163**	ND	ND
4-Chloroaniline	24,000	nc	2,700,000	bb	NL	c	1,066	D,E	**1,066**	ND	ND
4-Chlorophenyl-phenylether	NL		NL		NL		NL	D	**NA**	ND	ND
4-Methylphenol	31,000	nc	NL		NL		4,360	D,E	**4,360**	ND	ND
4-Nitroaniline	18,000	nc	NL		NL		NL	D	**NA**	ND	ND
4-Nitrophenol	NL		NL		NL		484	D,E	**484**	ND	ND
Acenaphthene	370,000	nc	37,000,000	b	NL	c	68,892	D,E,S	**68,892**	190 J	1,100
Acenaphthylene	NL		NL		NL		68,892	D,E,S	**68,892**	771	744
Acetophenone	NL		NL		NL		NL	D	**NA**	ND	ND
Anthracene	2,200,000	nc	180,000,000	b	NL	c	68,892	D,E,S	**68,892**	527	790
Atrazine	2,200	ca	NL		NL		NL	D	**2,200**	ND	ND
Benzaldehyde	610,000	nc	NL		NL		NL	D	**610,000**	ND	ND
Benzo(a)anthracene	620	ca	2,000	e	NL	c	1,085	D,E	**620**	2,230	4,854
Benzo(a)pyrene	62	ca	200	e	NL	c	296	D,E	**62**	1,715	2,180
Benzo(b)fluoranthene	620	ca	2,000	e	NL	c	5,329	D,E	**620**	2,651	4,268

Table 4-1
Surface and Subsurface Soil Screening Criteria
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Newburgh, New York

Chemical Name	Adjusted EPA Region IX PRGs: Residential Soil (1)		EPA Generic SSLs for Commercial/ Industrial - Ingestion/ Dermal		EPA Generic SSLs for Commercial/ Industrial - Inhalation		NYSDEC RSCO Adjusted for Site TOC of 4.85% (2)		Site-Specific Soil Screening Criteria (SSSSC) (3)	Site-Specific Background Value (4)	
										Surface Soil	Subsurface Soil
Benzo(g,h,i)perylene	NL		NL		NL		68,892	D,E,S	**68,892**	410 J	535
Benzo(k)fluoranthene	6,200	ca	23,000	e	NL	c	5,329	D,E	**5,329**	2,416	3,620
bis(2-Chloroethoxy)methane	NL		NL		NL		NL	D	**NA**	ND	ND
bis(2-Chloroethyl)ether	220	ca	2,000	e	400	e	NL	D	**220**	ND	ND
bis-(2-Ethylhexyl)phthalate	35,000	ca	140,000	e	NL	c	68,892	D,E,S	**35,000**	2,930	270 J
Butylbenzylphthalate	1,200,000	nc	140,000,000	b	NL	c	68,892	D,E,S	**68,892**	88 J	43 J
Caprolactam	3,100,000	nc	NL		NL		NL	D	**3,100,000**	ND	ND
Carbazole	24,000	ca	96,000	e	NL	c	NL	D	**24,000**	150 J	1,200
Chrysene	62,000	ca	230,000	e	NL	c	1,938	D,E	**1,938**	2,460	5,071
Dibenzo(a,h)anthracene	62	ca	200	e	NL	c	68	D,E	**62**	957	993
Dibenzofuran	15,000	nc	NL		NL		30,036	D,E	**15,000**	74 J	890
Diethylphthalate	4,900,000	nc	550,000,000	b	NL	c	34,396	D,E	**34,396**	ND	ND
Dimethylphthalate	61,000,000	nc	NL		NL		9,689	D,E	**9,689**	ND	ND
Di-n-butylphthalate	610,000	nc	68,000,000	b	NL	c	39,240	D,E	**39,240**	ND	ND
Di-n-octylphthalate	240,000	nc	14,000,000	b	NL	c	68,892	D,E,S	**68,892**	ND	ND
Fluoranthene	230,000	nc	24,000,000	b	NL	c	68,892	D,E,S	**68,892**	2,882	8,579
Fluorene	160,000	sat	24,000,000	b	NL	c	68,892	D,E,S	**68,892**	110 J	1,469
Hexachlorobenzene	300	ca	1,000	e	2,000	e	1,986	D,E	**1,986**	ND	ND
Hexachlorobutadiene	1,800	nc	25,000	e	13,000	e	NL	D	**1,800**	ND	ND
Hexachlorocyclopentadiene	37,000	nc	4,800,000	b	14,000	b	NL	D	**14,000**	ND	ND
Hexachloroethane	6,100	nc	140,000	e	92,000	e	NL	D	**6,100**	ND	ND
Indeno(1,2,3-cd)pyrene	620	ca	2,000	e	NL	c	15,502	D,E	**620**	1,321	2,258
Isophorone	510,000	ca	2,000,000	e	NL	c	21,316	D,E	**21,316**	ND	ND
Naphthalene	5,600	nc	12,000,000	b	240,000	b	62,978	D,E,S	**5,600**	ND	540
Nitrobenzene	2,000	nc	340,000	b	130,000	b	969	D,E	**969**	ND	ND
N-Nitroso-di-n-propylamine	69	ca	300	e	NL	c	NL	D	**69**	ND	ND
N-Nitrosodiphenylamine	99,000	ca	390,000	e	NL	c	NL	D	**99,000**	ND	ND
Pentachlorophenol	3,000	ca	10,000	e	NL	c	4,844	D,E	**3,000**	ND	ND
Phenanthrene	NL		NL		NL		68,892	D,E,S	**68,892**	1,000	5,860

Table 4-1
Surface and Subsurface Soil Screening Criteria
Consolidated Iron and Metal Superfund Site
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Chemical Name	Adjusted EPA Region IX PRGs: Residential Soil (1)		EPA Generic SSLs for Commercial/ Industrial - Ingestion/ Dermal		EPA Generic SSLs for Commercial/ Industrial - Inhalation		NYSDEC RSCO Adjusted for Site TOC of 4.85% (2)		Site-Specific Soil Screening Criteria (SSSSC) (3)	Site-Specific Background Value (4)	
										Surface Soil	Subsurface Soil
Phenol	1,800,000	nc	410,000,000	b	NL	c	145	D,E	**145**	ND	ND
Pyrene	230,000	nc	18,000,000	b	NL	c	68,892	D,E,S	**68,892**	3,448	7,819
P/PCBs											
4,4'-DDD	2,400	ca	13,000	c,e	NL	c	2,813	E,F,P	**2,400**	52 J	ND
4,4'-DDE	1,700	ca	9,000	c,e	NL	c	2,037	E,F,P	**1,700**	590	85
4,4'-DDT	1,700	ca	8,000	e	NL	g	2,037	E,F,P	**1,700**	103	57
Aldrin	29	ca	200	c,e	6,000	e	39.7	E,F	**29**	ND	ND
alpha-BHC	90	ca	500	c,e	1,000	e	106.7	E,F	**90**	ND	2
alpha-Chlordane	NL		7,000	e,H	120,000	e,H	523.8	E,F	**523.8**	2.5 J	ND
Aroclor-1016	390	nc	NL		NL		970	G	**390**	ND	ND
Aroclor-1221	NL		NL		NL		970	G	**970**	ND	ND
Aroclor-1232	NL		NL		NL		970	G	**970**	ND	ND
Aroclor-1242	NL		NL		NL		970	G	**970**	ND	ND
Aroclor-1248	NL		NL		NL		970	G	**970**	ND	100
Aroclor-1254	110	nc	NL		NL		970	G	**110**	102	110
Aroclor-1260	NL		NL		NL		970	G	**970**	62	62
beta-BHC	320	ca	2,000	c,e	NL	g	194	E,F	**194**	2	3
delta-BHC	NL		NL		NL		291	E,F	**291**	ND	ND
Dieldrin	30	ca	200	c,e	2,000	e	42.7	E,F	**30**	12	6.5 JN
Endosulfan I	NL		6,800,000	b,c	NL	c	873	E,F	**873**	2	ND
Endosulfan II	NL		6,800,000	b,c	NL	c	873	E,F	**873**	ND	ND
Endosulfan Sulfate	NL		NL		NL		970	E,F	**970**	6	6
Endrin	1,800	nc	340,000	b,c	NL	c	97	E,F	**97**	ND	ND
Endrin aldehyde	NL		NL		NL		NL	F	**NA**	4	14
Endrin ketone	NL		NL		NL		NL	F	**NA**	39 J	70 J
gamma-BHC (Lindane)	440	ca	2,000	e	NL	c	58.2	E,F	**58.2**	ND	ND
gamma-Chlordane	NL		7,000	e,H	120,000	e,H	523.8	E,F	**523.8**	16	16
Heptachlor	110	ca	700	c,e	7,000	e	97	E,F	**110**	ND	1
Heptachlor epoxide	53	ca	300	c,e	8,000	e	97	E,F	**53**	7.6 J	ND

Table 4-1
Surface and Subsurface Soil Screening Criteria
Consolidated Iron and Metal Superfund Site
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Chemical Name	Adjusted EPA Region IX PRGs: Residential Soil (1)		EPA Generic SSLs for Commercial/ Industrial - Ingestion/ Dermal		EPA Generic SSLs for Commercial/ Industrial - Inhalation		NYSDEC RSCO Adjusted for Site TOC of 4.85% (2)		Site-Specific Soil Screening Criteria (SSSSC) (3)	Site-Specific Background Value (4)	
										Surface Soil	Subsurface Soil
Methoxychlor	31,000	nc	5,700,000	b,c	NL	c	NL	F	**31,000**	ND	ND
Toxaphene	440	ca	3,000	c,e	150,000	e	NL	F	**440**	ND	ND
Inorganics											
Aluminum	7,600	nc	NL		NL		NL	B	**7,600**	9,058	9,436
Antimony	3.10	nc	450	b,c	NL	c	NL	B	**3.10**	1.4 J	0.96 J
Arsenic	0.39	ca	2	e	1,400	e	7.5	**	**0.39**	7	6
Barium	540	nc	79,000	b,c	1,000,000	b	300	**	**300**	94	85
Beryllium	15	nc	2,300	c,e	2,600	e	0.16	**	**0.16**	0	0
Cadmium	3.70	nc	900	b,h	3,400	e	1	**	**1.00**	2	1
Calcium	NL		NL		NL		NL	B	**NA**	11,810	22,749
Chromium	210	ca	3,400	b,c	510	e	10	**	**10**	26	21
Chromium (hexavalent)	22	nc	3,400	b,c	510	e	NL		**22**	NA	NA
Cobalt	140	nc	NL		NL		30	**	**30**	10	11
Copper	310	nc	NL		NL		25	**	**25**	154	184
Cyanide	120	nc	23,000	b,c	NL	c	NL	C	**120**	ND	0.17 J
Iron	2,300	nc	NL		NL		2,000	**	**2,000**	25,962	24,031
Lead	400	nc	750	j	NL	j	NL	B	**400**	365	206
Magnesium	NL		NL		NL		NL	B	**NA**	4,936	6,918
Manganese	180	nc	NL		NL		NL	B	**180**	635	667
Mercury	2.3		340	b,c	14	b	0.1		**0.10**	1	0
Nickel	160	nc	23,000	b,c	26,000	e	13	**	**13**	22.9 J	21 J
Potassium	NL		NL		NL		NL	B	**NA**	764	810
Selenium	39	nc	5,700	b,c	NL	c	2	**	**2.76**	ND	ND
Silver	39	nc	5,700	b,c	NL	c	NL	B	**39**	1	0
Sodium	NL		NL		NL		NL	B	**NA**	135	154
Thallium	0.52	nc	91	b,c	NL	c	NL	B	**1**	ND	ND
Vanadium	7.80	nc	7,900	b,c	NL	c	150	**	**8**	23	19
Zinc	2,300	nc	340,000	b,c	NL	c	20	**	**20**	152	147

Table 4-1
Surface and Subsurface Soil Screening Criteria
Consolidated Iron and Metal Superfund Site
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Chemical Name	Adjusted EPA Region IX PRGs: Residential Soil (1)	EPA Generic SSLs for Commercial/ Industrial - Ingestion/ Dermal	EPA Generic SSLs for Commercial/ Industrial - Inhalation	NYSDEC RSCO Adjusted for Site TOC of 4.85% (2)	Site-Specific Soil Screening Criteria (SSSSC) (3)	Site-Specific Background Value (4)	
						Surface Soil	Subsurface Soil

Notes:

Site-specific screening criteria was approved by EPA during the March 18, 2005 conference call. Please see Section 4.1.1 for a discussion of the screening criteria selection process.

All VOC, SVOC, and P/PCB values are in micrograms per kilogram (ug/kg); inorganic values are in milligrams per kilogram (mg/kg)

EPA = Environmental Protection Agency
NA =not available
ND = non detect
NL = chemical name not listed or screening value of this type not listed for the chemical
NYSDEC = New York State Department of Environmental Conservation
P/PCB = pesticide and polychlorinated biphenyls
PRG = preliminary remedial goal
RSCO = recommended soil cleanup objectives
SSSSC = site-specific soil screening criteria
SSL = soil screening level
SVOC = semi-volatile organic compound
VOC = volatile organic compound
TOC = total organic carbon

(1) EPA Region 9 PRGs adjusted to a cancer risk of 1 X 10-6 and a non-cancer hazard index of 0.1.
(2) NY State Recommended Soil Cleanup Objectives (TAGM #4046, January 1994). Organic values are adjusted to site TOC content. Inorganic values are not subject to this adjustment. See note E.
(3) SSSSC values are the lowest of the listed EPA and NYSDEC screening values.
(4) Site-specific background concentrations for surface and subsurface soil are the lower of the calculated 95% UCL and the maximum detected sample result, as shown on Table 4-6 (surface soil) and Table 4-7 (subsurface soil). Background values are provided for comparison purposes only.

A Total VOCs <10,000 ug/kg
B Use site background
C Must be calculated on a site specific basis dependent upon the site specific form of cyanide
D Total SVOCs <500,000 ug/kg, individual SVOCs <50,000 ug/kg

Table 4-1
Surface and Subsurface Soil Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Adjusted EPA Region IX PRGs: Residential Soil (1)	EPA Generic SSLs for Commercial/ Industrial - Ingestion/ Dermal	EPA Generic SSLs for Commercial/ Industrial - Inhalation	NYSDEC RSCO Adjusted for Site TOC of 4.85% (2)	Site-Specific Soil Screening Criteria (SSSSC) (3)	Site-Specific Background Value (4)	
						Surface Soil	Subsurface Soil

E Values are calculated using the site average organic carbon content: 4.85 % OC 48.5 g OC/kg soil
F Total Pesticides <10,000 ug/kg
G NYSDEC RSCO for PCBs is based on a soil organic carbon content of 5%
H Value applies to the sum of alpha- and gamma-Chlordane
I No SSL or RSCO available. Value is the EPA Region 9 Preliminary Remediation Goal for Residential Soil.
P Value capped at the NYSDEC limit on total pesticides (10 mg/kg)
S Value capped at the NYSDEC limit on individual SVOCs (50,000 mg/kg)
V Value capped at the NYSDEC limit on total VOCs (10,000 mg/kg)
** Use this value or site background

b Value corresponds to a noncancer hazard quotient of 1.
c Ingestion-Dermal pathway: calculated based on ingestion data only. Inhalation pathway: no toxicity criteria available.
ca Value from EPA Region IX human health criteria; based on cancer risk of 1E-06.
d Soil saturation limit
e Calculated values correspond to a cancer risk of 1 in 1,000,000
h SSL is based on dietary RfD
j EPA set a screening level of 750 mg/kg for lead based on conservative inputs to the Adult Pb model
nc Value from EPA Region IX human health criteria; based on noncancer hazard index of 0.1.

Table 4-2
Sediment Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	New York State Sediment Screening Criteria for Human Health Bioaccumulation, Freshwater Adjusted for Site TOC of 3.985% (1)		New York State Sediment Screening Criteria for Benthic Aquatic Life, Chronic Toxicity, Freshwater, Adjusted for Site TOC of 3.985%- with NYSDEC LEL for inorganics (1)		New York State Sediment - Aquatic Life - Severe Effect Level (SEL) for Inorganics (1)	MacDonald (2000) Consensus-based Probable Effect Concentration (PEC) (2)	EPA Region IX Critera: Industrial/ Commercial Soil		Sediment Screening Criteria (SSSDSC) (3)	Site-Specific Background Value - Sediment (4)
VOCs										
1,1,1-Trichloroethane	NL		NL		NL	NL	694,742	nc	**694,742**	ND
1,1,2,2-Tetrachloroethane	11.955	B	NL		NL	NL	929	ca	**11.955**	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	NL		NL		NL	NL	1,605	ca	**1,605**	ND
1,1,2-Trichloroethane	23.91	B	NL		NL	NL	6,874,970	nc	**23.91**	ND
1,1-Dichloroethane	NL		NL		NL	NL	173,865	nc	**173,865**	ND
1,1-Dichloroethene	0.797	B	NL		NL	NL	41,333	nc	**0.797**	ND
1,2,3-Trichlorobenzene	NL		3,626	B,E	NL	NL	NL		**3,626**	ND
1,2,4-Trichlorobenzene	NL		3,626	B,E	NL	NL	563,757	nc	**3,626**	ND
1,2-Dibromo-3-chloropropane	NL		NL		NL	NL	654	nc	**654**	ND
1,2-Dibromoethane	NL		NL		NL	NL	28	ca	**28**	ND
1,2-Dichlorobenzene	NL		478	B,D	NL	NL	408,423	nc	**478**	ND
1,2-Dichloroethane	27.895	B	NL		NL	NL	603	ca	**27.895**	ND
1,2-Dichloropropane	NL		NL		NL	NL	742	ca	**742**	ND
1,3-Dichlorobenzene	NL		478	B,D	NL	NL	6,273	nc	**478**	ND
1,4-Dichlorobenzene	NL		478	B,D	NL	NL	7,867	ca	**478**	ND
2-Butanone	NL		NL		NL	NL	2,710,201	nc	**2,710,201**	9.7
2-Hexanone	NL		NL		NL	NL	NL		**NA**	ND
4-Methyl-2-pentanone	NL		NL		NL	NL	283,677	nc	**283,677**	ND
Acetone	NL		NL		NL	NL	603,596	nc	**603,596**	49.6
Benzene	23.910	B	NL		NL	NL	1,315	ca	**23.910**	ND
Bromochloromethane	NL		NL		NL	NL	NL		**NA**	ND
Bromodichloromethane	NL		NL		NL	NL	1,831	ca	**1,831**	ND
Bromoform	NL		NL		NL	NL	218,200	ca	**218,200**	ND
Bromomethane	NL		NL		NL	NL	1,308	nc	**1,308**	ND
Carbon Disulfide	NL		NL		NL	NL	120,172	nc	**120,172**	ND
Carbon Tetrachloride	23.910	B	NL		NL	NL	549	ca	**23.910**	ND
Chlorobenzene	NL		139	B	NL	NL	53,047	nc	**139**	ND
Chloroethane	NL		NL		NL	NL	6,485	ca	**6,485**	ND
Chloroform	NL		NL		NL	NL	1,168	nc	**1,168**	ND
Chloromethane	NL		NL		NL	NL	2,646	ca	**2,646**	ND
cis-1,2-Dichloroethene	NL		NL		NL	NL	14,630	nc	**14,630**	ND
cis-1,3-Dichloropropene	NL		NL		NL	NL	NL		**NA**	ND
Cyclohexane	NL		NL		NL	NL	3,162,454	nc	**3,162,454**	ND
Dibromochloromethane	NL		NL		NL	NL	2,554	ca	**2,554**	ND

Table 4-2
Sediment Screening Criteria
Consolidated Iron and Metal Superfund Site
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Chemical Name	New York State Sediment Screening Criteria for Human Health Bioaccumulation, Freshwater Adjusted for Site TOC of 3.985% (1)		New York State Sediment Screening Criteria for Benthic Aquatic Life, Chronic Toxicity, Freshwater, Adjusted for Site TOC of 3.985%- with NYSDEC LEL for inorganics (1)		New York State Sediment - Aquatic Life - Severe Effect Level (SEL) for Inorganics (1)	MacDonald (2000) Consensus-based Probable Effect Concentration (PEC) (2)		EPA Region IX Critera: Industrial/ Commercial Soil		Sediment Screening Criteria (SSSDSC) (3)	Site-Specific Background Value - Sediment (4)
Dichlorodifluoromethane	NL		NL		NL	NL		30,806	nc	**30,806**	ND
Ethylbenzene	NL		956	B	NL	NL		19,528	ca	**956**	ND
Isopropylbenzene	NL		478	B	NL	NL		197,745	nc	**478**	4
Methyl Acetate	NL		NL		NL	NL		9,153,083	nc	**9,153,083**	ND
Methyl Tert-Butyl Ether	NL		NL		NL	NL		157,045	ca	**157,045**	ND
Methylcyclohexane	NL		NL		NL	NL		871,587	nc	**871,587**	ND
Methylene Chloride	NL		NL		NL	NL		20,527	ca	**20,527**	ND
Styrene	NL		NL		NL	NL		1,812,211	nc	**1,812,211**	ND
Tetrachloroethene	31.880	B	NL		NL	NL		3,422	ca	**31.880**	ND
Toluene	NL		1,953	B	NL	NL		221,257	nc	**1,953**	ND
trans-1,2-Dichloroethene	NL		NL		NL	NL		23,482	nc	**23,482**	ND
trans-1,3-Dichloropropene	NL		NL		NL	NL		NL		**NA**	ND
Trichloroethene	79.7	B	NL		NL	NL		115	ca	**79.7**	ND
Trichlorofluoromethane	NL		NL		NL	NL		127,607	nc	**127,607**	ND
Vinyl Chloride	2.7895	B	NL		NL	NL		746	ca	**2.7895**	ND
Xylenes (total)	NL		3,666	B,F	NL	NL		90,219	nc	**3,666**	4.0
SVOCs											
1,1'Biphenyl	NL		NL		NL	NL		2,334,051	nc	**2,334,051**	646.3
1,2,4,5-Tetrachlorobenzene	NL		NL		NL	NL		18,468	nc	**18,468**	ND
2,2'-oxybis(1-Chloropropane)	NL		NL		NL	NL		7,352	ca	**7,352**	ND
2,4,5-Trichlorophenol	NL		24	B,G	NL	NL		6,156,063	nc	**24**	ND
2,4,6-Trichlorophenol	NL		24	B,G	NL	NL		6,156	nc	**24**	ND
2,4-Dichlorophenol	NL		24	B,G	NL	NL		184,682	nc	**24**	ND
2,4-Dimethylphenol	NL		20	B,J	NL	NL		1,231,213	nc	**20**	ND
2,4-Dinitrophenol	NL		20	B,J	NL	NL		123,121	nc	**20**	ND
2,4-Dinitrotoluene	NL		NL		NL	NL		123,121	nc	**123,121**	ND
2,6-Dinitrotoluene	NL		NL		NL	NL		61,561	nc	**61,561**	ND
2-Chloronaphthalene	NL		NL		NL	NL		2,338,273	nc	**2,338,273**	ND
2-Chlorophenol	NL		24	B,G	NL	NL		23,577	nc	**24**	ND
2-Methylnaphthalene	NL		1,355	B	NL	NL		NL		**1,355**	885.8
2-Methylphenol	NL		20	B,J	NL	NL		3,078,031	nc	**20**	ND
2-Nitroaniline	NL		NL		NL	NL		1,761	nc	**1,761**	ND
2-Nitrophenol	NL		20	B,J	NL	NL		NL		**20**	ND
3,3'-Dichlorobenzidine	NL		NL		NL	NL		3,830	ca	**3,830**	ND
3-Nitroaniline	NL		NL		NL	NL		NL		**NA**	ND

Table 4-2
Sediment Screening Criteria
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4,6-Dinitro-2-methylphenol	NL		20	B,J	NL	NL		NL		**20**	ND
4-Bromophenyl-phenylether	NL		NL		NL	NL		NL		**NA**	ND
4-Chloro-3-methylphenol	NL		24	B,G	NL	NL		NL		**24**	ND
4-Chloroaniline	NL		NL		NL	NL		246,243	nc	**246,243**	ND
4-Chlorophenyl-phenylether	NL		NL		NL	NL		NL		**NA**	ND
4-Methylphenol	NL		20	B,J	NL	NL		307,803	nc	**20**	ND
4-Nitroaniline	NL		NL		NL	NL		NL		**NA**	ND
4-Nitrophenol	NL		20	B,J	NL	NL		NL		**20**	ND
Acenaphthene	NL		5,579	B	NL	NL		2,921,933	nc	**5,579**	17000 J
Acenaphthylene	NL		NL		NL	NL		NL		**NA**	917.9
Acetophenone	NL		NL		NL	NL		NL		**NA**	ND
Anthracene	NL		4,264	B	NL	845		23,828,651	nc	**845**	22000 J
Atrazine	NL		NL		NL	NL		7,764	ca	**7,764**	ND
Benzaldehyde	NL		NL		NL	NL		6,156,063	nc	**6,156,063**	ND
Benzo(a)anthracene	51.805	B	478	B	NL	1,050		2,110	ca	**51.805**	20,000 J
Benzo(a)pyrene	51.805	B	NL		NL	1,450		211	ca	**51.805**	15,000 J
Benzo(b)fluoranthene	51.805	B	NL		NL	NL		2,110	ca	**51.805**	16,000 J
Benzo(g,h,i)perylene	NL		NL		NL	NL		NL		**NA**	6,800 J
Benzo(k)fluoranthene	51.805	B	NL		NL	NL		21,096	ca	**51.805**	3,471.0
bis(2-Chloroethoxy)methane	NL		NL		NL	NL		NL		**NA**	ND
bis(2-Chloroethyl)ether	1.1955	B	NL		NL	NL		554	ca	**1.1955**	ND
bis(2-Ethylhexyl)phthalate	NL		7,950	B	NL	NL		123,121	ca	**7,950**	46,000 J
Butylbenzylphthalate	NL		NL		NL	NL		12,312,126	nc	**12,312,126**	340 J
Caprolactam	NL		NL		NL	NL		30,780,315	nc	**30,780,315**	ND
Carbazole	NL		NL		NL	NL		86,185	ca	**86,185**	583.8
Chrysene	51.805	B	NL		NL	1,290		210,962	ca	**51.805**	20,000 J
Dibenz(a,h)anthracene	NL		NL		NL	NL		211	ca	**211**	1,490.8
Dibenzofuran	NL		NL		NL	NL		312,668	nc	**312,668**	8,700 J
Diethylphthalate	NL		NL		NL	NL		49,248,503	nc	**49,248,503**	ND
Dimethylphthalate	NL		NL		NL	NL		615,606,291	nc	**615,606,291**	ND
Di-n-butylphthalate	NL		NL		NL	NL		6,156,063	nc	**6,156,063**	150 J
Di-n-octyl phthalate	NL		NL		NL	NL		2,462,425	nc	**2,462,425**	ND
Fluoranthene	NL		40,647	B	NL	2,230		2,200,035	nc	**2,230**	42,000 J
Fluorene	NL		319	B	NL	536		2,628,143	nc	**319**	14,000 J
Hexachlorobenzene	5.9775	B	221,965	B	NL	NL		1,077	ca	**5.9775**	ND

Table 4-2
Sediment Screening Criteria
Consolidated Iron and Metal Superfund Site
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Chemical Name	New York State Sediment Screening Criteria for Human Health Bioaccumulation, Freshwater Adjusted for Site TOC of 3.985% (1)		New York State Sediment Screening Criteria for Benthic Aquatic Life, Chronic Toxicity, Freshwater, Adjusted for Site TOC of 3.985%- with NYSDEC LEL for inorganics (1)		New York State Sediment - Aquatic Life - Severe Effect Level (SEL) for Inorganics (1)	MacDonald (2000) Consensus-based Probable Effect Concentration (PEC) (2)		EPA Region IX Critera: Industrial/ Commercial Soil		Sediment Screening Criteria (SSSDSC) (3)	Site-Specific Background Value - Sediment (4)
Hexachlorobutadiene	11.955	B	219	B	NL	NL		18,468	nc	**11.955**	ND
Hexachlorocyclopentadiene	NL		175	B	NL	NL		365,872	nc	**175**	ND
Hexachloroethane	NL		NL		NL	NL		61,561	nc	**61,561**	ND
Indeno(1,2,3-cd)pyrene	51.805	B	NL		NL	NL		2,110	ca	**51.805**	7,400 J
Isophorone	NL		NL		NL	NL		1,814,419	ca	**1,814,419**	ND
Naphthalene	NL		1,196	B	NL	561		18,769	nc	**1,196**	2,674.7
Nitrobenzene	NL		NL		NL	NL		10,293	nc	**10,293**	ND
N-Nitroso-di-n-propylamine	NL		NL		NL	NL		246	ca	**246**	ND
N-Nitrosodiphenylamine	NL		NL		NL	NL		351,775	ca	**351,775**	ND
Pentachlorophenol	NL		1,594	B	NL	NL		8,998	ca	**1,594**	ND
Phenanthrene	NL		4,782	B	NL	1,170		NL		**1,170**	57,000 J
Phenol	NL		20	B,J	NL	NL		36,936,377	nc	**20**	ND
Pyrene	NL		38,296	B	NL	1,520		2,912,620	nc	**1,520**	42,000 J
P/PCBs											
4,4'-DDD	0.3985	B	40	B	NL	28		9,951	ca	**0.3985**	4.7
4,4'-DDE	0.3985	B	NL		NL	31.3		7,025	ca	**0.3985**	6.9
4,4'-DDT	0.3985	B	NL		NL	62.9		7,025	ca	**0.3985**	ND
Aldrin	3.985	B,K	NL		NL	NL		101	ca	**3.985**	ND
Alpha-BHC	2.391	B,L	2.391	B,L	NL	NL		359	ca	**2.391**	ND
alpha-Chlordane	0.03985	B,C	1.196	B,C	NL	17.6	C	6,468	ca	**0.03985**	ND
Aroclor-1016	0.03188	B,H	769	B,H	NL	676	H	3,718	nc	**0.03188**	ND
Aroclor-1221	0.03188	B,H	769	B,H	NL	676	H	744	ca	**0.03188**	ND
Aroclor-1232	0.03188	B,H	769	B,H	NL	676	H	744	ca	**0.03188**	ND
Aroclor-1242	0.03188	B,H	769	B,H	NL	676	H	744	ca	**0.03188**	ND
Aroclor-1248	0.03188	B,H	769	B,H	NL	676	H	744	ca	**0.03188**	300 J
Aroclor-1254	0.03188	B,H	769	B,H	NL	676	H	744	ca	**0.03188**	ND
Aroclor-1260	0.03188	B,H	769	B,H	NL	676	H	744	ca	**0.03188**	ND
Beta-BHC	2.391	B,L	2.391	B,L	NL	NL		1,258	ca	**2.391**	ND
Delta-BHC	2.391	B,L	2.391	B,L	NL	NL		NL		**2.391**	ND
Dieldrin	3.985	B,K	NL		NL	61.8		108	ca	**3.985**	ND
Endosulfan I	NL		1.196	B	NL	NL		NL		**1.196**	ND
Endosulfan II	NL		1.196	B	NL	NL		NL		**1.196**	ND
Endosulfan sulfate	NL		NL		NL	NL		NL		**NA**	ND
Endrin	31.88	B	159	B	NL	207		18,468	nc	**31.88**	ND
Endrin aldehyde	NL		NL		NL	NL		NL		**NA**	ND

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Endrin ketone	NL		NL		NL	NL		NL		**NA**	8.5
gamma-BHC (Lindane)	2.391	B,L	2.391	B,L	NL	4.99		1,741	ca	**2.391**	ND
gamma-Chlordane	0.03985	B,C	0.03985	B,C	NL	17.6	C	6,468	ca	**0.03985**	ND
Heptachlor	0.03188	B	4	B	NL	NL		383	ca	**0.03188**	ND
Heptachlor epoxide	0.03188	B	4	B	NL	16		189	ca	**0.03188**	ND
Methoxychlor	NL		24	B	NL	NL		307,803	nc	**24**	ND
Toxaphene	0.797	B	0.3985	B	NL	NL		1,567	ca	**0.3985**	ND
Inorganics											
Aluminum	NL		NL		NL	NL		92,107,250	nc	**92,107,250**	15,093.1
Antimony	NL		2		25	NL		40,880	nc	**2**	13.8
Arsenic	NL		6		33	33		1,590	ca	**6**	6.4
Barium	NL		NL		NL	NL		6,657,735	nc	**6,657,735**	157.5
Beryllium	NL		NL		NL	NL		194,069	nc	**194,069**	ND
Cadmium	NL		0.6		9	4.98		45,141	nc	**0.6**	1.1
Calcium	NL		NL		NL	NL		NL		**NA**	5,792.3
Chromium	NL		26		110	111		64,045	ca	**26**	61.2
Chromium (hexavalent)	NL		NL		NL	NL		64,045	ca	**64,045**	ND
Cobalt	NL		NL		NL	NL		1,333,100	nc	**1,333,100**	16.4
Copper	NL		16		110	149		4,087,666	nc	**16**	92.7
Cyanide	NL		NL		NL	NL		1,231,310	nc	**1,231,310**	1.4 J
Iron	NL		20,000		40,000	NL		30,641,211	nc	**20,000**	33,594.2
Lead	NL		31		110	128		NL	ca	**31**	85.3
Magnesium	NL		NL		NL	NL		NL		**NA**	6,712.9
Manganese	NL		460		1110	NL		1,945,811	nc	**460**	1,949.9
Mercury	NL		0.15		1.3	1.06		57,574,427	nc	**0.15**	0.46 J
Nickel	NL		16		50	48.6		2,043,916	nc	**16**	35.0
Potassium	NL		NL		NL	NL		NL		**NA**	2,018.3
Selenium	NL		NL		NL	NL		510,995	nc	**510,995**	7.9
Silver	NL		1		2.2	NL		510,995	nc	**1**	ND
Sodium	NL		NL		NL	NL		NL		**NA**	792.6
Thallium	NL		NL		NL	NL		6,745	nc	**6,745**	5.7
Vanadium	NL		NL		NL	14	S	NL		**14**	27.9
Zinc	NL		120		270	459		30,641,211	nc	**120**	195.5

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Notes:

Site-specific screening criteria was approved by EPA during the March 18, 2005 conference call. Please see Section 4.1.1 for a discussion of the screening criteria selection process.

All VOC, SVOC, and P/PCB values are in micrograms per kilogram (ug/kg); inorganic values are in milligrams per kilogram (mg/kg)

LEL = lower effect level
NL = chemical name not listed or screening value of this type not listed for the chemical
OC = organic carbon
PEC = probable effect concentration
SEL = severe effect level
SSSDSC = Site specific sediment screening criteria
TOC = total organic carbon
μg/kg = microgram per kilogram
NA = not available
ND = non-detect value

(1) Technical Guidance for Screening Contaminated Sediments, Division of Fish, Wildlife and Marine Resources, Jan. 25, 1999
(2) MacDonald DD, Ingersoll CG, Berger T. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. *Arch Environ Contam Toxicol* 39:20-31.
(3) SSSDSC valuesare the lowest of the listed EPA, NYSDEC, and MacDonald screening values
(4) The site-specific background value for sediment is the lower of the calculated 95% UCL and the maximum detected sample result, as shown on Table 4-8. Background values are provided for comparison purposes only.

B Values are calculated based on a site average organic carbon content: 3.985 % OC 39.85 g OC/kg sediment
Total number of samples: 20
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 chlorinated Phenols
H Value applies to total PCBs
J Value applies to total unchlorinated phenols
K Value applies to sum of Aldrin and Dieldrin
L Value applies to total BHCs (hexachlorocyclohexanes)

Table 4-3
Surface Water Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Contaminant	EPA Ambient Water Quality Criteria - Human Health - for Consumption of Organism Only (1,2)			EPA Ambient Water Quality Criteria - Aquatic Life - Chronic - Fresh water - CCC (1)			NY State Standards and Guidance Values for Class B Surface Water - Human (FC) (3)			NY State Standards and Guidance Values for Class B Surface Water - Aquatic Life(C) (3)			Site-Specific Surface Water Screening Criteria (SSSWSC) (4)	Site-Specific Background Value - Surface Water (5)
	Value	Note	S/G	Value	Note	S/G	Value	Note	S/G	Value	Note	S/G	**Value**	Value
VOCs														
1,1,1-Trichloroethane	NL			NL			NL			NL			**NA**	ND
1,1,2,2-Tetrachloroethane	4		G	NL			NL			NL			**4**	ND
1,1,2-Trichloroethane	16		G	NL			NL			NL			**16**	ND
1,1,2-Tricholoro-1,2,2-trifluoroethane	NL			NL			NL			NL			**NA**	ND
1,1-Dichloroethane	NL			NL			NL			NL			**NA**	ND
1,1-Dichloroethene	3.2		G	NL			NL			NL			**3.2**	ND
1,2,3-Trichlorobenzene	NL			NL			NL			5	D	S	**5**	ND
1,2,4-Trichlorobenzene	NL			NL			NL			5	D	S	**5**	ND
1,2-Dibromo-3-chloropropane	NL			NL			NL			NL			**NA**	ND
1,2-Dibromoethane	NL			NL			NL			NL			**NA**	ND
1,2-Dichlorobenzene	NL			NL			NL			5	I	S	**5**	ND
1,2-Dichloroethane	37		G	NL			NL			NL			**37**	ND
1,2-Dichloropropane	15		G	NL			NL			NL			**15**	ND
1,3-Dichlorobenzene	NL			NL			NL			5	I	S	**5**	ND
1,4-Dichlorobenzene	NL			NL			NL			5	I	S	**5**	6.0
2-Butanone	NL			NL			NL			NL			**NA**	ND
2-Hexanone	NL			NL			NL			NL			**NA**	ND
4-Methyl-2-pentanone	NL			NL			NL			NL			**NA**	ND
Acetone	NL			NL			NL			NL			**NA**	ND
Benzene	51		G	NL			10		S	210		G	**10**	ND
Bromochloromethane	NL			NL			NL			NL			**NA**	ND
Bromodichloromethane	NL			NL			NL			NL			**NA**	ND
Bromoform	140		G	NL			NL			NL			**140**	ND
Bromomethane	NL			NL			NL			NL			**NA**	ND
Carbon Disulfide	NL			NL			NL			NL			**NA**	ND
Carbon Tetrachloride	1.6		G	NL			NL			NL			**1.6**	ND
Chlorobenzene	21,000		G	NL			400		S	5		S	**5**	ND
Chloroethane	NL			NL			NL			NL			**NA**	ND
Chloroform	470		G	NL			NL			NL			**470**	ND
Chloromethane	NL			NL			NL			NL			**NA**	ND
cis-1,2-Dichloroethene	NL			NL			NL			NL			**NA**	ND
cis-1,3-Dichloropropene	1,700		G	NL			NL			NL			**1,700**	ND
Cyclohexane	NL			NL			NL			NL			**NA**	ND
Dibromochloromethane	17		G	NL			NL			NL			**17**	ND
Dichlorodifluoromethane	NL			NL			NL			NL			**NA**	ND
Ethylbenzene	29,000		G	NL			NL			17		G	**17**	ND
Isopropylbenzene	NL			NL			NL			2.6		G	**2.6**	ND
Methyl Acetate	NL			NL			NL			NL			**NA**	ND
Methyl Tert-Butyl Ether	NL			NL			NL			NL			**NA**	ND
Methylcyclohexane	NL			NL			NL			NL			**NA**	ND
Methylene Chloride	590		G	NL			200		S	NL			**200**	ND
Styrene	NL			NL			NL			NL			**NA**	ND
Tetrachloroethene	3.3		G	NL			1		G	NL			**1**	ND
Toluene	200,000		G	NL			6,000		S	100		G	**100**	ND
trans-1,2-Dichloroethene	140,000		G	NL			NL			NL			**140,000**	ND
trans-1,3-Dichloropropene	NL			NL			NL			NL			**NA**	ND
Trichloroethene	30		G	NL			40		S	NL			**30**	ND
Trichlorofloromethane	NL			NL			NL			NL			**NA**	ND
Vinyl Chloride	530		G	NL			NL			NL			**530**	ND
Xylenes (total)	NL			NL			NL			65		G	**65**	ND
SVOCs														
1,1'-Biphenyl	NL			NL			NL			NL			**NA**	ND
1,2,4,5-Tetrachlorobenzene	NL			NL			NL			NL			**NA**	ND
2,2'-oxybis(1-Chloropropane)	NL			NL			NL			NL			**NA**	ND
2,4,5-Trichlorophenol	NL			NL			NL			NL			**NA**	ND
2,4,6-Trichlorophenol	NL			NL			NL			NL			**NA**	ND
2,4-Dichlorophenol	NL			NL			NL			NL			**NA**	ND
2,4-Dimethylphenol	NL			NL			1,000		S	NL			**1,000**	ND

Table 4-3
Surface Water Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Contaminant	EPA Ambient Water Quality Criteria - Human Health - for Consumption of Organism Only (1,2)			EPA Ambient Water Quality Criteria - Aquatic Life - Chronic - Fresh water - CCC (1)			NY State Standards and Guidance Values for Class B Surface Water - Human (FC) (3)			NY State Standards and Guidance Values for Class B Surface Water - Aquatic Life(C) (3)			Site-Specific Surface Water Screening Criteria (SSSWSC) (4)	Site-Specific Background Value - Surface Water (5)
	Value	Note	S/G	Value	Note	S/G	Value	Note	S/G	Value	Note	S/G	**Value**	Value
2,4-Dinitrophenol	NL			NL			400		S	NL			**400**	ND
2,4-Dinitrotoluene	3.4		G	NL			NL			NL			**3.4**	ND
2,6-Dinitrotoluene	NL			NL			NL			NL			**NA**	ND
2-Chloronaphthalene	1,600		G	NL			NL			NL			**1,600**	ND
2-Chlorophenol	NL			NL			NL			NL			**NA**	ND
2-Methylnaphthalene	NL			NL			4.7		G	NL			**4.7**	ND
2-Methylphenol	NL			NL			NL			NL			**NA**	ND
2-Nitroaniline	NL			NL			NL			NL			**NA**	ND
2-Nitrophenol	NL			NL			NL			NL			**NA**	ND
3,3'-Dichlorobenzidine	0.028		G	NL			NL			NL			**0.028**	ND
3-Nitroaniline	NL			NL			NL			NL			**NA**	ND
4,6-Dinitro-2-methylphenol	NL			NL			NL			NL			**NA**	ND
4-Bromophenyl-phenylether	NL			NL			NL			NL			**NA**	ND
4-Chloro-3-methylphenol	NL			NL			NL			NL			**NA**	ND
4-Chloroaniline	NL			NL			NL			NL			**NA**	ND
4-Chlorophenyl-phenylether	NL			NL			NL			NL			**NA**	ND
4-Methylphenol	NL			NL			NL			NL			**NA**	ND
4-Nitroaniline	NL			NL			NL			NL			**NA**	ND
4-Nitrophenol	NL			NL			NL			NL			**NA**	ND
Acenaphthene	990		G	NL			NL			5.3		G	**5.3**	ND
Acenaphthylene	NL			NL			NL			NL			**NA**	ND
Acetophenone	NL			NL			NL			NL			**NA**	ND
Anthracene	40,000		G	NL			NL			3.8		G	**3.8**	ND
Atrazine	NL			NL			NL			NL			**NA**	ND
Benzaldehyde	NL			NL			NL			NL			**NA**	ND
Benzo(a)anthracene	0.018		G	NL			NL			0.03		G	**0.018**	ND
Benzo(a)pyrene	0.018		G	NL			0.0012		G	NL			**0.018**	ND
Benzo(b)fluoranthene	0.018		G	NL			NL			NL			**0.018**	ND
Benzo(g,h,i)perylene	NL			NL			NL			NL			**NA**	ND
Benzo(k)fluoranthene	0.018		G	NL			NL			NL			**0.018**	ND
bis(2-Chloroethoxy)methane	NL			NL			NL			NL			**NA**	ND
bis(2-Chloroethyl)ether	0.53		G	NL			NL			NL			**0.53**	ND
bis-(2-Ethylhexyl)phthalate	2.2		G	NL			NL			0.6		S	**0.6**	1
Butylbenzylphthalate	1900		G	NL			NL			NL			**1,900**	ND
Caprolactam	NL			NL			NL			NL			**NA**	ND
Carbazole	NL			NL			NL			NL			**NA**	ND
Chrysene	0.018		G	NL			NL			NL			**0.018**	ND
Dibenz(a,h)anthracene	0.018		G	NL			NL			NL			**0.018**	ND
Dibenzofuran	NL			NL			NL			NL			**NA**	ND
Diethylphthalate	44,000		G	NL			NL			NL			**44,000**	ND
Dimethylphthalate	1,100,000		G	NL			NL			NL			**1,100,000**	ND
Di-n-butylphthalate	4,500		G	NL			NL			NL			**4,500**	ND
Di-n-octyl phthalate	NL			NL			NL			NL			**NA**	ND
Fluoranthene	140		G	NL			NL			NL			**140**	ND
Fluorene	5,300		G	NL			NL			0.54		G	**0.54**	ND
Hexachlorobenzene	0.00029		G	NL			0.00003		S	NL			**0.00003**	ND
Hexachlorobutadiene	18		G	NL			0.01		S	1		S	**0.01**	ND
Hexachlorocyclopentadiene	17,000		G	NL			NL			0.45		S	**0.45**	ND
Hexachloroethane	3.3		G	NL			0.6		S	NL			**0.6**	ND
Indeno(1,2,3-cd)pyrene	0.018		G	NL			NL			NL			**0.018**	ND
Isophorone	960		G	NL			NL			NL			**960**	ND
Naphthalene	NL			NL			NL			13		G	**13**	ND
Nitrobenzene	690		G	NL			NL			NL			**690**	ND
N-Nitroso-di-n-propylamine	3		G	NL			NL			NL			**3**	ND
N-Nitrosodiphenylamine	0.51		G	NL			NL			NL			**0.51**	ND
Pentachlorophenol	3		G	0.01	p	G	NL			0.01	P	S	**0.01**	ND
P/PCBs														
Phenanthrene	NL			NL			NL			5		G	**5**	ND
Phenol	1,700,000		G	NL			NL			NL			**1,700,000**	ND
Pyrene	4,000		G	NL			NL			4.6		G	**4.6**	ND

Table 4-3
Surface Water Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Contaminant	EPA Ambient Water Quality Criteria - Human Health - for Consumption of Organism Only (1,2)			EPA Ambient Water Quality Criteria - Aquatic Life - Chronic - Fresh water - CCC (1)			NY State Standards and Guidance Values for Class B Surface Water - Human (FC) (3)			NY State Standards and Guidance Values for Class B Surface Water - Aquatic Life(C) (3)			Site-Specific Surface Water Screening Criteria (SSSWSC) (4)	Site-Specific Background Value - Surface Water (5)
	Value	Note	S/G	Value	Note	S/G	Value	Note	S/G	Value	Note	S/G	**Value**	Value
4,4'-DDD	0.00031		G	NL			0.00008		S	NL			**0.00008**	ND
4,4'-DDE	0.00022		G	NL			0.000007		S	NL			**0.000007**	ND
4,4'-DDT	0.00022		G	0.001		G	0.00001		S	NL			**0.00001**	ND
Aldrin	0.00005		G	NL			0.001	A	S	NL			**0.00005**	ND
alpha-BHC	0.0049		G	NL			0.002		S	NL			**0.002**	ND
alpha-Chlordane	0.00081	F	G	0.0043	F	G	0.00002	F	S	NL			**0.00002**	ND
Aroclor-1016	0.000064	C	G	0.014	C	G	NL			NL			**0.000064**	ND
Aroclor-1221	0.000064	C	G	0.014	C	G	NL			NL			**0.000064**	ND
Aroclor-1232	0.000064	C	G	0.014	C	G	NL			NL			**0.000064**	ND
Aroclor-1242	0.000064	C	G	0.014	C	G	NL			NL			**0.000064**	ND
Aroclor-1248	0.000064	C	G	0.014	C	G	NL			NL			**0.000064**	ND
Aroclor-1254	0.000064	C	G	0.014	C	G	NL			NL			**0.000064**	ND
Aroclor-1260	0.000064	C	G	0.014	C	G	NL			NL			**0.000064**	ND
beta-BHC	0.017		G	NL			0.007		S	NL			**0.007**	ND
delta-BHC	NL			NL			0.008		S	NL			**0.008**	ND
Dieldrin	0.000054		G	0.056		G	0.0000006		S	0.056		S	**0.0000006**	ND
Endosulfan I	89		G	0.056		G	NL			NL			**0.056**	ND
Endosulfan II	89		G	0.056		G	NL			NL			**0.056**	ND
Endosulfan sulfate	89		G	NL			NL			NL			**89**	ND
Endrin	0.81		G	0.036		G	0.002		S	0.036		S	**0.002**	ND
Endrin aldehyde	0.3		G	NL			NL			NL			**0.3**	ND
Endrin ketone	NL			NL			NL			NL			**NA**	ND
gamma-BHC (Lindane)	0.063		G	NL			0.008		S	NL			**0.008**	ND
gamma-Chlordane	0.00081	F	G	0.0043	F	G	0.00002	F	S	NL			**0.00002**	ND
Heptachlor	0.000079		G	0.0038		G	0.0002		S	NL			**0.000079**	ND
Heptachlor epoxide	0.000039		G	0.0038		G	0.0003		S	NL			**0.000039**	ND
Methoxychlor	NL			0.03		G	NL			0.03		S	**0.03**	ND
Toxaphene	0.00028		G	0.0002		G	0.000006		S	0.005		S	**0.000006**	ND
Inorganics														
Aluminum	NL			87		G	NL			100		S	**87**	356.5
Arsenic	0.14		G	150		G	NL			150		S	**0.14**	ND
Barium	NL			NL			NL			NL			**NA**	ND
Beryllium	NL			NL			NL			11	B	S	**11**	ND
Cadmium	NL			2.5	H,K	G	NL			2.4	H	S	**2.4**	ND
Calcium	NL			NL			NL			NL			**NA**	28,300.0
Chromium	NL			84.9	H,K	G	NL			84.9	H	S	**84.9**	ND
Chromium (hexavalent)	NL			10.6	K	G	NL			11		S	**10.6**	ND
Cobalt	NL			NL			NL			5		S	**5**	ND
Copper	NL			10.3	H,K	G	NL			10.3	H	S	**10.3**	ND
Cyanide	220,000		G	5.2		G	9,000		S	5.2		S	**5.2**	6.6
Iron	NL			1,000		G	NL			300		S	**300**	412.1
Lead	NL			3.0	H,K	G	NL			4.5	H	S	**3**	8.3
Magnesium	NL			NL			NL			NL			**NA**	5,461.6
Manganese	100		G	NL			NL			300			**100**	42.5
Mercury	NL			0.655		G	0.0007		S	0.77		S	**0.0007**	ND
Nickel	4,600		G	59.8	H,K	G	NL			59.8	H	S	**59.8**	ND
Potassium	NL			NL			NL			NL			**NA**	ND
Selenium	4,200		G	5		G	NL			4.6		S	**4.6**	ND
Silver	NL			NL			NL			0.1		S	**0.1**	ND
Sodium	NL			NL			NL			NL			**NA**	650000.0
Thallium	6.3		G	NL			NL			8		S	**6.3**	ND
Vanadium	NL			NL			NL			14		S	**14**	ND
Zinc	26,000		G	135.9	H,K	G	NL			95.1	H	S	**95.1**	ND

Notes:

Site-specific screening criteria was approved by EPA during the March 18, 2005 conference call. Please see Section 4.1.1 for a discussion of the screening criteria selection process.

All VOC, SVOC, P/PCB and Inorganic values are in micrograms per liter (ug/L)

CCC = Criterion Continuous Concentration

FC = food chain

Table 4-3
Surface Water Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Contaminant	EPA Ambient Water Quality Criteria - Human Health - for Consumption of Organism Only (1,2)			EPA Ambient Water Quality Criteria - Aquatic Life - Chronic - Fresh water - CCC (1)			NY State Standards and Guidance Values for Class B Surface Water - Human (FC) (3)			NY State Standards and Guidance Values for Class B Surface Water - Aquatic Life(C) (3)			Site-Specific Surface Water Screening Criteria (SSSWSC) (4)	Site-Specific Background Value - Surface Water (5)
	Value	Note	S/G	Value	Note	S/G	Value	Note	S/G	Value	Note	S/G	Value	Value

NA = not available
NL = chemical name not listed or screening value of this type not listed for the chemical
ND = non-detect value
SSSWSC = site-specific surface water screening criteria

(1) Source: EPA. November 2002. National Recommended Water Quality Criteria: 2002. EPA 822-R-02-047. November.
(2) The Hudson River is a Class B fresh surface water. NY state regulations (6 NYCRR Part 701) define the best usage of class B waters as: primary and secondary contact recreation and fishing; suitable for fish propagation and survival. Class B waters are not used as a source of water supply for drinking, therefore the water quality criteria for ingestion of "organism only" apply.
(3) Source: NYSDEC. June 1998. TOGS 1.1.1. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. Includes April 2000 Addendum values. H(FC) is for human (fish consumption) and A(C) is for aquatic life (chronic).
(4) Screening criteria is the lowest of listed EPA and NYSDEC screening values.
(5) The site-specific background value for surface water is the lower of the calculated 95% UCL and the maximum detected sample result, as shown on Table 4-9. provided for comparison purposes only.

A - Value applies to the sum of Aldrin and Dieldrin
B - 11 ug/L *when the hardness is less than or equal to 75 ppm*; 1,100 ug/L *when hardness is greater than 75 ppm*
C - Value applies to the sum of the PCB compounds
D - Value applies to the sum of 1,2,3-, 1,2,4- and 1,3,5-trichlorobenzene
F - Value applies to the sum of alpha- and gamma-Chlordane
G - Guidance Value
I - Value applies to the sum of 1,2-, 1,3-, and 1,4-dichlorobenzene
J - Value applies to the sum of cis- and trans-1,3-dichloropropene
K - Value applies to the dissolved form of the metal (not Total)
p - pH-dependent **: pH value used is mean of 14 surface water samples**
S - Standard
p - pH-dependent **water (CCC)**
8.12 : pH assumed, based on site average pH in surface water (pH range: 7.715 to 8.23)
H - Hardness-dependent **: Hardness (mg/L) value used for calculations is mean value of 21 samples**
118 **(range: 100 to 140 mg/L)**

Cadmium dness)-2.715)
Chromium ness)+0.6848)
Copper dness)-1.702)
Lead dness)-4.297)
Nickel ness)+0.0584)
Pentachlorophenol ardness)+0.5)
Zinc 5*(pH)-5.134)
iations for Aquatic Life, Chronic, Fresh water (CCC)
Cadmium dness)-2.715)
Chromium ness)+0.6848)
Copper dness)-1.702)
Lead dness)-4.705)
Nickel ness)+0.0584)
Zinc Iness)+0.884)

Table 4-4
Groundwater Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	National Primary Drinking Water Standards (1)			New York State Standards (S) and Guidance (G) Values for Class GA Groundwater (2)			NYSDOH Drinking Water Quality Standards (3)		Site-Specific Groundwater Screening Criteria (SSGWSC) (4)	Site-Specific Background Values (5) Round 1 Groundwater		Site-Specific Background Values (5) Round 2 Groundwater	
	Value	Note	G/S	Value	Note	G/S	Value	G/S	Value	Value		Value	
VOCs													
1,1,1-Trichloroethane	200		S	5	PC	S	5	S	**5**	0.5	U	0.5	U
1,1,2,2-Tetrachloroethane	NL			5		S	5	S	**5**	0.5	U	0.5	U
1,1,2-Trichloro-1,2,2-trifluoroethane	NL			5	PC	S	NL		**5**	0.5	U	0.5	U
1,1,2-Trichloroethane	5		S	1		S	5	S	**1**	0.5	U	0.5	U
1,1-Dichloroethane	NL			5	PC	S	5	S	**5**	0.5	U	0.5	U
1,1-Dichloroethene	7		S	5	PC	S	5	S	**5**	0.5	U	0.5	U
1,2,3-Trichlorobenzene	NL			5	PC	S	5	S	**5**	0.5	U	0.5	U
1,2,4-Trichlorobenzene	70		S	5	PC	S	5	S	**5**	0.5	U	0.5	U
1,2-Dibromo-3-chloropropane	0.2		S	0.04		S	0.2	S	**0.04**	0.5	U	0.5	U
1,2-Dibromoethane	0.05		S	0.0006		S	0.05	S	**0.0006**	0.5	U	0.5	U
1,2-Dichlorobenzene	600		S	3		S	5	S	**3**	0.5	U	0.5	U
1,2-Dichloroethane	5		S	0.6		S	5	S	**0.6**	0.5	U	0.5	U
1,2-Dichloropropane	5		S	1		S	5	S	**1**	0.5	U	0.5	U
1,3-Dichlorobenzene	NL			3		S	5	S	**3**	0.5	U	0.5	U
1,4-Dichlorobenzene	75		S	3		S	5	S	**3**	5	U	0.5	U
2-Butanone	NL			50		G	NL		**50**	5	U	5	UJ
2-Hexanone	NL			50		G	50	S	**50**	5	U	5	UJ
4-Methyl-2-pentanone	NL			NL			50	S	**50**	5	U	5	UJ
Acetone	NL			50		G	50	S	**50**	5	U	5	U
Benzene	5		S	1		S	5	S	**1**	9.6		13	
Bromochloromethane	NL			5	PC	S	5	S	**5**	0.5	U	0.5	U
Bromodichloromethane	80	T	S	50		G	100	S	**50**	0.5	U	0.5	U
Bromoform	80	T	S	50		G	100	S	**50**	0.5	U	0.5	U
Bromomethane	NL			5	PC	S	5	S	**5**	0.5	U	0.5	U
Carbon Disulfide	NL			60		G	50	S	**50**	0.5	U	0.14	J
Carbon Tetrachloride	5		S	5		S	5	S	**5**	0.5	U	0.5	U
Chlorobenzene	100		S	5	PC	S	5	S	**5**	0.5	U	0.5	U
Chloroethane	NL			5	PC	S	5	S	**5**	0.5	U	0.5	U
Chloroform	80	T	S	7		S	100	S	**7**	0.5	U	0.5	U
Chloromethane	NL			5	PC	S	5	S	**5**	0.23	J	0.5	U
cis-1,2-Dichloroethene	70		S	5	PC	S	5	S	**5**	1.3		1.7	
cis-1,3-Dichloropropene	NL			0.4	J	S	5	S	**0.4**	0.5	U	0.5	U
Cyclohexane	NL			NL			NL		**NA**	0.5	U	0.5	U
Dibromochloromethane	80	T	S	50		G	100	S	**50**	0.5	U	0.5	U
Dichlorodifluoromethane	NL			5	PC	S	5	S	**5**	0.5	U	0.5	U
Ethylbenzene	700		S	5	PC	S	5	S	**5**	0.5	U	0.5	U
Isopropylbenzene	NL			5	PC	S	5	S	**5**	0.5	U	0.5	U
Methyl Acetate	NL			NL			NL		**NA**	0.5	U	0.5	U
Methyl Tert-Butyl Ether	NL			10		G	50	S	**10**	0.5	U	0.12	J
Methylcyclohexane	NL			NL			NL		**NA**	0.5	U	0.5	U
Methylene Chloride	5		S	5	PC	S	5	S	**5**	0.5	U	0.5	U
Styrene	100		S	5	PC	S	5	S	**5**	0.5	U	0.5	U
Tetrachloroethene	5		S	5	PC	S	5	S	**5**	0.5	U	0.5	U
Toluene	1,000		S	5	PC	S	5	S	**5**	0.5	U	0.12	J
trans-1,2-Dichloroethene	100		S	5	PC	S	5	S	**5**	0.16	J	1	
Trans-1,3-Dichloropropene	NL			0.4	J	S	5	S	**0.4**	0.83		0.5	U
Trichloroethene	5		S	5	PC	S	5	S	**5**	0.5	U	0.13	J
Trichlorofluoromethane	NL			5	PC	S	5	S	**5**	0.5	U	0.5	U
Vinyl Chloride	2		S	2		S	2	S	**2**	0.5	U	0.3	J
Xylenes (total)	10,000		S	5	PC	S	5	S	**5**	0.24	J	0.5	U

Table 4-4
Groundwater Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	National Primary Drinking Water Standards (1)			New York State Standards (S) and Guidance (G) Values for Class GA Groundwater (2)			NYSDOH Drinking Water Quality Standards (3)		Site-Specific Groundwater Screening Criteria (SSGWSC) (4)	Site-Specific Background Values (5)			
										Round 1 Groundwater		Round 2 Groundwater	
	Value	Note	G/S	Value	Note	G/S	Value	G/S	Value	Value		Value	
SVOCs													
1,1'Biphenyl	NL			5	PC	S	NL		**5**	10	U	10	U
2,2'-oxybis(1-Chloropropane)	NL			5	PC	S	NL		**5**	10	U	10	U
2,4,5-Trichlorophenol	NL			NL			5	S	**5**	25	U	25	U
2,4,6-Trichlorophenol	NL			NL			5	S	**5**	10	U	10	U
2,4-Dichlorophenol	NL			5	PC	S	NL		**5**	10	U	10	U
2,4-Dimethylphenol	NL			50		G	50	S	**50**	10	U	10	U
2,4-Dinitrophenol	NL			10		G	NL		**10**	25	U	25	U
2,4-Dinitrotoluene	NL			5	PC	S	50	S	**5**	10	U	10	U
2,6-Dinitrotoluene	NL			5	PC	S	50	S	**5**	10	U	10	U
2-Chloronaphthalene	NL			NL			5	S	**5**	10	U	10	U
2-Chlorophenol	NL			NL			5	S	**5**	10	U	10	U
2-Methylnaphthalene	NL			NL			NL		**NA**	10	U	10	U
2-Methylphenol	NL			NL			50	S	**50**	10	U	10	U
2-Nitroaniline	NL			5	PC	S	5	S	**5**	25	U	25	U
2-Nitrophenol	NL			NL			50	S	**50**	10	U	10	U
3,3'-Dichlorobenzidine	NL			5	PC	S	5	S	**5**	10	U	10	U
3-Nitroaniline	NL			5	PC	S	5	S	**5**	25	U	25	U
4,6-Dinitro-2-methylphenol	NL			NL			50	S	**50**	25	U	25	UJ
4-Bromophenyl-phenylether	NL			NL			50	S	**50**	10	U	10	U
4-Chloro-3-methylphenol	NL			NL			5	S	**5**	10	U	10	U
4-Chloroaniline	NL			5	PC	S	5	S	**5**	10	U	10	U
4-Chlorophenyl-phenylether	NL			NL			50	S	**50**	10	U	10	U
4-Methylphenol	NL			NL			50	S	**50**	10	U	10	U
4-Nitroaniline	NL			5	PC	S	5	S	**5**	25	U	25	UJ
4-Nitrophenol	NL			NL			50	S	**50**	25	U	25	U
Acenaphthene	NL			NL			50	S	**50**	10	U	10	U
Acenaphthylene	NL			NL			50	S	**50**	10	U	10	U
Acetophenone	NL			NL			50	S	**50**	10	U	10	U
Anthracene	NL			*50*		G	50	S	**50**	10	U	10	U
Atrazine	3		S	7.5		S	3	S	**3**	10	U	10	UJ
Benzaldehyde	NL			NL			NL		**NA**	10	U	10	UJ
Benzo(a)anthracene	NL			0.002		G	50	S	**0.002**	10	U	10	U
Benzo(a)pyrene	0.2		S	ND		S	0.2	S	**0.2**	10	U	10	U
Benzo(b)fluoranthene	NL			0.002		G	50	S	**0.002**	10	U	10	U
Benzo(g,h,i)perylene	NL			NL			50	S	**50**	10	U	10	U
Benzo(k)fluoranthene	NL			0.002		G	50	S	**0.002**	10	U	10	U
bis(2-Chloroethoxy)methane	NL			5	PC	S	5	S	**5**	10	U	10	U
bis(2-Chloroethyl)ether	NL			1		S	5	S	**1**	10	U	10	U
bis(2-Ethylhexyl)phthalate	6		S	5		S	6	S	**5**	10	U	10	U
Butylbenzylphthalate	NL			50		G	50	S	**50**	10	U	10	U
Caprolactam	NL			NL			NL		**NA**	10	U	10	U
Carbazole	NL			NL			50	S	**50**	10	U	10	U
Chrysene	NL			0.002		G	50	S	**0.002**	10	U	10	U
Dibenz(a,h)anthracene	NL			NL			50	S	**50**	10	U	10	U
Dibenzofuran	NL			NL			50	S	**50**	10	U	10	U
Diethylphthalate	NL			50		G	50	S	**50**	10	U	10	U
Dimethylphthalate	NL			50		G	50	S	**50**	10	U	10	U
Di-n-butylphthalate	NL			50		S	NL		**50**	10	U	10	U
Di-n-octyl phthalate	NL			50		G	50	S	**50**	10	U	10	U

Table 4-4
Groundwater Screening Criteria
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Chemical Name	National Primary Drinking Water Standards (1)			New York State Standards (S) and Guidance (G) Values for Class GA Groundwater (2)			NYSDOH Drinking Water Quality Standards (3)		Site-Specific Groundwater Screening Criteria (SSGWSC) (4)	Site-Specific Background Values (5)			
										Round 1 Groundwater		Round 2 Groundwater	
	Value	Note	G/S	Value	Note	G/S	Value	G/S	**Value**	Value		Value	
Fluoranthene	NL			50		G	50	S	**50**	10	U	10	U
Fluorene	NL			50		G	NL		**50**	10	U	10	U
Hexachlorobenzene	1		S	0.04		S	1	S	**0.04**	10	U	10	U
Hexachlorobutadiene	NL			0.5		S	5	S	**0.5**	10	U	10	U
Hexachlorocyclopentadiene	50		S	5	PC	S	5	S	**5**	10	U	10	U
Hexachloroethane	NL			5	PC	S	5	S	**5**	10	U	10	U
Indeno(1,2,3-cd)pyrene	NL			0.002		G	50	S	**0.002**	10	U	10	U
Isophorone	NL			50		G	50	S	**50**	10	U	10	U
Naphthalene	NL			NL			50	S	**50**	10	U	10	U
Nitrobenzene	NL			0.4		S	5	S	**0.4**	10	U	10	U
N-Nitroso-di-n-propylamine	NL			NL			50	S	**50**	10	U	10	U
N-Nitrosodiphenylamine	NL			50		G	50	S	**50**	10	U	10	U
Pentachlorophenol	1		S	NL			1	S	**1**	25	U	25	U
Phenanthrene	NL			50		G	50	S	**50**	10	U	10	U
Phenol	NL			NL			50	S	**50**	10	U	10	U
Pyrene	NL			50		G	50	S	**50**	10	U	10	U
P/PCBs													
4,4'-DDD	NL			0.3		S	5	S	**0.3**	0.1	U	0.1	U
4,4'-DDE	NL			0.2		S	NL		**0.2**	0.1	U	0.1	U
4,4'-DDT	NL			0.2		S	5	S	**0.2**	0.1	U	0.1	U
Aldrin	NL			ND		S	5	S	**5**	0.05	U	0.05	U
Alpha-BHC	NL			0.01		S	5	S	**0.01**	0.05	U	0.05	U
alpha-Chlordane	2	F	S	0.05	F	S	2	S	**0.05**	0.05	U	0.05	U
Aroclor-1016	0.5		S	0.09	C	S	0.5	S	**0.09**	1	U	1	U
Aroclor-1221	0.5		S	0.09	C	S	0.5	S	**0.09**	2	U	2	U
Aroclor-1232	0.5		S	0.09	C	S	0.5	S	**0.09**	1	U	1	U
Aroclor-1242	0.5		S	0.09	C	S	0.5	S	**0.09**	1	U	1	U
Aroclor-1248	0.5		S	0.09	C	S	0.5	S	**0.09**	1	U	1	U
Aroclor-1254	0.5		S	0.09	C	S	0.5	S	**0.09**	1	U	1	U
Aroclor-1260	0.5		S	0.09	C	S	0.5	S	**0.09**	1	U	1	U
Beta-BHC	NL			0.04		S	5	S	**0.04**	0.05	U	0.05	U
Delta-BHC	NL			0.04		S	5	S	**0.04**	0.05	U	0.05	U
Dieldrin	NL			0.004		S	5	S	**0.004**	0.1	U	0.1	U
Endosulfan I	NL			NL			50	S	**50**	0.05	U	0.05	U
Endosulfan II	NL			NL			50	S	**50**	0.1	U	0.1	U
Endosulfan sulfate	NL			NL			50	S	**50**	0.1	U	0.1	U
Endrin	2		S	ND		S	2	S	**2**	0.1	U	0.1	U
Endrin aldehyde	NL			5	PC	S	5	S	**5**	0.1	U	0.1	U
Endrin ketone	NL			5	PC	S	NL		**5**	0.1	U	0.1	U
gamma-BHC (Lindane)	0.2		S	0.05		S	0.2	S	**0.05**	0.05	U	0.05	U
gamma-Chlordane	2	F	S	0.05	F	S	2	S	**0.05**	0.05	U	0.05	U
Heptachlor	0.4		S	0.04		S	0.4	S	**0.04**	0.05	U	0.05	U
Heptachlor epoxide	0.2		S	0.03		S	0.2	S	**0.03**	0.05	U	0.05	U
Methoxychlor	40		S	35		S	40	S	**35**	0.5	U	0.5	U
Toxaphene	3		S	0.06		S	3	S	**0.06**	5	U	5	U

Table 4-4
Groundwater Screening Criteria
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	National Primary Drinking Water Standards (1)			New York State Standards (S) and Guidance (G) Values for Class GA Groundwater (2)			NYSDOH Drinking Water Quality Standards (3)		Site-Specific Groundwater Screening Criteria (SSGWSC) (4)	Site-Specific Background Values (5)			
										Round 1 Groundwater		Round 2 Groundwater	
	Value	Note	G/S	Value	Note	G/S	Value	G/S	Value	Value		Value	
Inorganics													
Aluminum	NL			NL			NL		NA	200	U	200	U
Antimony	6		S	3		S	6	S	3	60	U	60	U
Arsenic	10		S	25		S	50	S	10	10	U	10	U
Barium	2,000		S	1,000		S	2,000	S	1,000	200	U	79.7	J
Beryllium	4		S	3		G	4	S	3	5	U	5	U
Cadmium	5		S	5		S	5	S	5	5	U	5	U
Calcium	NL			NL			NL		NA	120,000		135,000	
Chromium	100		S	50		S	100	S	50	10	U	0.92	J
Chromium (hexavalent)	NL			50		S			50	NA		NA	
Cobalt	NL			NL			NL		NA	50	U	50	U
Copper	1,300	TT	S	200		S	1,300	S	200	25	U	2	J
Cyanide	200		S	200		S	200	S	200	3	J	1.5	J
Iron	NL			NL			300	S	300	590		773	
Lead	15	TT	S	25		S	15	S	15	10	U	3.5	R
Magnesium	NL			35,000		G	NL		35,000	18,000		20,800	
Manganese	NL			NL			300	S	300	890		954	
Mercury	2		S	0.7		S	2	S	0.7	0.2	U	0.2	U
Nickel	NL			100		S	NL		100	40	U	40	U
Potassium	NL			NL			NL		NA	5,000	U	4,290	J
Selenium	50		S	10		S	50	S	10	35	U	35	U
Silver	NL			50		S	100	S	50	10	U	10	UJ
Sodium	NL			20,000		S	NL		20,000	80,000		83,900	J
Thallium	2		S	0.5		G	2	S	0.5	25	U	7.1	J
Vanadium	NL			NL			NL		NA	50	U	50	U
Zinc	NL			2,000		G	5	S	5	60	U	23.1	R

Notes:

Site-specific screening criteria was approved by EPA during the March 18, 2005 conference call. Please see Section 4.1.1 for a discussion of the screening criteria selection process.

(1) EPA National Primary Drinking Water Standards (web page), EPA 822-R-02-038, Summer 2002
(2) NYSDEC. June 1998. TOGS 1.1.1. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.
Includes April 2000 Addendum values.
(3) New York State Department of Health Drinking Water Standards
(4) Screening criteria is the lowest of the listed EPA and NYSDEC screening values.
(5) The site-specific bckground values for groundwater are the results from the background monitoring well, MW-9, during sampling rounds 1 and 2.
Background values are provided for comparison purposes only.

All VOC, SVOC, P/PCB and Inorganic values are in micrograms per liter (ug/L)
NA = not available
NL = chemical name not listed or screening value of this type not listed for the chemical
P/PCBs = pesticides and polychlorinated biphenyls
SSGWSC = site-specific groundwater screening criteria
SVOCs = semi-volatile organic compounds
ug/l = microgram per liter
VOCs = volatile organic compounds
J = Value is estimated due to exceeded quality control criteria
U = Non-detected value
R = rejected value due to exceeded quality control criteria

C - Value applies to the sum of the PCB compounds
F - Value applies to the sum of alpha- and gamma-Chlordane
G - Guidance Value
S - Standard Value
PC - Principal Organic Contaminant
T - Value applies to total trihalomethanes (bromodichloromethane, bromoform, chloroform, dibrimochloromethane)
F - Value applies to the sum of alpha- and gamma- chlordane

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Newburgh, New York

Chemical Name	National Primary Drinking Water Standards (1)			New York State Standards (S) and Guidance (G) Values for Class GA Groundwater (2)			NYSDOH Drinking Water Quality Standards (3)		Site-Specific Groundwater Screening Criteria (SSGWSC) (4)	Site-Specific Background Values (5)			
										Round 1 Groundwater		Round 2 Groundwater	
	Value	Note	G/S	Value	Note	G/S	Value	G/S	Value	Value		Value	

TT - Treatment Technique

Table 4-5

Indicator Contaminants Selection
Consolidated Iron and Metal Superfund Site
Newburgh, New York

			Percent of Detections [1]				Percent of SSSSC Exceedances [2]				Magnitude of Highest Exceedance [3]			
Indicator Contaminant		SSSSC	PASS	PASB	SWSS	SWSB	PASS	PASB	SWSS	SWSB	PASS	PASB	SWSS	SWSB
PAHs	Benzo(a)anthracene	788	100	100	100	97	81	76	76	62	24	11	32	30
	Benzo(b)fluoranthene	620	100	95	100	97	95	86	92	65	35	10	35	31
	Benzo(a)pyrene	62	100	100	100	100	100	100	100	100	371	115	306	355
	Indeno(1,2,3-c,d)pyrene	620	100	91	100	89	90	67	89	57	27	6	16	24
	Dibenz(a,h)anthracene	49	81	57	89	65	81	57	89	60	112	24	63	88
PCBs	Aroclor-1254	110	100	100	100	89	100	100	97	78	318	245	227	53
Metals	Arsenic	0.39	100	100	100	100	100	100	100	100	73	128	102	187
	Cadmium	1	100	100	100	97	100	100	100	84	97	143	32	58
	Copper	25	100	100	100	100	100	100	100	100	440	266	274	212
	Iron	2000	100	100	100	100	100	100	100	100	64	77	56	44
	Lead	400	100	100	100	100	100	84	100	76	12	13	40	25
	Mercury	0.1	100	100	100	97	95	100	100	97	152	91	99	43
	Vandanium	7.8	100	100	100	100	100	100	100	100	33	11	97	49
	Zinc	20	100	100	100	100	100	100	100	100	545	1,665	394	810

Notes:

[1] Percent of detections is the number of detections divided by the total number of samples collected

[2] Percent of SSSSC exceedances is the number of SSSSC exceedances divided by the total number of samples collected

[3] The magnitude of highest exceedance is the highest exceedance value divided by the SSSSC

All PAH and PCB values are in microgram per kilogram (ug/kg)

Inorganic values are in milligram per kilogram (mg/kg)

PAHs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
SSSSC = site-specific soil screening criteria
PASS = process area surface soil samples
PASB = process area subsurface soil samples
SWSS = site-wide surface soil samples
SWSB = site-wide subsurface soil samples

Table 4-6

Background Surface Soil Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Minimum Detected Surface Soil Sample Result		Maximum Detected Surface Soil Sample Result		Average Background Subsurface Soil Samples (1)	95% Upper Confidence Limit	BKSS-01-S 4/8/2004		BKSS-02-D 4/8/2004		BKSS-03-D 4/1/2004		BKSS-04-S 4/1/2004		BKSS-05-D 4/8/2004		BKSS-06-D 4/7/2004		BKSS-07-D 4/7/2004		BKSS-08-D 4/7/2004		BKSS-09-D 4/7/2004		BKSS-10-avg 4/7/2004	
VOCs																										
Dichlorodifluoromethane	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Chloromethane	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Vinyl Chloride	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Bromomethane	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Chloroethane	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Trichlorofluoromethane	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
1,1-Dichloroethene	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Acetone	3	J	5	J	5.5	6.13	5	J	11	UJ	11	UJ	11	UJ	12	UJ	3	J	12	UJ	10	UJ	14	UJ	13	UJ
Carbon Disulfide	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Methyl Acetate	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Methylene Chloride	10	J	10	J	6.5	7.28	10	UJ	14	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	J	14	UJ	13	UJ
trans-1,2-Dichloroethene	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Methyl tert-Butyl Ether	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
1,1-Dichloroethane	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
cis-1,2-Dichloroethene	3	J	9	J	6.0	6.83	9	J	3	J	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
2-Butanone	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Chloroform	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
1,1,1-Trichloroethane	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Cyclohexane	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Carbon Tetrachloride	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Benzene	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
1,2-Dichloroethane	ND		ND		5.8	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	UJ	14	UJ	13	UJ
Trichloroethene	2	J	8	J	5.4	NA; <10 samp	8	J	2	J	2	J	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Metylcyclohexane	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
1,2-Dichloropropane	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Bromodichloromethane	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
cis-1,3-Dichloropropene	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
4-Methyl-2-pentanone	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Toluene	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
trans-1,3-Dichloropropene	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
1,1,2-Trichloroethane	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Tetrachloroethene	3	J	7	J	5.6	NA; <10 samp	7	J	3	J	3	J	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
2-Hexanone	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Dibromochloromethane	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
1,2-Dibromoethane	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Chlorobenzene	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Ethylbenzene	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
m,p-Xylenes	ND		ND		5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ

Table 4-6

Background Surface Soil Sample Results and Background Calculations
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Chemical Name	Minimum Detected Surface Soil Sample Result	Maximum Detected Surface Soil Sample Result	Average Background Subsurface Soil Samples (1)	95% Upper Confidence Limit	BKSS-01-S 4/8/2004		BKSS-02-D 4/8/2004		BKSS-03-D 4/1/2004		BKSS-04-S 4/1/2004		BKSS-05-D 4/8/2004		BKSS-06-D 4/7/2004		BKSS-07-D 4/7/2004		BKSS-08-D 4/7/2004		BKSS-09-D 4/7/2004		BKSS-10-avg 4/7/2004	
Styrene	ND	ND	5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Bromoform	ND	ND	5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
Isopropylbenzene	ND	ND	5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
1,1,2,2-Tetrachloroethane	ND	ND	5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
1,3-Dichlorobenzene	ND	ND	5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
1,4-Dichlorobenzene	ND	ND	5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
1,2-Dichlorobenzene	ND	ND	5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
1,2-Dibromo-3-chloropropane	ND	ND	5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
1,2,4-Trichlorobenzene	ND	ND	5.9	NA; all ND	10	UJ	11	UJ	11	UJ	11	UJ	12	UJ	12	UJ	12	UJ	10	R	14	UJ	13	UJ
SVOCs																								
Benzaldehyde	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Phenol	ND	ND	431	NA; all ND	1900	UJ	380	UJ	390	UJ	390	UJ	390	UJ	2000	UJ	2000	UJ	410	UJ	380	UJ	380	UJ
bis(2-Chloroethyl) ether	ND	ND	431	NA; all ND	1900	UJ	380	UJ	390	UJ	390	UJ	390	UJ	2000	UJ	2000	UJ	410	UJ	380	UJ	380	UJ
2-Chlorophenol	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2-Methylphenol	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2,2'-oxybis(1-Chloropropane)	ND	ND	431	NA; all ND	1900	UJ	380	UJ	390	UJ	390	UJ	390	UJ	2000	UJ	2000	UJ	410	UJ	380	UJ	380	UJ
Acetophenone	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
4-Methylphenol	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
n-Nitroso-di-n-propylamine	ND	ND	431	NA; all ND	1900	UJ	380	UJ	390	UJ	390	UJ	390	UJ	2000	UJ	2000	UJ	410	UJ	380	UJ	380	UJ
Hexachloroethane	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Nitrobenzene	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Isophorone	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2-Nitrophenol	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2,4-Dimethylphenol	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
bis(2-Chloroethoxy)methane	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2,4-Dichlorophenol	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Naphthalene	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
4-Chloroaniline	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Hexachlorobutadiene	ND	ND	431	NA; all ND	1900	UJ	380	UJ	390	UJ	390	UJ	390	UJ	2000	UJ	2000	UJ	410	UJ	380	UJ	380	UJ
Caprolactam	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
4-Chloro-3-methylphenol	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2-Methylnaphthalene	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Hexachlorocyclopentadiene	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2,4,6-Trichlorophenol	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2,4,5-Trichlorophenol	ND	ND	1085	NA; all ND	4800	U	940	U	990	U	980	U	990	UJ	5100	U	5000	U	1000	U	950	U	950	U
1,1'-Biphenyl	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2-Chloronaphthalene	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2-Nitroaniline	ND	ND	1085	NA; all ND	4800	UJ	940	UJ	990	UJ	980	UJ	990	UJ	5100	UJ	5000	UJ	1000	UJ	950	UJ	950	UJ
Dimethylphthalate	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
2,6-Dinitrotoluene	ND	ND	431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U

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Chemical Name	Minimum Detected Surface Soil Sample Result		Maximum Detected Surface Soil Sample Result		Average Background Subsurface Soil Samples (1)	95% Upper Confidence Limit	BKSS-01-S		BKSS-02-D		BKSS-03-D		BKSS-04-S		BKSS-05-D		BKSS-06-D		BKSS-07-D		BKSS-08-D		BKSS-09-D		BKSS-10-avg	
							4/8/2004		4/8/2004		4/1/2004		4/1/2004		4/8/2004		4/7/2004		4/7/2004		4/7/2004		4/7/2004		4/7/2004	
Acenaphthylene	47	J	2000		353	770.86	2000		280	J	89	J	56	J	110	J	270	J	380	J	47	J	110	J	380	U
3-Nitroaniline	ND		ND		1085	NA; all ND	4800	U	940	U	990	U	980	U	990	UJ	5100	U	5000	U	1000	U	950	U	950	U
Acenaphthene	53	J	190	J	323	830.71	190	J	380	U	53	J	390	U	130	J	2000	U	2000	U	410	U	77	J	380	U
2,4-Dinitrophenol	ND		ND		1085	NA; all ND	4800	UJ	940	UJ	990	UJ	980	UJ	990	UJ	5100	UJ	5000	UJ	1000	UJ	950	UJ	950	UJ
4-Nitrophenol	ND		ND		1085	NA; all ND	4800	UJ	940	UJ	990	UJ	980	UJ	990	UJ	5100	UJ	5000	UJ	1000	UJ	950	UJ	950	UJ
Dibenzofuran	74	J	74	J	419	958.57	1900	U	380	U	390	U	390	U	74	J	2000	U	2000	U	410	U	380	U	380	U
2,4-Dinitrotoluene	ND		ND		431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Diethylphthalate	ND		ND		431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Fluorene	51	J	110	J	397	***1000 (2)***	1900	U	380	U	51	J	390	U	110	J	2000	U	2000	U	410	U	78	J	380	U
4-Chlorophenyl-phenylether	ND		ND		431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
4-Nitroaniline	ND		ND		1085	NA; all ND	4800	U	940	U	990	U	980	U	990	UJ	5100	U	5000	U	1000	U	950	U	950	U
4,6-Dinitro-2-methylphenol	ND		ND		1085	NA; all ND	4800	UJ	940	UJ	990	UJ	980	UJ	990	UJ	5100	UJ	5000	UJ	1000	UJ	950	UJ	950	UJ
n-Nitrosodiphenylamine	ND		ND		431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
4-Bromophenyl-phenylether	ND		ND		431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Hexachlorobenzene	ND		ND		431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Atrazine	ND		ND		431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Pentachlorophenol	ND		ND		1085	NA; all ND	4800	U	940	U	990	U	980	U	990	UJ	5100	U	5000	U	1000	U	950	U	950	U
Phenanthrene	48	J	1000		785	1149.36	1700	J	430		610		460		1900	J	470	J	1100	J	130	J	1000		48	J
Anthracene	100	J	1200	J	324	527.32	1200	J	210	J	180	J	130	J	370	J	210	J	390	J	100	J	260	J	380	U
Carbazole	51	J	150	J	392	***1000 (2)***	1900	U	51	J	69	J	390	U	150	J	2000	U	2000	U	410	U	110	J	380	U
Di-n-butylphthalate	ND		ND		431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Fluoranthene	120	J	5200		1576	2882.13	5200		1100		1500		990		2600	J	730	J	1600	J	320	J	1600		120	J
Pyrene	170	J	7200		1858	3447.52	7200		1700		1600		980		2500	J	840	J	1400	J	390	J	1800		170	J
Butylbenzylphthalate	88	J	2000	U	420	958.11	1900	U	380	U	390	U	390	U	88	J	2000	U	2000	U	410	U	380	U	380	U
3,3'-Dichlorobenzidine	ND		ND		1000	NA; all ND	1900	R	380	R	390	R	390	R	390	R	2000	UJ	2000	UJ	410	R	380	R	380	R
Benzo(a)anthracene	66	J	5000		1115	2229.72	5000		900		980		560		1300	J	430	J	810	J	200	J	900		66	J
Chrysene	91	J	5600		1257	2459.52	5600		1100		1100		640		1400	J	520	J	870	J	250	J	1000		91	J
bis(2-Ethylhexyl) phthalate	42	J	6700		1041	2929.6	1900	U	42	J	140	J	49	J	250	J	2000	U	2000	U	6700		220	J	60	J
Di-n-octylphthalate	ND		ND		431	NA; all ND	1900	U	380	U	390	U	390	U	390	UJ	2000	U	2000	U	410	U	380	U	380	U
Benzo(b)fluoranthene	100	J	5100		1095	2650.88	5100		940		990		620		920	J	430	J	800	J	210	J	840		100	J
Benzo(k)fluoranthene	81	J	4600		991	2416.3	4600		850		860		520		820	J	450	J	670	J	220	J	840		81	J
Benzo(a)pyrene	120	J	3800		947	1714.72	3800		990		770		490		1000	J	480	J	780	J	210	J	830		120	J
Indeno(1,2,3-cd)pyrene	76	J	3000		718	1321.04	3000		700		610		350	J	680	J	400	J	550	J	170	J	640		76	J
Dibenz(a,h)anthracene	130	J	1300	J	404	957.04	1300	J	260	J	250	J	130	J	260	J	2000	U	220	J	410	U	220	J	380	U
Benzo(g,h,i)perylene	65	J	410	J	286	469.99	410	J	180	J	130	J	150	J	330	J	2000	U	250	J	65	J	150	J	380	U
P/PCBs																										
alpha-BHC	ND		ND		1.1	NA; all ND	2	U	1.9	U	2	U	2	U	2	UJ	2.1	U	4.1	U	2.1	U	2	U	2	U
beta-BHC	1.9	U	4.3		1.4	2.05	2	U	1.9	U	2	U	2	U	2	UJ	2.1	U	4.1	U	2.1	U	4.3		2	U
delta-BHC	ND		ND		1.1	NA; all ND	2	U	1.9	U	2	U	2	U	2	UJ	2.1	U	4.1	U	2.1	U	2	U	2	U
gamma-BHC (Lindane)	ND		ND		1.1	NA; all ND	2	U	1.9	U	2	U	2	U	2	UJ	2.1	U	4.1	U	2.1	U	2	U	2	U

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Chemical Name	Minimum Detected Surface Soil Sample Result		Maximum Detected Surface Soil Sample Result		Average Background Subsurface Soil Samples (1)	95% Upper Confidence Limit	BKSS-01-S 4/8/2004		BKSS-02-D 4/8/2004		BKSS-03-D 4/1/2004		BKSS-04-S 4/1/2004		BKSS-05-D 4/8/2004		BKSS-06-D 4/7/2004		BKSS-07-D 4/7/2004		BKSS-08-D 4/7/2004		BKSS-09-D 4/7/2004		BKSS-10-avg 4/7/2004	
Heptachlor	ND		ND		1.1	NA; all ND	2	U	1.9	U	2	U	2	U	2	UJ	2.1	U	4.1	U	2.1	U	2	U	2	U
Aldrin	ND		ND		1.1	NA; all ND	2	U	1.9	U	2	U	2	U	2	UJ	2.1	U	4.1	U	2.1	U	2	U	2	U
Heptachlor epoxide	1.9	U	7.6	J	1.9	NA; <10 samp	2	U	1.9	U	2	U	2	U	2	UJ	7.6	J	4.1	U	2.1	U	2.7	R	2	U
Endosulfan I	3	JN	3	JN	1.3	1.70	2	U	1.9	U	2	U	2	U	2	UJ	3	JN	4.1	U	2.1	U	2	U	2	U
Dieldrin	3.7	U	12	JN	4.1	NA; <10 samp	5.6	R	3.7	U	3.9	U	3.9	U	3.9	UJ	11	J	12	JN	4.1	U	3.8	U	3.8	U
4,4'-DDE	3.9	UJ	590		70.4	***590 (2)***	11	JN	5.9	JN	4.1	J	3.9	U	3.9	UJ	73		590		4.6		5.3	JN	6.4	
Endrin	ND		ND		2.4	NA; all ND	3.8	U	3.7	U	3.9	U	3.9	J	3.9	UJ	13	R	8	U	4.3	R	3.8	U	3.8	U
Endosulfan II	ND		ND		2.2	NA; all ND	3.8	U	3.7	U	3.9	U	3.9	U	3.9	UJ	4.1	U	8	U	4.1	U	3.8	U	3.8	U
4,4'-DDD	3.8	U	52	JN	15.5	NA; <10 samp	52	JN	7.9	R	6.9	R	3.9	U	4.3	R	4.1	UJ	33	J	4.1	U	4.9	R	3.8	U
Endosulfan sulfate	3.7	U	6.6	JN	3.3	5.97	3.8	U	3.7	U	3.9	U	3.9	U	6.6	JN	6.5		8	U	4.1	U	4.3	J	3.8	U
4,4'-DDT	3.9	UJ	300	J	44.9	102.57	20	JN	12	J	11	J	12	J	3.9	UJ	69	J	300	J	6.2	J	12	JN	5.1	J
Methoxychlor	ND		ND		11.1	NA; all ND	20	UJ	19	UJ	20	UJ	20	UJ	20	UJ	21	UJ	41	UJ	21	U	20	U	20	U
Endrin ketone	3.8	U	39	J	9.1	***39 (2)***	39	J	13		15		10		3.9	UJ	4.1	U	8	U	4.1	U	3.8	U	3.8	U
Endrin aldehyde	3.7	U	4.2		2.4	NA; <10 samp	8	R	3.7	U	4.2		3.9	U	3.9	UJ	4.1	U	8	U	4.1	U	3.8	U	3.8	U
alpha-Chlordane	1.9	U	2.5	JN	1.3	NA; <10 samp	2	U	1.9	U	2	U	2	U	2	UJ	67	R	4.1	U	2.5	JN	2	U	2	U
gamma-Chlordane	2	U	36	J	7.3	15.8	11	JN	5.3	J	7.1		5.1	JN	2	UJ	36	J	4.1	U	3.9		2	U	2	U
Toxaphene	ND		ND		111	NA; all ND	200	U	190	U	200	U	200	U	200	UJ	210	U	410	U	210	U	200	U	200	U
Aroclor-1016	ND		ND		21.5	NA; all ND	38	U	37	U	39	U	39	U	39	UJ	41	U	80	U	41	U	38	U	38	U
Aroclor-1221	ND		ND		43.6	NA; all ND	77	U	76	U	80	U	79	U	80	UJ	83	U	160	U	83	U	77	U	77	U
Aroclor-1232	ND		ND		21.5	NA; all ND	38	U	37	U	39	U	39	U	39	UJ	41	U	80	U	41	U	38	U	38	U
Aroclor-1242	ND		ND		21.5	NA; all ND	38	U	37	U	39	U	39	U	39	UJ	41	U	80	U	41	U	38	U	38	U
Aroclor-1248	ND		ND		21.5	NA; all ND	38	U	37	U	39	U	39	U	39	UJ	41	U	80	U	41	U	38	U	38	U
Aroclor-1254	37	U	170	J	36.6	101.82	38	U	37	U	39	U	39	U	39	UJ	41	U	80	U	41	U	170	J	38	U
Aroclor-1260	37	U	94	J	29.0	61.7	38	U	37	U	39	U	39	U	94	J	41	U	80	U	41	U	38	U	38	U
Inorganics																										
Aluminum	4720		10500		8003	9058	6450		9200		7260		9030		4720		10500		9320		6980		6790		9775	
Antimony	0.82	J	1.4	J	3.1	***4.48 (2)***	7	U	7.1	U	7	U	7.1	U	1.4	J	7.3	U	6.9	U	7.2	U	0.82	J	7	U
Arsenic	4.3		9.2		6.2	7.1	4.5		5.6		4.3		5.4		9.2		6.2	*	6.7	*	5.8	*	8.5	*	5.65	*
Barium	44.6		188		68.5	93.6	44.6		47.3		57.6		61.5		188		58.6	J*	46.2	J*	46.7	J*	80.9	J*	53.6	J*
Beryllium	0.3	J	0.56	J	0.4	0.46	0.36	J	0.48	J	0.38	J	0.45	J	0.3	J	0.56	J	0.45	J	0.34	J	0.39	J	0.435	J
Cadmium	0.67		3.1		1.2	1.57	0.67		0.89		0.75		1		3.1		0.95	*	0.92	*	0.75	*	1.5	*	0.975	*
Calcium	3760		18600		9081	11810	4780		8820		8950		13200		12200		5030		3760		10500		18600		4965	
Chromium	13.3		26.1		16.3	NA; <10 samp		R		R		R		R		R	14.9		13.3		13.3		26.1		13.8	
Cobalt	7.4		11.1		8.9	9.7	8.2		11.1		8.2		10.2		11		8.4		8.3		7.4		8.3		8.2	
Copper	27.3	*	193		63.1	154	30.1		35.5		30.2		35.8		193		27.3	*	32.6	*	33.1	*	183	*	30.25	*
Iron	17200		38300		22470	25962	17200		23800		18600		23300		38300		22700		21400		17500		20600		21300	
Lead	39.75		503		141	365	64.8		61.6		107		103		379		44.2		57.6		52		503		39.75	
Magnesium	2660		6570		4329	4936	3540		6570		3810		5080		2660		4310		4220		3980		4990		4125	
Manganese	439		718		589	635	541		652		547		718		557		660		626		538		439		609	
Mercury	0.04	J	0.99		0.24	0.54	0.07	JN	0.07	JN	0.11	JN	0.2	JN	0.61	JN	0.12	J	0.04	J	0.06	J	0.99		0.125	J

Table 4-6

Background Surface Soil Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Minimum Detected Surface Soil Sample Result		Maximum Detected Surface Soil Sample Result		Average Background Subsurface Soil Samples (1)	95% Upper Confidence Limit	BKSS-01-S 4/8/2004		BKSS-02-D 4/8/2004		BKSS-03-D 4/1/2004		BKSS-04-S 4/1/2004		BKSS-05-D 4/8/2004		BKSS-06-D 4/7/2004		BKSS-07-D 4/7/2004		BKSS-08-D 4/7/2004		BKSS-09-D 4/7/2004		BKSS-10-avg 4/7/2004	
Nickel	16.1	J*	22.9	J*	19.8	NA; <10 samp		R		R		R		R		R	22.1	J*	22.9	J*	16.1	J*	20	J*	18	J*
Potassium	592	EJ	834	EJ	721	764	619	EJ	796	EJ	688	EJ	834	EJ	592	EJ	764	EJ	709	EJ	733	EJ	744	EJ	733	EJ
Selenium	ND		ND		2.1	NA; all ND	4.1	U	4.1	U	4.1	U	4.1	U	4.3	U	4.3	U	4	U	4.2	U	4	U	4.1	U
Silver	0.25	JN	0.82	JN	0.46	0.56	0.43	J	0.28	J	0.42	J	0.36	J	0.65	J	0.56	JN	0.49	JN	0.25	JN	0.82	JN	0.365	JN
Sodium	85.7	J	204	J	115	135	85.7	J	92.6	J	118	J	118	J	204	J	93.1	J	94.7	J	108	J	126	J	108.5	J
Thallium	ND		ND		1.5	NA; all ND	2.9	U	2.9	U	2.9	U	2.9	U	3	U	3.1	U	2.9	U	3	U	2.9	U	2.9	U
Vanadium	13.8		30.8		19.5	22.9	16.4		16.8		17.2		19.4		15.3		30.8		29.4		13.8		18.9		17.25	
Zinc	80.4	EJ	266		117	152	89.3		90.7		95.5		113		266		80.9	EJ	80.4	EJ	89.2	EJ	182	EJ	80.4	EJ
Cyanide	ND		ND		1.5	NA; all ND	3	U	3	U	3	U	3	U	3	U	3.1	U	2.9	U	3.1	U	2.9	U	2.9	U

Notes:

VOCs, SVOCs, and P/PCBs values are in μg/kg. Inorganic values are in mg/kg
(1) Average background surface soil sample results are calculated with 1/2 the detection limit for non-detect values.
(2) Bold and italized values indicate that the UCL>maximum; therefore, maximum values are used for 95% UCL.
D = Deep (0-12 inches)
ND = non-detect
P/PCBs = Pesticides/Polycholinated Byphenols
S = Shallow (0-2 inches)
SVOCs = Semi-volatile Organic Compounds
VOCs = Volatile Organic Compounds

Data Qualifiers:
J = Estimated data due to exceeded quality control criteria.
U = Analyte was analyzed for but not detected.
E = The reported value is estimated because of the presence of interference.
N = Sample recovery is not within control limits.
R = data was rejected.
* = duplicate analysis not within control limits

Table 4-7

Background Subsurface Soil Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Minimum Detected Subsurface Soil Sample Result		Maximum Detected Subsurface Soil Sample Result		Average Background Subsurface Soil Samples (1)	95% Upper Confidence Limit	BKSB-01		BKSB-02		BKSB-03		BKSB-04		BKSB-05		BKSB-06		BKSB-07		BKSB-08		BKSB-09		BKSB-10	
							4/8/2004		4/8/2004		4/8/2004		4/8/2004		4/8/2004		4/7/2004		4/7/2004		4/7/2004		4/7/2004		4/7/2004	
VOCs																										
Dichlorodifluoromethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Chloromethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Vinyl Chloride	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Bromomethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Chloroethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Trichlorofluoromethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,1-Dichloroethene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Acetone	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Carbon Disulfide	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Methyl Acetate	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Methylene Chloride	ND		ND		5.5	NA; all ND	11	UJ	10	UJ	15	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
trans-1,2-Dichloroethene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Methyl tert-Butyl Ether	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,1-Dichloroethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
cis-1,2-Dichloroethene	3	J	3	J	5.1	5.55	11	UJ	10	UJ	3	J	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
2-Butanone	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Chloroform	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,1,1-Trichloroethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Cyclohexane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Carbon Tetrachloride	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Benzene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,2-Dichloroethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Trichloroethene	2	J	2	J	5.0	5.61	11	UJ	10	UJ	2	J	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Metylcyclohexane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,2-Dichloropropane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Bromodichloromethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
cis-1,3-Dichloropropene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
4-Methyl-2-pentanone	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Toluene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
trans-1,3-Dichloropropene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,1,2-Trichloroethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Tetrachloroethene	2	J	2	J	5.0	5.61	11	UJ	10	UJ	2	J	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
2-Hexanone	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Dibromochloromethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,2-Dibromoethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Chlorobenzene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Ethylbenzene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
m,p-Xylenes	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ

Table 4-7

Background Subsurface Soil Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Minimum Detected Subsurface Soil Sample Result		Maximum Detected Subsurface Soil Sample Result		Average Background Subsurface Soil Samples (1)	95% Upper Confidence Limit	BKSB-01 4/8/2004		BKSB-02 4/8/2004		BKSB-03 4/8/2004		BKSB-04 4/8/2004		BKSB-05 4/8/2004		BKSB-06 4/7/2004		BKSB-07 4/7/2004		BKSB-08 4/7/2004		BKSB-09 4/7/2004		BKSB-10 4/7/2004	
Styrene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Bromoform	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
Isopropylbenzene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,1,2,2-Tetrachloroethane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,3-Dichlorobenzene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,4-Dichlorobenzene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,2-Dichlorobenzene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,2-Dibromo-3-chloropropane	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
1,2,4-Trichlorobenzene	ND		ND		5.3	NA; all ND	11	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	13	UJ	10	UJ
SVOCs																										
Benzaldehyde	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Phenol	ND		ND		425	NA; all ND	370	UJ	1800	UJ	380	UJ	380	UJ	350	UJ	360	UJ	3700	UJ	380	UJ	410	UJ	360	UJ
bis(2-Chloroethyl) ether	ND		ND		425	NA; all ND	370	UJ	1800	UJ	380	UJ	380	UJ	350	UJ	360	UJ	3700	UJ	380	UJ	410	UJ	360	UJ
2-Chlorophenol	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2-Methylphenol	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2,2'-oxybis(1-Chloropropane)	ND		ND		425	NA; all ND	370	UJ	1800	UJ	380	UJ	380	UJ	350	UJ	360	UJ	3700	UJ	380	UJ	410	UJ	360	UJ
Acetophenone	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
4-Methylphenol	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
n-Nitroso-di-n-propylamine	ND		ND		425	NA; all ND	370	UJ	1800	UJ	380	UJ	380	UJ	350	UJ	360	UJ	3700	UJ	380	UJ	410	UJ	360	UJ
Hexachloroethane	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Nitrobenzene	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Isophorone	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2-Nitrophenol	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2,4-Dimethylphenol	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
bis(2-Chloroethoxy)methane	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2,4-Dichlorophenol	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Naphthalene	57	J	540		425	888.49	100	J	1800	U	540		380	UJ	350	UJ	360	U	3700	U	74	J	57	J	360	U
4-Chloroaniline	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Hexachlorobutadiene	ND		ND		425	NA; all ND	370	UJ	1800	UJ	380	UJ	380	UJ	350	UJ	360	UJ	3700	UJ	380	UJ	410	UJ	360	UJ
Caprolactam	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
4-Chloro-3-methylphenol	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2-Methylnaphthalene	42	J	450		427	1016.14	110	J	1800	U	450		380	UJ	350	UJ	360	U	3700	U	380	U	42	J	360	U
Hexachlorocyclopentadiene	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2,4,6-Trichlorophenol	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2,4,5-Trichlorophenol	ND		ND		1063	NA; all ND	920	U	4600	U	940	U	940	UJ	890	UJ	900	U	9200	U	950	U	1000	U	910	U
1,1'-Biphenyl	110	J	110	J	417	1178.96	370	U	1800	U	110	J	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2-Chloronaphthalene	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2-Nitroaniline	ND		ND		1063	NA; all ND	920	UJ	4600	UJ	940	UJ	940	UJ	890	UJ	900	UJ	9200	UJ	950	UJ	1000	UJ	910	UJ
Dimethylphthalate	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
2,6-Dinitrotoluene	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U

Table 4-7

Background Subsurface Soil Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Minimum Detected Subsurface Soil Sample Result		Maximum Detected Subsurface Soil Sample Result		Average Background Subsurface Soil Samples (1)	95% Upper Confidence Limit	BKSB-01 4/8/2004		BKSB-02 4/8/2004		BKSB-03 4/8/2004		BKSB-04 4/8/2004		BKSB-05 4/8/2004		BKSB-06 4/7/2004		BKSB-07 4/7/2004		BKSB-08 4/7/2004		BKSB-09 4/7/2004		BKSB-10 4/7/2004	
Acenaphthylene	47	J	910		388	743.54	910		560	J	650		62	J	350	UJ	47	J	990	J	380	U	120	J	360	U
3-Nitroaniline	ND		ND		1063	NA; all ND	920	U	4600	U	940	U	940	UJ	890	UJ	900	U	9200	U	950	U	1000	U	910	U
Acenaphthene	41	J	1100		476	1287.03	100	J	1800	U	1100		41	J	350	UJ	360	U	3700	U	66	J	170	J	360	U
2,4-Dinitrophenol	ND		ND		1063	NA; all ND	920	UJ	4600	UJ	940	UJ	940	UJ	890	UJ	900	UJ	9200	UJ	950	UJ	1000	UJ	910	UJ
4-Nitrophenol	ND		ND		1063	NA; all ND	920	UJ	4600	UJ	940	UJ	940	UJ	890	UJ	900	UJ	9200	UJ	950	UJ	1000	UJ	910	UJ
Dibenzofuran	98	J	890		480	1265.10	150	J	1800	U	890		380	UJ	350	UJ	360	U	3700	U	380	U	98	J	360	U
2,4-Dinitrotoluene	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Diethylphthalate	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Fluorene	54	J	1600		570	1469.04	400		1800	U	1600		380	UJ	350	UJ	360	U	3700	U	54	J	170	J	360	U
4-Chlorophenyl-phenylether	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
4-Nitroaniline	ND		ND		1063	NA; all ND	920	U	4600	U	940	U	940	UJ	890	UJ	900	U	9200	U	950	U	1000	U	910	U
4,6-Dinitro-2-methylphenol	ND		ND		1063	NA; all ND	920	UJ	4600	UJ	940	UJ	940	UJ	890	UJ	900	UJ	9200	UJ	950	UJ	1000	UJ	910	UJ
n-Nitrosodiphenylamine	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
4-Bromophenyl-phenylether	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Hexachlorobenzene	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Atrazine	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Pentachlorophenol	ND		ND		1063	NA; all ND	920	U	4600	U	940	U	940	UJ	890	UJ	900	U	9200	U	950	U	1000	U	910	U
Phenanthrene	120	J	14000		2293	5860.43	2700		890	J	14000		710	J	120	J	360	U	1800	J	550		1800		360	U
Anthracene	140	J	790		647	1316.29	790		400	J	3200	J	160	J	350	UJ	360	U	840	J	140	J	400	J	360	U
Carbazole	42	J	1200		499	1368.45	200	J	1800	U	1200		59	J	350	UJ	360	U	3700	U	42	J	200	J	360	U
Di-n-butylphthalate	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Fluoranthene	61	J	18000		3242	8578.94	5000		2200		18000		1300	J	220	J	61	J	2400	J	660		2400		360	U
Pyrene	56	J	15000		3039	7819.31	5200		2300		15000		1400	J	250	J	130	J	3000	J	750		2300		56	J
Butylbenzylphthalate	43	J	43	J	410	***1850 (2)***	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	43	J	410	U	360	U
3,3'-Dichlorobenzidine	ND		ND		1850	NA; all ND	370	R	1800	R	380	R	380	R	350	R	360	R	3700	UJ	380	R	410	R	360	R
Benzo(a)anthracene	53	J	9800		1929	4853.51	3500		1700	J	9800		770	J	150	J	53	J	1600	J	340	J	1200		360	U
Chrysene	56	J	9800		2032	5071.33	3900		1900		9800		870	J	160	J	56	J	1800	J	350	J	1300		360	U
bis(2-Ethylhexyl) phthalate	51	J	270	J	395	920.98	370	U	1800	U	51	J	60	J	350	UJ	360	U	3700	U	96	J	270	J	360	U
Di-n-octylphthalate	ND		ND		425	NA; all ND	370	U	1800	U	380	U	380	UJ	350	UJ	360	U	3700	U	380	U	410	U	360	U
Benzo(b)fluoranthene	53	J	7900		1736	4267.89	3700		1800	J	7900		710	J	150	J	53	J	1400	J	270	J	1200		360	U
Benzo(k)fluoranthene	45	J	6600		1500	3619.73	2800		2000		6600		580	J	130	J	45	J	1400	J	260	J	1000		360	U
Benzo(a)pyrene	54	J	4700		1338	2180.38	2500		1600	J	4700		800	J	170	J	150	J	2000	J	310	J	1100		54	J
Indeno(1,2,3-cd)pyrene	100	J	3900		1058	2257.71	2000		1400	J	3900		510	J	120	J	100	J	1400	J	210	J	760		360	U
Dibenz(a,h)anthracene	62	J	2200		506	993.17	840		560	J	2200		170	J	350	UJ	360	U	460	J	62	J	230	J	360	U
Benzo(g,h,i)perylene	92	J	570		340	534.63	470		270	J	570		290	J	92	J	190	J	980	J	160	J	200	J	360	U
P/PCBs																										
alpha-BHC	3.9	JN	3.9	JN	1.8	2.48	1.9	U	1.9	U	3.9	JN	1.9	UJ	1.8	UJ	1.8	U	1.9	U	2	U	2.1	U	1.9	U
beta-BHC	5		5		1.4	3.12	1.9	U	1.9	U	1.9	U	1.9	UJ	1.8	UJ	1.8	U	1.9	U	2	U	5		1.9	U
delta-BHC	ND		ND		1.0	NA; all ND	1.9	U	1.9	U	1.9	U	1.9	UJ	1.8	UJ	1.8	U	1.9	U	2	U	2.1	U	1.9	U
gamma-BHC (Lindane)	ND		ND		1.0	NA; all ND	1.9	U	1.9	U	1.9	U	1.9	UJ	1.8	UJ	1.8	U	1.9	U	2	U	2.1	U	1.9	U

Table 4-7

Background Subsurface Soil Sample Results and Background Calculations
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Chemical Name	Minimum Detected Subsurface Soil Sample Result		Maximum Detected Subsurface Soil Sample Result		Average Background Subsurface Soil Samples (1)	95% Upper Confidence Limit	BKSB-01		BKSB-02		BKSB-03		BKSB-04		BKSB-05		BKSB-06		BKSB-07		BKSB-08		BKSB-09		BKSB-10	
							4/8/2004		4/8/2004		4/8/2004		4/8/2004		4/8/2004		4/7/2004		4/7/2004		4/7/2004		4/7/2004		4/7/2004	
Heptachlor	2	JN	2.2	J	1.2	1.46	1.9	U	1.9	U	2	JN	1.9	UJ	1.8	UJ	1.8	U	1.9	U	2	U	2.2	J	1.9	U
Aldrin	ND		ND		1.0	NA; all ND	1.9	U	1.9	U	1.9	U	1.9	UJ	1.8	UJ	1.8	U	1.9	U	2	U	2.1	U	1.9	U
Heptachlor epoxide	ND		ND		0.9	NA; all ND	1.9	U	1.9	U	1.9	U	1.9	UJ	1.8	UJ	1.8	U	1.9	U	2	U	2.5	R	1.9	U
Endosulfan I	ND		ND		1.0	NA; all ND	1.9	U	1.9	U	1.9	U	1.9	UJ	1.8	UJ	1.8	U	1.9	U	2	U	2.1	U	1.9	U
Dieldrin	6.5	JN	6.5	JN	2.4	NA; <10 samp	3.7	U	3.7	U	17	R	4.1	R	3.5	UJ	3.6	U	6.5	JN	3.8	U	4.1	U	3.6	U
4,4'-DDE	7.5		85		10.7	***85 (2)***	3.7	U	7.5		3.7	U	3.7	UJ	3.5	UJ	3.6	U	85		3.8	U	4.1	U	3.6	U
Endrin	ND		ND		6.4	NA; all ND	3.7	U	3.7	U	47	J	3.7	UJ	3.5	UJ	3.6	U	3.7	U	3.8	U	4.1	U	3.6	U
Endosulfan II	ND		ND		1.9	NA; all ND	3.7	U	3.7	U	3.7	U	3.7	UJ	3.5	UJ	3.6	U	5.4	R	3.8	U	4.1	U	3.6	U
4,4'-DDD	ND		ND		3.7	NA; all ND	6.7	R	8.8	R	24	R	4.2	R	3.5	UJ	3.6	U	11	JN	3.8	U	5.1	R	3.6	U
Endosulfan sulfate	3.6	U	12		3.9	6.10	12		3.7	U	3.7	U	6.3	JN	3.7	J	3.6	U	3.8	JN	4.2	JN	4.1	U	3.6	U
4,4'-DDT	5.1		120		24.2	57.38	16	J	21	J	38	J	24	J	3.5	UJ	5.1		120		3.8	U	12	J	3.6	U
Methoxychlor	ND		ND		9.6	NA; all ND	19	UJ	19	UJ	19	UJ	19	UJ	18	UJ	18	U	19	UJ	20	U	21	U	19	U
Endrin ketone	14		70	JN	11.9	***70 (2)***	22	JN	14		70	JN	3.7	UJ	3.5	UJ	3.6	U	3.7	U	3.8	U	4.1	U	3.6	U
Endrin aldehyde	5.5	JN	23	JN	4.7	13.82	5.5	JN	3.7	U	23	JN	3.7	UJ	3.5	UJ	3.6	U	5.6	J	3.8	U	4.1	U	3.6	U
alpha-Chlordane	ND		ND		1.0	NA; <10 samp	1.9	U	1.9	U	1.9	U	1.9	UJ	1.8	UJ	2.2	R	1.9	U	2	U	2.1	R	1.9	U
gamma-Chlordane	1.9		51		7.8	16.06	8.9	JN	5.6	JN	51		2.5	J	2.4	J	2.2	J	1.9		2	U	2.1	U	1.9	U
Toxaphene	ND		ND		95.5	NA; all ND	190	U	190	U	190	U	190	UJ	180	UJ	180	U	190	U	200	U	210	U	190	U
Aroclor-1016	ND		ND		18.6	NA; all ND	37	U	37	U	37	U	37	UJ	35	UJ	36	U	37	U	38	U	41	U	36	U
Aroclor-1221	ND		ND		37.7	NA; all ND	74	U	74	U	76	U	76	UJ	72	UJ	73	U	74	U	77	U	83	U	74	U
Aroclor-1232	ND		ND		18.6	NA; all ND	37	U	37	U	37	U	37	UJ	35	UJ	36	U	37	U	38	U	41	U	36	U
Aroclor-1242	ND		ND		18.6	NA; all ND	37	U	37	U	37	U	37	UJ	35	UJ	36	U	37	U	38	U	41	U	36	U
Aroclor-1248	35	U	170	JN	33.5	99.61	37	U	37	U	37	U	37	UJ	35	UJ	36	U	37	U	38	U	170	JN	36	U
Aroclor-1254	190		190		35.5	110.33	37	U	37	U	37	U	37	UJ	35	UJ	36	U	37	U	38	U	190		36	U
Aroclor-1260	100	J	100	J	26.7	62.22	37	U	37	U	37	U	100	J	35	UJ	36	U	37	U	38	U	41	U	36	U
Inorganics																										
Aluminum	7380		10500		8871	9436	10500		9170		9130		8760		8250		9700		9470		8920		7430		7380	
Antimony	0.91	J	0.96	J	2.84	***4.22 (2)***	6.7	U	6.7	U	6.9	U	6.8	U	6.4	U	6.4	U	6.5	U	0.91	J	0.96	J	6.6	U
Arsenic	4.5		6.8	*	5.6	5.95	5.4		5.5		5.9		5.1		5.2		4.5	*	6.1	*	6.1	*	6.8	*	5	*
Barium	31.5	J*	151		62.3	84.6	44.5		54.4		151		59.8		49.3		31.5	J*	35.4	J*	88.5	J*	65.4	J*	43.5	J*
Beryllium	0.32	J	0.51	J	0.42	0.45	0.46	J	0.51	J	0.44	J	0.43	J	0.48	J	0.38	J	0.39	J	0.39	J	0.38	J	0.32	J
Cadmium	0.77	*	1.4	*	1.0	1.11	0.99	*	0.87		1.1	*	0.86	*	1.1	*	0.83	*	0.97	*	1.1	*	1.4	*	0.77	*
Calcium	2940		48800		14200	22749	10600		8300		17800		10400		2940		7230		15300		9430		48800		11200	
Chromium	10.8		21.1		15.1	NA; <10 samp		R		R		R		R		R	13.3		14.8		15.6		21.1		10.8	
Cobalt	7.9		12.8		9.6	10.55	10.3		12.2		8.7		9.8		12.8		8.3		8.7		8.3		7.9		8.6	
Copper	24.9		314		62.0	184.44	34.2		41		33		31.8		45.6		24.9	*	27.2	*	41.6	*	314	*	27.1	*
Iron	18700		25800		22860	24031	25800	J*	23600		22600	J*	21600	J*	24100	J*	22400		22000		22500		25300		18700	
Lead	15.3		457		110	206	60.1		75.1		457		114		65.4		15.3		45.3		91.2		156		20.5	
Magnesium	2970		10400		5815	6918	6270		5280		4880		5120		2970		5520		10400		5710		6860		5140	
Manganese	443		907		591	667	617		690		612		553		491		535		553		510		443		907	
Mercury	0.1		0.67		0.23	0.34	0.18		0.21	JN	0.29		0.44		0.12		0.11	U	0.11	U	0.21		0.67		0.1	J

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Background Subsurface Soil Sample Results and Background Calculations
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Chemical Name	Minimum Detected Subsurface Soil Sample Result		Maximum Detected Subsurface Soil Sample Result		Average Background Subsurface Soil Samples (1)	95% Upper Confidence Limit	BKSB-01		BKSB-02		BKSB-03		BKSB-04		BKSB-05		BKSB-06		BKSB-07		BKSB-08		BKSB-09		BKSB-10	
							4/8/2004		4/8/2004		4/8/2004		4/8/2004		4/8/2004		4/7/2004		4/7/2004		4/7/2004		4/7/2004		4/7/2004	
Nickel	16.5	J*	21	J*	19.4	NA; <10 samp		R		R		R		R		R	18.8	J*	21	J*	19.8	J*	20.9	J*	16.5	J*
Potassium	630	EJ	903	EJ	765	810	758	EJ	676	EJ	792	EJ	742	EJ	630	EJ	748	EJ	783	EJ	852	EJ	903	EJ	765	EJ
Selenium	ND		ND		1.9	NA; all ND	3.9	U	3.9	U	4	U	4	U	3.7	U	3.8	U	3.8	U	3.9	U	4.1	U	3.8	U
Silver	0.2	JN	0.63	JN	0.34	0.41	0.35	J	0.32	J	0.33	J	0.33	J	0.29	J	0.24	JN	0.35	JN	0.37	JN	0.63	JN	0.2	JN
Sodium	65.7	J	250	J	123	154	102	J	90	J	250	J	121	J	128	J	80.4	J	130	J	128	J	130	J	65.7	J
Thallium	ND		ND		1.4	NA; all ND	2.8	U	2.8	U	2.9	U	2.8	U	2.7	U	2.7	U	2.7	U	2.8	U	2.9	U	2.7	U
Vanadium	10.3		24.3		16.4	18.6	17.2		16.3		16.8		17.1		10.3		15.1		24.3		18		16.9		12	
Zinc	66.3	EJ	185	EJ	114	147	91.9		112		172		99		90.7		66.3	EJ	75	EJ	185	EJ	184	EJ	68.4	EJ
Cyanide	0.17	J	0.17	J	1.27	1.45	2.8	U	2.8	U	2.9	U	2.9	U	2.7	U	2.7	U	2.7	U	0.17	J	2.9	U	2.7	U

<u>Notes:</u>

VOCs, SVOCs, and P/PCBs values are in μg/kg. Inorganic values are in mg/kg

(1) Average background surface soil sample results are calculated with 1/2 the detection limit for non-detect values.

(2) Bold and italized values indicate that the UCL>maximum; therefore, maximum values are used for 95% UCL.

ND = non-detect

P/PCBs = Pesticides/Polycholinated Byphenols

SVOCs = Semi-volatile Organic Compounds

VOCs = Volatile Organic Compounds

Data Qualifiers:

J = Estimated data due to exceeded quality control criteria.

U = Analyte was analyzed for but not detected.

E = The reported value is estimated because of the presence of interference.

N = Sample recovery is not within control limits.

R = data was rejected.

* = duplicate analysis not within control limits

Table 4-8

Background Sediment Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Calculated Site-Specific Background Value - Sediment (1)		Maximum Detected Sample Result		95% Upper Confidence Limit (2)	Sample Results																			
						SD-01 8/16/2004		SD-02 8/16/2004		SD-03 8/16/2004		SD-04 8/16/2004		SD-05 8/16/2004		SD-06 8/17/2004		SD-07 8/17/2004		SD-08 8/17/2004		SD-09 8/17/2004		SD-10 8/17/2004	
VOCs																									
Dichlorodifluoromethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Chloromethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Vinyl Chloride	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Bromomethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Chloroethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Trichlorofluoromethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,1-Dichloroethene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,1,2-Trichloro-1,2,2-trifluoroethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Acetone	49.6		59	J	49.6	59	J	34	J	55	J	28	J	56	J	31	J	51	J	33	J	48	J	20	UJ
Carbon Disulfide	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Methyl Acetate	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Methylene Chloride	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
trans-1,2-Dichloroethene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Methyl tert-Butyl Ether	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,1-Dichloroethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
cis-1,2-Dichloroethene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
2-Butanone	9.7		12	J	9.7	12	UJ	16	UJ	15	UJ	16	UJ	12	J	15	UJ	11	J	16	UJ	8	J	20	UJ
Chloroform	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,1,1-Trichloroethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Cyclohexane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Carbon Tetrachloride	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Benzene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,2-Dichloroethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Trichloroethene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Methylcyclohexane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,2-Dichloropropane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Bromodichloromethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
cis-1,3-Dichloropropene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
4-Methyl-2-pentanone	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Toluene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
trans-1,3-Dichloropropene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,1,2-Trichloroethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Tetrachloroethene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
2-Hexanone	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Dibromochloromethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,2-Dibromoethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Chlorobenzene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Ethylbenzene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
m,p-Xylenes	4	J	4	J	8.6	12	UJ	16	UJ	4	J	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Styrene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
Bromoform	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ

Table 4-8

Background Sediment Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Calculated Site-Specific Background Value - Sediment (1)		Maximum Detected Sample Result		95% Upper Confidence Limit (2)	Sample Results																			
						SD-01 8/16/2004		SD-02 8/16/2004		SD-03 8/16/2004		SD-04 8/16/2004		SD-05 8/16/2004		SD-06 8/17/2004		SD-07 8/17/2004		SD-08 8/17/2004		SD-09 8/17/2004		SD-10 8/17/2004	
VOCs Continued																									
Isopropylbenzene	4	J	4	J	8.6	12	UJ	16	UJ	4	J	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,1,2,2-Tetrachloroethane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,3-Dichlorobenzene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,4-Dichlorobenzene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,2-Dichlorobenzene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,2-Dibromo-3-chloropropane	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
1,2,4-Trichlorobenzene	ND		ND		NA; all ND	12	UJ	16	UJ	15	UJ	16	UJ	18	UJ	15	UJ	16	UJ	16	UJ	16	UJ	20	UJ
SVOCs																									
Benzaldehyde	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Phenol	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
bis(2-Chloroethyl) ether	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2-Chlorophenol	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2-Methylphenol	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2,2'-oxybis(1-Chloropropane)	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Acetophenone	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
4-Methylphenol	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
n-Nitroso-di-n-propylamine	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Hexachloroethane	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Nitrobenzene	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Isophorone	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2-Nitrophenol	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2,4-Dimethylphenol	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
bis(2-Chloroethoxy)methane	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2,4-Dichlorophenol	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Naphthalene	2674.7		4600	J	2674.7	890	UJ	800	UJ	4600	J	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
4-Chloroaniline	ND		ND		NA; <10 samp	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ		R	840	UJ	1000	UJ
Hexachlorobutadiene	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Caprolactam	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
4-Chloro-3-methylphenol	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2-Methylnaphthalene	885.8		1900	J	885.8	890	UJ	800	UJ	1900	J	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Hexachlorocyclopentadiene	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2,4,6-Trichlorophenol	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2,4,5-Trichlorophenol	ND		ND		NA; all ND	2200	UJ	2000	UJ	19000	UJ	2200	UJ	2500	UJ	2200	UJ	2200	UJ	2300	UJ	2100	UJ	2600	UJ
1,1'-Biphenyl	646.3		1100	J	646.3	890	UJ	800	UJ	1100	J	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2-Chloronaphthalene	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2-Nitroaniline	ND		ND		NA; all ND	2200	UJ	2000	UJ	19000	UJ	2200	UJ	2500	UJ	2200	UJ	2200	UJ	2300	UJ	2100	UJ	2600	UJ
Dimethylphthalate	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2,6-Dinitrotoluene	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Acenaphthylene	917.9		1300	J	917.9	110	J	800	UJ	1300	J	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
3-Nitroaniline	ND		ND		NA; all ND	2200	UJ	2000	UJ	19000	UJ	2200	UJ	2500	UJ	2200	UJ	2200	UJ	2300	UJ	2100	UJ	2600	UJ
Acenaphthene	17000	J	17000	J	18578.6	360	J	150	J	17000	J	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2,4-Dinitrophenol	ND		ND		NA; all ND	2200	UJ	2000	UJ	19000	UJ	2200	UJ	2500	UJ	2200	UJ	2200	UJ	2300	UJ	2100	UJ	2600	UJ

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Newburgh, New York

Chemical Name	Calculated Site-Specific Background Value - Sediment (1)		Maximum Detected Sample Result		95% Upper Confidence Limit (2)	Sample Results																			
						SD-01 8/16/2004		SD-02 8/16/2004		SD-03 8/16/2004		SD-04 8/16/2004		SD-05 8/16/2004		SD-06 8/17/2004		SD-07 8/17/2004		SD-08 8/17/2004		SD-09 8/17/2004		SD-10 8/17/2004	
SVOCs Continued																									
4-Nitrophenol	ND		ND		NA; all ND	2200	UJ	2000	UJ	19000	UJ	2200	UJ	2500	UJ	2200	UJ	2200	UJ	2300	UJ	2100	UJ	2600	UJ
Dibenzofuran	8700	J	8700	J	9492.2	160	J	800	UJ	8700	J	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
2,4-Dinitrotoluene	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Diethylphthalate	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Fluorene	14000	J	14000	J	15288.2	380	J	800	UJ	14000	J	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
4-Chlorophenyl-phenylether	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
4-Nitroaniline	ND		ND		NA; all ND	2200	UJ	2000	UJ	19000	UJ	2200	UJ	2500	UJ	2200	UJ	2200	UJ	2300	UJ	2100	UJ	2600	UJ
4,6-Dinitro-2-methylphenol	ND		ND		NA; all ND	2200	UJ	2000	UJ	19000	UJ	2200	UJ	2500	UJ	2200	UJ	2200	UJ	2300	UJ	2100	UJ	2600	UJ
n-Nitrosodiphenylamine	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
4-Bromophenyl-phenylether	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Hexachlorobenzene	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Atrazine	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Pentachlorophenol	ND		ND		NA; all ND	2200	UJ	2000	UJ	19000	UJ	2200	UJ	2500	UJ	2200	UJ	2200	UJ	2300	UJ	2100	UJ	2600	UJ
Phenanthrene	57000	J	57000	J	62392.0	790	J	280	J	57000	J	890	UJ	100	J	110	J	110	J	110	J	180	J	380	J
Anthracene	22000	J	22000	J	24051.9	420	J	160	J	22000	J	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Carbazole	583.8		890	J	583.8	890	UJ	800	UJ	890	J	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Di-n-butylphthalate	150	J	150	J	4188.7	890	UJ	800	UJ	7500	UJ	890	UJ	120	J	130	J	120	J	150	J	96	J	1000	UJ
Fluoranthene	42000	J	42000	J	46275.8	5900	J	740	J	42000	J	180	J	190	J	190	J	170	J	200	J	280	J	610	J
Pyrene	42000	J	42000	J	46025.1	3200	J	890	J	42000	J	220	J	250	J	220	J	210	J	230	J	280	J	730	J
Butylbenzylphthalate	340	J	340	J	2216.9	890	UJ	340	J	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
3,3'-Dichlorobenzidine	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Benzo(a)anthracene	20000	J	20000	J	21990.9	2500	J	650	J	20000	J	92	J	180	J	130	J	110	J	130	J	180	J	340	J
Chrysene	20000	J	20000	J	22253.2	4300	J	870	J	20000	J	110	J	140	J	160	J	140	J	160	J	200	J	410	J
bis(2-Ethylhexyl) phthalate	46000	J	46000	J	50431.7	890	UJ	46000	J	7500	UJ	890	UJ	3000	J	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Di-n-octylphthalate	ND		ND		NA; all ND	890	UJ	800	UJ	7500	UJ	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Benzo(b)fluoranthene	16000	J	16000	J	17648.2	2600	J	400	J	16000	J	120	J	220	J	230	J	170	J	190	J	240	J	440	J
Benzo(k)fluoranthene	3471.0		6100	J	3471.0	1000	J	220	J	6100	J	890	UJ	110	J	890	UJ	890	UJ	920	UJ	100	J	190	J
Benzo(a)pyrene	15000	J	15000	J	16459.6	1600	J	320	J	15000	J	99	J	180	J	140	J	150	J	140	J	200	J	320	J
Indeno(1,2,3-cd)pyrene	7400	J	7400	J	8092.2	480	J	140	J	7400	J	890	UJ	990	UJ	93	J	890	UJ	920	UJ	94	J	220	J
Dibenz(a,h)anthracene	1490.8		2400	J	1490.8	150	J	800	UJ	2400	J	890	UJ	990	UJ	890	UJ	890	UJ	920	UJ	840	UJ	1000	UJ
Benzo(g,h,i)perylene	6800	J	6800	J	7449.2	560	J	190	J	6800	J	890	UJ	120	J	120	J	140	J	120	J	99	J	590	J
P/PCBs																									
alpha-BHC	ND		ND		NA; all ND	4.6	UJ	4.1	UJ	3.8	UJ	4.6	UJ	5.1	UJ	4.6	UJ	4.6	UJ	4.7	UJ	4.3	UJ	5.3	UJ
beta-BHC	ND		ND		NA; all ND	4.6	UJ	4.1	UJ	3.8	UJ	4.6	UJ	5.1	UJ	4.6	UJ	4.6	UJ	4.7	UJ	4.3	UJ	5.3	UJ
delta-BHC	ND		ND		NA; all ND	4.6	UJ	4.1	UJ	3.8	UJ	4.6	UJ	5.1	UJ	4.6	UJ	4.6	UJ	4.7	UJ	4.3	UJ	5.3	UJ
gamma-BHC (Lindane)	ND		ND		NA; all ND	4.6	UJ	4.1	UJ	3.8	UJ	4.6	UJ	5.1	UJ	4.6	UJ	4.6	UJ	4.7	UJ	4.3	UJ	5.3	UJ
Heptachlor	ND		ND		NA; all ND	4.6	UJ	4.1	UJ	3.8	UJ	4.6	UJ	5.1	UJ	4.6	UJ	4.6	UJ	4.7	UJ	4.3	UJ	5.3	UJ
Aldrin	ND		ND		NA; all ND	4.6	UJ	4.1	UJ	3.8	UJ	4.6	UJ	5.1	UJ	4.6	UJ	4.6	UJ	4.7	UJ	4.3	UJ	5.3	UJ
Heptachlor epoxide	ND		ND		NA; all ND	4.6	UJ	4.1	UJ	3.8	UJ	4.6	UJ	5.1	UJ	4.6	UJ	4.6	UJ	4.7	UJ	4.3	UJ	5.3	UJ
Endosulfan I	ND		ND		NA; all ND	4.6	UJ	4.1	UJ	3.8	UJ	4.6	UJ	5.1	UJ	4.6	UJ	4.6	UJ	4.7	UJ	4.3	UJ	5.3	UJ
Dieldrin	ND		ND		NA; all ND	8.9	UJ	8	UJ	7.5	UJ	8.9	UJ	10	UJ	8.9	UJ	8.9	UJ	9.2	UJ	8.4	UJ	10	UJ
4,4'-DDE	6.9		9	J	6.9	9	J	4.7	J	7.5	UJ	5.7	J	7.5	J	6.8	J	6.3	J	6.6	J	4.4	J	5.6	J

Table 4-8

Background Sediment Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Calculated Site-Specific Background Value - Sediment (1)		Maximum Detected Sample Result		95% Upper Confidence Limit (2)	Sample Results																			
						SD-01 8/16/2004		SD-02 8/16/2004		SD-03 8/16/2004		SD-04 8/16/2004		SD-05 8/16/2004		SD-06 8/17/2004		SD-07 8/17/2004		SD-08 8/17/2004		SD-09 8/17/2004		SD-10 8/17/2004	
P/PCBs Continued																									
Endrin	ND		ND		NA; all ND	8.9	UJ	8	UJ	7.5	UJ	8.9	UJ	10	UJ	8.9	UJ	8.9	UJ	9.2	UJ	8.4	UJ	10	UJ
Endosulfan II	ND		ND		NA; all ND	8.9	UJ	8	UJ	7.5	UJ	8.9	UJ	10	UJ	8.9	UJ	8.9	UJ	9.2	UJ	8.4	UJ	10	UJ
4,4'-DDD	4.7		4.7	J	4.7	4.7	J	8	UJ	7.5	UJ	8.9	UJ	10	UJ	8.9	UJ	8.9	UJ	9.2	UJ	8.4	UJ	10	UJ
Endosulfan sulfate	ND		ND		NA; all ND	8.9	UJ	8	UJ	7.5	UJ	8.9	UJ	10	UJ	8.9	UJ	8.9	UJ	9.2	UJ	8.4	UJ	10	UJ
4,4'-DDT	ND		ND		NA; all ND	8.9	UJ	8	UJ	7.5	UJ	8.9	UJ	10	UJ	8.9	UJ	8.9	UJ	9.2	UJ	8.4	UJ	10	UJ
Methoxychlor	ND		ND		NA; all ND	46	UJ	41	UJ	38	UJ	46	UJ	51	UJ	46	UJ	46	UJ	47	UJ	43	UJ	53	UJ
Endrin ketone	8.5		15	J	8.5	8.9	UJ	15	J	11	J	8.9	UJ	10	UJ	8.9	UJ	8.9	UJ	9.2	UJ	8.4	UJ	10	UJ
Endrin aldehyde	ND		ND		NA; all ND	8.9	UJ	8	UJ	7.5	UJ	8.9	UJ	10	UJ	8.9	UJ	8.9	UJ	9.2	UJ	8.4	UJ	10	UJ
alpha-Chlordane	ND		ND		NA; all ND	4.6	UJ	4.1	UJ	3.8	UJ	4.6	UJ	5.1	UJ	4.6	UJ	4.6	UJ	4.7	UJ	4.3	UJ	5.3	UJ
gamma-Chlordane	ND		ND		NA; all ND	4.6	UJ	4.1	UJ	3.8	UJ	4.6	UJ	5.1	UJ	4.6	UJ	4.6	UJ	4.7	UJ	4.3	UJ	5.3	UJ
Toxaphene	ND		ND		NA; all ND	460	UJ	410	UJ	380	UJ	460	UJ	510	UJ	460	UJ	460	UJ	470	UJ	430	UJ	530	UJ
Aroclor-1016	ND		ND		NA; all ND	89	UJ	80	UJ	75	UJ	89	UJ	100	UJ	89	UJ	89	UJ	92	UJ	84	UJ	100	UJ
Aroclor-1221	ND		ND		NA; all ND	180	UJ	160	UJ	150	UJ	180	UJ	200	UJ	180	UJ	180	UJ	190	UJ	170	UJ	210	UJ
Aroclor-1232	ND		ND		NA; all ND	89	UJ	80	UJ	75	UJ	89	UJ	100	UJ	89	UJ	89	UJ	92	UJ	84	UJ	100	UJ
Aroclor-1242	ND		ND		NA; all ND	89	UJ	80	UJ	75	UJ	89	UJ	100	UJ	89	UJ	89	UJ	92	UJ	84	UJ	100	UJ
Aroclor-1248	300	J	300	J	NA; <10 samp	260	J	100	J	100	J	230	J	300	J	280	J	270	J	260	J		R	210	J
Aroclor-1254	ND		ND		NA; all ND	89	UJ	80	UJ	75	UJ	89	UJ	100	UJ	89	UJ	89	UJ	92	UJ	84	UJ	100	UJ
Aroclor-1260	ND		ND		NA; all ND	89	UJ	80	UJ	75	UJ	89	UJ	100	UJ	89	UJ	89	UJ	92	UJ	84	UJ	100	UJ
Inorganics																									
Aluminum	15093.1		16000	J	15093.1	12000	J	13000	J	10000	J	15000	J	16000	J	16000	J	14000	J	15000	J	14000	J	15000	J
Antimony	13.8		17	J	13.8	14	J	14	J	13	J	16	UJ	17	J	16	UJ	16	UJ	17	J	15	UJ	17	UJ
Arsenic	6.4		7.2	J	6.4	5.9	J	7.2	J	6.1	J	6.9	J	4.2	J	6.1	J	6.3	J	5.9	J	5.1	J	4.4	J
Barium	157.5		260	J	157.5	210	J	73	J	260	J	89	J	96	J	97	J	85	J	89	J	82	J	110	J
Beryllium	ND		ND		NA; all ND	1.1	UJ	1.2	UJ	1.1	UJ	1.4	UJ	1.4	UJ	1.3	UJ	1.3	UJ	1.4	UJ	1.3	UJ	1.4	UJ
Cadmium	1.1		1.4	J	1.1	1.4	J	1.2	UJ	1.2	J	1.4	UJ	1.4	UJ	1.3	UJ	1.3	UJ	1.4	UJ	1.3	UJ	1.4	J
Calcium	5792.3		7800	J	5792.3	7800	J	3000	J	4800	J	4800	J	4800	J	5300	J	4700	J	4800	J	4500	J	5700	J
Chromium	61.2		68	J	61.2	55	J	29	J	40	J	60	J	63	J	68	J	60	J	59	J	58	J	56	J
Cobalt	16.4		18	J	16.4	14	J	14	J	13	J	16	J	17	J	18	J	16	J	16	J	15	J	16	J
Copper	92.7		130	J	92.7	100	J	31	J	130	J	64	J	68	J	70	J	62	J	63	J	61	J	66	J
Iron	33594.2		36000	J	33594.2	29000	J	29000	J	25000	J	33000	J	35000	J	36000	J	33000	J	33000	J	31000	J	33000	J
Lead	85.3		120	J	85.3	100	J	38	J	120	J	62	J	68	J	70	J	61	J	62	J	59	J	63	J
Magnesium	6712.9		7400	J	6712.9	6200	J	5500	J	5400	J	6600	J	6900	J	7400	J	6600	J	5700	J	6400	J	6700	J
Manganese	1949.9		2400	J	1949.9	980	J	1200	J	930	J	1900	J	2000	J	2400	J	2000	J	1800	J	1800	J	1700	J
Mercury	0.46 J		0.46	J	0.5	0.11	UJ	0.12	J	0.33	J	0.37	J	0.46	J	0.42	J	0.37	J	0.35	J	0.41	J	0.36	J
Nickel	35.0		38	J	35.0	31	J	29	J	27	J	34	J	37	J	38	J	34	J	34	J	33	J	34	J
Potassium	2018.3		2100	J	2018.3	1500	J	1900	J	1200	J	2000	J	2000	J	2100	J	1900	J	2100	J	2000	J	1900	J
Selenium	7.9		9.7	J	7.9	8	J	8.1	J	7.4	J	9.5	UJ	9.7	J	9.1	UJ	9.2	UJ	9.7	J	8.8	UJ	10	UJ
Silver	ND		ND		NA; all ND	2.3	UJ	2.3	UJ	2.1	UJ	2.7	UJ	2.8	UJ	2.6	UJ	2.6	UJ	2.8	UJ	2.5	UJ	2.9	UJ
Sodium	792.6		1100	J	792.6	1100	J	1200	UJ	1100	UJ	1400	UJ	1400	UJ	1300	UJ	1300	UJ	1400	UJ	1300	UJ	1400	UJ
Thallium	5.7		7	J	5.7	5.7	J	5.8	J	5.3	J	6.8	UJ	6.9	J	6.5	UJ	6.5	UJ	7	J	6.3	UJ	7.2	UJ
Vanadium	27.9		30	J	27.9	23	J	25	J	19	J	27	J	29	J	30	J	27	J	28	J	26	J	27	J
Zinc	195.5		210	J	195.5	150	J	120	J	200	J	190	J	200	J	210	J	180	J	180	J	180	J	190	J

Table 4-8

Background Sediment Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

	Calculated Site-Specific Background Value - Sediment (1)		Maximum Detected Sample Result		95% Upper Confidence Limit (2)	Sample Results																			
Chemical Name						SD-01 8/16/2004		SD-02 8/16/2004		SD-03 8/16/2004		SD-04 8/16/2004		SD-05 8/16/2004		SD-06 8/17/2004		SD-07 8/17/2004		SD-08 8/17/2004		SD-09 8/17/2004		SD-10 8/17/2004	
Inorganics Continued																									
Cyanide	1.4	J	1.4	J	4.6	0.5	J	5.6	UJ	0.91	J	7.4	UJ	7.3	UJ	7	UJ	1.4	J	7.4	UJ	7.2	UJ	8.2	UJ
Wet Chemistry																									
Percent Solids						40		43		47		35		35		39		37		36		37		34	
pH							R		R		R		R		R		R		R		R		R		R
Total Organic Carbon						58000		26000		48000		28000		37000		43000		57000		41000		45000		41000	
Sodium						36		36		33		36		50		36	J	39	J	53	J	52	J	32	J

<u>Notes:</u>

All VOC, SVOC, and P/PCB values are in micrograms per kilogram (ug/kg); inorganic values are in milligrams per kilogram (mg/kg)

(1) In cases where the 95% UCL>maximum detected value, the maximum value is used for the site-specific sediment background value.

(2) 95% UCL values are calculated with 1/2 the detection limit for non-detect values.

NA; all ND = Not available; the 95% UCL cannot be calculated because all results were non-detect.

NA; <10 samp = Not available; the 95% UCL cannot be calculated because there are less than 10 results (detects and non-detects) due to rejected (R) sample results.

P/PCBs = Pesticides and polychlorinated biphenyls

SVOCs = Semivolatile organic compounds

UCL = Upper confidence limit

VOCs = Volatile organic compounds

U = Non-detected value.

J = Value is estimated due to exceeded quality control criteria.

R = Rejected sample from laboratory.

Table 4-9

Background Surface Water Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Site-Specific Background Value - Surface Water (1)	Maximum Detected Sample Result	95% Upper Confidence Limit (2)	Sample Results																			
				SW-01 8/16/2004		SW-02 8/16/2004		SW-03 8/16/2004		SW-04 8/16/2004		SW-05 8/16/2004		SW-06 8/17/2004		SW-07 8/17/2004		SW-08 8/17/2004		SW-09 8/17/2004		SW-10 8/17/2004	
VOCs																							
Dichlorodifluoromethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	UJ
Chloromethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Vinyl Chloride	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Bromomethane	ND	ND	NA; all ND	10	UJ	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	10	U
Chloroethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Trichlorofluoromethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,1-Dichloroethene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	UJ
Acetone	ND	ND	NA; all ND	10	UJ	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	10	U
Carbon Disulfide	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Methyl Acetate	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Methylene Chloride	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
trans-1,2-Dichloroethene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Methyl tert-Butyl Ether	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,1-Dichloroethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
cis-1,2-Dichloroethene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Butanone	ND	ND	NA; all ND	10	UJ	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	10	U
Chloroform	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,1,1-Trichloroethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Cyclohexane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	UJ
Carbon Tetrachloride	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,2-Dichloroethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Trichloroethene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
MetHylcyclohexane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,2-Dichloropropane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Bromodichloromethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
cis-1,3-Dichloropropene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Methyl-2-pentanone	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Toluene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
trans-1,3-Dichloropropene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,1,2-Trichloroethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Tetrachloroethene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Hexanone	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Dibromochloromethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,2-Dibromoethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Chlorobenzene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Ethylbenzene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
m,p-Xylenes	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U

Table 4-9

Background Surface Water Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Site-Specific Background Value - Surface Water (1)	Maximum Detected Sample Result	95% Upper Confidence Limit (2)	Sample Results																			
				SW-01 8/16/2004		SW-02 8/16/2004		SW-03 8/16/2004		SW-04 8/16/2004		SW-05 8/16/2004		SW-06 8/17/2004		SW-07 8/17/2004		SW-08 8/17/2004		SW-09 8/17/2004		SW-10 8/17/2004	
VOCs Continued																							
Styrene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Bromoform	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Isopropylbenzene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,1,2,2-Tetrachloroethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,3-Dichlorobenzene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,4-Dichlorobenzene	6	8 J	6.0	10	U	8	J	6	J	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,2-Dichlorobenzene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,2-Dibromo-3-chloropropane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,2,4-Trichlorobenzene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
SVOCs																							
Benzaldehyde	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Phenol	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
bis(2-Chloroethyl) ether	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Chlorophenol	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Methylphenol	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,2'-oxybis(1-Chloropropane)	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Acetophenone	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Methylphenol	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
n-Nitroso-di-n-propylamine	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Hexachloroethane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Nitrobenzene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Isophorone	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Nitrophenol	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,4-Dimethylphenol	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	UJ
bis(2-Chloroethoxy)methane	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,4-Dichlorophenol	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Naphthalene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Chloroaniline	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Hexachlorobutadiene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Caprolactam	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Chloro-3-methylphenol	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Methylnaphthalene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Hexachlorocyclopentadiene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	UJ
2,4,6-Trichlorophenol	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,4,5-Trichlorophenol	ND	ND	NA; all ND	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
1,1'-Biphenyl	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Chloronaphthalene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Nitroaniline	ND	ND	NA; all ND	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Dimethylphthalate	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,6-Dinitrotoluene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U

Table 4-9

Background Surface Water Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Site-Specific Background Value - Surface Water (1)	Maximum Detected Sample Result	95% Upper Confidence Limit (2)	Sample Results																			
				SW-01 8/16/2004		SW-02 8/16/2004		SW-03 8/16/2004		SW-04 8/16/2004		SW-05 8/16/2004		SW-06 8/17/2004		SW-07 8/17/2004		SW-08 8/17/2004		SW-09 8/17/2004		SW-10 8/17/2004	
SVOCs Continued																							
Acenaphthylene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
3-Nitroaniline	ND	ND	NA; all ND	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Acenaphthene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,4-Dinitrophenol	ND	ND	NA; all ND	25	U	25	UJ	25	U	25	UJ	25	U	25	UJ	25	UJ	25	UJ	25	U	25	UJ
4-Nitrophenol	ND	ND	NA; all ND	25	U	25	UJ	25	U	25	UJ	25	U	25	UJ	25	UJ	25	UJ	25	U	25	U
Dibenzofuran	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,4-Dinitrotoluene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Diethylphthalate	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Fluorene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Chlorophenyl-phenylether	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Nitroaniline	ND	ND	NA; all ND	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
4,6-Dinitro-2-methylphenol	ND	ND	NA; all ND	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
n-Nitrosodiphenylamine	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Bromophenyl-phenylether	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Hexachlorobenzene	ND	ND	NA; all ND	10	U	10	UJ	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U
Atrazine	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Pentachlorophenol	ND	ND	NA; all ND	25	U	25	UJ	25	U	25	UJ	25	U	25	U	25	U	25	U	25	U	25	UJ
Phenanthrene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Anthracene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Carbazole	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Di-n-butylphthalate	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Fluoranthene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Pyrene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Butylbenzylphthalate	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
3,3'-Dichlorobenzidine	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzo(a)anthracene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Chrysene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
bis(2-Ethylhexyl) phthalate	1 J	1 J	6.5	10	U	10	U	10	U	10	U	10	U	10	U	1	J	1	J	1	J	10	U
Di-n-octylphthalate	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzo(b)fluoranthene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzo(k)fluoranthene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzo(a)pyrene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Indeno(1,2,3-cd)pyrene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Dibenz(a,h)anthracene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzo(g,h,i)perylene	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
P/PCBs																							
alpha-BHC	ND	ND	NA; all ND	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
beta-BHC	ND	ND	NA; all ND	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
delta-BHC	ND	ND	NA; all ND	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
gamma-BHC (Lindane)	ND	ND	NA; all ND	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U

Table 4-9

Background Surface Water Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Site-Specific Background Value - Surface Water (1)	Maximum Detected Sample Result	95% Upper Confidence Limit (2)	Sample Results																			
				SW-01 8/16/2004		SW-02 8/16/2004		SW-03 8/16/2004		SW-04 8/16/2004		SW-05 8/16/2004		SW-06 8/17/2004		SW-07 8/17/2004		SW-08 8/17/2004		SW-09 8/17/2004		SW-10 8/17/2004	
P/PCBs Continued																							
Heptachlor	ND	ND	NA; all ND	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Aldrin	ND	ND	NA; all ND	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor epoxide	ND	ND	NA; all ND	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Endosulfan I	ND	ND	NA; all ND	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Dieldrin	ND	ND	NA; all ND	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
4,4'-DDE	ND	ND	NA; all ND	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Endrin	ND	ND	NA; all ND	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Endosulfan II	ND	ND	NA; all ND	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
4,4'-DDD	ND	ND	NA; all ND	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
P/PCBs Continued																							
Endosulfan sulfate	ND	ND	NA; all ND	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
4,4'-DDT	ND	ND	NA; all ND	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Methoxychlor	ND	ND	NA; all ND	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Endrin ketone	ND	ND	NA; all ND	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Endrin aldehyde	ND	ND	NA; all ND	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
alpha-Chlordane	ND	ND	NA; all ND	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
gamma-Chlordane	ND	ND	NA; all ND	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Toxaphene	ND	ND	NA; all ND	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Aroclor-1016	ND	ND	NA; all ND	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aroclor-1221	ND	ND	NA; all ND	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Aroclor-1232	ND	ND	NA; all ND	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aroclor-1242	ND	ND	NA; all ND	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aroclor-1248	ND	ND	NA; all ND	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aroclor-1254	ND	ND	NA; all ND	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aroclor-1260	ND	ND	NA; all ND	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Inorganics																							
Aluminum	356.5	480	356.5	260		420		290		200	U	200	U	230		280		480		260		410	
Antimony	ND	ND	NA; all ND	60	U	60	U	60	U	60	U	60	U	60	U	60	U	60	U	60	U	60	U
Arsenic	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Barium	ND	ND	NA; all ND	200	U	200	U	200	U	200	U	200	U	200	U	200	U	200	U	200	U	200	U
Beryllium	ND	ND	NA; all ND	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Cadmium	ND	ND	NA; all ND	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Calcium	28300.0	29000	28300.0	28000		28000		28000		29000		28000		28000		28000		28000		28000		28000	
Chromium	ND	ND	NA; all ND	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Cobalt	ND	ND	NA; all ND	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Copper	ND	ND	NA; all ND	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Iron	412.1	520	412.1	350		520		370		230		170		290		340		440		320		470	
Lead	8.3	16	8.3	10	U	10	U	10	U	16		10	U	10	U	10	U	10	U	10	U	10	U
Magnesium	5461.6	5800	5461.6	5300		5400		5300		5400		5300		5100		5200		5800		5300		5400	
Manganese	42.5	55	42.5	36		55		48		29		32		28		30		31		30		45	

Table 4-9

Background Surface Water Sample Results and Background Calculations
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Site-Specific Background Value - Surface Water (1)	Maximum Detected Sample Result	95% Upper Confidence Limit (2)	Sample Results																			
				SW-01 8/16/2004		SW-02 8/16/2004		SW-03 8/16/2004		SW-04 8/16/2004		SW-05 8/16/2004		SW-06 8/17/2004		SW-07 8/17/2004		SW-08 8/17/2004		SW-09 8/17/2004		SW-10 8/17/2004	
Inorganics Continued																							
Mercury	ND	ND	NA; all ND	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Nickel	ND	ND	NA; all ND	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U
Potassium	ND	ND	NA; all ND	5000	U	5000	U	5000	U	5000	U	5000	U	5000	U	5000	U	5000	U	5000	U	5000	U
Selenium	ND	ND	NA; all ND	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U	35	U
Silver	ND	ND	NA; all ND	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	UJ
Sodium	650000	650000	709886.3	19000		20000		19000		20000		19000		19000		20000		20000		20000		650000	
Thallium	ND	ND	NA; all ND	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Vanadium	ND	ND	NA; all ND	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U	50	U
Zinc	ND	ND	NA; all ND	60	U	60	U	60	U	60	U	60	U	60	U	60	U	60	U	60	U	60	U
Cyanide	10.9	10.9	6.6	2.1	J	3.9	J	10	U	3.5	J	10	U	3.2	J	10	U	10	U	10	U	10.9	
Wet Chemistry																							
Hardness As CaCO3				110		130		110		110		100		120		110		110		140		110	
Sulfate				26		26		28		26		24		12		11		12		11		13	
Dissolved Organic Carbon				4.5		4.1		4.1		5		3.7		3.8		3.8		3.9		3.8		3.8	
Total Dissolved Solids				140		120		82		130		150		140		6		75		86		180	
Total Suspended Solids				11		12		9		8		6		9		74		10		6		11	

Notes:

All VOC, SVOC, P/PCB, and Inorganic values are in micrograms per liter (ug/l)

(1) In cases where the 95% UCL>maximum detected value, the maximum value is used for the site-specific sediment background value.

(2) 95% UCL values are calculated with 1/2 the detection limit for non-detect values.

NA; all ND = Not available; the 95% UCL cannot be calculated because all results were non-detect.

P/PCBs = pesticides and polychlorinated biphenyls

SVOCs = semivolatile organic compounds

UCL = upper confidence limit

VOCs = volatile organic compounds

U = non-detected value.

J = Value is estimated due to exceeded quality control criteria.

ND = non detected value

Table 4-10
Background Soil Boring Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	BKSS-01-S		BKSB-01		BKSS-02-D		BKSB-02		BKSS-03-D		BKSB-03		BKSS-04-S		BKSB-04		BKSS-05-D		BKSB-05		BKSS-06-D	
SVOCs																							
Benzo(a)anthracene	620	5000		3500		900		1700	J	980		9800		-----		770	J	1300	J	-----	J	-----	J
Chrysene	1938	5600		3900		-----		1900		-----		9800		-----		-----	J	-----	J	-----	J	-----	J
Benzo(b)fluoranthene	620	5100		3700		940		1800	J	990		7900		-----		710	J	920	J	-----	J	-----	J
Benzo(k)fluoranthene	5329	4600		-----		-----		-----		-----		6600		-----		-----	J	-----	J	-----	J	-----	J
Benzo(a)pyrene	62	3800		2500		990		1600	J	770		4700		490		800	J	1000	J	170	J	480	J
Indeno(1,2,3-cd)pyrene	620	3000		2000		700		1400	J	-----		3900		-----	J	-----	J	680	J	-----	J	-----	J
Dibenz(a,h)anthracene	62	1300	J	840		260	J	560	J	250	J	2200		130	J	170	J	260	J	-----	UJ	-----	U
P/PCBs																							
Aroclor-1254	110	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	UJ	-----	UJ	-----	UJ	-----	U
Inorganics																							
Aluminum	7600	-----		10500		9200		9170		-----		9130		9030		8760		-----		8250		10500	
Arsenic	0.39	4.5		5.4		5.6		5.5		4.3		5.9		5.4		5.1		9.2		5.2		6.2	
Beryllium	0.16	0.36	J	0.46	J	0.48	J	0.51	J	0.38	J	0.44	J	0.45	J	0.43	J	0.3	J	0.48	J	0.56	J
Cadmium	1	-----		-----		-----		-----		-----		1.1		-----		-----		3.1		1.1		-----	
Chromium	10	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	14.9	
Copper	25	30.1		34.2		35.5		41		30.2		33		35.8		31.8		193		45.6		27.3	
Iron	2000	17200		25800	J	23800		23600		18600		22600	J	23300		21600	J	38300		24100	J	22700	
Lead	400	-----		-----		-----		-----		-----		457		-----		-----		-----		-----		-----	
Manganese	180	541		617		652		690		547		612		718		553		557		491		660	
Mercury	0.1	-----	J	0.18		-----	J	0.21	J	0.11	J	0.29		0.2	J	0.44		0.61	J	0.12		0.12	J
Nickel	13	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	22.1	J
Vanadium	8	16.4		17.2		16.8		16.3		17.2		16.8		19.4		17.1		15.3		10.3		30.8	
Zinc	20	89.3		91.9		90.7		112		95.5		172		113		99		266		90.7		80.9	J

Table 4-10
Background Soil Boring Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	BKSB-06		BKSS-07-D		BKSB-07		BKSS-08-D		BKSB-08		BKSS-09-D		BKSB-09		BKSS-10-D		BKSS-10-D-Dup		BKSB-10	
SVOCs																					
Benzo(a)anthracene	788	-----	J	810	J	1600	J	-----	J	-----	J	900		1200		-----	J	-----	J	-----	U
Chrysene	1938	-----	J	-----	J	1800	J	-----	J	-----	J	-----		-----		-----	J	-----	J	-----	U
Benzo(b)fluoranthene	620	-----	J	800	J	1400	J	-----	J	-----	J	840		1200		-----	J	-----	J	-----	U
Benzo(k)fluoranthene	5329	-----	J	-----	J	-----	J	-----	J	-----	J	-----		-----		-----	J	-----	J	-----	U
Benzo(a)pyrene	62	150	J	780	J	2000	J	210	J	310	J	830		1100		120	J	77	J	-----	J
Indeno(1,2,3-cd)pyrene	620	-----	J	-----	J	1400	J	-----	J	-----	J	640		760		-----	J	-----	U	-----	U
Dibenz(a,h)anthracene	62	-----	U	220	J	460	J	-----	U	62	J	220	J	230	J	-----	U	-----	U	-----	U
P/PCBs																					
Aroclor-1254	110	-----	U	-----	U	-----	U	-----	U	-----	U	170	J	190		-----	U	-----	U	-----	U
Inorganics																					
Aluminum	7600	9700		9320		9470		-----		8920		-----		-----		9990		9560		-----	
Arsenic	0.39	4.5		6.7		6.1		5.8		6.1		8.5		6.8		5.2		6.1		5	
Beryllium	0.16	0.38	J	0.45	J	0.39	J	0.34	J	0.39	J	0.39	J	0.38	J	0.44	J	0.43	J	0.32	J
Cadmium	1	-----		-----		-----		-----		1.1		1.5		1.4		-----		-----		-----	
Chromium	10	13.3		13.3		14.8		13.3		15.6		26.1		21.1		14.3		13.3		10.8	
Copper	25	-----		32.6		27.2		33.1		41.6		183		314		30.8		29.7		27.1	
Iron	2000	22400		21400		22000		17500		22500		20600		25300		21800		20800		18700	
Lead	400	-----		-----		-----		-----		-----		503		-----		-----		-----		-----	
Manganese	180	535		626		553		538		510		439		443		566		652		907	
Mercury	0.1	-----	U	-----	J	-----	U	-----	J	0.21		0.99		0.67		-----	J	0.16		-----	J
Nickel	13	18.8	J	22.9	J	21	J	16.1	J	19.8	J	20	J	20.9	J	18.7	J	17.3	J	16.5	J
Vanadium	8	15.1		29.4		24.3		13.8		18		18.9		16.9		17.5		17		12	
Zinc	20	66.3	J	80.4	J	75	J	89.2	J	185	J	182	J	184	J	81.5	J	79.3	J	68.4	J

Notes:

Indicator contaminants are bolded

All SVOC, and P/PCB values are in micrograms per kilogram (ug/kg); inorganic values are in milligrams per liter (mg/kg)

P/PCBs = pesticides and polychlorinated biphenyls

BKSB = background subsurface soil sample (2-4 feet below ground surface)

BKSS = background surface soil sample (S - 0-2 inches below ground surface; D - 0-12 inches below ground surface)

SSSSC = site-specific soil screening criteria

SVOCs = semivolatile organic compounds

Dashed cells indicate that the value does not exceed the SSSSC

R = rejected sample from laboratory.

J = estimated data due to exceeded quality control criteria

U = non-detected value

Table 4-11
VOC Soil Screening Sample Results
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Data by Vertical Horizon (feet bgs)												
	0-2 (A)	2-4 (B)	4-6 (C)	6-8 (D)	8-10 (E)	10-12 (F)	12-14 (G)	14-16 (H)	16-18 (I)	18-20 (J)	20-22 (K)	22-24 (L)	28-30 (N)
PASB-01	0	0	0	0	NR	NR	0	0					
PASB-02	0	0	0	0	0	0	0	0					
PASB-03	0	0	0	0	0	0	0	0					
PASB-04	7.8	64.1	17.7	18.2	18	2.7	0.6	0					
PASB-05	129	32	77	0.3	0	0	0	0					
PASB-06	8.6	28.2	30	4	0	9.9	0	0					
PASB-07	0	0	1.5	0	0	0	0	0					
PASB-08	3.2	15.6	10	1.8	0	1.1	0	1.4					
PASB-09	7	35.7	22	30	2	0	0	1.2					
PASB-10	1	22.3	9	NR	2	NR	NR	0					
PASB-10a	13.6	38.6											
PASB-10b	3.9	25.7											
PASB-10c	0	19.2											
PASB-10d	0	68.2											
PASB-11	0	0	73.4	55.5	1.2	1.8	2.6	1.7					
PASB-12	1.2	7.3	0.5	4.6	6.4	0	1.2	0.1					
PASB-13	NR	14.6	13.7	8.2	0	1.2	0	0					
PASB-14	NR	32.4	5.8	16.7	8.1	NR	12.6	0.1					
PASB-15	NR	10.5	91.6	72.3	72.3	72.3	13.4	21.6	31.5	1.6	40	51.2	8
PASB-16	4.2	78.3	27.2	2.9	6	NR	1.1	0.4					
PASB-17	1.2	0.5	1.6	2.5	88.4	NR	12.9	1.4					
PASB-18	53.6	9.1	0.7	0	0	0	1.4	0					
PASB-19	0	1.4	18.6	11.1	5.6	2.8	NR	1					
PASB-20	NA	NA	NA	NA	NA	NA	NA	NA					
PASB-21	NA	NA	NA	NA	NA	NA	NA	NA					

Table 4-11
VOC Soil Screening Sample Results
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Data by Vertical Horizon (feet bgs)												
	0-2 (A)	2-4 (B)	4-6 (C)	6-8 (D)	8-10 (E)	10-12 (F)	12-14 (G)	14-16 (H)	16-18 (I)	18-20 (J)	20-22 (K)	22-24 (L)	28-30 (N)
SWSB-01	0	0	0	0	0	0	0	0					
SWSB-02	0	0	0	0	0	0	0	0					
SWSB-03	0	0	0	0	0	0	0	0					
SWSB-04	1.3	0	0	0	0	0	0	0					
SWSB-05	0	66.7	0	0	0								
SWSB-06	0	0	0	0	0	0	0	0					
SWSB-07	0	0	0	470	0	0	0	0					
SWSB-08	0.1	648	0	0	0								
SWSB-09		189	19.3	34.6	0								
SWSB-10		1.1	1.4	0	1.4	0	0	0					
SWSB-11	3.2	2.4	28.7	0	0	0	0	0					
SWSB-12	64.1	30	199	23	1.8								
SWSB-13	7.3	10.4	2.6	6.4	9.8	0	0	0					
SWSB-14	0	0	4.2	0	0	0	6	0	0	0			
SWSB-15	1835	1054	71.4	2.6	345								
SWSB-16	26.8	114	351	126	10.8	4.7	13.5	5.2					
SWSB-17	108	390	107	18.2	3.5	0	0	0					
SWSB-18	0.8	1.2	1.7	0	0.8								
SWSB-19	NR	3.5	2.8	0									
SWSB-20	NA	NA	NA	NA	NA	NA	NA	NA					
SWSB-21	NA	NA	NA	NA	NA	NA	NA	NA					
SWSB-22	NA	NA	NA	NA	NA	NA	NA	NA					
SWSB-23	NA	NA	NA	NA	NA	NA	NA	NA					
SWSB-24	NA	NA	NA	NA	NA	NA	NA	NA					
SWSB-25	NA	NA	NA	NA	NA	NA	NA	NA					

Table 4-11
VOC Soil Screening Sample Results
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Data by Vertical Horizon (feet bgs)												
	0-2 (A)	2-4 (B)	4-6 (C)	6-8 (D)	8-10 (E)	10-12 (F)	12-14 (G)	14-16 (H)	16-18 (I)	18-20 (J)	20-22 (K)	22-24 (L)	28-30 (N)
SWSB-26	NA	NA	NA	NA	NA	NA	NA	NA	▨	▨	▨	▨	▨
SWSB-27	NA	NA	NA	NA	NA	NA	NA	NA	▨	▨	▨	▨	▨
SWSB-28	NA	NA	NA	NA	NA	NA	NA	NA	▨	▨	▨	▨	▨
SWSB-29	NA	NA	NA	NA	NA	NA	NA	NA	▨	▨	▨	▨	▨
SWSB-30	NA	NA	NA	NA	NA	NA	NA	NA	▨	▨	▨	▨	▨
SWSB-31	NA	NA	NA	NA	NA	NA	NA	NA	▨	▨	▨	▨	▨
SWSB-32	NA	NA	NA	NA	NA	NA	NA	NA	▨	▨	▨	▨	▨
SWSB-33	0	0	0	0	0	▨	▨	▨	▨	▨	▨	▨	▨
SWSB-34	0	0	0	2.7	3.4	▨	▨	▨	▨	▨	▨	▨	▨
SWSB-35	0	0	0	2.9	3.9	1.4	0.1	NR	▨	▨	▨	▨	▨
SWSB-36	0	0	0	0	93.4	0	82.4	0	▨	▨	▨	▨	▨
SWSB-37	0	0	0	0	0	▨	▨	▨	▨	▨	▨	▨	▨

Notes:
All values in milligram per kilogram (mg/kg)
Maximum PID reading for each 2-foot interval reported.
Shaded cells indicate no sample collected
bgs = below ground surface
PASB = process area soil boring
NR = no recovery; no data available due to lack of sample recovery
NA = not available; no photoionization detector reading due to malfunction caused by humidity.

PID = photoionized detector
SWSB = site-wide soil boring
VOC = volatile organic compound

(A) = 0 to 2 feet bgs
(B) = 2 to 4 feet bgs
(C) = 4 to 6 feet bgs
(D) = 6 to 8 feet bgs
(E) = 8 to 10 feet bgs
(F) = 10 to 12 feet bgs
(G) = 12 to 14 feet bgs
(H) = 14 to 16 feet bgs
(I) = 16 to 18 feet bgs
(J) = 18 to 20 feet bgs
(K) = 20 to 22 feet bgs
(L) = 22 to 24 feet bgs
(N) = 28 to 30 feet bgs

Table 4-12
PCB Soil Screening Sample Results
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Data by Vertical Horizon (feet bgs)							
	0-2 (A)	2-4 (B)	4-6 (C)	6-8 (D)	8-10 (E)	10-12 (F)	12-14 (G)	14-16 (H)
PASB-01	2.72	0.53	0.07 U	0.04 U	NR	NR	NR	NR
PASB-02	1.77	0.88	1.02	0.49	0.67	NR	NR	NR
PASB-03	2.86	0.59	0.06	2.58	0.02	NR	NR	NR
PASB-04	12.58	6.63	4.82	0.02 U	0.77	6.97	NR	NR
PASB-05	9.82	12.28	5.3	3.41	NR U	NR	NR	NR
PASB-06	NR	NR	NR	NR	NR	NR	NR	NR
PASB-07	2.73	0.86	U	U	U	NR	NR	NR
PASB-08	2.99	4.1	3.7	4.25	NR	NR	NR	NR
PASB-09	12.84	9.93	11.21	0.06 U	NR	NR	NR	NR
PASB-10	52.87	8.29	NR	NR	0.24 U	NR	NR	NR
PASB-10a	14.8	12.02	▨	▨	▨	▨	▨	▨
PASB-10b	10.61	2.36	▨	▨	▨	▨	▨	▨
PASB-10c	11.8	3.21	▨	▨	▨	▨	▨	▨
PASB-10d	11.8	3.71	▨	▨	▨	▨	▨	▨
PASB-11	0.72	3.73	1.77	NR U	0.01 U	NR	NR	NR
PASB-12	0.3	0.77	0.06 U	NR U	0.01 U	NR	NR	NR
PASB-13	0.33	3.41	0.7	NR	NR	NR	NR	NR
PASB-14	10.78	2.8	1.68	0.64	0.37	NR	NR	NR
PASB-15	NR	4.45	NR	NR	NR	NR	NR	NR
PASB-16	0.39	3.47	0.53	0.01 U	NR	NR	NR	NR
PASB-17	1.13	0.21 U	0.1	0.05 U	NR	NR	NR	NR
PASB-18	1.57	1.41	0.34	0.03 U	NR	NR	NR	NR
PASB-19	NR	2.12	0.4	NR	NR	NR	NR	NR
PASB-20	0.31	0.12 U	0.01	0.36	NR	NR	NR	NR
PASB-21	2.88	1.45	0.61	0.43	NR	NR	NR	NR
SWSB-01	0.46	U	U	U	NR	NR	U	NR
SWSB-02	1.81	U	0.19	0.28	U	NR	NR	NR
SWSB-03	U	U	0.01 U	U	0.01 U	NR	NR	NR
SWSB-04	5.27	U	U	0.03 U	U	NR	NR	NR
SWSB-05	14.16	0.87	6.07	NR	NR	▨	▨	▨
SWSB-06	0.72	0.22 U	0.67	1.06	0.01 U	0.93	0.01 U	NR
SWSB-07	0.49	0.04 U	0.13 U	0.02 U		NR	NR	NR
SWSB-08	4.79	0.94	2.25	0.47	NR	▨	▨	▨
SWSB-09	4.5	3.35	0.29	0.04 U	NR	▨	▨	▨
SWSB-10	NR	1.08	2.23	4.6	0.3	NR	NR	NR
SWSB-11	5.64	0.9	0.75	NR	U	0.36	0.08 U	NR
SWSB-12	6.24	2.19	3.97	0.04 U	NR	▨	▨	▨
SWSB-13	1.84	7.75	U	NR	0.49	NR	0.01 U	NR
SWSB-14	1.04	2.27	4.79	NR	3.96	NR	0.65	0.04 U
SWSB-15	1.24	1.87	0.16 U	9.89	NR	▨	▨	▨
SWSB-16	2.02	0.06 U	0.45	2.03	0.28	NR	0.26	NR
SWSB-17	2.21	1.22	0.49	0.24 U	NR	NR	NR	NR
SWSB-18	0.03 U	0.11 U	U	1.86	0.1 U	▨	▨	▨
SWSB-19	1.43	0.22 U	0.3	0.06 U	NR	▨	▨	▨
SWSB-20	1.74	0.13 U	U	0.14 U	0.02 U	NR	NR	NR
SWSB-21	1.11	0.82	U	U	U	NR	NR	NR

Table 4-12
PCB Soil Screening Sample Results
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Data by Vertical Horizon (feet bgs)							
	0-2 (A)	2-4 (B)	4-6 (C)	6-8 (D)	8-10 (E)	10-12 (F)	12-14 (G)	14-16 (H)
SWSB-22	3.46	7.42	1.92	3.49	0.02 U	NR	NR	NR
SWSB-23	NR	0.24 U	2.6	1.03	0.4	0.79	NR	NR
SWSB-24	7.45	2.47	0.53	2.82	5.02	1.37	NR	NR
SWSB-25	7.74	5.77	U	0.03 U	NR	NR	NR	NR
SWSB-26	0.36	1.8	3.25	0.03 U	NR	NR	2.71	NR
SWSB-27	4.19	8.02	0.03 U	4.56	0.11 U	NR	NR	NR
SWSB-28	2.74	0.03 U	U	2.09	45.6	NR	NR	NR
SWSB-29	0.55	1.32	0.03 U	U	NR	NR	NR	NR
SWSB-30	1.15	0.26	5.36	2.17	0.29	NR	NR	NR
SWSB-31	2.38	2.14	2.19	2.06	4.99	NR	NR	NR
SWSB-32	NR	4.42	1.19	NR	5.52	NR	NR	NR
SWSB-33	2.15	0.19 U	0.08 U	0.42	3.79			
SWSB-34	4.55	0.04 U	0.12 U	3.65	20.81			
SWSB-35	0.8	0.1 U	0.08 U	3.29	3.17	3.49	NR	NR
SWSB-36	6.34	4.95	3.1	2.47	0.49	2.31	0.77	NR
SWSB-37	4.58	6.78	8.49	2.13	0.11 U			

Notes:

bgs = below ground surface
PASB = process area soil boring
SWSB = site-wide soil boring
U = non-detected value.

Shaded cells indicate no sample collected
NR = no recovery; no data available due to lack of sample recovery
All results in milligram per kilogram (mg/kg)

(A) = 0 to 2 feet bgs
(B) = 2 to 4 feet bgs
(C) = 4 to 6 feet bgs
(D) = 6 to 8 feet bgs

(E) = 8 to 10 feet bgs
(F) = 10 to 12 feet bgs
(G) = 12 to 14 feet bgs
(H) = 14 to 16 feet bgs

Table 4-13
Lead XRF Soil Screening Sample Results
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Data by Vertical Horizon (feet bgs)								
	0-2 (A)	2-4 (B)	4-6 (C)	6-8 (D)	8-10 (E)	10-12 (F)	12-14 (G)	14-16 (H)	16-18 (I)	18-20 (J)
PASB-01	748.0	700.2	189.0	455.0	339.0	NR	797.0	NR		
PASB-02	2089.0	485.1	787.0	742.0	225.0	706.0	338.0	NR		
PASB-03	1690.0	400.7	129.0	541.0	101.0	NR	19.3	NR		
PASB-04	5219.2	NR	1481.2	9604.1	127.4	2848.9	2290.2	NR		
PASB-05	8517.0	19798.4	6660.1	218.9	1186.0	482.5	NR	NR		
PASB-06	4499.8	2809.4	1827.3	2071.9	249.8	794.4	28.2	NR		
PASB-07	1265.3	701.5	98.6	134.3	269.7	194.7	172.5	NR		
PASB-08	2426.1	1933.9	1927.2	3022.8	NR	NR	NR	NR		
PASB-09	7720.0	4815.7	2857.6	351.7	69.6	325.6	377.4	NR		
PASB-10	7478.2	4271.4	NR	NR	759.1	NR	758.6	NR		
PASB-10a	8090.5	7122.7								
PASB-10b	5772.8	2338.6								
PASB-10c	7772.7	17565.3								
PASB-10d	7379.7	3597.9								
PASB-11	341.5	3336.6	941.5	98.7	1110.3	1143.7	489.1	NR		
PASB-12	376.5	484.3	420.5	20.0 U	95.9	208.7	20.0 U	NR		
PASB-13	4323.7	3443.1	620.6	443.6	1611.9	472.8	20.0 U	NR		
PASB-14	5506.7	1732.3	937.4	69.3	1271.6	756.9	20.0 U	NR		
PASB-15	5634.3	3800.9	NR	NR	NR	NR	NR	NR	NR	NR
PASB-16	406.3	1558.0	484.7	854.5	805.2	NR	20.0 U	NR		
PASB-17	280.5	405.7	818.8	122.4	302.1	NR	158.0	NR		
PASB-18	3840.3	1244.4	1109.6	2905.2	457.2	810.7	98.2	NR		
PASB-19	NR	1004.7	2503.9	NR	376.7	1069.5	85.7	NR		
PASB-20	702.9	NR	36.2	439.6	514.0	364.2	304.4	NR		
PASB-21	2613.6	765.0	1751.5	NR	1050.6	NR	20.0 U	NR		
SWSB-01	613.0	632.0	93.8	246.0	509.0	194.0	NR	NR	NR	20.0 U
SWSB-02	289.5	233.7	500.8	713.2	221.7	610.6	346.3	NR		
SWSB-03	518.0	151.6	109.0	20.0 U	233.4	846.7	1115.3	NR		
SWSB-04	1105.9	191.3	20.0 U	29.0	823.5	NR	NR	NR		
SWSB-05	2456.2	2191.4	1152.6	1357.1						
SWSB-06	663.9	1687.4	541.2	722.9	1047.2	836.2	124.8	NR		
SWSB-07	332.7	148.9	363.6	77.7	21.0	94.7	212.6	NR		
SWSB-08	2081.6	1956.2	66.4	4218.6	296.7					
SWSB-09	2650.1	1441.8	558.5	1210.7	624.6					

Table 4-13
Lead XRF Soil Screening Sample Results
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Data by Vertical Horizon (feet bgs)									
	0-2 (A)	2-4 (B)	4-6 (C)	6-8 (D)	8-10 (E)	10-12 (F)	12-14 (G)	14-16 (H)	16-18 (I)	18-20 (J)
SWSB-10	NR	1038.7	923.7	1448.7	1194.5	1272.5	249.5	NR		
SWSB-11	3863.3	1002.4	668.7	291.0	63.2	757.4	93.4	NR		
SWSB-12	3395.3	302.1	1928.4	113.1	192.1					
SWSB-13	1393.5	1803.5	27.3	NR	1368.0	NR	206.9	NR		
SWSB-14	1009.0	1732.1	1681.2	93.8	3162.2	NR	1091.4	1008.4	456.0	477.8
SWSB-15	639.7	946.5	838.4	2878.9	466.1					
SWSB-16	374.5	631.3	69.1	2384.5	2380.8	NR	71.5	NR		
SWSB-17	13900.0	1331.0	478.6	1270.0	5819.0	3621.0	1170.0	NR		
SWSB-18	246.2	20.0 U	20.0 U	1558.0	402.6					
SWSB-19	1816.0	123.6	728.3	50.4	NR					
SWSB-20	302.0	5031.0	465.3	112.3	180.8	NR	NR	NR		
SWSB-21	1936.0	1153.0	105.7	868.3	135.8	NR	NR	NR		
SWSB-22	3504.0	2199.0	4873.0	821.3	1213.0	NR	NR	NR		
SWSB-23	NR	456.8	784.5	3300.0	1707.0	2256.0	3531.0	NR		
SWSB-24	4740.8	1145.0	130.2	1000.8	2460.6	798.6	249.0	NR		
SWSB-25	283.8	5629.1	157.8	348.7	2451.1	NR	NR	NR		
SWSB-26	2692.5	3584.7	2276.3	1993.1	20.0 U	976.1	NR	NR		
SWSB-27	3034.7	2564.7	4074.2	4034.1	1040.7	NR	NR	NR		
SWSB-28	3660.8	31.2	20.0 U	1827.3	4919.3	NR	NR	NR		
SWSB-29	916.6	2740.3	1603.6	389.2	20.0 U	NR	NR	NR		
SWSB-30	2473.4	21.0	5445.5	15714.9	3632.0	NR	NR	NR		
SWSB-31	5340.6	1748.9	50.6	3052.1	4587.1	NR	NR	NR		
SWSB-32	NR	5259.2	1788.2	NR	3013.0					
SWSB-33	2146.9	516.0	14200.9	286.8	2144.9					
SWSB-34	4114.3	128.1	95.8	4263.8	3849.0	NR	NR	NR		
SWSB-35	554.4	353.5	145.9	2450.3	2810.7	2324.9	408.9	NR		
SWSB-36	1034.3	2014.2	2408.1	1680.2	644.1	1211.2	31.0	NR		
SWSB-37	1412.2	1413.6	2841.2	396.0	678.4					

Notes:

All units in parts per million (ppm)
Shaded cells indicate no sample collected
PASB = process area soil boring
SWSB = site-wide soil boring

NR = no recovery; no data available due to lack of sample recovery
bgs = below ground surface
XRF = X-ray fluorescence

Table 4-13
Lead XRF Soil Screening Sample Results
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Sample ID	Data by Vertical Horizon (feet bgs)									
	0-2 (A)	2-4 (B)	4-6 (C)	6-8 (D)	8-10 (E)	10-12 (F)	12-14 (G)	14-16 (H)	16-18 (I)	18-20 (J)

(A) = 0 to 2 feet bgs
(B) = 2 to 4 feet bgs
(C) = 4 to 6 feet bgs
(D) = 6 to 8 feet bgs
(E) = 8 to 10 feet bgs
(F) = 10 to 12 feet bgs
(G) = 12 to 14 feet bgs
(H) = 14 to 16 feet bgs
(I) = 16 to 18 feet bgs
(J) = 18 to 20 feet bgs

Table 4-14
Process Area Soil Boring Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	PASS-01-S		PASB-01		PASS-02-D		PASB-02		PASS-03-D		PASB-03		PASS-04-D		PASB-04		PASS-05-S		PASB-05		PASS-06-D		PASB-06	
VOCs																											
m,p-Xylenes (total)	**5813**	-----	UJ	-----	UJ	-----	UJ	-----	U	-----	UJ	-----		-----	UJ	-----		-----	UJ	29000		-----	R	-----	
SVOCs																											
Phenol	**145**	-----	UJ	-----	U	-----	UJ	-----	U	-----	UJ	-----	U	-----	UJ	-----	U	-----	UJ	-----	U	-----	UJ	-----	U
Benzo(a)anthracene	**620**	2400		640		12000		1700		3100		-----	J	19000		1500	J	4800		8800		5000		900	J
Chrysene	1938	2800		-----		13000		1800		3600		-----	J	22000		1700	J	5800		9300		5900		-----	J
bis(2-Ethylhexyl) phthalate	35000	-----		-----		-----		-----	J	40000		-----		63000		-----		-----		68000		73000		37000	
Benzo(b)fluoranthene	**620**	2900		710		13000		1400		3300		-----	J	22000		1200	J	5900		6500		5500		760	J
Benzo(k)fluoranthene	5329	-----		-----		10000		-----		-----		-----	J	20000		-----	J	5200		7500		4900		-----	J
Benzo(a)pyrene	**62**	2900		680		13000		1600		3500		240	J	23000		1200	J	6100		7100		5700		780	J
Indeno(1,2,3-cd)pyrene	**620**	2400		-----	J	12000		900	J	2900		-----	J	17000		680	J	4600		3800	J	3600	J	-----	J
Dibenz(a,h)anthracene	**62**	700	J	120	J	3600	J	240	J	900	J	-----	U	5500		240	J	1300	J	1200	J	1000	J	-----	U
P/PCBs																											
Heptachlor	110	-----	UJ	-----	U	-----	J	-----	U	-----	J	-----	J	570	J	-----	U	340	J	510	J	800	J	-----	U
Heptachlor epoxide	53	-----	R	-----	R	-----	R	-----	J	-----	R	-----	U	-----	UJ	-----	U	-----	UJ	-----	UJ	-----	UJ	-----	U
Endrin	97	460	J	-----	J	1100	J	-----	U	470	J	-----	U	2500	J	-----	J	2900	J	1500	J	2200	J	-----	J
4,4'-DDD	2400	-----	UJ	-----	U	-----	UJ	-----	J	-----	UJ	-----	JN	-----	UJ	-----	U	-----	UJ	-----	UJ	-----	UJ	-----	J
4,4'-DDT	1700	-----	UJ	-----	U	-----	UJ	-----		-----	J	-----		3000	J	-----	U	-----	UJ	1800	J	2700	J	-----	
Aroclor-1242	970	-----	UJ	-----	U	-----	UJ	-----	U	-----	UJ	-----	U	35000	J	7700		28000	J	35000		38000	J	1800	
Aroclor-1248	970	3800	J	-----		14000	J	-----	U	4000	J	-----		-----	UJ	-----	U	-----	UJ	-----	UJ	-----	UJ	-----	U
Aroclor-1254	**110**	6200	J	840		17000	J	250	J	5600	J	310		33000	J	3400		35000	J	27000		28000	J	2200	
Aroclor-1260	970	-----	UJ	-----		4800	J	-----	U	1700	J	-----	J	-----	UJ	-----		-----	UJ	15000	J	-----	UJ	1400	
Inorganics																											
Aluminum	7600	18600				19200		7660	J	23700		15400	J	27100		15000	J	31500		24100	J	37600		12300	J
Antimony	3.1	15				34.6		9.4	J	17		5.7	J	52		39.1	J	51.3		-----	UJ	97.5		19.7	J
Arsenic	**0.39**	10.9		9.8		15.3		13.4		9.9		9.7		23.4		18.9		24.3		49.8		26.4		20.8	
Barium	300	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	838	J	-----	J	-----	J	1160	J	682	J	551	J
Beryllium	0.16	0.49		0.54		0.34	J	0.7		0.47	J	0.63		0.64		0.83		0.36	J	0.39	J	0.4	J	0.46	J
Cadmium	**1**	11.1		4.2	J	31.9		3.1	J	12.8		6.5	J	30.2		18.1	J	31.9		30.9	J	96.5		20.1	J
Chromium	10	77.1		-----	R	114		-----	R	69		-----	R	187		-----	R	143		-----	R	153		-----	R
Copper	**25**	909		265	J	1420		114	J	1210		210	J	5840	D	221	J	2350		1460	J	2730		231	J
Iron	**2000**	51800		33600	J	94400		60200	J	51300		39100	J	127000		44900	J	95200		2E+05	J	89000		74500	J
Lead	**400**	1000		421	J	1880		-----	J	1560		-----	J	4070		876	J	3530		4520	J	3970		1810	J
Manganese	180	672		509	J	851		495	J	695		918	J	1040		736	J	931		1150	J	909		1060	J
Mercury	**0.1**	3.5		2	J	7.3	D	0.36	J	1.9		0.86	J	12.6	D	3	J	10.6	D	9.1	J	5.1		1.6	J
Nickel	13	101	J	-----	R	177	J	-----	R	87.8	J	-----	R	238	J	-----	R	239	J	-----	R	216	J	-----	R
Selenium	2.76	-----	U	2.5	J	-----	U	2.8	J	-----	U	3.3	J	-----	U	2.2	J	-----	U	-----	R	-----	U	-----	R
Thallium	1	-----	U	1.4	J	-----	U	2.4	J	-----	U	2.3	J	-----	U	2.5	J	-----	U	5.9		-----	U	3.3	
Vanadium	**7.8**	51.1		34.5		119		28.5		53.5		25		204		26.7		126		73.3		114		26	
Zinc	**20**	2000	J	2450	J	4250	J	440	J	2280	J	944	J	6200	J	999	J	10900	J	33300	J	5410	J	2450	J

Table 4-14
Process Area Soil Boring Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	PASS-07-D		PASB-07		PASS-08-D		PASB-08		PASS-09-D		PASB-09		PASS-10-D		PASB-10		PASS-11-D		PASB-11		PASB-11-DUP		PASS-12-D		PASB-12	
VOCs																											
m,p-Xylenes	**5813**	-----	UJ	-----	J	-----	UJ	-----	J	-----	UJ	**14000**		-----	UJ	5500		-----	UJ	5600		6800		-----	UJ	-----	J
SVOCs																											
Phenol	145	-----	UJ	-----	U	-----	UJ	-----	U	-----	UJ	230	J	-----	UJ	-----	U	-----	UJ	-----	U	-----	U	-----	UJ	-----	U
Benzo(a)anthracene	**620**	2100		-----	J	4800		2200		1300	J	1100	J	4100	J	1100	J	1600	J	1800	J	2300	J	2700	J	1600	J
Chrysene	1938	2400		-----	J	5500		2200		1500	J	1600	J	4600	J	-----	J	1600	J	2300	J	3000	J	2900	J	2000	
bis(2-Ethylhexyl) phthalate	35000	-----		-----	J	-----		-----		-----	J	-----		-----	J	48000		-----	J	-----		-----		-----	J	-----	
Benzo(b)fluoranthene	**620**	2500		870	J	5700		2100		1900	J	1500	J	4600	J	1200	J	1600	J	1400	J	1400	J	3200	J	1500	J
Benzo(k)fluoranthene	5329	-----		-----	J	4900		-----		-----	J	-----	J	4000	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J
Benzo(a)pyrene	**62**	2600		680	J	5900		2100		1400	J	1200	J	5000	J	1000	J	1700	J	1800	J	1900	J	3200	J	1700	J
Indeno(1,2,3-cd)pyrene	**620**	2000		-----	J	4700		1600	J	1500	J	790	J	4000	J	700	J	1300	J	1100	J	860	J	2700	J	1300	J
Dibenz(a,h)anthracene	**62**	550	J	200	J	1300	J	390	J	500	J	-----	U	1400	J	-----	U	450	J	-----	U	-----	U	750	J	350	J
P/PCBs																											
Heptachlor	110	-----	UJ	-----	J	320	J	-----	J	450	J	-----	UJ	290	J	950	J	-----	J	-----	U	-----	J	-----	J	-----	J
Heptachlor epoxide	53	-----	R	-----	U	-----	UJ	-----	R	-----	UJ	-----	UJ	-----	UJ	-----	R	-----	R	-----	U	-----	U	-----	R	-----	U
Endrin	97	420	J	-----	J	1500	J	-----	U	1300	J	860		1400	J	380	J	-----	J	-----	J	-----	J	490	J	-----	R
4,4'-DDD	2400	-----	UJ	-----	U	-----	UJ	12000		-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	J	-----	J	-----	UJ	-----	J
4,4'-DDT	1700	-----	UJ	-----		-----	UJ	2200	J	1900	J	-----	J	-----	UJ	-----	J	-----	UJ	-----		-----	J	-----	UJ	-----	
Aroclor-1242	970	-----	UJ	-----		21000	J	7500		-----	UJ	24000		-----	UJ	54000		-----	UJ	1900		2800		-----	UJ	-----	U
Aroclor-1248	970	3500	J	-----	U	-----	UJ	-----	U	37000	J	-----	UJ	23000	J	-----	UJ	4600	J	-----	U	-----	U	3600	J	-----	
Aroclor-1254	**110**	5000	J	770		20000	J	6700		24000	J	14000		22000	J	9600		5800	J	1700		2900		6100	J	560	
Aroclor-1260	970	2100	J	-----		6600	J	2400		6100	J	6700	J	6900	J	2600	J	2100	J	-----		1200		1800	J	-----	
Inorganics																											
Aluminum	7600	26900		19700	J	37400		17700	J	44500		104001	J	42000		49400	J	61100		55800	J	42200	J	32900		18300	J
Antimony	3.1	22.2		5.8	J	85.1		14	J	43.9		32.8	J	47.2		42.1	J	25.4		14.6	J	13.8	J	14.8		6.7	J
Arsenic	**0.39**	10.3		6.9		27		20		22.8		35.2		28.4		25.3		7.3		18.1		17.8		10.2		10.1	
Barium	300	-----	J	-----	J	1930	J	-----	J	622		909	J	-----		681	J	-----		-----	J	-----	J	-----		-----	J
Beryllium	0.16	0.51	J	0.64		0.68		0.82		0.41	J	0.47	J	0.41	J	0.38	J	0.39	J	0.47	J	0.45	J	0.47	J	0.85	
Cadmium	**1**	12.3		3.9	J	78.4		27.9	J	42.5		85.4	J	46.6		42.3	J	9.3		22.6	J	21.3	J	11.2		7.3	J
Chromium	10	83.7		-----	R	184		-----	R	230		-----	R	177		-----	R	103		-----	R	-----	R	93.8		-----	R
Copper	**25**	1350		330	J	2710		2770	J	2970		5150	J	2760		6650	J	4780	D	2440	J	1740	J	1840		670	J
Iron	**2000**	52600		37000	J	90500		57100	J	93400	J	117999	J	99400	J	79100	J	60000	J	53700	J	72800	J	49600	J	45000	J
Lead	**400**	1270		685	J	3270		1180	J	3580		3860	J	3930		2250	J	4680		1640	J	1560	J	1250		1930	J
Manganese	180	733		790	J	1010		979	J	904		1250	J	1080		917	J	777		908	J	806	J	729		787	J
Mercury	**0.1**	3.4		0.9	J	12.2	D	3.6	J	15.2	D	5.1	J	8.2	D	1.5	J	1.2		1	J	1.3	J	2.3		0.68	J
Nickel	13	92.9	J	-----	R	189	J	-----	R	413		-----	R	263		-----	R	125		-----	R	-----	R	98.8		-----	R
Selenium	2.76	-----	U	-----	J	3.4	J	-----	R	-----	J	-----	R	-----	U	-----	R	-----	J	3.8	J	2.7	J	-----	U	-----	J
Thallium	1	-----	U	2.2	J	-----	U	4.1		-----	U	4.8		-----	U	3		-----	U	2.5	J	2.7	J	-----	U	2.3	J
Vanadium	**7.8**	56.1		38.5		111		82.9		170		54.6		256		31.3		57.3		47.9		45.9		55.4		31	
Zinc	**20**	1940	J	521	J	7570	J	3610	J	6560		8320	J	6850		6790	J	3050		3600	J	3420	J	2710		489	J

Table 4-14
Process Area Soil Boring Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	PASS-13-S		PASB-13		PASS-14-D		PASB-14		PASS-15-D		PASS-15-D-Dup		PASB-15		PASS-16-S		PASB-16		PASS-17-D		PASB-17		PASS-18-D	
VOCs																									
m,p-Xylenes	5813	-----	UJ	-----	U	-----	UJ	-----		-----	UJ	-----	UJ	-----		-----	UJ	-----		-----	UJ	-----		-----	UJ
SVOCs																									
Phenol	145	-----	UJ	-----	U	-----	UJ	-----	U	-----	UJ	-----	UJ	-----	U	-----	UJ	-----	U	-----	UJ	-----	U	-----	UJ
Benzo(a)anthracene	**620**	670	J	1600	J	5100	J	-----	J	680	J	-----	J	-----	J	1100	J	6300		700	J	990		1400	J
Chrysene	1938	-----	J	1700	J	5700	J	-----	J	-----	J	-----	J	-----	J	-----	J	6200		-----	J	-----		1600	J
bis(2-Ethylhexyl) phthalate	35000	-----	J	-----	J	-----	J	-----		-----	J	-----	J	-----		-----	J	-----	U	-----	J	-----	U	-----	J
Benzo(b)fluoranthene	**620**	840	J	920	J	5200	J	-----	J	750	J	690	J	-----	U	1300	J	5000		740	J	900		1600	J
Benzo(k)fluoranthene	5329	-----	J	-----	J	4400	J	-----	J	-----	J	-----	J	-----	U	-----	J	-----		-----	J	-----		-----	J
Benzo(a)pyrene	**62**	900	J	1000	J	6000	J	500	J	870	J	740	J	440	J	1500	J	4100		870	J	890		1500	J
Indeno(1,2,3-cd)pyrene	**620**	-----	J	690	J	4100	J	-----	UJ	650	J	710	J	-----	UJ	1300	J	2300	J	790	J	-----		1200	J
Dibenz(a,h)anthracene	**62**	-----	UJ	-----	U	1300	J	-----	U	-----	UJ	-----	UJ	-----	U	320	J	530	J	-----	UJ	130	J	330	J
P/PCBs																									
Heptachlor	110	-----	J	-----	J	380	J	-----	U	-----	J	-----	J	-----		-----	J	-----	U	-----	J	-----	U	-----	J
Heptachlor epoxide	53	-----	R	-----	R	-----	UJ	-----	U	62	J	-----	R	-----	U	-----	R	-----	U	-----	R	-----	U	-----	UJ
Endrin	97	750	J	-----		1600	J	-----	J	620	J	630	J	-----		-----	J	-----	J	-----	UJ	-----	J	-----	J
4,4'-DDD	2400	-----	UJ	-----		-----	UJ	-----	J	-----	UJ	-----	UJ	-----	J	-----	UJ	-----	R	-----	UJ	-----		-----	UJ
4,4'-DDT	1700	-----	UJ	-----	U	-----	UJ	-----		-----	UJ	-----	UJ	-----	J	-----	UJ	-----	J	-----	J	-----	J	-----	J
Aroclor-1242	970	-----	UJ	-----	U	-----	UJ	3000		-----	UJ	-----	UJ	4100		-----	UJ	3300		-----	UJ	-----		-----	UJ
Aroclor-1248	970	-----	UJ	2000		19000	J	-----	U	8300	J	8300	J	-----	U	1600	J	-----	U	-----	J	-----	U	1200	J
Aroclor-1254	**110**	11000	J	3100		23000	J	2100		9300	J	9400	J	4200		3500	J	2500		460	J	340		1800	J
Aroclor-1260	970	-----	UJ	1200		9700	J	1100		2000	J	2000	J	3300	J	-----	J	1500		-----	J	-----	J	-----	J
Inorganics																									
Aluminum	7600	42300		34000	J	52400		8770	J	147000	D	124000	D	64400	J	42400		31900	J	67400		13700	J	50300	
Antimony	3.1	16.5		20	J	45.3		10.1	J	74.3	J	111	J	128	J	19		11.9	J	18.1		6.3	J	22.5	
Arsenic	**0.39**	8.4		25.9		16.2		19.5		19.5	J	12.5	J	36.3		7.8		15.7		8.8		8.4		9.7	
Barium	300	-----		956	J	-----		619	J	-----		-----		953	J	-----		-----	J	-----		-----	J	-----	
Beryllium	0.16	0.45	J	0.46	J	0.36	J	0.32	J	0.41	J	0.46	J	0.37	J	0.37	J	0.58		0.48	J	0.66		0.44	J
Cadmium	**1**	11.9		74.8	J	34.7		143	J	32		33.9		55.5	J	9.3		16.3	J	13.2		3.8	J	23.4	
Chromium	10	93.7		-----	R	152		-----	R	266		335		-----	R	132		-----	R	112		-----	R	125	
Copper	**25**	4190	D	1470	J	3710		640	J	7930	D	8410	D	6090	J	3100		3080	J	2660		566	J	3870	D
Iron	**2000**	30500	J	146001	J	77500	J	83700	J	46200	J	53100	J	131001	J	52800	J	62300	J	39000	J	38200	J	46000	J
Lead	**400**	1040		2970	J	2500		902	J	3450		4220		5190	J	1260		1210	J	1080		-----	J	1770	
Manganese	180	741		1290	J	845		594	J	1600		1330		1050	J	724		889	J	1090		589	J	798	
Mercury	**0.1**	1.4		2.1	J	8	D	0.7	J	3.8		2.8		2.8	J	1.4		1.5	J	3.6		1.1	J	2.2	
Nickel	13	75.1		-----	R	282		-----	R	265		196		-----	R	140		-----	R	98.8		-----	R	128	
Selenium	2.76	-----	U	-----	R	-----	J	-----	R	-----	U	-----	U	-----	R	-----	U	2.7	J	-----	U	-----	J	-----	U
Thallium	1	-----	U	5.8		-----	U	2.9		-----	U	-----	U	4.5		-----	U	3		-----	U	2	J	-----	U
Vanadium	**7.8**	32.7		34.3		107		58.2		92		77.2		53.9		51.6		51.3		39.9		23.4		46.9	
Zinc	**20**	1820		12700	J	5780		6430	J	6100		6220		25800	J	2480		3060	J	2080		370	J	2980	

Table 4-14
Process Area Soil Boring Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
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Chemical Name	SSSSC	PASB-18		PASB-18-DUP		PASS-19-D		PASB-19		PASS-20-D		PASS-20-D-Dup		PASB-20		PASS-21-D		PASB-21	
VOCs																					
m,p-Xylenes	5813	-----	J	-----		-----	UJ	8100		-----	UJ	-----	UJ	-----	U	-----	UJ	-----	
SVOCs																					
Phenol	145	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ
Benzo(a)anthracene	620	4500	J	3600	J	-----	J	1600	J	-----	J	2300	J	4600	J	1400	J	3100	J
Chrysene	1938	4800	J	3100	J	-----	J	1900	J	-----	J	2500	J	6800	J	1600	J	3300	J
bis(2-Ethylhexyl) phthalate	35000	-----		-----	J	-----	J	-----	J	-----	J	-----	J	-----	UJ	-----	J	-----	J
Benzo(b)fluoranthene	620	3800	J	3000	J	-----	J	1000	J	-----	J	2100	J	3700	J	1800	J	2400	J
Benzo(k)fluoranthene	5329	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	4100	J	-----	J	-----	J
Benzo(a)pyrene	62	3900	J	3100	J	430	J	1100	J	580	J	2300	J	4000	J	1700	J	2300	J
Indeno(1,2,3-cd)pyrene	620	2100	J	1600	J	-----	J	1000	J	-----	J	1300	J	2500	J	1400	J	1300	J
Dibenz(a,h)anthracene	62	600	J	510	J	-----	UJ	-----	UJ	-----	UJ	410	J	470	J	460	J	370	J
P/PCBs																					
Heptachlor	110	-----	U	-----	U	-----	UJ	-----	U	-----	J	-----	J	-----		-----	J	-----	U
Heptachlor epoxide	53	-----	U	-----	U	-----	R	-----	U	-----	R	-----	R	-----	J	-----	R	-----	R
Endrin	97	-----		-----	J	-----	J	-----	J	-----	J	-----	J	-----	U	-----	J	-----	
4,4'-DDD	2400	-----		-----	J	-----	UJ	-----	J	-----	UJ	-----	UJ	-----	J	-----	UJ	-----	
4,4'-DDT	1700	-----		-----	J	-----	J	-----		-----	J	-----	J	-----	J	-----	UJ	-----	
Aroclor-1242	970	-----	U	2300		-----	UJ	-----	U	-----	UJ	-----	UJ	-----		-----	UJ	-----	
Aroclor-1248	970	1300	J	-----	U	-----	J	1800		-----	J	-----	J	-----	U	3300	J	-----	U
Aroclor-1254	110	1700		2100		1300	J	1400		1100	J	950	J	140		4500	J	830	
Aroclor-1260	970	1300		1400	J	-----	J	-----		-----	J	-----	J	-----	U	-----	UJ	-----	
Inorganics																					
Aluminum	7600	19500	J	18300		146000	D	20400	J	45200		55000		13700		37800		19600	
Antimony	3.1	9	J	4.4	J	59.2		10.8	J	33.5		21.7		-----	J	22.1		4.1	J
Arsenic	0.39	13.5		-----	R	7.3		11.9		8.2		7.4		-----	R	9.3		-----	R
Barium	300	-----	J	-----		-----		-----	J	-----	J	-----	J	-----		-----		-----	
Beryllium	0.16	0.59		0.59		0.56	J	0.53	J	0.54	J	0.61		0.68		0.63		0.86	
Cadmium	1	21.4	J	17.7		17.7		12	J	60.5		50.9		3.3		15.7		6.8	
Chromium	10	-----	R	57.8		277		-----	R	104		95		19.8		129		38.6	
Copper	25	829	J	-----	R	11000	D	731	J	2050		2560		-----	R	2690		-----	R
Iron	2000	64700	J	61500		54800	J	71700	J	46200	J	39300	J	30000		50600	J	52200	
Lead	400	1520	J	-----	R	2480		782	J	1770		1010		-----	R	1370		-----	R
Manganese	180	669	J	697		1370		791	J	778		824		608		750		706	
Mercury	0.1	0.99	J	1.3		1		0.82	J	-----	R	-----	R	0.29		1.8		0.66	
Nickel	13	-----	R	89.7		229		-----	R	87.8		87.4		28.4		115		93.1	
Selenium	2.76	2.8	J	4.1		-----	U	3.4	J	-----	U	-----	J	-----	J	-----	U	2.8	J
Thallium	1	2.6	J	2.7	J	-----	U	3.3		-----	U	-----	U	1.7	J	-----	U	2.5	J
Vanadium	7.8	30.3		29.9		60		29.2		36.4		37.4		26.1		52.5		30.1	
Zinc	20	2120	J	2400		5230		2310	J	2650		2470		134		2360		1320	

Table 4-14
Process Area Soil Boring Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
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Notes:
Indicator contaminants are bolded
All VOC, SVOC, and P/PCB values are in micrograms per kilogram (ug/kg); inorganic values are in milligrams per kilogram (mg/kg)
Dup = duplicate
P/PCBs = pesticides and polychlorinated biphenyls
PASB = process area subsurface soil sample (2-4 feet below ground surface)
PASS = process area soil boring surface soil sample (S - 0-2 inches below ground surface; D - 0-12 inches below ground surface)
SSSSC = site-specific soil screening criteria
SVOCs = semivolatile organic compounds
VOCs = volatile organic compounds
A = Detected sample value is greater than the screening criteria value.
Dashed cells indicate that the value does not exceed the SSSSC -----
D = Compound is identified as a secondary dilution factor.
J = Value is estimated due to exceeded quality control criteria.
R = rejected sample from laboratory.
U = non-detected value.

Table 4-15
Site-Wide Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	SWSS-01-D		SWSB-01		SWSS-02-D		SWSB-02		SWSS-03-D		SWSB-03		SWSS-04-D		SWSB-04		SWSS-05-D		SWSB-05		SWSS-06-D		SWSB-06		SWSS-07-D	
VOCs																											
Benzene	291	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
m,p-Xylenes (total)	5813	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	J	-----		-----	U	-----	U	-----	U
SVOCs																											
Phenol	145	-----	U	-----	J	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Naphthalene	5600	-----	J	-----		-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	J	-----	U	6300		-----	U
Dimethylphthalate	9689	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	J	-----	U	-----	J	-----	U	-----	J	-----	U	-----	U
Phenanthrene	68892	-----		-----		-----	U	-----	J	-----	J	-----	J	-----	U	-----	J	-----	J	-----	J	-----		69000		-----	J
Fluoranthene	68892	-----		-----		-----		-----	J	-----		-----		-----	J	-----	J	-----		-----	J	52000		70000		-----	
Benzo(a)anthracene	**620**	-----		3700		1300		630	J	-----	J	-----	J	660	J	-----	J	2800	J	850	J	19000		22000		1800	J
Chrysene	1938	-----		3500		-----		-----	J	-----		-----		-----	J	-----	J	4300		-----	J	15000		20000		2300	
bis(2-Ethylhexyl) phthalate	35000	-----	U	-----	U	-----	J	-----	J	-----		-----	U	-----	J	-----	U	-----	U	-----	U	-----	J	-----	J	-----	
Benzo(b)fluoranthene	**620**	-----	J	2500		1400		-----	J	-----	J	-----	J	1500	J	-----	J	3000	J	1100	J	11000		16000		1600	J
Benzo(k)fluoranthene	5329	-----		-----		-----		-----	J	-----	J	-----		-----	J	-----	J	-----	J	-----	J	10000		18000		-----	J
Benzo(a)pyrene	**62**	610		2900		1100		660	J	240	J	320	J	1000	J	120	J	3600	J	1700	J	17000		21000		1600	J
Indeno(1,2,3-cd)pyrene	**620**	-----		1500		690		-----	J	-----	J	-----	J	1400	J	-----	J	3300	J	1200	J	8000		11000		1400	J
Dibenz(a,h)anthracene	**49**	120	J	520		200	J	-----	U	51	J	60	J	-----	U	-----	U	810	J	-----	U	3000		4300		340	J
P/PCBs																											
Heptachlor	110	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	J	-----	UJ	-----	UJ
Heptachlor epoxide	53	-----	R	-----	UJ	-----	R	-----	R	-----	UJ	-----	UJ	-----	R	-----	UJ	-----	R	-----	UJ	-----	R	-----	R	-----	R
Dieldrin	30	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ
Endrin	97	-----	J	-----	UJ	-----	J	-----	UJ	-----	J	-----	UJ	-----	J	-----	J	1200	J	-----	J	-----	J	-----	J	-----	J
Aroclor-1016	390	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ
Aroclor-1242	970	-----	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	3400	J	-----	UJ	-----	UJ	-----	UJ
Aroclor-1248	970	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	1200	J	-----	J	17000	J	-----	UJ	-----	J	1400	J	3200	J
Aroclor-1254	**110**	470	J	-----	UJ	360	J	200	J	-----	J	-----	UJ	3000	J	-----	J	25000	J	2500	J	1600	J	1900	J	4200	J
Aroclor-1260	970	1800	J	-----	UJ	-----	J	-----	J	-----	UJ	-----	UJ	1300	J	-----	J	3800	J	-----	J	1600	J	1800	J	1600	J
Inorganics																											
Aluminum	7600	16000		15000		14400		14900		21100		17700		32200		14200		46400		20700		19900		21000		35000	
Antimony	3.1	3.4	J	-----	J	3.5	J	-----	J	7	J	-----	J	-----	R	4.8	J	-----	R	5.7	J	-----	R	5.8	J	-----	R
Arsenic	**0.39**	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R
Beryllium	0.16	0.66		0.73		0.61		0.71		0.68		0.75		0.68		0.58		0.66		0.83		0.65		1		0.61	
Cadmium	**1**	10.6		1.2		4.5		3.6		31.7		-----		17.8		2		32.3		21.8		16		9.2		12.8	
Chromium	10	48.1		20.2		31.4		28.4		51.2		20		137		25.8		187		51.1		96.6		59.6		89.2	
Copper	**25**	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R
Iron	**2000**	73500		30400		31500		35300		45000		32200		66700		42500		110001		38800		70100		43900		61600	
Lead	**400**	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R
Manganese	180	757		610		592		794		720		733		870		792		1140		763		966		1190		849	
Mercury	**0.1**	2.4		4.3		1.5		0.3		2		0.23		2.6		0.79		4.3		1.3		3.2		4.2		2.7	
Nickel	13	66.1		28		40.2		35.8		61.8		27.7		145		33.2		270		206		107		64		111	
Selenium	2.76	5.1		2.1	J	4.4		-----	J	2.3	J	-----	U	4.8		-----	J	7.9		6.4		3.6	J	2.8	J	3.9	J
Thallium	1	2.6	J	2.3	J	1.9	J	2.2	J	2.4	J	1.8	J	3.1		2.5	J	4.7		2.5	J	3.5		3.7		2.6	J
Vanadium	**8**	65.8		26.1		33.5		30.1		66		25.9		142		23		271		161		49.4		42.2		66.6	
Zinc	**20**	3020		271		493		312		990		108		2650		404		7250		1620		1800		1380		2290	

Table 4-15
Site-Wide Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	SWSB-07		SWSS-08-S		SWSB-08		SWSS-09-D		SWSB-09		SWSS-10-D		SWSB-10		SWSS-11-D		SWSB-11		SWSS-12-D		SWSB-12		SWSS-13-D	
VOCs																									
Benzene	291	-----	J	-----	U	-----		-----	J	-----		-----	U	-----	U	-----	U	-----		-----	U	-----		-----	U
m,p-Xylenes	5813	-----	U	-----		-----		-----	J	55000	J	-----	U	-----		-----	U	-----	J	-----	U	-----	J	-----	U
SVOCs																									
Phenol	145	-----	U	-----	U	-----	U	-----	UJ	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Naphthalene	5600	-----	U	-----	U	-----		-----	J	8000		-----	J	-----	J	-----	U	-----	J	-----	U	-----	J	-----	U
Dimethylphthalate	9689	-----	U	-----	J	-----	U	-----	UJ	-----	U	-----	U	-----	U	-----	U	-----	U	-----	J	-----	U	-----	U
Phenanthrene	68892	-----	J	-----	J	-----	J	-----	J	-----	J	-----		-----		-----	J	-----	J	-----	J	-----		-----	U
Fluoranthene	68892	-----		-----	J	-----	J	-----	J	-----	J	-----		-----		-----	J	-----	J	-----		-----		-----	J
Benzo(a)anthracene	620	-----	J	650	J	-----	J	-----	J	-----	J	3600		11000		930	J	-----	J	2000	J	3300	J	-----	U
Chrysene	1938	-----	J	-----	J	-----	J	-----	J	-----	J	4100		11000		-----	J	-----	J	2300		3400	J	-----	U
bis(2-Ethylhexyl) phthalate	35000	-----	U	-----		-----		-----	J	-----		-----	J	-----		-----		-----		-----		280000		-----	
Benzo(b)fluoranthene	620	-----	J	770	J	-----	J	990	J	-----	J	2800		6400		1000	J	-----	J	1900	J	2900	J	-----	J
Benzo(k)fluoranthene	5329	-----	J	-----	J	-----	J	-----	J	-----	J	-----		6200		-----	J	-----	J	-----	J	-----	J	-----	J
Benzo(a)pyrene	62	330	J	770	J	320	J	1100	J	610	J	3300		7200		1200	J	550	J	2200		3500	J	550	J
Indeno(1,2,3-cd)pyrene	620	-----	J	850	J	-----	J	1200	J	-----	J	2200		4200		1100	J	-----	J	2100		2100	J	-----	J
Dibenz(a,h)anthracene	49	-----	J	250	J	-----	U	280	J	-----	U	700	J	1200	J	260	J	-----	U	500	J	470	J	-----	U
P/PCBs																									
Heptachlor	110	-----	UJ	-----	J	-----	UJ	-----	UJ	-----	J	-----	J	-----	J	-----	J	120	J	-----	J	-----	J	-----	U
Heptachlor epoxide	53	-----	UJ	-----	R	81	J	-----	R	210	J	370	J	150	J	-----	R	110	J	-----	R	-----	R	-----	R
Dieldrin	30	-----	UJ	-----	UJ	56	J	-----	UJ	130	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	U	-----	U	-----	U
Endrin	97	-----	UJ	460	J	-----	UJ	-----	UJ	-----	J	510	J	-----	J	360	J	-----	J	1300	J	-----	R	-----	R
Aroclor-1016	390	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	U	-----	U	-----	U
Aroclor-1242	970	-----	UJ	-----	UJ	1600	J	-----	UJ	4000	J	-----	UJ	-----	UJ	-----	UJ	7300	J	-----	U	-----	U	-----	U
Aroclor-1248	970	-----	UJ	4600	J	-----	UJ	2600	J	-----	UJ	2200	J	2600	J	4900	J	-----	UJ	13000		5700		-----	U
Aroclor-1254	110	-----	UJ	6000	J	1400	J	3700	J	2900	J	6600	J	2500	J	4900	J	3800	J	18000		5800	J	9900	
Aroclor-1260	970	-----	UJ	1800	J	-----	J	2000	J	1600	J	1700	J	-----	J	6100	J	1600	J	-----	U	2600		2200	J
Inorganics																									
Aluminum	7600	9220		37500		14500		22500		14800		23600		17600		15300		14000		46800		26700		17600	
Antimony	3.1	-----	J	-----	R	128		-----	R	-----	UR	-----	UR	-----	UR	-----	R	-----	R	-----	R	-----	R	-----	R
Arsenic	0.39	-----	R	-----	R	-----	R	19.6		21		8.8		7.2		39.8		20.8		16.8		11.4		24.1	
Beryllium	0.16	0.51	J	0.51		0.63		0.88		0.77		0.68		0.54	J	0.47	J	0.51	J	0.55	J	0.42	J	0.55	J
Cadmium	1	1.3		14.3		58.3		18.6		32.2		7		3		16		12.9		21		11.1		16.3	
Chromium	10	15.1		110		25.9		72.6		32.4		60.7		37.6		99		70.3		147		71.6		99.1	
Copper	25	-----	R	-----	R	-----	R	869		1170		3040		413		765		550		2290		1420		539	
Iron	2000	23400		65600		36800		57700		61900		49200		37500		111999		83300		86200		62500		61700	
Lead	400	-----	R	-----	R	-----	R	4050	J	755	J	923	J	636	J	2900	J	3650	J	2520	J	1200	J	1300	J
Manganese	180	462		775		840		702		763		804		566		961		1390		1170		1160		1120	
Mercury	0.1	0.32		2.6		0.29		2.3		0.51		1.6		1.2		9.9		2.7		3.9		1.6		1.2	
Nickel	13	18.2		175		35.6		118		843		112		60.4		287		84.5		212		108		304	J
Selenium	2.76	-----	J	4.6		-----	J	5		13		4.7		2.5	J	11.2		27.1		7.5		6.1		5.7	
Thallium	1	1.6	J	2.3	J	2.2	J	2.4	J	2.8		2.4	J	1.3	J	3.7		4.1		3.8		3.1		3.4	
Vanadium	8	17.6		66.6		24.6		77.2		25.7		112		44.4		48.4		29		114		79.1		131	
Zinc	20	107		5500		402		4360	J	16200	J	1720	J	788	J	7880	J	2340	J	4990	J	2210	J	2350	J

Table 4-15
Site-Wide Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	SWSS-13-D-DUP		SWSB-13		SWSS-14-S		SWSB-14		SWSS-15-S		SWSB-15		SWSS-16-D		SWSB-16		SWSS-17-S		SWSB-17		SWSS-18-D		SWSB-18	
VOCs																									
Benzene	291	-----	UJ	-----		-----	U	-----	U	-----	U	280	J	-----	U	-----	U	-----	U	-----		-----		-----	U
m,p-Xylenes	5813	-----	UJ	-----		-----	U	-----	U	-----	U	-----		-----	U	-----	U	-----	U	-----		-----		-----	U
SVOCs																									
Phenol	145	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ
Naphthalene	5600	-----	UJ	7400	J	-----	UJ	-----	UJ	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	UJ
Dimethylphthalate	9689	-----	UJ	-----	UJ	-----	UJ	-----	UJ	17000	J	-----	UJ	-----	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ
Phenanthrene	68892	-----	J	59000	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	UJ
Fluoranthene	68892	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J
Benzo(a)anthracene	**620**	-----	J	24000	J	2800	J	4900	J	4200	J	3500	J	25000	J	2100	J	1900	J	1400	J	2500	J	-----	J
Chrysene	1938	-----	J	24000	J	2800	J	4700	J	4900	J	3700	J	23000	J	2100	J	2100	J	1700	J	2800	J	-----	J
bis(2-Ethylhexyl) phthalate	35000	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J
Benzo(b)fluoranthene	**620**	1100	J	12000	J	3000	J	5700	J	3800	J	2800	J	22000	J	1800	J	2900	J	1200	J	2400	J	-----	J
Benzo(k)fluoranthene	5329	-----	J	12000	J	-----	J	-----	J	-----	J	-----	J	17000	J	-----	J	-----	J	-----	J	-----	J	-----	J
Benzo(a)pyrene	**62**	1300	J	22000	J	3000	J	5100	J	4300	J	2800	J	19000	J	2000	J	2200	J	1100	J	2200	J	500	J
Indeno(1,2,3-cd)pyrene	**620**	1200	J	8500	J	2000	J	2900	J	3700	J	1900	J	10000	J	1100	J	1800	J	800	J	1300	J	-----	UJ
Dibenz(a,h)anthracene	**49**	-----	UJ	2800	J	510	J	800	J	740	J	620	J	3100	J	380	J	660	J	-----	UJ	370	J	-----	UJ
P/PCBs																									
Heptachlor	110	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	UJ	-----	U	-----	J	-----	J
Heptachlor epoxide	53	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	R	-----	J	-----	R	-----	U	-----	R	-----	R
Dieldrin	30	-----	UJ	81	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	U	-----	U	-----	U
Endrin	97	-----	UJ	-----	J	-----	J	-----	R	400	J	-----	UJ	380	J	-----	J	-----	R	-----	J	-----	J	-----	
Aroclor-1016	390	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	U	-----	U	-----	U
Aroclor-1242	970	-----	UJ	1300	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	J	-----	UJ	1700		-----	U	-----	U
Aroclor-1248	970	1800	J	-----	UJ	1600	J	2100	J	2400	J	1300	J	1700	J	-----	UJ	2900		-----	U	-----	J	-----	
Aroclor-1254	**110**	3000	J	1700	J	3400	J	2700	J	5000	J	1500	J	2400	J	170	J	4100		1900		510		280	J
Aroclor-1260	970	1800	J	1100	J	1200	J	-----	J	1700	J	-----	J	1900	J	-----	J	1300	J	1400		-----	U	-----	
Inorganics																									
Aluminum	7600	18000		16300		26800		21200		28500		16300		25400		17300		91400		19600		21000	J	17100	J
Antimony	3.1	-----	UR	-----	UR	-----	UR	-----	UR	-----	UR	-----	UR	-----	UR	-----	UR	-----	R	-----	UR	-----	J	-----	J
Arsenic	**0.39**	22		8.1		16.5		10		10.8		5.9		14.6		9.7		9.1		13.5		5.1		4.8	
Beryllium	0.16	0.64		0.65		0.67		0.62		0.59		0.45	J	0.87		0.93		0.64		0.7		0.81	J	0.58	J
Cadmium	**1**	11.1		7.6		12.7		5.8		9.8		3.4		10.9		-----	J	11.7		7.2		2		1.3	
Chromium	10	50.7		30.1		72.7		53.2		94.7		32.5		80.2		40.2		126		50		30.9	J	27.3	J
Copper	**25**	513		399		1040		769		1230		451		833		134		6850		651		291	J	262	J
Iron	**2000**	61100		37100		73300		44300		66600		36200		86300		88900		74200		47800		31100		23400	
Lead	**400**	1560	J	446	J	1310	J	888	J	1560	J	743	J	976	J	-----	J	6790	J	2360	J	445		-----	
Manganese	180	1080		697		1170		836		855		494		934		1310		969		761		696		589	
Mercury	**0.1**	2.1		0.41		1.7		0.98		1.7		0.72		1.3		0.25		1.8		0.85		1.1	J	0.23	J
Nickel	13	109	J	48.4		119		85.1		152		44.5		105		44.7		209		71.9		37.4		25.1	
Selenium	2.76	4.8		3.4	J	5.8		3.9		6.2		2.7	J	7.7		7.7		6.7		4.6		2.1	J	-----	U
Thallium	1	3.2		1.7	J	3.6		2.1	J	2.7		1.6	J	3.3		4.1		2.5	J	2.1	J	2.2	J	1.9	J
Vanadium	**8**	115		57.6		107		80		116		42.5		86.4		32.3		87.7		44.5		38.5		35.3	
Zinc	**20**	2090	J	1900	J	2130	J	1670	J	2420	J	1100	J	1640	J	183	J	4940	J	2340	J	466	J	274	J

Table 4-15
Site-Wide Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	SWSS-19-D		SWSB-19		SWSS-20-S		SWSB-20		SWSS-21-D		SWSB-21		SWSB-21-DUP		SWSS-22-D		SWSB-22		SWSS-23-D		SWSB-23		SWSS-24-D		SWSB-24	
VOCs																													
Benzene	291	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	J	-----	U	-----		-----	UJ	-----	U
m,p-Xylenes	5813	-----	U	-----	U	-----	UJ	-----	U	-----	U	-----	J	-----	U	-----	U	-----	U	-----	U	-----	J	-----	UJ	-----	J
SVOCs																													
Phenol	145	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ
Naphthalene	5600	-----	UJ	-----	J	-----	UJ	-----	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	J	-----	UJ	-----	UJ	-----	UJ	-----	J
Dimethylphthalate	9689	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	J	-----	UJ	-----	UJ	-----	J	-----	UJ	-----	J	-----	UJ	-----	J	-----	UJ
Phenanthrene	68892	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J
Fluoranthene	68892	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J
Benzo(a)anthracene	**620**	**4300**	**J**	**1000**	**J**	-----	**J**	**4700**	**J**	**2500**	**J**	-----	**J**	**830**	**J**	**1900**	**J**	**4000**	**J**	**2000**	**J**	-----	**J**	**8300**	**J**	**5900**	**J**
Chrysene	1938	4200	J	-----	J	-----	J	4100	J	2200	J	-----	J	-----	J	2000	J	4300	J	2000	J	-----	J	6800	J	5400	J
bis(2-Ethylhexyl) phthalate	35000	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J
Benzo(b)fluoranthene	**620**	**3700**	**J**	**980**	**J**	-----	**J**	**4400**	**J**	**1800**	**J**	-----	**J**	**980**	**J**	**1600**	**J**	**4400**	**J**	**2400**	**J**	-----	**J**	**5200**	**J**	**5300**	**J**
Benzo(k)fluoranthene	5329	4000	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	4200	J	-----	J	-----	J	4200	J	4000	J
Benzo(a)pyrene	**62**	**2900**	**J**	**840**	**J**	**480**	**J**	**3200**	**J**	**1900**	**J**	**400**	**J**	**750**	**J**	**1600**	**J**	**3500**	**J**	**2000**	**J**	**320**	**J**	**3900**	**J**	**5000**	**J**
Indeno(1,2,3-cd)pyrene	**620**	**1500**	**J**	-----	**J**	-----	**J**	**2300**	**J**	**1400**	**J**	-----	**J**	-----	**J**	**1700**	**J**	**2600**	**J**	**2000**	**J**	-----	**J**	**2800**	**J**	**3300**	**J**
Dibenz(a,h)anthracene	**49**	**550**	**J**	**130**	**J**	-----	**UJ**	**580**	**J**	**400**	**J**	-----	**UJ**	-----	**UJ**	-----	**UJ**	**1200**	**J**	**510**	**J**	-----	**J**	**930**	**J**	**910**	**J**
P/PCBs																													
Heptachlor	110	-----	J	-----	U	-----	U	-----	U	-----	J	-----	J	-----	J	-----	J	-----	U	-----	J	-----	J	-----	J	-----	
Heptachlor epoxide	53	-----	R	-----	R	-----	R	-----	U	-----	R	-----	R	-----	R	-----	R	-----	U	-----	U	-----	R	-----	R	-----	R
Dieldrin	30	-----	UJ	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	190	J	-----	U	-----	U	-----	U	-----	U
Endrin	97	-----	R	-----	U	-----	J	-----	J	-----	J	-----	U	-----	J	-----	R	440	J	360		-----	U	-----	J	-----	J
Aroclor-1016	390	-----	UJ	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Aroclor-1242	970	-----	UJ	-----	U	-----	U	1400		-----	U	-----	U	-----	U	-----	U	4500		-----	U	-----	U	-----	U	-----	U
Aroclor-1248	970	2100		-----		1900		-----	U	1100		-----		-----		2800		-----	U	3100		-----	J	2600		1500	
Aroclor-1254	**110**	**3000**		**260**	**J**	**2100**		**1300**	**J**	**1200**	**J**	**380**	**J**	**600**	**J**	**4300**		**5100**		**5400**		**300**	**J**	**4000**		**1300**	**J**
Aroclor-1260	970	-----	J	-----		-----	J	-----		-----		-----		-----		1600	J	7900		1100	J	-----	J	1500	J	-----	
Inorganics																													
Aluminum	7600	21700	J	18700	J	31500	J	10600	J	55700	J	24000	J	42900	J	64300	J	47900	J	43100	J	24000	J	28600	J	21700	J
Antimony	3.1	5.6	J	-----	J	10.5	J	293	J	7.1	J	5.2	J	5.8	J	8.5	J	10.8	J	9.8	J	-----	J	10.4	J	4.2	J
Arsenic	**0.39**	**13**		**8.1**		**11.6**		**73.1**		**7**		**8.3**		**9.1**		**9.4**		**8.9**		**11.6**		**6.3**		**14.2**		**8.2**	
Beryllium	0.16	0.76	J	0.85	J	0.61	J	0.59	J	0.71	J	0.83	J	0.81	J	1.7	J	0.76	J	0.66	J	1.3	J	0.6	J	0.84	J
Cadmium	**1**	**7.9**		**2.3**		**17.7**		**13.2**		**9.5**		**4**		**7.9**		**13.6**		**9.1**		**19.2**		**1.6**		**17.2**		**3.4**	
Chromium	10	106	J	38.7	J	96.6	J	65.4	J	121	J	46.7	J	77	J	124	J	95.4	J	113	J	34	J	106	J	38	J
Copper	**25**	**667**	**J**	**192**	**J**	**2150**	**J**	**432**	**J**	**4740**	**J**	**480**	**J**	**1770**	**J**	**3110**	**J**	**2890**	**J**	**2850**	**J**	**141**	**J**	**1490**	**J**	**334**	**J**
Iron	**2000**	**108999**		**82000**		**68400**		**36500**		**53800**		**38500**		**45900**		**75100**		**45600**		**78300**		**45900**		**111000**		**45200**	
Lead	**400**	**1160**		**1050**		**2320**		**9970**		**1280**		**581**		**988**		**2160**		**1390**		**5490**		-----		**15900**		**703**	
Manganese	180	1180		860		768		645		737		801		901		1610		790		911		746		961		773	
Mercury	**0.1**	**1.6**	**J**	**0.31**	**J**	**1.4**	**J**	**0.76**	**J**	**1.8**	**J**	**0.45**	**J**	**0.93**	**J**	**2.5**	**J**	**1.5**	**J**	**3.1**	**J**	**0.14**	**J**	**2.1**	**J**	**1.4**	**J**
Nickel	13	122		55.6		112		55.9		133		45.5		77.1		160		98.5		194		49.4		162		45.1	
Selenium	2.76	9.2		5.3		5.8		4.1		4.3		2.7	J	3.1	J	6.4		4	J	7.2		2.9	J	10.1		2.5	J
Thallium	1	3.7		2.7		2.5	J	2.3	J	2.4	J	1.9	J	2.7	J	4.1		1.9	J	3.4		2.3	J	3.8		1.9	J
Vanadium	**8**	**97.5**		**34.5**		**51.6**		**22.4**		**81.1**		**34.9**		**55.3**		**105**		**65.6**		**226**		**46.3**		**103**		**38.7**	
Zinc	**20**	**1300**	**J**	**291**	**J**	**2060**	**J**	**633**	**J**	**3060**	**J**	**647**	**J**	**1870**	**J**	**3210**	**J**	**1960**	**J**	**3470**	**J**	**475**	**J**	**2580**	**J**	**719**	**J**

Table 4-15
Site-Wide Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	SWSS-25-D		SWSB-25		SWSS-26-S		SWSB-26		SWSS-27-D		SWSB-27		SWSS-28-D		SWSB-28		SWSS-29-D		SWSB-29		SWSS-30-S		SWSB-30		SWSS-31-D	
VOCs																											
Benzene	291	-----	U	-----	U	-----	U	-----	J	-----	U	-----	J	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
m,p-Xylenes	5813	-----	U	-----	U	-----	U	-----		-----	U	19000		-----	J	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
SVOCs																											
Phenol	145	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Naphthalene	5600	-----	U	-----	J	-----	U	13000		-----	J	10000		-----	U	-----	U	-----	U	-----	U	-----	J	-----	J	-----	U
Dimethylphthalate	9689	-----		-----	U	-----	U	-----	U	-----	J	-----	U	-----	J	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Phenanthrene	68892	-----		-----		-----		81000		-----		-----		-----		-----	J	-----		-----		-----		-----		-----	J
Fluoranthene	68892	-----		-----	J	-----		-----		-----		-----		-----		-----	J	-----		-----		-----		-----		-----	
Benzo(a)anthracene	**620**	**660**		**1000**	**J**	**1900**		**7500**		**2400**		**2200**		**1800**		-----	**J**	**1200**		-----		**1600**		-----		-----	**J**
Chrysene	1938	-----		-----	J	2100		6800		2400		2500		1900		-----	J	1500		-----		1700		-----		-----	J
bis(2-Ethylhexyl) phthalate	35000	-----		-----		-----		-----		-----		-----		-----		-----	J	-----		-----		-----		-----	J	-----	
Benzo(b)fluoranthene	**620**	**1300**		**950**	**J**	**1800**		**3500**	**J**	**4300**		**3000**		**2700**		-----	**J**	**1400**		-----		**1500**		-----		**730**	**J**
Benzo(k)fluoranthene	5329	-----	U	-----	J	-----		-----	J	-----	U	-----		-----		-----	J	-----		-----	J	-----		-----		-----	J
Benzo(a)pyrene	**62**	**710**		**890**	**J**	**2000**		**3000**	**J**	**2700**		**2800**		**2600**		**250**	**J**	**1600**		**470**		**1600**		**460**		**830**	
Indeno(1,2,3-cd)pyrene	**620**	-----	**J**	-----	**U**	**1200**	**J**	**1200**	**J**	**1300**		**1400**	**J**	**1500**		-----	**U**	**1700**	**J**	-----	**J**	**1400**	**J**	-----	**J**	**890**	**J**
Dibenz(a,h)anthracene	**49**	**91**	**J**	-----	**U**	**420**	**J**	-----	**U**	**400**	**J**	**520**	**J**	**470**	**J**	**76**	**J**	**620**		**120**	**J**	**370**		**73**	**J**	**190**	**J**
P/PCBs																											
Heptachlor	110	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	UJ	-----		-----	UJ	-----	U	-----	R	-----	U
Heptachlor epoxide	53	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	UJ	-----	U	-----	UJ	-----	U	-----	R	-----	U
Dieldrin	30	-----	U	-----	J	-----	U	-----	U	-----	U	-----	U	-----	U	-----	UJ	-----	U	-----	UJ	-----	U	-----	R	-----	U
Endrin	97	-----	U	-----	J	-----	U	-----	U	-----	U	-----	U	-----	U	-----	UJ	-----	U	-----	UJ	-----	U	-----	R	-----	U
Aroclor-1016	390	-----	U	-----	U	-----	U	-----	U	-----	U	2200		-----	U	-----	UJ	-----	U	-----	UJ	-----	U	-----	R	-----	U
Aroclor-1242	970	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	UJ	-----	U	-----	UJ	-----	U	-----	R	-----	U
Aroclor-1248	970	-----	U	-----	U	-----	U	2300	J	2800		-----	U	3000		-----	UJ	-----	J	-----	UJ	-----	J	-----	R	-----	U
Aroclor-1254	**110**	**5100**		**1000**	**J**	**1300**		**2000**		**3300**		**3300**		**3800**		-----	**J**	**540**	**J**	-----	**J**	**1000**		-----	**R**	**1500**	
Aroclor-1260	970	-----	U	-----	U	-----		1200		1600		-----		1300	J	-----	UJ	-----	J	-----	J	-----	J	-----	R	-----	
Inorganics																											
Aluminum	7600	18000		12000		23000		89000		32000		28000		27000		15000		25000		-----		21000		14000		32000	
Antimony	3.1	-----	U	-----	U	15		52		34		15		19		-----	U	17		11		11		-----	U	19	
Arsenic	**0.39**	**7**		**6.7**		**13**		**16**		**13**		**11**		**12**		**5.4**		**11**		**19**		**8.6**		**7.4**		**9.2**	
Beryllium	0.16	0.59		0.58		-----	U	-----	U	-----	U	0.57		-----	U	0.57		-----	U	-----	U	0.6		0.59		-----	U
Cadmium	**1**	**6.1**		**2.3**		**12**		**21**		**13**		**6.9**		**11**		**1.3**		**12**		**9.2**		**5.8**		-----		**7.4**	
Chromium	10	40		22		83		230		89		79		91		26		64		39		50		28		73	
Copper	**25**	**620**		**190**		**1300**		**5300**		**3100**		**1400**		**1300**		**310**		**1300**		**340**		**720**		**220**		**3400**	
Iron	**2000**	**52000**		**32000**		**110000**		**78000**		**110000**		**49000**		**80000**		**38000**		**57000**		**45000**		**53000**		**36000**		**76000**	
Lead	**400**	**770**		**550**		**3700**		**3200**		**5400**		**1300**		**2900**		**500**		**2200**		**1100**		**1500**		-----		**3900**	
Manganese	180	790		760		920		1200		1100		880		970		740		720		350		780		740		930	
Mercury	**0.1**	**0.8**		**0.34**		**1.3**		**0.88**		**2.4**		**1.3**		**2.7**		**0.33**		**2.6**		**1.2**		**1.6**		**0.35**		**1.9**	
Nickel	13	72		47		170		2600		4600		150		210		48		120		49		75		34		170	
Selenium	2.76	4.2		-----	U	6.5		5.8		7.9		-----	U	5.7		-----	U	4.8		4.5		4.2		-----	U	5.8	
Thallium	1	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Vanadium	**8**	**36**		**22**		**97**		**140**		**120**		**380**		**150**		**36**		**89**		**23**		**63**		**22**		**170**	
Zinc	**20**	**970**		**370**		**3500**		**4400**		**5200**		**1800**		**3100**		**630**		**2400**		**1100**		**1900**		**400**		**3700**	

Table 4-15
Site-Wide Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	SWSB-31		SWSB-31-Dup		SWSS-32-D		SWSB-32		SWSS-33-D		SWSB-33		SWSS-34-S		SWSB-34		SWSS-35-D		SWSS-35-D-Dup		SWSB-35	
VOCs																									
Benzene	291	-----	U	-----	J	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
m,p-Xylenes	5813	-----		-----		-----	U	-----	U	-----	U	-----	J	-----	U	-----	U	-----	U	-----	U	-----	U
SVOCs																									
Phenol	145	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Naphthalene	5600	-----	J	-----	J	-----		-----	U	-----	J	-----	J	-----	J	-----	J	-----		-----	J	-----	U
Dimethylphthalate	9689	-----	U	-----	U	-----	J	-----	U	-----	J	-----	U	-----	J	-----	U	-----		-----		-----	U
Phenanthrene	68892	-----	J	-----	J	-----		-----		-----		-----		-----		-----		-----		-----		-----	
Fluoranthene	68892	-----	J	-----	J	-----	J	-----		-----		-----		-----		-----		-----		-----		-----	
Benzo(a)anthracene	620	-----	U	-----	U	1300		990	J	1900		1500		2800		1100		6000		4600		1000	
Chrysene	1938	-----	U	-----	U	1500		-----	J	2100		1600		3800		-----		6900		5200		-----	
bis(2-Ethylhexyl) phthalate	35000	-----		-----		37000		-----		-----		-----		-----		-----	U	-----		-----		-----	
Benzo(b)fluoranthene	620	-----	U	-----	U	1800		1100	J	3200		1300		4300		880		7200		5900		1200	
Benzo(k)fluoranthene	5329	-----	U	-----	U	-----		-----	J	-----		-----		-----		-----		4100		-----		-----	
Benzo(a)pyrene	62	-----	U	-----	U	1600		1200		2300		1400		3800		1000		7600		5500		1200	
Indeno(1,2,3-cd)pyrene	620	-----	UJ	-----	UJ	1100	J	1000	J	2100		990		2100		730		5100		4000		820	
Dibenz(a,h)anthracene	49	-----	UJ	-----	UJ	300	J	-----	UJ	550		310	J	620		220	J	1400		1100		230	J
P/PCBs																									
Heptachlor	110	-----	U	-----	UJ	-----	J	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Heptachlor epoxide	53	-----	U	-----	UJ	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Dieldrin	30	-----	U	-----	UJ	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Endrin	97	-----	U	-----	UJ	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Aroclor-1016	390	-----	U	-----	UJ	-----	U	-----	U	-----		-----	U	-----	U	-----	U	1200		1500		-----	U
Aroclor-1242	970	-----	U	-----	UJ	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Aroclor-1248	970	-----	U	-----	UJ	-----	U	-----	U	-----	U	-----	U	1500	J	-----	U	-----	U	-----	U	-----	U
Aroclor-1254	110	1200		-----	J	3100		3100		2500		150		4500		-----	J	6900		9400		-----	U
Aroclor-1260	970	-----		-----	UJ	-----	U	-----	U	-----		-----	U	1100		-----	U	-----	U	2100	J	-----	U
Inorganics																									
Aluminum	7600	14000		14000		25000		28000		27000		12000		26000		13000		29000		37000		11000	
Antimony	3.1	12		9		40		21		26		-----	U	20		-----	U	30		33		-----	U
Arsenic	0.39	10		10		12		11		11		5.9		12		6.2		15		16		4.1	
Beryllium	0.16	-----	U	-----	U	-----	U	-----	U	-----	U	0.64		-----	U	0.63		-----	U	-----	U	-----	U
Cadmium	1	4.2		3.5		9.9		9		12		-----	U	9.9		-----		20		23		-----	
Chromium	10	61		59		86		81		90		18		91		20		120		120		17	
Copper	25	900		480		1500		1400		1600		86		1300		89		1700		3200		53	
Iron	2000	80000		94000		89000		63000		100000		28000		82000		39000		68000		110000		26000	
Lead	400	8300		8900		8100		3400		9300		-----		4100		-----		2600		3300		-----	
Manganese	180	850		840		900		820		1100		630		920		590		900		1100		580	
Mercury	0.1	0.69		0.64		2.4		3.6		2.5		0.8		2.7		0.14		3.9		3.2		0.57	
Nickel	13	120		95		180		490		180		27		160		31		190		190		24	
Selenium	2.76	4.8		5.3		5.5		4.3		11		-----	U	5.5		-----	U	-----	U	5.3		-----	U
Thallium	1	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Vanadium	8	250		180		150		220		160		18		160		24		180		230		19	
Zinc	20	4600		3400		3900		3100		4800		230		3200		240		4000		6800		200	

Table 4-15
Site-Wide Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSSC	SWSS-36-D		SWSB-36		SWSS-37-D		SWSB-37	
VOCs									
Benzene	291	-----	U	-----	U	-----	U	-----	U
m,p-Xylenes	5813	-----	J	-----	J	-----	J	-----	J
SVOCs									
Phenol	145	-----	U	1600		-----	U	-----	U
Naphthalene	5600	-----	U	-----		-----	U	-----	J
Dimethylphthalate	9689	-----	U	-----		-----	J	-----	U
Phenanthrene	68892	-----		-----		-----		-----	
Fluoranthene	68892	-----		-----		-----		-----	
Benzo(a)anthracene	620	6600		20000		2300		3300	
Chrysene	1938	7500		20000		2700		3700	
bis(2-Ethylhexyl) phthalate	35000	-----		-----		-----		-----	
Benzo(b)fluoranthene	620	5600		19000		3100		6400	
Benzo(k)fluoranthene	5329	3900		15000		-----		-----	U
Benzo(a)pyrene	62	5700		22000		3000		4600	
Indeno(1,2,3-cd)pyrene	620	3300		15000		2400		2900	
Dibenz(a,h)anthracene	49	950	J	3300		600	J	780	J
P/PCBs									
Heptachlor	110	-----	U	-----	U	-----	U	-----	U
Heptachlor epoxide	53	-----	U	-----	U	-----	U	-----	U
Dieldrin	30	-----	U	-----	U	-----	U	-----	U
Endrin	97	-----	U	-----	U	-----	U	-----	U
Aroclor-1016	390	-----		470		-----	J	510	
Aroclor-1242	970	-----	U	-----	U	-----	U	-----	U
Aroclor-1248	970	-----	U	-----	U	-----	U	-----	U
Aroclor-1254	110	4300		3400	J	4600	J	4500	J
Aroclor-1260	970	-----		-----	J	1300		1200	
Inorganics									
Aluminum	7600	22000		24000		26000		23000	
Antimony	3.1	12		16		16		30	
Arsenic	0.39	12		11		13		10	
Beryllium	0.16	-----	U	-----	U	0.55		-----	U
Cadmium	1	11		9.6		12		9.6	
Chromium	10	56		79		64		56	
Copper	25	930		1200		1200		1100	
Iron	2000	51000		57000		48000		46000	
Lead	400	1200		1500		1500		2100	
Manganese	180	880		850		860		800	
Mercury	0.1	1.7		1.8		2.3		-----	U
Nickel	13	92		130		160		120	
Selenium	2.76	-----	U	4.7		-----	U	-----	U
Thallium	1	-----	U	-----	U	-----	U	-----	U
Vanadium	8	92		200		760		170	
Zinc	20	2600		2200		2500		2300	

Table 4-15
Site-Wide Surface and Subsurface Soil Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Notes:

Indicator contaminants are bolded.
All VOC, SVOC, and P/PCB values are in micrograms per kilogram (ug/kg); inorganic values are in milligrams per kilogram (mg/kg)
Dup = duplicate
P/PCBs = pesticides and polychlorinated biphenyls
SWSB = site-wide soil boring subsurface soil sample (2-4 feet below ground surface)
SWSS = site-wide soil boring surface soil sample (S - 0-2 inches below ground surface; D - 0-12 inches below ground surface)
SSSSC = site-specific soil screening criteria
SVOCs = semivolatile organic compounds
VOCs = volatile organic compounds
Dashed cells indicate that the value does not exceed the SSSSC
J = Value is estimated due to exceeded quality control criteria.
R = rejected sample from laboratory.
U = non-detected value.

Table 4-16
Sediment Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSDSC	SD-11		SD-12		SD-13		SD-14		SD-15		SD-16		SD-16-Dup		SD-17		SD-18		SD-19		SD-20	
SVOCs																							
4-Methylphenol	20	70	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	U	-----	UJ	-----	U	-----	UJ
Fluorene	319	370	J	-----	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	J	-----	J	4800		350	J
Phenanthrene	1170	3200	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	2400		1900	J	28000		5000	J
Anthracene	845	-----	J	-----	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	J	-----	J	8300		970	J
Fluoranthene	2230	6200	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	4500		3000	J	40000		8700	J
Naphthalene	1196	-----	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	U	-----	J	1300	J	-----	UJ
Pyrene	1520	3900	J	-----	J	-----	J	-----	J	-----	J	-----	J	-----	J	5700		2800	J	40000		6900	J
Benzo(a)anthracene	**52**	**2900**	**J**	**710**	**J**	**160**	**J**	**280**	**J**	**180**	**J**	**300**	**J**	**340**	**J**	**2700**		**1300**	**J**	**16000**		**3900**	**J**
Chrysene	52	3500	J	840	J	200	J	350	J	250	J	400	J	390	J	3000		1600	J	16000		4300	J
Benzo(b)fluoranthene	**52**	**4100**	**J**	**870**	**J**	**270**	**J**	**370**	**J**	**330**	**J**	**500**	**J**	**410**	**J**	**3000**		**1700**	**J**	**15000**		**4800**	**J**
Benzo(k)fluoranthene	**52**	**1600**	**J**	**370**	**J**	**96**	**J**	**160**	**J**	**-----**	**UJ**	**170**	**J**	**170**	**J**	**1000**		**700**	**J**	**5900**		**1800**	**J**
Benzo(a)pyrene	**52**	**3400**	**J**	**670**	**J**	**190**	**J**	**290**	**J**	**240**	**J**	**340**	**J**	**300**	**J**	**2200**		**1400**	**J**	**12000**		**3900**	**J**
Indeno(1,2,3-cd)pyrene	**52**	**3000**	**J**	**490**	**J**	**110**	**J**	**180**	**J**	**120**	**J**	**180**	**J**	**220**	**J**	**1700**		**1100**	**J**	**7700**		**3800**	**J**
Dibenz(a,h)anthracene	**211**	**850**	**J**	**-----**	**J**	**-----**	**UJ**	**-----**	**UJ**	**-----**	**UJ**	**-----**	**UJ**	**-----**	**UJ**	**470**	**J**	**410**	**J**	**2400**	**J**	**780**	**J**
P/PCBs																							
4,4'-DDE	0.3985	12	J	6.1	J	7.3	J	4.7	J	5.9	J	6.3	J	7	J	9.8	J	6.5	J	3.5	J	4.5	J
4,4'-DDD	0.3985	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	11		-----	UJ	3.3	J	-----	UJ
Aroclor-1248	0.03188	520	J	-----	R	220	J	-----	R	-----	R	260	J	290	J	-----	R	230	J	-----	U	-----	UJ
Inorganics																							
Antimony	2	-----	U	15	J	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	UJ	-----	U	-----	UJ	-----	U	-----	U
Arsenic	**6**	**-----**		**-----**	**J**	**-----**	**J**	**-----**	**J**	**-----**	**J**	**-----**	**J**	**-----**	**J**	**14**		**-----**	**J**	**-----**		**-----**	
Cadmium	**0.6**	**1.4**		**-----**	**UJ**	**-----**	**UJ**	**-----**	**UJ**	**-----**	**UJ**	**-----**	**UJ**	**-----**	**UJ**	**1.7**		**-----**	**UJ**	**-----**	**U**	**-----**	**U**
Chromium	26	42		51	J	64	J	60	J	55	J	69	J	63	J	86		59	J	-----		31	
Copper	**16**	**340**		**82**	**J**	**70**	**J**	**69**	**J**	**59**	**J**	**82**	**J**	**73**	**J**	**2600**		**74**	**J**	**36**		**95**	
Iron	**20000**	**27000**		**29000**	**J**	**35000**	**J**	**35000**	**J**	**30000**	**J**	**38000**	**J**	**34000**	**J**	**69000**		**34000**	**J**	**32000**		**25000**	
Lead	**31**	**360**		**78**	**J**	**71**	**J**	**69**	**J**	**60**	**J**	**83**	**J**	**72**	**J**	**400**		**77**	**J**	**67**		**340**	
Manganese	460	610		1400	J	1800	J	1700	J	1700	J	1900	J	1900	J	1300		1700	J	540		-----	
Nickel	16	36		30	J	37	J	35	J	31	J	39	J	36	J	86		34	J	21		33	
Silver	1	-----	UJ	-----	UJ	3.4	J	-----	UJ	3	J	7.2	J	5	J	2.3		-----	UJ	-----	U	-----	U
Zinc	**120**	**450**		**190**	**J**	**200**	**J**	**200**	**J**	**170**	**J**	**230**	**J**	**210**	**J**	**1100**		**210**	**J**	**160**		**420**	

Notes:

Indicator Contaminants are bolded
VOCs = volatile organic compounds
SVOCs = semivolatile organic compounds
P/PCBs = pesticides and polychlorinated biphenyls
SSSDSC = site-specific sediment screening criteria
All VOC, SVOC, and P/PCB values are in micrograms per kilogram (ug/kg); inorganic values are in milligrams per kilogram (mg/kg)
Dashed cells indicate that the value does not exceed the SSSDSC

U = non-detected value.
J = Value is estimated due to exceeded quality control criteria.
R = rejected sample from laboratory.
Dup = duplicate

Table 4-17
Surface Water Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSSWSC	SW-11		SW-12		SW-13		SW-14		SW-15		SW-16		SW-16-Dup		SW-17		SW-18		SW-19		SW-20	
Inorganics																									
Aluminum	87	290		200		350		460		610		390		430		320		320		470		440	
Iron	**300**	**360**		**-----**		**440**		**600**		**740**		**500**		**520**		**490**		**430**		**600**		**520**	
Lead	**3**	**-----**	U	**12**		**-----**	U	**10**		**-----**	U	**-----**	U	**-----**	U	**-----**	U	**-----**	U	**-----**	U	**-----**	U

Notes:
Indicator contaminants are bolded.
All values are in micrograms per liter (ug/L)
Dup = duplicate
SSSWC = site-specific surface water screening criteria
SW = surface water
Dashed cells indicate that the value does not exceed the SSSWSC
U = non-detected value.

Table 4-18

Vertical Profile Wells - 24-hour TAT VOA Results
Consolidated Iron and Metal Site
Newburgh, New York

VPMW-1

Chemical Name	SSGWSC	VPMW-1-10-15*	VPMW-1-15-20^{++}	VPMW-1-20-25	VPMW-1-25-30^{++}
2-Butanone	50	----- U	11	6 J	3.6 J
2-Hexanone	50	----- U	----- U	----- U	1.0 J
4-Methyl-2-pentanone	50	----- U	----- U	----- U	10
Acetone	50	----- U	47 B	42	19
Benzene	1	**47**	**1.1 J**	----- U	----- U
Carbon Disulfide	50	----- U	----- U	1.1 J	----- U
Chloroform	7	**7.9**	----- U	----- U	----- U
Cyclohexane	NA	410 E	65	1.9 J	16
Ethylbenzene	5	**1400** E	**140**	**11**	**44**
Isopropylbenzene	5	**210** E	----- U	----- U	3.7 J
Methyl acetate	NA	----- U	----- U	----- U	33
Methylcyclohexane	NA	170	----- U	----- U	4.9 J
Methylene Chloride	5	----- U	**6.4** JB	**6.8** JB	3.6 JB
Toluene	5	**210** E	4.6 J	----- U	2.0 J
m,p-Xylene	5	**3000** E	**350** E	**25**	**100**
o-Xylene	5	**1700** E	**74**	**6.7**	**23**

Vertical Profile
Well Data

VPMW-4

Chemical Name	SSGWSC	VPMW-4-13-18	VPMW-4-18-23^{++}	VPMW-4-23-28
Acetone	50	9.4 J	7 J	9.1 J
Carbon Disulfide	50	16	3.2 J	3.7 J
Methylene Chloride	5	**8.3 JB**	3.5 JB	4.1 JB
Methyl tert-butyl ether	10	9.6	**11**	10

VPMW-5

Chemical Name	SSGWSC	VPMW-5-6-11^{++}	VPMW-5-11-16	VPMW-5-11-16 D	VPMW-5-16-21	VPMW-5-21-26^{++}	VPMW-5-26-31
4-Methyl-2-Pentanone	50	----- U	----- U	----- U	----- U	----- U	9.6 J
Acetone	50	6.2 J	9 J	6.3 J	11	6.6 J	----- U
Benzene	1	----- U	----- U	----- U	----- U	**2.6 J**	**12**
Carbon Disulfide	50	3 J	2 J	7.2	6.8	5.7	6
Cyclohexane	NA	2.1 J	2.2 J	2.2 J	2.2 J	2.7 J	11
Ethylbenzene	5	2.2 J	1.8 J	1.8 J	1.3 J	**7.1**	**42**
Isopropylbenzene	5	----- U	----- U	----- U	----- U	----- U	3.1 J
Methylcyclohexane	NA	1.5 J	1.4 J	1.5 J	1.6 J	2.1 J	8.5
Methylene Chloride	5	4.4 JB	**5.2 JB**	**5.2 JB**	4.4 JB	**5.2 JB**	4.5 JB
Toluene	5	----- U	----- U	----- U	----- U	1.5 J	**10**
m,p-Xylene	5	**5.8**	4.7 J	4.7 J	3 J	**20**	**120**
o-Xylene	5	----- U	----- U	----- U	----- U	3.3 J	**22**
Methyl tert-butyl ether	10	**28**	**26**	**19**	----- U	1.5 J	2.7 J

Table 4-18

Vertical Profile Wells - 24-hour TAT VOA Results
Consolidated Iron and Metal Site
Newburgh, New York

Notes:

Screening criteria exceedances are bolded.

Vertical profile well numbers correspond with monitoring well numbers

* Actual groundwater sample interval was 12-15 feet bgs, due to the water table depth of 12 feet bgs.

++ A confirmatory sample was collected at this interval and sent for CLP analysis (see Table 4-19 for results)

All VOC values are in micrograms per liter (ug/L)

Dashed cells indicate that the value does not exceed the detection limit.

VPMW = vertical profile monitoring well

SSGWSC = site-specific groundwater screening criteria

TAT = turn-around-time

VOCs = volatile organic compounds

D - Duplicate sample

A = Detected sample value is greater than the screening criteria value.

U = non-detected value.

B = Analyte is found in the associated blank and in the sample.

Also:

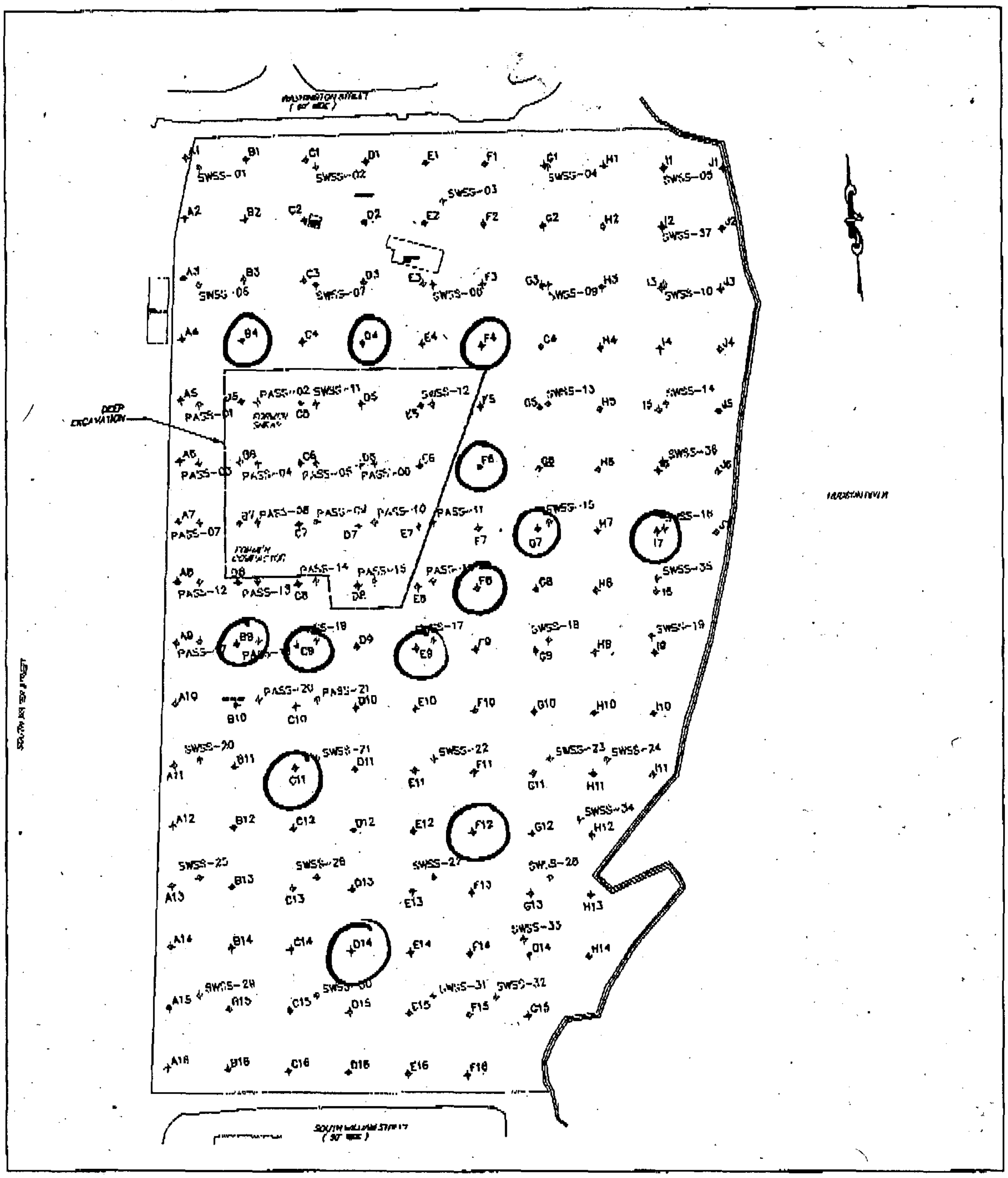
Dredge spoils

GW

- Railway, transport

- documentation
  sampling

To: Wayne Mizerak



MAP REFERENCES:

1. THIS MAP HAS BEEN GENERATED USING THE TOPOGRAPHIC MAP GENERATED BY CHAZEN ENGINEERING, LAND SURVEYING AND LANDSCAPE ARCHITECTURE CO., P.C. TITLED "TOPOGRAPHIC AND BOUNDARY SURVEY" PROJECT NO. 50817.00 FOR CITY OF NEWBURGH, ORANGE COUNTY, NEW YORK SECTION 40, BLOCK 3, LOT 3.

U.S. EPA ENVIRONMENTAL RESPONSE TEAM
RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
EP-C-04-032
W.A.# 0-208

FIGURE x
DRAFT - LOCATION OF DEEP EXCAVATION/ SAMPLING LOCATIONS
CONSOLIDATED IRON AND METAL
NEWBURGH, NY

Table 4-19
Vertical Profile Wells - CLP Confirmatory VOC Screening Criteria Exceedances
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	SSGWSC	VPMW-1-15-20		VPMW-1-25-30		VPMW-4-18-23		VPMW-5-6-11		VPMW-5-21-26	
Benzene	1	1.1	J	-----	U	-----	U	-----	U	2.6	J
Ethylbenzene	5	140		11		-----	U	-----	J	7.1	
m,p-Xylenes	5	350		25		-----	U	5.8		20	
Methylene Chloride	5	6.4	JB	6.8	JB	10	B	-----	U	-----	U
Methyl tert-Butyl Ether	10	-----	U	-----	U	12		28		-----	J

Notes:

Vertical profile well numbers correspond with monitoring well numbers
All VOC values are in micrograms per liter (ug/L)
VPMW = vertical profile monitoring well
SSGWSC = site-specific groundwater screening criteria
TAT = turn-around-time
VOCs = volatile organic compounds
Dashed cells indicate that the value does not exceed the SSGWSC
U = non-detected value.
B = Analyte is found in the associated blank and in the sample.

Table 4-20
Groundwater Monitoring Well Screening Criteria Exceedances - Round 1 and Round 2
Consolidated Iron and Metal Superfund Site
Newburgh, New York

ROUND 1

Chemical Name	SSGWSC	MW-09-R1 (background)		MW-01-R1		MW-02-R1		MW-03-R1		MW-04-R1		MW-05-R1		MW-05-R1-Dup		MW-06-R1		MW-07-R1		MW-08-R1	
VOCs																							
Methyl tert-butyl ether	10	-----	U	-----	U	-----		-----		14		14		11		-----		19		15	
Benzene	1	9.6		-----	U	-----	U	-----	J	3.8		18		15		-----	U	-----	U	-----	J
Toluene	5	-----	J	-----	J	-----	J	-----		-----		9.8		9.7		-----	U	-----	U	-----	J
Ethylbenzene	5	-----	U	-----		-----	U	-----	J	-----		62		61		-----	U	-----	U	-----	J
m,p-Xylenes	5	-----	U	-----		-----	U	-----		6.6		260		250		-----	U	-----	U	-----	
INORGANICS																							
Iron	**300**	**590**		**4500**		**42000**		**26000**		**30000**		**70000**		**69000**		**14000**		**19000**		**5900**	
Lead	**15**	**-----**	U	**-----**	U	**-----**	U	**38**		**-----**	U	**91**		**89**		**-----**	U	**-----**	U	**-----**	
Magnesium	35000	-----		-----		-----		47000		47000		67000		67000		-----		37000		-----	
Manganese	300	890		3100		2200		1400		1200		1500		1500		1100		670		380	
Sodium	20000	80000		84000		93000		45000		110000		150000		150000		50000		70000		30000	
Zinc	**5**	**-----**	U	**-----**	U	**-----**	U	**-----**	U	**-----**	U	**150**		**140**		**-----**	U	**-----**	U	**-----**	U

ROUND 2

Chemical Name	SSGWSC	MW-09-R2 (background)		MW-01-R2		MW-02-R2		MW-03-R2		MW-04-R2		MW-05-R2		MW-05-R2-Dup		MW-06-R2		MW-07-R2		MW-08-R2	
VOCs																							
Methyl tert-butyl ether	10	-----	J	-----	U	-----	J	16		47	J	-----	J	-----		-----		26		14	
Benzene	1	13		-----	J	-----	U	-----	J	1.9	J	4.9		4.4		-----	U	-----	U	-----	J
Ethylbenzene	5	-----	U	-----		-----	U	-----	U	-----		19		17		-----	U	-----	U	-----	J
m,p-Xylenes	5	-----	U	-----	J	-----	U	-----	J	-----		61		65		-----	U	-----	U	-----	
INORGANICS																							
Antimony	3	-----	U	-----	U	-----	U	33.4	J	-----	U	-----	U	-----	U	-----	U	-----	U	-----	U
Iron	**300**	**773**		**5550**		**50200**		**37600**		**29000**		**87200**		**84400**		**19600**		**20800**		**10900**	
Magnesium	35000	-----		-----		46200		54800		55500		89800		87300		-----		39000		-----	
Manganese	300	954		2730		2430		1700		1250		1890		1840		1640		668		488	
Sodium	20000	83900	J	78300	J	105000	J	43700	J	114999	J	200001	J	192000	J	47400	J	69200	J	29200	J
Thallium	0.5	7.1	J	5.9	J	6.3	J	4.6	J	6.2	J	8.9	J	5.9	J	-----	U	5.1	J	6.2	J
Zinc	**5**	**-----**	R	**26.4**	J	**25.6**	J	**-----**	R	**33.1**	J	**98.8**		**97.8**		**26.2**	J	**46.7**	J	**105**	

Notes:

Indicator contaminants are bolded
All values are in micrograms per liter (ug/L)
Dashed cells indicate that the value does not exceed the SSGWSC ----
SSGWSC = site-specific groundwater screening criteria

R1 = round 1 groundwater sampling event
R2 = round 2 groundwater sampling event
VOCs = volatile organic compounds
U = non-detected value.

J = value is estimated due to exceeded quality control criteria
R = data was rejected

Table 4-21a

Soil Boring LNAPL Sample Data
Consolidated Iron and Metal Site
Newburgh, New York

Chemical Name	SSSSC	PASB-02-LNAPL		SWSB-15-LNAPL	
VOCs (ug/kg)					
1,1,1-Trichloroethane	3,876	11	R	11	U
1,1,2,2-Tetrachloroethane	410	11	R	11	U
1,1,2-Trichloro-1,2,2-trifluoroethane	13,778	11	R	11	U
1,1,2-Trichloroethane	730	11	R	11	U
1,1-Dichloroethane	969	11	R	11	U
1,1-Dichloroethene	100	11	R	11	U
1,2,4-Trichlorobenzene	6,200	11	R	11	U
1,2-Dibromo-3-chloropropane	210	11	R	11	U
1,2-Dibromoethane	32	11	R	11	U
1,2-Dichlorobenzene	13,778	11	R	11	U
1,2-Dichloroethane	280	11	R	11	U
1,2-Dichloropropane	340	11	R	11	U
1,3-Dichlorobenzene	7,751	11	R	11	U
1,4-Dichlorobenzene	3,400	11	R	11	U
2-Butanone	1,453	11	R	11	
2-Hexanone	NA	11	R	11	U
4-Methyl-2-pentanone	4,844	11	R	11	U
Acetone	969	27	UJ	53	
Benzene	291	11	R	11	U
Bromodichloromethane	820	11	R	11	U
Bromoform	62,000	11	R	11	U
Bromomethane	390	11	R	11	U
Carbon Disulfide	13,080	11	R	11	U
Carbon Tetrachloride	220	11	R	11	U
Chlorobenzene	8,236	11	R	11	U
Chloroethane	3,000	11	R	11	U
Chloroform	220	11	R	11	U
Chloromethane	4,700	11	R	11	U
cis-1,2-Dichloroethene	4,300	11	R	11	U
cis-1,3-Dichloropropene	780	11	R	11	U
Cyclohexane	140,000	11	R	4	J
Dibromochloromethane	1,100	11	R	11	U
Dichlorodifluoromethane	9,400	11	R	11	U
Ethylbenzene	13,778	11	R	11	U
Isopropylbenzene	57,000	11	R	11	U
m,p-Xylenes	484	3	J	3	J
Methyl Acetate	2,200,000	11	R	11	U
Methyl tert-Butyl Ether	17,000	11	R	17	J
Methylene Chloride	484	11	UJ	11	U
Metylcyclohexane	260,000	4	J	4	J
Styrene	440,000	11	R	11	U
Tetrachloroethene	480	11	R	11	U
Toluene	7,267	2	J	11	U
trans-1,2-Dichloroethene	1,453	11	R	11	U
trans-1,3-Dichloropropene	780	11	R	11	U
Trichloroethene	53	11	R	11	U
Trichlorofluoromethane	39,000	11	R	3	J
Vinyl Chloride	79	11	R	11	U
SVOCs (ug/kg)					
1,1'-Biphenyl	300,000	54	J	90	J
2,2'-oxybis(1-Chloropropane)	NA	460	U	400	UJ
2,4,5-Trichlorophenol	484	1200	U	1000	UJ
2,4,6-Trichlorophenol	610	460	U	400	UJ
2,4-Dichlorophenol	1,938	460	U	400	UJ
2,4-Dimethylphenol	120,000	460	U	400	UJ
2,4-Dinitrophenol	969	1200	U	1000	UJ
2,4-Dinitrotoluene	3,000	460	U	400	UJ
2,6-Dinitrotoluene	3,000	460	U	400	UJ
2-Chloronaphthalene	490,000	460	U	400	UJ

Table 4-21a

Soil Boring LNAPL Sample Data
Consolidated Iron and Metal Site
Newburgh, New York

Chemical Name	SSSSC	PASB-02-LNAPL		SWSB-15-LNAPL	
2-Chlorophenol	3,876	460	U	400	UJ
2-Methylnaphthalene	68,892	230	J	320	J
2-Methylphenol	484	460	U	400	UJ
2-Nitroaniline	2,083	1200	UJ	1000	UJ
2-Nitrophenol	1,599	460	U	400	UJ
3,3'-Dichlorobenzidine	1,100	460	U	400	UJ
3-Nitroaniline	1,800	1200	UJ	1000	UJ
4,6-Dinitro-2-methylphenol	NA	1200	U	1000	UJ
4-Bromophenyl-phenylether	NA	460	U	400	UJ
4-Chloro-3-methylphenol	1,163	460	U	400	UJ
4-Chloroaniline	1,066	460	U	400	UJ
4-Chlorophenyl-phenylether	NA	460	U	400	UJ
4-Methylphenol	4,360	460	U	400	UJ
4-Nitroaniline	NA	1200	U	1000	UJ
4-Nitrophenol	484	1200	UJ	1000	UJ
Acenaphthene	68,892	390	J	800	J
Acenaphthylene	68,892	110	J	200	J
Acetophenone	NA	150	J	47	J
Anthracene	68,892	1400		2300	J
Atrazine	2,200	460	U	400	UJ
Benzaldehyde	610,000	460	U	400	UJ
Benzo(a)anthracene	620	**2800**		**4200**	**J**
Benzo(a)pyrene	62	**1900**		**2900**	**J**
Benzo(b)fluoranthene	620	**1800**		**2300**	**J**
Benzo(g,h,i)perylene	68,892	500	U	400	UJ
Benzo(k)fluoranthene	5,329	1800		2500	J
bis(2-Chloroethoxy)methane	NA	460	U	400	UJ
bis(2-Chloroethyl) ether	220	460	U	400	UJ
bis(2-Ethylhexyl) phthalate	35,000	99	J	67	J
Butylbenzylphthalate	68,892	460	U	400	UJ
Caprolactam	3,100,000	460	U	400	UJ
Carbazole	24,000	330	J	1200	J
Chrysene	1,938	**2500**		**4600**	**J**
Dibenz(a,h)anthracene	49	**270**	**J**	**490**	**J**
Dibenzofuran	15,000	240	J	600	J
Diethylphthalate	34,396	460	U	400	UJ
Dimethylphthalate	9,689	460	U	400	UJ
Di-n-butylphthalate	39,240	460	U	400	UJ
Di-n-octylphthalate	68,892	460	U	400	UJ
Fluoranthene	68,892	4800		9600	J
Fluorene	68,892	480		760	J
Hexachlorobenzene	300	460	U	400	UJ
Hexachlorobutadiene	1,800	460	U	400	UJ
Hexachlorocyclopentadiene	14,000	460	UJ	400	UJ
Hexachloroethane	6,100	460	U	400	UJ
Indeno(1,2,3-cd)pyrene	620	**870**		**1500**	**J**
Isophorone	21,316	460	U	400	UJ
Naphthalene	5,600	190	J	830	J
Nitrobenzene	969	460	U	400	UJ
n-Nitroso-di-n-propylamine	69	460	U	400	UJ
n-Nitrosodiphenylamine	99,000	460	U	400	UJ
Pentachlorophenol	3,000	1200	U	1000	UJ
Phenanthrene	68,892	3600		10000	J
Phenol	145	97	J	400	UJ
Pyrene	68,892	4500		9000	J
P/PCBs (ug/kg)					
4,4'-DDD	2,400	10	J	4	UJ
4,4'-DDE	1,700	4.6	U	4	UJ
4,4'-DDT	1,700	8.4		5.4	JN
Aldrin	29	2.4	U	2.1	UJ

Table 4-21a

Soil Boring LNAPL Sample Data
Consolidated Iron and Metal Site
Newburgh, New York

Chemical Name	SSSSC	PASB-02-LNAPL		SWSB-15-LNAPL	
alpha-BHC	90	2.4	U	2.1	UJ
alpha-Chlordane	2,616	2.4	U	2.1	J
Aroclor-1016	390	46	U	40	UJ
Aroclor-1221	1,378	93	U		UJ
Aroclor-1232	1,378	[illegible]		40	UJ
Aroclor-1242	1,378	46	U	40	UJ
Aroclor [illegible]	1,378	46	U	40	UJ
Aroclor-1254	110	83		40	UJ
Aroclor-1260	1,378	46	U	40	UJ
beta-BHC	320	2.4	U	2.1	UJ
delta-BHC	1,453	2.4	U	2.1	UJ
Dieldrin	30	4.6	U	4	UJ
Endosulfan I	4,360	2.4	U	2.1	UJ
Endosulfan II	4,360	4.6	U	4	UJ
Endosulfan sulfate	4,844	4.6	U	12	R
Endrin	484	4.6	U	6.7	R
Endrin aldehyde	NA	4.6	U	8.1	J
Endrin ketone	NA	4.6	U	4	UJ
gamma-BHC (Lindane)	291	2.4	U	2.1	UJ
gamma-Chlordane	2,616	3.6	J	2.4	JN
Heptachlor	110	2.4	U	2.1	UJ
Heptachlor epoxide	53	2.4	U	2.1	UJ
Methoxychlor	31,000	24	U	21	UJ
Toxaphene	440	240	U	210	UJ
Inorganic Analytes (mg/kg)					
Aluminum	7,600	**11000**		7430	
Antimony	3.10	**7**	J	7.3	UR
Arsenic	0.39	35.7	R	**7.6**	
Barium	300	152		69.5	R
Beryllium	0.16	**0.41**	J	**0.43**	J
Cadmium	1	**4**		0.61	U
Calcium	NA	18400		12200	
Chromium	10	**28.9**		**13.6**	
Cobalt	30	26.6		8.3	
Copper	25	**454**	R	**141**	
Cyanide	120	3.3	U		
Iron	2,000	**91800**		**27100**	
Lead	400	340	R	**799**	J
Magnesium	NA	4700		6200	
Manganese	180	**662**		**409**	
Mercury	0.1	**4.9**		**1.8**	
Nickel	13	**61.7**		**19.9**	
Potassium	NA	1430		1310	J
Selenium	2	**6.4**		**3.2**	J
Silver	39	0.5	J	0.24	J
Sodium	NA	655	U	335	J
Thallium	0.52	**2.5**	J	**1.2**	J
Vanadium	7.80	**33.3**		**22.1**	
Zinc	20	**762**		**154**	J
TPH					
Motor Oil	NA	-----	U	-----	U
Terphenyl-D14	NA	92		85	
Diesel Range Organics	NA	310		71	

Notes:
Indicator contaminants are highlighted
Screening criteria exceedances are bolded
VOCs = volatile organic compounds
SVOCs = semivolatile organic compounds
U = non-detected value.
J = Value is estimated due to exceeded due to exceeded quality control criteria .
LNAPL = light non-aqueous phase liquid
P/PCBs = pesticides and polychlorinated biphenyls
SSSSC = site-specific soil screening criteria
Dup = duplicate
R = data was rejected
TPH = total petroleum hydrocarbons
NA = not applicable

Table 4-21b

Groundwater LNAPL Sample Data
Consolidated Iron and Metal Site
Newburgh, New York

Chemical Name	SSGWSC*	GWS-02-LNAPL		GWS-05-LNAPL		GWS-15-LNAPL		GWS-16-LNAPL		GWS-16-LNAPL-DUP	
VOCs (ug/L)											
1,1,1-Trichloroethane	5	10	U	10	U	10	U	10	U	10	U
1,1,2,2-Tetrachloroethane	5	10	U	10	U	10	U	10	U	10	U
1,1,2-Trichloro-1,2,2-trifluoroethane	5	10	U	10	U	10	U	10	U	10	U
1,1,2-Trichloroethane	1	10	U	10	U	10	U	10	U	10	U
1,1-Dichloroethane	5	10	U	10	U	10	U	10	U	10	U
1,1-Dichloroethene	5	10	U	10	U	10	U	10	U	10	U
1,2,4-Trichlorobenzene	5	10	U	10	U	10	U	10	U	10	U
1,2-Dibromo-3-chloropropane	0.04	10	R	10	U	10	UJ	10	R	10	R
1,2-Dibromoethane	0.0006	10	U	10	U	10	U	10	U	10	U
1,2-Dichlorobenzene	3	10	U	10	U	10	U	10	U	10	U
1,2-Dichloroethane	0.6	10	U	10	U	10	U	10	U	10	U
1,2-Dichloropropane	1	10	U	10	U	10	U	10	U	10	U
1,3-Dichlorobenzene	3	10	U	10	U	10	U	10	U	10	U
1,4-Dichlorobenzene	3	10	U	10	U	10	U	10	U	10	U
2-Butanone	50	10	U	10	U	10	UJ	10	U	10	U
2-Hexanone	50	10	UJ	10	U	10	UJ	10	U	10	U
4-Methyl-2-pentanone	50	10	U	10	U	15	J	10	U	10	U
Acetone	50	10	UJ	10	UJ	10	UJ	10	U	10	U
Benzene	1	10	U	10	U	**21**		10	U	10	U
Bromodichloromethane	50	10	U	10	U	10	U	10	U	10	U
Bromoform	50	10	U	10	UJ	10	U	10	U	10	U
Bromomethane	5	10	U	10	U	10	U	10	U	10	U
Carbon Disulfide	50	10	U	10	U	10	U	10	U	10	U
Carbon Tetrachloride	5	10	U	10	U	10	U	10	U	10	U
Chlorobenzene	5	10	U	10	U	10	U	10	U	10	U
Chloroethane	5	10	U	10	U	10	UJ	10	U	10	U
Chloroform	7	10	U	10	U	10	U	10	U	10	U
Chloromethane	5	10	U	10	U	10	UJ	10	U	10	U
cis-1,2-Dichloroethene	5	10	U	10	U	10	U	10	U	10	U
cis-1,3-Dichloropropene	0.4	10	U	10	U	10	U	10	U	10	U
Cyclohexane	NA	6	J	10	U	4	J	10	U	10	U
Dibromochloromethane	50	10	U	10	U	10	U	10	U	10	U
Dichlorodifluoromethane	5	10	U	10	U	10	U	10	U	10	U
Ethylbenzene	5	10	U	10	U	**36**		10	U	10	U
Isopropylbenzene	5	10	U	10	U	3	J	10	U	10	U
m,p-Xylenes	5	10	U	10	U	**230**		10	U	10	U
Methyl Acetate	NA	10	U	10	U	10	U	10	U	10	U
Methyl tert-Butyl Ether	10	**23**	J	1	J	2	J	**58**		**65**	
Methylene Chloride	5	10	U	10	U	10	U	10	U	10	U
Metylcyclohexane		10	U	10	U	3	J	10	U	10	U
Styrene	5	10	U	10	U	10	U	10	U	10	U
Tetrachloroethene	5	10	U	10	U	10	U	10	U	10	U
Toluene	5	10	U	10	U	**120**		10	U	10	U
trans-1,2-Dichloroethene	5	10	U	10	U	10	U	10	U	10	U
trans-1,3-Dichloropropene	0.4	10	U	10	U	10	U	10	U	10	U
Trichloroethene	5	10	U	10	U	10	U	10	U	10	U
Trichlorofluoromethane	5	10	U	10	U	10	U	10	U	10	U
Vinyl Chloride	2	10	U	10	U	10	U	10	U	10	U
SVOCs (ug/L)											
1,1'-Biphenyl	5	10	UJ	10	U	10	U	10	U	10	U
2,2'-oxybis(1-Chloropropane)	5	10	UJ	10	U	10	U	10	UJ	10	UJ
2,4,5-Trichlorophenol	5	25	U	25	U	25	U	25	U	25	U
2,4,6-Trichlorophenol	5	10	U	10	U	10	U	10	U	10	U
2,4-Dichlorophenol	5	10	U	10	U	10	U	10	U	10	U
2,4-Dimethylphenol	50	10	U	10	U	5	J	10	U	10	U
2,4-Dinitrophenol	10	25	U	25	U	25	U	25	U	25	U
2,4-Dinitrotoluene	5	10	UJ	10	U	10	U	10	U	10	U
2,6-Dinitrotoluene	5	10	UJ	10	U	10	U	10	U	10	U
2-Chloronaphthalene	5	10	UJ	10	U	10	U	10	U	10	U

Table 4-21b

Groundwater LNAPL Sample Data
Consolidated Iron and Metal Site
Newburgh, New York

Chemical Name	SSGWSC*	GWS-02-LNAPL		GWS-05-LNAPL		GWS-15-LNAPL		GWS-16-LNAPL		GWS-16-LNAPL-DUP	
2-Chlorophenol	5	10	U	10	U	10	U	10	U	10	U
2-Methylnaphthalene	NA	10	UJ	10	U	4	J	10	U	10	U
2-Methylphenol	50	2	J	10	U	10	U	10	U	10	U
2-Nitroaniline	5	25	UJ	25	UJ	25	U	25	UJ	25	UJ
2-Nitrophenol	50	10	U	10	U	10	U	10	U	10	U
3,3'-Dichlorobenzidine	5	10	UJ	10	U	10	UJ	10	U	10	U
3-Nitroaniline	5	25	UJ	25	UJ	25	U	25	U	25	U
4,6-Dinitro-2-methylphenol	50	25	U	25	U	25	U	25	U	25	U
4-Bromophenyl-phenylether	50	10	UJ	10	U	10	U	10	U	10	U
4-Chloro-3-methylphenol	5	10	U	10	U	10	U	10	U	10	U
4-Chloroaniline	5	10	UJ	10	U	10	U	10	U	10	U
4-Chlorophenyl-phenylether	50	10	UJ	10	U	10	UJ	10	U	10	U
4-Methylphenol	50	4	J	10	U	29		10	U	10	U
4-Nitroaniline	5	25	UJ	25	U	25	U	25	U	25	U
4-Nitrophenol	50	25	UJ	25	UJ	25	UJ	25	UJ	25	UJ
Acenaphthene	50	10	UJ	10	U	10	U	8	J	8	J
Acenaphthylene	50	10	UJ	10	U	10	U	10	U	10	U
Acetophenone	50	10	UJ	10	U	10	U	10	U	10	U
Anthracene	50	10	UJ	10	U	10	U	2	J	2	J
Atrazine	3	10	UJ	10	U	10	U	10	U	10	U
Benzaldehyde	NA	10	UJ	10	U	10	U	10	U	10	U
Benzo(a)anthracene	0.002	10	UJ	10	U	10	U	10	U	10	U
Benzo(a)pyrene	0.2	10	UJ	10	U	10	U	10	U	10	U
Benzo(b)fluoranthene	0.002	10	UJ	10	U	10	U	10	U	10	U
Benzo(g,h,i)perylene	50	10	UJ	10	U	10	UJ	10	U	10	U
Benzo(k)fluoranthene	0.002	10	UJ	10	U	10	U	10	U	10	U
bis(2-Chloroethoxy)methane	5	10	UJ	10	U	10	U	10	U	10	U
bis(2-Chloroethyl) ether	1	10	UJ	10	U	10	U	10	U	10	U
bis(2-Ethylhexyl) phthalate	5	10	UJ	10	U	10	U	1	J	10	U
Butylbenzylphthalate	50	10	UJ	10	U	10	U	10	U	10	U
Caprolactam	NA	10	UJ	10	U	10	U	10	U	10	U
Carbazole	50	10	UJ	10	U	10	UJ	3	J	5	J
Chrysene	0.002	10	UJ	10	U	10	U	1	J	10	U
Dibenz(a,h)anthracene	50	10	UJ	10	U	10	UJ	10	U	10	U
Dibenzofuran	50	10	UJ	10	U	10	U	2	J	3	J
Diethylphthalate	50	10	UJ	10	U	10	U	10	U	10	U
Dimethylphthalate	50	10	UJ	10	U	10	U	10	U	10	U
Di-n-butylphthalate	50	10	UJ	10	U	10	U	10	U	10	U
Di-n-octylphthalate	50	10	UJ	10	U	10	U	10	U	10	U
Fluoranthene	50	10	UJ	10	U	10	U	3	J	3	J
Fluorene	50	10	UJ	10	U	10	U	7	J	8	J
Hexachlorobenzene	0.04	10	UJ	10	U	10	U	10	U	10	U
Hexachlorobutadiene	0.5	10	UJ	10	U	10	U	10	U	10	U
Hexachlorocyclopentadiene	5	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ
Hexachloroethane	5	10	UJ	10	U	10	U	10	U	10	U
Indeno(1,2,3-cd)pyrene	0.002	10	UJ	10	U	10	UJ	10	U	10	U
Isophorone	50	10	UJ	10	U	10	U	10	U	10	U
Naphthalene	50	10	UJ	10	U	10		2	J	2	J
Nitrobenzene	0.4	10	UJ	10	U	10	U	10	UJ	10	UJ
n-Nitroso-di-n-propylamine	50	10	UJ	10	U	10	U	10	UJ	10	UJ
n-Nitrosodiphenylamine	50	10	UJ	10	U	5	J	10	U	10	U
Pentachlorophenol	1	25	U	25	U	25	U	25	U	25	U
Phenanthrene	50	10	UJ	10	U	10	U	6	J	8	J
Phenol	50	5	J	10	U	7	J	10	U	10	U
Pyrene	50	10	UJ	10	U	10	U	2	J	2	J
P/PCBs (ug/L)											
4,4'-DDD	0.3	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	UJ
4,4'-DDE	0.2	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	UJ
4,4'-DDT	0.2	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	UJ
Aldrin	5	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ

Table 4-21b

Groundwater LNAPL Sample Data
Consolidated Iron and Metal Site
Newburgh, New York

Chemical Name	SSGWSC*	GWS-02-LNAPL		GWS-05-LNAPL		GWS-15-LNAPL		GWS-16-LNAPL		GWS-16-LNAPL-DUP	
alpha-BHC	0.01	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ
alpha-Chlordane	0.05	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ
Aroclor-1016	0.09	1	UJ	1	U	1	U	1	UJ	1	UJ
Aroclor-1221	0.09	2	UJ	2	U	2	U	2	UJ	2	UJ
Aroclor-1232	0.09	1	UJ	1	U	1	U	1	UJ	1	UJ
Aroclor-1242	0.09	1	UJ	1	U	1	U	1	UJ	1	UJ
Aroclor-1248	0.09	**1.6**	**J**	1	U	1	U	1	UJ	1	UJ
Aroclor-1254	0.09	**1**	**J**	1	U	1	U	1	UJ	1	UJ
Aroclor-1260	0.09	1	UJ	1	U	1	U	1	UJ	1	UJ
beta-BHC	0.04	0.05	UJ	0.05	U	0.083	R	0.05	UJ	0.05	UJ
delta-BHC	0.04	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ
Dieldrin	0.004	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	UJ
Endosulfan I	50	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ
Endosulfan II	50	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	UJ
Endosulfan sulfate	50	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	UJ
Endrin	2	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	UJ
Endrin aldehyde	5	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	UJ
Endrin ketone	5	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	UJ
gamma-BHC (Lindane)	0.05	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ
gamma-Chlordane	0.05	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ
Heptachlor	0.04	**0.05**	**J**	0.05	U	0.05	U	0.05	UJ	0.05	UJ
Heptachlor epoxide	0.03	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	UJ
Methoxychlor	35	0.5	UJ	0.5	U	0.5	U	0.5	UJ	0.5	UJ
Toxaphene	0.06	5	UJ	5	U	5	U	5	UJ	5	UJ
Inorganic Analytes (ug/L)											
Aluminum	200			**1340**		**4700**		**17200**		**14500**	
Antimony	NA			60	U	60	U	7.6	J	11.7	J
Arsenic	3			**5.3**	**J**	10	U	**7.8**	**J**	**8**	**J**
Barium	10			**172**	**J**	**380**		**425**		**398**	
Beryllium	1,000			0.08	J	5	U	0.73	J	0.61	J
Cadmium	3			**3.4**	**J**	5	U	**3.9**	**J**	**3.1**	**J**
Calcium	5			**59500**		**100000**		**102999**		**101001**	
Chromium	NA			4.2	J	10	U	24.5	J	20.8	J
Copper	50			**168**	**J**	**65**		**114**		**95.6**	
Iron	200			**4900**		**33000**		**30700**		**26800**	
Lead	300			**362**		85		**380**		**335**	
Magnesium	15			**14700**		**48000**		**55700**		**54100**	
Manganese	35,000			903		1700		1780		1690	
Mercury	300			0.2	U	20	U	3.4		3.3	
Nickel	0.7			10.8	J	40	U	25.3	J	20.8	J
Potassium	100			**5230**	**J**	**26000**		**18700**		**18500**	
Selenium	NA			35	U	35	U	35	U	35	U
Silver	10			10	U	10	U	7.2	J	6.4	J
Sodium	50			**24800**	**J**	**110000**		**105000**		**107001**	
Thallium	20,000			25	U	25	U	4.9	J	25	U
Vanadium	0.5			**9.1**	**J**	50	U	**30.7**	**J**	**26.6**	**J**
Zinc	NA			718		150		493		409	
Cyanide	5			10	U	10	UJ	**6.5**	**J**	**5**	**J**
TPH (mg/kg)											
TPH-Diesel Range Organics	NA	0.99	J	0.78		1.2	J	3.2		3.3	J
TPH-Motor Oil	NA	4.4	J	0.05	U	0.05	UJ	4.4		9.7	J

Notes:

* The SSGWSC is for monitoring wells (based on low-detection limit (LDL) VOC analyses); however, the LNAPL screening samples were analyzed normal detection limit VOCs, and therefore may have detection limits above the SSGWSC. The SSGWSC is provided for comparison purposes

Indicator contaminants are highlighted

Screening criteria exceedances are bolded

VOCs = volatile organic compounds

SVOCs = semivolatile organic compounds

Table 4-21b

Groundwater LNAPL Sample Data
Consolidated Iron and Metal Site
Newburgh, New York

Chemical Name	SSGWSC*	GWS-02-LNAPL	GWS-05-LNAPL	GWS-15-LNAPL	GWS-16-LNAPL	GWS-16-LNAPL-DUP

U = non-detected value.
J = Value is estimated due to exceeded due to exceeded quality control criteria
LNAPL = light non-aqueous phase liquid
P/PCBs = pesticides and polychlorinated biphenyls
SSGWSC = site-specific groundwater screening criteria
Dup = duplicate
R = data was rejected
TPH = total petroleum hydrocarbons
NA = not applicable

Table 5-1
Fate and Transport Properties for Indicator Contaminants
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Compounds	Molecular Weight (g/mole)		Water Solubility '@25 deg. C **@20 deg.C (mg/L)		Henry's Law Constant (atm-m^3/mol)		Vapor Pressure @ 20-25°C (mm Hg)		K$_{oc}$ Literature (mL/g)		Kd$_s$* Project-specific calculated (cm^3/g)	log K$_{ow}$ (unitless)		K$_{ow}$ (unitless)		Rf-cal from site specific Kd (unitless)	Literature Kd (mL/g)		Rf-cal from literature Kd (unitless)	Adsorption based on Site-Calc Kd - Lit Kd	Volatilization from Water	Mobility based on Site-Calc Rf - Lit Calc Rf
PAHs																						
Benzo(a)anthracene	228	a	1.0E-02	a	1.0E-06	a	2.2E-08	a	3.58E+05	b	1.3E+04	5.7	b	4.77E+05	c	6.6E+04	2.60E+03	c	1.4E+04	High - High	Moderate	Low - Low
Benzo(a)pyrene	252	a	2.3E-03	a	1.6E-06	a	5.6E-09	a	9.69E+05	b, c	3.4E+04	6.11	b	1.35E+06	c	1.8E+05	9.69E+03	c	5.1E+04	High - High	Moderate	Low - Low
Benzo(b)fluoranthene	252	a	1.2E-03	a	1.2E-05	a	5.0E-07	a	1.23E+06	b-cal	4.3E+04	6.2	b	1.59E+06	c	2.3E+05	8.36E+03	c	4.4E+04	High - High	Moderate	Low - Low
Dibenz(a,h)anthracene	278	a	5.0E-04	a	7.3E-08	a	1.0E-10	a	1.77E+06	b	6.2E+04	6.69	b	3.53E+06	c	3.3E+05	1.79E+04	c	9.4E+04	High - High	Low	Low - Low
Indeno(1,2,3-c,d)pyrene	276	a	6.2E-02	a	7.0E-08	a	1.0E-10	a	3.47E+06	b-cal	1.2E+05	6.65	b	8.22E+06	c	6.4E+05	4.11E+04	c	2.2E+05	High - High	Low	Low - Low
PCBs																						
Aroclor 1254	328	a	6.0E-02	a	2.0E-03	a	7.7E-05	a	3.09E+05	b	1.1E+04	5.58	b	1.61E+06	c	5.7E+04	9.83E+04	c	5.1E+05	High - High	High	Low - Low
Metals																						
Arsenic (+3)	74.9	c	insoluble-highly soluble	c	31.6	f	NA	c	No data	c,a	NA	No data; 0.68	a,f	No data	a	NA	25 at pH 4.9; 29 at pH 6.8, 31 at pH 8	c	1.6E+02	NA - High	High	- Moderate
Cadmium	112	c	insoluble	c	0	c	8.98E-18	f	No data	a	NA	-0.07	f	No data	a	NA	15 at pH 4.9; 75 at pH 6.8, 4300 at pH 8	c	3.9E+02	NA - High	Low	- Moderate
Copper	63.55	o	*insoluble-partly* soluble	c	0; 1, No data	o, f, a	0	f	No data	a	NA	-0.57	f	No data	a	NA	40 at pH 4.9; 10,000 at pH 6.8; 28,500 at pH 8	c	5.2E+04	NA - High	NA	- Low
																	40	f	2.1E+02	NA - High	NA	- Moderate
Iron	55.85	f	624,000	f	No data; 1	a, f	4.2E-09	f	No data	a	NA	-0.77	f	No data		NA	25	f	1.3E+02	NA - High	NA	- Moderate
Lead	207	c	Insoluble-highly soluble	a	No data	a	1.77 at 1000°C (Pb) and 1 @ 513°C-PbBr; others-No data	c	No data	a	NA	No data; 0.73	c, a; f	No data	a	NA	9.00E+02	c	4.7E+03	NA - High	NA	- Low
Mercury	201	c	5.6E-02	c	7.0E-03	c	2.00E-03	a	No data	a, c	NA	No data; 0.62	c; f	No data	a	NA	1.00E+03	c	5.2E+03	NA - High	High	- Low
Mercuric Chloride	272	f	6.9E+04	f	4.6E-01	f	5.9E-12	f	No data	a	NA	-0.22	f	NA	f	NA	NA	f	NC	NA -	High	- NC
Vanadium	51	b	Insoluble	a	NC	a	2.34E-02 @ 1916 °C	d	No data	a	NA	No data; 0.23	c; f	No data	a	NA	1.0E+03	f	5.2E+03	NA - High	NA	- Low
Vanadium (as sulfate)	164	f	1.1E+05	f	NA	f	2.9E-20	f	No data	a	NA	-0.27	f	NA	f	NA	NA	f	NC	NA - High	NA	- NC
Zinc	65	c	Insoluble; chromates sparingly soluble		0, 1	c, f	1 @ 487 °C; 7.99E^{-23} (i)	d, f	No data	a, c	NA	-0.47	f	No data	a	NA	62 @ pH 6.8	c	3.3E+02	NA - High	NA	- Moderate

Table 5-1
Fate and Transport Properties for Indicator Contaminants
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Notes
NA = not available or not applicable
- = no data

* Kd = Soil/Water Partition Coefficient (= Koc x foc) *cc/gm*
** Rf = Retardation Factor = 1 + (Rho_b x Kd/Eta_e) dimensionless
** or retardation factor = 1 + (ρb / η) Kd

Fraction Organic Carbon, f	3.52%	(foc(%)=TOC*10^{-4})
Soil Bulk Density, ρb =	1.57 g/mL	
Effective Porosity, η =	30%	

Adsorption is	"Low"	if Kd <	0.5
	"High"	if Kd >	2
	"Moderate"	if Kd is in-between	
Volatilization from Water i	"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	

Henry's Law Constant for most metals assumed as zero since vapor pressure & solubility of metals are zero
foc value above Is for soil average TOC results of 35,200 mg/kg. Sediment average TOC values (39,800 mg/kg) will provide higher Kd values.

Abbreviations:
atm-m^3/mol = atmosphere per mole per cubic meter (Henry's Law Constant)
C = Celsius
cal = calculated
mL/g = milliliter per gram
g/mL = gram per milliliter
deg. = degrees
g/mole = grams per mole
Koc = Soil Organic Carbon/Water Partition Coefficient, mL/g
Kow = n-Octanol/Water Partition Coefficient, dimensionless
mg/l = milligrams per liter
mm Hg = millimeter of mercury
mg/L = milligram per liter
ml/gm = milliliter per gram
NA = not available
NC = not calculable
TOC = total organic carbon
umoles/L = micromoles per liter

Sources:
a. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological Profiles. U.S. Department of Health and Human Services. (presented in order of appearance)
- _____. 1995. Toxicological Profile for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene. US Department of Health and Human Services. August.
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- _____. 2004. Draft Toxicological Profile for Copper. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. September.
- _____. 1999. Toxicological Profile for Lead. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. July.
- _____. 2000b. Toxicological Profile for Manganese. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. September
- _____. 1992. Toxicological Profile for Vanadium. US Department of Health and Human Services. July.

b: EPA 1996. EPA Soil Screening Guidance: Technical Background Document. May. (*Geometric mean values used.*)
c. _____. 1998. Human Heath Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Volume 2. Appendix Chemical-specific Parameter Values. EPA 530-D-98-001. July. (Literature values are based on foc value of 0.01)
http://www.epa.gov/earth1r6/6pd/rcra_c/protocol/volur
d: Hazardous Substance Databank 2004. A database of the National Library of Medicine's TOXNET system. http://toxnet.nlm.nih.gov
e. EPA 1990. Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA530-D-99-001A. November.
f: Risk Assessment Information Services, Oak Ridge National Laboratory on-line data base, http://risk.lsd.ornl.gov/, October 2004

Table 6-1
Summary of Chemicals of Potential Concern for Human Health Risk Assessment
Consolidated Iron and Metal Site
Newburgh, New York

Chemical	Surface Soil	Subsurface Soil	Sediment	Surface Water	Groundwater	Vapor Intrusion
Volatile Organic Compounds						
2-Butanone	--	N	N	--	N	Y
Acetone	N	N	N	--	N	Y
Benzene	Y	Y	--	--	Y	Y
Carbon Disulfide	N	N	--	--	N	Y
Chloromethane	--	N	--	--	N	Y
Cyclohexane	N	N	--	--	N	Y
Ethylbenzene	N	N	--	--	N	Y
Isopropylbenzene	N	N	--	--	N	Y
m,p-Xylenes	N	Y	--	--	Y	Y
Methyl Acetate	--	N	--	--	N	Y
Methyl tert-Butyl Ether	N	N	--	--	Y	Y
Methylene Chloride	N	N	--	--	N	Y
Methylcyclohexane	N	N	--	--	N	Y
Toluene	N	N	N	--	N	Y
trans-1,2-Dichloroethene	--	--	--	--	N	Y
Vinyl Chloride	--	--	--	--	Y	Y
Semi-volatile Organic Compounds						
2-Methylnaphthalene	N	N	N	--	N	Y
4-Methylphenol	--	N	N	--	Y	N
Acenaphthene	N	N	N	--	N	Y
Benzo(a)anthracene	Y	Y	Y	--	--	--
Benzo(a)pyrene	Y	Y	Y	--	--	--
Benzo(b)fluoranthene	Y	Y	Y	--	--	--
Benzo(k)fluoranthene	Y	Y	N	--	--	--
bis(2-Ethylhexyl) phthalate	Y	Y	N	--	N	N
Dibenz(a,h)anthracene	Y	Y	Y	--	--	--
Dibenzofuran	N	Y	N	--	--	--
Fluoranthene	N	N	N	--	N	Y
Fluorene	N	N	N	--	N	Y
Indeno(1,2,3-cd)pyrene	Y	Y	Y	--	--	--
Naphthalene	N	Y	N	--	Y	Y
Phenanthrene	N	Y	N	--	N	Y
Pyrene	N	N	N	--	N	Y
Pesticide/Polychlorinated Biphenyls						
4,4'-DDD	N	Y	N	--	--	--
4,4'-DDT	Y	Y	--	--	--	--
Aroclor-1016	Y	Y	--	--	--	--
Aroclor-1242	Y	Y	--	--	--	--
Aroclor-1248	Y	Y	Y	--	--	--
Aroclor-1254	Y	Y	--	--	--	--
Aroclor-1260	Y	Y	--	--	--	--
Dieldrin	--	Y	--	--	--	--
Endrin	Y	N	--	--	--	--
Heptachlor	Y	Y	--	--	--	--
Heptachlor epoxide	Y	Y	--	--	--	--

Table 6-1
Summary of Chemicals of Potential Concern for Human Health Risk Assessment
Consolidated Iron and Metal Site
Newburgh, New York

Chemical	Surface Soil	Subsurface Soil	Sediment	Surface Water	Groundwater	Vapor Intrusion
Dioxins						
Dioxin TEQ-WHO_{98}	Y	NA	NA	NA	NA	NA
Inorganics						
Aluminum	Y	Y	Y	N	Y	N
Antimony	Y	Y	Y	--	Y	N
Arsenic	Y	Y	Y	--	Y	N
Barium	Y	Y	N	--	N	N
Cadmium	Y	Y	N	--	N	N
Chromium	Y	Y	Y	--	Y	N
Copper	Y	Y	Y	--	Y	N
Cyanide	N	N	N	N	Y	N
Iron	Y	Y	Y	N	Y	N
Lead	Y	Y	N	N	Y	N
Manganese	Y	Y	Y	N	Y	N
Mercury	Y	Y	N	--	Y	Y
Nickel	Y	Y	Y	--	Y	N
Silver	Y	N	N	--	N	N
Thallium	Y	Y	Y	--	Y	N
Vanadium	Y	Y	Y	--	Y	N
Zinc	Y	Y	N	--	N	N

Notes:

See Tables B-2.1 through B-2.6 for a full list of detected chemicals and basis for selection as chemical of potential concern (COPC).

-- = Not Detected

Y = Detected and selected as COPC

N = Detected but not selected as COPC

NA = Not analyzed. Samples from this medium were not analyzed for the indicated chemical.

Table 6-2
Summary of Carcinogenic Risks and Non-Carcinogenic Health Hazards - Reasonable Maximum Exposure
Consolidated Iron and Metal Site
Newburgh, New York

Receptor	Cancer Risk	Cancer Risk Note	Noncancer Hazard Index (HI)	Noncancer HI Note
Current/Future				
Trespasser - Adolescent (12 to 18 years old)	2 x 10^{-5}	Cancer risk is within EPA target range of 1 x 10^{-4} and 1 x 10^{-6}.	3	Skin - HI of 2 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI of 2 mostly from ingestion and dermal contact with PCBs in soil. Nails - HI of 2 mostly from ingestion and dermal contact with PCBs in soil.
Recreational User - Adult	5 x 10^{-5}	Cancer risk is within EPA target range of 1 x 10^{-4} and 1 x 10^{-6}.	0.2	HI value is below EPA threshold of 1.
Recreational User - Adolescent (12 to 18 years old)	1 x 10^{-5}	Cancer risk is within EPA target range of 1 x 10^{-4} and 1 x 10^{-6}.	0.2	HI value is below EPA threshold of 1.
Future				
Site Worker	2 x 10^{-4}	Cancer risk is above EPA target range of 1 x 10^{-4} and 1 x 10^{-6} primarily due to PCBs in soil (6 x 10^{-5}) and arsenic in groundwater (3 x 10^{-5}).	8	Skin - HI of 4 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI of 4 mostly from ingestion and dermal contact with PCBs in soil. Nails - HI of 4 mostly from ingestion and dermal contact with PCBs in soil. Blood - HI of 2 mostly from ingestion of antimony and thallium in groundwater.
Construction Worker	8 x 10^{-6}	Cancer risk is within EPA target range of 1 x 10^{-4} and 1 x 10^{-6}.	9	Skin - HI of 6 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI of 6 mostly from ingestion and dermal contact with PCBs in soil. Nails - HI of 6 mostly from ingestion and dermal contact with PCBs in soil. Lungs - HI value is equal to EPA threshold of 1. Blood - HI value is equal to EPA threshold of 1. Whole body - HI value is equal to EPA threshold of 1.
Resident - Adult	2 x 10^{-4}	Cancer risk is above EPA target range of 1 x 10^{-4} and 1 x 10^{-6} primarily due to PCBs in soil (6 x 10^{-5}) and arsenic in groundwater (8 x 10^{-5}).	14	Skin - HI of 5 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI of 5 mostly from ingestion and dermal contact with PCBs in soil. Nails - HI of 5 mostly from ingestion and dermal contact with PCBs in soil. Blood - HI of 5 mostly from ingestion of antimony and thallium in groundwater. Whole body - HI of 3 mostly from ingestion of antimony in groundwater. Lungs - HI of 2 mostly from ingestion of antimony in groundwater. CNS - HI of 2 mostly from ingestion of manganese and mercury in soil and groundwater.

Table 6-2
Summary of Carcinogenic Risks and Non-Carcinogenic Health Hazards - Reasonable Maximum Exposure
Consolidated Iron and Metal Site
Newburgh, New York

Receptor	Cancer Risk	Cancer Risk Note	Noncancer Hazard Index (HI)	Noncancer HI Note
Resident - Child (0 to 6	4×10^{-4}	Cancer risk is above EPA target range of 1×10^{-4} and 1×10^{-6} primarily due to PCBs (1×10^{-4}), PAHs (7×10^{-5}), and arsenic in soil (7×10^{-5}).	73	Skin - HI of 41 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI of 38 mostly from ingestion and dermal contact with PCBs in soil. Nails - HI of 38 mostly from ingestion and dermal contact with PCBs in soil. Blood - HI of 13 mostly from ingestion of antimony (5) and thallium (6) in groundwater. Whole body - HI of 9 mostly from ingestion of antimony (5) and naphthalene (2) in groundwater. Lungs - HI of 7 mostly from ingestion of antimony in groundwater. CNS - HI of 7 mostly from ingestion of mercury (2) in soil and inhalation of xylenes (1) and mercury (2) in groundwater. GI Tract - HI of 5 mostly from ingestion of copper in soil. Kidney - HI of 3 mostly from ingestion of cadmium in soil. Nasal epithelium - HI of 2 mostly from inhalation of napthalene in groundwater.
On-Site Recreational User -	6×10^{-5}	Cancer risk is within EPA target range of 1×10^{-4} and 1×10^{-6}.	3	Skin - HI of 2 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI of 2 mostly from ingestion and dermal contact with PCBs in soil. Nails - HI of 2 mostly from ingestion and dermal contact with PCBs in soil.
On-Site Recreational User -	1×10^{-4}	Cancer risk is above EPA target range of 1×10^{-4} and 1×10^{-6} primarily due to PCBs (5×10^{-5}), PAHs (3×10^{-5}), and arsenic in soil (3×10^{-5}).	22	Skin - HI of 16 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI of 16 mostly from ingestion and dermal contact with PCBs in soil. Nails - HI of 16 mostly from ingestion and dermal contact with PCBs in soil. GI Tract - HI of 2 mostly from ingestion of copper in soil. Kidney - HI value is equal to EPA threshold of 1. CNS - HI value is equal to EPA threshold of 1.

Cancer risks: An excess lifetime cancer risk of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes. EPA's generally acceptable risk range for site-related exposures is 1×10^{-6} to 1×10^{-4} (one in million to one in ten thousand).

Noncancer hazards: EPA Risk Assessment Guidance for Superfund (EPA 1989) states that, generally, a hazard index (HI) greater than 1 indicates the potential for adverse noncancer effects.

Table 6-3
Summary of Carcinogenic Risks and Non-Carcinogenic Health Hazards - Central Tendency Exposure
Consolidated Iron and Metal Site
Newburgh, New York

Receptor	Cancer Risk	Cancer Risk Note	Noncancer Hazard Index (HI)	Noncancer HI Note
Current/Future				
Trespasser - Adolescent (12 to 18 years old)	4×10^{-6}	Cancer risk is within EPA target range of 1×10^{-4} and 1×10^{-6}.	0.7	HI value is below EPA threshold of 1.
Recreational User - Adult	4×10^{-6}	Cancer risk is within EPA target range of 1×10^{-4} and 1×10^{-6}.	0.04	HI value is below EPA threshold of 1.
Recreational User - Adolescent (12 to 18 years old)	4×10^{-6}	Cancer risk is within EPA target range of 1×10^{-4} and 1×10^{-6}.	0.06	HI value is below EPA threshold of 1.
Future				
Site Worker	4×10^{-5}	Cancer risk is within EPA target range of 1 x 10-4 and 1 x 10-6.	9	Blood - HI of 5 mostly from ingestion of antimony (2) and thallium (3) in groundwater. Whole body - HI of 3 mostly from ingestion of antimony in groundwater. Lungs - HI of 2 mostly from ingestion of antimony in groundwater. Skin - HI of 2 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI value is equal to EPA threshold of 1. Nails - HI value is equal to EPA threshold of 1.
Resident - Adult	5×10^{-5}	Cancer risk is within EPA target range of 1 x 10-4 and 1 x 10-6.	8	Blood - HI of 3 mostly from ingestion of antimony and thallium in groundwater. Skin - HI of 2 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI of 2 mostly from ingestion and dermal contact with PCBs in soil. Nails - HI of 2 mostly from ingestion and dermal contact with PCBs in soil. Whole body - HI of 2 mostly from ingestion of antimony in groundwater. Lungs - HI of 2 mostly from ingestion of antimony in groundwater.

Table 6-3
Summary of Carcinogenic Risks and Non-Carcinogenic Health Hazards - Central Tendency Exposure
Consolidated Iron and Metal Site
Newburgh, New York

Receptor	Cancer Risk	Cancer Risk Note	Noncancer Hazard Index (HI)	Noncancer HI Note
Resident - Child (0 to 6	2×10^{-4}	Cancer risk is above EPA target range of 1×10^{-4} and 1×10^{-6} primarily due to PCBs (6×10^{-5}), PAHs (3×10^{-5}), and arsenic in soil (3×10^{-5}).	31	Skin - HI of 17 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI of 16 mostly from ingestion and dermal contact with PCBs in soil. Nails - HI of 16 mostly from ingestion and dermal contact with PCBs in soil. Blood - HI of 5 mostly from ingestion of antimony (2) and thallium (2) in groundwater. Whole body - HI of 4 mostly from ingestion of antimony in groundwater. Lungs - HI of 3 mostly from ingestion of antimony in groundwater. CNS - HI of 3 mostly from ingestion of mercury in soil and inhalation of mercury in groundwater. GI Tract - HI of 3 mostly from ingestion of copper in soil. Kidney - HI value is equal to EPA threshold of 1.
On-Site Recreational User - Adult	4×10^{-6}	Cancer risk is within EPA target range of 1×10^{-4} and 1×10^{-6}.	0.5	HI value is below EPA threshold of 1.
On-Site Recreational	3×10^{-5}	Cancer risk is within EPA target range of 1×10^{-4} and 1×10^{-6}.	5	Skin - HI of 3 mostly from ingestion and dermal contact with PCBs in soil. Eye - HI of 3 mostly from ingestion and dermal contact with PCBs in soil. Nails - HI of 3 mostly from ingestion and dermal contact with PCBs in soil.

Cancer risks: An excess lifetime cancer risk of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes. EPA's generally acceptable risk range for site-related exposures is 1×10^{-6} to 1×10^{-4} (one in million to one in ten thousand).

Noncancer hazards: EPA Risk Assessment Guidance for Superfund (EPA 1989) states that, generally, a hazard index (HI) greater than 1 indicates the potential for adverse noncancer effects.

Table 6-4
COPC Summary Table
Consolidated Iron and Metal Superfund Site
Newburgh, New York

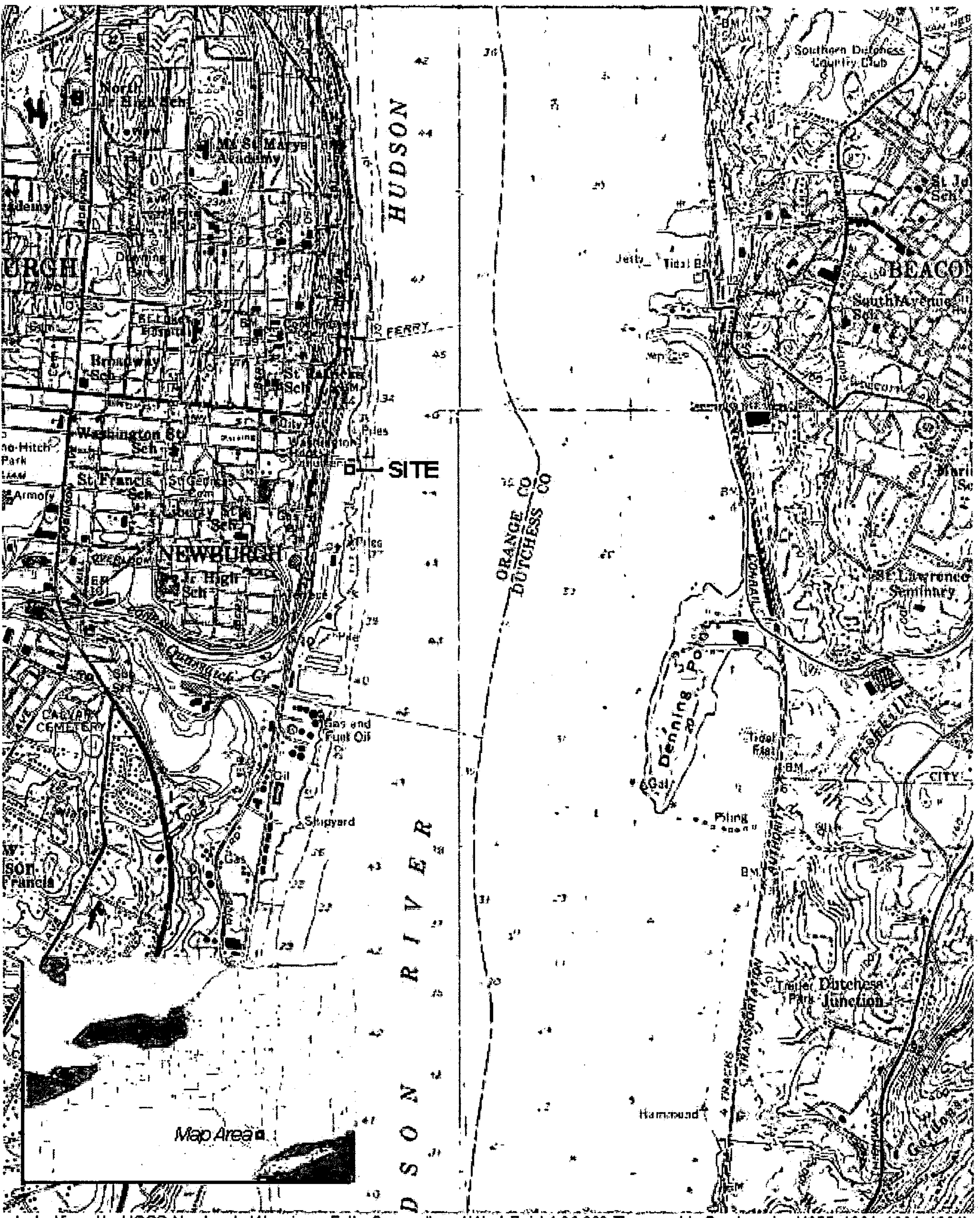
Chemical Name	Surface Soil		Sediment	Surface Water
	Process Area	Non-Process Area		
Volatile Organic Compounds				
2-Butanone	No	No	Yes	No
Acetone	No	No	Yes	No
Benzene	No	Yes	No	No
Ethylbenzene	No	Yes	No	No
Isopropylbenzene	No	Yes	No	No
Methylcyclohexane	No	Yes	No	No
Methyl tert-Butyl Ether	No	Yes	No	No
Xylenes (total)	No	Yes	No	No
Semi-volatile Organic Compounds				
Acenaphthene	No	No	Yes	No
Acenaphthylene	No	No	Yes	No
Anthracene	Yes	Yes	Yes	No
Benzaldehyde	No	No	Yes	No
Benzo(a)anthracene	Yes	Yes	Yes	No
Benzo(a)pyrene	Yes	Yes	Yes	No
Benzo(b)fluoranthene	Yes	Yes	Yes	No
Benzo(g,h,i)perylene	No	No	Yes	No
Benzo(k)fluoranthene	Yes	Yes	Yes	No
bis(2-Ethylhexyl) phthalate	Yes	Yes	Yes	No
Butylbenzylphthalate	Yes	Yes	Yes	No
Carbazole	Yes	Yes	Yes	No
Chrysene	Yes	Yes	Yes	No
Dibenzo(a,h)anthracene	Yes	Yes	Yes	No
Dibenzofuran	Yes	Yes	Yes	No
Dimethylphthalate	No	No	Yes	No
2,6-Dinitrotoluene	No	Yes	No	No
Di-n-butylphthalate	No	No	Yes	No
Di-n-octylphthalate	Yes	Yes	Yes	No
Fluoranthene	Yes	Yes	Yes	No
Fluorene	Yes	Yes	Yes	No
Indeno(1,2,3-cd)pyrene	Yes	Yes	Yes	No
2-Methylnaphthalene	No	Yes	Yes	No
4-Methylphenol	No	No	Yes	No
Naphthalene	Yes	Yes	Yes	No
Phenanthrene	Yes	Yes	Yes	No
Pyrene	Yes	Yes	Yes	No
Total PAHs	Yes	Yes	Yes	No

Table 6-4
COPC Summary Table
Consolidated Iron and Metal Superfund Site
Newburgh, New York

Chemical Name	Surface Soil		Sediment	Surface Water
	Process Area	Non-Process Area		
Pesticides and Polychlorinated biphenyls				
4,4'-DDD	No	No	Yes	No
4,4'-DDE	Yes	Yes	Yes	No
4,4'-DDT	Yes	Yes	No	No
Total DDTs	Yes	Yes	Yes	No
Aldrin	No	Yes	No	No
Alpha-BHC	No	Yes	No	No
alpha-Chlordane	No	No	No	No
Aroclor-1016	No	Yes	No	No
Aroclor-1242	Yes	No	No	No
Aroclor-1248	Yes	Yes	Yes	No
Aroclor-1254	Yes	Yes	No	No
Aroclor-1260	Yes	Yes	No	No
Total PCBs	Yes	Yes	Yes	No
beta-BHC	No	Yes	No	No
Endosulfan sulfate	Yes	Yes	No	No
Endrin	Yes	Yes	No	No
Endrin aldehyde	No	Yes	Yes	No
Endrin ketone	No	Yes	Yes	No
gamma-BHC	No	Yes	No	No
Heptachlor	Yes	Yes	No	No
Heptachlor epoxide	No	Yes	No	No
Methoxyclor	Yes	Yes	No	No
Inorganics				
Aluminum	Yes	Yes	Yes	Yes
Antimony	Yes	Yes	Yes	No
Arsenic	Yes	Yes	Yes	No
Barium	Yes	Yes	Yes	No
Beryllium	No	Yes	No	No
Cadmium	Yes	Yes	Yes	No
Chromium	Yes	Yes	Yes	No
Cobalt	Yes	Yes	Yes	No
Copper	Yes	Yes	Yes	No
Cyanide	Yes	Yes	Yes	No
Iron	Yes	Yes	Yes	Yes
Lead	Yes	Yes	Yes	Yes
Manganese	Yes	Yes	Yes	Yes
Mercury	Yes	Yes	Yes	No
Nickel	Yes	Yes	Yes	No
Selenium	Yes	Yes	Yes	No
Silver	Yes	Yes	Yes	No
Thallium	No	Yes	Yes	No
Vanadium	Yes	Yes	Yes	No
Zinc	Yes	Yes	Yes	No

Yes = Selected as COPCs
No = Not selected as COPCs

Figures



adapted from the USGS Newburgh, Wappinger Falls, Cornwall, and West Point 1:24,000 Topographic Quadrangles (1957, 1981, 1981, 1981)

0 N 1 Mile

Figure 1-1
Site Location Map
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

CDM

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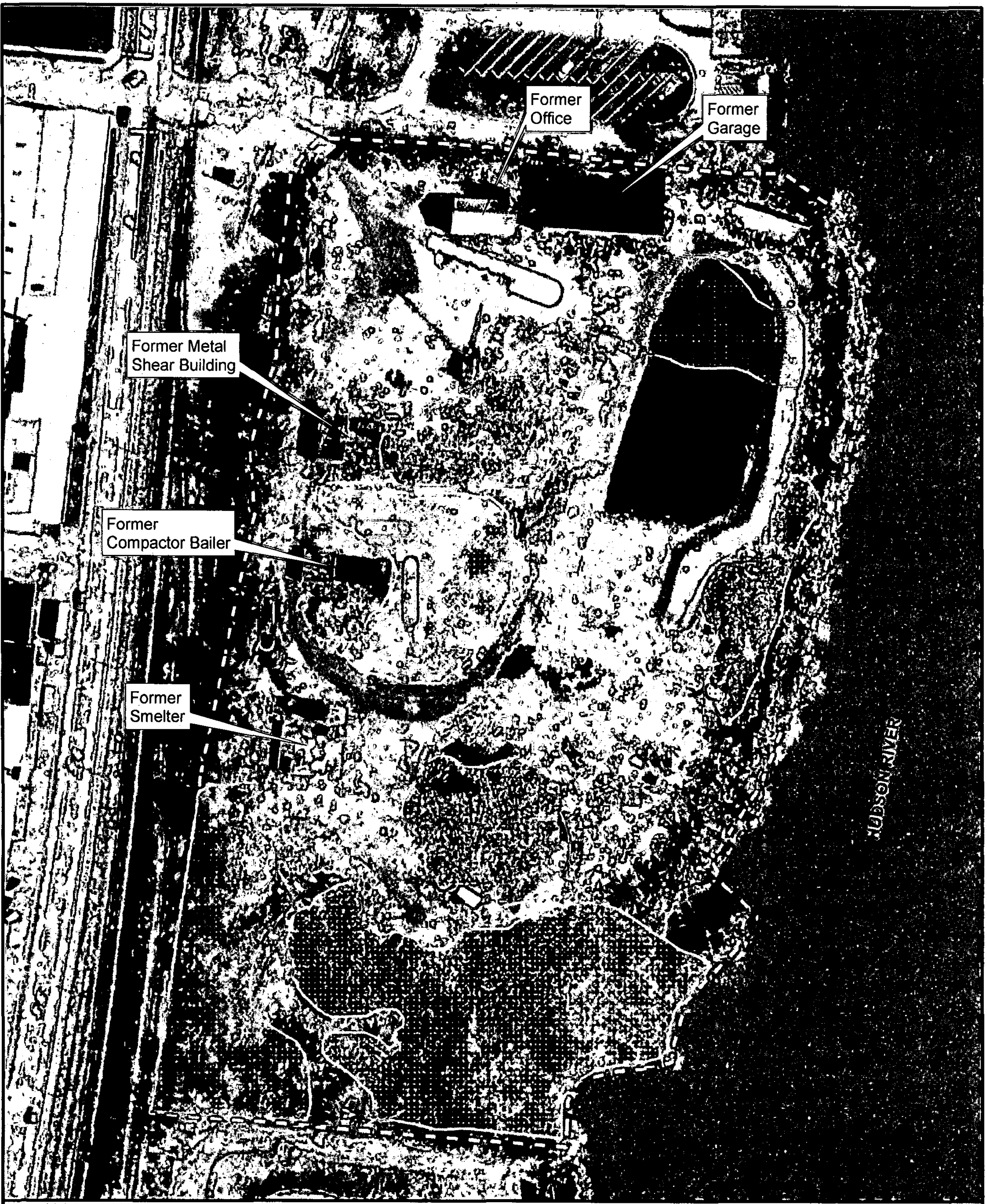

Note: aerial photograph dated April 2001

LEGEND

- ▨ Former Ash/ Slag Pile
- ▨ Former Soil Pile
- ⬭ Former Underground Storage Tank
- ▨ Former Tire Pile
- ▨ Former Scrap Metal Pile
- ▭ Site Boundary

0 25 50 100 150 Feet

Figure 1-2
Site Map

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

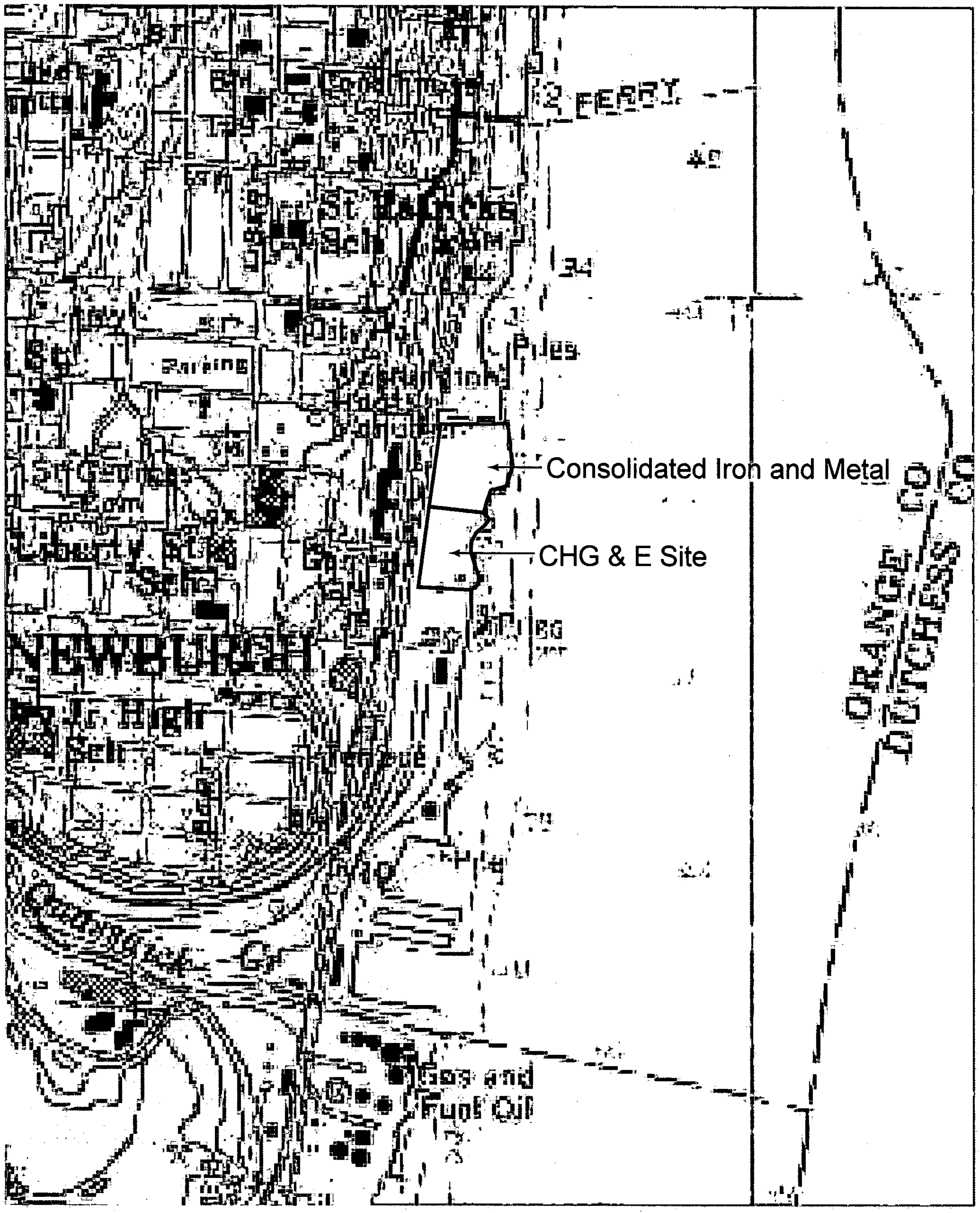

Figure 1-3

Adjacent Site Location Map

Consolidated Iron and Metals Superfund Site

Newburgh, Orange County, New York

Note: aerial photograph dated April 2001

LEGEND

■ Background Soil Boring Locations

- - Site Boundary

N W E S

0 262.5 525 1,050 Feet

Figure 2-1
Background Soil Boring Locations
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

CDM

Note: aerial photograph dated April 2001

LEGEND

- ■ Site-Wide Soil Borings
- ● Monitoring Wells
- ☐ Process Area Soil Borings

Figure 2-2

Process Area Soil Borings, Site-Wide Soil Borings, and Monitoring Well Locations

Consolidated Iron and Metal Superfund Site

Newburgh, Orange County, New York

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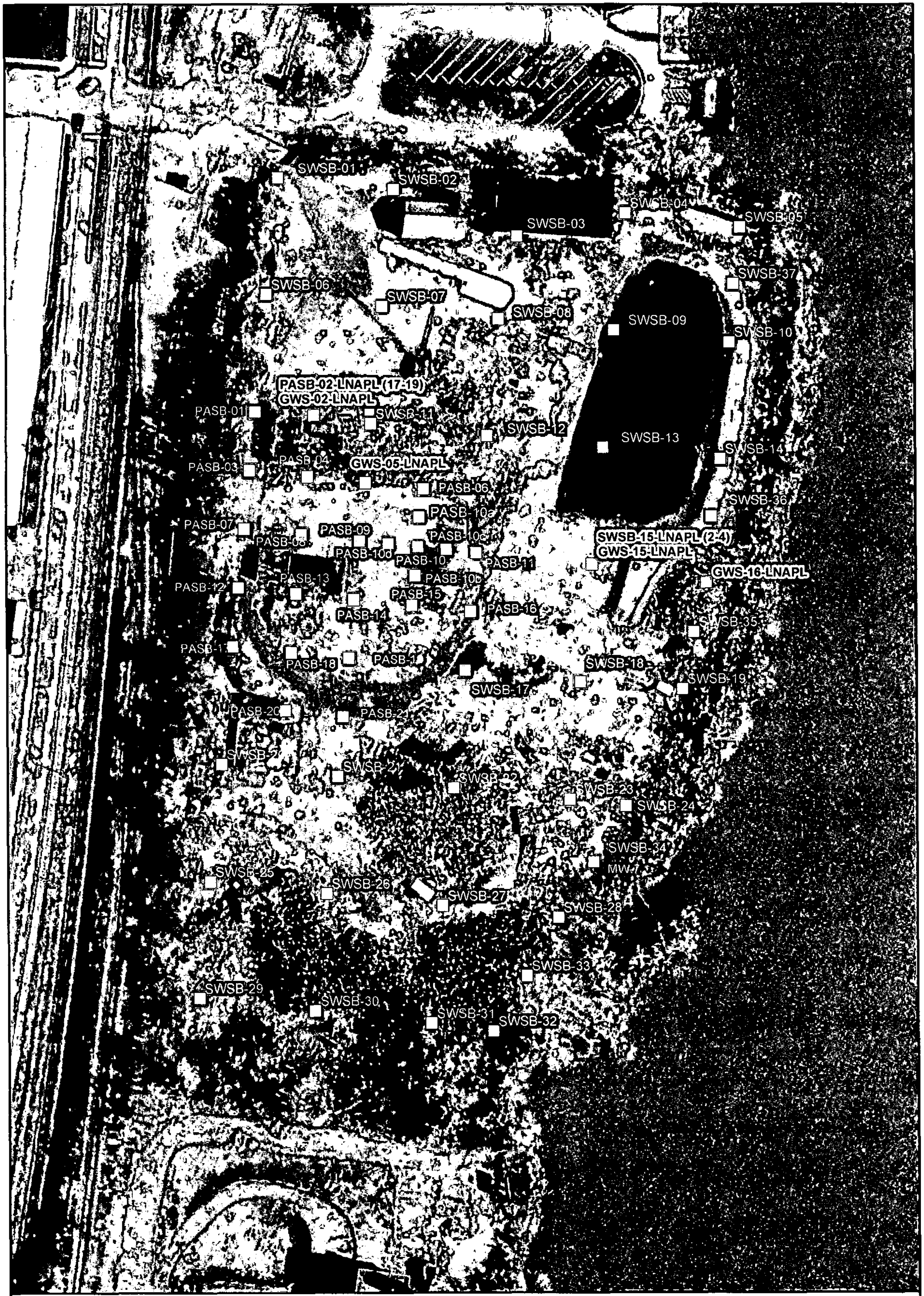

Note: aerial photograph dated April 2001

LEGEND

▣ Location of Observed LNAPL and Associated Sample Numbers:

PASB-02-LNAPL (17-19)	Soil Sample (Depth)
GWS-02-LNAPL	Groundwater Sample Collected Just Below the Water Table

☐ Soil Boring location With No observed LNAPL

0 25 50 100 150 Feet

Figure 2-3

LNAPL Soil and Groundwater Sample Locations

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

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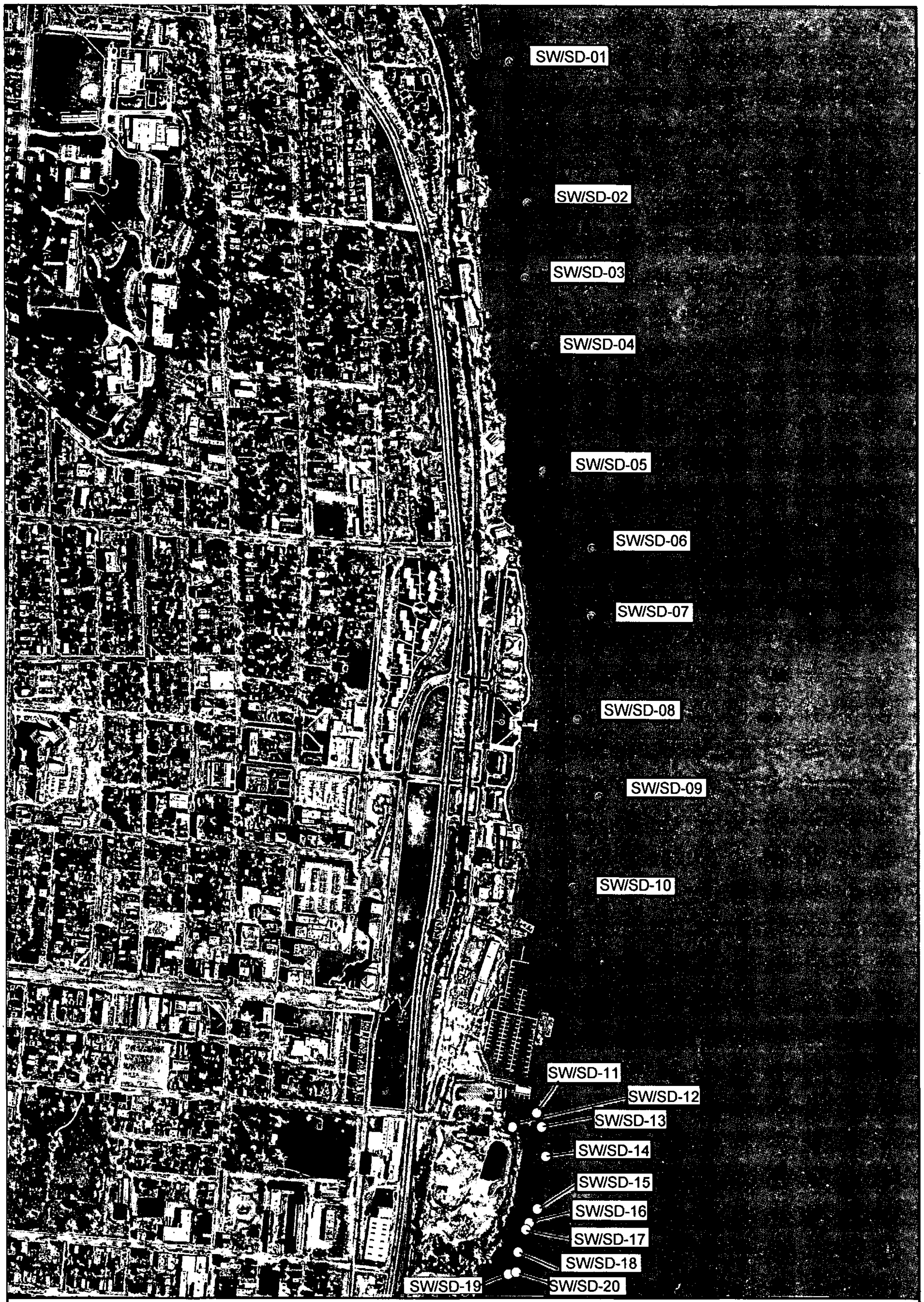


Note: aerial photograph dated April 2001

LEGEND

○ Sediment and Surface Water Sample Locations

◎ Background Sediment and Surface Water Sample Locations

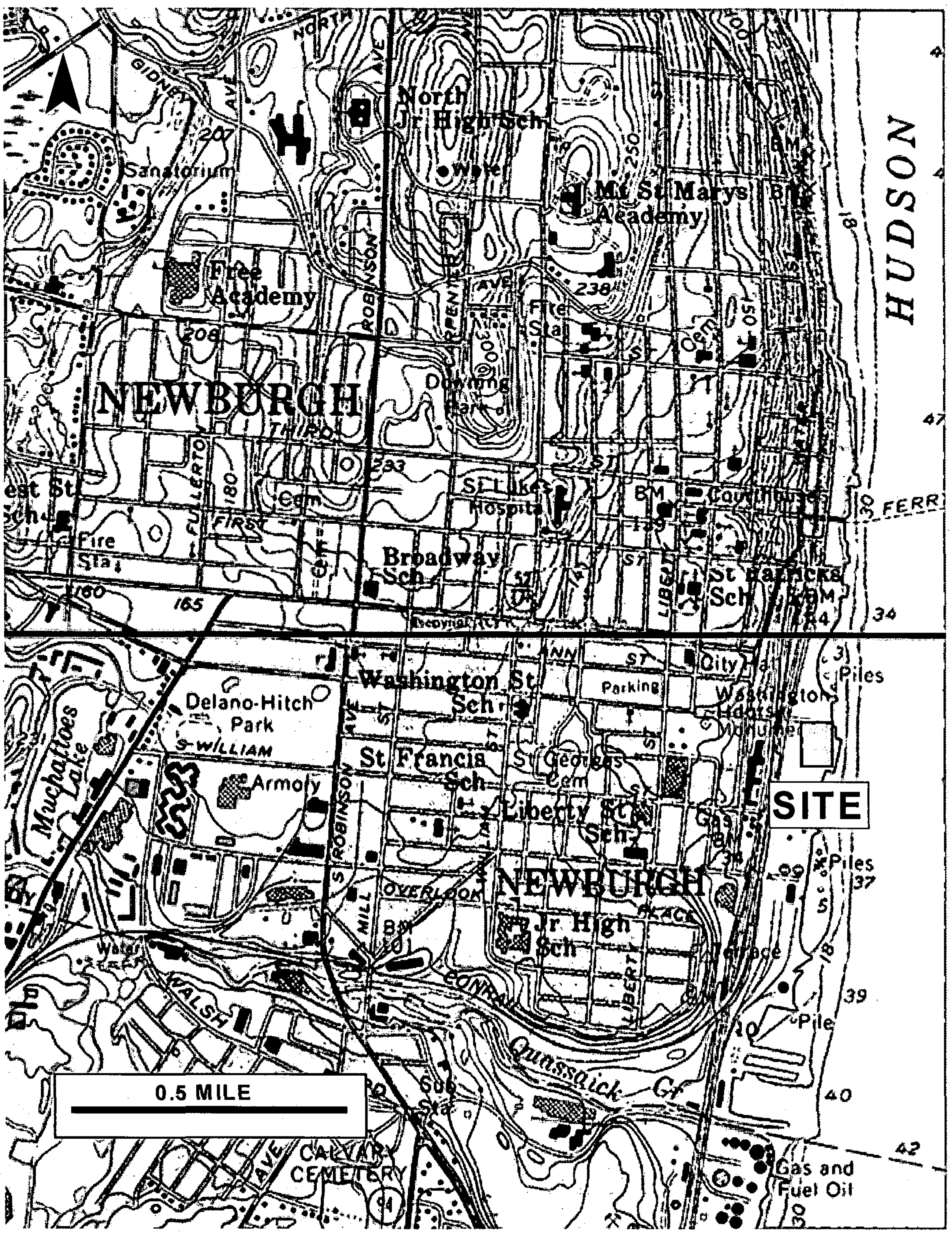
- - Site Boundary

0 250 500 1,000 Feet

Figure 2-4
Sediment and Surface Water Sample Locations

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

CDM



Source: USGS Newburgh, Wappinger Falls, Cornwall, and West Point 1:24,000 Topographic Quadrangles (1957, 1981, 1981, 1981)

CDM

Figure 3-1
Area Topography
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

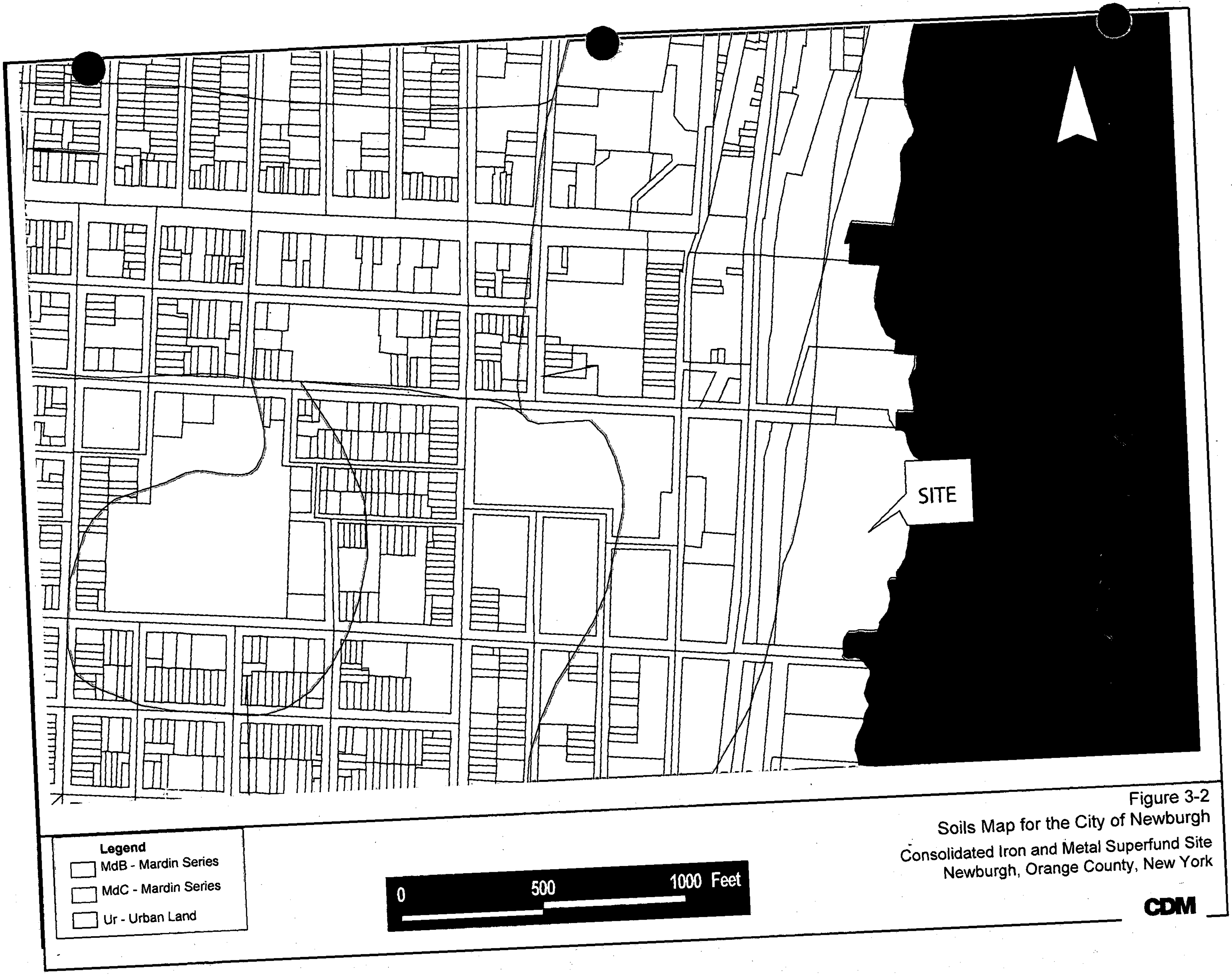
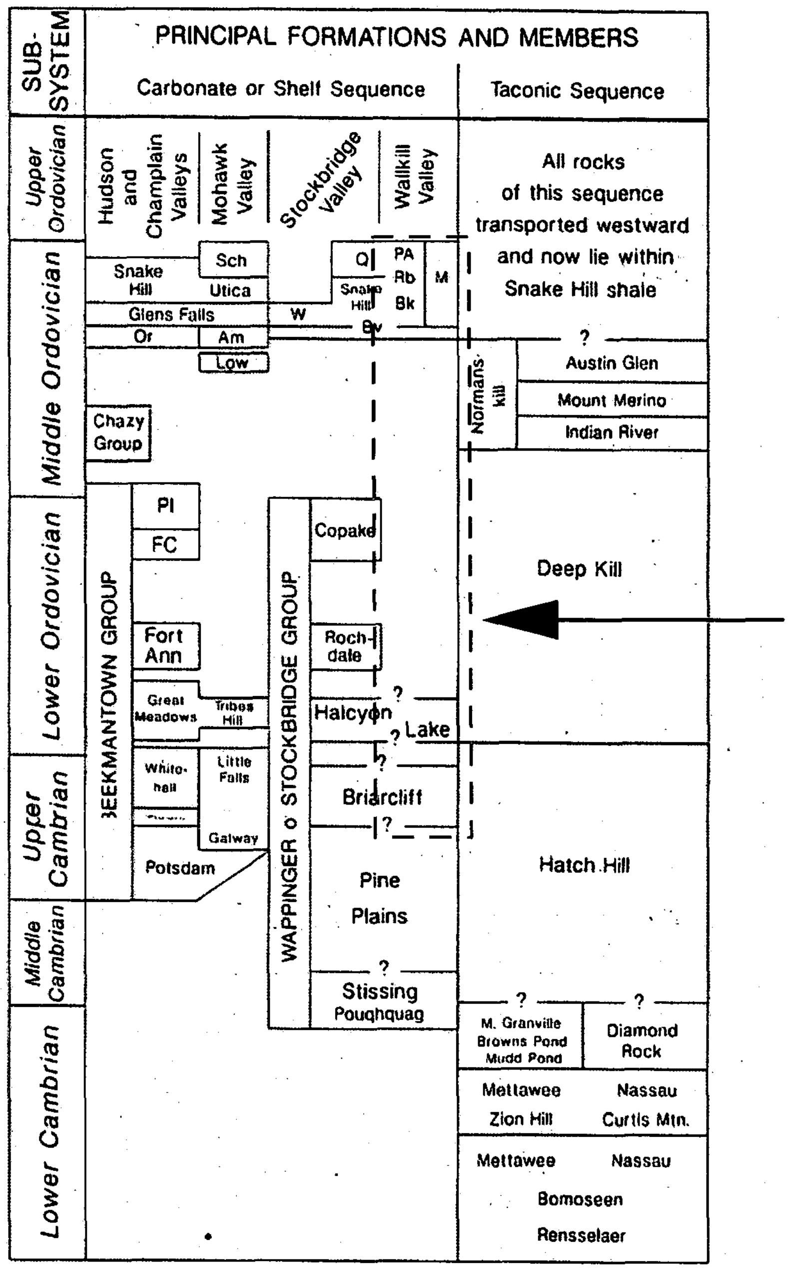


Figure 3-2
Soils Map for the City of Newburgh
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

CDM

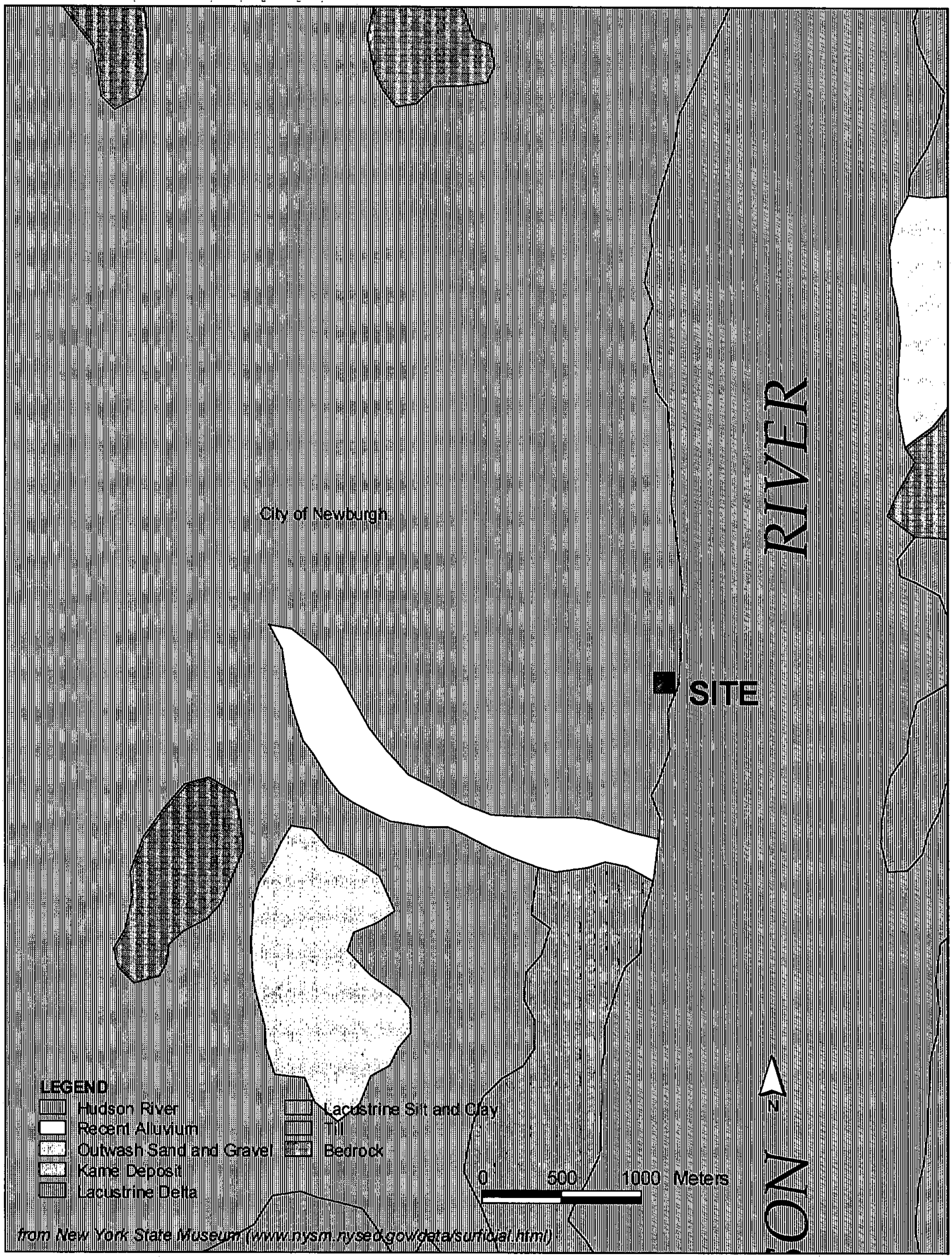


BEDROCK STRATIGRAPHIC UNITS IN SITE VICINITY

Figure 6.1. This chart summarizes the Cambrian and Ordovician rock formations found in the Hudson-Mohawk Lowlands and Taconic Mountains. Compare this figure with Plate 3 to see how these formations fit into the geology of the State as a whole. Abbreviations are translated as follows: Am=Amsterdam; Bk=Bushkill Shale; Bv=Balmville; FC=Fort Cassin; Low=Lowville; M=Martinsburg; Or=Orwell; PA=Pen Argyl; PI=Providence Island; Q=Quassaic; Rb=Ramseyburg Member; Sch=Schenectady; Ticon=Ticonderoga; W=Walloomsac.

Source: Isachsen et al. (2000)

Figure 3-3
Bedrock Stratigraphy
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York



from New York State Museum (www.nysm.nysed.gov/gdata/surficial.html)

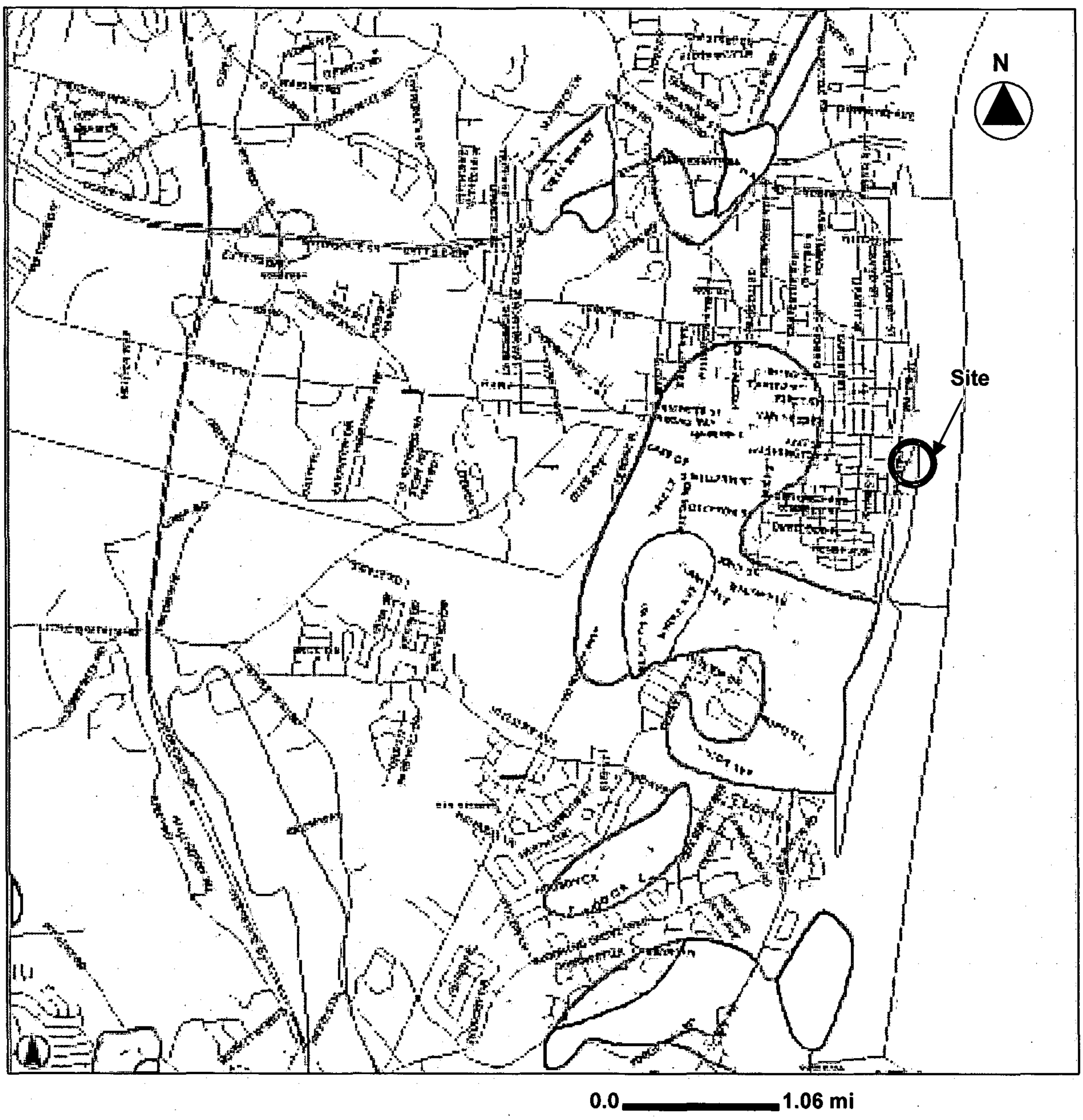
Figure 3-4

Surficial Geology of Newburgh and Vicinity

Consolidated Iron and Metal Superfund Site

Newburgh, Orange County, New York

CDM



Source: LBG. (1995)

Legend

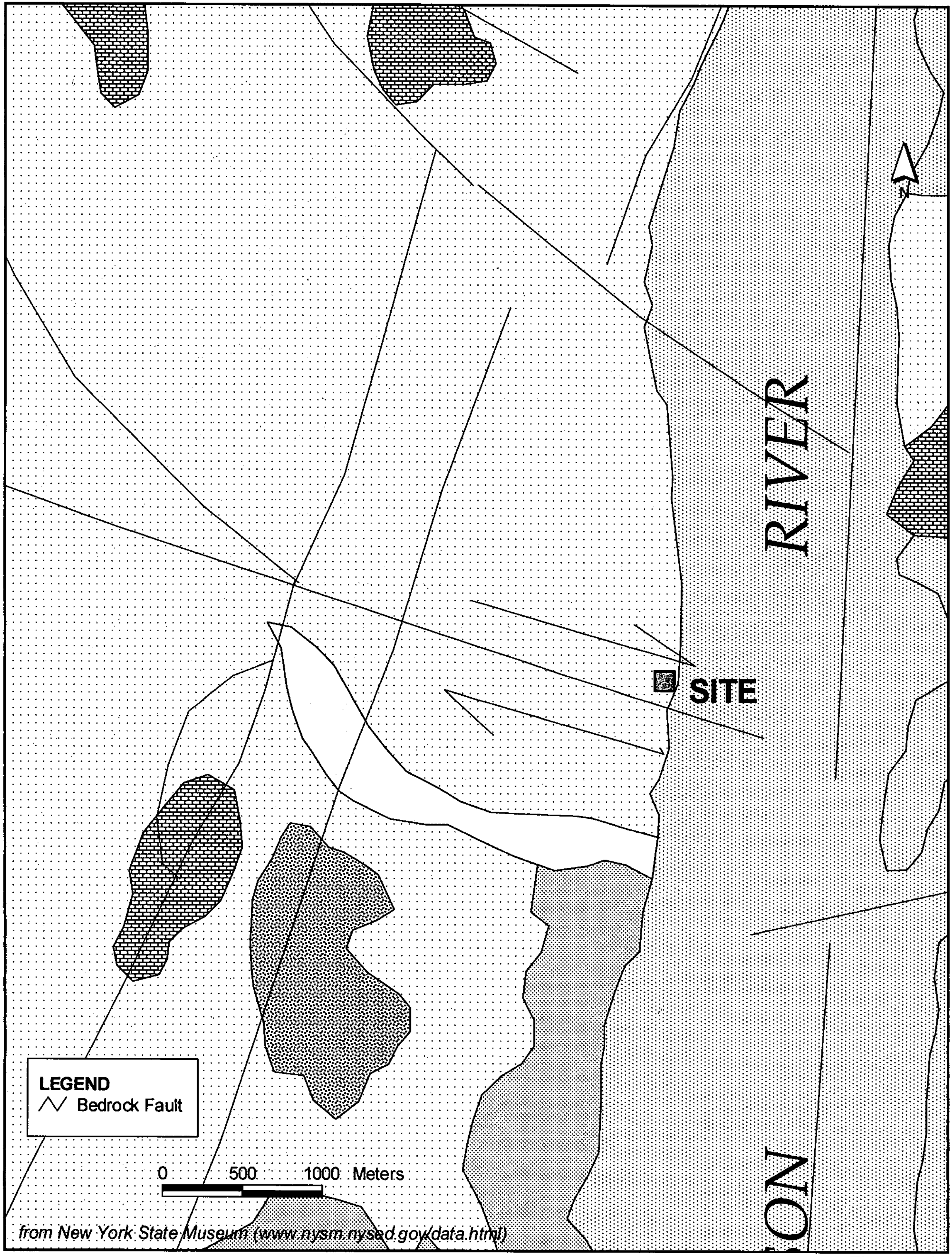
- ☐ **Below Water table**
- ☐ **Below Clay Layer**
- ☐ **Above Water Table**
- ☐ **Clay and Silt**

Figure 3-5

Sand and Gravel Aquifers

Consolidated Iron and Metal Superfund Site

Newburgh, Orange County, New York



from New York State Museum (www.nysm.nysed.gov/data.html)

Figure 3-6
Bedrock Fault Map of Newburgh and Vicinity
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

CDM

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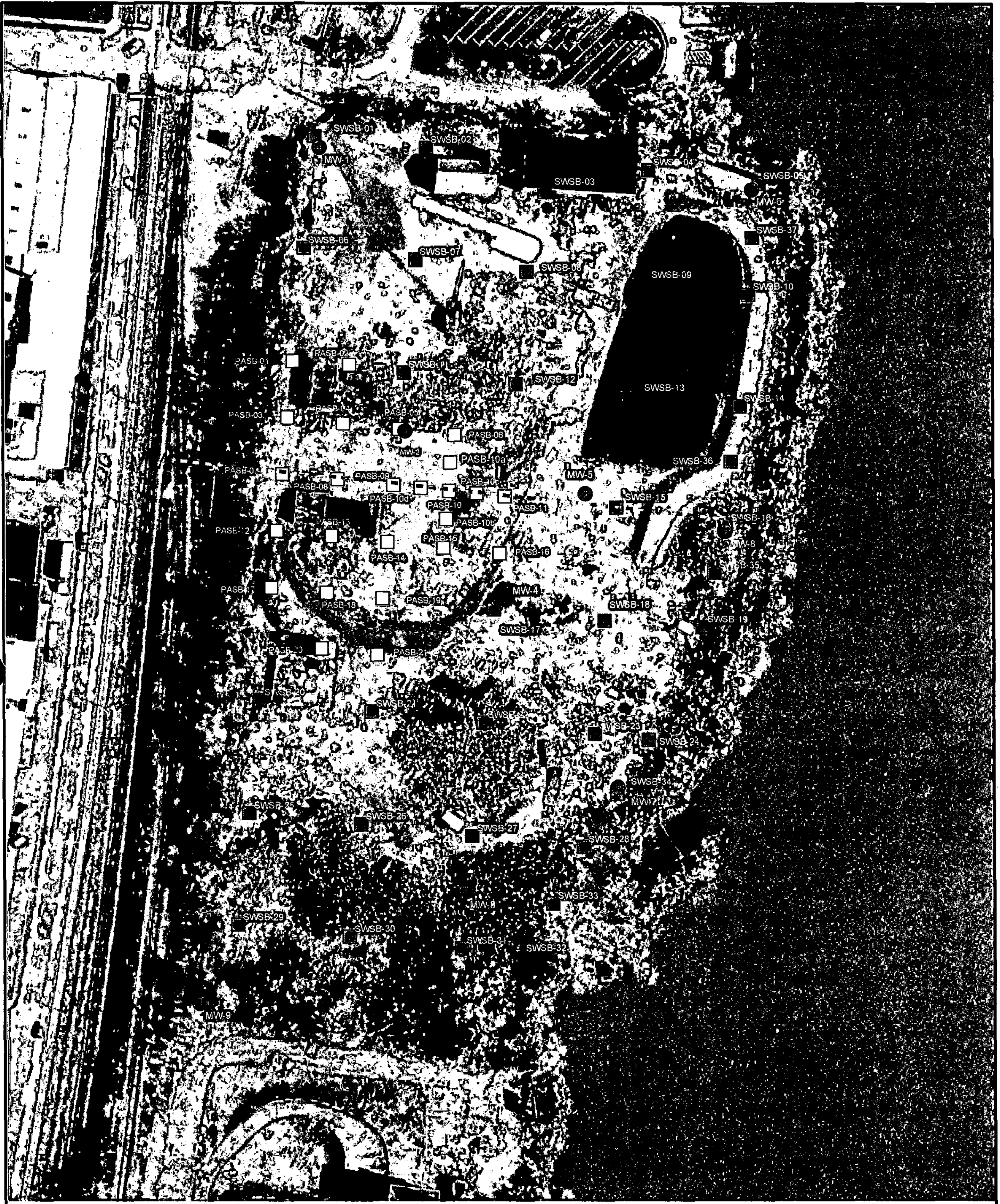


Note: aerial photograph dated April 2001

LEGEND

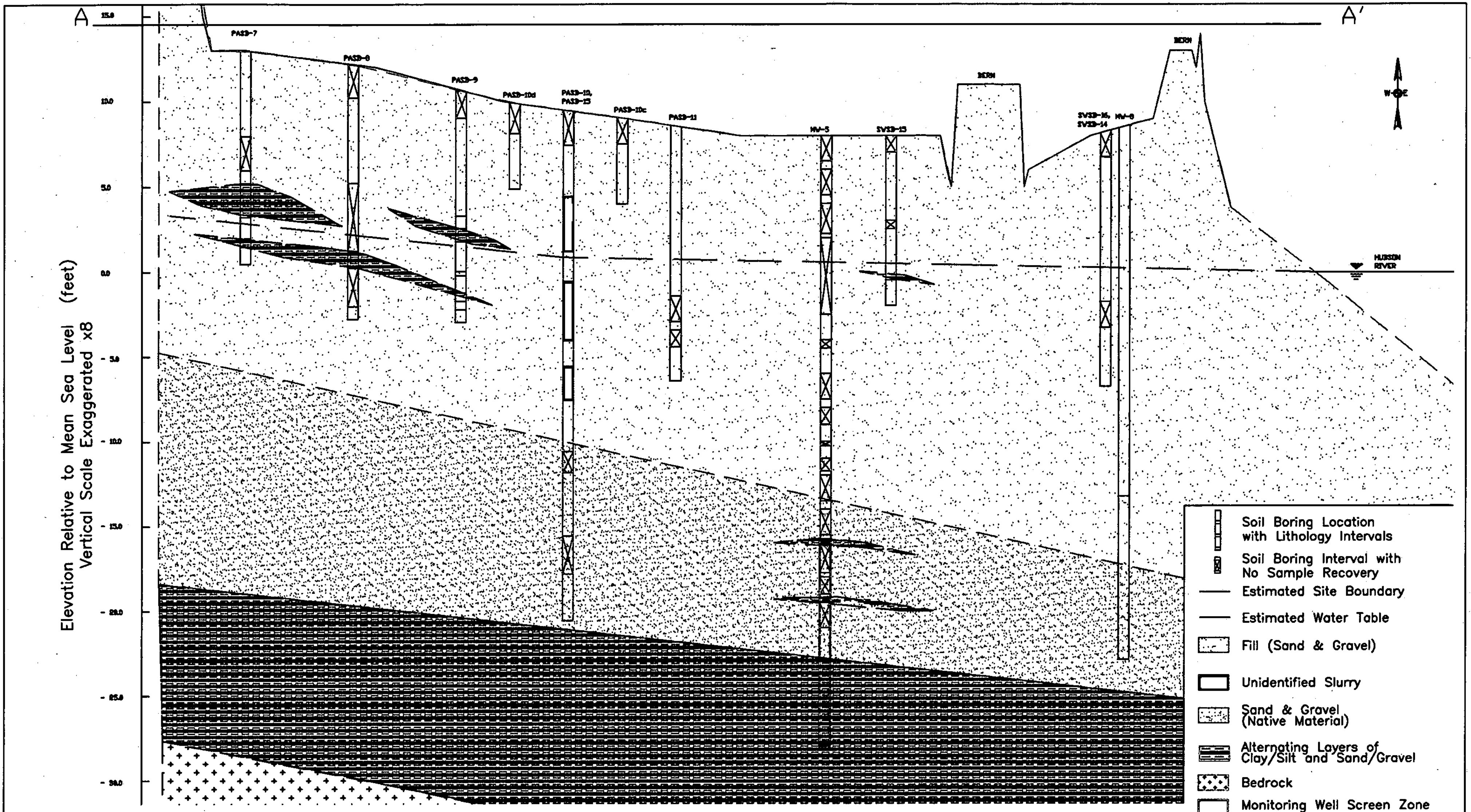
▣ Site-Wide Soil Borings
◉ Monitoring Wells
☐ Process Area Soil Borings
A--A' Cross Section Location

4

0 25 50 100 150 Feet

Figure 3-7
Geologic Cross Section Location Map
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

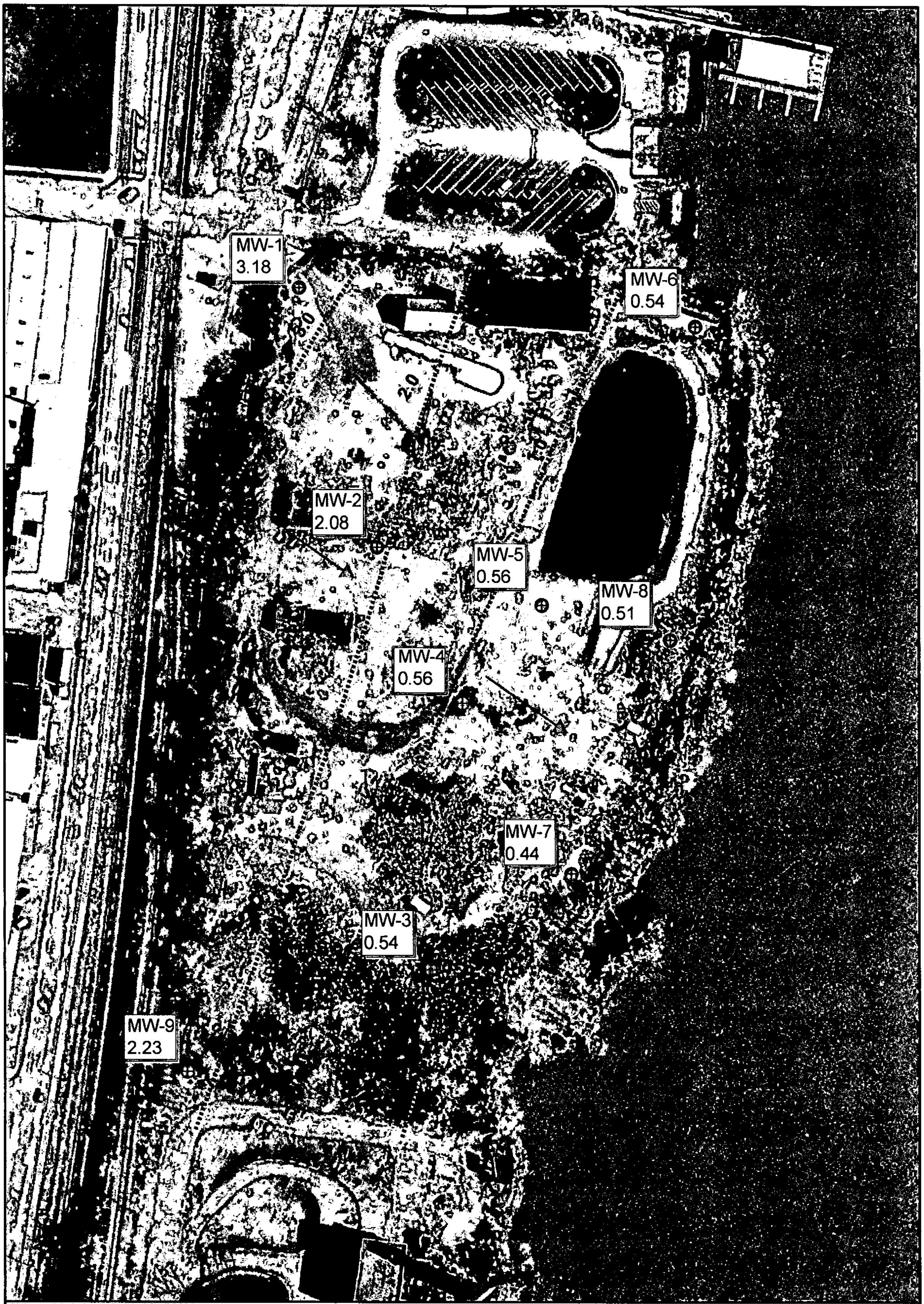
CDM



NOTE:
1. WATER TABLE IS ESTIMATED FROM 8/04 WATER LEVEL MEASUREMENTS
2. DEEPER LITHOLOGY IS EXTRAPOLATED FROM DEEPER SOIL BORINGS AT MW–1 AND MW–4, AND CROSS SECTIONS FROM AN ADJOINING SITE (BBL1997)

CDM

Figure 3-8
Geologic Cross Section AA'
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York



Note: aerial photograph dated April 2001

LEGEND

●	Monitoring Wells with Water Level Elevations in Feet Above Mean Sea Level
3.0 ····	Groundwater Contour Line with Elevations in feet above mean Sea Level
→	Groundwater Flow Direction

Figure 3-9
Groundwater Contour Map, August 2004
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

CDM

Note: aerial photograph dated April 2001

LEGEND

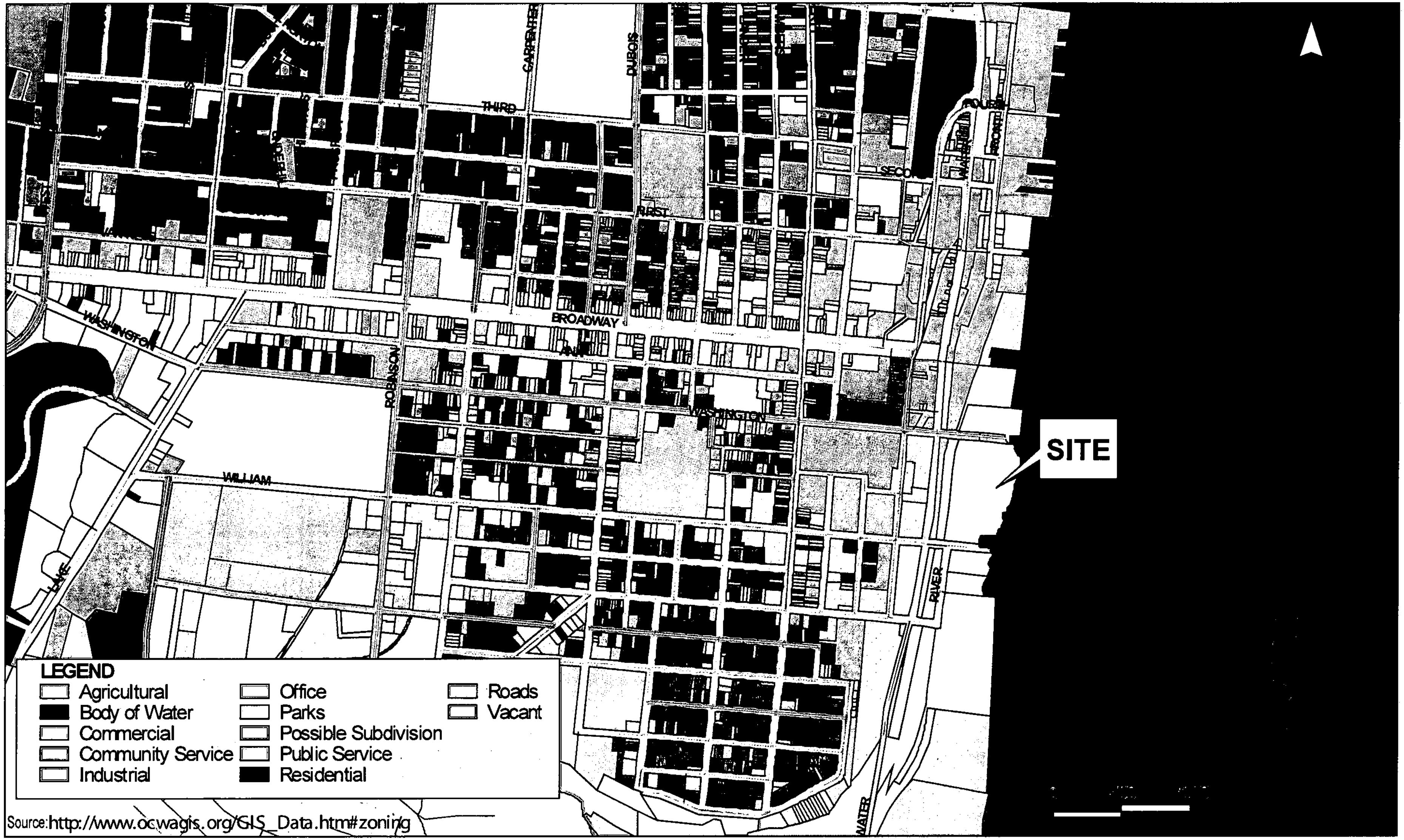
- ⊕ Monitoring Wells with Water Level Elevations in Feet Above Mean Sea Level
- 3.0 ⋯⋯ Groundwater Contour Line with Elevations in Feet Above Mean Sea Level
- → Groundwater Flow Direction

N

0 20 40 80 120 Feet

Figure 3-10
Groundwater Contour Map, November 2004

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York



Source:http://www.ocwagis.org/GIS_Data.htm#zoning

Figure 3-11
Land Use Map for the City of Newburgh
Consolidated Iron and MEtal Superfund Site
Newburgh, Orange County, New York

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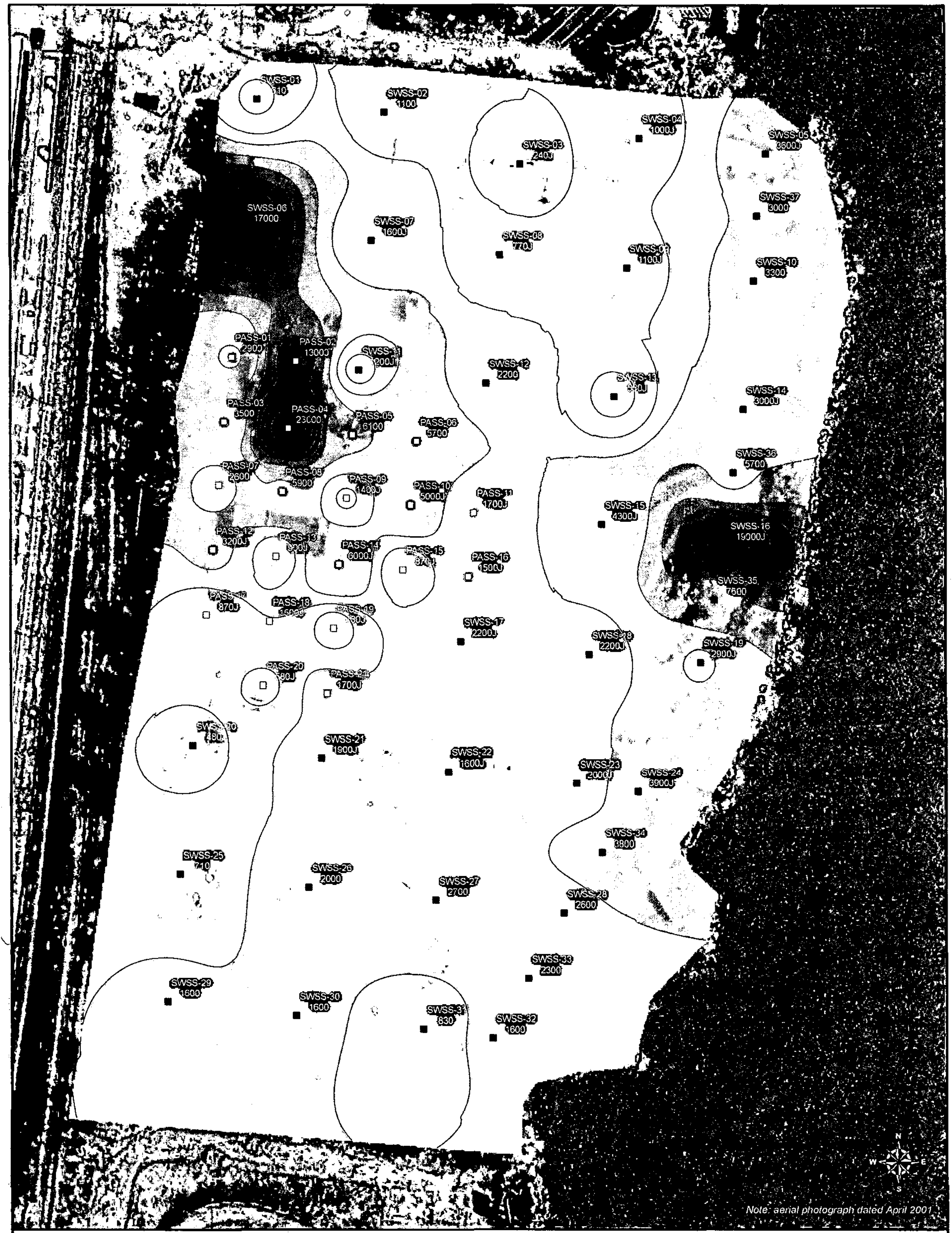

Legend

■ SWSS: Site-wide Surface Soil Sample Location

⊡ PASS: Process Area Surface Soil Sample Location

— Benzo(a)pyrene Concentration Contour

All values in ug/kg

J = estimated data due to exceeded quality control criteria

Benzo(a)pyrene Site-Specific Soil Screening Criteria = 62 ug/kg

Potential Clean-up Level (CRQL) = 660 ug/kg

Benzo(a)pyrene ug/kg

□ 240 - 660	■ 9,000 - 12,000
□ 660 - 1,500	■ 12,000 - 15,000
□ 1,500 - 3,000	■ 15,000 - 18,000
□ 3,000 - 6,000	■ 18,000 - 21,000
▨ 6,000 - 9,000	■ 21,000 - 24,000

Figure 4-1a
Surface Soil Benzo(a)pyrene Isoconcentration Map

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

0 25 50 100 150 Feet

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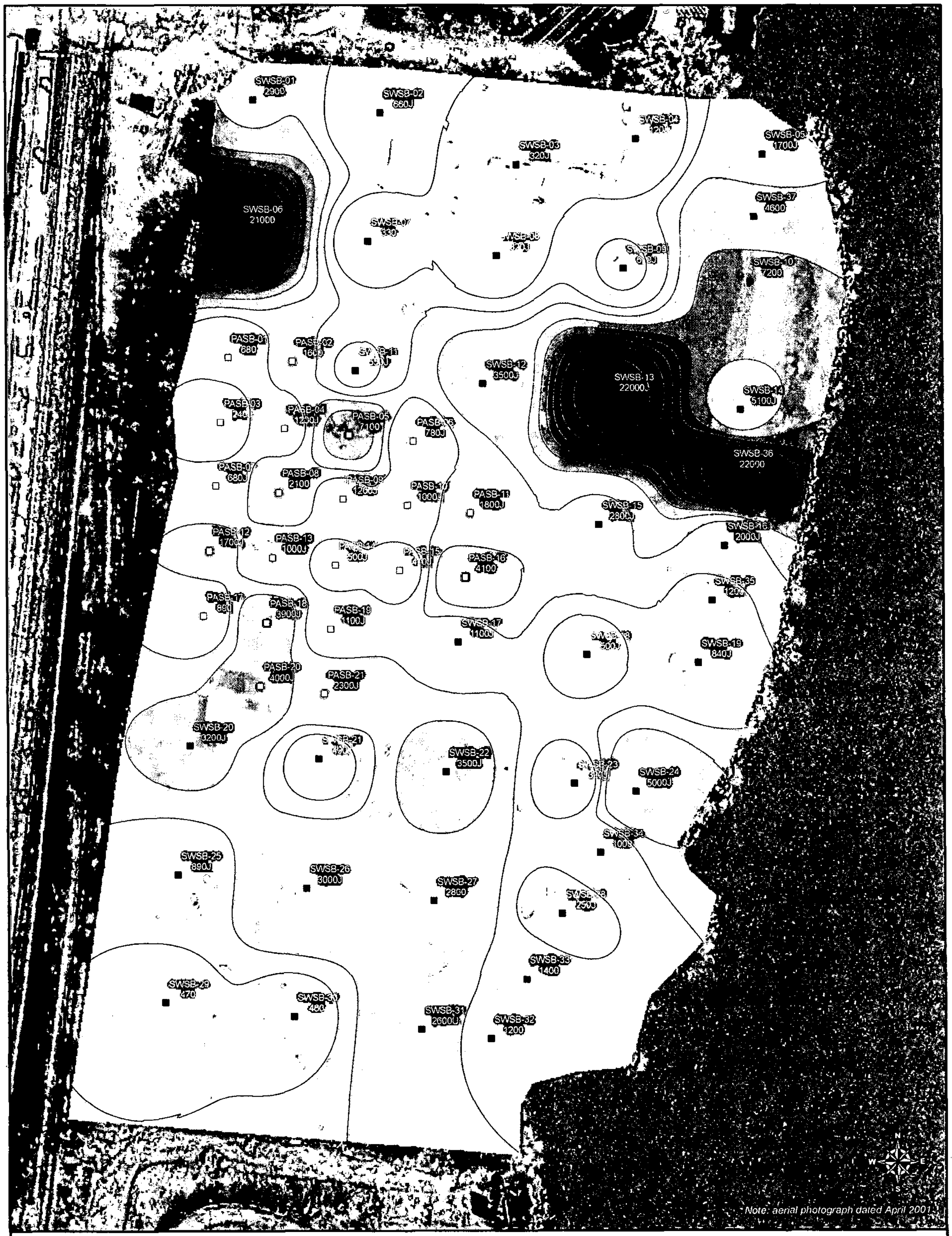


Note: aerial photograph dated April 2001

Legend

- ■ SWSB: Site-wide Subsurface Soil Sample Location
- ▣ PASB: Process Area Subsurface Soil Sample Location
- — Benzo(a)pyrene Concentration Contour

All values in ug/kg

J = estimated data due to exceeded quality control criteria

Benzo(a)pyrene Site-Specific Soil Screening Criteria = 62 ug/kg

Potential Clean-up Level (CRQL) = 660 ug/kg

Benzo(a)pyrene ug/kg

☐	120 - 660	■	9,000 - 12,000
☐	660 - 1,500	■	12,000 - 15,000
☐	1,500 - 3,000	■	15,000 - 18,000
☐	3,000 - 6,000	■	18,000 - 21,000
▨	6,000 - 9,000	■	21,000 - 24,000

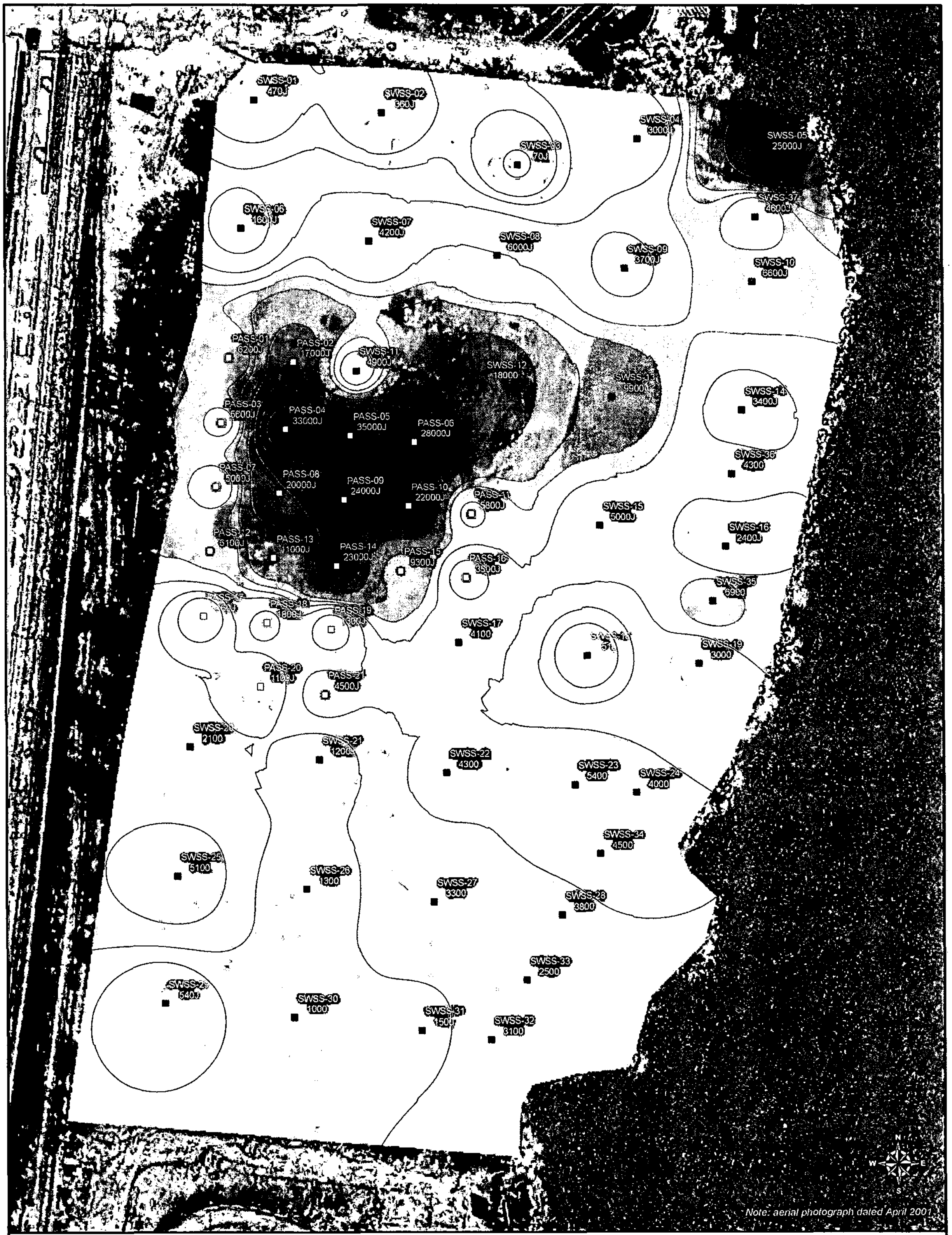
0 25 50 100 150 Feet

Figure 4-1b
Subsurface Soil Benzo(a)pyrene Isoconcentration Map

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

CDM

C:\MS\GIS\ConsolidatedIron\GISProjectFile\ArcMap Projects\SS_Aroclor1254_contours.mxd



Note: aerial photograph dated April 2001

Legend

■ SWSS: Site-wide Surface Soil Sample Location

▣ PASS: Process Area Surface Soil Sample Location

— Aroclor 1254 Concentration Contour

Aroclor 1254 ug/kg

☐ 0-110	▨ 8,000 - 10,000
☐ 110 - 1,000	▨ 10,000 - 15,000
☐ 1,000. - 2,000	■ 15,000 - 20,000
☐ 2,000 - 4,000	■ 20,000 - 25,000
☐ 4,000 - 6,000	■ 25,000 - 30,000
☐ 6,000 - 8,000	■ 30,000 - 35,000

All values in ug/kg
J = estimated data due to exceeded quality control criteria
Aroclor 1254 Site-Specific Soil Screening Criteria = 110 ug/kg
Potential Clean-up Level (CRQL) = 1000 ug/kg

Figure 4-2a
Surface Soil Aroclor 1254 Isoconcentration Map
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

0 25 50 100 150 Feet

CDM

50

Curly

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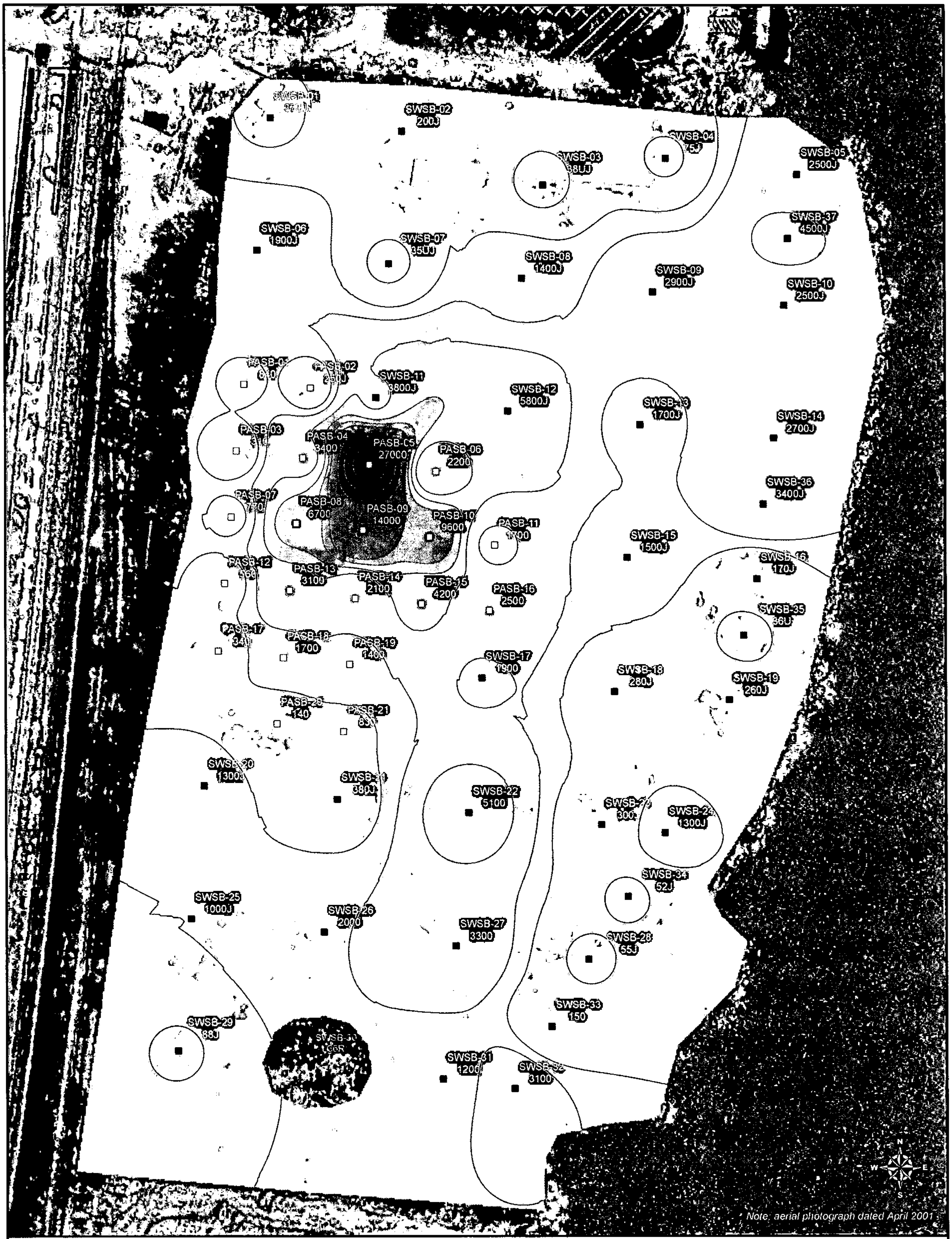


Legend

■ SWSB: Site-wide Subsurface Soil Sample Location

▣ PASB: Process Area Subsurface Soil Sample Location

— Aroclor 1254 Concentration Contour

All values in ug/kg
R = rejected data
J = estimated data due to exceeded quality control criteria
Aroclor 1254 Site-Specific Soil Screening Criteria = 110 ug/kg
Potential Clean-up Level (CRQL) = 1000 ug/kg

Aroclor 1254 ug/kg

- ☐ 0-110
- ☐ 140 - 1,000
- ☐ 1,000 - 2,000
- ☐ 2,000 - 4,000
- ☐ 4,000 - 6,000
- ▨ 6,000 - 8,000
- ▨ 8,000 - 10,000
- ■ 10,000 - 15,000
- ■ 15,000 - 20,000
- ■ 20,000 - 25,000
- ■ 25,000 - 28,000

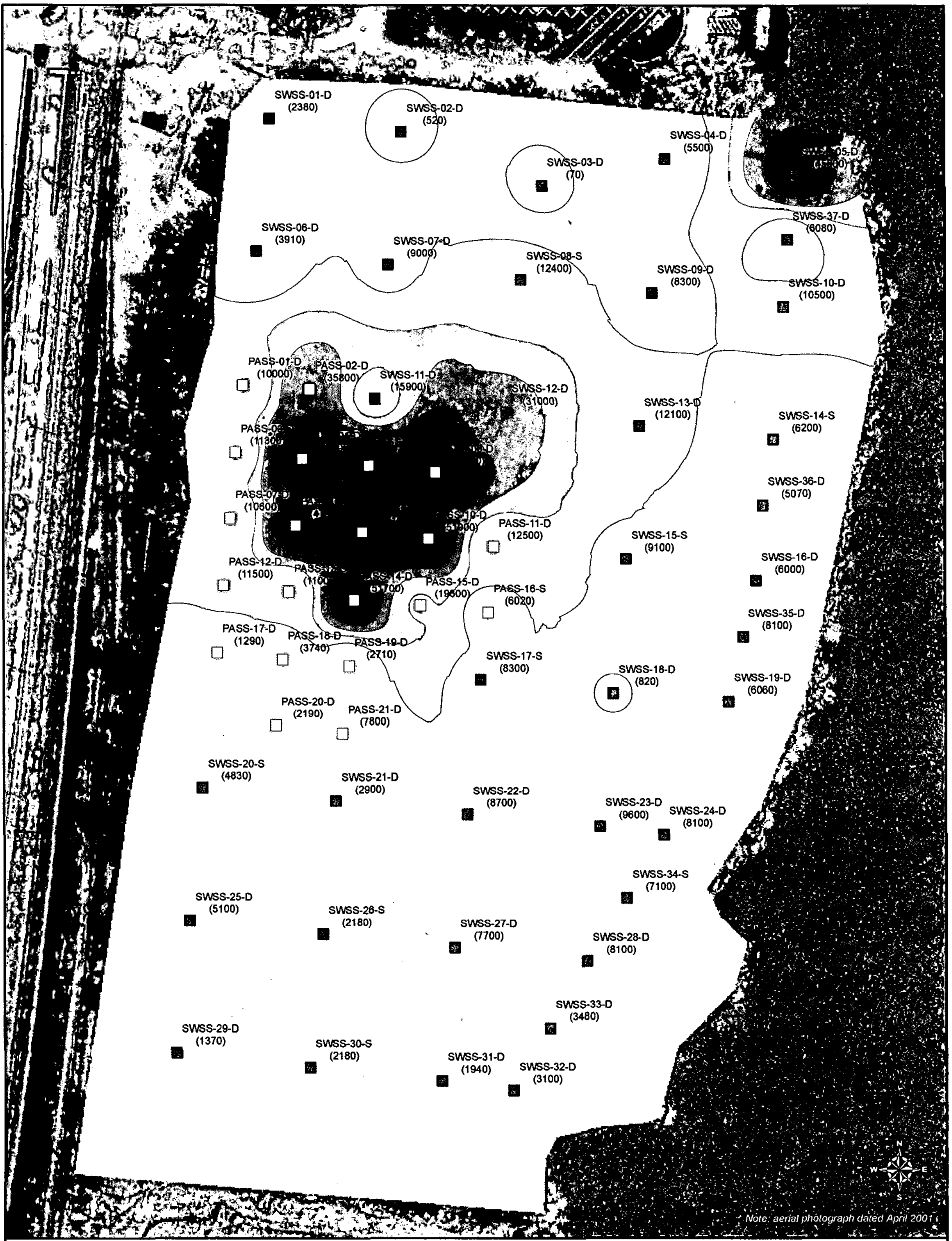
0 25 50 100 150 Feet

Figure 4-2b
Subsurface Soil Aroclor 1254 Isoconcentration Map

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

CDM

C:\MS\GIS\ConsolidatedIron\GISProjectFile\ArcMap Projects\SS_Total_PCB_contours.mxd



Note: aerial photograph dated April 2001

Legend

■ SWSS: Site-wide Surface Soil Sample Location

☐ PASS: Process Area Surface Soil Sample Location

— Total PCBs Concentration Contour

(000) Total PCBs in ug/kg

Total PCBs (ug/kg)

☐	70 - 1,000	▨	30,000 - 40,000
☐	1,000 - 10,000	■	40,000 - 50,000
☐	10,000 - 20,000	■	50,000 - 60,000
☐	20,000 - 30,000	■	60,000 - 70,000

Note: No qulifiers are shown as the values are a sum of total PCBs
Potential cleanup level (TAGM) = 1 ppm (1,000 ug/kg)

Figure 4-2c
Surface Soil Total PCBs Isoconcentration Map

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

0 25 50 100 150 Feet

CDM

Deputy

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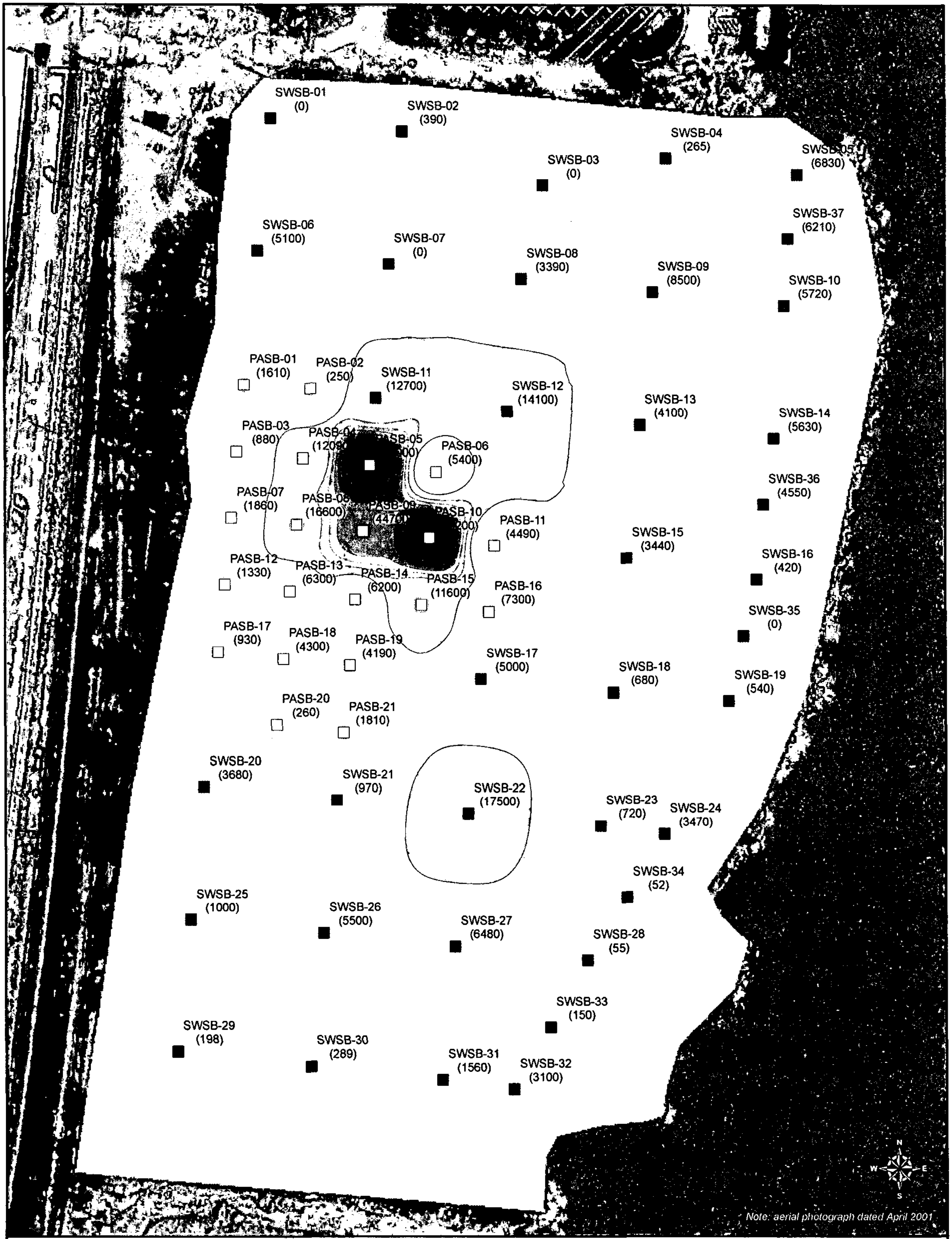


Note: aerial photograph dated April 2001

Legend

- ■ SWSB: Site-wide Subsurface Soil Sample Location
- ☐ PASB: Process Area Subsurface Soil Sample Location
- — Total PCBs Concentration Contour
- (000) Total PCBs in ug/kg

Total PCBs (ug/kg)

☐	0 - 10,000	■	40,000 - 50,000
☐	10,000 - 20,000	■	50,000 - 60,000
☐	20,000 - 30,000	■	60,000 - 70,000
☐	30,000 - 40,000	■	70,000 - 77,000

Note: No qulifiers are shown as the values are a sum of total PCBs
Potential cleanup level (TAGM) = 10 ppm (10,000 ug/kg)

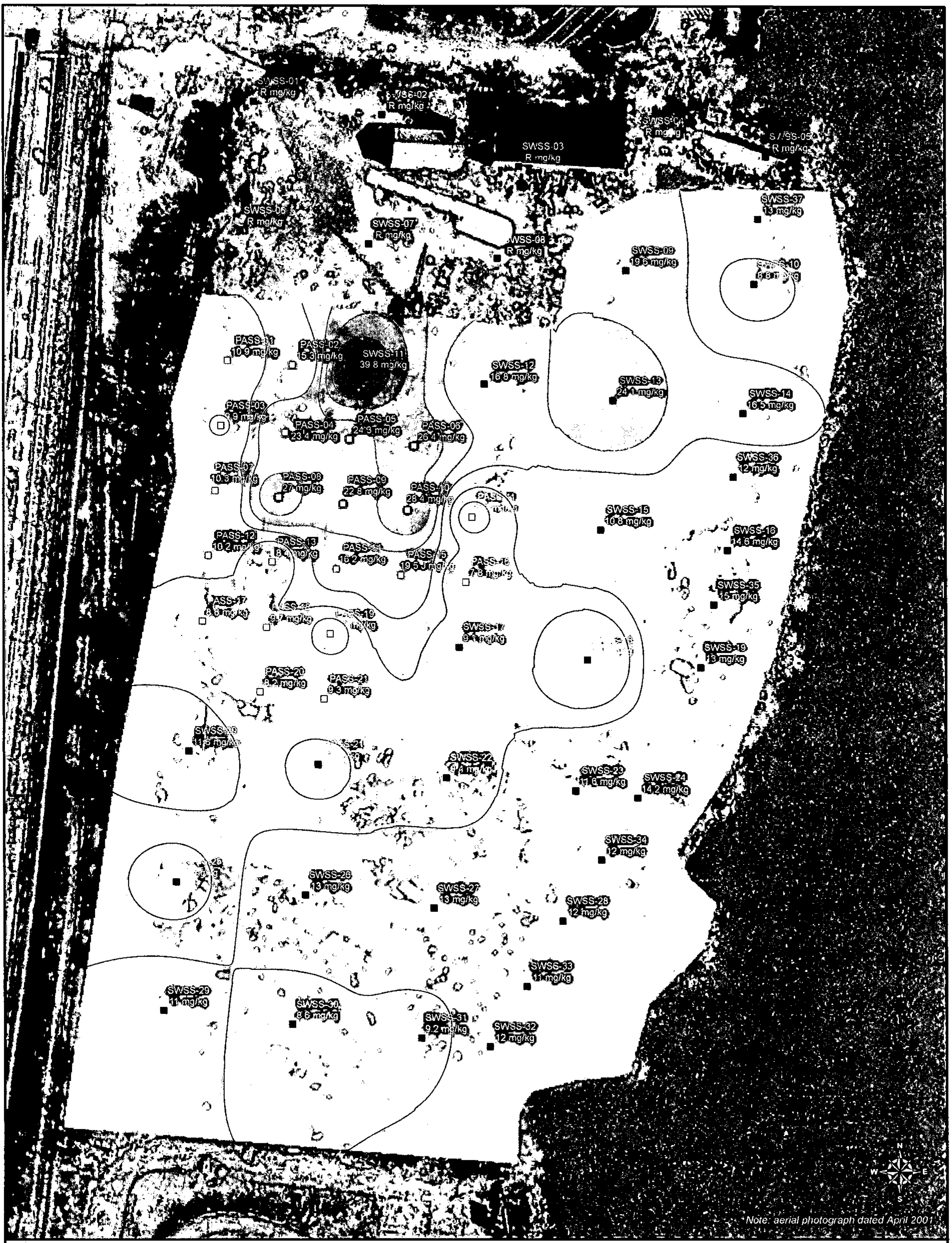
Figure 4-2d
Subsurface Soil Total PCBs Isoconcentration Map

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

0 25 50 100 150 Feet

CDM

C:\MS\GIS\ConsolidatedIron\GISProjectFile\ArcMap Projects\SS_Arsenic_contours.mxd



Note: aerial photograph dated April 2001

Legend

■ SWSS: Site-wide Surface Soil Sample Location

▣ PASS: Process Area Surface Soil Sample Location

— Arsenic Concentration Contour

Arsenic mg/kg

☐ 0.39 - 7.5
☐ 7.5 - 10
☐ 10 - 15
☐ 15- 20
☐ 20 - 25
☐ 25 - 30
■ 30 - 35
■ 35 - 40

All values in mg/kg
R = rejected data
J = estimated data due to exceeded quality control criteria
Arsenic Site-Specific Soil Screening Criteria = 0.39 mg/kg
Potential Clean-up Level (CRQL) = 7.5 mg/kg

0 25 50 100 150 Feet

Figure 4-3a
Surface Soil Arsenic Isoconcentration Map
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

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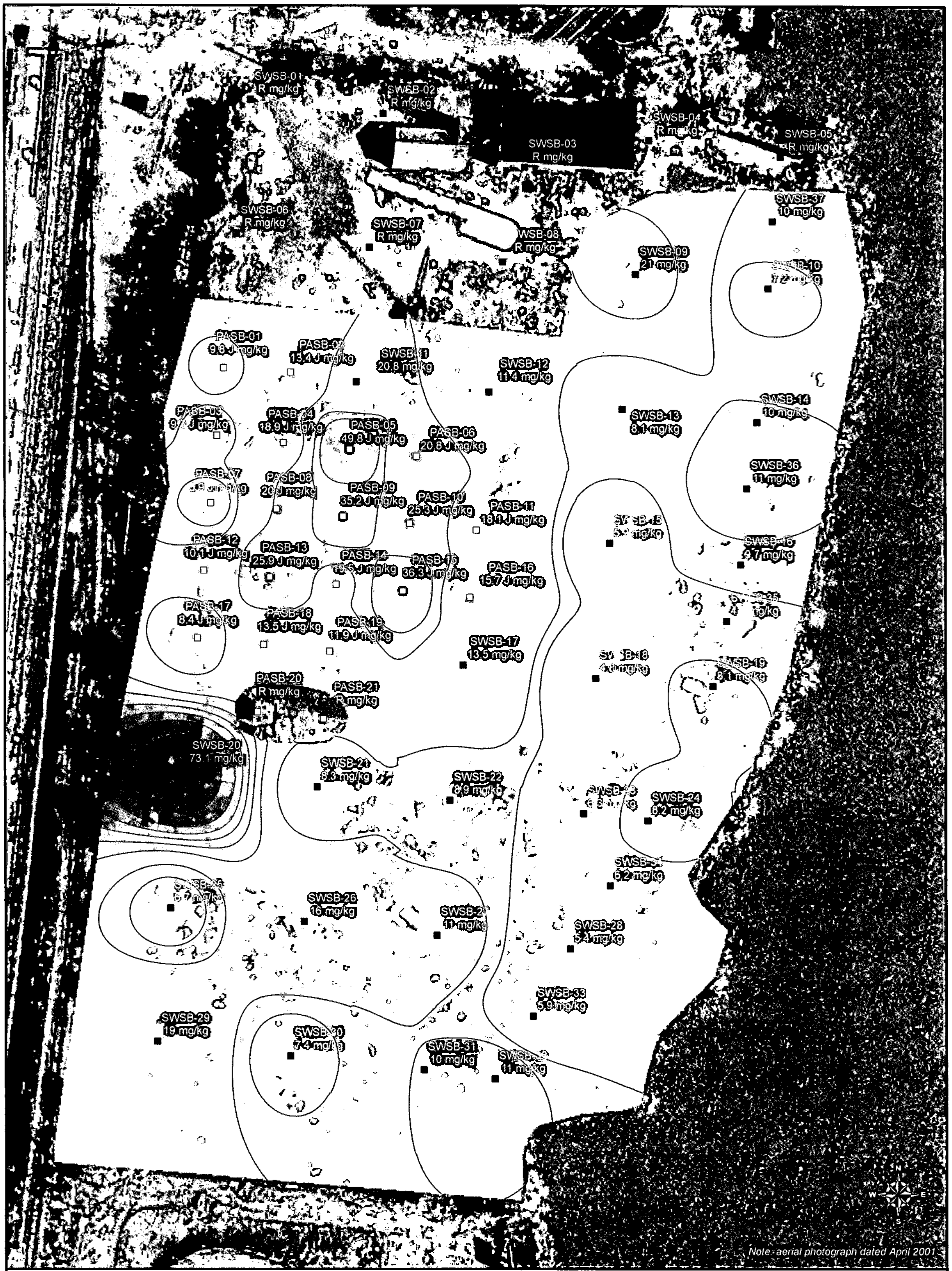

Note: aerial photograph dated April 2001

Legend

■ SWSB: Site-wide Subsurface Soil Sample Location

☐ PASB: Process Area Subsurface Soil Sample Location

— Arsenic Concentration Contour

All values in mg/kg
R = rejected data
Arsenic Site-Specific Soil Screening Criteria = 0.39 mg/kg
Potential Clean-up Level (CRQL) = 7.5 mg/kg

Arsenic mg/kg

☐ 0.39 - 7.5
☐ 7.5 - 10
☐ 10 - 20
☐ 20 - 30
☐ 30 - 40
☐ 40 - 50
▨ 50 - 60
■ 60 - 70
■ 70 - 80

Figure 4-3b
Suburface Soil Arsenic Isoconcentration Map
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

0 20 40 80 120 Feet

CDM

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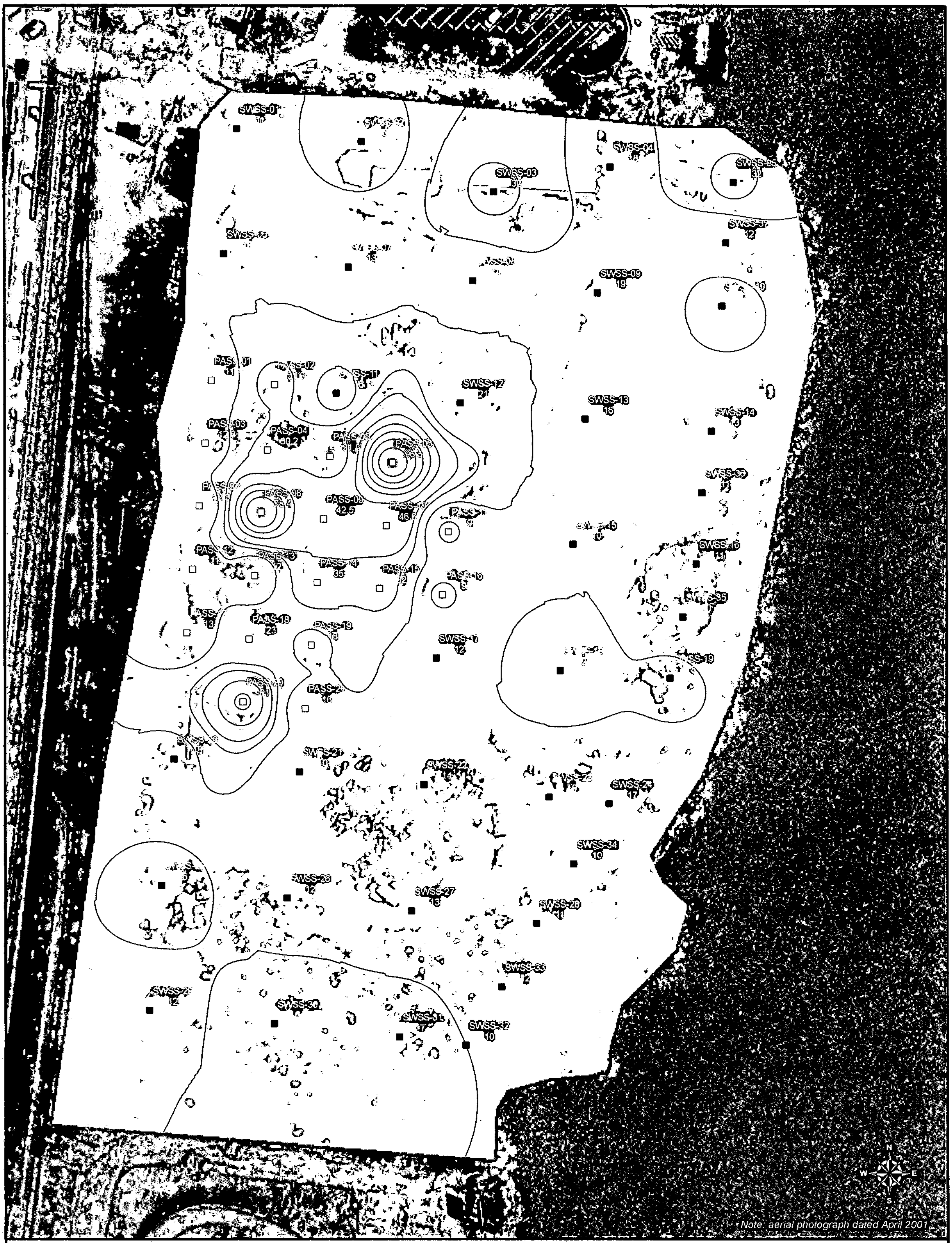

Legend

■ SWSS: Site-Wide Surface Soil Sample Location

□ PASS: Process Area Surface Soil Sample Location

— Cadmium Concentration Contour

Cadmium mg/kg

☐ 1 - 10
☐ 10 - 20
☐ 20 - 30
☐ 30 - 37
☐ 37 - 50
☐ 50 - 60
☐ 60 - 70
☐ 70 - 80
☐ 80 - 90
☐ 90 - 100

All values in mg/kg
Cadmium Site-Specific Soil Screening Criteria = 1 mg/kg
Potential Clean-Up Level (EPA Region 9 PRG for Human Health Risk for Residential Soil) = 37 mg/kg

0 25 50 100 150 Feet

Figure 4-4a
Surface Soil Cadmium Isoconcentration Map

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

CDM

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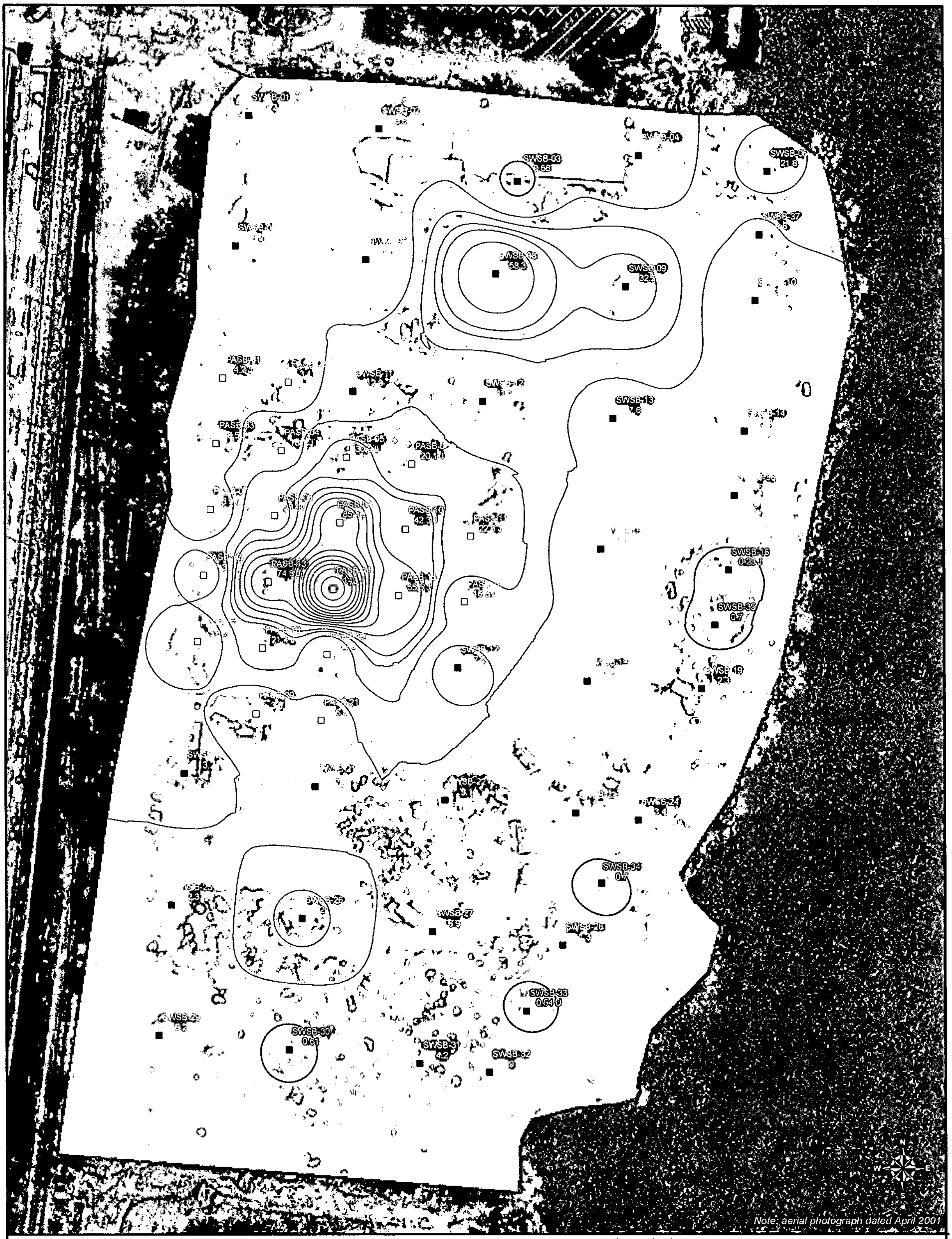

Legend

■ SWSB: Site-wide Subsurface Soil Sample Location

▣ PASB: Process Area Subsurface Soil Sample Location

— Cadmium Concentration Contour

All values in mg/kg
R = rejected data
U = non-detected value
J = estimated data due to exceeded quality control criteria.
Cadmium Site-Specific Soil Screening Criteria = 1 mg/kg
Potential Clean-up level (EPA Region 9 PRG for Human Health Risk for Residential Soil) = 37 mg/kg

Cadmium mg/kg

☐ 0 - 1
☐ 1 - 10
☐ 11 - 20
☐ 20 - 30
☐ 30 - 37
☐ 37 - 50
☐ 50 - 60
☐ 60 - 70
☐ 70 - 80
☐ 80 - 90
☐ 90 - 100
☐ 100 - 110
☐ 110 - 120
☐ 120 - 130
☐ 130 - 140
☐ 140 - 150

Figure 4-4b
Suburface Soil Cadmium Isoconcentration Map
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

0 25 50 100 150 Feet

CDM

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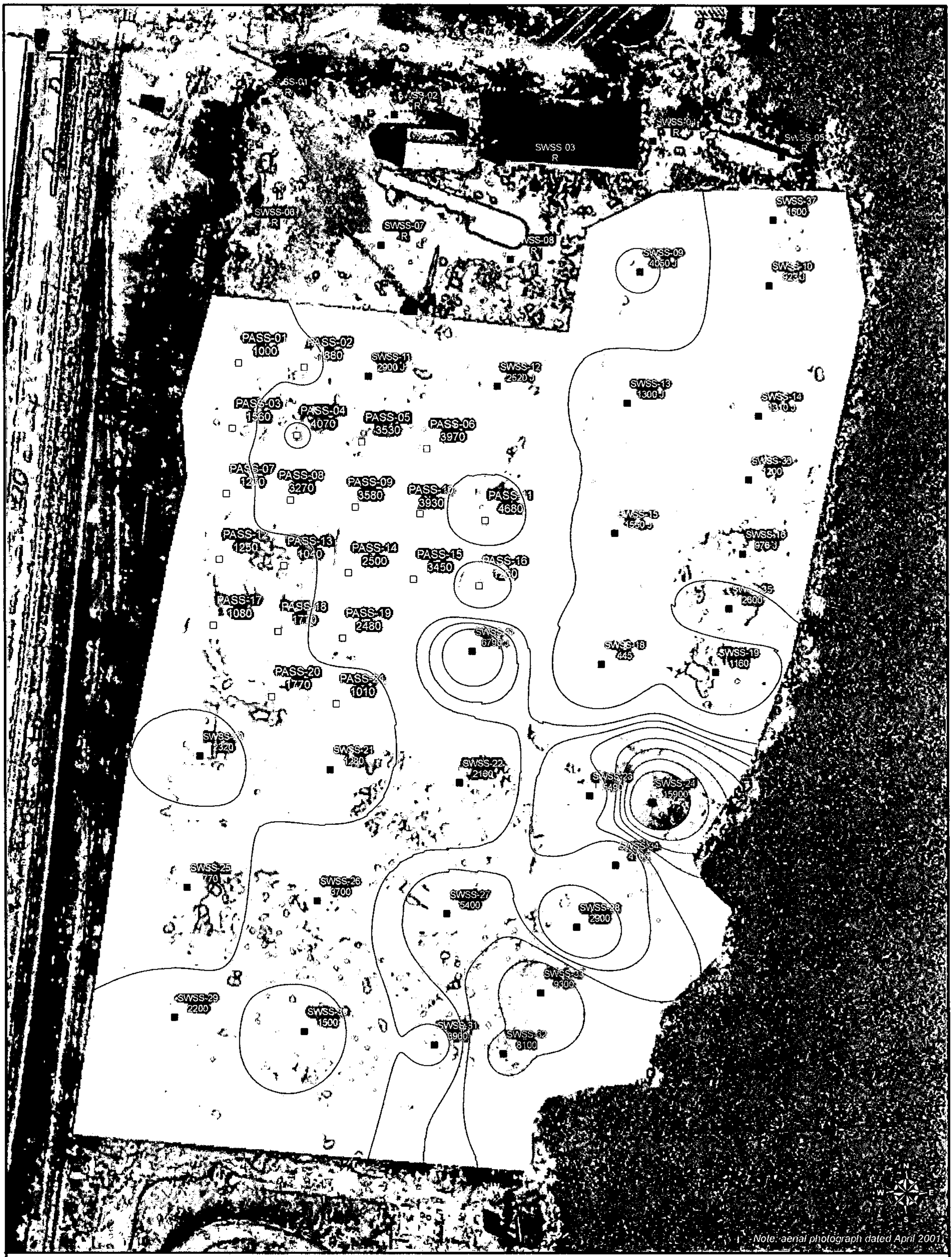

Note: aerial photograph dated April 2001

Legend

- ■ SWSS: Site-Wide Surface Soil Sample Location
- ☐ PASS: Process Area Surface Soil Sample Location
- — PASS & SWSS Lead Concentration Contour

Lead mg/kg

☐	400 - 2,000	☐	8,000 - 10,000
☐	2,000 - 4,000	☐	10,000- 12,000
☐	4,000 - 5,000	☐	12,000- 14,000
☐	5,000 - 6,000	■	14,000 - 16,000
☐	6,000 - 8,000		

All values in mg/kg
R = rejected data
J = estimated data due to exceeded quality control criteria
Lead Site-Specific Soil Screening Criteria = 400 mg/ kg
Potential Clean-up Level (CRQL) = 5000 mg/kg

Figure 4-5a
Surface Soil Lead Isoconcentration Map
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

0 25 50 100 150 Feet

CDM

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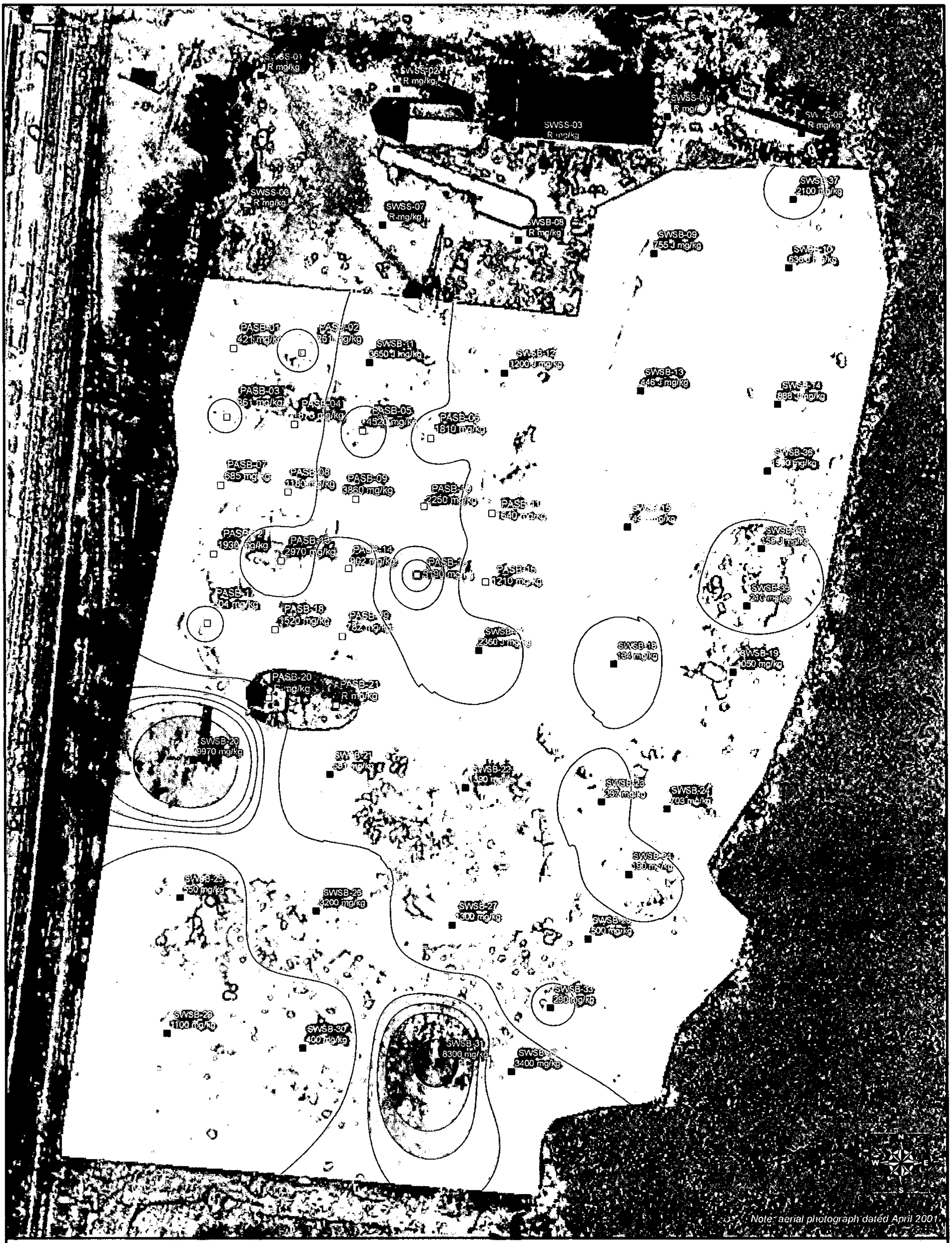


Note: aerial photograph dated April 2001

Legend

■ SWSB: Site-Wide Subsurface Soil Sample Location

☐ PASB: Process Area Subsurface Soil Sample Location

— Lead Concentration Contour

Lead mg/kg

☐	0 - 400	☐	5,000 - 6,000
☐	400- 2,000	☐	6,000 - 8,000
☐	2,000 - 4,000	▨	8,000 - 10,000
☐	4,000 - 5,000		

All values in mg/kg
R = rejected data
J = estimated data due to exceeded quality control criteria
Lead Site-Specific Soil Screening Criteria = 400 mg/kg
Potential Clean-up Level (CRQL) = 5000 mg/kg

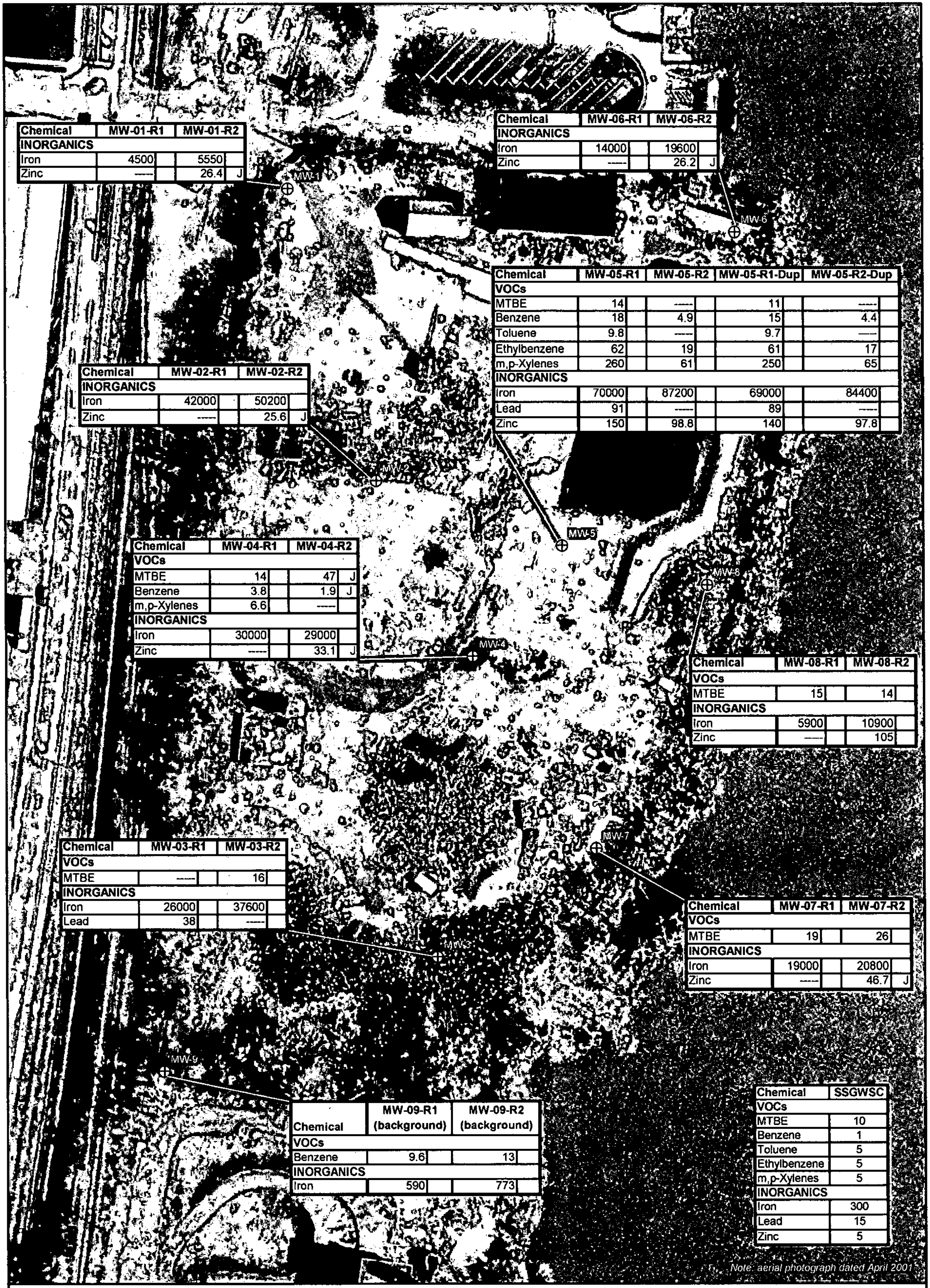
0 25 50 100 150 Feet

Figure 4-5b

Suburface Soil Lead Isoconcentration Map

Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

CDM



Chemical	MW-01-R1		MW-01-R2	
INORGANICS				
Iron	4500		5550	
Zinc	----		26.4	J

Chemical	MW-06-R1		MW-06-R2	
INORGANICS				
Iron	14000		19600	
Zinc	----		26.2	J

Chemical	MW-05-R1		MW-05-R2		MW-05-R1-Dup		MW-05-R2-Dup	
VOCs								
MTBE	14		----		11		----	
Benzene	18		4.9		15		4.4	
Toluene	9.8		----		9.7		----	
Ethylbenzene	62		19		61		17	
m,p-Xylenes	260		61		250		65	
INORGANICS								
Iron	70000		87200		69000		84400	
Lead	91		----		89		----	
Zinc	150		98.8		140		97.8	

Chemical	MW-02-R1		MW-02-R2	
INORGANICS				
Iron	42000		50200	
Zinc	----		25.6	J

Chemical	MW-04-R1		MW-04-R2	
VOCs				
MTBE	14		47	J
Benzene	3.8		1.9	J
m,p-Xylenes	6.6		----	
INORGANICS				
Iron	30000		29000	
Zinc	----		33.1	J

Chemical	MW-08-R1		MW-08-R2	
VOCs				
MTBE	15		14	
INORGANICS				
Iron	5900		10900	
Zinc	----		105	

Chemical	MW-03-R1		MW-03-R2	
VOCs				
MTBE	----		16	
INORGANICS				
Iron	26000		37600	
Lead	38		----	

Chemical	MW-07-R1		MW-07-R2	
VOCs				
MTBE	19		26	
INORGANICS				
Iron	19000		20800	
Zinc	----		46.7	J

Chemical	MW-09-R1 (background)		MW-09-R2 (background)	
VOCs				
Benzene	9.6		13	
INORGANICS				
Iron	590		773	

Chemical	SSGWSC
VOCs	
MTBE	10
Benzene	1
Toluene	5
Ethylbenzene	5
m,p-Xylenes	5
INORGANICS	
Iron	300
Lead	15
Zinc	5

Note: aerial photograph dated April 2001

LEGEND

⊕ Monitoring Wells

All values are in micrograms per liter (ug/L)
R1 = round 1 groundwater sampling event
R2 = round 2 groundwater sampling event
U = non-detected value
R = rejected sample from laboratory
J = value is estimated due to exceeded quality control criteria
SSGWSC = site-specific groundwater screening criteria
---- = the value does not exceed the SSGWSC

Figure 4-6
Indicator Contaminant and VOC Exceedances in Monitoring Wells
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

N
W E
S

0 25 50 100 150 Feet

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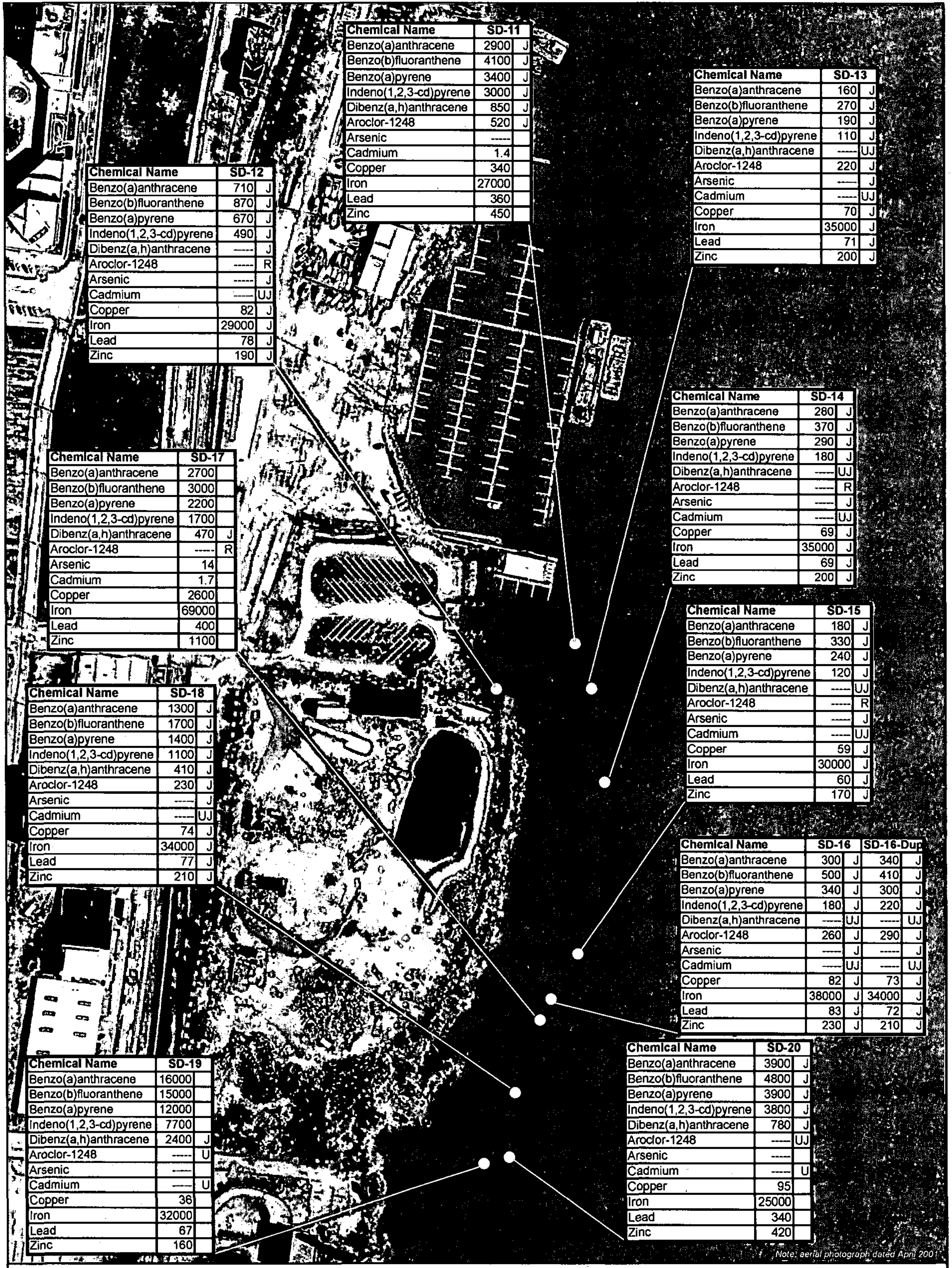

Chemical Name	SD-11	
Benzo(a)anthracene	2900	J
Benzo(b)fluoranthene	4100	J
Benzo(a)pyrene	3400	J
Indeno(1,2,3-cd)pyrene	3000	J
Dibenz(a,h)anthracene	850	J
Aroclor-1248	520	J
Arsenic	-----	
Cadmium	1.4	
Copper	340	
Iron	27000	
Lead	360	
Zinc	450	

Chemical Name	SD-13	
Benzo(a)anthracene	160	J
Benzo(b)fluoranthene	270	J
Benzo(a)pyrene	190	J
Indeno(1,2,3-cd)pyrene	110	J
Dibenz(a,h)anthracene	-----	UJ
Aroclor-1248	220	J
Arsenic	-----	J
Cadmium	-----	UJ
Copper	70	J
Iron	35000	J
Lead	71	J
Zinc	200	J

Chemical Name	SD-12	
Benzo(a)anthracene	710	J
Benzo(b)fluoranthene	870	J
Benzo(a)pyrene	670	J
Indeno(1,2,3-cd)pyrene	490	J
Dibenz(a,h)anthracene	-----	J
Aroclor-1248	-----	R
Arsenic	-----	J
Cadmium	-----	UJ
Copper	82	J
Iron	29000	J
Lead	78	J
Zinc	190	J

Chemical Name	SD-14	
Benzo(a)anthracene	280	J
Benzo(b)fluoranthene	370	J
Benzo(a)pyrene	290	J
Indeno(1,2,3-cd)pyrene	180	J
Dibenz(a,h)anthracene	-----	UJ
Aroclor-1248	-----	R
Arsenic	-----	J
Cadmium	-----	UJ
Copper	69	J
Iron	35000	J
Lead	69	J
Zinc	200	J

Chemical Name	SD-17	
Benzo(a)anthracene	2700	
Benzo(b)fluoranthene	3000	
Benzo(a)pyrene	2200	
Indeno(1,2,3-cd)pyrene	1700	
Dibenz(a,h)anthracene	470	J
Aroclor-1248	-----	R
Arsenic	14	
Cadmium	1.7	
Copper	2600	
Iron	69000	
Lead	400	
Zinc	1100	

Chemical Name	SD-15	
Benzo(a)anthracene	180	J
Benzo(b)fluoranthene	330	J
Benzo(a)pyrene	240	J
Indeno(1,2,3-cd)pyrene	120	J
Dibenz(a,h)anthracene	-----	UJ
Aroclor-1248	-----	R
Arsenic	-----	J
Cadmium	-----	UJ
Copper	59	J
Iron	30000	J
Lead	60	J
Zinc	170	J

Chemical Name	SD-18	
Benzo(a)anthracene	1300	J
Benzo(b)fluoranthene	1700	J
Benzo(a)pyrene	1400	J
Indeno(1,2,3-cd)pyrene	1100	J
Dibenz(a,h)anthracene	410	J
Aroclor-1248	230	J
Arsenic	-----	J
Cadmium	-----	UJ
Copper	74	J
Iron	34000	J
Lead	77	J
Zinc	210	J

Chemical Name	SD-16		SD-16-Dup	
Benzo(a)anthracene	300	J	340	J
Benzo(b)fluoranthene	500	J	410	J
Benzo(a)pyrene	340	J	300	J
Indeno(1,2,3-cd)pyrene	180	J	220	J
Dibenz(a,h)anthracene	-----	UJ	-----	UJ
Aroclor-1248	260	J	290	J
Arsenic	-----	J	-----	J
Cadmium	-----	UJ	-----	UJ
Copper	82	J	73	J
Iron	38000	J	34000	J
Lead	83	J	72	J
Zinc	230	J	210	J

Chemical Name	SD-19	
Benzo(a)anthracene	16000	
Benzo(b)fluoranthene	15000	
Benzo(a)pyrene	12000	
Indeno(1,2,3-cd)pyrene	7700	
Dibenz(a,h)anthracene	2400	J
Aroclor-1248	-----	U
Arsenic	-----	
Cadmium	-----	U
Copper	36	
Iron	32000	
Lead	67	
Zinc	160	

Chemical Name	SD-20	
Benzo(a)anthracene	3900	J
Benzo(b)fluoranthene	4800	J
Benzo(a)pyrene	3900	J
Indeno(1,2,3-cd)pyrene	3800	J
Dibenz(a,h)anthracene	780	J
Aroclor-1248	-----	UJ
Arsenic	-----	
Cadmium	-----	U
Copper	95	
Iron	25000	
Lead	340	
Zinc	420	

Note: aerial photograph dated April 2001

LEGEND

○ Sediment and Surface Water Sample Locations

- - Site Boundary

▭ 500 Value exceeds the calculated 95% UCL

SSSDSC = site-specifc sediment screening criteria
U = non-detected value
J = value is estimated due to exceeded quality control criteria
R = rejected sample from laboratory
All organic values are in micrograms per kilogram (ug/kg)
All inorganic values are in milligrams per kilogram (mg/kg)
Dashed cell indicate that the value does not exceed the SSSDSC

Chemical Name	SSSDSC	95% UCL
Benzo(a)anthracene	52	20,000
Benzo(b)fluoranthene	52	16,000
Benzo(a)pyrene	52	15,000
Indeno(1,2,3-cd)pyrene	52	7,400
Dibenz(a,h)anthracene	211	1,490.8
Aroclor-1248	1	0
Arsenic	6	6.4
Cadmium	0.6	1.1
Copper	16	92.7
Iron	20000	33,594.2
Lead	31	85.3
Zinc	120	195.5

Figure 4-7
Indicator Contaminant Exceedances in Sediment
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York

N
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S

0 75 150 300 Feet

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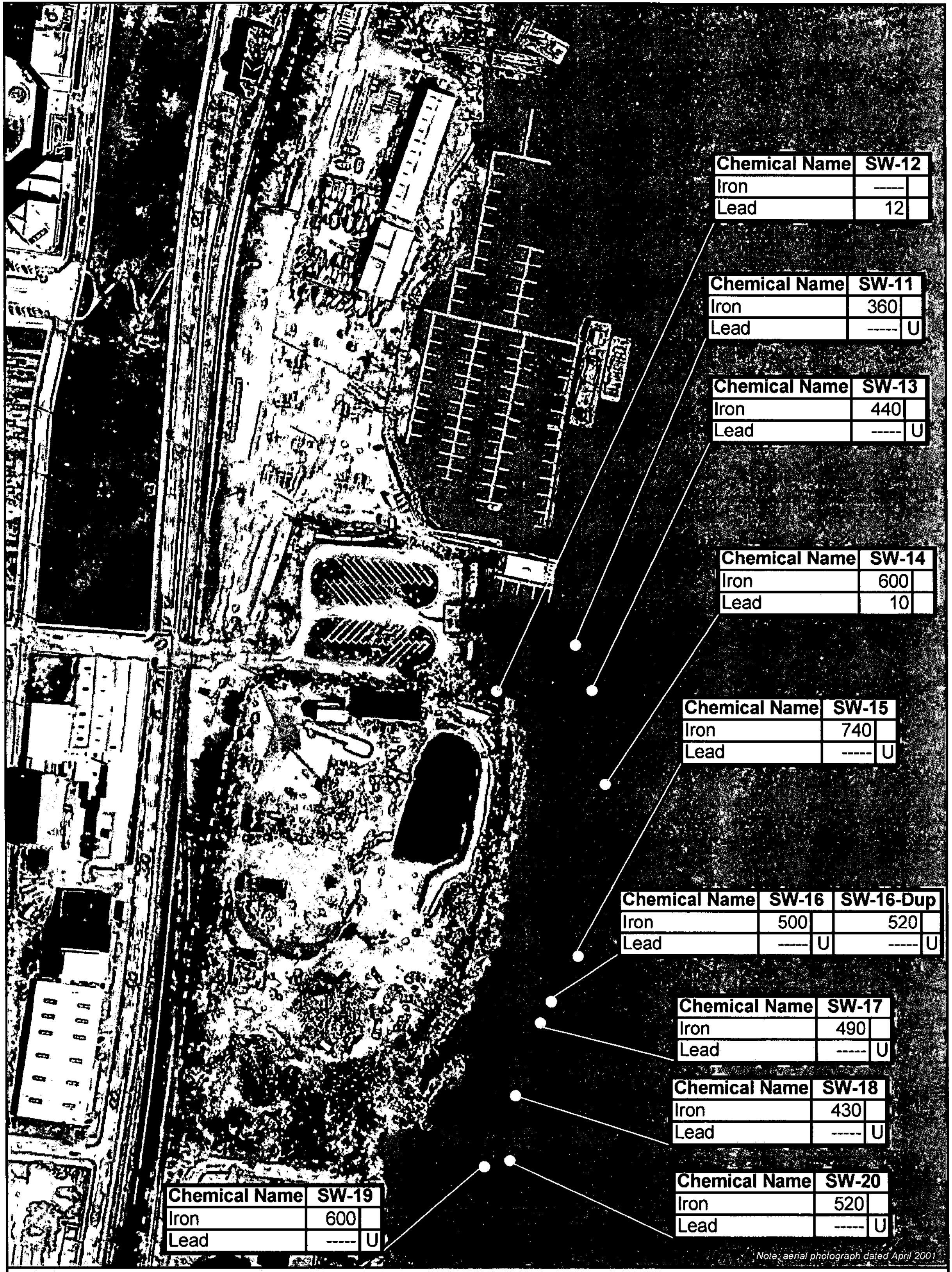


Chemical Name	SW-12	
Iron	-----	
Lead	12	

Chemical Name	SW-11	
Iron	360	
Lead	-----	U

Chemical Name	SW-13	
Iron	440	
Lead	-----	U

Chemical Name	SW-14	
Iron	600	
Lead	10	

Chemical Name	SW-15	
Iron	740	
Lead	-----	U

Chemical Name	SW-16		SW-16-Dup	
Iron	500		520	
Lead	-----	U	-----	U

Chemical Name	SW-17	
Iron	490	
Lead	-----	U

Chemical Name	SW-18	
Iron	430	
Lead	-----	U

Chemical Name	SW-19	
Iron	600	
Lead	-----	U

Chemical Name	SW-20	
Iron	520	
Lead	-----	U

Note: aerial photograph dated April 2001

LEGEND

◎ Sediment and Surface Water Sample Locations

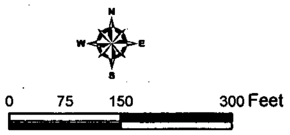
- - Site Boundary

500 Value exceeds the calculated 95% UCL

All values are in micrograms perkilogram (ug/kg)
Dashed cells indicate that the value does not exceed
SSSWC = site-specific surface water screening criteria
J = Value is estimated due to exceeded quality control criteria
U = non-detected value.
Dup = duplicate
UCL = upper confidence limit

Chemical Name	SSSWSC	95% UCL
Iron	300	412
Lead	3	8.3

Figure 4-8
Indicator Contaminant Exceedances in Surface Water
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York



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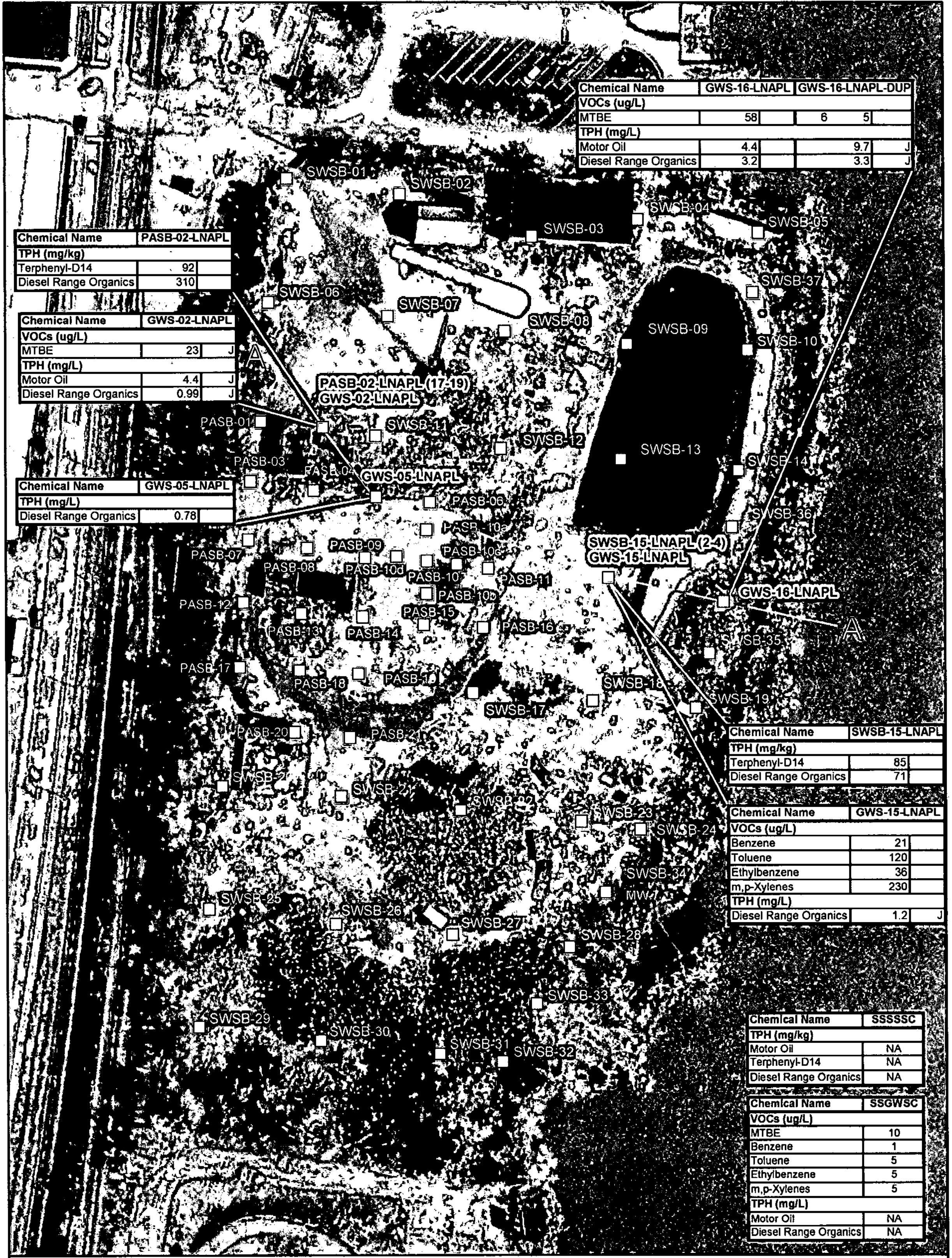

Chemical Name	GWS-16-LNAPL		GWS-16-LNAPL-DUP	
VOCs (ug/L)				
MTBE	58		6 5	
TPH (mg/L)				
Motor Oil	4.4		9.7	J
Diesel Range Organics	3.2		3.3	J

Chemical Name	PASB-02-LNAPL	
TPH (mg/kg)		
Terphenyl-D14	92	
Diesel Range Organics	310	

Chemical Name	GWS-02-LNAPL	
VOCs (ug/L)		
MTBE	23	J
TPH (mg/L)		
Motor Oil	4.4	J
Diesel Range Organics	0.99	J

Chemical Name	GWS-05-LNAPL	
TPH (mg/L)		
Diesel Range Organics	0.78	

Chemical Name	SWSB-15-LNAPL	
TPH (mg/kg)		
Terphenyl-D14	85	
Diesel Range Organics	71	

Chemical Name	GWS-15-LNAPL	
VOCs (ug/L)		
Benzene	21	
Toluene	120	
Ethylbenzene	36	
m,p-Xylenes	230	
TPH (mg/L)		
Diesel Range Organics	1.2	J

Chemical Name	SSSSSC
TPH (mg/kg)	
Motor Oil	NA
Terphenyl-D14	NA
Diesel Range Organics	NA

Chemical Name	SSGWSC
VOCs (ug/L)	
MTBE	10
Benzene	1
Toluene	5
Ethylbenzene	5
m,p-Xylenes	5
TPH (mg/L)	
Motor Oil	NA
Diesel Range Organics	NA

Note: aerial photograph dated April 2001

LEGEND

▣	Location of Observed LNAPL and Associated Sample Numbers:
PASB-02-LNAPL (17-19)	Soil Sample (Depth)
GWS-02-LNAPL	Groundwater Sample Collected Just Below the Water Table
☐	Soil Boring location With No observed LNAPL
A——A	Cross Section

NOTES:

J = value estimated due to exceeded quality control criteria

LNAPL = light non-aqueous phase liquid

SSGWSC = site-specific groundwater screening criteria

SSSSC = site-specific soil screening criteria

MTBE = Methyl tert-Butyl Ether

TPH = total petroleum hydrocarbons

VOCs = volatile organic compounds

N

0 25 50 100 150 Feet

Figure 4-9a

VOC Screening Criteria Exceedances and TPH Results: Soil and Groundwater LNAPL Samples

Consolidated Iron and Metal Superfund Site

Newburgh, Orange County, New York

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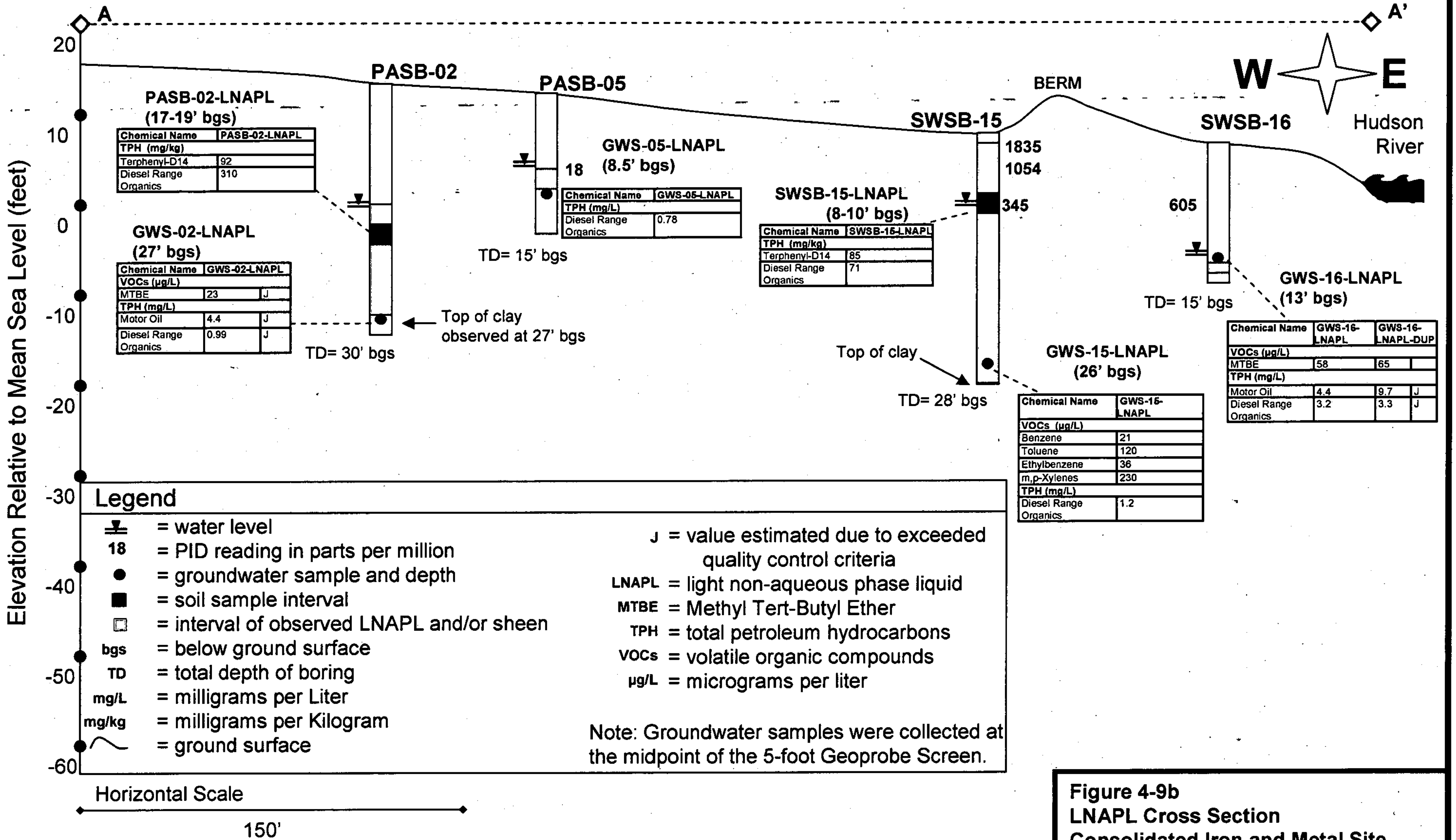

PASB-02-LNAPL (17-19' bgs)

Chemical Name	PASB-02-LNAPL
TPH (mg/kg)	
Terphenyl-D14	92
Diesel Range Organics	310

GWS-02-LNAPL (27' bgs)

Chemical Name	GWS-02-LNAPL	
VOCs (µg/L)		
MTBE	23	J
TPH (mg/L)		
Motor Oil	4.4	J
Diesel Range Organics	0.99	J

GWS-05-LNAPL (8.5' bgs)

Chemical Name	GWS-05-LNAPL
TPH (mg/L)	
Diesel Range Organics	0.78

SWSB-15-LNAPL (8-10' bgs)

Chemical Name	SWSB-15-LNAPL
TPH (mg/kg)	
Terphenyl-D14	85
Diesel Range Organics	71

GWS-15-LNAPL (26' bgs)

Chemical Name	GWS-15-LNAPL
VOCs (µg/L)	
Benzene	21
Toluene	120
Ethylbenzene	36
m,p-Xylenes	230
TPH (mg/L)	
Diesel Range Organics	1.2

GWS-16-LNAPL (13' bgs)

Chemical Name	GWS-16-LNAPL	GWS-16-LNAPL-DUP	
VOCs (µg/L)			
MTBE	58	65	
TPH (mg/L)			
Motor Oil	4.4	9.7	J
Diesel Range Organics	3.2	3.3	J

Legend

≚	= water level
18	= PID reading in parts per million
●	= groundwater sample and depth
■	= soil sample interval
☐	= interval of observed LNAPL and/or sheen
bgs	= below ground surface
TD	= total depth of boring
mg/L	= milligrams per Liter
mg/kg	= milligrams per Kilogram
∼	= ground surface
J	= value estimated due to exceeded quality control criteria
LNAPL	= light non-aqueous phase liquid
MTBE	= Methyl Tert-Butyl Ether
TPH	= total petroleum hydrocarbons
VOCs	= volatile organic compounds
µg/L	= micrograms per liter

Note: Groundwater samples were collected at the midpoint of the 5-foot Geoprobe Screen.

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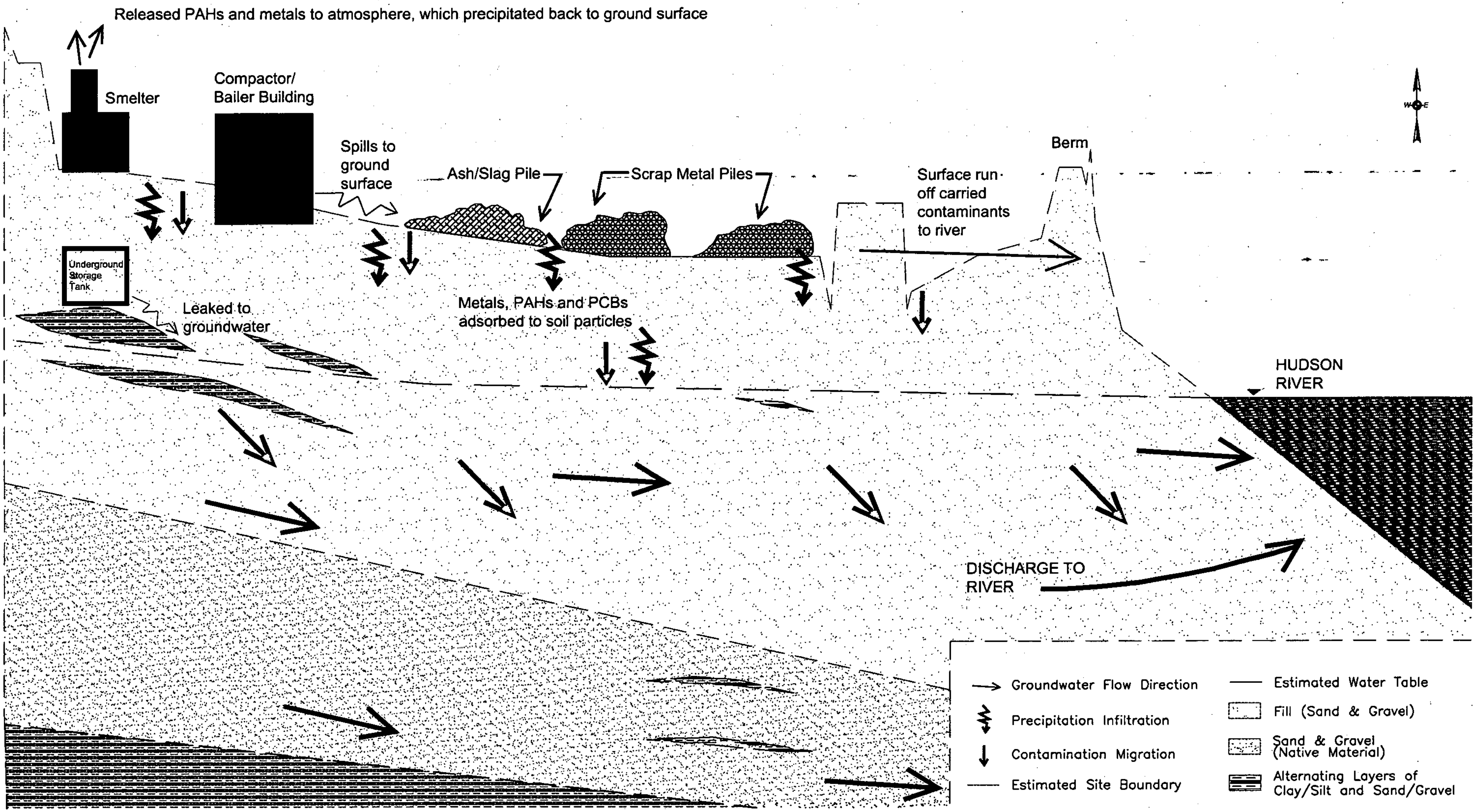
Figure 4-9b
LNAPL Cross Section
Consolidated Iron and Metal Site
Newburgh, Orange County, New York



NOTE:
1. WATER TABLE IS ESTIMATED FROM 8/04 WATER LEVEL MEASUREMENTS

NOT TO SCALE

CDM

Figure 5-1
Conceptual Site Model
Consolidated Iron and Metal Superfund Site
Newburgh, Orange County, New York