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Sediment Remedial Investigation Report

General Motors LLC

Former General Motors Assembly Plant Site

Sleepy Hollow, New York

January 2012

ARCADIS

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I certify that I am currently a NYS registered professional engineer and that this Sediment Remedial Investigation Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

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Former General Motors Assembly Plant Site Sleepy Hollow, New York

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1. Introduction and Purpose

This Sediment Remedial Investigation Report (RI Report) has been prepared by ARCADIS on behalf of General Motors LLC (GM LLC), in accordance with Brownfield Cleanup Agreements (BCAs) with the New York State Department of Environmental Conservation (NYSDEC) for the investigation and remediation of the Former General Motors North Tarrytown Assembly Plant Site located at 199 Beekman Avenue, Village of Sleepy Hollow, New York (Site).

The contemplated use of the Site is mixed commercial and restricted residential development, with public open space, including public access to the waterfront and municipal public works operations. The Site is located in the Village of Sleepy Hollow's RF – Riverfront Development Zoning district, which allows for a mixed use development of residential and commercial properties consistent with the RF zoning, as determined by the Village of Sleepy Hollow, lead Agency for State Environmental Quality Review (SEQR) of the proposed redevelopment of the Site (Findings Resolution adopted by the Village on July 24, 2007 and 2011 Amended Findings Resolution adopted January 25, 2011).

The Site is situated on the eastern shore of the Hudson River (Figure 1A) and occupies an area of approximately 96.2 acres within the Village of Sleepy Hollow (Figure 1B). It comprises three, non-contiguous parcels: 1) former main assembly plant area referred to as the West Parcel (approximately 66.2 acres); 2) eastern parking lot referred to as the East Parcel (approximately 28.3 acres); and 3) former salaried employee parking lot referred to as the South Parcel (approximately 1.7 acres).

General Motors Corporation (GMC) and their development partner Roseland/Sleepy Hollow, LLC (Roseland) initiated formal NYSDEC review of Site environmental conditions in a Voluntary Cleanup Agreement (VCA) signed in November 2002. The VCA applied to the entire Site and included investigation of the Hudson River adjacent to the West Parcel. In June 2004, the project transitioned from the Voluntary Cleanup Program to the Brownfield Cleanup Program (BCP). As part of that transition, two separate BCAs were signed in May 2005, one for the East Parcel and the other for the West Parcel. The BCA for the West Parcel also includes the South Parcel and the Hudson River as an identified offsite area of interest to the West Parcel. On April 1, 2009, Roseland terminated its participation in the BCAs and the Site redevelopment. On June 1, 2009, GMC filed for bankruptcy. On July 10, 2009, in accordance with an order from the Bankruptcy court, GMC changed its name to Motors Liquidation Company (MLC) and sold its interest in the Sleepy Hollow site to a newly formed company, GM LLC. GM LLC signed two BCAs in 2010 that superseded the two previous BCAs signed by GMC and Roseland.

GM and Roseland initiated formal NYSDEC review of Site environmental conditions as Volunteers in a Voluntary Cleanup Agreement (VCA) signed in November 2002. The VCA applied to the entire Site and included investigation of the Hudson River adjacent to the West Parcel. In June 2004, the Volunteers expressed their interest in transitioning from the Voluntary Cleanup Program (VCP) to the Brownfield Cleanup Program (BCP). During the transition, separate BCAs were developed for the East and West Parcels, signed in May 2005. The separate BCA for the East Parcel is intended to facilitate the donation of approximately 24.5 acres of this land to the Village of Sleepy Hollow. The BCA for the West Parcel encompasses the South Parcel; the Hudson River is the identified offsite area of interest to the West Parcel.

GMC initially purchased properties that comprise the West Parcel in 1914. Prior to that purchase, the parcel had been partially developed with urban fill, consisting largely of coal cinders and various aggregate mixtures to extend the waterfront into a portion of the former Pocantico Bay. Industrial operations prior to GMC’s purchase included a brickyard, a percussion rock drill factory, and two facilities where gasoline and steam-powered automobiles were manufactured and assembled. GMC demolished most of the early industrial buildings during the 1920s, filled in the remainder of Pocantico Bay with dredge spoils, and constructed an automotive assembly complex that continued to expand and operate for over 70 years. In the East Parcel, purchased by GMC in 1960 for parking, the former Village of North Tarrytown operated a small (<10 acres) municipal refuse and ash landfill during the 1920s and 1930s. The South Parcel, developed on a natural hillside, was previously residential. The North Tarrytown Assembly Plant ceased automobile assembly operations in the summer of 1996 and GMC commenced an organized process of facility decommissioning. The Village of North Tarrytown was renamed Sleepy Hollow in 1997. All references to North Tarrytown in this report and previous documents apply to the Village of Sleepy Hollow.

Between 1996 and 2000, GMC undertook several environmental investigations at the Site to prepare for facility closure. These efforts included Phase I and Phase II Environmental Site Assessments, a Phase III Extent of Contamination Study (EMCON, 1996; 1997; and 2001a), and a Sediment Quality Investigation in the Hudson River (Exponent and EMCON, 1999). In addition, an Interim Corrective Measures Project (EMCON, 2001b) was implemented primarily to remediate fill and soil containing residual petroleum and hydraulic fluids, as well as metals found in crawl spaces beneath floor slabs of the former Chassis and Body Assembly Plants, and to remove two underground fuel storage tanks before these buildings were demolished.

Roseland conducted additional sampling of soil and groundwater during 2002 as part of their due diligence investigation (EcolSciences, 2002). The findings of this investigation, and the earlier investigations within the Site conducted by GMC, reflect levels of metals, polycyclic aromatic hydrocarbons (PAHs), and petroleum compounds that are typical of historically filled sites along the Hudson River, especially those dedicated to industrial uses. The GMC and Roseland findings were used to prepare an Investigation Work Plan (IWP), which specified additional on-Site sampling pursuant to the VCA program (AMEC, 2003a). The on-Site RI findings were presented in a Preliminary Draft Remedial Investigation Report (Preliminary Draft RIR), December 2006 (BBL, 2006).

A separate IWP for the off-Site investigation of Hudson River Sediments was outlined in the Supplemental Sediment Investigation Work Plan for Voluntary Cleanup Agreement, Former General Motors Assembly Plant Site, Sleepy Hollow, New York (2004 SSIWP), prepared by AMEC for GMC (AMEC 2004) and implemented in July 2004 pursuant to the VCA for the Site. Data from GMC's preliminary investigation in 1997 was used to focus GMC's 2004 study plan. The data from the 1997 and 2004 investigations were collectively evaluated consistent with the framework presented in the New York State Department of Environmental Conservation (NYSDEC) guidance document Technical Guidance for Screening Contaminated Sediments (NYSDEC, 1999). These evaluations were provided to NYSDEC in an interim Draft Sediment Data Evaluation Technical Memorandum (BBL, 2006a).

Based on GMC's evaluation of the 1997 and 2004 data and discussions with NYSDEC, it was concluded that an additional supplemental investigation under the BCA for the West Parcel was necessary to determine if there is predictive and observed evidence of significant toxicity and benthic community impairment in the near-Site areas relative to background conditions. The scope of work for the latest supplemental sediment investigation was developed through several scoping sessions with NYSDEC. and is described in the Supplemental Sediment Investigation Work Plan for Brownfield Cleanup Agreement-West Parcel Former General Motors Assembly Plant Site, Sleepy Hollow, New York (2006 SSIWP) prepared by Blasland, Bouck and Lee, Inc.(BBL) for GMC (BBL 2006b). The field sampling outlined in the 2006 SSIWP was performed during September-October 2006.

The collective objectives, methods and findings of all three investigations conducted by GMC are summarized in this Sediment RIR in the following sections:

- Section 1 – Introduction. This section describes the overall remedial investigation program for the Site and role of GMC's sediment investigations in that process.

- Section 2 – Site Description and History. This section describes general Site setting and history of land use, with emphasis on historic wastewater discharges, which are the focus of the sediment investigations.

- Section 3 – Objectives, Scope and Rationale. This section describes the primary objectives of the sediment investigations through 2006 and a brief summary of the scope and rationale for the concluding biological impact evaluations.

- Section 4 – Historic Hudson River Investigations. This section summarizes the pre-Remedial Investigation (pre-RI) sampling and analysis conducted by GMC, as well as a regional study conducted by NYSDEC, upstream of the Site, in 2000/2001.

- Section 5 – Phase I (2004) Sediment Investigation. This section describes the scope of first phase of sediment investigations conducted under the VCA for the Site.

- Section 6 – Evaluation of Phase I Data. This section summarizes the preliminary evaluation of the 2004 sediment investigation as well as the pre-RI data from GMC and NYSDEC surveys.

- Section 7 – Phase II (2006) Sediment Investigations. This section describes the scope of the second phase of sediment investigations conducted under the BCA for the Site (West Parcel).

- Section 8 – Evaluation of Phase II Sediment Data. This section presents the findings of the 2006 investigations of the biologically active surface zone and associated toxicity testing and benthic impact assessment.

- Section 9 – Evaluation of Phase II Subsurface Sediment Data. This section presents the findings associated with various subsurface core samples beneath the biologically active surface layer to assess conditions associated with historic sediment deposition.

- Section 10 – Qualitative Human Health Exposure Assessment. This section identifies and characterizes the potential pathways for human exposure to sediments in the Site vicinity.

- Section 11 – Fish and Wildlife Resource Impact Assessment. This section assesses the type and extent of fish and wildlife resources, and characterizes potential impacts of site-derived contaminants to those resources.

- Section 12 – Conclusions and Recommendations. This section presents the conclusions and recommendations regarding Hudson River sediments in the vicinity of the Site.

- Section 13 – References. This section lists the references cited in this report

2. Site Description and History

2.1 Site Description and Land Use

At the time of facility closure in 1996, the main assembly plant property (West Parcel) contained two manufacturing buildings (the Body Plant and the Chassis Plant) and support operations consisting of a powerhouse, petroleum bulk storage tanks, a wastewater pretreatment facility, a water storage tank, and miscellaneous day shelters for equipment and personnel. These structures were decommissioned and demolished by 1999, leaving concrete building slabs and asphalt surfaces covering most of the Site (Figure 1B). A stockpile of recycled concrete aggregate from the demolition, some of which was spread on the West Parcel, is situated near the waterfront, landward of the former wastewater treatment plant berm and wall. The West Parcel is separated from the East Parcel by an active railroad corridor owned by Conrail serving Metro-North, AMTRAK, and freight services. The East Parcel was developed by GMC as a Parking lot, which remains covered with asphalt. The former salaried employee parking lot is located across Beekman Avenue, directly south of the West Parcel. This paved lot is bordered by Beekman Avenue, Hudson Street, River Street, and property owned by the Village of Sleepy Hollow.

The West Parcel includes approximately 1,000 ft of rip-rapped shoreline on the Hudson River. The overall topography of the West Parcel is relatively flat, with significant portions occupied by the remaining building floor slabs of the former Chassis and Body Plants (Figure 1C). Ground surface elevations over much of the West Parcel are within 5 to 20 feet (ft) above mean sea level (MSL), with building slabs at an approximate elevation of 13 ft. The surrounding area rises steeply to the east, away from the Hudson River. The Salaried Parking Lot on the southeast side of the facility is located on this rise, overlooking the plant from an elevation sloping from approximately 20 to 50 ft. Most of the East Parcel is relatively flat, with paved surface elevations between 3 to 11 feet above MSL, bounded on the south and east perimeter by steep slopes. Under an agreement with GMC, the Village of Sleepy Hollow is currently using the East Parcel to temporarily stage materials for municipal public works projects.

Groundwater in the Site vicinity is not used as a potable water supply. A reservoir fed municipal water-supply system services the Sleepy Hollow area, including the Site. Reservoirs for this system (and other community water supplies) are located more than 3 miles upgradient of the Site. The Catskill Aqueduct serves as the main source of water for the Village of Sleepy Hollow. Water is stored in the Village's reservoir in the Rockefeller State Park Preserve. It is unlikely that groundwater beneath the Site would ever be used as a potable water supply because the area is serviced by the local municipal system and the natural water bearing units below the fill are expected to have relatively low yields. Although the fill may represent a zone of significant groundwater yield, such artificially created deposits are typically unsuitable and undesirable as potable supplies.

Current land uses within the immediate site vicinity include a mix of industrial, commercial, residential, and parkland. Most of the industrial property in the surrounding area is located along the Hudson River waterfront, south of the Site. These industrial uses have recently (2004-2005) included shipping and receiving of automobiles and other freight, as well as commercial oil distribution and asphalt manufacturing. Both the oil distribution and asphalt manufacturing operation were served by commercial tanker or barge service via the Hudson River Federal Navigation channel to enter and exit the Tarrytown Harbor. There are also two marinas at the southern end of the Harbor. Historic waterfront uses near the Site have included a coal and lumber receiving facility adjacent to the Site and a manufactured gas plant (which has recently been remediated) in the vicinity of the former asphalt plant. By 2006, the automobile transfer yard adjacent to the Site was redeveloped as Ichabod’s Landing, a residential waterfront development, and the former asphalt plant site in the Village of Tarrytown is under site construction for another residential waterfront development. Several non-industrial commercial facilities, as well as the Village of Sleepy Hollow Public Works Facility and the Village of Tarrytown Public Works Garage, are currently present within the industrially zoned area south of the Site near the Hudson River waterfront. The commercial center for the Village of Sleepy Hollow is less than 0.5 miles east of the Site. Lands immediately southeast and east of the Site are primarily residential. Public parklands surround the northern borders of the Site. Kingsland Point Park of Westchester County abuts the northwest border of the Site. The Tarrytown Lighthouse, which is listed on the National Register of Historic Places, is located immediately west of the Site (in the Hudson River) and is accessible to the public through Kingsland Point Park. DeVries Park of Sleepy Hollow abuts the northern border of the Site. Philipsburg Manor, a restored early 18th century farm with public access, adjoins DeVries Park and the northeast corner of the Site. Active freight and passenger rail services run through the Site within a common corridor.

2.2 Site Waterfront History

Two of the three outfalls located on the current Site waterfront have historically discharged wastewater from automobile assembly and painting processes into the Hudson River. The oldest discharge is Outfall 3 (OF-3), which discharged wastewater from the northern section of the former Body Plant to the Hudson River from 1914 (at the earliest) until 1962. Prior to 1914, the facility was used by another automotive manufacturer to produce steam-powered automobiles. This outfall (OF-3) was sealed and replaced with a 48-inch storm drain [Outfall 1 (OF-1)] in 1963, and the Body and Chassis Plant wastewater flows were combined to discharge through this drain. The location of the OF-3 outlet is only approximate because the shoreline was modified in 1960. OF-1 discharges from the shoreline at the southern end of the Site, close to the Federal Navigation Channel in the northern area of the Tarrytown Harbor. Outfall 2 (OF-2) is a storm water outfall, constructed in the early 1960s during the expansion of the waterfront to its current configuration. This storm drain currently services the West Parcel in the vicinity of the former Body Plant, and discharges offshore, approximately mid-way between OF-1 and OF-3. Process wastewater was never discharged from OF-2.

Processes that contributed to the historical wastewater flow included metal washing and other processes that utilized chromium, zinc, and nickel compounds, caustic solutions, automotive paints and paint thinners. In order to eliminate the discharge of industrial wastewater to the Hudson River, GMC constructed a wastewater treatment plant at the Site during 1970-1971. Following completion of the wastewater treatment plant in October 1971, GMC's industrial wastewater connection to the Hudson River outfall (OF-1) was completely sealed and severed, and all treated wastewater was discharged to the Village's sewer system. The Village's treatment system operated until the early 1980s when all sanitary and wastewater flow was diverted to the Westchester County sewer system.

In addition to Site stormwater discharge, the Tarrytown Harbor currently receives stormwater discharges from the Villages of Tarrytown and Sleepy Hollow. Over 20 wastewater discharge permit holders exist in the general vicinity, including several municipal wastewater treatment plants and two electrical generating stations within 20 miles upstream of the harbor. The Village of Sleepy Hollow historically discharged municipal wastewater, following primary treatment, to the harbor within 800 feet south of the Site. A former battery manufacturing site upland of the Site, and within in the same stormwater drainage basin, underwent soil remediation during the 1980's to remove mercury-contaminated soils from the facility and neighboring properties. An historic manufactured gas plant (MGP) site at the former asphalt plant site on the Tarrytown waterfront recently underwent remediation, including dredging of Hudson River sediments from the harbor navigation channel in 2004 to remove coal tar that had seeped into the river bottom downstream of the Site.

3. Objectives, Scope and Rationale

3.1 Objectives

A significant number of sediment samples have been collected from the Hudson River by GMC and others over the past several years to characterize the general extent of contamination that may be related to current and historic waterfront activities and discharges to the River. Recognizing that sediment quality near the site reflects decades of urban, agricultural and industrial land use resulting in discharges of many naturally occurring and anthropogenic chemical constituents from points up and down the River, a regional data search and three field investigations have been conducted by GMC between 1997 and 2006 to determine the nature and extent of possible Site-related impacts.

The primary objectives of the sediment evaluations in 1997 and 2004 were to 1) identify chemicals of potential concern (COPC) in Hudson River sediment that may be attributable to the Site; and 2) identify areas of the Hudson River where site-related COPC concentrations in sediments are most prevalent. These data were collectively evaluated during 2004-2006 to determine the extent to which additional data collection activities may be warranted to further assess the potential toxicity of the sediments in the more prevalent Site-related COPC areas.

The 2006 SSIWP outlined a series of supplemental studies, developed with significant input from NYSDEC, which build upon the existing information on sediment quality and provide additional chemical and biological data needed to evaluate the degree of environmental impairment, if any, evident in near-Site sediments relative to background. The objectives of these supplemental studies were as follows:

1. Predict Site-specific metal toxicity to benthic organisms using the equilibrium partitioning sediment benchmark (ESB) approach, based on sediment and pore water chemistry as specified in USEPA (2005a) guidance.

2. Determine whether benthic communities in near-Site areas of interest are significantly impaired relative to representative background locations, based on a benthic invertebrate survey and calculation of biological metrics.

3. Determine if sediments in near-Site areas of interest may be more toxic to representative benthic organisms than sediments from background locations, based on the findings of whole sediment bioassays.

4. Determine if select metals (chromium, copper, lead, mercury and zinc) in near-Site and background sediments have bioaccumulated in a representative benthic organism, based on whole body tissue analysis.

5. Provide a general depositional profile of the near-Site area of interest and representative background areas through sediment aging techniques (geochronology).

6. Provide a representative vertical profile of select metal concentrations in the near-Site area of interest, including the immediate vicinity of OF-1, and background areas.

7. Characterize the physical and geotechnical properties of sediments in the vicinity of OF-1 to support design of an interim remedial measure (IRM) under consideration for this area.

3.2 Scope and Rationale

In order to meet these objectives, the 2006 supplemental sediment investigation integrated bulk sediment chemistry and grain size analyses with sediment toxicity benchmark and bioaccumulation parameters, whole sediment toxicity testing, and benthic community assessment throughout the background and near-Site study areas. The scope of work included analyses of the following:

- Surface and subsurface sediment samples for COPC concentrations (chromium, copper, lead, mercury, and zinc), total organic carbon (TOC), simultaneously extracted metals (SEM), and acid volatile sulfides (AVS);

- Sediment pore water extraction and analyses of COPCs, soluble organic carbon, hardness and pH;

- Benthic macroinvertebrate community surveys;

- 28-day whole sediment toxicity tests (bioassays);

- Bivalve tissue sampling and analysis for COPCs;

- Radionuclide analysis for geochronology (deposition profiles); and

- Physical characterization, including grain size and selective geotechnical properties.

4. Historic Hudson River Sediment Investigations

Several historical sediment investigations have been conducted for the lower Hudson River in the vicinity of the Site. These investigations include a study conducted in 1997 specific to the Site, and non-site specific studies conducted in 2000/2001. This section summarizes the scope and activities of these earlier sediment investigations. Later studies in 2004 (Phase I Study) and 2006 (Phase II Study), components of the Remedial Investigation of the Site under the VCA and BCA described in Section 1.1, are described in subsequent sections of this report.

For data evaluation purposes, the sample locations from the various sediment investigations are divided into two primary groups: background (upstream or reference locations) and near-Site. Sediment samples collected within a closely-spaced grid at OF-1 are also identified separately. Background and near-Site sediment sample locations of historical sediment investigations are depicted on Figures 2 and 3.

4.1 1997 Sediment Investigation (Exponent)

In 1997, Exponent and EMCON (Exponent) designed and conducted a sediment investigation for GMC to determine representative baseline sediment quality conditions in the Hudson River following the GMC Assembly Plant closure. Exponent collected surface (0 to 2 inch) sediment samples from 106 locations of the lower Hudson River, including areas upstream, adjacent to, and downstream of the Site (Exponent and EMCON, 1999). The objective of the sampling was to identify and characterize potential constituents of concern that could have been associated with historical GMC wastewater discharges from the Site.

4.1.1 Sample Locations

Sixteen of the sediment samples were collected from four transects (Transects 14 to 17) located approximately 1 to 3 miles upstream of the Site. These four transects are outside of the potential zone of Site influence, and are useful for establishing background sediment quality. Eighty-six of the sample locations were considered near-Site locations, and the remaining four downstream locations were not considered Site-related due to their relative distance downstream. The sample locations from the Exponent study are depicted on Figures 2 and 3 and designated with a combination of the letter “T” and numbers (e.g., T14D).

4.1.2 Sample Methods

The sediment samples were collected using push-core sampling equipment, following the procedures described in the Data Report for the Sediment Quality Investigation (Exponent and EMCON 1999).

4.1.3 Analyses

Sediment samples were analyzed for 14 select inorganic metals that were expected constituents in historical wastewater discharge. The constituents were antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, molybdenum, nickel, tin, titanium, and zinc. Analyses were conducted by Columbia Analytical Services (CAS), Rochester, New York.

4.1.4 Results

Results of the 1997 investigation are presented in Data Report for the Sediment Quality Investigation, Hudson River (Exponent and EMCON 1999), which has previously been provided to NYSDEC. Data from that investigation, for metals carried through the 2004 investigation, are included in Section 6.

4.2 2000/2001 Regional Sediment Investigation (Versar)

In 2000 and 2001, Versar, Inc. (Versar) collected surficial (0 to 1 inch) sediment samples from the lower Hudson River (from the Battery up to Troy, New York) as part of the Hudson River Estuary Biocriteria Project for NYSDEC (Versar, 2003). The goal of the Hudson River Estuary Biocriteria Project was to develop one or more biological indicators that could be used to assess the ecological condition of the estuary (Versar, 2003). A more detailed description of the study (including the results) is presented in the Hudson River Estuary Biocriteria Final Report (Versar, 2003).

4.2.1 Sample Locations

As part of the 2000/2001 studies samples were not taken in the immediate vicinity of the Site. However, samples bracketed the Site starting from approximately 1 mile upstream and approximately 2 miles downstream. For this reason, 39 sediment samples collected by Versar approximately 1 to 5 miles upstream of the Site were considered to be representative of background conditions for the Site. Sample locations from the Versar study are depicted on Figure 2 and designated with a 3- or 4-digit numeric identification (e.g., 608 or 1074).

4.2.2 Sample Methods

The sediment samples from the Versar study were collected using a Young grab sampler, and three samples were collected from each station.

4.2.3 Analyses

The 2000/2001 Versar sediment samples were analyzed for Aroclor PCBs, PAHs, chlorinated pesticides, and select metals (aluminum, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc).

4.2.4 Results

Analytical data from the Versar sampling efforts, for constituents included in GMC's 2004 investigation, are included in Section 6. In addition to sediment chemistry, Versar (2003) also studied benthic biota biological communities, and habitat characteristics throughout sections of the Hudson River estuary from the Battery (southern tip of Manhattan) to the Troy Dam, including the general vicinity of the Site. The study classified benthic habitats as degraded, indeterminate, and non-degraded, based on evaluation of ERM quotients for sediment chemistry data, as well as benthic invertebrate and fish community indices and proximity to urban areas. The general vicinity of the river near the Site (within approximately twenty miles upstream and downstream of the Site and east of the main channel) was generally classified as "degraded". Versar found that the most pervasive chemical contaminants found throughout the Hudson River are metals. Both metal and PAH contamination occurred throughout the river, but PAHs were most prevalent at sites in Yonkers, Newburgh Bay, Poughkeepsie, and Kingston. Although samples were not collected by Versar within the Tarrytown Harbor (where the Site is located), similar urban waterfront conditions occur at the Site given the historic waterfront development, as well as commercial land and harbor use along the Sleepy Hollow and Tarrytown waterfront.

5. Phase I (2004) Sediment Investigation

In 2004 a sediment investigation was conducted by AMEC Earth & Environmental, Inc. (AMEC) for GMC to evaluate potential historical discharge from the Site. The sampling was conducted in accordance with a NYSDEC-approved SSIWP (AMEC, 2004).

5.1 Sample Locations

In 2004 AMEC collected sediment samples from 45 locations, including 39 near-Site stations and 6 background stations. The sediment samples included surficial (0 to 2 inch) samples and subsurface (2 to 6 inch and 6 to 12 inch) samples.

The near-Site stations were located in the vicinity of the three existing outfalls; however, the allocation was subjective because the area that might be influenced by individual outfalls was unknown. The stations were numbered consecutively in a downstream to upstream sequence (SED01 through SED39). Nineteen sampling stations (SED01 through SED19) were located in the vicinity of OF-1. Station SED10 was located immediately in front of OF-1, within ten feet of the visible concrete opening. The remaining 18 stations were arranged in four transects, extending from approximately 50 feet offshore to approximately 800 to 1,100 feet offshore.

Eleven sampling stations (SED20 through SED30) were located in the vicinity of OF-2. The 11 stations were arranged in 3 transects extending from approximately 50 feet offshore to approximately 550 to 1,000 feet offshore. Stations SED23 through SED26 form a transect originating at OF-2. SED26 was located in the general vicinity of the submerged outfall, approximately 50 feet from the shoreline. Stations SED27 through SED30 are located along Transect 8 (from GMC's 1997 sampling), which was oriented in line with a previously incorrect location for OF-2. The correct location of OF-2 was recently verified and is shown on Figure 3.

Nine stations (SED31 through SED39) were located in the vicinity of OF-3. Station SED37 was located in the immediate vicinity of the submerged OF-3, within 50 feet of the shoreline. The remaining stations were oriented to fit the cove configuration in that area, extending up to 300 feet upstream and approximately 900 feet downstream of the shoreline at OF-3.

Background samples were collected approximately 3 to 5 miles upstream near Ossining, New York, at 6 locations previously sampled by either Versar or Exponent.

Background samples were collected from the same three depth intervals as the near-Site samples, for a total of 18 samples.

Sample locations of the 2004 study are depicted on Figures 2 and 3 and designated as SED## (e.g., SED10).

5.2 Sampling Methods

The 2004 sediment samples were collected with a core sampler. At each of the 45 sampling stations, the core was segmented into three intervals: interval A (0 to 2 inch), interval B (2 to 6 inch), and interval C (6 to 12 inch)). The samples from each interval were identified separately (e.g., SED01A, SED01B, and SED01C).

At 15 of the near-Site locations (shown as proposed 12-inch cores on Figure 2 of the 2004 SSIWP) each of the three sample intervals were submitted to the laboratory for analysis. At the remaining 24 near-Site stations (designated as contingency cores on Figure 2 of the 2004 SSIWP) only intervals A and B were initially analyzed. The interval C of these stations was extracted and frozen pending the results of the intervals A and B analyses. The decision to analyze the interval C samples was made based on the results of the analysis of the upper two intervals after consultation with NYSDEC.

New pre-cleaned core liners made of clear Lexan® were used to retrieve each sediment sample. The cores were kept in an upright position onboard the sampling vessel and were transferred to the onshore field laboratory for processing. At the field laboratory, the sediment cores were segmented into three intervals and qualitative observations regarding the presence of anthropogenic materials, shells, and macrobenthos were recorded.

General water quality was measured at each sample location with a portable electronic water quality monitor (e.g., Horiba Water Quality Meter). Measurements included temperature, dissolved oxygen, pH, conductivity, and salinity. Qualitative observations of water conditions (turbidity, presence of floating objects and debris) were also made.

Copies of the 2004 field sampling logs are provided in Appendix A.

5.3 Analyses

Samples were analyzed for specific metals representative of GMC's historical wastewater discharge. NYSDEC agreed that the metals to retain from the 1997 investigation for analysis in the 2004 investigation were antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, and zinc.

Samples were also analyzed for Arochlor PCBs, PAHs, and TOC. PAHs and PCBs were identified as target analytes by NYSDEC. However, PAHs and PCBs are not considered COPCs for the near-Site Hudson River. Trace levels of PCBs (typically around 1 ppm) were detected in recycled concrete aggregates which were produced during demolition of onsite buildings in 1998/1999. This milled concrete has been stockpiled for future recycling as structural subsurface fill at the Site. Similarly, PAHs were detected in historical fill that was used on site. The fill dates back to the 1800s, and is found in limited areas and believed to be naturally attenuating.

Sediment was also collected at each station for grain size characterization. A matrix summarizing the type of samples collected at each station is provided in Table 1. Analyses were performed by CAS, Rochester, New York.

5.4 Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures were implemented during the 2004 study and were carried out in accordance with the SSIWP (BBL, 2004). QA/QC activities are described below.

5.4.1 Field QA/QC

Field sampling activities were performed following standard operating procedures as described in the SSIWP (BBL, 2004). The field instruments used for measuring field water quality parameters such as salinity, temperature, conductivity, dissolved oxygen, and pH were calibrated in accordance with the manufacturers' specifications and checked on a daily basis. Field QA/QC samples were collected and described as follows:

- Field duplicates were used to assess consistency of sampling methods, sample homogeneity, and precision of laboratory analytical procedures. Field duplicates for sediment or pore water were collected at a frequency of 10% of the total number of samples collected per matrix. Duplicate samples were submitted for laboratory analyses for the same chemical parameters as the parent samples.

- Equipment (rinsate) blanks were collected only in cases where non-dedicated sampling devices were used for sample acquisition. Equipment blanks were prepared by pouring analyte-free water over decontaminated sampling equipment to verify that the decontamination procedure had been adequately carried out and that there was no cross-contamination of samples occurring due to the equipment itself. Equipment blanks were collected at a frequency of 5% of the total number of samples collected with non-dedicated sampling device and submitted for laboratory analyses for the same analytical (chemical) parameters as that of those samples collected using the equipment.

- Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples were used to assess the accuracy and precision of laboratory methods. MS/MSD samples were prepared by spiking the samples with known quantities of target analytes at the laboratory prior to undergoing the analysis. MS/MSD samples were prepared at a frequency of 5% of the total number of samples collected per matrix.

Field duplicate results are presented with the primary sample results in the data tables (Section 6). Results of equipment blanks and MS/MSD are presented within the laboratory reports submitted to the NYSDEC separately.

5.4.2 Laboratory QA/QC

Sample analyses and method QA/QC procedures were performed by the laboratories in accordance with the requirements of appropriate analytical methods described in the SSIWP (BBL, 2004).

5.4.3 Laboratory Data QA/AC

Laboratory analytical data for the Phase I data set were evaluated and validated by AMEC. The results of the chemistry data validation are documented in the Data Usability Summary Reports (DUSRs) prepared for each sample delivery group in accordance with the Guidance for Development of Data Usability Summary Reports (NYSDEC, 2002). The primary objective of the DUSR is to determine whether or not the data, as presented, meet the project-specific criteria for data quality and data use. The DUSRs confirm that the data-quality objectives outlined in the 2004SSIWP were met, and provide the final validated laboratory data tables for all samples. All analytical data included in the RI Report reflect the validated data including any adjustments, if applicable, based on the DUSRs. The DUSRs produced associated with this sediment investigation have been provided to the NYSDEC under separate cover.

5.5 Results

Results of the 2004 sampling were provided to NYSDEC in an interim technical memorandum and are presented and discussed in Section 6.

6. Evaluation of the Phase I Data

Prior to conducting the subsequent (Phase II) studies, a screening-level evaluation of the Phase I data was conducted. The Phase I data evaluation included the results from the 2004 data, as well as data from the historical (1997, 2000/2001) studies, as appropriate. The Phase I data evaluation included comparison of sediment data with screening criteria and comparison of near-Site data with data from background or reference areas.

The Phase I data evaluation approach was consistent with the framework presented in the NYSDEC guidance document entitled Technical Guidance for Screening Contaminated Sediments (NYDEC, 1999). It relied on an initial comparison of sediment data with generic, conservative chemical-specific screening criteria. Also, because the Hudson River has been affected by anthropogenic activities, the near-Site data were further compared with those of background or reference areas. Specifically, this screening-level evaluation included the following steps:

- Step 1 – Relevant sediment data that are representative of Site-related sediment and background conditions were identified.

- Step 2 - The background data were evaluated for outliers per NYSDEC's request. The analyses resulted in a conservative background data set that excluded "high outliers" (censored background).

- Step 3 - The near-Site data were compared to background data using statistical methods.

- Step 4 - The near-Site and background data were screened using freshwater lowest effect levels (LELs) and severe effect levels (SELs).

- Step 5 - Sediment ranking was conducted for each sampling location.

6.1 Relevant Sediment Data

Relevant sediment data (Tables 3 and 4) from the combined dataset from 1997 to 2004 were used in the Phase I data evaluation. Although there are different sampling depths within this data set, all of the sediment data from the near-Site and upstream background area (as far upstream as Ossining, New York) are included in this evaluation. Exponent (in 1997) sampled the upper 2 inches as a representative interval for the aerobic, biologically active zone for most benthos and bottom-feeding fish, and to assess current (rather than historic) conditions. The Versar (2000-2001) sampling included the upper 1 inch. AMEC (in 2004) included the 2-inch interval for comparison with the Exponent data, plus two deeper intervals (2 to 6 inches and 6 to 12 inches).

Exponent (1997) study data are presented on Figures 6 through 9 in four segments. AMEC (2004) study data are presented on Figures 10 through 12 in three segments.

A statistical comparison of surface and subsurface sediment data from the AMEC investigation was conducted using a nonparametric analysis of variance. The Kruskal-Wallis (p-value) test statistic was used to analyze statistical differences amongst the population arithmetic means. P-values less than 0.05 were considered statistically different. This analysis did not indicate any significant differences between surface and subsurface samples (to 12 inches) for most of the constituents within the study area. The exceptions were antimony, arsenic, and cadmium, where the subsurface intervals exhibited significantly higher average concentrations than the surface interval.

There are also some differences in the data set regarding sediment type. Review of unpublished data from the NYSDEC Benthic Mapping Project (as well as sediment classification data from the Exponent, Versar and AMEC investigations) indicates that the study area (including background areas) is predominantly mud (soft silt and clay), sand, or a combination of the two. Since many chemical constituents have an affinity for organic carbon and organic matter represents a food source for benthic organisms, sediment type can have an influence on both constituent concentrations and habitat quality. For this assessment, the effects of sediment type were not considered.

6.2 Outlier Analysis

Previous discussions with NYSDEC regarding the Tarrytown sediment data resulted in the NYSDEC’s recommendation to review the background data to identify and remove potential outliers that may be biased high from the background data set. The following analysis was prepared in response to that recommendation, with the recognition that removal of outliers from the background data is very conservative because it removes area-specific background data that are reflective of non-site related upstream conditions, biasing the background data in favor of lower concentrations. Rather than removing data based on subjective opinion, the background data were systematically screened for the presence of potential statistical outliers. Statistical outliers are identified through some measure of extreme distance of anomalously high points from the central tendency and underlying distribution of a data set. The background data set was screened for high outliers (for PCBs, total PAHs, and individual metals) using the Outlier Identification option in the Statgraphics software package (Statgraphics®Plus, Version 5, 2000). The z-statistic based on the median absolute deviation (MAD) was used because it was the most sensitive to anomalous values, and therefore most likely to identify outliers. The MAD method measures the distance of a given point from a sample mean when the mean and standard deviation are based on the median absolute deviation of sample statistics with each individual point eliminated one at a time. Because it uses parametric statistics, this method requires normality in the data, and therefore some constituent data were log-transformed prior to analysis to satisfy that requirement. In instances where the data could not be statistically fit to either a normal or log-normal distribution, the closest fit was selected. If a sample was identified as an outlier for a particular constituent, the data for the particular constituent were removed from the dataset.

The results of the outlier analysis are provided in Table 4. For each constituent, the underlying distribution is provided if it was normally or log-normally distributed, along with the assumed distribution used in the outlier analysis. The resulting samples identified as outliers are also provided by constituent. Total PAHs and total PCBs were not included in the outlier analysis because not all samples were analyzed for these constituents. The result of the background outlier analysis identifies two samples for arsenic and barium, and one sample for manganese as outliers (Table 4). In total, four background sediment locations have metal-specific outliers that were removed from the data set (samples Versar 506, Versar 1087, T17A, and SED43).

6.3 Comparison to Background Concentrations

Sediment quality within the lower Hudson River has been affected by anthropogenic loadings of organic and inorganic constituents in storm water runoff and various urban and industrial wastewater discharges. For this reason, it is important to identify possible Site-related COPC levels relative to background conditions. The next step of the sediment screening process compares sediment COPC concentrations for near-Site and background sample populations using analysis of variance and comparison of arithmetic means (i.e., ANOVA, t-tests) to determine if a significant difference existed between sample populations. The sediment evaluation included both surface (0 to 2 inch) and subsurface (2 to 6 inch; 6 to 12 inch) sediment. As discussed in Step 2, background outliers (for metals) were conservatively removed from the comparative analysis.

Initially, the data from each sample population (i.e., near-Site and background) were plotted to determine data distributions and tested for normality using Lilliefor's and Shapiro-Wilk Quantile-Quantile (Q-Q) plots and histograms. Prior to evaluation of variance and arithmetic mean comparisons, log-normal data sets were transformed. Arithmetic means were compared using the Bonferroni and Least Significant Difference (LSD) t-test methodologies (alpha = 0.05). Non-parametric distributions were analyzed using Kruskal-Wallis one-way ANOVA test procedure (alpha = 0.05).

The t-tests compare the entire near-Site sediment data set to background concentrations (minus the outliers). A summary of the t-test comparison is presented below:

Constituent	Arithmetic Mean Concentration (mg/kg)		Near-Site Significantly Higher?
	Near-Site[1]	Background[2]	
Antimony	2.84	ND (3.22)	
Arsenic	9.63	8.25	
Barium	211	46.9	X
Cadmium	1.40	0.77	X
Chromium	56.9	40.7	X
Copper	64.7	39.6	X
Lead	95.6	41.9	X
Manganese	716	731	
Mercury	0.925	0.396	X
Nickel	27.9	25.5	X
Zinc	185	121	X
Total PCB	0.673	0.125	X
Total PAH	4.64	0.421	X

Notes:
1. Includes all near-Site sediment data.
2. Excludes background outliers.
ND = Not detected in any of the background samples.
X = Concentrations in near-Site sediment samples are significantly higher than background (alpha = 0.05).

The t-tests for comparison of arithmetic means for all near-Site data and background data (excluding the outliers) indicates that near-Site data are not significantly elevated for arsenic and manganese. Therefore, these metals are excluded as possible COPC for near-Site sediment. Similarly, the t-tests indicate that near-Site data for antimony is not significantly higher than background. However, the near-Site and background data sets are largely quantified using the detection limits, because antimony was non-detect in all of the background samples and detected infrequently (approximately 6%) in the near-Site samples. Reporting limits for antimony vary by study, and are generally higher for the background (Versar) and 1997 Exponent data. Given the relatively low frequency of detection near the Site, and the higher detection limits of the background data from Versar, antimony is excluded as a possible COPC.

PCBs in the Site vicinity were identified as significantly greater than background (maximum near-Site = 4.81 mg/kg; maximum background = 2.5). However, the potential for PCBs to have been discharged from the Site to the Hudson River is relatively low. PCBs have not been detected in historic Site fill, including the sediments that had been dredged from the Hudson and used to extend the shoreline to its current location. Site-wide groundwater sampling has not revealed the presence of PCBs. A limited number of minor spills associated with PCB containing fluids in electrical equipment and a few hydraulic systems occurred inside the former assembly plant buildings, but all residual contamination of building surfaces was removed or cleaned up prior to facility demolition. As such, these interior spills had no means to reach the Hudson River. Trace levels of PCBs (typically around 1 mg/kg) have been detected in recycled concrete aggregate produced during demolition of the former on-site buildings in 1998-1999. This aggregate was stockpiled and spread on a portion of the Site following facility demolition. The stockpile is situated within a bermed area, which prevents direct flow of stormwater runoff from the stockpile to the Hudson River. If stormwater discharge associated with the millings was a source of PCBs near the Site, it would be a relatively recent occurrence because the stockpile did not exist before 1998. The observed vertical distribution of PCBs in sediments, however, suggests that the deposition of trace PCBs in this area was not uniquely recent (since 1998), owing to the sustained vertical distribution of PCBs to 12 inches below the river bottom. The Tarrytown Harbor navigational channel, which is routinely subject to physical sediment disturbance from vessel traffic and maintenance dredging, may exert an influence on the areal extent and vertical distribution of all constituents near the Site, including PCBs. Regardless, because concentrations are elevated relative to background, PCBs are included in this evaluation.

PAHs are identified as significantly greater than background (maximum near-Site = 16.2 mg/kg; maximum background = 3.83 mg/kg). Storm water (including storm water from the Site) is expected to convey PAHs that are typically found in parking lot, roadway, and roof runoff. While it is understood that PAHs were not significant components of the process waste streams, they are expected to be ubiquitous in asphalt runoff from the entire urban watershed of Sleepy Hollow and Tarrytown. While

PAHs have been found in historical fill used to develop the Site prior to the 1960s, they have typically been found in many waterfront fill areas along the lower Hudson River. The proposed Ferry Landings Site in Tarrytown (near Exponent transect T04), also adjacent to the Tarrytown Navigational Channel, is the Site of a recent coal tar remediation project at an historic manufactured gas plant (MGP) site.. The project included the dredging of PAH-contaminated coal tars and sediments from the shoreline out into the harbor channel, soon after the AMEC sampling was completed in the summer of 2004. Other possible localized sources may include a heating oil storage facility and the former asphalt manufacturing facility (location of the historic MGP site) Both facilities have been regularly serviced by tankers or barges, indicating the possibility of historical spills in the harbor area. Stations SED1 and SED2 are closest to these facilities. Regardless, because concentrations are elevated relative to background, PAHs are included in this evaluation.

6.4 Comparison to NYSDEC Sediment Criteria

Sediment criteria from the NYSDEC (1999) Technical Guidance for Screening Contaminated Sediments were used to screen the near-Site data and the background data, including previously identified outlier samples, (Tables 2 and 3). Inorganic constituent concentrations were compared to the NYSDEC (1999) freshwater LELs and SELs. Total PCB and PAH concentrations were compared to the LELs and SELs provided in Persaud et al. (1993). This comparison was performed per NYSDEC (2005) direction to use freshwater sediment criteria values for this initial screening, which were subsequently used as the basis of the station ranking. Water quality data measured during 2004 sediment investigation, presented in Table 5 confirm that the study area is within the brackish water transition zone between freshwater and marine conditions. Data derived from the 2006 investigation are compared to saltwater sediment criteria in assessing bulk sediment chemistry.

It should be noted that according to NYSDEC (1999), these criteria do not necessarily represent the final concentrations that must be achieved through sediment remediation. Comprehensive sediment testing and risk management are necessary to establish when remediation is appropriate and what final contaminant concentrations the sediment remediation efforts should achieve (NYSDEC, 1999).

Both near-Site data (Table 2) and background data (Table 3) frequently exceed the freshwater screening values. Every sample (including all of the background samples) exceeds the LEL for at least one metal, and most samples exceed the LEL for multiple metals. In addition, several metals detected in near-Site sediment samples exceed the

SEL, and some metals in background samples (i.e., lead, mercury) also exceed the SELs. Given the high frequency of LEL exceedance in the background samples, and recognizing that one objective of the screening criteria comparison was to identify site-related areas where the concentrations (and possibly the sediment toxicity) may be greatest, SELs were used to identify possible sediment COPC for subsequent sample ranking. Using this method, those metals that are below the SEL for all near-Site sediment samples (and therefore are not considered COPC) are arsenic, cadmium, and nickel. Metals above the SEL and background (and considered COPC) are chromium, copper, lead, mercury and zinc.

With regard to organic constituents, concentrations of PCBs and PAHs were also generally greater than the LELs in near-Site data (and the background data for PCBs), but lower than SELs. As such, using the same approach used above for metals (i.e., use of SELs to select COPC because of the high frequency of LEL exceedance), PCBs and PAHs are not identified as COPC because concentrations are lower than the SELs. PCBs were reported at relatively low concentrations in both background (maximum = 2.5 mg/kg, in SED43B) and near-Site sediment samples (maximum = 4.81 mg/kg, in sample SED10C, which is a 6- to 12-inch sample within 10-feet of OF-1). Total PCB concentrations (both near-Site and background) exceed the LEL value of 0.07 mg/kg, but not the SEL of 5.3 mg/kg. The near-Site sediment data indicate that PCBs are detected most frequently in the near shore stations, and at stations near the Tarrytown Harbor navigation channel. Many of the samples collected from the offshore periphery of the study area (e.g., SED5, SED11, SED12, SED16, SED23, SED24, SED27, and SED28) were non-detect for PCBs.

Similarly, PAHs were reported at relatively low concentrations in both background (maximum = 3.83 mg/kg in SED43B) and near-Site sediment samples (maximum = 16.2 mg/kg, in sample SED5C, from the 6- to 12-inch depth interval collected approximately 1,100 feet offshore of OF-1). Although several near-Site sediment PAH concentrations exceed the LEL of 4.0 mg/kg, they are well below the SEL of 100 mg/kg.

A summary of Steps 3 and 4 (which leads to identification of final COPCs) is provided below.

Constituent	Maximum Near-Site Exceeds Screening Value	Final COPC[1]
Barium	No	No
Cadmium	No	No
Chromium	Yes	Yes
Copper	Yes	Yes
Lead	Yes	Yes
Mercury	Yes	Yes
Zinc	Yes	Yes
PAHs	No	No
PCBs	No	No

Note:
1. Final COPC are identified as those constituents with near-Site concentrations significantly greater than the appropriate screening value [i.e., NYSDEC (1999) SELs for metals and Persaud et al. (1990) SELs for PCBs and PAHs] [These COPCs are also significantly greater than background (Step 3)].

Based on the above evaluation (specifically Steps 3 and 4), it is apparent that near-Site concentrations of some inorganic constituents (chromium, copper, lead, mercury and zinc) exceed both background and screening values (SELs) and therefore, according to NYSDEC (1999) guidance, there is potential for these higher inorganic concentrations to be associated with adverse ecological effects (although there are uncertainties associated with the screening values as described in latter sections of this document). Unlike inorganic constituents, all PCB and PAH concentrations are below the SEL, indicating adverse effects are not likely for "the majority of sediment-dwelling organisms".

NYSDEC (1999) indicates that if screening criteria are exceeded then additional investigation is generally needed to determine the need for remedial action. To identify locations that could pose the greatest potential risk to benthic invertebrates, a sediment ranking approach has been employed (Step 5 below). This ranking approach focuses only on inorganic COPCs (specifically, chromium, copper, lead, mercury and zinc) that exceed SELs. Because no outliers exist in the background data set for these metals, as discussed previously, all data for these metals were ranked. PCBs, PAHs and inorganic constituents whose concentrations do not exceed SELs are not considered "final" COPCs and are not included in the ranking approach because they are present at a level where adverse effects are not likely for the majority of benthic organisms.

6.5 Sediment Ranking

The purpose of the sediment ranking is to identify those sample locations that exhibit the highest COPC levels relative to SELs and which therefore have the greatest potential to affect the benthic community. The methods used to rank locations are described below. A sediment ranking approach (or quotient approach) is used to identify which sample locations exhibit the highest metal concentrations relative to screening values. Each sediment metal COPC concentration is "normalized" to its respective screening value (e.g., SEL) using a quotient approach as described by Long et al. (1998). This approach has been documented in the scientific literature [(Hyland et al. (1999); Long and Morgan (1990); MacDonald et al. (2000); Ingersoll et al. (2002); Crane et al. (2002)] and has been applied at various sites across the country, including New York State (e.g., NYDEC, 2004; USEPA, 2005).

For each inorganic COPC, the ratio of the sample COPC concentration to the SEL is calculated, and these ratios are summed for all COPCs in each sample. As stated by Hyland et al. (1999), summed quotients provide measures of the cumulative magnitude of COPC levels relative to effect thresholds and can be used to rank and compare locations in terms of their potential toxicity to benthic organisms. In these evaluations, sample-specific summed quotients are assigned a ranking of low, moderate or high relative to background.

The following provides an example calculation using background sample SED40A:

COPC	COPC Concentration (mg/kg)	Severe Effect Level (mg/kg)	Ratio[1]
Chromium	32.2	110	0.29
Copper	19.2	110	0.18
Lead	16.9	110	0.15
Mercury	0.07	1.3	0.05
Zinc	96.3	270	0.36
		Sum[2] =	**1.03**

Notes:
1. Ratio of the COPC concentration to the SEL.
2. Sum of the individual ratios.

The cumulative site ranking for metals for both the near-Site and background data is presented in Table 6. These rankings are based on the fact that the highest sum for the background samples is approximately 6.0 (SED43B = 5.7), indicating that rankings above 6 may identify the priority areas of concern relative to background conditions.

Based on the spatial extent of the highest ranked stations for metals, areas of potential concern were identified. Stations outside of these areas have quotient sums that are comparable to background, or represent very isolated cases. The samples with the highest rankings (SED10B, SED10A, SED10C, and T07A) are found at the mouth of OF-1. Additional locations with the highest relative rankings occur offshore of OF-1 (one area encompassing offshore samples SED25 and SED21, and a second area encompassing SED1, SED6, SED7, and SED13). These potential areas of concern are separated from the Site shoreline by the Tarrytown Harbor navigation channel. This channel was last dredged in 2001 and has been reportedly dredged at a frequency of about once every 10-15 years as needed. Although these offshore stations are ranked in the same interval (greater than 6) as OF-1, the actual offshore sums are no higher than 9, compared with sums as high as 25 at OF-1.

Beyond these offshore areas are two isolated sample points ranked higher than 6.0. One of these points (SED34) located approximately 100-feet off the west side of the Site is completely surrounded by additional samples ranked equivalent to background, some within 20-30 feet from the higher ranking sample location. The second sample (T04C), located more than 2,000 feet downstream of the Site, is approximately 100 feet offshore of the former MGP site and near the entrance to the Tarrytown Marina. This sample point is also directly adjacent to samples ranked equivalent to background. As such, these represent isolated cases rather than priority areas of concern.

6.5.1 PCBs and PAHs

As stated above, PCBs and PAHs are not evaluated using the summed quotient approach because they are not considered COPCs as their concentrations do not exceed SELs. As such, PCB and PAH data are discussed qualitatively below.

Total PCB concentrations in all samples are below the SEL of 5.3 mg/kg (Table 2), ranging from non-detect to 4.81 mg/kg. The distribution of PCBs indicates that approximately 99% of the samples exhibited total PCBs <4 mg/kg, 97% <3 mg/kg, 93 % <2 mg/kg, and 80% <1 mg/kg. Samples in the top 3 percent bracket are SED10C (6-12 inches) at the mouth of OF-1, as well as SED36C (6-12 inches), and SED38 B (2-6 inches) at the upstream end of the near-Site area. However, lower total PCB concentrations (0.7-1.27 mg/kg) were observed in the surface (0-2-inch) interval at these three stations.

For total PAHs, concentrations in all samples were well below the SEL of 100 mg/kg (Table 2), ranging from non-detect to 16.2 mg/kg. The distribution of PAHs indicates that approximately 99% of the samples exhibited total PAHs <16 mg/kg, 97% <12 mg/kg, 85 % <8 mg/kg and 40% <4 mg/kg. Samples in the top 3% bracket are SED10B (2-6 inches) at the mouth of OF-1, SED5C (6-12 inches) approximately 1,000 feet offshore of OF-1, and SED30A (0-2 inches), upstream of OF-2 near the lighthouse. PAH concentrations on the order of 4 to 12 mg/kg are common throughout the near-Site area, including the majority of stations sampled within the Tarrytown Harbor.

6.6 Phase I Evaluation Summary

This screening-level evaluation has been conducted to identify constituents of potential concern, and prioritized areas for further evaluation. NYSDEC's Guidance for Screening Contaminated Sediments (NYSDEC 1999) provided a framework for this evaluation. Using that framework, a step-wise adaptation to the guidance was developed and implemented to address the unique aspects of the data distribution within this section of the Hudson River. The adaptation included use of SEL benchmarks for screening and prioritization, because the concentrations of metals observed in the near-Site and background areas are typically above the LEL, with a number of locations exhibiting one or metals above the SEL. A sediment ranking approach described by Long et al.(1999) was used to systematically identify and rank areas based on the degree (ratio) to which they exceed the SEL for one or more metals. Areas (contiguous stations) that rank higher than background stations were prioritized for further action. PCBs and PAHs were not added to the ratios developed for metals, because no samples exceeded freshwater SELs. Rather, the ranges and distributions of PCBs and PAHs were qualitatively evaluated.

The COPCs for the Site are identified based on a comparison of near-Site sediment data to screening values and statistical comparisons to background concentrations. The sediment evaluation presented in this memorandum identifies the primary inorganic sediment COPCs for the Site as chromium, copper, lead, mercury, and zinc. For metals, concentrations in both near-Site and background samples frequently exceed the lower generic sediment quality criteria (i.e., LEL). Given the frequency of LEL exceedance in background samples, SELs were used to identify COPCs. Chromium, copper, lead, mercury, and zinc are identified as COPCs for the near shore area of the Site based on elevated concentrations above background and exceedance of the SEL. However, with the exception of a few higher lead concentrations in the immediate vicinity of OF-1, most COPC concentrations were the same order of magnitude as the SEL. Sediment ranking techniques were used to identify locations of potential concern.

PCBs and PAHs have been detected in near-Site sediment samples at concentrations above background and LELs, but no areas have PCB or PAH levels above SELs, even at the mouth of Outfall OF-1.

Based on this analysis, the following conclusions are derived:

- The most pervasive chemical contaminants found throughout the tidal Hudson River, between Troy and Manhattan, are metals. Likewise, metals are by far the most pervasive constituent of concern observed in the sediment investigations conducted in the Site vicinity, including the background area. In addition to metals, sediments near the historically commercial/industrial waterfront in the Tarrytown Harbor area also exhibit levels of organic contaminants such as PCBs and PAHs that can be found in similar urban harbors.

- Most inorganic constituents detected in both background and Site data exceeded the lower LEL value, and those that exceeded the higher SEL, were only marginally greater than the SEL. Overall, stations at the mouth of Outfall OF-1 exhibit the highest relative rankings for metals. In fact, with the exceptions of lead at the mouth of Outfall OF-1, inorganic COPC concentrations were generally the same order of magnitude as the SEL.

- Potential areas of concern were identified based on comparison of near-site data to background concentrations and generic screening criteria, and the sediment ranking approach. These rankings do not necessarily indicate areas where impairment (e.g., impacts to benthic invertebrates) has occurred, but merely indicates areas with the highest potential for ecological risks within the study area.

- Areas ranked in the highest category (greater than 6) would be considered priority areas for an evaluation of potential impacts from metals, relative to the majority of rankings in near-Site areas (greater than 4.5 to 6), and background areas (less than or equal to 5.7). Areas of potential concern identified through this screening process do not represent areas of confirmed impact. Rather, these areas provide a general boundary within which the impact to benthic communities can be further assessed.

- PCBs and PAHs were found at levels less than SELs. The observed distribution of these constituents does not suggest any specific areas where significant adverse impacts to benthic communities from these constituents would be anticipated. The areas of potential concern prioritized by inorganic COPC ranking encompass the range of PAH and PCB concentrations in the near-Site area.

Based on the results of above evaluation and discussions with NYSDEC, a supplement (Phase II) site-specific sediment investigation was proposed to further assess potential impacts to the Hudson River, and to determine if there is evidence of significant benthic community impairment in the near-Site areas relative to background conditions. Data of Phase II investigation are presented in Section 7.

7. Phase II (2006) Sediment Investigation

Following the Phase I data evaluation, a supplemental (Phase II) sediment investigation was conducted by BBL. The scope of the study was based on the evaluation of previous (1997 through 2004) sediment data (described in Section 6) and discussions with NYSDEC. As part of these discussions, the list of COPCs was reduced to five metals (chromium, copper, lead, mercury, and zinc).

The specific objectives for the supplemental Phase II sediment investigation, as stated in the 2006 SSIWP (BBL, 2006), were as follows:

1. Evaluate potential Site-specific COPC-related toxicity to benthic organisms using the equilibrium partitioning sediment benchmark (ESB) approach, based on sediment and pore water chemistry [United States Environmental Protection Agency (USEPA), 2005a].

2. Evaluate whether benthic communities in near-Site areas of interest are significantly impaired relative to representative background locations, based on a benthic invertebrate survey and calculation of biological metrics.

3. Evaluate whether sediments in near-Site areas of interest are more toxic to representative benthic organisms than sediments from background locations, based on the findings of whole sediment bioassays.

4. Evaluate whether bivalves in near-Site sediments have bioaccumulated COPCs at significantly higher levels than those from background sediments.

5. Provide a general depositional profile of the near-Site area of interest and representative background areas through sediment aging techniques (geochronology).

6. Provide representative vertical concentration profile of COPCs in the near-Site area of interest, including the immediate vicinity of OF-1, and background areas.

7. Characterize the physical and geotechnical properties of sediments in the vicinity of former industrial outfall OF-1 to support design of an interim remedial measure (IRM) under consideration for this area.

The Phase II sampling was conducted in September and October 2006. Following is a description of the sampling locations, sampling methods, and analyses that were conducted. The results from the Phase II sampling are presented in Phase II data evaluation (Section 8).

7.1 Sampling Locations

In accordance to the NYSDEC-approved 2006 SSIWP (BBL, 2006), sediment samples were collected from 56 locations, including 29 near-Site stations and 11 background stations. Sixteen additional cores were collected in the vicinity of OF-1 for detailed COPC delineation and/or geotechnical characterization. The specific sampling areas (in reference to historical sampling locations) were as follows:

- At the mouth of OF-1, in the vicinity of historical locations SED10 and T07A;
- Off-shore of OF-1, in the vicinity of historical locations SED21 and SED25;
- Off-shore of OF-1, in the vicinity of historical locations SED1, SED6, SED7, and SED13;
- Near-Site Upstream – upstream of OF-3, in the vicinity of historical locations T11C, T12A, T12D, and T12E;
- Near-Site Downstream – downstream of OF-1, in the vicinity of historical locations T05E, T05I, T03B, and T03E; and
- Background – approximately 6,000 to 30,000 feet upstream of the Site, in the vicinity of historical locations 302, 306, 408, 504, 506, SED40, SED43, and T14D.

Sediment sampling locations were sequentially numbered from upstream to downstream. Stations SED100 through SED110 are background stations. Stations SED111 through SED139 are near-Site stations. Stations SED140 through SED155 are delineation stations near OF-1. Data from the delineation stations are treated separately and excluded from the background and near-Site data comparisons. The OF-1 area is represented by near-Site station SED126 for all data comparisons.

Three deep coring locations were field-adjusted from their proposed locations to avoid the cable right-of-way as follows:

- Proposed coring location of SED130 was adjusted to the location of SED127 which is approximately 380 feet north-northwest of SED130.

- Proposed coring location of SED137 was adjusted to the location of SED138 which is approximately 1,020 feet south-southwest of SED137.

- Proposed coring location of SED132 was adjusted to the location of SED128 which is approximately 470 feet northeast of SED132.

Additional adjustments of the locations were made due to the inability to collect sediment samples from certain locations. These adjustments are as follows:

- Proposed location SED136 could not be sampled because the water was too deep (29 feet). This station was relocated easterly to shallower waters.

- Proposed location SED120 was located on an oyster reef, and sediment recovery was insufficient for sampling. This station was relocated twice, in a northerly direction, until sediment recovery and sampling was feasible.

Actual sediment sampling locations are presented on Figure 4 (background) and Figure 5 (near-Site). The OF-1 area core sample locations are also shown on Figure 5.

7.2 Sampling Methods

Sediment sampling activities were performed in accordance with the 2006 SSIWP (BBL, 2006c). Sediment samples were collected from a pontoon boat, using the appropriate sampling equipment specific to each task. Multiple samples and/or sample types taken at the same station were obtained within a few feet of one another to obtain co-located sub-samples or duplicate samples for each station. At each location, several types of sediment samples were collected.

Surficial sediment was collected using a Ponar dredge. Several grabs were collected from the same location, and the dredge contents were homogenized in a stainless steel bowl. Subsamples of the resulting sediment were used for the metals analyses and sediment toxicity tests. If bivalves were present they were retained for biological tissue analysis.

Sediment samples for the ESB parameter analyses were collected using 3-inch ID Lexan® tubing mounted to a push-core sampler. These samples included a minimum of two surficial core samples (0 to 6 inches) for pore water analyses and two core samples (0 to 6 inches) for AVS/SEM and TOC. Individual cores were combined in the laboratory to provide sufficient sample volume for one analysis per station.

The benthic invertebrate community samples were also collected using a Ponar dredge, in a manner consistent with the NYSDEC (2002) Quality Assurance Work Plan for Biological Monitoring in New York State. Sediment grab samples were collected in triplicate at each of 29 near-site stations and 11 background stations. The sediment from each grab was sieved (standard U.S. No. 30) and the sieve contents were placed in plastic jars and preserved with 70% isopropyl alcohol. Water quality measurements were also recorded at each station, and included measurement of DO, water temperature, salinity, ORP, pH, conductivity, and turbidity. Water velocity was also measured. Physical descriptions of the sediment were recorded for each grab sample.

Bivalve tissue samples were collected at the request of NYSDEC to evaluate the potential for bioaccumulation of COPC from sediment. Seventeen bivalve tissue samples were collected from the Hudson River, including 7 samples from background (reference) locations and 10 samples (including one replicate) from near-Site locations. The bivalve samples were collected by removing live specimens of bivalves (Rangia cuneata) from sediment samples that were collected as part of the sediment investigation, and by performing supplemental sediment collection looking specifically for bivalves. Originally, the 2006 SSIWP proposed the collection of bivalve tissue samples from 10 near-Site locations and 10 background locations, subject to availability of bivalves. Because bivalves were not encountered at many proposed locations following a reasonable level of effort, some bivalve samples were collected from alternate locations (Table 1).

The sediment cores were collected using vibracoring equipment. The lengths of the cores recovered ranged from 1 to 9 feet depending on field conditions. The sediment cores were sectioned into 2-inch increments in the uppermost foot, and into 4-inch intervals from the 1-foot depth to the bottom of the core. The exception was core SED126, which encountered refusal at approximately 16 inches and top one foot (six 2-inch increments) of sediment was retained for laboratory analyses.

Copies of 2006 sediment sampling field logs are provided in Appendix B.

7.3 Analyses - Surface Sediment

The surficial (0 to 6 inch) sediment samples were analyzed for sediment chemistry, bioavailability parameters (SEM, AVS, TOC, and pore water), laboratory bioassay, invertebrate community, and bivalve tissue sampling.

Sediment Chemistry

The bulk sediment chemistry samples were analyzed for chromium, copper, lead, mercury, and zinc. The analyses were performed by CAS in Rochester, New York.

Sediment SEM, AVS, TOC and Pore Water

Surficial bulk sediment samples were analyzed for AVS, SEM, and TOC. Pore water samples were collected from the same locations as the bulk sediment samples. Pore water was extracted from sediment by double centrifuge, without filtration, in a nitrogen atmosphere glove box at CAS, Kelso, Washington. Preserved pore water extracts were returned to CAS for analyses of COPCs (chromium, copper, lead, mercury, and zinc), and non-preserved aliquots of each pore water extract were shipped in coolers at 4^oC to CAS for analysis of soluble (dissolved) organic carbon, pH and hardness.

Sediment Physical Characterization

Sediment samples from all Ponar dredges performed for bulk sediment chemistry and biological sampling were measured for grain size distribution by EMCON-OWT, Inc., (a subcontractor of CAS).

Benthic Invertebrate Community

The benthic community samples were submitted to Aquatec Biological in Willston, Vermont for taxonomic identification. The samples were picked to remove organisms using a magnifying lens, and the macroinvertebrates were counted and identified to the lowest practical taxonomic level (typically species-level). In instances when there were more than 100 organisms, the taxonomy laboratory randomly selected a 100-organism sub-sample for taxonomic identification. The remaining organisms in the sample were counted, and the total taxonomic counts for the sub-sample were adjusted by the proportion of the total number of specimens to represent a comparable count for the entire sample. For example, if a sample contained a total of 300 organisms, and 4 polychaete worms were identified in the 100-organism sub-sample, then the total sample count would be adjusted to reflect 12 polychaete worms. Eight of the samples were re-picked for quality assurance, and yielded a picking efficiency of approximately 95 percent.

Sediment Toxicity

Sediment from each of the 29 near-Site locations and 11 background locations were submitted for 28-day bioassays using a marine amphipod (Leptocheirus plumulosus). The tests were conducted by EnviroSystems Inc. of Hampton, New Hampshire. The sediment tests were conducted using the protocols established by USEPA (2001) Methods for Assessing the Chronic Toxicity of Marine and Estuarine Sediment-Associated Contaminants with the Amphipod Leptocheirus plumolosus. Eight replicates were performed for each sample.

Bivalve Tissue

The bivalves were submitted whole to CAS for tissue removal and analyses of COPCs (chromium, copper, lead, mercury, and zinc).

7.4 Analyses - Subsurface Sediment

The subsurface sediment samples were analyzed for sediment chemistry, geochronology, and geotechnical analyses.

Sediment Chemistry

Sediment cores were collected from 7 near-Site locations (including station SED126 at OF-1), 3 background locations, and 13 locations in the vicinity of OF-1. Each core (up to 10 feet) was sectioned into 1-foot (near-Site and background) or 2-foot (OF-1) intervals and submitted to CAS for analyses of chromium, copper, lead, mercury, and zinc.

Sediment Geochronology

Deeper core sampling was conducted for geochronology profiles to determine the deposition rates of representative near-Site and background areas. The geochronology evaluation was conducted by analyzing sections of sediment cores for specific radioisotopes. The occurrence of these isotopes can be used to determine the approximate age and deposition rates of the sediment. The sediment samples were submitted to Geonuclear, Inc. in Orangeburg, New York for radiological chronology analyses. Analysis of specific intervals was performed at the discretion of Geonuclear's analyst. The radiological spectral analyses were performed by Environmental Inc. Midwest Laboratory in Northbrook, Illinois, a subcontractor of Geonuclear Inc.

Geotechnical Analyses

For geotechnical characteristics near OF-1, three sediment cores (SED147, SED149 and SED150) were collected within the deep chemistry grid established at OF-1 (Figure 5). The cores extended to a depth of approximately 10 feet or refusal (e.g., SED147 was a short core due to refusal at 10 inches). Core SED149 was sectioned into 2-foot undisturbed samples for one dimensional consolidation testing and bulk density determination. SED149 served as a replacement for SED148, which was planned closer to OF-1, but could not be advanced due to refusal at less than 1-foot. SED-149 also served to provide deep geotechnical data planned at SED147, and was analyzed for water content, bulk density, specific gravity, Atterberg limits, grain size with hydrometer, and consolidation (single drainage and load response).

A matrix summarizing the type of samples collected at each station during 2006 study is provided in Table 7.

7.5 Quality Assurance/Quality Control

Quality assurance/quality control procedures were implemented during the 2006 study and were carried out in accordance with the 2006 SSIWP (BBL, 2006c). QA/QC activities for field sampling, laboratory analysis and data evaluation are described below.

7.5.1 Field QA/QC

Field sampling activities were performed following standard operating procedures as described in the 2006 SSIWP (BBL, 2006c). The field instruments used for measuring field water quality parameters such as salinity, temperature, conductivity, dissolved oxygen, and pH were calibrated in accordance with the manufacturers' specifications and checked on a daily basis. Field QA/QC samples were collected and described as follows:

- Field duplicates were used to assess consistency of sampling methods, sample homogeneity, and precision of laboratory analytical procedures. Field duplicates for sediment or pore water were collected at a frequency of 10% of the total number of samples collected per matrix. Duplicate samples were submitted for laboratory analyses for the same chemical parameters as the parent samples.

- Equipment (rinsate) blanks were collected only in cases where non-dedicated sampling devices were used for sample acquisition. Equipment blanks were prepared by pouring analyte-free water over decontaminated sampling equipment to verify that the decontamination procedure had been adequately carried out and that there was no cross-contamination of samples occurring due to the equipment itself. Equipment blanks were collected at a frequency of 5% of the total number of samples collected with non-dedicated sampling device and submitted for laboratory analyses for the same analytical (chemical) parameters as that of those samples collected using the equipment.

- MS/MSD samples were used to assess the accuracy and precision of laboratory methods. MS/MSD samples were prepared by spiking the samples with known quantities of target analytes at the laboratory prior to undergoing the analysis. MS/MSD samples were prepared at a frequency of 5% of the total number of samples collected per matrix.

Field duplicate results are presented with the primary sample results in the data tables (Section 8). Results of equipment blanks and MS/MSD are presented within the laboratory reports submitted to the NYSDEC separately.

7.5.2 Laboratory QA/QC

Sample analyses and method QA/QC procedures were performed by the laboratories in accordance with the requirements of appropriate analytical methods described in the 2006 SSIWP (BBL, 2006c).

7.5.3 Laboratory Data QA/QC

Laboratory analytical data for the Phase II data set were evaluated and validated by Conestoga-Rovers & Associates (CRA). The results of the chemistry data validation are documented in the DUSRs prepared for each sample delivery group in accordance with the Guidance for Development of Data Usability Summary Reports (NYSDEC, 2002). The primary objective of the DUSR is to determine whether or not the data, as presented, meet the project-specific criteria for data quality and data use. The DUSRs confirm that the data-quality objectives outlined in the 2006 SSIWP were met, and provide the final validated laboratory data tables for all samples. All analytical data included in the RI Report reflect the validated data including any adjustments, if applicable, based on the DUSRs. The DUSRs produced associated with this sediment investigation are provided to the NYSDEC under separate cover.

8. Evaluation of the Phase II Sediment Data

This section presents data collected during 2006 (Phase II) sediment investigation and evaluation of biological impacts with all relevant data sets using a weight-of-evidence approach.

As described in Section 7, the 2006 sediment investigation integrated bulk sediment chemistry with sediment toxicity benchmark and bioaccumulation parameters, whole sediment toxicity testing, and benthic community assessment throughout the background and near-Site study areas. Data of chemistry, geochronology and physical/geotechnical characterization were also collected in the vicinity of OF-1 to assist in the evaluation of need for remedial action. 2006 study surface sediment data and sampling locations are presented on Figures 13 through 16 in four segments.

8.1 Surface Sediment Chemistry Data

Surficial (0-6 inches) sediment COPC data from 29 near-site locations and 11 background locations are presented in Table 8 (near-Site) and Table 9 (background). At near-Site locations, COPC concentrations ranged from 13.8 to 148 mg/kg for chromium, 9.3 to 152 mg/kg for copper, 10.2 to 1,520 mg/kg for lead, non-detect to 2.6 mg/kg for mercury, and 43.1 to 1,260 mg/kg for zinc (Table 8). Sediment sample SED126, located in the immediate vicinity of OF-1, exhibited some of the highest COPC concentrations (i.e., for chromium, lead, and zinc).

For background locations, chromium, copper, lead, and zinc were detected in each of the 11 sediment locations (Table 9). Mercury was detected in 9 of the sample locations. COPC concentrations ranged from 8.4 to 89.4 mg/kg for chromium, 8.3 to 75.1 mg/kg for copper, 6.3 to 87.2 mg/kg for lead, non-detect to 0.99 mg/kg for mercury, and 28.7 to 205 mg/kg for zinc.

8.2 Background Evaluation

Background screening levels (BSLs) were calculated for each COPC using the 2006 data from sample stations SED100 through SED110. The BSLs are intended to represent ambient background conditions in which constituents may be present due to anthropogenic inputs unrelated to Site activities. Consistent with USEPA guidance for establishing BSLs (USEPA, 1989; 1992; 1998a; 1998b) the statistical methods are based on an upper confidence interval for an upper percentile, otherwise referred to as an upper tolerance limit or UTL. The BSLs represent estimates of the 99 percent upper confidence limit for the 95th percentile, or a 99/95 UTL. Various parametric and non-parametric methods for calculating UTLs are recommended by USEPA and generally depend on the statistical distribution of the data and the sample size. The data for chromium, copper, mercury, and zinc were generally consistent with normal distributions, and lead was consistent with a lognormal distribution.

The BSLs and corresponding statistical methods applicable to each data set are summarized in Table C-1 (Appendix C). BSLs for chromium, copper, mercury, and zinc are based on the normal distribution. With the small sample sizes (n=11), the BSLs for these metals exceed the maximum concentration by a factor of approximately 3 to 4. While it is not uncommon for a UTL to exceed the maximum, it is important to recognize that this extrapolation introduces a source of uncertainty when comparing the BSL to Site data.

The BSL for lead data (which were lognormally distributed) was non-parametric, and is considered to be more indicative of background concentrations because the lognormal BSL is nearly an order of magnitude greater than the maximum. The non-parametric BSL is determined by a discrete sample from the data set. The appropriate rank-ordered sample is determined based on the sample size required to achieve the desired coverage. To represent a 99/95 UTL, any data set with less than n=127 samples will require the use of the maximum concentration to estimate a BSL. Accordingly, for lead (n=11), the maximum value is selected and will provide 91% coverage of the data on average.

Near-site surficial sediment COPC data from 29 stations were compared to BSLs, as summarized in Table C-2 (Appendix C). Concentrations for COPCs at the following near-Site locations were observed to be greater than the BSLs:

- Chromium – SED126;
- Copper – SED123, SED125, SED126, SED130, SED132, and SED136;
- Lead - SED117, SED121, SED123, SED125, SED126, SED130, SED131, SED132, SED133, and SED136;
- Mercury – SED123, SED131, SED132, SED134; and
- Zinc – SED126.

8.3 Surface Sediment Toxicity Benchmark Data

A primary objective of the 2006 Phase II investigation was to evaluate site-specific factors that influence the bioavailability and subsequent toxicity of metals in the bulk sediments. The USEPA's Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (USEPA, 2005b) concludes, based upon years of study, that "(c)oncentrations of bulk (total dry weight basis) metals in sediment alone are typically not good measures of metal toxicity" (Page 2-6). To address this problem the USEPA has finalized guidance for estimating metal toxicity based on the site-specific bioavailable metal fraction (Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixture: USEPA, 2005a). This bioavailable fraction is measured directly in pore water and/or predicted based on the relative sediment concentrations of AVS, SEM (cadmium, copper, lead, nickel, silver, and zinc), and TOC. Both AVS and TOC are capable of sequestering and immobilizing a range of metals in sediment, thus rendering them non-toxic.

Consistent with the USEPA approach, the Phase II investigation included the following: 1) evaluation of the relative concentrations of SEM to AVS and TOC, which provide a basis for evaluating the capacity of sediments to bind metals and render them non-toxic; and 2) direct measurement of metal concentrations in sediment pore water and comparison of those concentrations to NYSDEC and USEPA water quality criteria for protection of aquatic life.

8.3.1 AVS/SEM, and TOC Data

The ESB assessment included measurements of AVS, SEM, and TOC in bulk sediments from the same stations and depth interval as the surficial bulk sediment chemistry. The SEM, AVS, and TOC data are presented in Table 8 (near-Site) and Table 9 (background). The data were evaluated using the following methods developed by USEPA (2005a):

- Sediment in which (SEM – AVS)/f_{oc} < 130 µmoles/goc should pose no risk of adverse biological effects (e.g. toxicity not predicted) due to cadmium, copper, lead, nickel, and zinc.

- Sediment in which (SEM – AVS)/ f_{oc} >130 umols/goc < 3,000 µmols/goc fall in the uncertain range and may require further Site-specific studies to resolve potential toxicity. due to cadmium, copper, lead, nickel or zinc.

- Sediment in which (SEM – AVS)/ f_{oc} > 3,000 µmols/goc will likely result in adverse biological effects (toxicity predicted) due to cadmium, copper, lead, nickel or zinc.

Calculation of the (∑SEM – AVS)/f_{oc} benchmark values requires measurable levels of AVS and TOC. In this data set, AVS was lower than MDLs at 9 of 11 background stations and 4 of 29 near-Site stations. Where AVS was below the MDL, benchmarks were developed by estimating AVS at one-half the MDL. AVS levels are the highest in the near-Site area, and decline with distance upstream of the Site as the River transitions from moderately saline to near freshwater conditions.

The (∑SEM – AVS)/f_{oc} values for the near-Site samples ranged from less than zero to 2,189 µmoles/g_{oc}. All but one of the sediment samples were below the USEPA lowest benchmark of 130 µmoles/g_{oc}. The (∑SEM – AVS)/f_{oc} values for the background samples ranged from less than zero to 39 µmoles/g_{oc}. Consistent with USEPA guidance, sediment conditions should pose no risk of adverse biological effects to the benthic environment due to SEM metals (i.e., cadmium, copper, lead, nickel, and zinc). The only sediment sample which exceeded 130 µmoles/g_{oc} was sample SED126 (2,189 µmoles/g_{oc}); however, this sample was below the upper benchmark of 3,000 µmoles/g_{oc}. According to USEPA guidance, values between 130 µmoles/g_{oc} and 3,000 µmoles/g_{oc} fall in a range of uncertainty in which the potential for metal toxicity is resolved with additional site-specific data.

The uncertainty regarding SED126 is further evaluated (in subsequent sections of this report) based on additional site-specific lines of evidence, including pore water data, sediment toxicity testing, and benthic macroinvertebrate survey data.

8.3.2 Pore Water Data

Sediment pore water samples were collected as an additional line of evidence that compliments the sediment ESBs based on AVS, SEM and TOC. The pore water data are presented in Table 10 (near-Site) and Table 11 (background). The pore water data were evaluated based on comparison to background (using BSLs) and comparison to water quality standards.

For the background comparison, BSLs were calculated for each COPC using the data from the nine background stations that yielded adequate pore water for analysis. The BSLs represent ambient background conditions in which constituents may be present due to anthropogenic inputs unrelated to Site activities. The BSLs and corresponding statistical methods applicable to each pore water COPC data set are summarized in Table C-3 (Appendix C). Pore-water BSLs for chromium and copper are based on the normal distribution.

Near-site surficial sediment COPC data from 27 stations were compared to initial BSLs (Table C-4). Concentrations for COPCs at the following near-Site locations are observed to be greater than the BSLs: chromium (SED132 and SED134), copper (SED134), lead (SED114 and SED134), and zinc (SED134).

The pore water results were further evaluated by comparing the data to water quality standards. The Hudson River segment encompassing the near-Site and background study area is classified as Saline Class B waters (SB) in accordance with 6NYCRR Part 864 (Section 864.6 Table 1, Item 2). However, the Site study area exhibits tidally influenced salinities that fall between fresh (< 1 part per thousand [ppt]) and saltwater (> 10 ppt), as defined by EPA (2002). Ten of the 11 near-site locations sampled in September-October 2006 had water column salinities of 5 or 6 ppt. The near-Site reach of the Hudson River is a gaining river (i.e., fresh groundwater flows towards the river), which can drive interstitial water salinities lower than water column salinities. Therefore, aquatic life in this portion of the river includes both freshwater and marine species, and it is appropriate to compare sediment pore water data to both freshwater and marine standards.

A summary of the pore water data and comparison to water quality criteria for protection of aquatic life is presented in Table 12. All concentrations of COPCs detected are below the applicable New York State freshwater criteria. Only one sample of pore water (SED134) marginally exceeds the USEPA freshwater CCC for lead. SED134 is the only sample that exceeds saltwater criteria for lead (both New York State and USEPA). Pore water copper concentrations for all near-Site and background stations were greater than both the New York State and USEPA saltwater criteria. Chromium, mercury, and zinc for near-Site and background pore water were either non-detect or below water quality criteria.

The potential significance of the pore water data relative to water quality criteria or standards is evaluated further based on additional site-specific lines of evidence, including sediment toxicity testing and benthic macroinvertebrate survey data.

8.4 Bulk Sediment Toxicity Testing

Bulk sediment toxicity tests were conducted as part of the Phase II sediment investigation, based on a request by NYSDEC. The sediment toxicity tests were 28-day bioassays using a marine amphipod (Leptocheirus plumulosus), with eight replicates per sample. The endpoints measured in the study were percent survival, growth, and reproduction.

The percent survival, growth, and reproduction data from the sediment toxicity testing is presented in Table 13, and summaries of the test results are presented in Figure 17 (percent survival), Figure 18 (growth), Figure 19 (reproduction, juveniles per amphipod), and Figure 20 (reproduction, offspring per female).

The mean survival for the 11 reference locations ranged from 43% (SED109) to 91% (SED102), and for the 28 near-Site locations the mean survival ranged from 68% (SED133) to 91% (SED131). For reference locations, amphipod growth, measured as mean dry body mass at the end of the bioassay ranged from 0.38 mg (SED109) to 1.58 mg (SED100). The mean dry body weight for near-Site bioassay test organisms ranged from 0.41 mg (SED111) to 1.45 mg (SED119). In measuring reproduction for reference site locations, the mean number of juveniles per amphipod ranged from 0.06 (SED108) to 1.77 (SED104), and the mean number of offspring per female ranged from 0.17 (SED108) to 3.74 (SED104). For near-Site locations the mean number of juveniles per amphipod ranged from 0.09 (SED114) to 1.55 (SED119), and the mean number of offspring per female ranged from 0.24 (SED114) to 3.36 (SED119).

The results from the sediment toxicity bioassays were evaluated by developing site-specific tolerance limits using the bioassay results from the reference sediment samples, using the methodology described by Hunt et al. (2001). The tolerance limit is a conservative benchmark based on a 95% confidence limit placed on a lower 10th percentile of the data. The tolerance limit represents the lowest performing 10% of reference data. The data's probability distribution (i.e. parametric vs. non-parametric) dictates the most appropriate method for calculating the 95% confidence interval (Hunt et al. 2001). Likewise, outliers can skew the data which can lead to an under- or over-estimation of the tolerance value. When outliers are detected, the tolerance limits should be developed from the dataset with and without the outliers (Hunt et al. 2001). Therefore, probability distribution and outlier tests were performed on the survival, growth, and reproduction datasets prior to developing threshold values. ProUCL 4.0 software was used to perform the distribution testing on the data. The distribution of the data was determined with Q-Q plots and statistical tests (Shapiro-Wilk Test).

Because the datasets were parametrically distributed and were assumed not to contain any temporal or spatial biases, the generalized tolerance limit formula described in Hunt et al. (2001) was used to calculate tolerance limits (Equation 1):

Equation 1: $$L_{p,\alpha} = \overline{X} - K_{p,\alpha} S$$

Where:

$L_{p,\alpha}$ = Lower one-sided parametric tolerance limit

$\overline{X}$ = Arithmetic mean

$K_{p,\alpha}$ = Factor for calculating 100(1-α)% Confidence limits on the pth quantile of a normal distribution

S = Standard deviation

8.4.1 Survival Tolerance Limit

Results from the reference area bioassays showed relatively high survival of the test organisms, and generally exceeded 70% survival. Reference site SED109 had a mean survival of 43%, and an outlier analysis (using a Dixon test) indicated that the survival rate for SED109 was a statistically significant outlier (p<0.01). Therefore tolerance values were calculated two ways: with SED109 and with SED109 omitted. It is important to note that survival rate from SED109 is a valid response for reference sediment.

The survival dataset with SED109 (n=11) showed a lognormal distribution, and the mean survival dataset without SED109 (n=10) was normally distributed. The tolerance limit values and summary statistics on the two data sets are presented in Table 14. The tolerance limit for all samples is 58.5%, and the tolerance limit for the dataset without sample SED109 is 76.1%. Of the near-Site data set, only three samples (SED133 = 68.5%, SED136 = 70% and SED132 = 75.6%) had a mean survival less than 76.1%. Two reference (background) stations also had survival below the 76.1% tolerance limit (SED107 = 73.8 % and SED109 = 43%).

Given the uncertainty in what may have caused the reduced survival observed in SED109, a less conservative but appropriate representation of the ambient conditions affecting amphipod survival within the study area is a tolerance limit of 58.5%. Using this tolerance limit all of the near-Site samples fall within the range of survival that can be considered background.

8.4.2 Growth Tolerance Limit

The Dixon outlier analysis conducted on the mean growth dataset concluded that no sample location was a statistically significant outlier, and based on the analyses none of the data points were excluded to develop a growth tolerance limit. The growth dataset was normally distributed.

The growth tolerance limit and summary statistics on the data sets are presented in Table 14. A tolerance limit for growth was estimated at 0.377 mg. Growth measurements for all of the near-Site samples were above the tolerance limit.

8.4.3 Reproduction Tolerance Limit

The endpoints for reproduction were observations of the number of juveniles per amphipod and the number of offspring per female. The Dixon outlier analysis conducted on the two endpoints concluded that no sample location was a statistically significant outlier, and based on the analyses none of the data points were excluded to develop reproduction tolerance limits. Both reproduction datasets were lognormally distributed.

The reproduction tolerance limits and summary statistics on the data sets are presented in Table 14. A tolerance limit for juveniles per amphipod was estimated at 0.064, and a tolerance limit for offspring per female was estimated at 0.158. Measurements of both reproduction endpoints for all of the near-Site samples were above the tolerance limits.

8.5 Benthic Macroinvertebrate Community Assessment

A benthic macroinvertebrate community assessment was conducted as part of the Phase II sediment investigation. The purpose of the study was to evaluate whether benthic communities in near-Site areas of interest are significantly impaired relative to representative background locations, based on a benthic invertebrate survey and calculation of biological metrics.

The species counts from the benthic community data are presented in Table 15. The data indicate a large degree of variability in the number and types of organisms that are present. The organisms that were identified in the grab samples include marine species such as the Eastern oyster (Crassostrea virginica) and the ribbed mussel (Geukensia demissa), and freshwater species such as midges (e.g., Clinotanypus sp.).

Benthic community metrics were also calculated to aid in interpretation of the community data. Metrics are various attributes of the benthic assemblage that change in some predictable way with increased sediment contamination. A list of possible metrics applicable to the Hudson River was provided in the Versar (2003) Hudson River Estuary Biocriteria Report that was prepared for the NYSDEC. The Versar (2003) report includes Margalef species richness, percent abundance of epifauna, number of infauna species, number of polychaete species; and abundance of suspension feeders ($\#/m^2$). An additional metric (Shannon-Wiener Index of Diversity), was also calculated. Due to the variability in the individual grabs from the same station, the invertebrate counts from each grab sample were combined for each station.

Species characteristics (e.g., feeding categories, faunal classification) that were used to calculate metric values are presented in Table 16. A summary of the benthic community metrics for each sample is presented in Table 17. Water quality data collected during sampling activities are summarized in Table 18.

Total organism counts (Figure 21) ranged from a total of 50 organisms per sample (SED108, a background sample) to almost 2,000 organisms per sample (SED101, also a background sample). In general, the variability within the total organism counts among replicates and among stations indicates a spotty distribution of the benthic community that varies widely throughout the river bottom, regardless of COPC concentration. For example, at background location SED109, the total number of organisms ranged from 357 organisms (replicate BBR1) to 16 organisms (replicate BBR3). However, these replicate grab samples were collected immediately adjacent to each other. The samples with the highest total organism counts (over 800 organisms total) were all upstream background samples (SED-100,SED-101, SED-102, and SED-103). The uniquely higher counts at the three most abundant organism locations (SED 101 through 103) are primarily attributed to the abundance of juvenile molluscs (Macoma sp.) that were present within these three locations. The abundance of these juvenile bivalves was likely a factor of favorable habitat at these locations. However, the benthic organism counts for the remaining background samples (SED 104 through 109) were comparable to the near-Site stations.

The values for the other biological metrics are also variable and indicate no overall differences between near-Site stations and background (reference) stations. The Margalef species richness is used to evaluate the overall richness (abundance and diversity) of the benthic community. The species richness values for the near-Site stations are at or above the background values (Figure 22). The abundance of epifauna is a measure of the proportion of organisms that live on the sediment interface. The values for abundance of epifauna within near-Site locations are similar to background (Figure 23). The number of infauna species is a measure of the number of different types of organisms that reside within the sediment. The numbers of infauna species within near-Site locations are similar to background (Figure 24). The number of polychaete species is a metric that measures the diversity of a particular class of annelid worms. The numbers of polychaete species within near-Site locations is similar and often higher than background (Figure 25). The abundance of suspension feeders is a measure of the total number of organisms that derive their food source by filtering the water column. The abundance of suspension feeders within near-Site locations are within the range observed at background locations (Figure 26). The Shannon-Wiener Diversity Index is used to measure diversity and evenness within the benthic community. The diversity values for near-Site locations are similar and often higher (greater diversity) than background (Figure 27).

Collectively, the data from the benthic macroinvertebrate community assessment indicate a spotty distribution of the benthic community that varies widely throughout the river bottom, regardless of COPC concentration. Excluding uniquely high juvenile mollusc abundance in the furthest upstream stations, the overall benthic macroinvertebrate indices observed at the near-Site stations are comparable to those observed at the background stations.

8.6 Bivalve Tissue

Bivalve tissue samples were collected to assess whether COPCs in near-Site and background sediments have bioaccumulated in a representative benthic organism, based on whole body tissue analysis. Seventeen bivalve tissue samples were collected from the Hudson River, including 7 samples from background (reference) locations and 10 samples (including one replicate) from near-Site locations.

The bivalve tissue data for both near-Site and background stations are presented in Table 19 and Figure 28. Lead and mercury were not detected in any of the near-Site locations. Chromium was detected at one background location (SED101 = 0.99 mg/kg) and two near-Site locations (SED129 = 1.2 mg/kg, and SED133 = 1.1 mg/kg). Copper was detected in each of the background samples (with concentrations ranging from 2.1 to 4.6 mg/kg) and six of the near-Site locations (with concentrations ranging from 2 to 4.4 mg/kg). Zinc was detected in all of the background samples (9.9 to 15.1 mg/kg) and all of the near-Site locations (8 to 15.3 mg/kg). Lead and mercury were not detected in any of the background samples or the near-Site samples.

These results indicate that COPC concentrations in bivalve tissues from near-Site areas are not elevated in comparison to bivalves from background (reference) locations.

8.7 Weight of Evidence Evaluation

The site-specific measurements of sediment toxicity were evaluated through a sediment quality triad (SQT) approach. The SQT approach includes co-located measurements of: 1) sediment chemistry and bioavailability, 2) sediment toxicity, and 3) benthic macroinvertebrate community structure. Collectively, these data are used to identify potential risks related to sediment-associated COPCs.

The SQT approach integrates environmental chemistry, biological observation, and biological experimentation to determine pollution-induced degradation of sediment (Chapman et al., 1987). The SQT incorporates both laboratory studies (i.e., measurement of chemical concentrations, sediment toxicity testing) and field validation (i.e., benthic community survey) to develop a weight-of-evidence approach and draws conclusions based upon separate lines of evidence (Suter, 1993). According to the USEPA (1992), the SQT provides a comprehensive approach to in-place sediment control because it allows for an assessment of potential interactions between chemicals and the environment, and includes the potential toxic effects of both measured and unmeasured chemicals.

Several lines of evidence were evaluated for the near-Site areas of the Hudson River. The data collected to evaluate these lines of evidence include measures of COPC metals in bulk sediment, pore water, and biota, calculation of ESB based on SEM, AVS and organic carbon in sediments, comparisons of pore water concentrations of COPCs against NYSDEC and USEPA water quality criteria, assessment of survival, growth, and reproduction from 28-day sediment toxicity tests with L. plumulosus, and evaluation of observed benthic macroinvertebrate community characteristics. Collectively, information from these studies provides a diverse dataset to evaluate multiple lines of evidence and identify potential biological impacts related to sediment-associated COPCs. Each line of evidence contributing to this weight-of-evidence evaluation is summarized in Table 20 and described in the following sections.

8.7.1 Line of Evidence No. 1 – Sediment Chemistry

Near-Site surficial bulk sediment COPC concentrations exceed some BSLs (Section 8.2) and, as shown on Table 20, some COPCs exceed the Effects Range Median (ERM) guidance values for saltwater sediments listed in NYSDEC 1999. However, USEPA's ESB Guidance, makes clear that concentrations of total metals in bulk sediment are poor indicators of sediment toxicity (USEPA, 2005b). To address this issue the ESB guidance provides methods based on concentrations of SEM, AVS, and TOC, and direct measure of sediment pore water to evaluate the potential toxicity of metals in sediments. Based on the ESB guidance, measures of (SEM-AVS)/f_{oc} below <130 µmoles/goc are considered non toxic. Toxicity is considered uncertain in the, >130 µmoles/goc and <3,000 µmoles/goc, and likely (predicted toxic) for >3,000 µmoles/goc (USEPA 2005a).

As described in Section 8.3, all but one of the near-Site samples were below 130 µmoles/goc predicting no metal related toxicity. The single sample that exceeded an (SEM-AVS)/f_{oc} of 130 µmoles/goc (SED 126) was below the <3,000 µmoles/goc threshold and the potential for metal toxicity is thus considered uncertain for this sample. SED 126 is immediately adjacent to OF-1 and exhibited the maximum observed chromium, lead and zinc concentrations in the near-Site study area. None of the stations fall into the "predicted-toxic" category. Overall, the ESB results indicate very low bioavailability and potential for toxicity throughout the near-Site area. Based on the ESB Guidance, uncertainty associated with metal toxicity at SED 126 can be resolved using independent site-specific lines of evidence as discussed below.

These data indicate that, with the possible exception of SED126, elevated concentrations of COPCs measured in bulk sediments are sequestered in the solid phase and thus not biologically available of toxic. The concentrations of COPC in pore water data provide an independent line of evidence for evaluating for metal sequestration and potential toxicity in near-Site sediments.

All COPC pore water concentrations were below New York State freshwater criteria, as described in Section 8.3. For lead, one near-Site sample (SED134) exceeds the New York State and USEPA saltwater criteria. None of the samples exceed the saltwater criteria for chromium, mercury, and zinc. All of the near-Site and background samples exceed the saltwater criteria for copper, suggesting a regional rather than Site-related condition.

Collectively, the ESB and pore water chemistry data for the entire near-Site area, with the possible exception of the immediate vicinity of OF-1, indicate very low bioavailability and potential for toxicity based on measures of (SEM-AVS)/f_{oc} in sediments and COPCs in sediment pore water.

8.7.2 Line of Evidence No. 2 – Bioaccumulation Data

The accumulation of metals in bivalve tissue provides an additional Site-specific line of evidence for the evaluation of COPC bioavailability and potential for toxicity. Specifically, the bivalve tissue data is used to assess whether COPCs in sediment have bioaccumulated in a representative benthic organism to levels in excess of levels observed in the same organisms at background locations. Bivalves are a useful organism for evaluating accumulation because they are relatively sessile, and they reside within the sediment matrix.

As described in Section 8.6, the bivalve tissue results from the near-Site stations are comparable to the concentrations detected in bivalves from background (reference) stations. These results indicate that there is no increase in COPC bioaccumulation in bivalves from near-Site stations vs. background stations. This finding is consistent with the results of the ESB studies and pore water data that indicated low bioavailability of COPCs in the study area sediments.

8.7.3 Line of Evidence No. 3 – Sediment Toxicity

The results of the 28-day tests with L. plumulosus were evaluated as a direct measure of potential toxicity to sediment organisms. Based on the ESB results, SED126, which was collected immediately adjacent to OF-1, was the only location which fell in the uncertain range and thus could not clearly be classified as non-toxic. Results of the L. plumulosus bioassays (Section 8.4 and Figures 17-20) clearly demonstrate no evidence of sediment toxicity at SED126 relative to both laboratory controls and background samples.

As for the remainder of the samples, the only potential effect in the near-Site sediment samples, based on a comparison of the background tolerance limit excluding the outlier sample, was slightly reduced survival in three samples (SED132, SED133, and SED136). The survival in these three samples was 75.6%, 68.5%, and 70.0%, respectively, and was higher than the lowest background survival. Two background samples (SED107 and SED109) also had survival below the tolerance limit. None of the samples had survival below the tolerance limit based on all background data. Similarly, there was no effect on growth and reproduction for any near-Site samples.

The results from the toxicity tests indicate that the possible moderately elevated toxicity of surficial sediment at a few locations in the near-Site area is consistent with background samples. Moreover, the lack of correlation with ESB results (e.g. SED126) indicate that these variations in toxicity cannot be attributed to Site-related COPCs.

8.7.4 Line of Evidence No. 4 – Benthic Community Indices

Benthic macroinvertebrate community data directly measure whether sediment COPC concentrations have affected the populations of resident organisms. An advantage of using the benthic macroinvertebrate community assessments to determine sediment quality is that it provides an accurate indication of the health of the system, and it is based on direct observation rather than theoretically derived data (USEPA, 1992).

As described in Section 8.5, the benthic macroinvertebrate data indicate a large degree of variability in the number and types of organisms present. The benthic metric values calculated from the near-Site locations are generally similar to the values calculated from the background (reference) locations. These data indicate that, based on direct observation, population-level impairment to the benthic macroinvertebrate community is not occurring.

8.7.5 Weight of Evidence Summary

The above summaries of lines of evidence indicate that elevated concentrations of COPCs in bulk sediments at near-Site locations are not bioavailable or toxic to benthic organisms. A summary of the weight-of-evidence approach is presented in Table 20. The table is set up consistent with USEPA (1992) Sediment Classification Methods Compendium.

The evidence provided in Table 20, classified in terms of “+ and “-“ progresses left-to-right from generic screening level comparisons, through predictive site-specific indicators of toxicity and bioavailability, and concludes with direct benthic community observations relative to background. In summary, bulk sediment chemistry data indicate that COPCs are present at levels above BSLs (most frequently for lead) and/or above sediment ERM values at some near-Site locations (most frequently for mercury), and these exceedance metrics are generally not co-related. COPCs in pore water suggest regional background exposure of benthic organisms to copper above water quality criteria, as well as exposure to lead above water quality criteria at only one near-Site station (SED 134), which did not exhibit elevated lead in the corresponding bulk sediment sample.

A site-specific ESB value indicating “uncertain toxicity” was observed in only one station (SED-126). However, other lines of evidence for SED-126 demonstrate: 1) no increase in COPC bioaccumulation in resident bivalves: 2) no evidence of increased toxicity in L. plumulosus bioassays: 2) no evidence of negative impact to the near-Site benthic community. For the three samples with slightly reduced percent survival relative to background from the toxicity tests (SED132, SED133, and SED136), toxicity from Site COPCs was not predicted by the ESB methods and may be attributable to other localized conditions. Moreover there is no evidence of impact to the benthic community at these sites.

In summary, no COPC concentration thresholds were associated with adverse biological impacts within the study area and there were no corresponding adverse effects associated with COPCs. Overall, multiple lines of site-specific evidence support the conclusion that benthic biota in the near-Site area are not impacted by COPC levels relative to background.

9. Evaluation of Phase II Subsurface Sediment Data

This section describes the results of the sub-surface sediment sampling that was conducted as part of the Phase II investigation. The subsurface sediment core data reflect conditions beneath the biologically active zone (0-6 inches). As such, deep sediment chemistry data are not evaluated with respect to potential impact to benthic biota. Rather, the subsurface data are indicative of the depositional history of COPCs.

Sediment cores were collected to provide representative profiles of COPC concentrations in deeper sediment. Sediment cores were collected from three general areas: 3 cores from the background area; 6 cores from the near-Site area; and 13 cores from the immediate area of OF-1 (Figures 4 and 5). The overall core depths reached a maximum depth of 10-feet below the sediment bed surface, less refusal or lack of sediment recovery. All cores from this area-wide series were sectioned into 1-foot intervals.

As described in the following sections, the sediment cores provided data for sediment chemistry, physical characterization, geochronology, and geotechnical characteristics.

9.1 Subsurface Sediment Chemistry Data

The COPC and TOC data for subsurface sediment are presented in Table 21 (background), Table 22 (near-Site), and Table 23 (vicinity of OF-1).

9.1.1 Background Data

Subsurface sediment samples were analyzed for COPC concentrations from three background area sediment cores: SED102, SED103, and SED104 (Figure 4). Chromium, copper, lead, and zinc were detected in all background cores (Table 21). Mercury was detected in cores SED103 and SED104. COPC concentrations ranged from 23.6 to 31.9 mg/kg for chromium, 11.8 to 58.0 mg/kg for copper, 7.8 to 70.1 mg/kg for lead, non-detect to 0.37 mg/kg for mercury, and 63.7 to 171.0 mg/kg for zinc.

Figure 29 presents the COPC concentration profiles for the background deep sediment cores by each COPC. In general the background cores have consistent subsurface concentration profiles over the sample depths, with two exceptions. The 0-1foot section of SED103 exhibited slightly higher concentration compared to that of subsequent depths. At location SED104, the COPC concentrations in the top two feet were much higher than concentrations observed at deeper intervals. The results of geochronology analysis (Appendix D), as summarized in Section 9.2, suggests that the deposition rate at SED104 is more than twice that observed at SED103.

9.1.2 Near-Site Area Data

Subsurface sediment samples were analyzed for COPC concentrations from six near-site sediment cores: SED119, SED123, SED126, SED127, SED128, and SED138 (Figure 5). As shown in Table 22, COPCs were detected in all near-site core locations. COPC concentrations ranged from 11.3 to 257 mg/kg for chromium, 8 to 265 mg/kg for copper, non-detect to 1,530 mg/kg for lead, non-detect to 8.8 mg/kg for mercury, and 38.2 to 3,030 mg/kg for zinc.

Figure 30 presents the COPC concentration profiles for the near-Site deep sediment cores by each COPC constituent. In general the near-Site cores have variable subsurface concentration profiles over the sample depths, presumably reflecting differences in depositional history among the sampled locations. The profile patterns for near-site cores are discussed in three profile subgroups: a) SED119 and SED138; b) SED 123, SED127 SED128; and c) SED 126 based on their COPC profiles.

Group a) - Both SED119 and SED138 cores have relatively flat concentration profiles for all COPCs. The SED119 profile exhibits overall lower COPC concentrations than the background cores. SED119 is located within 500 feet of the Site near OF-2 and within the Tarrytown Harbor navigation channel footprint (Figure 5). As a result, sediment recovered at this location is below the depth of channel dredging activities. The surface elevation of core SED119 is at an elevation of 19.5 feet below mean sea level (MSL) which is deeper than the bottom of maintained channel elevation of 12 ft below MSL (-12ft elevation). SED138 is located nearly 4,000 feet downstream of the Site and nearly 1,000 feet offshore of the harbor navigation channel. Subsurface COPC concentrations at SED138 are slightly lower, in general, than near-Site cores SED123, SED127, and SED128 (Figure 30)

Group b) - SED123, SED127 and SED128 are located within 50 feet offshore of the harbor navigation channel, with SED128 closest to OF-1 (Figurer 5). Profiles for lead and zinc in all three cores exhibit similar profiles in terms of maintaining a narrow range of surface concentrations for at least 3-feet before a concentration decrease is noted. Lead and zinc concentration in SED 128 peak at the 3 to 4-foot interval and decrease deeper with depth below 4 feet. At SED123, peak levels of lead and zinc are reached at the 5 to 6-foot interval (Figure 30) before decreasing with increasing depth. In contrast, SED127 maintains similar concentrations of lead and zinc throughout the 10-

foot profile. Chromium profiles are a little more variable when compared to lead and zinc in these cores, but the observed concentration changes with depth correspond to those noted for lead and zinc. Copper and mercury profiles are the most variable, with concentrations increasing with depth until at least 3 feet below the surface, although their concentrations profiles appear to vary independent of chromium, lead and zinc (Figure 30).

Group c) – This subgroup consists of SED126, located at the mouth of OF-1. This core yielded only 16 inches of sediment recovery due to the limited depth of sediment on top of the rock rip-rap in that area. Therefore, no depth profile could be developed below the single 0-1 foot sample shown on Figure 30. However, vertical concentration profiles for 13 cores taken from a sampling grid surrounding SED126, as described in Section 9.1.3, provide greater detail regarding vertical COPC distribution near OF-1.

9.1.3 OF-1 Data

Thirteen cores (SED140, SED141, SED142, SED143, SED144, SED145, SED146, SED149, SED151, SED152, SED153, SED154, and SED155) were collected in the very near vicinity of OF-1 (Figure 5) and sectioned into 2-foot intervals. As shown in Table 23, COPCs were detected in all OF-1 area core locations at concentrations ranging from 10.8 to 1,960 mg/kg for chromium, 5.4 to 177 mg/kg for copper, 6.1 to 8,420 mg/kg for lead, non-detect to 3.5 mg/kg for mercury, and 31.2 to 14,500 mg/kg for zinc.

Figure 31 presents the verical concentration profiles for the OF-1 grid cores by each COPC constituent, relative to depth below the river bottom. In general, the OF-1 cores have variable subsurface concentration profiles over the sample depths. As shown in Figure 31, the concentrations within the top foot are within the same order of magnitude (copper and mercury) or within two orders of magnitude (chromium, lead and zinc). As the depths increase, the range of concentration variation increases. COPC concentrations of chromium, lead and zinc, in cores from SED141, SED143, SED146, and SED152 show a general pattern of concentration decrease with depth below the 0-1 foot interval or exhibit a peak in concentration at the 3-foot depth interval before a decline is observed. Four cores further offshore along the edge of the navigation channel (SED142, SED145, SED151, and SED153) tend to exhibit their peak concentrations at the 5-7 foot depth intervals. Copper and mercury, which exhibit less resemblance to the chromium lead and zinc profiles, also tend to peak within 0-3 feet near OF-1 and within 5-7 feet along the edge of the navigation channel.

The river bottom slopes from the shoreline at Of-1 at an elevation of -4ft MSL (4 feet below mean sea level) to the bottom of the harbor navigation channel from at -12ft MSL. To examine COPCs by elevation, representative concentration profiles of COPC concentrations vs. elevation (relative to MSL) are illustrated on Figures 32 and 33. These figures display COPC data from cross sections A-A' and B-B' (Figure 5). The peak concentrations appear to follow a steeper slope than the present river bottom bathymetry. Concentration profiles from cross section A- A' (Figure 32), close to the shoreline, indicate that most peak concentrations of chromium, lead and zinc, are typically reached between elevation -9 to -12 ft MSL (9 to 12 feet below MSL). The river bottom along cross section A-A' is at an approximate elevation of -6 to -9 ft MSL. Concentration profiles from cross section B-B' (Figure 33), further from shoreline along the edge of the navigation channel, indicate that peak concentrations of chromium, lead and zinc are reached at -14 to -16 ft MSL or lower (below the deepest sample). The river bottom along cross section B-B' is at an approximate elevation of -9 to -10 ft MSL. In contrast to cross section A-A', ,the peak concentrations along cross-section B-B' reside beneath approximately 3 to 4 feet of relatively cleaner sediments as shown in Figure 33 A similar cleaner surface layer is diminished or non-existent closer to the shoreline near OF-1 (Figure 32). It is noteworthy that the biologically based assessment samples at OF-1 (SED126), as presented in Section 8, were collected from the near-shore area where a relatively clean surface layer is absent.

9.2 Subsurface Sediment Geochronology Data

In this study (provided in Appendix D), radiological activities of naturally occurring isotopes beryllium-7, cesium-137, and lead-210 were analyzed to assess the age (when specific sediment strata were deposited) and dynamics (sedimentation rate) throughout the sampled sediment horizon. Beryllium-7 has a very short half-life (approximately 53 days) and is useful for measuring sediment transport on less than an annual time scale. Cesium-137 is a thermonuclear byproduct with a half-life of 30.3 years, and its presence is directly related to the atmospheric testing of nuclear devices that began in the mid- to late-1950s and peaked in 1963. The cesium-137 horizon (first occurrence) and peak activities are used to mark these time periods and calculate average sediment deposition rates during and subsequent to those years. Lead-210 is a naturally occurring radioactive isotope with a half-life of 22.8 years. In theory, lead-210 activities are highest at the surface of sediment where it is affected continuously by deposition, and decreases with sediment depth due to constant decay. Lead-210 was used to delineate the approximate mixing depth of sediment and to date the individual sediment strata at depth.

The radiochemical data of sediment samples are presented in Table 26 (near-Site) and Table 27 (background). Sedimentary properties of each core and chronology data interpretation are summarized in the table below.

Sediment Core ID	Pb-210 Chronology Mixing Depth (inch)	Cs-137 Chronology Horizon (inch)	Cs-137 Chronology 1963 Marker (inch)	Preferred Sedimentation Rate (inches/year)
Background				
SED103	2	3 to 5	Not defined	0.08±0.02
SED104	8	9 to 11	5 to 9	0.19±0.02
Near-Site				
SED123	6	7 to 9	Not defined	0.15±0.02
SED126 (OF-1)	No trend defined (short core with approx. 12 inch recovery)	> 11	Not defined	> 0.21
SED128	50 to 60	42 to 50	34 to 50	0.88±0.08
SED138	6	1 to 3	Not defined	0.04±0.02

Beryllium-7 was not detected in any of the sediment increments. Because of its short half-life of 53 days, beryllium-7 is only detectable within the last half year. Therefore, the sediment chronology interpretation is based on the results for lead-210 and cesium-137.

Sedimentation rates in near-Site cores ranged from 0.04 to 0.88 inches per year. SED128 (south of OF-1) exhibited the highest sedimentation rate (0.88 inches per year) and mixing depth (50 to 60 inches). The sedimentation rate of core SED123 appeared to be similar to background core SED104, but with a higher degree of mixing activities (i.e., relatively flat isotope profile within the mixing zone) and absent of the 1963 cesium-137 marker. Core SED138 had the lowest sedimentation rate (0.04 inches per year) and shallow mixing depth (6 inches). Core SED126 was collected at the mouth of OF-1, and reached refusal (rock) at approximately 16 inches. The sediment chronology data from SED126 suggest a depositional condition. Visual observations indicate that this core contained fine to coarse sand with some silt, over fine to coarse gravel and rock fragments.

The sedimentation rates for background cores SED103 and SED104 are 0.08 and 0.19 inches per year, respectively. Core SED104 had a distinct 1963 cesium-137 marker between 5 to 9 inches. In comparison, core SED104 had a higher degree of depositional characteristic than core SED103. The sedimentation rate and mixing depth at SED128, located near a turn in the Tarrytown Harbor channel, is significantly greater than the other locations analyzed in near-Site and background areas.

As noted in Section 9.1.2 and displayed on Figure 30, variations in COPC concentrations are noted in cores adjacent to the harbor navigation channel, including SED123 and SED128. The d30, variations in COPC concentrations are noted in cores adjacent to the harbor navigation channel, including SED123 and SED128. The deep 50-60 inch mixing depth, and 1963 marker at the 3-4 foot interval in SED128, corresponds to the zone of peak COPC concentrations within the 3-4 foot depth, which may indicate a decline in COPC concentrations with recent deposition since the early 1960s. This apparent trend in COPC deposition does not carry over to SED123, which shows only a 6-inch mixing depth and the 1963 marker between 5 to 7 inches. Corresponding COPC levels in SED123 peak at intervals much deeper (up to 6 feet) than the 1963 marker. However, a slight decline in COPC levels is apparent in the 0-1 foot interval compared to the 1-2 foot interval.

9.3 Sediment Grain Size and Geotechnical Characteristics

9.3.1 Surface Sediment Grain Size Data

Grain size analysis was performed on all surface sediment samples collected in near-Site area (Table 24) and background area (Table 25). Silt and clay were dominant in the majority of the sediment samples except locations SED100, SED101, SED113, SED117, SED118, SED126, and SED135 where sand was prevalent.

9.3.2 Subsurface Sediment Geotechnical Data

Representative laboratory samples were taken from sediment samples SED147, SED149 and SED150 from the surface to a depth of 8 feet. The material was generally black to dark gray organic silt with sand. The sediment becomes coarser with depth terminating in a coarse to fine sand with little silt.

Geotechnical laboratory tests included particle size analysis, moisture content, Atterberg Limits, bulk density, specific gravity and consolidation testing. The test results are summarized in Table 28, Geotechnical testing data.

Limited gravel was detected in the samples, partially controlled by the sampling method. The total percentage of sand ranged from 1 to 82%. The amount of silt and clay ranged from 13 to 67% and 5 to 38%, respectively.

The moisture content in the recovered samples varied from 18 to 140%. The low end of the scale were coarser sand samples that may be affected by the sampling method, but all the samples are submerged and are assumed saturated.

The liquid and plastic limits (Atterberg) show that the plastic cohesive soils extend to approximately 6 feet in depth and are generally classified as moderate to highly plastic organic silt. The 6 to 8 foot sample was non-plastic silty sand.

The bulk density was in a fairly narrow range for the 0 to 6 feet interval of 84 to 95 pounds per cubic foot (pcf) while the 6 to 8 feet interval was 134 pcf, as can be expected from the coarser sand. The unitless specific gravity values range from 2.461 to 2.702 and average approximately 2.58.

The two consolidation tests were run on the sample intervals of 2 to 4 feet and 4 to 6 feet of sample SED149. The Compression Index (Cc) was approximately 0.6 for both samples. The Cc value gives the relative amount of consolidation or settlement that can be expected from loading of the sediment. The Coefficient of Consolidation (Cv) represents the relative time for consolidation to occur under load. The value of Cv varied under load, but in general ranged from 0.01 to 0.62 inches^2 per minute. Review of typical values for compressible soils shows that these organic silty sediments can be expected to significantly consolidate under load and consolidation will occur rather quickly. Specifics values of time and amount of consolidation will depend on the amount of load applied, the time to apply the load, the amount of load removed prior to loading (i.e., excavation) and the overall thickness of the compressible soil layer

10. Qualitative Human Health Exposure Assessment

10.1 Introduction

This section presents a Qualitative Human Health Exposure Assessment (QHHEA) that describes the potential for human health exposure to site-related (COPCs) in Hudson River sediments adjacent to the Site. The QHHEA was conducted following New York State Department of Health (NYSDOH) Quantitative Human Health Exposure Assessment guidance as presented in the NYSDEC (2002) Technical Guidance for Site Investigation and Remediation. A QHHEA was previously conducted for the upland portion of the Site and is presented in the December 2006 RI Report for the Site (BBL, 2006). The assessment for Hudson River sediments uses information regarding foreseeable future uses for the shoreline and near-shore portions of the Site, as well as available sediment data, to evaluate potential exposure to human receptors. The QHHEA characterizes the environmental setting of the Site and identifies COPCs, future receptors, and potentially complete exposure pathways.

10.2 Environmental Setting

The Site is located along the eastern shore of the Hudson River, in the Village of Sleepy Hollow, New York (Figure 1A). The upland portion of the Site currently consists of three, non-contiguous portions totaling approximately 96.2 acres. The former main assembly plant area (West Parcel) contains 66.2 acres, the eastern parking lot (East Parcel) contains 28.3 acres, and the salaried employee parking lot (South Parcel) contains 1.7 acres (Figure 1B). The former main assembly plant area and the eastern parking lot are separated by an active railroad corridor owned by Metro-North/Conrail. The former salaried employee parking lot is located across Beekman Avenue, directly south of the main assembly plant property. This lot is bordered by Beekman Avenue, Hudson Street, River Street, and property owned by the Village of Sleepy Hollow.

The off-site portion of the Site comprises a portion of the Hudson River and shoreline adjacent to the Site. The off-site portion of the Site is bounded to the west by the federal navigation channel and extends upriver just beyond river mile 28 and downriver to just below river mile 26.

The contemplated future use of the Site is mixed commercial and restricted residential development, with public open space, including public access to the waterfront and municipal public works operations. On June 7, 2011 the Village of Sleepy Hollow adopted a resolution granting a Special Permit and Approving the Riverfront

Development Concept Plan for the Lighthouse Landing Riverfront Development, as shown on Figure 1D. Future land uses of Kingsland Point Park to the north and the managed residential, commercial and waterfront park properties to the south are not expected to change significantly in the future with regard to anticipated human access to the Hudson River sediments. The entire Hudson River shoreline within the bounds of the off-shore area of the Site is comprised of seawall or rip-rap with the exception of a small beach located between the northern boundary of the Site and the southern boundary of Kingsland Point Park and a more extensive beach area located along the northern shoreline of Kingsland Point Park. Key post-development features along the waterfront portion of the Site will include a fishing pier, a floating dock (dock and dine), an existing lighthouse, and a second floating dock for launching small craft. The existing lighthouse (Tarrytown Lighthouse) is listed on the National Register of Historic Places and is currently accessible to the public through Kingsland Point Park.

The qualitative human health exposure assessment presented herein evaluates potential exposure of human receptors to site-related constituents in sediments under future land use conditions. The medium of concern is near-shore Hudson River sediment along the waterfront portion of the Site, Kingsland Point Park, and the commercial/industrial areas to the south.

10.3 Constituents of Potential Concern

GMC has conducted three sediment investigations (1997, 2004, and 2006) to evaluate the nature and extent of site-related chemicals in Hudson River sediments. Based on data from all three studies, five COPCs were identified for offshore sediments. They are chromium, copper, lead, nickel, and zinc.

10.4 Potential Receptors, Exposure Points, and Exposure Pathways

The entire length of Hudson River shoreline within the bounds of the offshore portion of the Site will consist of seawall or rip-rap as well as two areas comprising beach. The beach areas include the northern shoreline of Kingsland Point Park and a smaller beach located between the northern edge of the Site and the southern edge of Kingsland Point Park. The remaining portions of shoreline bordering Kingsland Point Park and the Site will consist of seawall with walking paths. The shoreline bordering the existing managed residential, commercial and waterfront park areas south of the Site will remain a mix of seawall and rip-rap.

An initial step in evaluating potential human exposure is identifying complete exposure pathways. In accordance with NYSDOH guidance for conducting a QHHEA (NYSDEC, 2002), and consistent with USEPA risk assessment guidance (1989), for an exposure pathway to be complete, the following five elements must exist:

1) a source of COPC;

2) release and transport mechanisms of COPC;

3) a point of human exposure;

4) routes of exposure where constituents from these media could be taken up by the human body; and

5) a receptor population.

An exposure pathway is complete if all five elements exist. If any element is not present, then no further evaluation is necessary (USEPA, 1989; NYSDEC, 2002).

10.4.1 Sources and Transport Mechanisms

As previously described in Sections 6 and 8, COPCs have been identified in near-shore sediments of the Hudson River. COPCs (i.e., metals) that are potentially derived from the Site would have entered the River prior to 1971 in industrial wastewater discharges as dissolved and suspended solids. Natural patterns of sediment deposition from local and upstream sources, sediment transport along the river bottom, local dredging of navigation channels, and waterfront development before and since 1971 would have contributed to the recently observed sediment conditions.

10.4.2 Receptors

Potential human receptors that may frequent the shoreline portions of the Site and adjacent properties include:

- Adult and child recreators; and
- Workers involved in beach or seawall maintenance.

Under the anticipated future land use, most of the shoreline will be accessible to the general public. Likely recreational activities include use of the beaches for walking, wading, fishing; use of the boat launches for fishing and launching of boats; use of the walkways on the seawalls for walking, running, and similar recreational activities; and visiting the Tarrytown Lighthouse. Workers may be involved in maintenance of beaches and seawalls.

10.4.3 Exposure Points

Recreators may contact nearshore sediments during recreational activities and workers may contact sediments during maintenance activities at the beaches or on seawalls. Therefore, exposure points are near-shore Hudson River sediments.

Hudson River surface water is considered a negligible exposure medium because metals are primarily bound to the sediment matrix, and any metals partitioning from sediments to the water phase would rapidly attenuate with the relatively fast currents. Fish and shellfish are also considered negligible exposure medium because metals are not considered bioaccumulative chemicals and anglers would generally fish from a much broader area of the Hudson River, not just in the nearshore area of the Site. Air is considered a negligible exposure medium because metals are not volatile. While Hudson River sediment in the nearshore area is considered the exposure point of interest, potential exposure to recreators and workers would be limited to areas with direct access to near-shore sediments (e.g., the two beach areas and the boat launch). Sediments adjacent to the seawall are not considered exposure points because there is no direct access to these sediments by recreators. While workers could have contact with sediments along the seawalls, such contact is expected to be minimal and infrequent.

It is important to note that the larger of the two beaches, the beach area along the northern portion of Kingsland Point Park, is located a substantial distance upstream from the Site and is within the portion of the River identified as background for the purposes of evaluating COPCs in this RI. In a recent study on swimming in the Hudson River, the northern beach area at Kingsland Point Park was identified as one of five beaches on the Hudson River that was considered feasible as a “swimming beach” without any further action other than beach and facility improvements (NYSDEC, 2005). The minor beach at the southern end of Kingsland Point Park is likely to be integrated into a new on-Site hardscape feature under the future Site development, to function as a boat launch area for small hand-carried craft.

10.4.4 Exposure Pathways Evaluation

The exposure pathways evaluation integrates information on COPC sources, transport mechanisms, exposure points, and the characteristics (e.g., behaviors) of human receptors to determine with a potential exposure pathway is complete, incomplete, or insignificant. Three exposure routes are considered. These are ingestion, dermal contact, and inhalation. As discussed in Section 10.4.3, air is not considered an exposure point because metals are not volatile. Therefore, the inhalation exposure pathway is considered an incomplete exposure pathway. However, both recreators and workers may have direct contact to nearshore sediments in the vicinity of the beaches and boat launch. Therefore, incidental sediment ingestion and dermal contact with sediments are potentially complete exposure pathways. Neither of these potential exposure pathways are considered significant however, since the frequency and duration of exposure to both recreators and workers is expected to be minimal.

11. Fish and Wildlife Resource Impact Assessment

This section of the RI presents a qualitative fish and wildlife exposure assessment for the Hudson River in the vicinity of the Site. The near-Site area of the Hudson River included in this assessment is shown on Figure 5. Non-riverine areas of the Site were evaluated as part of the on-Site RI and are not evaluated in this document.

The objectives of this qualitative assessment are to identify the fish and wildlife resources that exist in the vicinity of the Site, and to evaluate the potential for exposure of these resources to Site-related constituents in environmental media.

This qualitative assessment for fish and wildlife resources was conducted in accordance with NYSDEC (2004) guidance for the BCP. Per the BCP requirements, this qualitative assessment is equivalent to Steps I and IIA of NYSDEC's Fish and Wildlife Resource Impact Analysis (FWRIA) outlined in DER-10 (NYSDEC, 2002a). As an initial part of the FWRIA, Step I characterizes terrestrial and aquatic ecologies of the Site and surrounding areas, and develops a list of potential ecological receptors. The specific components of Step I are as follows: Step IA) Site description and maps; Step IB) description of fish and wildlife resources; Step IC) description of fish and wildlife resource value; and Step ID) identification of applicable fish and wildlife regulatory criteria. Step IIA involves a pathway analysis, which utilizes the receptor information generated in Step I to evaluate potential exposure pathways based on Site ecology and the location of Site-related constituents.

This qualitative fish and wildlife exposure assessment is based (in part) on information from the ecological resource assessment conducted for the Site by EcolSciences (2005) entitled Assessment of Ecological Resources for Lighthouse Landing Redevelopment Project, Village of Sleepy Hollow, Westchester County, New York), and field observations from the 2006 sediment investigation.

11.1 Site Description

The Hudson River is a relatively large river, and the basin encompasses about 13,300 square miles in eastern New York and parts of Vermont, New Jersey, Massachusetts, and Connecticut (Wall et al., 1998). Nearly all of the urban and industrial centers in the basin are concentrated along the Hudson River (Wall et al., 1998). In the vicinity of the Site, the Hudson River shoreline has been modified by historical land use. Almost the entire shoreline is constructed of rip-rap or (in the vicinity of the marinas) bulkhead. The historic Tarrytown Lighthouse is located along the upstream portion of the shoreline (Figure 1C), and the shoreline around the lighthouse is also constructed of rip-rap.

The Hudson River in the vicinity of the Site is tidally influenced, and current fluctuates upstream or downstream depending on the tide. The Hudson River adjacent to the Site is characterized as mesohaline (Versar, 2003). Mesohaline typically has a salinity of 5 to 18 practical salinity units (psu) (Versar, 2003). During periods of high water such as spring floods, freshwater conditions occur in the vicinity of the Site. As the flow of freshwater declines through the summer, the salt front (i.e., 100 ppm) gradually moves upriver. Water depth in the vicinity of the Site drops off relatively quickly from shore, to a maximum depth of approximately 45 feet in the vicinity of the main shipping channel.

The lower Hudson River reflects a long history of human use, and water quality is impacted by point and non-point sources within the watershed. There are many industrial and municipal discharges, and a majority of water quality impairment for the Hudson River is derived from stormwater runoff (NYSDEC, 2007). Historical contaminants present throughout the Hudson River, and attributable to various sources, include PAHs, pesticides, PCBs, and metals.

The substrate within the near-Site area is hard-bottom rip-rap adjacent to the shoreline, with a predominance of silt and clay further away from the shoreline. Areas that are subject to swifter currents (i.e., downstream of the Tarrytown Lighthouse) have rocky hard bottom with some oyster shells.

11.2 Ecological Characterization

The NYSDEC best usage classification for this stretch of the Hudson is Class SB. According to New York Regulations Title 6 §701.11, the best usages of Class SB streams are primary and secondary contact recreation and fishing. Class SB waters are suitable for fish propagation and survival.

11.3 Fish and Wildlife Resources

The fish and wildlife resources of the Hudson River in the near-Site vicinity are limited, to some extent, by the urban nature of the surrounding land use and the lack of suitable shoreline habitat.

The survey that was conducted as part of the 2006 sediment investigation provides information regarding the benthic community of the Hudson River. The survey results (described in Section 8.5) indicate a large degree of variability in the number and types of organisms that are present. The organisms that were identified in the grab samples include marine species such as the Eastern oyster (Crassostrea virginica) and the ribbed mussel (Geukensia demissa), and freshwater species such as midges (e.g., Clinotanypus sp.). Total organism counts ranged from a total of 3 per grab to almost 1,000 organisms. In general, the variability within the data indicates a spotty distribution of the benthic community that varies widely throughout the river bottom

More than 150 species of fish are known to occur within the tidal portion of the Hudson River (Smith, 1985). These species include freshwater and marine species, and migratory species. Fish species known to inhabit tidal sections of the Hudson include alewife (Alosa pseudoharengus), American eel (Anguilla rostrata), gizzard shad (Dorosoma cepedianum), and striped bass (Morone saxatilis).

Wildlife that is expected to occur within the near-Site area of the Hudson River is limited to various species of water birds, including ducks, geese, and gulls.

11.3.1 Threatened/Endangered Species and Significant Habitat

According to the NYSDEC Natural Heritage Program (NHP), the shortnose sturgeon (Acipenser brevirostrum) (a state-endangered fish species) occurs within the lower Hudson River from the Battery in New York City at its junction with Upper New York Bay, upstream to the Federal Dam in Troy (EcolSciences, 2005). No Significant Coastal Fish and Wildlife Habitats are present onsite or within the immediate vicinity of the Site (EcolSciences, 2005).

The nearest mapped significant habitat is the Piermont Marsh located 3 to 4 miles downstream of the Site, along the western shoreline of the Hudson River in the town of Orangetown (EcolSciences, 2005). Piermont Marsh is an approximately 725-acre wetland complex of brackish marsh and intertidal shallows, and is one of the largest undeveloped wetland complexes along the lower Hudson River (EcolSciences, 2005).

11.3.2 Observations of Stress

Observations of stress pertinent to an aquatic system include fish kills or stressed aquatic vegetation. No visible evidence of stress was noted for the Site or surrounding areas in the ecological assessment (EcolSciences, 2005). Similarly, there was no evidence of stress noted during the aquatic field work that was conducted by BBL in 2006.

11.4 Fish and Wildlife Resources Values

Step IC consists of an assessment of 1) the general ability of the area within 0.5-mile of the Site to support fish and wildlife resources, and 2) the value of fish and wildlife resources to humans. The following subsections provide a qualitative evaluation of the value of the identified covertypes to wildlife and the value of these wildlife resources to humans.

11.4.1 Value of Habitat to Associated Fauna

The Hudson River is inhabited by a variety of aquatic species, including fish. Anadramous fish such as striped bass and herring use the Hudson River for spawning. The Hudson River also serves as an important travel corridor for migratory birds. Although the section of the Hudson River adjacent to the Site does not have a natural shoreline (i.e., free from anthropogenic modifications and/or disturbances), this tidal river is still considered to be an important aquatic resource to aquatic, semi-aquatic, and terrestrial wildlife.

11.4.2 Value of Resources to Humans

Current human use of fish and wildlife resources associated with the Hudson River includes fishing, recreational boating, and wildlife observation. Given the post-industrial nature of the near-Site shoreline and limited shoreline access, these types of human use activities do not routinely occur in the immediate vicinity of the Site, although commercial and sport fishing by boat occurs offshore throughout the lower Hudson River. Future uses of the Hudson River along the Site waterfront are likely to increase based on the water-dependent uses included in the future Site conceptual development plans.

11.5 Pathway Analysis

The pathway analysis (equivalent to Step IIA outlined in DER-10) identifies complete or potentially complete ecological exposure pathways to Site-related constituents. According to NYSDEC (1994) guidance, if Step IIA concludes that there are no potentially complete exposure pathways, ecological impacts are considered to be minimal and no further evaluation is warranted.

The objective of the pathway analysis is to identify potential pathways by which fish and wildlife receptors may be exposed to Site constituents. A complete exposure pathway exists if there is a source, a potential point of exposure, and a viable route of exposure and receptors at the exposure point. If any one of these elements is missing, then the pathway is not considered to be complete and exposure cannot occur, irrespective of chemical concentrations in environmental media.

For the Hudson River adjacent to the Site, sediment is considered the potential medium of interest associated with the Site, and metals are the COPCs. Surface water is not considered to be a medium of interest because metals are expected to be predominantly bound to the sediment.

Potential exposure pathways associated with sediment-related COPCs are direct contact and ingestion for fish and macroinvertebrates. Wildlife (e.g., ducks, geese, gulls) are not expected to be exposed to metals via sediment because the depth of the water column would deter contact. Potential exposure to metals via bioaccumulation in the food chain is not expected, because available tissue data (described in Section 8.7.4) indicate that bioaccumulation of COPCs is not significant.

A criteria-specific analysis (Step IIB), which consists of comparing Site data to numerical criteria, would be conducted only if potentially complete exposure pathways are identified. Analyses of the sediment data, as well as an assessment of other lines of evidence (e.g., toxicity testing results, benthic community survey, biological tissue data) are presented in Section 8.

11.6 Summary and Conclusions

The near-Site area of the Hudson River is a mesohaline environment, characterized as relatively deep (generally 4 to 45 feet), with a shoreline of predominantly rip-rap. The media of interest is sediment, and the COPCs are metals. The only potentially complete ecological exposure pathways are direct contact and ingestion for fish and macroinvertebrates. The potential significance of these exposure pathways are evaluated in terms of measured bioaccumulation of COPCs and observed benthic community characteristics discussed in Section 8.

12. Conclusions and Recommendations

12.1 Phase I Findings

Sediment investigations conducted by GMC in 1997 and 2004, produced screening level evaluations that identified constituents of potential concern, and prioritized areas for further evaluation. Data from a regional NYSDEC sediment study between 2000 and 2001 were included to enhance the background sediment database. NYSDEC's Technical Guidance for Screening Contaminated Sediments (NYSDEC 1999) provided a framework for this evaluation. Using that framework, a step-wise adaptation to the guidance was developed and implemented to address the unique aspects of the data distribution within this section of the Hudson River.

A focused list of COPCs for the Site was identified based on a comparison of near-Site sediment data to screening values and statistical comparisons to background concentrations. Chromium, copper, lead, mercury, and zinc were identified as COPCs for the near shore area of the Site based on elevated concentrations above background and degree of exceedance of freshwater SELs. However, with the exception of a few higher lead concentrations in the immediate vicinity of OF-1, most COPC concentrations were the same order of magnitude as the SEL. Sediment ranking techniques were used to identify locations of potential concern.

PCBs and PAHs were detected in near-Site sediment samples at levels above freshwater LELs, but no areas exhibited PCB or PAH levels above freshwater SELs, even at the mouth of Outfall OF-1.

Based on this analysis, the following conclusions are derived from the screening evaluation of the 1997-2004 data:

- The most pervasive chemical contaminants found throughout the tidal Hudson River, between Troy and Manhattan, are metals. Likewise, metals are by far the most pervasive constituent of concern observed in the sediment investigations conducted in the Site vicinity, including the background area. In addition to metals, sediments near the historically commercial/industrial waterfront in the Tarrytown Harbor area also exhibit levels of organic contaminants such as PCBs and PAHs that can be found in similar urban harbors.

- Most inorganic constituents detected in both background and Site data exceeded the lower LEL screening value, and those that exceeded the higher SEL, were only marginally greater than the SEL. Overall, stations at the mouth of Outfall OF-1 exhibit the highest relative rankings for metals. In fact, with the exceptions of lead at the mouth of Outfall OF-1, inorganic COPC concentrations were generally the same order of magnitude as the SEL.

- Potential areas of concern were identified based on comparison of near-Site data to background concentrations and generic screening criteria, and the sediment ranking approach for inorganic COPCs. These rankings do not necessarily indicate areas where impairment (e.g., impacts to benthic invertebrates) has occurred, but merely indicate areas with the highest potential for ecological risks within the study area.

- PCBs and PAHs were found at levels less than SELs. The observed distribution of these constituents does not suggest any specific areas where significant adverse impacts to benthic communities from these constituents would be anticipated. The areas of potential concern prioritized by inorganic COPC ranking encompass the range of PAH and PCB concentrations in the near-Site area.

Based on the results of above evaluation and further discussions with NYSDEC, a supplement (Phase II) site-specific sediment investigation was proposed to further assess potential impacts to the Hudson River, and to determine if there is evidence of significant benthic community impairment in the near-Site areas relative to background conditions.

12.2 Phase II Findings

The 2006 SSIWP outlined a comprehensive approach to benthic impact assessment, covering a broad area of interest in the Hudson River designed to evaluate multiple lines of evidence of possible benthic impacts attributable to COPCs in sediments near the Site. The 2006 SSIWP was developed with significant input from NYSDEC, and was based on evaluation of previous investigation results and an overall goal to complete all phases of an integrated risk-based impact study.

The 2006 SSIWP study design incorporated whole sediment analyses within the biologically active zone (0-6 inches) in conjunction with widely-used toxicity benchmarks, confirmatory bulk sediment toxicity tests, representative biological tissue sampling, and benthic community assessment. This risk-based approach identified sampling stations that exhibit differences in COPC concentrations relative to background, as expected based on previous investigations, and characterized the observed concentrations relative to sediment criteria. Although the Phase I findings were used for screening purposes to narrow the geographic areas of interest, the 2006 investigation applied all of the planned confirmatory impact assessment tools throughout the entire study area. These tools provided several integrated lines of evidence to evaluate bioavailability and potential toxicity of COPCs to benthic biota, and to assess community-level indicators of benthic impact relative to background.

Key findings of the Phase II sediment investigation, as they relate to an evaluation of biological impact, are summarized as follows:

- COPCs in several near-Site stations are present in the biologically active sediment zone at concentrations above BSLs and/or freshwater sediment screening criteria. However, the Site-specific ESB values, based on the ($\sum$SEM – AVS)/foc benchmark, predict an absence of toxicity attributable to the COPCs at all near-Site locations except SED126 near OF-1. Although SED126 exhibits an uncertain potential for adverse biological effects based on this ESB benchmark, other lines of evidence for SED126 demonstrate: 1) no increase in COPC bioaccumulation in resident bivalves: 2) no evidence of increased toxicity in L. plumulosus bioassays: 2) no evidence of negative impact to the near-Site benthic community. The biological investigations and toxicity testing results confirmed that the near-Site area in general, including SED126, does not exhibit toxicity or apparent benthic community impairment, relative to observed background conditions.

- Four individual near-Site sampling stations exhibit one or more COPCs in pore water at levels greater than background. However, pore water results for the near-Site area in general indicate a lack of predicted toxicity to freshwater organisms based on comparison to water quality criteria for the protection of freshwater systems. Only one near-Site station exhibited lead in pore water above marine criteria, but the corresponding marine sediment bioassay test performance was equivalent to background. In general, copper levels in pore water may predict potential impairment to marine organisms, based on comparison to marine/saltwater criteria, but this condition was observed throughout the background and study area and is unlikely to be attributable to the Site. As such, near-Site impairment to benthic organisms relative to background is generally not predicted by the pore water data. This prediction is supported by the toxicity test results, which indicated that the near-Site and background sediments exhibited mostly equivalent effects on test organisms.

- The bivalve tissue results indicate that there is no increase in COPC bioaccumulation in bivalves from near-Site stations vs. background stations. This finding is consistent with the results of the ESB studies and pore water data that indicated low bioavailability of COPCs in the study area sediments.

- The results from the toxicity tests indicate that the possible moderately elevated toxicity of surficial sediment at a few locations in the near-Site area is consistent with background samples. Moreover, the lack of correlation with ESB results (e.g. SED126) indicates that these variations in toxicity cannot be attributed to Site-related COPCs.

- Benthic macroinvertebrate data indicate a large degree of variability in the number and types of organisms present. The benthic metrics calculated from the near-Site locations are generally similar to the values calculated from the background (reference) locations. These data indicate that, based on direct observation, population-level impairment to the benthic macroinvertebrate community is not occurring.

A weight-of-evidence evaluation of the 2006 data indicated that no COPC concentration thresholds were associated with adverse biological impacts within the study area and there were no corresponding adverse effects associated with COPCs. Overall, multiple lines of site-specific evidence support the conclusion that benthic biota in the near-Site area are not impacted by COPC levels relative to background.

12.3 Recommendations

Based on the findings of the 2006 investigation, including a weight of evidence evaluation that indicated absence of biological impacts relative to background, no remedial action is recommended for Hudson River sediments near the Site.

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Tables

TABLE 1
SAMPLE MATRIX SUMMARY
1997 - 2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Medium:	SEDIMENT						SURFACE WATER
Laboratory Analsis	Inorganics	PCBs	PAHs	Grain Size	Solids	TOC	Water Quality
NEAR-SITE							
2004 (GM)							
SED01A	X	X	X	X	X	X	X
SED01B	X	X	X	X	X	X	X
SED01C	X	X	X	X	X	X	X
SED02A	X	X	X	X	X	X	X
SED02B	X	X	X	X	X	X	X
SED02C	X	X	X	X	X	X	X
SED03A	X	X	X	X	X	X	X
SED03B	X	X	X	X	X	X	X
SED03C	X	X	X	X	X	X	X
SED04A	X	X	X	X	X	X	X
SED04B	X	X	X	X	X	X	X
SED04C	X	X	X	X	X	X	X
SED05A	X	X	X	X	X	X	X
SED05B	X	X	X	X	X	X	X
SED05C	X	X	X	X	X	X	X
SED06A	X	X	X	X	X	X	X
SED06B	X	X	X	X	X	X	X
SED06C	X	X	X	X	X	X	X
SED07A	X	X	X	X	X	X	X
SED07B	X	X	X	X	X	X	X
SED07C	X	X	X	X	X	X	X
SED08A	X	X	X	X	X	X	X
SED08B	X	X	X	X	X	X	X
SED08C	X	X	X	X	X	X	X
SED09A	X	X	X	X	X	X	X
SED09B	X	X	X	X	X	X	X
SED09C	X	X	X	X	X	X	X
SED10A	X	X	X	X	X	X	X
SED10B	X	X	X	X	X	X	X
SED10C	X	X	X	X	X	X	X
SED11A	X	X	X	X	X	X	X
SED11B	X	X	X	X	X	X	X
SED11C	X	X	X	X	X	X	X
SED12A	X	X	X	X	X	X	X
SED12B	X	X	X	X	X	X	X
SED12C	X	X	X	X	X	X	X
SED13A	X	X	X	X	X	X	X
SED13B	X	X	X	X	X	X	X
SED13C	X	X	X	X	X	X	X
SED14A	X	X	X	X	X	X	X
SED14B	X	X	X	X	X	X	X
SED14C	X	X	X	X	X	X	X
SED15A	X	X	X	X	X	X	X
SED15B	X	X	X	X	X	X	X
SED15C	X	X	X	X	X	X	X
SED16A	X	X	X	X	X	X	X
SED16B	X	X	X	X	X	X	X
SED16C	X	X	X	X	X	X	X
SED17A	X	X	X	X	X	X	X
SED17B	X	X	X	X	X	X	X
SED17C	X	X	X	X	X	X	X
SED18A	X	X	X	X	X	X	X
SED18B	X	X	X	X	X	X	X
SED18C	X	X	X	X	X	X	X
SED19A	X	X	X	X	X	X	X
SED19B	X	X	X	X	X	X	X

TABLE 1
SAMPLE MATRIX SUMMARY
1997 - 2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Medium:	SEDIMENT						SURFACE WATER
Laboratory Analsis	Inorganics	PCBs	PAHs	Grain Size	Solids	TOC	Water Quality
NEAR-SITE							
2004 (GM)							
SED19C	X	X	X	X	X	X	X
SED20A	X	X	X	X	X	X	X
SED20B	X	X	X	X	X	X	X
SED20C	X	X	X	X	X	X	X
SED21A	X	X	X	X	X	X	X
SED21B	X	X	X	X	X	X	X
SED21C	X	X	X	X	X	X	X
SED22A	X	X	X	X	X	X	X
SED22B	X	X	X	X	X	X	X
SED22C	X	X	X	X	X	X	X
SED23A	X	X	X	X	X	X	X
SED23B	X	X	X	X	X	X	X
SED23C	X	X	X	X	X	X	X
SED24A	X	X	X	X	X	X	X
SED24B	X	X	X	X	X	X	X
SED24C	X	X	X	X	X	X	X
SED25A	X	X	X	X	X	X	X
SED25B	X	X	X	X	X	X	X
SED25C	X	X	X	X	X	X	X
SED26A	X	X	X	X	X	X	X
SED26B	X	X	X	X	X	X	X
SED26C	X	X	X	X	X	X	X
SED27A	X	X	X	X	X	X	X
SED27B	X	X	X	X	X	X	X
SED27C	X	X	X	X	X	X	X
SED28A	X	X	X	X	X	X	X
SED28B	X	X	X	X	X	X	X
SED28C	X	X	X	X	X	X	X
SED29A	X	X	X	X	X	X	X
SED29B	X	X	X	X	X	X	X
SED29C	X	X	X	X	X	X	X
SED30A	X	X	X	X	X	X	X
SED30B	X	X	X	X	X	X	X
SED30C	X	X	X	X	X	X	X
SED31A	X	X	X	X	X	X	X
SED31B	X	X	X	X	X	X	X
SED31C	X	X	X	X	X	X	X
SED32A	X	X	X	X	X	X	X
SED32B	X	X	X	X	X	X	X
SED32C	X	X	X	X	X	X	X
SED33A	X	X	X	X	X	X	X
SED33B	X	X	X	X	X	X	X
SED33C	X	X	X	X	X	X	X
SED34A	X	X	X	X	X	X	X
SED34B	X	X	X	X	X	X	X
SED34C	X	X	X	X	X	X	X
SED35A	X	X	X	X	X	X	X
SED35B	X	X	X	X	X	X	X
SED35C	X	X	X	X	X	X	X
SED36A	X	X	X	X	X	X	X
SED36B	X	X	X	X	X	X	X
SED36C	X	X	X	X	X	X	X
SED37A	X	X	X	X	X	X	X
SED37B	X	X	X	X	X	X	X
SED37C	X	X	X	X	X	X	X
SED38A	X	X	X	X	X	X	X
SED38B	X	X	X	X	X	X	X
SED38C	X	X	X	X	X	X	X
SED39A	X	X	X	X	X	X	X
SED39B	X	X	X	X	X	X	X
SED39C	X	X	X	X	X	X	X

TABLE 1
SAMPLE MATRIX SUMMARY
1997 - 2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Medium:	SEDIMENT						SURFACE WATER
Laboratory Analsis	Inorganics	PCBs	PAHs	Grain Size	Solids	TOC	Water Quality
NEAR-SITE							
1997 (Exponent)							
T01A	X						
T01B	X						
T01C	X						
T01D	X						
T02A	X						
T02B	X						
T02C	X						
T02D	X						
T02E	X						
T03A	X						
T03B	X						
T03C	X						
T03D	X						
T03E	X						
T03F	X						
T04C	X						
T04D	X						
T04E	X						
T04F	X						
T04G	X						
T04H	X						
T04I	X						
T05A	X						
T05B	X						
T05C	X						
T05D	X						
T05E	X						
T05F	X						
T05G	X						
T05H	X						
T05I	X						
T06A	X						
T06B	X						
T06C	X						
T06D	X						
T06E	X						
T06F	X						
T06G	X						
T06H	X						
T06I	X						
T06K	X						
T07A	X						
T07B	X						
T07C	X						
T07D	X						
T07E	X						
T07F	X						
T07G	X						
T07H	X						
T08A	X						
T08B	X						
T08C	X						
T08D	X						
T08E	X						
T08F	X						
T08G	X						
T08I	X						
T09A	X						
T09B	X						
T09C	X						
T09D	X						
T09E	X						
T09F	X						
T09G	X						
T10A	X						

TABLE 1
SAMPLE MATRIX SUMMARY
1997 - 2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Medium:	SEDIMENT						SURFACE WATER
Laboratory Analsis	Inorganics	PCBs	PAHs	Grain Size	Solids	TOC	Water Quality
NEAR-SITE							
1997 (Exponent)							
T10B	X						
T10C	X						
T10D	X						
T10E	X						
T10F	X						
T10G	X						
T11C	X						
T11D	X						
T11E	X						
T11F	X						
T11G	X						
T11H	X						
T12A	X						
T12B	X						
T12C	X						
T12D	X						
T12E	X						
T12F	X						
T13A	X						
T13B	X						
T13C	X						
T13D	X						
T13E	X						
T13F	X						
BACKGROUND							
2004 (GM)							
SED40A	X	X	X	X	X	X	X
SED40B	X	X	X	X	X	X	X
SED40C	X	X	X	X	X	X	X
SED41A	X	X	X	X	X	X	X
SED41B	X	X	X	X	X	X	X
SED41C	X	X	X	X	X	X	X
SED42A	X	X	X	X	X	X	X
SED42B	X	X	X	X	X	X	X
SED42C	X	X	X	X	X	X	X
SED43A	X	X	X	X	X	X	X
SED43B	X	X	X	X	X	X	X
SED43C	X	X	X	X	X	X	X
SED44A	X	X	X	X	X	X	X
SED44B	X	X	X	X	X	X	X
SED44C	X	X	X	X	X	X	X
SED45A	X	X	X	X	X	X	X
SED45B	X	X	X	X	X	X	X
SED45C	X	X	X	X	X	X	X
BACKGROUND							
1997 (Exponent)							
T14A	X						
T14B	X						
T14C	X						
T14D	X						
T14E	X						
T15A	X						
T15B	X						
T15C	X						
T15D	X						
T16A	X						
T16B	X						
T16C	X						
T17A	X						
T17B	X						
T17C	X						
T17D	X						

Note:
Inorganics include the following metals: Antimony, Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Manganese, Mercury, Nickel, Zinc

TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	GM, 2004 SED1A 7/7/04 Near-Site	GM, 2004 SED2A 7/7/04 Near-Site	GM, 2004 SED3A 7/7/04 Near-Site	GM, 2004 SED4A 7/7/04 Near-Site	GM, 2004 SED5A 7/7/04 Near-Site	GM, 2004 SED6A 7/8/04 Near-Site	GM, 2004 SED7A 7/8/04 Near-Site	GM, 2004 SED8A 7/8/04 Near-Site	GM, 2004 SED9A 7/8/04 Near-Site	GM, 2004 SED10A 7/8/04 Near-Site	GM, 2004 SED11A 7/8/04 Near-Site	GM, 2004 SED12A 7/8/04 Near-Site	GM, 2004 SED13A 7/8/04 Near-Site
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)			52.6	49.6	38.5	38.7	51.3	49.5	58.5	50.5 [42.8]	50.7	81.2	56.7	47.6	52.7
TOC (mg/kg)			17,500	20,000	28,800	31,700	20,500	6,890	23,500	19,100 [22,500 J]	24,700	6,470	15,400	21,700	13,400
Total PCB (mg/kg)	0.07	5.3	**1.3**	**1.8**	**0.45**	**0.43**	0.13 U	**0.89 J**	**0.71 J**	**0.65 [0.48 J]**	**0.353**	**1.03**	0.12 U	0.14 U	**2.02 J**
Total PAH (mg/kg)	4.0	100	3.928 J	**7.538 J**	**4.18 J**	3.963 J	**5.357 J**	**4.662 J**	**5.9 J**	**3.629 J [5.56 J]**	**5.337 J**	3.56 J	**6.599 J**	**6.43 J**	2.92 J
Antimony (mg/kg)	2.0	25	1.08 UJ	1.15 UJ	1.48 UJ	1.47 UJ	1.11 UJ	0.63 UJ	0.55 UJ	0.64 UJ [0.75 UJ]	0.61 UJ	**34.3 J**	1.01 UJ	1.2 UJ	1.08 UJ
Arsenic (mg/kg)	6.0	33	**7.3**	**14.3 J**	**9.3 J**	**9.5 J**	**19.2**	**13.7**	**10.9**	**7.6 [9 J]**	**7.4**	**6.4**	**16.5**	**21.8 J**	**11.3**
Barium (mg/kg)	NA	NA	162	362 J	96.1 J	92.1 J	83.3	106	178	79 [90.6 J]	79.9	7,880	66.7	102 J	213
Cadmium (mg/kg)	0.6	9.0	0.18 UJ	**1.2 J**	0.05 UJ	0.05 UJ	0.04 UJ	0.41 J	0.05 UJ	0.79 UJ [1.1 UJ]	0.8 UJ	0.29 J	0.03 UJ	0.04 UJ	**0.74 J**
Chromium (mg/kg)	26	110	**67.9**	**121 J**	**61.3 J**	**70.1 J**	**54.9**	**102**	**81.7**	**53.2 [61 J]**	**47.5**	**196**	**39.3**	**71.2 J**	**81.6**
Copper (mg/kg)	16	110	**67.5**	**158 J**	**65 J**	**76.5 J**	**101**	**141**	**113**	**61.2 [71.3 J]**	**52.5**	**65.8**	**84.6**	**123 J**	**90.7**
Lead (mg/kg)	31	110	**82.9**	**170 J**	**70.9 J**	**85.5 J**	**105**	**136**	**114**	**67.5 [78.2 J]**	**60**	**1,070**	**84.1**	**146 J**	**108**
Manganese (mg/kg)	460	1100	**508**	**561 J**	**1,360 J**	**1,220 J**	**515**	**558**	453	**838 [969 J]**	**1,020**	250	**525**	**780 J**	**591**
Mercury (mg/kg)	0.2	1.3	**1.2**	NA	**0.63 J**	**0.79 J**	**1.3**	**3.4**	**1.8**	**0.69 [0.82 J]**	**0.55**	0.13	**1.1**	**1.4 J**	**2.3**
Nickel (mg/kg)	16	50	**29.1**	**39 J**	**35.3 J**	**37.5 J**	**29.6**	**33.8**	**29.3**	**28 [32.6 J]**	**26.8**	**31.2**	**27.3**	**33.7 J**	**32.8**
Zinc (mg/kg)	120	270	**172**	**260 J**	**197 J**	**212 J**	**212**	**246**	**214**	**162 [191 J]**	**155**	**2,170**	**185**	**259 J**	**201**

See Notes on Page 21.

TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	GM, 2004 SED14A 7/9/04 Near-Site	GM, 2004 SED15A 7/9/04 Near-Site	GM, 2004 SED16A 7/12/04 Near-Site	GM, 2004 SED17A 7/12/04 Near-Site	GM, 2004 SED18A 7/9/04 Near-Site	GM, 2004 SED19A 7/9/04 Near-Site	GM, 2004 SED20A 7/12/04 Near-Site	GM, 2004 SED21A 7/9/04 Near-Site	GM, 2004 SED22A 7/9/04 Near-Site	GM, 2004 SED23A 7/12/04 Near-Site	GM, 2004 SED24A 7/12/04 Near-Site	GM, 2004 SED25A 7/12/04 Near-Site	GM, 2004 SED26A 7/13/04 Near-Site
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)			47.1	41.9	54.6	48.9	46.6	43.6	51.6	46.8	61.4	57.5	55.6 [57.1]	50.8	78.7
TOC (mg/kg)			26,000 J	24,300 J	17,800	19,000 J	23,400 J	22,400 J	36,200	27,400 J	13,000	10,700	10,200 [18,900]	22,400	3,140
Total PCB (mg/kg)	0.07	5.3	**0.81 J**	**1.15 J**	0.12 U	**0.78 J**	**0.61 J**	**1.61 J**	**1.9**	**0.64 J**	**0.38 J**	0.12 U	0.12 U [0.12 U]	**1.27 J**	0.085 UJ
Total PAH (mg/kg)	4.0	100	**5.46 J**	**10.32 J**	**6.242 J**	**4.7 J**	**6.065 J**	**10.88 J**	**5.711 J**	**7.192 J**	1.046 J	0.57 U	0.59 U [0.58 U]	1.027 J	1.499 J
Antimony (mg/kg)	2.0	25	1.27 UJ	1.43 UJ	1 UJ	1.2 UJ	0.68 UJ	2.6 UJ	1.1 UJ	0.67 UJ	0.52 UJ	0.99 UJ	1 UJ [1 UJ]	1.1 UJ	0.9 UJ
Arsenic (mg/kg)	6.0	33	**8.9 J**	**9.6 J**	**17.9**	**10 J**	**9 J**	**9 J**	**20.3**	**18.7 J**	**10.7**	**6.8**	**8.3 [9.9]**	**14.3**	3.5
Barium (mg/kg)	NA	NA	111 J	212 J	73.8	90.6 J	118 J	965 J	93.4	110 J	177	39.8	40.7 [37.6]	73	27.7
Cadmium (mg/kg)	0.6	9.0	0.04 UJ	0.05 UJ	0.16 UJ	0.56 J	0.04 UJ	0.04 UJ	0.28 J	0.38 J	0.03 UJ	0.48 UJ	0.034 UJ [0.36 UJ]	0.09 UJ	0.35 UJ
Chromium (mg/kg)	26	110	**65.3 J**	**67.7 J**	**42.2**	**74.3 J**	**69.1 J**	**152 J**	**79.5**	**113 J**	**39.4**	23.3	24.3 [23.7]	**52**	13.6
Copper (mg/kg)	16	110	**73.8 J**	**69 J**	**78.5**	**90 J**	**76.7 J**	**69.5 J**	**127**	**154 J**	**44.1**	**16.7**	**17.6 [17.3]**	**55.4**	12.7
Lead (mg/kg)	31	110	**79.6 J**	**106 J**	**86.8**	**92.9 J**	**88.7 J**	**167 J**	**115**	**145 J**	**58.7**	16.8	16.4 [16.1]	**52.2**	10.3
Manganese (mg/kg)	460	1100	**742 J**	**1,380 J**	**599**	**618 J**	**733 J**	**1,030 J**	**1,040**	**1,020 J**	**550**	**502**	**804 [861]**	**891**	221
Mercury (mg/kg)	0.2	1.3	**0.91 J**	**0.75 J**	**0.8**	**1.2 J**	**0.87 J**	**0.78 J**	**1.1**	**2.5 J**	**0.47**	0.09	0.08 [0.18]	**0.69**	0.04 U
Nickel (mg/kg)	16	50	**31.7 J**	**34.5 J**	**28.2**	**31.2 J**	**33.5 J**	**37.3 J**	**32.3**	**38.2 J**	**26.4**	**23.8**	**20.4 [20.3]**	**33.5**	15.7
Zinc (mg/kg)	120	270	**191 J**	**240 J**	**182 J**	**194 J**	**199 J**	**467 J**	**222 J**	**291 J**	**123**	73.8 J	69.7 J [76.3 J]	**139 J**	49.6

See Notes on Page 21.

TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source	LEL	SEL	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004
Sample ID			SED27A	SED28A	SED29A	SED30A	SED31A	SED32A	SED33A	SED34A	SED35A	SED36A	SED37A	SED38A	SED39A
Date			7/13/04	7/13/04	7/13/04	7/13/04	7/13/04	7/13/04	7/14/04	7/14/04	7/14/04	7/14/04	7/14/04	7/14/04	7/14/04
			Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)			62.1	59.7	61.7	63.3 [61.8]	53.6	42.7	49.8	46.6	47.3	50	79	52.2 [47.6]	59.4
TOC (mg/kg)			21,300	12,500	13,800	13,600 [16,200]	19,300	19,200 J	25,400	24,100 J	26,700 J	16,100	980	23,800 [22,700 J]	7,490
Total PCB (mg/kg)	0.07	5.3	0.11 UJ	0.06	0.11 UJ	**0.49 [0.324]**	**0.52 J**	**0.56 J**	**0.44 J**	**0.88 J**	**0.68 J**	**0.7 J**	0.085 U	**0.42 [0.57 J]**	**0.246 J**
Total PAH (mg/kg)	4.0	100	0.056 J	0.146 J	0.53 U	**7.582 J [16.439 J]**	3.238 J	3.66 J	**5.151 J**	**9.697 J**	**6.69 J**	3.423 J	0.42 U	**7.82 J [7.27 J]**	2.143 J
Antimony (mg/kg)	2.0	25	1.2 UJ	1.2 UJ	1.2 UJ	1.1 UJ [1.2 UJ]	1.3 UJ	1.7 UJ	0.63 UJ	0.67 UJ	0.68 U	0.65 UJ	0.65 J	0.61 UJ [0.67 UJ]	0.52 UJ
Arsenic (mg/kg)	6.0	33	**6.9**	**6.8**	**6.4**	5.8 [5.7]	**7.1**	**7.7 J**	**8.2 J**	**9.9 J**	**9.3 J**	**7 J**	1.9 J	**7 J [8.4 J]**	5.8 J
Barium (mg/kg)	NA	NA	48.3	32.3	37	136 [133]	69.5	73.3 J	97.1	218 J	161 J	65.6	78.5	106 [96.6 J]	109
Cadmium (mg/kg)	0.6	9.0	0.41 UJ	0.44 UJ	0.49 UJ	0.2 UJ [0.05 UJ]	0.26 UJ	0.16 UJ	0.18 J	**0.88 J**	0.47 J	0.26 UJ	0.14 UJ	0.29 J [0.33 UJ]	0.29 J
Chromium (mg/kg)	26	110	23.8	23.8	22.8	**32.5 [36]**	**52.7**	**58.8 J**	**49.8**	**74.1 J**	**57.6 J**	**52.2**	14.1	**46.3 [49.8 J]**	**37.5**
Copper (mg/kg)	16	110	**23**	14.7	**16.1**	**33.1 [39]**	**59.3**	**66 J**	**59.8**	**83.3 J**	**66.6 J**	**58.9**	8.6	**52.9 [57.4 J]**	**36.4**
Lead (mg/kg)	31	110	**34.9**	12.6	14.4	**115 [65.2]**	**59.6**	**70.5 J**	**63.7**	**98.6 J**	**74.9 J**	**61.5**	**39.1**	**64.2 [59.5 J]**	**52**
Manganese (mg/kg)	460	1100	**1,880**	**720**	**695**	**489 [403]**	**643**	**919 J**	**740**	**652 J**	**779 J**	**577**	192	**769 [815 J]**	**555**
Mercury (mg/kg)	0.2	1.3	0.12	0.06	0.06	**0.42 [0.42]**	**0.59**	**0.74 J**	**0.59 N**	**1.1 J**	**0.74 J**	**0.67 N**	0.06 N	**0.63 N [0.63 J]**	**0.51 N**
Nickel (mg/kg)	16	50	**25.5**	**21.7**	**21.8**	**19 [21.2]**	**26.6**	**32.2 J**	**26.7**	**32 J**	**27.7 J**	**27.3**	11.9	**25.1 [26.8 J]**	**21.3**
Zinc (mg/kg)	120	270	78.2	66.4	67.9	**143 [127]**	**153**	**178 J**	**151**	**210 J**	**168 J**	**156**	82.5	**147 [154 J]**	118

See Notes on Page 21.

TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	GM, 2004 SED1B 7/7/04 Near-Site	GM, 2004 SED2B 7/7/04 Near-Site	GM, 2004 SED3B 7/7/04 Near-Site	GM, 2004 SED4B 7/7/04 Near-Site	GM, 2004 SED5B 7/7/04 Near-Site	GM, 2004 SED6B 7/8/04 Near-Site	GM, 2004 SED7B 7/8/04 Near-Site	GM, 2004 SED8B 7/8/04 Near-Site	GM, 2004 SED9B 7/8/04 Near-Site	GM, 2004 SED10B 7/8/04 Near-Site	GM, 2004 SED11B 7/8/04 Near-Site	GM, 2004 SED12B 7/8/04 Near-Site	GM, 2004 SED13B 7/8/04 Near-Site
Depth (inches)			2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6
Solids (%)			55.1	58.3	42.8	40.8	52.1	53.2	51.4	47.5 [44.7]	52.6	79	55.1	52	57.1
TOC (mg/kg)			17,000	16,700	20,200	25,400	19,800	19,000	17,000	22,200 J [22,800 J]	25,100	4,880	25,800	17,100	20,800
Total PCB (mg/kg)	0.07	5.3	**1.2**	**0.44**	**0.41**	**0.52**	0.13 U	**0.076 J**	**0.94 J**	**0.81 J [0.71 J]**	**0.51**	**2.7**	0.12 U	0.13 U	**0.85**
Total PAH (mg/kg)	4.0	100	**4.035 J**	2.76 J	**4.27 J**	**5.018 J**	**9.136 J**	**9.314 J**	**6.426 J**	**5.308 J [4.31 J]**	**7.26 J**	**14.74 J**	**12.577 J**	**6.043 J**	2.198 J
Antimony (mg/kg)	2.0	25	1.03 UJ	0.98 UJ	1.33 UJ	1.4 UJ	1.09 UJ	0.6 UJ	0.64 J	0.68 UJ [0.69 UJ]	0.61 UJ	**48.4**	1.01 UJ	1.1 UJ	1 UJ
Arsenic (mg/kg)	6.0	33	**11.3**	**11.9**	**10.8 J**	**11 J**	**18.4**	**17.2**	**14.3**	**9.2 J [9.1 J]**	**7.4**	**10.2**	**16.4**	**15.2**	**11.9**
Barium (mg/kg)	NA	NA	125	89.2	93.1 J	91.9 J	84.4	76.8	114	80 J [87.3 J]	149	8,000	67.5	72.8	99.7
Cadmium (mg/kg)	0.6	9.0	**0.63 J**	0.05 UJ	0.04 UJ	0.05 UJ	0.04 UJ	1.1 UJ	0.15 UJ	0.8 UJ [0.88 UJ]	0.8 UJ	**1.2 J**	0.03 UJ	0.04 UJ	**0.94 J**
Chromium (mg/kg)	26	110	**79.2**	**56.6**	**70.1 J**	**67.7 J**	**46.8**	**51**	**106**	**63.1 J [64.7 J]**	**48.8**	**264**	**41**	**46.2**	**87.6**
Copper (mg/kg)	16	110	**95.3**	**63.7**	**80 J**	**73.5 J**	**97**	**95.3**	**148**	**71.4 J [75.1 J]**	**53.6**	**43.2**	**103**	**92.5**	**114**
Lead (mg/kg)	31	110	**102**	**70.4**	**88.5 J**	**81.1 J**	**98.7**	**100**	**161**	**81.9 J [84.7 J]**	**82.7**	**1,470**	**92.5**	**103**	**126**
Manganese (mg/kg)	460	1100	**609**	**603**	**1,280 J**	**1,150 J**	**543**	**499**	**554**	**931 J [982 J]**	**1,100**	279	**509**	**515**	**581**
Mercury (mg/kg)	0.2	1.3	**2.4**	**2.2**	**0.84 J**	**0.76 J**	**1.2**	**1**	**2.3**	**0.87 J [1.3 J]**	**0.62**	**0.32**	**1.4**	**0.99**	**2.6**
Nickel (mg/kg)	16	50	**32.7**	**29.2**	**35.5 J**	**35.8 J**	**28.9**	**29.8**	**34.2**	**30.9 J [32.5 J]**	**26.1**	**48.3**	**30.7**	**28.8**	**31.3**
Zinc (mg/kg)	120	270	**194**	**143**	**203 J**	**201 J**	**201**	**198**	**268**	**182 J [192 J]**	**166**	**2,300**	**209**	**202**	**212**

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TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source	LEL	SEL	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004
Sample ID			SED14B	SED15B	SED16B	SED17B	SED18B	SED19B	SED20B	SED21B	SED22B	SED23B	SED24B	SED25B	SED26B
Date			7/9/04	7/9/04	7/12/04	7/12/04	7/9/04	7/9/04	7/12/04	7/9/04	7/9/04	7/12/04	7/12/04	7/12/04	7/13/04
			Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site
Depth (inches)			2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6
Solids (%)			46.7	38.4	63.1	50.6	47.4	44.8	48.1	47.4	63.3	58.6	64.4 [66.7]	53.7	73.8
TOC (mg/kg)			26,300 J	24,500 J	16,900	24,700	22,100 J	24,800 J	23,200 J	23,900 J	11,300	10,800	12,000 [16,100]	18,700	2,380
Total PCB (mg/kg)	0.07	5.3	**1 J**	**0.55 J**	0.11 U	**0.43**	**1.33 J**	**0.99 J**	**1.7 J**	**0.63 J**	0.11 U	0.11 U	0.1 U [0.1 U]	**2.11 J**	0.091 UJ
Total PAH (mg/kg)	4.0	100	**5.29 J**	**4.448 J**	**6.829 J**	**6.71 J**	**4.66 J**	**11.27 J**	**6.03 J**	**5.49 J**	0.263 J	0.56 U	0.51 U [0.49 U]	2.774 J	0.45 U
Antimony (mg/kg)	2.0	25	1.28 UJ	1.56 UJ	0.9 UJ	1.1 UJ	0.67 UJ	**2.2 UJ**	1.2 UJ	0.65 UJ	0.5 UJ	0.97 UJ	0.89 UJ [1.1 UJ]	1.1 UJ	1 UJ
Arsenic (mg/kg)	6.0	33	**9 J**	**10.4 J**	**14.6**	**20.4**	**11.3 J**	**10.1 J**	**28.8 J**	**16.2 J**	**7.1**	5.8	**6.6 [6.2]**	**12.3**	4.7
Barium (mg/kg)	NA	NA	107 J	92.6 J	54.4	103	226 J	359 J	108 J	114 J	30.4	41.8	31.7 [32.3]	95.6	21.2
Cadmium (mg/kg)	0.6	9.0	0.04 UJ	0.05 UJ	0.23 UJ	0.21 J	0.13 UJ	0.04 UJ	0.04 UJ	**1.1 J**	0.03 UJ	0.43 UJ	0.029 UJ [0.074 UJ]	0.6 UJ	0.45 UJ
Chromium (mg/kg)	26	110	**71.8 J**	**69.7 J**	**29.9**	**91.5**	**103 J**	**77.4 J**	**86.5 J**	**110 J**	20.2	22.1	19.9 [19.8]	**85.4**	12.5
Copper (mg/kg)	16	110	**82 J**	**76.3 J**	**56.4**	**198**	**109 J**	**85.5 J**	**174 J**	**146 J**	15.7	13.4	11.4 [10.9]	**110**	12.3
Lead (mg/kg)	31	110	**87.3 J**	**97.9 J**	**56.2**	**124**	**134 J**	**132 J**	**144 J**	**144 J**	13.5	14.5	10.3 [8.9]	**99.9**	6.8 U
Manganese (mg/kg)	460	1100	**829 J**	**1,470 J**	**570**	**783**	**706 J**	**1,170 J**	**1,320 J**	**1,200 J**	**663**	**625**	**784 [668]**	**825**	275
Mercury (mg/kg)	0.2	1.3	**0.94 J**	**0.8 J**	**0.61**	**1.2**	**1.7 J**	**0.92 J**	**1.4 J**	**4.8 J**	0.09	0.06 U	0.05 U [0.05 U]	**1.5**	0.04 U
Nickel (mg/kg)	16	50	**32.6 J**	**39.5 J**	**23.3**	**32.8**	**38.4 J**	**37.8 J**	**36 J**	**38.3 J**	**20.4**	**22.9**	**19.3 [19]**	**36**	**17**
Zinc (mg/kg)	120	270	**193 J**	**224 J**	**125 J**	**242 J**	**242 J**	**267 J**	**254 J**	**280 J**	65.7	68.3 J	57.8 J [56.7 J]	**194 J**	45.2

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TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source	LEL	SEL	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004	GM, 2004
Sample ID			SED27B	SED28B	SED29B	SED30B	SED31B	SED32B	SED33B	SED34B	SED35B	SED36B	SED37B	SED38B	SED39B
Date			7/13/04	7/13/04	7/13/04	7/13/04	7/13/04	7/13/04	7/14/04	7/14/04	7/14/04	7/14/04	7/14/04	7/14/04	7/14/04
			Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site	Near-Site
Depth (inches)			2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6
Solids (%)			53.5	72.2	65.1	66.3 [67.1]	53.7	57.4	42.5	52.5	56	46.3	81.2	51.5 [51.2]	66.1
TOC (mg/kg)			17,000	12,300	14,500	10,300 [16,900]	34,500	22,100	17,600 J	22,500	26,900	19,500 J	707	19,700 [23,400]	9,240
Total PCB (mg/kg)	0.07	5.3	0.13 UJ	0.025 J	0.1 UJ	**0.53 [0.379]**	**0.7 J**	**0.46 J**	**0.63 J**	**2.41 J**	**0.66**	**0.79 J**	0.083 U	**1.9 [6.33]**	**0.241**
Total PAH (mg/kg)	4.0	100	0.62 U	0.46 U	0.51 U	**6.882 J [1.312 J]**	**5.11 J**	2.431 J	**8.19 J**	**4.283 J**	**7.201 J**	3.961 J	0.41 U	**5.32 J [5.69 J]**	1.408 J
Antimony (mg/kg)	2.0	25	1.4 UJ	1 UJ	1.1 UJ	1.1 UJ [1.1 UJ]	1.3 UJ	1.3 UJ	0.74 UJ	1.7 UJ	0.57 UJ	0.66 UJ	0.93 J	1 J [1.3 J]	**3 J**
Arsenic (mg/kg)	6.0	33	**7.7**	4.8	**7.5**	**8.6 [8.8]**	**7.9**	**6.9**	**9.8 J**	**14**	**7.5 J**	**8.4 J**	1.7 J	**9.5 J [10.8 J]**	**9.7 J**
Barium (mg/kg)	NA	NA	58.4	26.2	31.3	88.1 [83.4]	101	64.2	130 J	652	142	80.7 J	44.2	231 [229]	212
Cadmium (mg/kg)	0.6	9.0	0.57 UJ	0.37 UJ	0.45 UJ	0.17 UJ [0.03 UJ]	0.42 J	0.09 UJ	0.48 J	**1.9 J**	0.55 J	0.11 J	0.12 UJ	**1.8 J [2.2 J]**	**1.2 J**
Chromium (mg/kg)	26	110	**26.9**	18	21.5	**34.5 [37.3]**	**66.4**	**46.3**	**62.1 J**	**110**	**61.3**	**70 J**	13.1	**97 [113]**	**47.5**
Copper (mg/kg)	16	110	**26.1**	10.9	12.8	**39.6 [41.5]**	**75.4**	**52.9**	**77.5 J**	**120**	**65.8**	**82.8 J**	9	**86.8 [95.8]**	**42.7**
Lead (mg/kg)	31	110	**41.3**	8.9	10	**52.9 [57.1]**	**80.5**	**59.3**	**82.3 J**	**167**	**76.9**	**83.7 J**	**53.7**	**121 [144]**	**144**
Manganese (mg/kg)	460	1100	**2,140**	**523**	**829**	**494 [542]**	**596**	**861**	**762 J**	**605**	**680**	**682 J**	107	**650 [647]**	**505**
Mercury (mg/kg)	0.2	1.3	0.12	0.04	0.05 U	**0.8 [0.58]**	**0.94**	**0.61**	**1 J**	**4.9 N**	**0.72 N**	**0.86 J**	0.09 N	**0.64 N [1.5 N]**	**3.5 N**
Nickel (mg/kg)	16	50	**29.3**	**17.4**	**22.1**	**24 [23.6]**	**28.3**	**25.6**	**30.2 J**	**42.2**	**27.3**	**31.4 J**	12.5	**32.2 [35.3]**	**26.3**
Zinc (mg/kg)	120	270	90.2	54.5	66	123 [115]	**169**	**142**	**186 J**	**352**	**166**	**188 J**	76.1	**231 [251]**	**213**

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TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	GM, 2004 SED1C 7/7/04 Near-Site	GM, 2004 SED2C 7/7/04 Near-Site	GM, 2004 SED3C 7/7/04 Near-Site	GM, 2004 SED4C 7/7/04 Near-Site	GM, 2004 SED5C 7/7/04 Near-Site	GM, 2004 SED6C 7/8/04 Near-Site	GM, 2004 SED7C 7/8/04 Near-Site	GM, 2004 SED8C 7/8/04 Near-Site	GM, 2004 SED9C 7/8/04 Near-Site	GM, 2004 SED10C 7/8/04 Near-Site	GM, 2004 SED11C 7/8/04 Near-Site	GM, 2004 SED12C 7/8/04 Near-Site	GM, 2004 SED13C 7/8/04 Near-Site
Depth (inches)			6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12
Solids (%)			53.5	55.9	43.1	44.2	50.7	56.5	55	49.6 [48.7]	48.8	65.8	55.8	60.5	49.7
TOC (mg/kg)			23,000	19,600	22,300 J	27,000 J	21,500	17,300	21,600	21,500 [20,000 J]	25,300 J	13,900	19,000	18,000	20,500
Total PCB (mg/kg)	0.07	5.3	**0.79**	**0.92**	**0.45 J**	**0.49 J**	0.13 U	0.12 U	**0.5 J**	**0.78 J**	**0.38 J**	**4.81**	0.12 U	0.11 U	**0.73**
Total PAH (mg/kg)	4.0	100	**10.6 J**	**9.18 J**	1.03 J	**4.63 J**	**16.2 J**	**9.32 J**	**6.449 J**	**4.49 J [4.168 J]**	2.976 J	**8.48 J**	**6.69 J**	**9.52 J**	**6.08**
Antimony (mg/kg)	2.0	25	**2.7 B**	**3.6 B**	**2.1 J**	1.9 J	1.6 B	1.2 B	0.58 UJ	0.64 UJ [0.65 UJ]	0.66 UJ	**21.3**	1 U	1 B	1.15 UJ
Arsenic (mg/kg)	6.0	33	**15.4**	**14.2**	**10.6 J**	**12.2 J**	**17.8**	**15.1**	**15.7**	**9.6 [8.9 J]**	**7.6 J**	**9.6**	**14.9**	**15**	**20.1**
Barium (mg/kg)	NA	NA	129	115	85.1 J	96.3 J	70.2	68	101	174 [93.7 J]	76 J	6,620	64.4	57.2	113
Cadmium (mg/kg)	0.6	9.0	**2 J**	**3 J**	**1.1 J**	**1.5 J**	**0.75 J**	**0.8 J**	0.34 J	0.93 UJ [0.99 UJ]	0.98 UJ	0.5 J	**0.68 J**	**0.72 J**	0.44 UJ
Chromium (mg/kg)	26	110	**95.7**	**94.5**	**64.9 J**	**75 J**	**42.8**	**40.2**	**92.9**	**63.9 [59.3 J]**	**53.1 J**	**141**	**38.9**	**34.9**	**98.5**
Copper (mg/kg)	16	110	**131**	**119**	**70 J**	**80.1 J**	**107**	**88.6**	**142**	**70.7 [65.5 J]**	**57.2 J**	**65.8**	**89.3**	**72.3**	**172**
Lead (mg/kg)	31	110	**176**	**126**	**75.5 J**	**84.1 J**	**89.4**	**79**	**132**	**80.2 [78 J]**	**67.8 J**	**938**	**77.7**	**67.8**	**145**
Manganese (mg/kg)	460	1100	**476**	**653**	**1,160 J**	**1,310 J**	**540**	450	**562**	**1,140 [1,070 J]**	**1,070 J**	**462**	**463**	447	**596**
Mercury (mg/kg)	0.2	1.3	**2.7**	**2.5**	**0.82 J**	**0.85 J**	**1.6**	**0.9**	**3.2**	**0.86 [0.61 J]**	**0.57 J**	**0.59**	**1.8**	**0.69**	**2.1**
Nickel (mg/kg)	16	50	**31.8**	**35.3**	**34.4 J**	**37.5 J**	**30.1**	**25.9**	**32.6**	**32.6 [32.1 J]**	**29.1 J**	**36.6**	**28.7**	**24.6**	**34.9**
Zinc (mg/kg)	120	270	**252 J**	**246 J**	**198 J**	**225 J**	**221 J**	**178 J**	**256**	**189 [177 J]**	**169 J**	**901**	**195 J**	**163 J**	**262**

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TABLE 2
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Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	GM, 2004 SED14C 7/9/04 Near-Site	GM, 2004 SED15C 7/9/04 Near-Site	GM, 2004 SED16C 7/12/04 Near-Site	GM, 2004 SED17C 7/12/04 Near-Site	GM, 2004 SED18C 7/9/04 Near-Site	GM, 2004 SED19C 7/9/04 Near-Site	GM, 2004 SED20C 7/12/04 Near-Site	GM, 2004 SED21C 7/9/04 Near-Site	GM, 2004 SED22C 7/9/04 Near-Site	GM, 2004 SED23C 7/12/04 Near-Site	GM, 2004 SED24C 7/12/04 Near-Site	GM, 2004 SED25C 7/12/04 Near-Site
Depth (inches)			6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12
Solids (%)			46.3	41.1	55.3	51.4	49.5 [49.3]	46 [44.3]	48.3	48.4	56.7	56.3	63.6 [62.4]	50
TOC (mg/kg)			27,600 J	27,200 J	24,600	34,800	5,200 J [22,100	25,000 J [27,000 J	26,600 J	29,200 J	14,200	12,800	11,700 [11,900]	29,600
Total PCB (mg/kg)	0.07	5.3	**0.8 J**	**0.84 J**	0.12 U	**0.32**	**1 J [1.35 J]**	**0.55 J [0.74 J]**	**0.45 J**	**0.42 J**	**0.091**	0.12 U	0.11 U [0.11 U]	**2.69**
Total PAH (mg/kg)	4.0	100	**4.43 J**	**5.991 J**	**10.4 J**	**6.39 J**	**4.52 J [3.55 J]**	**2.8 J [5.29 J]**	**5.87 J**	**6.12 J**	**0.137 J**	0.59 U	0.52 U [0.53 U]	**5.451 J**
Antimony (mg/kg)	2.0	25	1.3 UJ	1.46 UJ	1.1 B	**2.8 B**	**2.7 J [3.1 J]**	**2.7 J [2.5 J]**	**2.4 J**	**3.6 J**	1 U	1 U	0.9 UJ [0.91 UJ]	1.1 UJ
Arsenic (mg/kg)	6.0	33	**9.9 J**	**10.3 J**	**23**	**21.7**	**10.7 J [11.1 J]**	**10.1 J [10.8 J]**	**27 J**	**21.6 J**	**11.3**	**8.3**	**6.5 [9.4]**	**15.8**
Barium (mg/kg)	NA	NA	92.5 J	108 J	83.9	102	125 J [164 J]	206 J [249 J]	116 J	109 J	52.9	40.3	34.9 [34]	129
Cadmium (mg/kg)	0.6	9.0	0.04 UJ	0.05 UJ	**0.83 J**	**1.6 J**	**2 J [2 J]**	**1.2 J [1.2 J]**	**1.4 J**	**3 J**	**0.91 J**	0.48 J	0.41 UJ [0.17 UJ]	**4 J**
Chromium (mg/kg)	26	110	**75.6 J**	**69.6 J**	**46.2**	**104**	**93.1 J [95.1 J]**	**66 J [70.2 J]**	**88.3 J**	**124 J**	**36.1**	23.3	22.4 [24]	**144**
Copper (mg/kg)	16	110	**84 J**	**73.3 J**	**114**	**172**	**94.7 J [102 J]**	**69 J [72.2 J]**	**176 J**	**165 J**	**33.3**	14	11.5 [13.3]	**162**
Lead (mg/kg)	31	110	**88.7 J**	**89.7 J**	**89.1**	**126**	**115 J [117 J]**	**85.5 J [95.8 J]**	**137 J**	**142 J**	28.1	12	9.7 [11.4]	**198**
Manganese (mg/kg)	460	1100	**941 J**	**1,410 J**	**802**	**740**	**696 J [711 J]**	**1,020 J [1,100 J]**	**960 J**	**1,200 J**	**755**	**688**	**654 [685]**	**921**
Mercury (mg/kg)	0.2	1.3	**1.2 J**	**0.74 J**	**1**	**1.2**	**1.6 J [1.6 J]**	**0.84 J [0.79 J]**	**1.4 J**	**5 J**	**0.21**	0.06 U	0.05 U [0.05 U]	**5.3**
Nickel (mg/kg)	16	50	**34.5 J**	**37.5 J**	**30**	**34.3**	**35 J [35.8 J]**	**32 J [32.9 J]**	**37.2 J**	**38.8 J**	**29**	**23.5**	**21.6 [23.6]**	**39.7**
Zinc (mg/kg)	120	270	**201 J**	**215 J**	**212 J**	**275 J**	**237 J [228 J]**	**230 J [235 J]**	**270 J**	**320 J**	106 J	72.7 J	64 J [69 J]	**324 J**

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TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	GM, 2004 SED26C 7/13/04 Near-Site	GM, 2004 SED27C 7/13/04 Near-Site	GM, 2004 SED28C 7/13/04 Near-Site	GM, 2004 SED29C 7/13/04 Near-Site	GM, 2004 SED30C 7/13/04 Near-Site	GM, 2004 SED31C 7/13/04 Near-Site	GM, 2004 SED32C 7/13/04 Near-Site	GM, 2004 SED33C 7/14/04 Near-Site	GM, 2004 SED34C 7/14/04 Near-Site	GM, 2004 SED35C 7/14/04 Near-Site	GM, 2004 SED36C 7/14/04 Near-Site	GM, 2004 SED37C 7/14/04 Near-Site
Depth (inches)			6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12	6-12
Solids (%)			78.1	51.9	61.8	63.6	67.2 [66]	54.7	44.1	44.6	57.6	46	48 [51.2]	81.1
TOC (mg/kg)			2,580	16,800	13,200	14,300	15,300 [19,400]	22,500	26,400 J	24,800 J	14,400	26,600 J	25,400 J [23,700	788
Total PCB (mg/kg)	0.07	5.3	0.086 UJ	0.13 U	0.11 UJ	0.11 UJ	**0.194 J [0.14]**	**1.27**	**0.51 J**	**0.64 J**	0.068	**1.01 J**	**4.18 J [1.91 J]**	0.083 U
Total PAH (mg/kg)	4.0	100	0.42 U	0.64 U	0.53 U	0.52 U	2.706 J [0.767 J]	**5.08 J**	3.84 J	3 J	0.782 J	**4.72 J**	3.6 J [2.27 J]	0.81 U
Antimony (mg/kg)	2.0	25	0.9 UJ	1.1 U	1.2 UJ	1.2 UJ	1.1 UJ [0.47 UJ]	**2.6 B**	1.6 J	**2.7 J**	0.56 UJ	**4.3 J**	**4.4 J [3.9 B]**	**4 J**
Arsenic (mg/kg)	6.0	33	4.8	**12.8**	**6.1**	**9.6**	**11.2 [11.2]**	**9.9**	**12.4 J**	**13 J**	**13.2**	**13.2 J**	**11.4 J [10.4]**	2.3 J
Barium (mg/kg)	NA	NA	17.5	51.8	36.5	32.6	57 [57.9]	363	81.9 J	110 J	51.3	148 J	206 J [212]	256
Cadmium (mg/kg)	0.6	9.0	0.51 UJ	0.59 J	0.52 UJ	0.58 UJ	0.34 UJ [0.03 UJ]	**2 J**	**1.2 J**	**1.6 J**	0.08 UJ	**2.3 J**	**2.7 J [2.7 J]**	0.1 UJ
Chromium (mg/kg)	26	110	11.5	**27.5**	24.9	22.5	**32.6 [29.8]**	**79**	**70.6 J**	**83.7 J**	**28.6**	**106 J**	**107 J [106]**	17.4
Copper (mg/kg)	16	110	11.2	**18.3**	13.7	13.2	**39.4 [30.1]**	**78.8**	**81.5 J**	**101 J**	**24.9**	**99.6 J**	**95.1 J [93.6]**	**16.5**
Lead (mg/kg)	31	110	6.1 U	17.1	10.5	10.4	**46.2 [42.8]**	**110**	**82.1 J**	**94.5 J**	25.9	**117 J**	**123 J [120]**	**127**
Manganese (mg/kg)	460	1100	272	**710**	**714**	**825**	**545 [539]**	**572**	**1,160 J**	**998 J**	**571**	**864 J**	**585 J [548]**	157
Mercury (mg/kg)	0.2	1.3	0.04 U	0.06	0.05 U	0.05 U	**0.59 [0.46]**	**2**	**0.98 J**	**1.1 J**	**0.54 N**	**1.2 J**	**1.3 J [1.4]**	0.07 N
Nickel (mg/kg)	16	50	15.8	**27.9**	**23.1**	**22.5**	**24.6 [24.8]**	**29.8**	**33.1 J**	**34.3 J**	**27.4**	**39.9 J**	**36.4 J [34.1]**	15
Zinc (mg/kg)	120	270	45.2	87 J	69.4	67.4	106 [99.2]	**226 J**	**194 J**	**215 J**	92.7	**242 J**	**245 J [237 J]**	111

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TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

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Source Sample ID Date	LEL	SEL	GM, 2004 SED38C 7/14/04 Near-Site	GM, 2004 SED39C 7/14/04 Near-Site	Exponent, 1997 T02A 7/15/97 Near-Site	Exponent, 1997 T02B 7/15/97 Near-Site	Exponent, 1997 T02C 7/15/97 Near-Site	Exponent, 1997 T02D 7/15/97 Near-Site	Exponent, 1997 T02E 7/15/97 Near-Site	Exponent, 1997 T03A 7/15/97 Near-Site	Exponent, 1997 T03B 7/15/97 Near-Site
Depth (inches)			6-12	6-12	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)			57.8 [58.8]	74.6							
TOC (mg/kg)			14,300 [15,900]	6,240							
Total PCB (mg/kg)	0.07	5.3	**2.8 [3.03 J]**	**0.096**							
Total PAH (mg/kg)	4.0	100	2.401 J [2.946 J]	1.62 J							
Antimony (mg/kg)	2.0	25	1.3 J [0.68 J]	**3.4 B**	1.61 UNJ	1.91 UNJ	1.61 UNJ	1.85 UNJ [1.9 UNJ]	2.08 UNJ	1.56 UNJ	1.75 UNJ
Arsenic (mg/kg)	6.0	33	**11.5 [11.7]**	**6.1**	**6.63**	**15.2**	**8.6**	**6.3 [6.43]**	**8.02**	**6.51**	**7.32**
Barium (mg/kg)	NA	NA	260 [180]	92	28.9	57.4	34.3	42.2 [45]	47.9	27.6	36.3
Cadmium (mg/kg)	0.6	9.0	**1.9 J [1.1 J]**	**1.5 J**	**1.86**	**3.1**	**2.12**	**2.39 [2.58]**	**2.67**	**1.93**	**1.98**
Chromium (mg/kg)	26	110	**102 [76.9]**	**31.8**	24.6	**49.9**	26	**51.5 [53.7]**	**53.3**	23.2	**27.5**
Copper (mg/kg)	16	110	**91.5 [67.5]**	**28.2**	18.6 U	**95.4**	24.9 U	**60.4 J [64.7 J]**	**61.7 J**	18.7 U	17.3 U
Lead (mg/kg)	31	110	**138 [99]**	**116**	16.1	**87.2**	30.2	**54.1 [58.6]**	**61**	15.6	14
Manganese (mg/kg)	460	1100	**642 [644]**	270	445	384	404	393 [552]	410	**480**	**538**
Mercury (mg/kg)	0.2	1.3	**3.4 N [0.87 N]**	**0.42**	0.241 U	**1.75**	**0.475**	**0.552 [0.565]**	**0.571**	0.234 U	0.263 U
Nickel (mg/kg)	16	50	**35.3 [32.1]**	**18.6**	**18.8**	**30**	**21.2**	**24.1 [25.2]**	**26.5**	**19.7**	**22.8**
Zinc (mg/kg)	120	270	**243 [191]**	**136 J**	69.5	**172**	77.5	**125 [135]**	**139**	68	69

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TABLE 2
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Source Sample ID Date	**LEL**	**SEL**	**Exponent, 1997 T03C 7/15/97 Near-Site**	**Exponent, 1997 T03D 7/15/97 Near-Site**	**Exponent, 1997 T03E 7/15/97 Near-Site**	**Exponent, 1997 T03F[a] 7/15/97 Near-Site**	**Exponent, 1997 T04C 7/15/97 Near-Site**	**Exponent, 1997 T04D 7/15/97 Near-Site**	**Exponent, 1997 T04E 7/15/97 Near-Site**	**Exponent, 1997 T04F 7/15/97 Near-Site**	**Exponent, 1997 T04G 7/15/97 Near-Site**
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)											
TOC (mg/kg)											
Total PCB (mg/kg)	0.07	5.3									
Total PAH (mg/kg)	4.0	100									
Antimony (mg/kg)	2.0	25	2.23 UNJ	1.72 UNJ	1.91 UNJ	2.35 UNJ	14.5 UNJ	14.7 UNJ	10.5 UNJ	11.2 UNJ	11.3 UNJ
Arsenic (mg/kg)	6.0	33	**7.28**	5.12	**7.76**	**6.68**	**10.8**	**8.26**	3.88	**12.1**	**13.3**
Barium (mg/kg)	NA	NA	54	43.1	35.9	54.6	115 *	87.3 *	114 *	44.1 *	52.7 *
Cadmium (mg/kg)	0.6	9.0	**2.99**	**1.69**	**2.31**	**2.47**	**4.33**	**3.41**	**2.06**	**2.5**	**2.77**
Chromium (mg/kg)	26	110	**55.1**	**32.1**	**47**	**50.6**	**109**	**84.8**	**41.1**	**45.3**	**70.1**
Copper (mg/kg)	16	110	**67.2 J**	37.3 U	**58.7 J**	60.2 U	**131**	**81.1**	**40.8 J**	**77.3**	**110**
Lead (mg/kg)	31	110	**62.9**	**36.8**	**55.3**	**54.8**	**192 *NJ**	**94.1 *NJ**	**37.6 *NJ**	**69.1 *NJ**	**83.2 *NJ**
Manganese (mg/kg)	460	1100	**531**	455	338	**600**	426	**539**	383	439	380
Mercury (mg/kg)	0.2	1.3	**0.712**	**0.359**	**1.48**	**0.642**	**2.47**	**0.934**	**0.694**	**1.36**	**1.61**
Nickel (mg/kg)	16	50	**28.1**	**18.4**	**23.5**	**26.8**	**33.2**	**33.3**	**19.2**	**25**	**26.6**
Zinc (mg/kg)	120	270	**153**	92.4	**126**	**142**	**262**	**191**	102	**149**	**173**

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TABLE 2
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Source Sample ID Date	LEL	SEL	Exponent, 1997 T04H 7/15/97 Near-Site	Exponent, 1997 T04I[b] 7/15/97 Near-Site	Exponent, 1997 T05A 7/15/97 Near-Site	Exponent, 1997 T05B 7/15/97 Near-Site	Exponent, 1997 T05C 7/15/97 Near-Site	Exponent, 1997 T05D 7/15/97 Near-Site	Exponent, 1997 T05E 7/15/97 Near-Site	Exponent, 1997 T05F 7/15/97 Near-Site	Exponent, 1997 T05G 7/15/97 Near-Site
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)											
TOC (mg/kg)											
Total PCB (mg/kg)	0.07	5.3									
Total PAH (mg/kg)	4.0	100									
Antimony (mg/kg)	2.0	25	10.2 UNJ	14.7 UNJ	16 UNJ	15.3 UNJ	16.7 UNJ	16.9 UNJ	11.2 UNJ	13 UNJ	12.7 UNJ
Arsenic (mg/kg)	6.0	33	**12.9**	**8.92**	5.92	**6.93**	**7.72**	**7.38**	4.44	**12.7**	**11.9**
Barium (mg/kg)	NA	NA	30 *	66.3 *	62.9 *	56.8 *	62.8	46.5	76	47.8	57.7
Cadmium (mg/kg)	0.6	9.0	**2.29**	**2.89**	**2.57**	**2.49**	**3.97**	**3.46**	**2.51**	**3.12**	**3.62**
Chromium (mg/kg)	26	110	**42.3**	**93.6**	**56**	**54.2**	**60.8**	**58.3**	**49.4**	**45.5**	**75.3**
Copper (mg/kg)	16	110	**50.3 J**	**96.6**	**55.5 J**	**54.7 J**	**60.6 J**	**60.8 J**	**47.2 J**	**69.3**	**117**
Lead (mg/kg)	31	110	**64 *NJ**	**109 *NJ**	**58.7 *NJ**	**57.3 *NJ**	**69.7**	**81.4**	**55.2**	**80.5**	**94.3**
Manganese (mg/kg)	460	1100	345	**469**	**901**	**816**	**986**	**944**	337	439	**533**
Mercury (mg/kg)	0.2	1.3	**1.15**	**1.15**	**0.931**	**1.09**	**0.833**	**1.08**	**0.785**	**1.1**	**1.51**
Nickel (mg/kg)	16	50	**23.4**	**31.3**	**29.1**	**28.4**	**35.6**	**32.7**	**22.5**	**28.4**	**31.7**
Zinc (mg/kg)	120	270	116	**187**	**153**	**156**	**183**	**173**	**130**	**168**	**192**

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TABLE 2
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Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	Exponent, 1997 T05H 7/15/97 Near-Site	Exponent, 1997 T05I 7/15/97 Near-Site	Exponent, 1997 T06A 7/15/97 Near-Site	Exponent, 1997 T06B 7/15/97 Near-Site	Exponent, 1997 T06C 7/15/97 Near-Site	Exponent, 1997 T06D 7/15/97 Near-Site	Exponent, 1997 T06E 7/15/97 Near-Site	Exponent, 1997 T06F 7/15/97 Near-Site
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)										
TOC (mg/kg)										
Total PCB (mg/kg)	0.07	5.3								
Total PAH (mg/kg)	4.0	100								
Antimony (mg/kg)	2.0	25	12 UNJ	10.3 UNJ	9.38 UNJ	10.9 UNJ	10.6 UNJ	10.6 UNJ [10.6 UNJ]	16.8 UNJ	12.1 UNJ
Arsenic (mg/kg)	6.0	33	**7.31**	**8.06**	5.45	**6.44**	5.46	5.01 [4.84]	**7.17**	**7.71**
Barium (mg/kg)	NA	NA	32.5	25.2	148	100	82.9	67.6 [75.3]	55.5	265
Cadmium (mg/kg)	0.6	9.0	**3.19**	**2.57**	**2.75**	**3.39**	**2.96**	**2.99 [2.95]**	**3.61**	**4.17**
Chromium (mg/kg)	26	110	**47.4**	**32.4**	**39.4**	**42.9**	**41.2**	**46.9 [47.7]**	**56.9**	**79.8**
Copper (mg/kg)	16	110	**54.8 J**	**31.9 J**	**47.8 J**	**59.3**	**48.9 J**	**59.3 J [58]**	**58.3 J**	**81.8**
Lead (mg/kg)	31	110	**61.2**	**37**	**132**	**86.3**	**66.2**	**63 [61.7]**	**67.8**	**115**
Manganese (mg/kg)	460	1100	**468**	439	297	**750**	423	343 [334]	**1,030**	431
Mercury (mg/kg)	0.2	1.3	**0.753**	**0.628**	**1.53**	**1.31**	**0.891**	**0.788 [0.813]**	**0.692**	**2.23**
Nickel (mg/kg)	16	50	**29.1**	**23**	**18.3**	**23.7**	**24.3**	**25.8 [24.2]**	**33.9**	**30.2**
Zinc (mg/kg)	120	270	**130**	90.6	**192**	**190**	**153**	**148 [145]**	**173**	**202**

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TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

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Source **Sample ID** **Date**	**LEL**	**SEL**	**Exponent, 1997** **T06G** **7/15/97** **Near-Site**	**Exponent, 1997** **T06H** **7/15/97** **Near-Site**	**Exponent, 1997** **T06I** **7/15/97** **Near-Site**	**Exponent, 1997** **T06K[c]** **7/15/97** **Near-Site**	**Exponent, 1997** **T07A** **7/15/97** **Near-Site**	**Exponent, 1997** **T07B** **7/15/97** **Near-Site**	**Exponent, 1997** **T07C** **7/15/97** **Near-Site**	**Exponent, 1997** **T07D** **7/15/97** **Near-Site**	**Exponent, 1997** **T07E** **7/15/97** **Near-Site**
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)											
TOC (mg/kg)											
Total PCB (mg/kg)	0.07	5.3									
Total PAH (mg/kg)	4.0	100									
Antimony (mg/kg)	2.0	25	11.7 UNJ	11.2 UNJ	14.2 UNJ	12 UNJ	**10.3 NJ**	1.98 UNJ	2.77 UNJ	3.05 UNJ	2.14 UNJ
Arsenic (mg/kg)	6.0	33	**10.9**	**15.6**	4.17	**7.19**	**17.7 *NJ**	**7.33**	**8.95**	**9.39**	**8.44**
Barium (mg/kg)	NA	NA	56.1	47.2	48.1	144	830 *NJ	477	93.1	64	170
Cadmium (mg/kg)	0.6	9.0	**2.99**	**3.16**	**3.41**	**3.73**	**4.03 *NJ**	**2.26**	**2.62**	**2.56**	**2.7**
Chromium (mg/kg)	26	110	**41.7**	**38.7**	**53.3**	**72.7**	**90.7 *NJ**	**88.9**	**62**	**59.8**	**62.7**
Copper (mg/kg)	16	110	**66**	**67.3**	**52.4 J**	**70.3 J**	**146 ***	**74.5**	**74**	**65.2**	**71.5**
Lead (mg/kg)	31	110	**75.1**	**73.4**	**57.1**	**106**	**1,010 ***	**380**	**90.9**	**72.9**	**80.1**
Manganese (mg/kg)	460	1100	454	**533**	**607**	416	350 *	**483**	**978**	**1,080**	**630**
Mercury (mg/kg)	0.2	1.3	**0.833**	**0.833**	**0.668**	**1.5**	0.19 U	**0.315**	**0.734**	**0.576**	**0.814**
Nickel (mg/kg)	16	50	**27.4**	**28.4**	**32**	**32.7**	**34.3 ***	**23.2**	**33.2**	**33.5**	**31.5**
Zinc (mg/kg)	120	270	**158**	**161**	**151**	**179**	**374**	**257**	**216**	**184**	**187**

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Source Sample ID Date	LEL	SEL	Exponent, 1997 T07F 7/15/97 Near-Site	Exponent, 1997 T07G 7/15/97 Near-Site	Exponent, 1997 T07H 7/15/97 Near-Site	Exponent, 1997 T08A 7/15/97 Near-Site	Exponent, 1997 T08B 7/15/97 Near-Site	Exponent, 1997 T08C 7/15/97 Near-Site	Exponent, 1997 T08D 7/15/97 Near-Site	Exponent, 1997 T08E 7/15/97 Near-Site
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)										
TOC (mg/kg)										
Total PCB (mg/kg)	0.07	5.3								
Total PAH (mg/kg)	4.0	100								
Antimony (mg/kg)	2.0	25	1.66 UNJ	1.69 UNJ	2.14 UNJ	1.61 UNJ	1.46 UNJ [1.42 UNJ]	1.63 UNJ	1.37 UNJ	2.44 UNJ
Arsenic (mg/kg)	6.0	33	**6.31**	**11.2**	**8.57**	**6.8**	4.41 [3.97]	4.46	3.01	**13.4**
Barium (mg/kg)	NA	NA	42.4	46.1	45.7	151	83.3 [87]	244	54.1	69.9
Cadmium (mg/kg)	0.6	9.0	**1.5**	**2.05**	**2.33**	**2.16**	**1.57 [1.52]**	**1.74**	**1.16**	**4.28**
Chromium (mg/kg)	26	110	**29.6**	**45.6**	**53.6**	**34.9**	22.9 [24.5]	**41**	13.2	**80.9**
Copper (mg/kg)	16	110	**32.7**	**77.6**	**61.3**	**44.3**	**24.7 [24.1]**	**51.1**	14.5	**77.3**
Lead (mg/kg)	31	110	**34.7**	**67.5**	**65.4**	**72.5**	**38.6 [38.2]**	**118**	27.2	**117**
Manganese (mg/kg)	460	1100	**553**	386	419	390	341 [378]	397	321	**809**
Mercury (mg/kg)	0.2	1.3	**0.412**	**0.9**	**0.799**	**0.419**	**0.237 [0.259]**	**0.393**	0.205 U	**1.16**
Nickel (mg/kg)	16	50	**18.1**	**23.6**	**28.2**	**27.9**	**17.6 [18.1]**	**29.2**	**21.4**	**35.7**
Zinc (mg/kg)	120	270	93.7	**146**	**148**	**125**	94.3 [92.4]	**189**	81.3	**174**

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TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	Exponent, 1997 T08F 7/15/97 Near-Site	Exponent, 1997 T08G 7/15/97 Near-Site	Exponent, 1997 T08I[d] 7/15/97 Near-Site	Exponent, 1997 T09A 7/15/97 Near-Site	Exponent, 1997 T09B 7/15/97 Near-Site	Exponent, 1997 T09C 7/15/97 Near-Site	Exponent, 1997 T09D 7/15/97 Near-Site	Exponent, 1997 T09E 7/15/97 Near-Site	Exponent, 1997 T09F 7/15/97 Near-Site
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)											
TOC (mg/kg)											
Total PCB (mg/kg)	0.07	5.3									
Total PAH (mg/kg)	4.0	100									
Antimony (mg/kg)	2.0	25	1.96 UNJ	2.12 UNJ	13.3 UNJ	1.96 UNJ	1.86 UNJ	2.21 UNJ	2.23 UNJ	11.4 UNJ	13.4 UNJ
Arsenic (mg/kg)	6.0	33	**7.14**	**8.85**	5.44	**9.67**	**9.76**	**8.19**	**9.17**	5.12	**7.11**
Barium (mg/kg)	NA	NA	43.8	39.9	54	41.8	43.4	223	101	49.1 *	43 *
Cadmium (mg/kg)	0.6	9.0	**2.09**	**2.06**	**3.74**	**1.76**	**1.62**	**3.25**	**3.44**	**2.38**	**2.73**
Chromium (mg/kg)	26	110	**40.7**	**31.4**	44.5	**33.8**	**29.3**	**77.5**	**66.5**	**52.2**	**34.2 J**
Copper (mg/kg)	16	110	**45.2**	**30.4**	**41.2**	**36**	**33.2**	**79.2**	**86.6**	**44.6 J**	26.2 U
Lead (mg/kg)	31	110	**48.5**	**48.4**	**51.3**	**39.7**	**33**	**126**	**72.3**	**63.8 *NJ**	**35.6 *NJ**
Manganese (mg/kg)	460	1100	452	**556**	684	**466**	**505**	**625**	**645**	404	**577**
Mercury (mg/kg)	0.2	1.3	**0.515**	0.318 U	**0.403**	**0.413**	**0.354**	**0.892**	**0.973**	**0.556**	0.336 U
Nickel (mg/kg)	16	50	**25.8**	**28.9**	**31.6**	**22.4**	**17.6**	**31.8**	**29.2**	**21.7**	**28.2**
Zinc (mg/kg)	120	270	120	103	135	105	86.1	**203**	**169**	110	89.3

See Notes on Page 21.

TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	Exponent, 1997 T09G 7/15/97 Near-Site	Exponent, 1997 T10A 7/15/97 Near-Site	Exponent, 1997 T10B 7/15/97 Near-Site	Exponent, 1997 T10C 7/15/97 Near-Site	Exponent, 1997 T10D 7/15/97 Near-Site	Exponent, 1997 T10E 7/15/97 Near-Site	Exponent, 1997 T10F 7/15/97 Near-Site	Exponent, 1997 T10G 7/15/97 Near-Site
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)										
TOC (mg/kg)										
Total PCB (mg/kg)	0.07	5.3								
Total PAH (mg/kg)	4.0	100								
Antimony (mg/kg)	2.0	25	13.2 UNJ	7.45 UNJ	7.03 UNJ	7.6 UNJ	7.99 UNJ	16.3 UNJ	15 UNJ	12.8 UNJ [12.8 UNJ]
Arsenic (mg/kg)	6.0	33	**7.46**	2.14	2.56	2.02	2.05	**9.56**	**7.82**	**7.59 [6.93]**
Barium (mg/kg)	NA	NA	50.3 *	38.9 *	140 *	137 *	17.4 *	62.4 *	58 *	39.4 * [41.4 *]
Cadmium (mg/kg)	0.6	9.0	**4.19**	**0.796**	**1.45**	**0.951**	**0.752**	**2.59**	**2.98**	**2.03 [1.88]**
Chromium (mg/kg)	26	110	**83.2**	13.4 J	15.8 J	17.1 J	14.4 J	**58.9**	**70.5**	**36.2 J [33 J]**
Copper (mg/kg)	16	110	**55 J**	9.57 U	**26 J**	12 U	8.03 U	**57.8 J**	**66 J**	31.1 U [27.3 U]
Lead (mg/kg)	31	110	**73.5 *NJ**	**35 *NJ**	**49.4 *NJ**	**35.4 *NJ**	30.6 *NJ	**58.3 *NJ**	**73.5 *NJ**	**31.3 *NJ [27.7 *NJ]**
Manganese (mg/kg)	460	1100	**486**	161	**789**	136	164	**894**	**595**	**490 [435]**
Mercury (mg/kg)	0.2	1.3	**0.616**	0.186 U	0.176 U	0.19 U	0.2 U	**0.545**	**0.45**	0.32 U [0.32 U]
Nickel (mg/kg)	16	50	**28.3**	9.98	**19.2**	13.6	12.9	**29.2**	**32.5**	**23 [22]**
Zinc (mg/kg)	120	270	**157**	76.5	91.8	82.1	68.3	**155**	**179**	98.3 [91.5]

See Notes on Page 21.

TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	Exponent, 1997 T11C 7/15/97 Near-Site	Exponent, 1997 T11D 7/15/97 Near-Site	Exponent, 1997 T11E 7/15/97 Near-Site	Exponent, 1997 T11F 7/15/97 Near-Site	Exponent, 1997 T11G 7/15/97 Near-Site	Exponent, 1997 T11H 7/15/97 Near-Site	Exponent, 1997 T12A 7/15/97 Near-Site	Exponent, 1997 T12B 7/15/97 Near-Site	Exponent, 1997 T12C 7/15/97 Near-Site
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)											
TOC (mg/kg)											
Total PCB (mg/kg)	0.07	5.3									
Total PAH (mg/kg)	4.0	100									
Antimony (mg/kg)	2.0	25	8.3 UNJ	10.2 UNJ	15.7 UNJ	13.4 UNJ	9.19 UNJ	6.02 UNJ	8.02 UNJ	8.58 UNJ	13.8 UNJ
Arsenic (mg/kg)	6.0	33	3.24	4.92	**8.12**	**6.38**	4.24	4.79	3.25 NJ	3.83 NJ	**14.9**
Barium (mg/kg)	NA	NA	38.5	65.1	55.4	50	30.5	20.7	17.5	26.6	67
Cadmium (mg/kg)	0.6	9.0	**1.51**	**2.06**	**3.13**	**2.54**	**1.91**	**1.45**	**0.944**	**1.23**	**4.15**
Chromium (mg/kg)	26	110	20.5	**37.6**	**64.8**	**38.8**	**33.2**	22.3	16.7	24.3	**57.1**
Copper (mg/kg)	16	110	19.2 U	**34.2 J**	**64.5 J**	31.3 U	**34.2 J**	7.3	10.7	**16.5**	**61.5**
Lead (mg/kg)	31	110	20.7	**42.2**	**67.4**	**32.1**	**36.3**	5.89	16.8	21.2	**60.1**
Manganese (mg/kg)	460	1100	353	388	**945**	**893**	291	104	295	365	**789**
Mercury (mg/kg)	0.2	1.3	**0.491**	**0.532 NJ**	**1.09 NJ**	**0.688 NJ**	**0.456 NJ**	0.151 U	0.201 U	0.215 U	**1.11 NJ**
Nickel (mg/kg)	16	50	13.7	**18.1**	**29.5**	**25.4**	**18.1**	**19.7**	12.2	14.6	**34.4**
Zinc (mg/kg)	120	270	59.5 J	100 J	**159 J**	108 J	89.9 J	37.1 J	54.1 J	65.8 J	**153 J**

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TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	Exponent, 1997 T12D 7/15/97 Near-Site	Exponent, 1997 T12E 7/15/97 Near-Site	Exponent, 1997 T12F 7/15/97 Near-Site	Exponent, 1997 T13A 7/15/97 Near-Site	Exponent, 1997 T13B 7/15/97 Near-Site	Exponent, 1997 T13C 7/15/97 Near-Site	Exponent, 1997 T13D 7/15/97 Near-Site
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)									
TOC (mg/kg)									
Total PCB (mg/kg)	0.07	5.3							
Total PAH (mg/kg)	4.0	100							
Antimony (mg/kg)	2.0	25	11.3 UNJ	13.5 UNJ	6.02 UNJ	12.4 UNJ	12.8 UNJ	14 UNJ	13.5 UNJ
Arsenic (mg/kg)	6.0	33	4.36	**6.05**	5.43	4.73 NJ	**7.52 NJ**	**6.7**	5.81
Barium (mg/kg)	NA	NA	58.3	55.6	20.4	52.5	58.5	56.7	57.4
Cadmium (mg/kg)	0.6	9.0	**2.57**	**2.83**	**1.52**	**1.96**	**2.18**	**3.26**	**2.87**
Chromium (mg/kg)	26	110	**48.3**	**51.1**	23	**41.3**	**42.7**	**71.2**	**48.2**
Copper (mg/kg)	16	110	**47.5**	**47.1**	7.13	**36.4**	**33.3**	**67**	**48.7**
Lead (mg/kg)	31	110	**49.8**	**49.8**	5.71	**42.1**	**37.8**	**73.3**	**52.9**
Manganese (mg/kg)	460	1100	415	**558**	105	**705**	**650**	**514**	**675**
Mercury (mg/kg)	0.2	1.3	**0.757 NJ**	**1.67 NJ**	0.151 U	**0.335**	**0.348**	**0.921 NJ**	**0.87 NJ**
Nickel (mg/kg)	16	50	**23.2**	**25.1**	**19.1**	**24.4**	**28**	**29.1**	**25.3**
Zinc (mg/kg)	120	270	**123 J**	**130 J**	35.7 J	119 J	112 J	**156 J**	**139 J**

See Notes on Page 21.

TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source **Sample ID** **Date**	**LEL**	**SEL**	**Exponent, 1997** **T13E** **7/15/97** **Near-Site**	**Exponent, 1997** **T13F[e]** **7/15/97** **Near-Site**
Depth (inches)			0-2	0-2
Solids (%)				
TOC (mg/kg)				
Total PCB (mg/kg)	0.07	5.3		
Total PAH (mg/kg)	4.0	100		
Antimony (mg/kg)	2.0	25	12.3 UNJ	12.5 UNJ
Arsenic (mg/kg)	6.0	33	**10.1**	**8.63 NJ**
Barium (mg/kg)	NA	NA	51.2	42
Cadmium (mg/kg)	0.6	9.0	**3.11**	**1.88**
Chromium (mg/kg)	26	110	**36.1**	**35.8**
Copper (mg/kg)	16	110	**30.3**	**30.6**
Lead (mg/kg)	31	110	**41.4**	**33.7**
Manganese (mg/kg)	460	1100	**576**	**545**
Mercury (mg/kg)	0.2	1.3	**0.434 NJ**	**0.441**
Nickel (mg/kg)	16	50	**29.5**	**23.7**
Zinc (mg/kg)	120	270	103 J	95.8 J

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TABLE 2
SEDIMENT DATA - NEAR-SITE LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Notes:
1. Screening values for metals are the NYSDEC (1999) LELs and SELs.
2. Total PCB and PAH screening criteria are the LELs and SELs presented in Persaud et al. (1993)
LEL = Lowest Effect Level.
SEL = Severe Effect Level.
Bolded values exceed LEL.
Shaded values exceed SEL.
mg/kg = milligrams per kilogram (concentration in parts per million).
NA = not available.
a - Replicate for station T03D.
b - Replicate for station T04D.
c - Replicate for station T06F.
d - Replicate for station T08G.
e - Replicate for station T13B.

Data Qualifiers:
B = For metals, indicates that the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
J = Indicates an estimated value.
N = Indicates that the spiked sample recovery is not within control limits.
U = Indicates that the analyte was analyzed for but not detected.
* = Duplicate relative percent difference outside limits.

TABLE 3
SEDIMENT DATA - BACKGROUND LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	GM, 2004 SED 40A 7/15/04 Upstream	GM, 2004 SED 41A 7/15/04 Upstream	GM, 2004 SED 42A 7/15/04 Upstream	GM, 2004 SED 43A 7/15/04 Upstream	GM, 2004 SED 44A 7/15/04 Upstream	GM, 2004 SED 45A 7/15/04 Upstream	GM, 2004 SED 40B 7/15/04 Upstream	GM, 2004 SED 41B 7/15/04 Upstream	GM, 2004 SED 42B 7/15/04 Upstream	GM, 2004 SED 43B 7/15/04 Upstream	GM, 2004 SED 44B 7/15/04 Upstream	GM, 2004 SED 45B 7/15/04 Upstream
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	2-6	2-6	2-6	2-6	2-6	2-6
Solids (%)			50.2	54.8 [53.3]	50.4	52.6	49.3	54.1	49.7	52.1 [52.5]	45.5	47.3	50	57.4
TOC (mg/kg)			33,000 J	10,000 J [13,600 J]	12,200 J	17,300 J	13,600 J	11,600 J	13,600 J	12,200 J [12,300 J]	16,400 J	18,100 J	13,300 J	14,300 J
Total PCB (mg/kg)	0.07	5.3	0.069	**0.1 [0.075]**	0.13 U	**2.26 J**	**0.21 J**	**0.077**	0.13 UJ	0.13 U [0.13 U]	0.15 UJ	**2.94 J**	0.13 U	0.12 U
Total PAH (mg/kg)	4.0	100	0.66 U	0.6 U [0.148 J]	0.65 U	1.94 J	0.856 J	0.265 J	0.66 UJ	0.63 U [0.63 U]	0.73 UJ	3.828 J	0.66 U	0.57 U
Antimony (mg/kg)	2.0	25	1 UJ	0.92 UJ [0.95 UJ]	0.97 UJ	0.95 UJ	0.99 UJ	0.94 UJ	0.98 UJ	0.96 UJ [0.93 UJ]	1.1 UJ	1.1 UJ	0.98 UJ	0.88 UJ
Arsenic (mg/kg)	6.0	33	**8.7**	**7.9 [8]**	**8.7**	**8.9**	**8.4 J**	**9.4**	**9**	**8.3 [8.5]**	**9.4 J**	**12.4 J**	**8.8**	**8.1**
Barium (mg/kg)	NA	NA	53	45.5 [43.4]	43	63.9	54.9 J	44.6	50.6	43.9 [40.7]	43.2 J	91.7 J	45.5	35.9
Cadmium (mg/kg)	0.6	9.0	0.32 J	0.28 J [0.24 J]	0.22 J	**1.8 J**	0.49 J	0.28 J	0.32 J	0.28 J [0.17 J]	0.18 J	**2.9 J**	0.39 J	0.23 J
Chromium (mg/kg)	26	110	**32.2**	**28.1 [28.8]**	**26.7**	**68.7**	**36.8 J**	**27.4**	**30**	**29.5 [27.5]**	**27.4 J**	**116 J**	**27.5**	23.8
Copper (mg/kg)	16	110	**19.2**	**18.4 [18.1]**	**16.6**	**54.8**	**32.2 J**	**18.8**	**17.3**	16 [15.5]	**16.8 J**	**105 J**	**17.9**	15
Lead (mg/kg)	31	110	16.9	18.4 [17.5]	14.1	**71.8**	**32.7 J**	16.7	14.4	14.4 [13.5]	14.1 J	**160 J**	15.6	12
Manganese (mg/kg)	460	1100	**821**	**722 [714]**	**748**	**698**	**781 J**	**720**	**789**	**731 [717]**	**806 J**	**839 J**	**830**	**671**
Mercury (mg/kg)	0.2	1.3	0.07	0.1 [0.09]	0.07	**0.33**	**0.28 J**	0.07	0.06 U	0.06 U [0.06 U]	0.07 UJ	**1.6 J**	0.06 U	0.06 U
Nickel (mg/kg)	16	50	**30.9**	**25.2 [26.7]**	**28.1**	**31.5**	**27.7 J**	**27**	**30.6**	**29.1 [28.6]**	**29.2 J**	**39.4 J**	**28**	**26.5**
Zinc (mg/kg)	120	270	96.3	87.3 [88.6]	86.4	**164**	117 J	87.6	90.9	88.8 [84.6]	87.6 J	**272 J**	87.6	77.2

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TABLE 3
SEDIMENT DATA - BACKGROUND LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	GM, 2004 SED 40C 7/15/04 Upstream	GM, 2004 SED 41C 7/15/04 Upstream	GM, 2004 SED 42C 7/15/04 Upstream	GM, 2004 SED 43C 7/15/04 Upstream	GM, 2004 SED 44C 7/15/04 Upstream	GM, 2004 SED 45C 7/15/04 Upstream	xponent, 199 T14A 7/15/97 Upstream	xponent, 199 T14B 7/15/97 Upstream	xponent, 199 T14C 7/15/97 Upstream
Depth (inches)			6-12	6-12	6-12	6-12	6-12	6-12	0-2	0-2	0-2
Solids (%)			52.8	51.8 [52.2]	50.3	60.8	54.1	55.2			
TOC (mg/kg)			12,200 J	4,300 J [12,300	13,000 J	21,300 J	11,800 J	13,600 J			
Total PCB (mg/kg)	0.07	5.3	0.13 U	0.13 U [0.13 U]	0.13 U	**0.45**	0.12 U	0.12 U			
Total PAH (mg/kg)	4.0	100	0.63 U	0.64 U [0.63 U]	0.66 U	0.54 U	0.61 U	0.6 U			
Antimony (mg/kg)	2.0	25	0.93 UJ	.97 UJ [0.59 UJ	0.97 UJ	0.8 UJ	0.94 UJ	0.88 UJ	8.85 U	8.65 U	11.7 U
Arsenic (mg/kg)	6.0	33	**9.6**	**7.6 [8.7]**	**9.1**	**8.4**	**8.6**	**9.5**	3.63 NJ	3.2 NJ	**8.68**
Barium (mg/kg)	NA	NA	43.4	41.2 [41.8]	41	53.5	38.2	39.5	48.1	41.8	50.1
Cadmium (mg/kg)	0.6	9.0	0.2 J	0.26 J [0.15 UJ]	0.24 J	**0.86 J**	0.28 J	0.31 J	**1.47**	**1.44**	**2.64**
Chromium (mg/kg)	26	110	**26.5**	**25.6 [27.2]**	25.9	**42.5**	23.4	25.6	**28.8**	**28.2**	**40.6**
Copper (mg/kg)	16	110	**17**	14.2 [15.1]	15.4	**32.2**	14.4	15.6	**28**	**25.6**	**40.6**
Lead (mg/kg)	31	110	13.2	12.3 [13.5]	13.1	**42.5**	11.5	12.7	28.2	26.8	**38.6**
Manganese (mg/kg)	460	1100	**668**	**732 [736]**	**747**	**730**	**828**	**680**	409	318	**635**
Mercury (mg/kg)	0.2	1.3	0.06 U	0.06 U [0.06 U]	0.06 U	**0.27**	0.06 U	0.06 U	**0.437**	**0.308**	**0.854 NJ**
Nickel (mg/kg)	16	50	**28.4**	**25.7 [28.4]**	**28.4**	**26.7**	**24.5**	**27.8**	**20.1**	**18.3**	**26.8**
Zinc (mg/kg)	120	270	85	77.9 [83.1]	85.8	112	72.9	81.5	95.6 J	90.3 J	117 J

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TABLE 3
SEDIMENT DATA - BACKGROUND LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
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Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	Exponent, 1997 T14D 7/15/97 Upstream	Exponent, 1997 T14E 7/15/97 Upstream	Exponent, 1997 T15A 7/15/97 Upstream	Exponent, 1997 T15B 7/15/97 Upstream	Exponent, 1997 T15C 7/15/97 Upstream	Exponent, 1997 T15D 7/15/97 Upstream	Exponent, 1997 T16A 7/15/97 Upstream	Exponent, 1997 T16B 7/15/97 Upstream
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Solids (%)										
TOC (mg/kg)										
Total PCB (mg/kg)	0.07	5.3								
Total PAH (mg/kg)	4.0	100								
Antimony (mg/kg)	2.0	25	11.8 U	14.2 U [14.1 U]	13.1 U	13.4 U	11.8 U	13.5 U	12.5 U	13 U
Arsenic (mg/kg)	6.0	33	**8**	**9.41 [8.22]**	**8.06 NJ**	**7.14 NJ**	**6.76 NJ**	**6.89 NJ**	**6.62 NJ**	5.44 NJ
Barium (mg/kg)	NA	NA	47.2	62.6 [55.7]	56	54.6	40.1	40.5	46.8	43
Cadmium (mg/kg)	0.6	9.0	**2.46**	**4.08 [3.47]**	**2.48**	**2.24**	**2.02**	**1.99**	**2.21**	**2.16**
Chromium (mg/kg)	26	110	**42.4**	**85.8 [75.6]**	**39.7**	**43.2**	**32.4**	**30.4**	**38.2**	**51.8**
Copper (mg/kg)	16	110	**60.1**	**102 [86.2]**	**24.4**	**31.3**	**20**	**18.1**	**30.5**	**46.2**
Lead (mg/kg)	31	110	**60.1**	**100 [84.3]**	30.7	**38.5**	23.6	21.7	**35.1**	**57.3**
Manganese (mg/kg)	460	1100	**485**	**514 [457]**	**887**	**839**	**835**	**892**	**760**	**590**
Mercury (mg/kg)	0.2	1.3	**0.727 NJ**	**1.77 NJ [1.54 NJ]**	0.327 U	**0.738**	0.295 U	0.338 U	0.313 U	**0.534**
Nickel (mg/kg)	16	50	**27.1**	**34.1 [29.5]**	**31.6**	**28.6**	**27.1**	**28.2**	**26.1**	**28.2**
Zinc (mg/kg)	120	270	**145 J**	**195 J [167 J]**	115 J	**124 J**	93.3 J	87.8 J	116 J	**147 J**

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TABLE 3
SEDIMENT DATA - BACKGROUND LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	Exponent, 1997 T16C 7/15/97 Upstream	Exponent, 1997 T17A 7/15/97 Upstream	Exponent, 1997 T17B 7/15/97 Upstream	Exponent, 1997 T17C 7/15/97 Upstream	Exponent, 1997 T17D 7/15/97 Upstream	Versar 202 9/27/00 Upstream	Versar 207 9/27/00 Upstream	Versar 208 9/22/00 Upstream	Versar 209 9/22/00 Upstream
Depth (inches)			0-2	0-2	0-2	0-2	0-2	0-1	0-1	0-1	0-1
Solids (%)											
TOC (mg/kg)											
Total PCB (mg/kg)	0.07	5.3						0.043 U	0.028 U	0.033 U	0.035 U
Total PAH (mg/kg)	4.0	100						0.85 U	0.56 U	0.67 U	0.167
Antimony (mg/kg)	2.0	25	12.8 U	15.7 U	14.1 U	13.4 U	13.2 U				
Arsenic (mg/kg)	6.0	33	5.84 NJ	**7.39 NJ**	5.6 NJ	**6.88 NJ**	**7.48 NJ**	**8.3**	**9.1**	**14.3**	**9.2**
Barium (mg/kg)	NA	NA	50.5	90.9	56.5	51	52.6				
Cadmium (mg/kg)	0.6	9.0	**2.47**	**3.97**	**2.68**	**2.29**	**3.03**	0.2 U	0.134 U	0.55 B	0.09 U
Chromium (mg/kg)	26	110	**59.1**	**57.4**	**53.2**	**43**	**61.2**	**45.2**	20.8	**51.7**	**47.6**
Copper (mg/kg)	16	110	**51.6**	**66.3**	**53.4**	**31.4**	**49.1**	**56.5**	**19.2**	**59**	**52.4**
Lead (mg/kg)	31	110	**62.5**	**72.1**	**56.7**	**38.8**	**66.4**	**55.1**	18	**59.7**	**53.9**
Manganese (mg/kg)	460	1100	**661**	**1,220**	**718**	**817**	**779**				
Mercury (mg/kg)	0.2	1.3	**0.819**	**1.7**	**0.621**	**0.644**	**0.686**	**0.38**	0.11	**0.42**	0.08
Nickel (mg/kg)	16	50	**29**	**33.9**	**29.2**	**28.5**	**31.8**	**23.7**	**17**	**26.5**	**24.4**
Zinc (mg/kg)	120	270	**156 J**	**190 J**	**159 J**	**121 J**	**156 J**	**148**	67	**145**	**134**

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TABLE 3
SEDIMENT DATA - BACKGROUND LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Source Sample ID Date	LEL	SEL	Versar 252 9/22/00 Upstream	Versar 255 9/22/20 Upstream	Versar 259 9/22/20 Upstream	Versar 302 9/22/20 Upstream	Versar 306 9/22/20 Upstream	Versar 307 9/25/00 Upstream	Versar 310 9/25/00 Upstream	Versar 353 9/22/20 Upstream	Versar 402 9/21/00 Upstream	Versar 403 9/22/20 Upstream	Versar 407 9/21/00 Upstream	Versar 408 9/21/00 Upstream
Depth (inches)			0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
Solids (%)														
TOC (mg/kg)														
Total PCB (mg/kg)	0.07	5.3	0.035 U	0.037 U	0.033 U	0.034 U	0.028 U	0.036 U	0.03 U	0.026 U	0.023 U	0.027 U	0.042 U	0.041 U
Total PAH (mg/kg)	4.0	100	0.71 U	0.74 U	0.65 U	0.68 U	0.18	0.72 U	0.6 U	0.53 U	0.46 U	0.12	0.83 U	0.81 U
Antimony (mg/kg)	2.0	25												
Arsenic (mg/kg)	6.0	33	5.9	**7.9**	**8.5**	**13.9**	**8.2**	**7.5**	**7.4**	**6.6**	4.4	5.2	**10.1**	**8.8**
Barium (mg/kg)	NA	NA												
Cadmium (mg/kg)	0.6	9.0	0.086 U	0.18 B	0.078 U	0.082 U	0.07 U	0.176 U	0.142 U	0.064 U	0.056 U	0.064 U	0.102 U	0.096 U
Chromium (mg/kg)	26	110	**45.5**	**52.9**	**34.6**	**42.6**	24.5	**85.9**	19.9	**30.4**	14.9	**29.5**	**60.8**	**32.3**
Copper (mg/kg)	16	110	**51.3**	**61.1**	**38.3**	**49.8**	15.3	**91.1**	15.2	**20.1**	**18.7**	**30.1**	**67.8**	**27.2**
Lead (mg/kg)	31	110	**50.5**	**64.8**	**37.9**	**52.2**	12.2	**105**	14.2	19.7	22	30.5	**69.7**	27.3
Manganese (mg/kg)	460	1100												
Mercury (mg/kg)	0.2	1.3	0.04	**1.2**	**0.28**	**0.21**	0.05 B	**1.1**	0.03 U	**0.33**	**0.16 N**	**0.22**	**0.57 N**	0.12 N
Nickel (mg/kg)	16	50	**24.3**	**24.2**	**19.9**	**24.2**	**22**	**25.5**	**17.5**	**22.7**	10.1	**18.1**	**29.7**	**25.2**
Zinc (mg/kg)	120	270	**140**	**147**	105	**126**	72.5	**189**	63.2	74.1	76.9	108	**177**	101

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TABLE 3
SEDIMENT DATA - BACKGROUND LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
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Source	LEL	SEL	Versar	Versar	Versar	Versar	Versar	Versar	Versar	Versar	Versar	Versar	Versar	Versar
Sample ID			452	504	506	508	510	551	604	606	608	1074	1075	1076
Date			9/21/00	9/21/00	9/20/00	9/21/00	9/21/00	9/21/00	9/20/00	9/21/00	9/20/00	10/4/01	10/4/01	10/4/01
			Upstream	Upstream	Upstream	Upstream	Upstream	Upstream	Upstream	Upstream	Upstream	Upstream	Upstream	Upstream
Depth (inches)			0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
Solids (%)														
TOC (mg/kg)														
Total PCB (mg/kg)	0.07	5.3	0.04 U	0.027 U	0.035 U	0.036 U	0.02 U	0.036 U	0.035 U	0.036 U	0.043 U	**0.16**	0.059	0.038 U
Total PAH (mg/kg)	4.0	100	0.79 U	0.55 U	0.69 U	0.72 U	0.41 U	0.07	0.69 U	0.72 U	0.148	1.261	0.59 U	0.26
Antimony (mg/kg)	2.0	25												
Arsenic (mg/kg)	6.0	33	**11.9**	3.2	**21.4**	**16.1**	0.96 B	**7.1**	**7.5**	**12.9**	**9.8**	2.9	3.6	**6.4**
Barium (mg/kg)	NA	NA												
Cadmium (mg/kg)	0.6	9.0	0.096 U	0.066 U	0.084 U	0.088 U	0.05 U	0.086 U	0.084 U	0.088 U	0.102 U	0.55 B	0.35 B	0.52 B
Chromium (mg/kg)	26	110	**26.3**	22.6	**45.3**	**45.7**	7.7	**48.9**	**43.7**	**31**	**58.9**	**31.8**	**26.1**	**43.1**
Copper (mg/kg)	16	110	**19.9**	**26.3**	**56.6**	**71**	7.8	**52.2**	**47.7**	**29**	**65.3**	**37.4**	**34.8**	**49.5**
Lead (mg/kg)	31	110	17.3	30.3	**60.5**	**82.4**	6.8	**60.9**	**52.2**	29.4	**69.8**	**35.5**	28.7	**46.5**
Manganese (mg/kg)	460	1100												
Mercury (mg/kg)	0.2	1.3	0.05 BN	**1.2 N**	**0.43 N**	**0.5 N**	**0.31 N**	**0.37 N**	**0.23 N**	**0.21 N**	**0.4 N**	0.15	**0.25**	**0.32**
Nickel (mg/kg)	16	50	**26.2**	13.3	**28.3**	**28.3**	6.2	**24.4**	**23.9**	**24.1**	**31.5**	**17.8**	15.6	**24**
Zinc (mg/kg)	120	270	86.4	80.7	**157**	**194**	28.7	**155**	**156**	102	**194**	100	97.4	**132**

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TABLE 3
SEDIMENT DATA - BACKGROUND LOCATIONS - 1997-2004 STUDY

Sediment Remedial Investigation Report
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Source Sample ID Date	LEL	SEL	Versar 1077 10/4/01 Upstream	Versar 1078 10/4/01 Upstream	Versar 1079 10/4/01 Upstream	Versar 1080 10/4/01 Upstream	Versar 1081 10/4/01 Upstream	Versar 1082 10/4/01 Upstream	Versar 1083 10/9/01 Upstream	Versar 1084 10/9/01 Upstream	Versar 1085 10/9/01 Upstream	Versar 1086 10/9/01 Upstream	Versar 1087 10/9/01 Upstream
Depth (inches)			0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1
Solids (%)													
TOC (mg/kg)													
Total PCB (mg/kg)	0.07	5.3	0.046 U	0.033 U	0.036 U	0.036 U	0.037 U	0.039 U	0.036 U	0.034 U	0.059	0.064 U	0.039 U
Total PAH (mg/kg)	4.0	100	0.144	0.66 U	0.72 U	0.72 U	0.74 U	0.16	0.72 U	0.468	0.88 U	0.21	0.21
Antimony (mg/kg)	2.0	25											
Arsenic (mg/kg)	6.0	33	**9.7**	5.9	**8.4**	**7.3**	**6.8**	**8.9**	**12.6**	**10.6**	**13.6**	**16.2**	**18.8**
Barium (mg/kg)	NA	NA											
Cadmium (mg/kg)	0.6	9.0	0.31 B	0.49 B	0.13 U	**1.4**	0.14 B	0.29 B	0.13 U	0.12 U	0.16 U	0.23 U	**1 B**
Chromium (mg/kg)	26	110	**58.9**	**36**	22.9	**63.9**	**31.5**	**34.2**	**41.8**	**28**	**72.1**	**47.5**	**89.8**
Copper (mg/kg)	16	110	**76.1**	**52.9**	**22.2**	**70.1**	**35.1**	**40.4**	**51.2**	**26.9**	**80.1**	**45.5**	**93.3**
Lead (mg/kg)	31	110	**72.8**	**46.2**	15.8	**81.5**	**31.7**	**34.8**	**47.6**	24.2	**80.9**	**40.1**	**118**
Manganese (mg/kg)	460	1100											
Mercury (mg/kg)	0.2	1.3	**0.67**	**0.56**	0.15	**0.75**	**0.22**	**0.19**	**0.31**	**1**	**0.49**	**0.58**	**0.85**
Nickel (mg/kg)	16	50	**30.8**	**18.9**	**21**	**22.8**	**20.9**	**21.6**	**22.4**	**21.8**	**32**	**36.6**	**29.9**
Zinc (mg/kg)	120	270	**191**	**121**	77.3	**160**	98.9	102	**129**	91.9	**210**	**154**	**202**

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TABLE 3
SEDIMENT DATA - BACKGROUND LOCATIONS - 1997-2004 STUDY

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Notes:

1. Screening values for metals are the NYSDEC (1999) LELs and SELs.
2. Total PCB and PAH screening values are the LELs and SELs presented in Persaud et al. (1993)

LEL = Lowest Effect Level.
SEL = Severe Effect Level.
Bolded values exceed LEL.
Shaded values exceed SEL.
mg/kg = milligrams per kilogram (concentration in parts per million).
NA = not available.

Data Qualifiers:

B = For metals, indicates that the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
J = Indicates an estimated value.
N = Indicates that the spiked sample recovery is not within control limits.
U = Indicates that the analyte was analyzed for but not detected.

TABLE 4
SEDIMENT DATA OUTLIER ANALYSIS - 1997-2004 STUDY

Sediment Remedial Investigation Report
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Constituent	Statistical Distribution Used	Outliers Identified by Median Absolute Deviation Z-Score
Arsenic	Lognormal[1]	Versar 506, Versar 1087
Barium	Lognormal[2]	T17A, SED43B
Chromium	Lognormal[2]	None
Cadmium	Lognormal[2]	None
Copper	Lognormal[2]	None
Lead	Lognormal[2]	None
Manganese	Normal[2]	T17A
Nickel	Normal[1]	None
Mercury	Lognormal[1]	None
Zinc	Lognormal [2]	None

Notes:
1. The statistical distribution was identified by the Chi Square Test, Shapiro Wilks Test, Kolmolgorov-Smirnov Test, and/or Anderson-Darling Test ($p>0.05$).
2. The statistical distribution identified was not statistically significant, but was selected based on closeness of fit, the effect of removing outliers, and professional judgment.

Non-detections were included as one-half the sample detection limit.
All results generated by Statgraphics software outlier identification option.

TABLE 5
WATER QUALITY DATA - 2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample Location	Collection Date	Measurement Interval	DO (mg/L)	Water Temperature (C)	Salinity (%)	ORP (mV)	pH	Conductivity (mS/cm)	Turbidity, Minimum	Turbidity, Maximum	TDS (g/L)
SED1	7/7/2004	Surface	6.25	24.80	0.87	128	7.40	14.9	35	39	9.2
		Bottom	6.30	24.70	0.88	134	7.30	15.1	49	53	9.3
SED2	7/7/2004	Surface	7.20	25.73	0.81	146	7.45	14.0	12	15	8.7
		Bottom	7.48	25.38	0.85	154	7.40	14.7	18	21	9.1
SED3	7/7/2004	Surface	7.50	25.67	0.83	6	7.53	14.4	32	32	8.9
		Bottom	7.60	25.05	0.90	-97	7.29	15.5	32	32	9.6
SED4	7/7/2004	Surface	8.14	26.10	0.81	37	7.56	14.1	39	42	8.7
		Bottom	8.40	26.15	0.83	9	7.39	14.5	31	36	8.8
SED5	7/7/2004	Surface	7.96	25.63	0.83	133	7.49	14.2	24	27	8.9
		Bottom	7.99	25.21	0.87	141	7.43	15.0	80	110	9.3
SED6	7/8/2004	Surface	6.88	24.58	0.95	165	7.35	16.2	11	17	10.0
		Bottom	7.20	24.56	0.95	172	7.33	16.2	24	47	10.1
SED7	7/8/2004	Surface	7.20	24.65	0.92	124	7.48	15.8	35	47	9.8
		Bottom									
SED8	7/8/2004	Surface	7.18	24.81	0.91	134	7.42	15.6	16	16	9.6
		Bottom									
SED9	7/8/2004	Surface	7.03	24.91	0.91	32	7.43	15.5	11	13	9.6
		Bottom	7.48	24.94	0.92	53	7.36	15.8	84	110	9.7
SED10	7/8/2004	Surface	7.86	25.38	0.91	165	7.56	15.7	4	6	9.7
		Bottom									
SED11	7/8/2004	Surface	7.76	25.30	0.81	30	7.46	14.0	19	22	8.7
		Bottom	8.18	25.29	0.90	6	7.40	15.3	210	260	9.5
SED12	7/8/2004	Surface	8.09	25.74	0.75	136	7.52	13.0	1	1	8.1
		Bottom	8.14	25.56	0.88	145	7.54	15.1	9	9	9.3
SED13	7/8/2004	Surface	8.14	25.99	0.81	34	7.58	13.9	1	4	8.6
		Bottom	8.47	25.99	0.81	-5	7.57	14.0	16	27	8.7
SED14	7/9/2004	Surface	7.34	24.93	0.81	31	7.42	14.4	22	47	8.8
		Bottom	7.24	24.80	0.88	-6	7.38	15.4	47	62	9.2
SED15	7/9/2004	Surface	7.54	24.86	0.85	39	7.51	14.6	15	99	9.1
		Bottom	7.69	24.85	0.89	113	7.50	15.5	200	250	9.4
SED16	7/12/2004	Surface	7.31	25.38	0.75	170	7.58	13.1	0	0	8.1
		Bottom	6.70	25.07	0.97	181	7.47	16.5	0	0	10.2
SED17	7/12/2004	Surface	7.02	25.34	0.75	1.71	7.55	13.0	- -	- -	8.1
		Bottom	6.71	24.96	0.98	182	2.53	16.8	- -	- -	10.3
SED18	7/9/2004	Surface	7.98	25.71	0.74	37	7.63	12.8	8	8	7.9
		Bottom	8.04	25.61	0.75	24	7.64	13.0	260	260	8.0
SED19	7/9/2004	Surface	7.88	25.19	0.75	37	7.56	12.9	23	30	8.1
		Bottom	7.90	25.12	0.77	15	7.55	14.0	56	100	8.3
SED20	7/12/2004	Surface	7.43	25.38	0.71	134	7.58	12.4	- -	- -	7.7
		Bottom	7.09	25.20	0.86	140	7.58	14.7	- -	- -	9.1
SED21	7/9/2004	Surface	7.80	25.67	0.69	27	7.69	12.1	7	10	7.5
		Bottom	7.63	25.16	0.81	8	7.64	14.0	17	22	8.7
SED22	7/9/2004	Surface	8.14	25.46	0.71	28	7.59	12.5	37	47	7.7
		Bottom	8.24	25.41	0.73	18	7.57	12.6	37	43	7.9
SED23	7/12/2004	Surface	7.77	25.54	0.64	141	7.74	11.4	- -	- -	7.0
		Bottom	6.50	25.48	0.89	152	7.43	17.0	410	410	9.7
SED24	7/12/2004	Surface	7.63	25.57	0.66	171	7.64	11.5	- -	- -	7.2
		Bottom	7.24	25.22	0.87	183	61.00	14.8	7	7	9.4
SED25	7/12/2004	Surface	7.44	25.42	0.72	167	7.68	12.6	- -	- -	7.7
		Bottom	6.27	24.81	1.07	178	7.43	17.9	- -	- -	11.1
SED26	7/13/2004	Surface	6.96	24.47	0.75	207	7.58	12.8	- -	- -	7.9
		Bottom	6.84	24.19	0.92	217	7.54	15.8	- -	- -	9.7
SED27	7/13/2004	Surface	6.86	24.57	0.70	144	7.69	12.2	- -	- -	7.6
		Bottom	5.63	23.94	1.34	190	7.33	24.0	280	670	13.6
SED28	7/13/2004	Surface	7.01	24.53	0.69	164	7.72	12.2	- -	- -	7.5
		Bottom	5.67	23.97	1.34	176	7.42	22.3	- -	- -	13.7
SED29	7/13/2004	Surface	7.51	24.44	0.76	173	7.71	13.1	- -	- -	8.1
		Bottom	7.20	24.33	0.94	180	7.55	16.6	- -	- -	9.7
SED30	7/13/2004	Surface	7.57	24.36	0.74	173	7.72	12.9	- -	- -	8.0
		Bottom	7.63	24.34	0.74	174	7.73	12.8	- -	- -	7.9
SED31	7/13/2004	Surface	7.73	24.29	0.72	74	7.70	12.6	- -	- -	7.8
		Bottom	8.14	24.23	0.72	62	7.70	12.6	- -	- -	7.8
SED32	7/13/2004	Surface	7.15	24.65	0.73	134	7.69	12.7	- -	- -	7.9
		Bottom	5.82	23.79	1.35	159	7.46	22.3	- -	- -	13.8
SED33	7/14/2004	Surface	7.43	24.27	0.70	189	7.66	12.2	- -	- -	7.6
		Bottom	7.58	24.00	0.75	197	7.65	13.2	- -	- -	8.1

TABLE 5
WATER QUALITY DATA - 2004 STUDY

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Sample Location	Collection Date	Measurement Interval	DO (mg/L)	Water Temperature (C)	Salinity (%)	ORP (mV)	pH	Conductivity (mS/cm)	Turbidity, Minimum	Turbidity, Maximum	TDS (g/L)
SED34	7/14/2004	Surface	7.36	24.07	0.72	197	7.59	12.5	- -	- -	7.8
		Bottom	7.51	24.03	0.72	198	7.50	12.6	- -	- -	7.8
SED35	7/14/2004	Surface	7.44	24.10	0.71	90	7.72	12.3	- -	- -	7.7
		Bottom	7.58	24.03	0.72	95	7.68	12.6	- -	- -	7.8
SED36	7/14/2004	Surface	7.52	24.17	0.70	164	7.72	12.2	- -	- -	7.7
		Bottom	7.54	24.11	0.71	165	7.70	12.5	- -	- -	7.7
SED37	7/14/2004	Surface	7.93	24.08	0.70	171	7.76	12.2	- -	- -	7.6
		Bottom									
SED38	7/14/2004	Surface	7.54	24.18	0.71	172	7.69	12.3	- -	- -	7.7
		Bottom	7.54	23.98	0.78	175	7.62	14.4	- -	- -	8.3
SED39	7/14/2004	Surface	8.44	24.71	0.67	81	7.73	11.7	- -	- -	7.2
		Bottom									
SED40	7/15/2004	Surface	7.36	24.68	0.58	218	7.57	10.4	- -	- -	6.4
		Bottom	7.43	24.50	0.62	218	7.60	10.9	- -	- -	6.8
SED41	7/15/2004	Surface	7.49	24.91	0.56	208	7.62	10.0	- -	- -	6.2
		Bottom	8.04	24.56	0.65	216	7.68	11.2	- -	- -	7.1
SED42	7/15/2004	Surface	7.51	24.89	0.58	199	7.63	10.3	- -	- -	6.4
		Bottom	7.93	24.69	0.61	207	7.70	10.7	- -	- -	6.7
SED43	7/15/2004	Surface	7.25	24.82	0.60	173	7.64	10.6	- -	- -	6.6
		Bottom	7.58	24.54	0.73	180	7.65	12.7	- -	- -	7.8
SED44	7/15/2004	Surface	7.29	25.34	0.58	175	7.20	10.3	- -	- -	6.4
		Bottom	8.07	25.19	0.58	181	7.62	10.3	- -	- -	6.4
SED45	7/15/2004	Surface	7.88	25.48	0.58	177	7.71	10.4	- -	- -	6.4
		Bottom	8.21	25.47	0.58	176	7.71	10.3	- -	- -	6.4

Notes:
- - = Not available.
% = percentage
C = degrees Celsius
DO = dissolved oxygen
g/L = grams per liter
mg/L = milligrams per liter
mS/cm = milliSiemens per ce **(milli - assumed due to estuarine conditions)**
mV = millivolts
NTU = Nephelometric Turbidity Units
ORP = Oxidation Reduction Potential
TDS = Total Dissolved Solids
Shading = average (DO was reported as a range.)

TABLE 6
CUMULATIVE SITE RANKING - COPCS FROM 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
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Sample Location	Area Classification	Cumulative Ranking SEL	Cr Ratio 110	Cu Ratio 110	Pb Ratio 110	Hg Ratio 1.3	Zn Ratio 270
SED10B	Near-Site	24.92	2.40	0.393	13.36	0.25	8.52
SED10A	Near-Site	20.24	1.78	0.598	9.73	0.10	8.04
SED10C	Near-Site	14.20	1.28	0.598	8.53	0.45	3.34
T07A	Near-Site	12.79	0.82	1.327	9.18	0.07	1.39
SED25C	Near-Site	9.86	1.31	1.473	1.80	4.08	1.20
SED21C	Near-Site	8.95	1.13	1.500	1.29	3.85	1.19
SED34B	Near-Site	8.68	1.00	1.091	1.52	3.77	1.30
SED21B	Near-Site	8.37	1.00	1.327	1.31	3.69	1.04
SED6A	Near-Site	6.97	0.93	1.282	1.24	2.62	0.91
T04C	Near-Site	6.80	0.99	1.191	1.75	1.90	0.97
SED21A	Near-Site	6.75	1.03	1.400	1.32	1.92	1.08
SED7C	Near-Site	6.75	0.84	1.291	1.20	2.46	0.95
SED1C	Near-Site	6.67	0.87	1.191	1.60	2.08	0.93
SED7B	Near-Site	6.53	0.96	1.345	1.46	1.77	0.99
SED13C	Near-Site	6.36	0.90	1.564	1.32	1.62	0.97
T07B	Near-Site	6.13	0.81	0.677	3.45	0.24	0.95
SED2C	Near-Site	5.92	0.86	1.082	1.15	1.92	0.91
SED19A	Near-Site	5.86	1.38	0.632	1.52	0.60	1.73
SED13B	Near-Site	5.76	0.80	1.036	1.15	2.00	0.79
SED20C	Near-Site	5.73	0.80	1.600	1.25	1.08	1.00
SED 43B	Background	5.70	1.05	0.955	1.45	1.23	1.01
SED20B	Near-Site	5.69	0.79	1.582	1.31	1.08	0.94
SED39B	Near-Site	5.61	0.43	0.388	1.31	2.69	0.79
SED17C	Near-Site	5.60	0.95	1.564	1.15	0.92	1.02
SED17B	Near-Site	5.58	0.83	1.800	1.13	0.92	0.90
SED18B	Near-Site	5.35	0.94	0.991	1.22	1.31	0.90
SED12A	Near-Site	5.13	0.65	1.118	1.33	1.08	0.96
SED1B	Near-Site	5.08	0.72	0.866	0.93	1.85	0.72
SED13A	Near-Site	5.06	0.74	0.825	0.98	1.77	0.74
SED38C*	Near-Site	5.06	0.81	0.723	1.08	1.64	0.80
SED2A	Near-Site	5.04	1.10	1.436	1.55		0.96
SED7A	Near-Site	4.98	0.74	1.027	1.04	1.38	0.79
T06F	Near-Site	4.98	0.73	0.744	1.05	1.72	0.75
SED18C*	Near-Site	4.90	0.86	0.894	1.05	1.23	0.86
SED36C*	Near-Site	4.86	0.97	0.858	1.10	1.04	0.89
SED31C	Near-Site	4.81	0.72	0.716	1.00	1.54	0.84
SED35C	Near-Site	4.75	0.96	0.905	1.06	0.92	0.90
SED38B*	Near-Site	4.70	0.95	0.830	1.20	0.82	0.89
SED20A	Near-Site	4.59	0.72	1.155	1.05	0.85	0.82
SED25B	Near-Site	4.56	0.78	1.000	0.91	1.15	0.72
T05G	Near-Site	4.48	0.68	1.064	0.86	1.16	0.71
SED19B	Near-Site	4.38	0.70	0.777	1.20	0.71	0.99
T14E*	Background	4.37	0.73	0.855	0.84	1.27	0.67

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Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample Location	Area Classification	Cumulative Ranking SEL	Cr Ratio 110	Cu Ratio 110	Pb Ratio 110	Hg Ratio 1.3	Zn Ratio 270
T04I	Near-Site	4.30	0.85	0.878	0.99	0.88	0.69
T04G	Near-Site	4.27	0.64	1.000	0.76	1.24	0.64
SED5C	Near-Site	4.22	0.39	0.973	0.81	1.23	0.82
SED33C	Near-Site	4.18	0.76	0.918	0.86	0.85	0.80
SED5A	Near-Site	4.16	0.50	0.918	0.95	1.00	0.79
1087	Background	4.14	0.82	0.848	1.07	0.65	0.75
307	Background	4.11	0.78	0.828	0.95	0.85	0.70
T02B	Near-Site	4.10	0.45	0.867	0.79	1.35	0.64
T06K	Near-Site	4.08	0.66	0.639	0.96	1.15	0.66
T08E	Near-Site	4.04	0.74	0.703	1.06	0.89	0.64
T09C	Near-Site	4.01	0.70	0.720	1.15	0.69	0.75
SED11B	Near-Site	4.00	0.37	0.936	0.84	1.08	0.77
SED17A	Near-Site	3.98	0.68	0.818	0.84	0.92	0.72
SED11C	Near-Site	3.98	0.35	0.812	0.71	1.38	0.72
SED2B	Near-Site	3.96	0.51	0.579	0.64	1.69	0.53
SED34A	Near-Site	3.95	0.67	0.757	0.90	0.85	0.78
SED14C	Near-Site	3.92	0.69	0.764	0.81	0.92	0.74
T06A	Near-Site	3.88	0.36	0.435	1.20	1.18	0.71
SED5B	Near-Site	3.87	0.43	0.882	0.90	0.92	0.74
SED16C	Near-Site	3.82	0.42	1.036	0.81	0.77	0.79
T17A	Background	3.79	0.52	0.603	0.66	1.31	0.70
T04D	Near-Site	3.79	0.77	0.737	0.86	0.72	0.71
SED6B	Near-Site	3.74	0.46	0.866	0.91	0.77	0.73
SED12B	Near-Site	3.71	0.42	0.841	0.94	0.76	0.75
SED15A	Near-Site	3.67	0.62	0.627	0.96	0.58	0.89
SED15B	Near-Site	3.66	0.63	0.694	0.89	0.62	0.83
SED4C	Near-Site	3.66	0.68	0.728	0.76	0.65	0.83
SED14B	Near-Site	3.63	0.65	0.745	0.79	0.72	0.71
SED32C	Near-Site	3.60	0.64	0.741	0.75	0.75	0.72
SED19C*	Near-Site	3.57	0.62	0.642	0.82	0.63	0.86
SED3B	Near-Site	3.57	0.64	0.727	0.80	0.65	0.75
SED1A	Near-Site	3.54	0.62	0.614	0.75	0.92	0.64
SED18A	Near-Site	3.54	0.63	0.697	0.81	0.67	0.74
SED8B*	Near-Site	3.53	0.58	0.666	0.76	0.83	0.69
SED36B	Near-Site	3.51	0.64	0.753	0.76	0.66	0.70
SED4A	Near-Site	3.50	0.64	0.695	0.78	0.61	0.79
SED15C	Near-Site	3.48	0.63	0.666	0.82	0.57	0.80
SED33B	Near-Site	3.48	0.56	0.705	0.75	0.77	0.69
T07C	Near-Site	3.43	0.56	0.673	0.83	0.56	0.80
T06B	Near-Site	3.43	0.39	0.539	0.78	1.01	0.70
T09D	Near-Site	3.42	0.60	0.787	0.66	0.75	0.63
SED11A	Near-Site	3.42	0.36	0.769	0.76	0.85	0.69
SED14A	Near-Site	3.40	0.59	0.671	0.72	0.70	0.71

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Former General Motors North Tarrytown Assembly Plant
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Sample Location	Area Classification	Cumulative Ranking SEL	Cr Ratio 110	Cu Ratio 110	Pb Ratio 110	Hg Ratio 1.3	Zn Ratio 270
SED31B	Near-Site	3.37	0.60	0.685	0.73	0.72	0.63
SED4B	Near-Site	3.35	0.62	0.668	0.74	0.58	0.74
T04F	Near-Site	3.34	0.41	0.703	0.63	1.05	0.55
T05D	Near-Site	3.29	0.53	0.553	0.74	0.83	0.64
SED3C	Near-Site	3.28	0.59	0.636	0.69	0.63	0.73
1085	Background	3.27	0.66	0.728	0.74	0.38	0.78
T07E	Near-Site	3.27	0.57	0.650	0.73	0.63	0.69
T05F	Near-Site	3.24	0.41	0.630	0.73	0.85	0.62
SED6C	Near-Site	3.24	0.37	0.805	0.72	0.69	0.66
T11E	Near-Site	3.22	0.59	0.586	0.61	0.84	0.59
T13C	Near-Site	3.21	0.65	0.609	0.67	0.71	0.58
SED16A	Near-Site	3.18	0.38	0.714	0.79	0.62	0.67
SED8C*	Near-Site	3.14	0.56	0.619	0.72	0.57	0.68
1080	Background	3.13	0.58	0.637	0.741	0.577	0.59
1077	Background	3.11	0.54	0.692	0.66	0.52	0.71
T12E	Near-Site	3.11	0.46	0.428	0.45	1.28	0.48
255	Background	3.09	0.48	0.555	0.59	0.92	0.54
T03E	Near-Site	3.07	0.43	0.534	0.50	1.14	0.47
T05C	Near-Site	3.06	0.55	0.551	0.63	0.64	0.68
T12C	Near-Site	3.05	0.52	0.559	0.55	0.85	0.57
SED35B	Near-Site	3.02	0.56	0.598	0.70	0.55	0.61
SED8A*	Near-Site	3.02	0.52	0.602	0.66	0.58	0.65
SED3A	Near-Site	3.01	0.56	0.591	0.64	0.48	0.73
SED32A	Near-Site	3.00	0.53	0.600	0.64	0.57	0.66
SED35A	Near-Site	3.00	0.52	0.605	0.68	0.57	0.62
T09G	Near-Site	2.98	0.76	0.500	0.67	0.47	0.58
T07G	Near-Site	2.97	0.41	0.705	0.61	0.69	0.54
T05B	Near-Site	2.93	0.49	0.497	0.52	0.84	0.58
T07D	Near-Site	2.92	0.54	0.593	0.66	0.44	0.68
T10F	Near-Site	2.92	0.64	0.600	0.67	0.35	0.66
508	Background	2.91	0.42	0.645	0.75	0.38	0.72
T08C	Near-Site	2.91	0.37	0.465	1.07	0.30	0.70
407	Background	2.90	0.55	0.616	0.63	0.44	0.66
T06G	Near-Site	2.89	0.38	0.600	0.68	0.64	0.59
T06H	Near-Site	2.87	0.35	0.612	0.67	0.64	0.60
T06E	Near-Site	2.84	0.52	0.530	0.62	0.53	0.64
T05A	Near-Site	2.83	0.51	0.505	0.53	0.72	0.57
T07H	Near-Site	2.80	0.49	0.557	0.59	0.61	0.55
T03C	Near-Site	2.80	0.50	0.611	0.57	0.55	0.57
608	Background	2.79	0.54	0.594	0.63	0.31	0.72
T16C	Background	2.78	0.54	0.469	0.57	0.63	0.58
SED9B	Near-Site	2.77	0.44	0.487	0.75	0.48	0.61
T04H	Near-Site	2.74	0.38	0.457	0.58	0.88	0.43

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Sample Location	Area Classification	Cumulative Ranking SEL	Cr Ratio 110	Cu Ratio 110	Pb Ratio 110	Hg Ratio 1.3	Zn Ratio 270
SED12C	Near-Site	2.73	0.32	0.657	0.62	0.53	0.60
T17D	Background	2.71	0.56	0.446	0.60	0.53	0.58
T06D*	Near-Site	2.69	0.43	0.533	0.57	0.62	0.54
SED9C	Near-Site	2.68	0.48	0.520	0.62	0.44	0.63
T06C	Near-Site	2.67	0.37	0.445	0.60	0.69	0.57
SED36A	Near-Site	2.66	0.47	0.535	0.56	0.52	0.58
SED 43A	Background	2.64	0.62	0.498	0.65	0.25	0.61
SED33A	Near-Site	2.59	0.45	0.544	0.58	0.45	0.56
T10E	Near-Site	2.58	0.54	0.525	0.53	0.42	0.57
SED31A	Near-Site	2.58	0.48	0.539	0.54	0.45	0.57
T14D	Background	2.57	0.39	0.546	0.55	0.56	0.54
T02E	Near-Site	2.55	0.48	0.561	0.55	0.44	0.51
T06I	Near-Site	2.55	0.48	0.476	0.52	0.51	0.56
T17B	Background	2.55	0.48	0.485	0.52	0.48	0.59
T05H	Near-Site	2.55	0.43	0.498	0.56	0.58	0.48
T13D	Near-Site	2.55	0.44	0.443	0.48	0.67	0.51
SED38A*	Near-Site	2.54	0.44	0.501	0.56	0.48	0.56
SED25A	Near-Site	2.50	0.47	0.504	0.47	0.53	0.51
T02D*	Near-Site	2.47	0.48	0.569	0.51	0.43	0.48
T05E	Near-Site	2.47	0.45	0.429	0.50	0.60	0.48
SED9A	Near-Site	2.45	0.43	0.477	0.55	0.42	0.57
SED39C	Near-Site	2.44	0.29	0.256	1.05	0.32	0.52
SED32B	Near-Site	2.44	0.42	0.481	0.54	0.47	0.53
208	Background	2.41	0.47	0.536	0.54	0.32	0.54
506	Background	2.39	0.41	0.515	0.55	0.33	0.58
T16B	Background	2.37	0.47	0.420	0.52	0.41	0.54
T12D	Near-Site	2.36	0.44	0.432	0.45	0.58	0.46
551	Background	2.33	0.44	0.475	0.55	0.28	0.57
T09E	Near-Site	2.30	0.47	0.405	0.58	0.43	0.41
SED30A*	Near-Site	2.28	0.31	0.328	0.82	0.32	0.50
202	Background	2.27	0.41	0.514	0.50	0.29	0.55
T03F	Near-Site	2.25	0.46	0.274	0.50	0.49	0.53
SED16B	Near-Site	2.23	0.27	0.513	0.51	0.47	0.46
1086	Background	2.23	0.43	0.414	0.36	0.45	0.57
T14C	Background	2.18	0.37	0.369	0.35	0.66	0.43
SED30B*	Near-Site	2.17	0.33	0.369	0.50	0.53	0.44
T08A	Near-Site	2.16	0.32	0.403	0.66	0.32	0.46
SED22A	Near-Site	2.11	0.36	0.401	0.53	0.36	0.46
1078	Background	2.11	0.33	0.481	0.42	0.43	0.45
T08F	Near-Site	2.06	0.37	0.411	0.44	0.40	0.44
604	Background	2.06	0.40	0.434	0.47	0.18	0.58
T08I	Near-Site	2.06	0.40	0.375	0.47	0.31	0.50
T15B	Background	2.05	0.39	0.285	0.35	0.57	0.46

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1076	Background	2.00	0.39	0.450	0.42	0.25	0.49
T04E	Near-Site	2.00	0.37	0.371	0.34	0.53	0.38
1083	Background	1.99	0.38	0.465	0.43	0.24	0.48
SED39A	Near-Site	1.97	0.34	0.331	0.47	0.39	0.44
T17C	Background	1.97	0.39	0.285	0.35	0.50	0.45
209	Background	1.96	0.43	0.476	0.49	0.06	0.50
302	Background	1.94	0.39	0.453	0.47	0.16	0.47
504	Background	1.94	0.21	0.239	0.28	0.92	0.30
SED37C	Near-Site	1.93	0.16	0.150	1.15	0.05	0.41
252	Background	1.89	0.41	0.466	0.46	0.03	0.52
1084	Background	1.83	0.25	0.245	0.22	0.77	0.34
T11D	Near-Site	1.82	0.34	0.311	0.38	0.41	0.37
SED30C*	Near-Site	1.79	0.28	0.316	0.40	0.40	0.38
T13A	Near-Site	1.79	0.38	0.331	0.38	0.26	0.44
T05I	Near-Site	1.74	0.29	0.290	0.34	0.48	0.34
T13B	Near-Site	1.72	0.39	0.303	0.34	0.27	0.41
T11F	Near-Site	1.72	0.35	0.142	0.29	0.53	0.40
T09A	Near-Site	1.70	0.31	0.327	0.36	0.32	0.39
T13E	Near-Site	1.70	0.33	0.275	0.38	0.33	0.38
SED 43C	Background	1.69	0.39	0.293	0.39	0.21	0.41
T11G	Near-Site	1.63	0.30	0.311	0.33	0.35	0.33
259	Background	1.61	0.31	0.348	0.34	0.22	0.39
T13F	Near-Site	1.60	0.33	0.278	0.31	0.34	0.35
SED 44A	Background	1.57	0.33	0.293	0.30	0.22	0.43
T07F	Near-Site	1.55	0.27	0.297	0.32	0.32	0.35
1082	Background	1.52	0.31	0.367	0.32	0.15	0.38
T08G	Near-Site	1.51	0.29	0.276	0.44	0.12	0.38
T16A	Background	1.49	0.35	0.277	0.32	0.12	0.43
SED34C	Near-Site	1.48	0.26	0.226	0.24	0.42	0.34
T14A	Background	1.46	0.26	0.255	0.26	0.34	0.35
T09B	Near-Site	1.46	0.27	0.302	0.30	0.27	0.32
SED22C	Near-Site	1.44	0.33	0.303	0.26	0.16	0.39
1074	Background	1.44	0.29	0.340	0.32	0.12	0.37
1081	Background	1.43	0.29	0.319	0.29	0.17	0.37
T03D	Near-Site	1.41	0.29	0.170	0.33	0.28	0.34
T15A	Background	1.41	0.36	0.222	0.28	0.13	0.43
403	Background	1.39	0.27	0.274	0.28	0.17	0.40
1075	Background	1.37	0.24	0.316	0.26	0.19	0.36
606	Background	1.35	0.28	0.264	0.27	0.16	0.38
T08B*	Near-Site	1.32	0.22	0.222	0.35	0.19	0.35
T14B	Background	1.30	0.26	0.233	0.24	0.24	0.33
SED27B	Near-Site	1.28	0.24	0.237	0.38	0.09	0.33
T02C	Near-Site	1.28	0.24	0.113	0.27	0.37	0.29

TABLE 6
CUMULATIVE SITE RANKING - COPCS FROM 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample Location	Area Classification	Cumulative Ranking SEL	Cr Ratio 110	Cu Ratio 110	Pb Ratio 110	Hg Ratio 1.3	Zn Ratio 270
408	Background	1.26	0.29	0.247	0.25	0.09	0.37
T10B	Near-Site	1.24	0.14	0.236	0.45	0.07	0.34
T09F	Near-Site	1.21	0.31	0.119	0.32	0.13	0.33
T10G*	Near-Site	1.19	0.31	0.133	0.27	0.12	0.35
353	Background	1.17	0.28	0.183	0.18	0.25	0.27
T15C	Background	1.15	0.29	0.182	0.21	0.11	0.35
SED27A	Near-Site	1.12	0.22	0.209	0.32	0.09	0.29
T15D	Background	1.09	0.28	0.165	0.20	0.13	0.33
T11C	Near-Site	1.06	0.19	0.087	0.19	0.38	0.22
SED37B	Near-Site	1.04	0.12	0.082	0.49	0.07	0.28
SED 40A	Background	1.03	0.29	0.175	0.15	0.05	0.36
SED 41A*	Background	0.99	0.26	0.166	0.16	0.07	0.33
1079	Background	0.96	0.21	0.202	0.14	0.12	0.29
SED 45A	Background	0.95	0.25	0.171	0.15	0.05	0.32
SED27C	Near-Site	0.94	0.25	0.166	0.16	0.05	0.32
452	Background	0.94	0.24	0.181	0.16	0.04	0.32
SED 40B	Background	0.92	0.27	0.157	0.13	0.02	0.34
SED37A	Near-Site	0.91	0.13	0.078	0.36	0.05	0.31
402	Background	0.91	0.14	0.170	0.20	0.12	0.28
T10C	Near-Site	0.91	0.16	0.055	0.32	0.07	0.30
SED 44B	Background	0.90	0.25	0.163	0.14	0.02	0.32
SED 42A	Background	0.90	0.24	0.151	0.13	0.05	0.32
SED24A*	Near-Site	0.89	0.22	0.159	0.15	0.10	0.27
T12B	Near-Site	0.89	0.22	0.150	0.19	0.08	0.24
SED 42B	Background	0.88	0.25	0.153	0.13	0.03	0.32
T08D	Near-Site	0.88	0.12	0.132	0.25	0.08	0.30
SED 41B*	Background	0.87	0.26	0.143	0.13	0.02	0.32
207	Background	0.86	0.19	0.175	0.16	0.08	0.25
SED23A	Near-Site	0.86	0.21	0.152	0.15	0.07	0.27
SED 40C	Background	0.85	0.24	0.155	0.12	0.02	0.31
T10A	Near-Site	0.84	0.12	0.044	0.32	0.07	0.28
SED 42C	Background	0.84	0.24	0.140	0.12	0.02	0.32
SED 45C	Background	0.81	0.23	0.142	0.12	0.02	0.30
T03B	Near-Site	0.81	0.25	0.079	0.13	0.10	0.26
SED 41C*	Background	0.81	0.24	0.133	0.12	0.02	0.30
T02A	Near-Site	0.80	0.22	0.085	0.15	0.09	0.26
SED29A	Near-Site	0.78	0.21	0.146	0.13	0.05	0.25
306	Background	0.78	0.22	0.139	0.11	0.04	0.27
T03A	Near-Site	0.78	0.21	0.085	0.14	0.09	0.25
T10D	Near-Site	0.78	0.13	0.037	0.28	0.08	0.25
SED 45B	Background	0.77	0.22	0.136	0.11	0.02	0.29
SED22B	Near-Site	0.76	0.18	0.143	0.12	0.07	0.24
SED28A	Near-Site	0.76	0.22	0.134	0.11	0.05	0.25

TABLE 6
CUMULATIVE SITE RANKING - COPCS FROM 1997-2004 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample Location	Area Classification	Cumulative Ranking SEL	Cr Ratio 110	Cu Ratio 110	Pb Ratio 110	Hg Ratio 1.3	Zn Ratio 270
SED 44C	Background	0.74	0.21	0.131	0.10	0.02	0.27
SED23C	Near-Site	0.74	0.21	0.127	0.11	0.02	0.27
SED23B	Near-Site	0.73	0.20	0.122	0.13	0.02	0.25
SED28C	Near-Site	0.72	0.23	0.125	0.10	0.02	0.26
310	Background	0.69	0.18	0.138	0.13	0.01	0.23
SED29C	Near-Site	0.69	0.20	0.120	0.09	0.02	0.25
SED24C*	Near-Site	0.69	0.21	0.113	0.10	0.02	0.25
T12A	Near-Site	0.68	0.15	0.097	0.15	0.08	0.20
SED29B	Near-Site	0.67	0.20	0.116	0.09	0.02	0.24
SED24B*	Near-Site	0.60	0.18	0.101	0.09	0.02	0.21
SED28B	Near-Site	0.58	0.16	0.099	0.08	0.03	0.20
510	Background	0.55	0.07	0.071	0.06	0.24	0.11
SED26A	Near-Site	0.53	0.12	0.115	0.09	0.02	0.18
T11H	Near-Site	0.52	0.20	0.066	0.05	0.06	0.14
T12F	Near-Site	0.52	0.21	0.065	0.05	0.06	0.13
SED26B	Near-Site	0.44	0.11	0.112	0.03	0.02	0.17
SED26C	Near-Site	0.42	0.10	0.102	0.03	0.02	0.17

Notes:
SEL = Severe Effect Level (freshwater values cited from Persaud et al. (1992))

Cr = Chromium
Cu = Copper
Pb = Lead
Hg = Mercury
Zn = Zinc
* = Indicates field duplicate analyzed and averaged with original field sample at this location.
Individual ratio equals the sample concentration divided by the SEL.
Cumulative ranking is the sum of the individual ratios per sample location.

TABLE 7
SAMPLE MATRIX SUMMARY - 2006 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

MEDIUM	SEDIMENT						PORE WATER	BIOLOGICAL TISSUE	BENTHIC COMMUNITY	SEDIMENT TOXICITY
LABORATORY ANALYSIS	SURFACE COPC Metals/TOC/AVS/SEM	SUBSURFACE COPC Metals/TOC	Chronology Cesium-137 and Lead-210	Grain-Size Distribution	Physical Characteristics	Consolidation Test	Select COPC Metals/TOC (Dissolved)/Total Hardness (CaCO3) & pH	COPC Metals	Taxonomy and Counts	28-Day Bioassay
SED100	X			X			NR	X	X	X
SED101	X			X			X	X	X	X
SED102	X	X		X			X		X	X
SED103	X	X	X	X			X	X	X	X
SED104	**X**	X	X	**X**			**X**		**X**	X
SED105	X			X			X	X	X	X
SED106	X			X			X	X	X	X
SED107	X			X			X		X	X
SED108	X			X			X	X	X	X
SED109	X			X			X		X	X
SED110	X			X			NR	X	X	X
SED111	X			X			X		X	X
SED112	X			X			X		X	X
SED113	X			X			X		X	X
SED114	X			X			X		X	X
SED115	X			X			X		X	X
SED116	X			X			X		X	X
SED117	X			X			X		X	X
SED118	X			X			NR		X	X
SED119	X	X		X			X		X	X
SED120	X			X			X	**X**	X	X
SED121	X			X			X	**X**	X	X
SED122	X			X			X		X	X
SED123	X	X	X	X			X		X	X
SED124	X			X			X	**X**	X	X
SED125	X			X			X		X	X
SED126	X	X	X	X			NR	X	X	X
SED127	X	**X**		X			X		X	X
SED128	X	**X**	**X**	X			X		X	X
SED129	X			X			X	X	X	X
SED130	X			X			X	**X**	X	X
SED131	X			X			X		X	X
SED132	X			X			X		X	X
SED133	X			X			X	**X**	X	X
SED134	X			X			X	**X**	X	X
SED135	X			X			X		X	X
SED136	X			X			X		X	X
SED137	X			X			X	**X**	X	
SED138	X	**X**	**X**	X			X		X	X
SED139	X			X			X		X	X
SED140		X								
SED141		X								
SED142		X								
SED143		X								

TABLE 7
SAMPLE MATRIX SUMMARY - 2006 STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

MEDIUM	SEDIMENT						PORE WATER	BIOLOGICAL TISSUE	BENTHIC COMMUNITY	SEDIMENT TOXICITY
LABORATORY ANALYSIS	**SURFACE COPC Metals/TOC/AVS/SEM**	**SUBSURFACE COPC Metals/TOC**	**Chronology Cesium-137 and Lead-210**	**Grain-Size Distribution**	**Physical Characteristics**	**Consolidation Test**	**Select COPC Metals/TOC (Dissolved)/Total Hardness (CaCO3) & pH**	**COPC Metals**	**Taxonomy and Counts**	**28-Day Bioassay**
SED144		X								
SED145		X								
SED146		X								
SED147				X	X					
SED148				X						
SED149		X				X				
SED150				X	X					
SED151		X								
SED152		X								
SED153		X								
SED154		X								
SED155		X								

Notes:
X = Sample collected
NR = No sample collected due to low recovery of sample volume
Shade = Proposed and adjusted sampling location (sample not collected)
Shade/bold = new sample location

TABLE 8
SEDIMENT DATA - 2006 STUDY
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Lowest AVS Benchmark (bold)	Units	SED111 0 - 0.5 9/14/2006	SED111 0 - 0.5 10/11/2006	SED112 0 - 0.5 9/13/2006	SED113 0 - 0.5 9/13/2006	SED113 0 - 0.5 10/11/2006	SED114 0 - 0.5 9/13/2006	SED115 0 - 0.5 9/12/2006	SED116 0 - 0.5 9/12/2006	SED117 0 - 0.5 9/18/2006	SED118 0 - 0.5 9/19/2006
Inorganics												
Chromium (Total)	--	mg/kg	56	52	69.4	13.8	13.9	60.8	47.5	63.5	36.1	16
Copper	--	mg/kg	65.6	65.2	76.3	9.3	10.2	28.4	60.5	77.6	38.2	12.2
Lead	--	mg/kg	66.2 J	64.9	80.7 J	15.8 J	14.3	29.1 J	65.7 J	76.2 J	129 J	19.5
Mercury	--	mg/kg	0.67	0.58	0.89	0.09	0.08	0.27	0.5	0.94	0.48	0.04 U
Zinc	--	mg/kg	164	168	177	43.1	43.4	72.2	139	181	121	52.3
Simultaneously Extracted Metals (SEM)												
Cadmium	--	umol/g	0.00169	0.00231	0.00338	0.000623	0.000623	0.00124	0.00294	0.00214	0.0024	0.000623
Copper	--	umol/g	0.0393 J	0.268 J	0.0928 J	0.0645 J	0.0724 J	0.127 J	0.0409 J	0.0268 J	0.0126 J	0.0724 J
Lead	--	umol/g	0.142 J	0.186	0.23 J	0.0507 J	0.0454	0.1 J	0.183 J	0.161 J	0.158 J	0.0217
Nickel	--	umol/g	0.0528	0.0886	0.0579	0.0256	0.0392	0.0358	0.0426	0.0511	0.0443	0.075
Silver	--	umol/g	0.00191 U	0.002 U	0.00197 U	0.0011 U	0.00109 U	0.00126 U	0.00161 U	0.00204 U	0.00137 U	0.00106 U
Zinc	--	umol/g	0.843	1.12	1.08	0.312	0.31	0.73	0.899	0.98	0.896	0.317
Acid Volatile Sulfide (AVS)												
Acid Volatile Sulfide	--	umol/g	7.81	2.25	2.14 U	1.21 U	1.19 U	1.59	1.2 J	3.27	5.69	1.26 UJ
Total Organic Carbon (TOC)												
TOC	--	mg/kg	21,600	18,700	20,000	1,630	1,700	10,400	15,600	16,700	15,200	5,630
Organic Carbon Fraction	--	--	0.0216	0.0187	0.02	0.00163	0.0017	0.0104	0.0156	0.0167	0.0152	0.00563
AVS / SEM Parameter												
($\sum$SEM - AVS)/foc	130	umol/goc	-312	-31	20	-93	-75	-57	36	-123	-301	-25

TABLE 8
SEDIMENT DATA - 2006 STUDY
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Lowest AVS Benchmark (bold)	Units	SED119 0 - 0.5 9/21/2006	SED120 0 - 0.5 10/10/2006	SED121 0 - 0.5 9/19/2006	SED122 0 - 0.5 10/10/2006	SED123 0 - 0.5 9/19/2006	SED124 0 - 0.5 9/19/2006	SED125 0 - 0.5 10/4/2006	SED126 0 - 0.5 10/4/2006	SED127 0 - 0.5 9/19/2006	SED128 0 - 0.5 9/19/2006
Inorganics												
Chromium (Total)	--	mg/kg	43.5	56.3	61.6	30.3	102	62.2	97.2	148	55.5	57.2
Copper	--	mg/kg	43.2	75	59.9	30.5	135	68.1	152	111	65.9	65
Lead	--	mg/kg	45.3	77.9	89	29.8	122	77.5	130	1,520	67.7	66.5
Mercury	--	mg/kg	0.35	1.1	0.95	0.22	1.8	0.68	1.2	0.27	0.63	0.67
Zinc	--	mg/kg	122	152	186	93.6	269	197	269	1,260	174	175
Simultaneously Extracted Metals (SEM)												
Cadmium	--	umol/g	0.00249	0.00445	0.004	0.00133	0.00427	0.004	0.00534	0.00614 J	0.00356	0.00329
Copper	--	umol/g	0.175 J	0.319 J	0.115 J	0.0708 J	0.0818 J	0.239 J	0.538 J	0.579 J	0.101 J	0.112 J
Lead	--	umol/g	0.0709	0.222	0.183	0.0695	0.229	0.215	0.329	3.23	0.181	0.191
Nickel	--	umol/g	0.0954	0.0801	0.0971	0.0716	0.124	0.138	0.143	0.412	0.121	0.133
Silver	--	umol/g	0.00184 U	0.00145 U	0.00146 U	0.0015 U	0.00194 U	0.0021 U	0.00172 U	0.00109 UJ	0.00184 U	0.00219 U
Zinc	--	umol/g	0.65	1.03	1.41	0.482	1.68	1.68	1.9	17.3 J	1.4	1.25
Acid Volatile Sulfide (AVS)												
Acid Volatile Sulfide	--	umol/g	2.43 J	4.54	2.84 J	3.88	6.23 J	27.7 J	8.1	4.67	7.64 J	9.62 J
Total Organic Carbon (TOC)												
TOC	--	mg/kg	33,900	10,900	23,700	14,200	27,500	29,500	27,700	7,700	24,700	29,400
Organic Carbon Fraction	--	--	0.0339	0.0109	0.0237	0.0142	0.0275	0.0295	0.0277	0.0077	0.0247	0.0294
AVS / SEM Parameter												
(∑SEM - AVS)/foc	130	umol/goc	-42	-265	-43	-224	-149	-862	-187	**2189**	-236	-270

TABLE 8
SEDIMENT DATA - 2006 STUDY
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Lowest AVS Benchmark (bold)	Units	SED129 0 - 0.5 10/10/2006	SED130 0 - 0.5 10/10/2006	SED131 0 - 0.5 10/10/2006	SED132 0 - 0.5 10/10/2006	SED133 0 - 0.5 10/10/2006	SED134 0 - 0.5 10/10/2006	SED135 0 - 0.5 10/10/2006	SED136 0 - 0.5 10/10/2006	SED137 0 - 0.5 10/10/2006	SED138 0 - 0.5 10/12/2006	SED139 0 - 0.5 9/20/2006
Inorganics													
Chromium (Total)	--	mg/kg	35.4	110	74.2	83.8	44	57.7	65.8	69.2	48.1	52.2	24.4
Copper	--	mg/kg	75.2	112	78.3	116	91.1	67.8	84.8	128	70.2	84.1	11.5
Lead	--	mg/kg	70	151	92.9	116	92.7	68.3	85.6	102	66	77.4	10.2
Mercury	--	mg/kg	0.81	1.6	2.3	2.6	1	2.6	1.5	1.3	1.4	1	0.05 U
Zinc	--	mg/kg	154	265	182	207	185	155	160	201	148	162	62.9
Simultaneously Extracted Metals (SEM)													
Cadmium	--	umol/g	0.00169	0.0089	0.0072	0.00649	0.00294	0.00712	0.00516	0.00347	0.00302	0.00374	0.00089
Copper	--	umol/g	0.271 J	0.533 J	0.338 J	0.411 J	0.319 J	0.363 J	0.239 J	0.544 J	0.258 J	0.529 J	0.0393 J
Lead	--	umol/g	0.245	0.492	0.362	0.312	0.299	0.305	0.253	0.311	0.258	0.229	0.0154
Nickel	--	umol/g	0.0937	0.157	0.112	0.0971	0.0988	0.102	0.0937	0.104	0.0903	0.0818	0.0647
Silver	--	umol/g	0.00152 U	0.00184 U	0.00159 U	0.00169 U	0.00152 U	0.00179 U	0.00163 U	0.00158 U	0.00157 U	0.00159 U	0.00127 U
Zinc	--	umol/g	1.31	2.32	1.76	1.52	1.51	1.49	1.43	1.64	1.34	1.25	0.321
Acid Volatile Sulfide (AVS)													
Acid Volatile Sulfide	--	umol/g	8.13	5.94	4.05	9.94	5.43	4.17	3.89	7.16	6.55	1.76 J	1.60 UJ
Total Organic Carbon (TOC)													
TOC	--	mg/kg	18,600	24,100	10,600	19,400	15,600	17,400	21,200	16,400	21,300	12,400	11,600
Organic Carbon Fraction	--	--	0.0186	0.0241	0.0106	0.0194	0.0156	0.0174	0.0212	0.0164	0.0213	0.0124	0.0116
AVS / SEM Parameter													
(∑SEM - AVS)/foc	130	umol/goc	-334	-101	-139	-391	-205	-109	-88	-278	-216	98	-31

Notes:
1. For SEM and AVS non-detects ("U" or "UJ"), half value of the detection limits was used to calculate (∑SEM - AVS)/foc.
2. Bolded value represents a value exceeding the lowest AVS benchmark.

mg/kg = milligrams per kilogram (concentration in parts per million)

Data Qualifiers:
J = Indicates an estimated value
U = Indicates that the analyte was analyzed for but not detected

TABLE 9
SEDIMENT DATA - 2006 STUDY
BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Lowest AVS Benchmark (bold)	Units	SED100 0 - 0.5 9/20/2006	SED101 0 - 0.5 9/20/2006	SED102 0 - 0.5 9/20/2006	SED103 0 - 0.5 9/20/2006	SED104 0 - 0.5 9/21/2006	SED105 0 - 0.5 9/21/2006
Inorganics								
Chromium (Total)	--	mg/kg	8.4	15.4	40.2	89.4	46.1	41.3
Copper	--	mg/kg	8.3	11	33.3	75.1	56.3	44.5
Lead	--	mg/kg	6.3	10.6	34.1	87.2	65.6	77.5
Mercury	--	mg/kg	0.2	0.12	0.34	0.69	0.46	0.99
Zinc	--	mg/kg	28.7	43.2	115	205	176	142
Simultaneously Extracted Metals (SEM)								
Cadmium	--	umol/g	0.00089	0.00133	0.00089	0.0064	0.00489	0.00187
Copper	--	umol/g	0.0488 J	0.0834 J	0.0708 J	0.127 J	0.112 J	0.184 J
Lead	--	umol/g	0.0169	0.0347	0.0323	0.24	0.138	0.171
Nickel	--	umol/g	0.0238	0.0494	0.0392	0.153	0.123	0.0886
Silver	--	umol/g	0.00103 U	0.00117 U	0.00173 U	0.0021 U	0.00173 U	0.00157 U
Zinc	--	umol/g	0.153	0.303	0.315	1.8	1.5	0.794
Acid Volatile Sulfide (AVS)								
Acid Volatile Sulfide	--	umol/g	1.12 UJ	1.39 UJ	1.85 UJ	8.54 J	1.56 J	5.12 J
Total Organic Carbon (TOC)								
TOC	--	mg/kg	1,280	7,920	16,700	18,500	23,700	19,400
Organic Carbon Fraction	--	--	0.00128	0.00792	0.0167	0.0185	0.0237	0.0194
AVS / SEM Parameter								
(∑SEM - AVS)/foc	130	umol/goc	-247	-28	-28	-336	13	-200

TABLE 9
SEDIMENT DATA - 2006 STUDY
BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Lowest AVS Benchmark (bold)	Units	SED106 0 - 0.5 9/20/2006	SED107 0 - 0.5 9/13/2006	SED108 0 - 0.5 9/18/2006	SED109 0 - 0.5 9/13/2006	SED109-DUP 0 - 0.5 9/13/2006	SED110 0 - 0.5 9/18/2006
Inorganics								
Chromium (Total)	--	mg/kg	31.2	24.4	31	35	35	23
Copper	--	mg/kg	17.9	12.7	23.6	48.8	50.7	12.8
Lead	--	mg/kg	16.4	11 J	23.2 J	76.3 J	58.1 J	10.8 J
Mercury	--	mg/kg	0.08	0.05 U	0.21	0.89	0.69	0.05 U
Zinc	--	mg/kg	89.5	63.3	87.2	140	135	63.7
Simultaneously Extracted Metals (SEM)								
Cadmium	--	umol/g	0.000694 U	0.000676 U	0.00107	0.000978	0.00116	0.000712 U
Copper	--	umol/g	0.0378 J	0.0236 J	0.0629 J	0.135 J	0.153 J	0.0236 J
Lead	--	umol/g	0.0159	0.0154 J	0.07 J	0.185 J	0.175 J	0.0198 J
Nickel	--	umol/g	0.0409	0.0272	0.0272	0.0426	0.0477	0.0256
Silver	--	umol/g	0.00144 U	0.00141 U	0.00182 U	0.00165 U	0.00154 U	0.00147 U
Zinc	--	umol/g	0.216	0.297	0.421	0.798	0.898	0.263
Acid Volatile Sulfide (AVS)								
Acid Volatile Sulfide	--	umol/g	1.98 UJ	1.55 U	2 U	1.79 U	2.31	1.6 U
Total Organic Carbon (TOC)								
TOC	--	mg/kg	14,700	11,300	11,900	14,700	17,400	10,700
Organic Carbon Fraction	--	--	0.0147	0.0113	0.0119	0.0147	0.0174	0.0107
AVS / SEM Parameter								
(∑SEM - AVS)/foc	130	umol/goc	-46	-36	-35	18	-59	-44

Notes:
1. For SEM and AVS non-detects ("U" or "UJ"), half value of the detection limits was used to calculate (∑SEM - AVS)/foc.

mg/kg = milligrams per kilogram (concentration in parts per million)

Data Qualifiers:
J = Indicates an estimated value
U = Indicates that the analyte was analyzed for but not detected

TABLE 10
PORE WATER DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID:	Freshwater Criteria (mg/L)		Saltwater Criteria (mg/L)			SED111	SED112	SED113	SED114	SED115	SED116	SED117	SED119	SED120
Sample Depth (ft):						0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Date Collected:	NYS Class B (Chronic)	USEPA NAWQC (CCC)	NYS Class SB (Chronic)	USEPA NAWQC (CCC)	Units	10/11/2006	9/13/2006	9/13/2006	9/13/2006	9/12/2006	9/12/2006	9/18/2006	9/21/2006	10/10/2006
Inorganics														
Chromium	0.2307	0.2307	0.054	0.05	mg/L	0.0084 J	0.0060 J	0.0053 J	0.0071 J	0.0086 J	0.0091 J	0.0087 J	0.0054 J	0.0053 J
Copper	0.0293	0.0293	0.0034	0.0031	mg/L	*0.0061* J	*0.0060* J	*0.0043* J	*0.0185* J	*0.0053* J	*0.0056* J	*0.0059* J	*0.0066* J	*0.0171* J
Lead	0.0165	0.0109	0.008	0.0081	mg/L	0.0030 U	0.0030 U	0.0030 U	0.0077 J	0.0041 J	0.0030 U	0.0039 J	0.0030 U	0.0030 U
Mercury	0.00077	0.00077	0.00077	0.00094	mg/L	0.00003 U	0.00010 U	0.00003 U	0.00004 U	0.00004 U	0.00003 U	0.00007 U	0.00004 U	0.00009 U
Zinc	0.2685	0.3824	0.066	0.081	mg/L	0.0022 U	0.0022 U	0.0022 U	0.0022 U	0.0022 U	0.0022 U	0.0022 U	0.0022 U	0.0022 U
Miscellaneous														
Hardness	- -	- -	- -	- -	mg/L	1,340	1,620	1,860	1,190	1,360	1,320	1,380	1,600	1,100
pH (lab)	- -	- -	- -	- -	s.u.	7.79	7.82	7.64	7.89	7.84	7.75	7.92	7.67	7.97
Organic Carbon - Filtered														
Soluble Organic Carbon			- -	- -	mg/L	13.70	9.75	8.91	7.54	12.60	12.60	12.80	11.60	14.40

TABLE 10
PORE WATER DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID:	Freshwater Criteria (mg/L)		Saltwater Criteria (mg/L)			SED121	SED122	SED123	SED124	SED125	SED127	SED128	SED129	SED130
Sample Depth (ft):						0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Date Collected:	NYS Class B (Chronic)	USEPA NAWQC (CCC)	NYS Class SB (Chronic)	USEPA NAWQC (CCC)	Units	9/19/2006	10/10/2006	9/19/2006	9/19/2006	10/4/2006	9/19/2006	9/19/2006	10/10/2006	10/10/2006
Inorganics														
Chromium	0.2307	0.2307	0.054	0.05	mg/L	0.0062 J	0.0058 J	0.0056 J	0.0085 J	0.0114	0.0063 J	0.0100 J	0.0053 J	0.0117
Copper	0.0293	0.0293	0.0034	0.0031	mg/L	*0.0051* J	*0.0073* J	*0.0045* J	*0.0049* J	*0.0082* J	*0.0057* J	*0.0041* J	*0.0050* J	*0.0188* J
Lead	0.0165	0.0109	0.008	0.0081	mg/L	0.0030 U	0.0030 U	0.0030 U	0.0030 U	0.0030 U	0.0030 U	0.0030 U	0.0030 U	0.0062 J
Mercury	0.00077	0.00077	0.00077	0.00094	mg/L	0.00003 U	0.00002 U	0.00004 U	0.00002 U	0.00004 U	0.00003 U	0.00002 U	0.00004 U	0.00010 U
Zinc	0.2685	0.3824	0.066	0.081	mg/L	0.0022 U	0.0022 U	0.0022 U	0.0022 U	0.0027 J	0.0022 U	0.0022 U	0.0022 U	0.0022 U
Miscellaneous														
Hardness	- -	- -	- -	- -	mg/L	1,410	1,450	1,640	1,390	1,120	1,490	1,390	1,150	1,300
pH (lab)	- -	- -	- -	- -	s.u.	7.78	7.74	7.83	7.63	7.74	7.88	7.96	7.7	7.8
Organic Carbon - Filtered														
Soluble Organic Carbon			- -	- -	mg/L	10.10	11.80	8.69	14.90	14.70	8.83	13.60	16.20	10.90

TABLE 10
PORE WATER DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID:	Freshwater Criteria (mg/L)		Saltwater Criteria (mg/L)			SED131	SED132	SED133	SED134	SED135	SED136	SED137	SED138	SED139
Sample Depth (ft):						0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Date Collected:	NYS Class B (Chronic)	USEPA NAWQC (CCC)	NYS Class SB (Chronic)	USEPA NAWQC (CCC)	Units	10/10/2006	10/10/2006	10/10/2006	10/10/2006	10/10/2006	10/10/2006	10/10/2006	10/12/2006	9/20/2006
Inorganics														
Chromium	0.2307	0.2307	0.054	0.05	mg/L	0.0100	0.0135	0.0073 J	0.0207	0.0116	0.0055 J	0.0074 J	0.0086 J	0.0055 J
Copper	0.0293	0.0293	0.0034	0.0031	mg/L	*0.0067* J	*0.0133* J	*0.0064* J	*0.0195* J	*0.0109* J	*0.0050* J	*0.0080* J	*0.0081* J	*0.0055* J
Lead	0.0165	0.0109	0.008	0.0081	mg/L	0.0030 U	0.0055 J	0.0030 U	*0.0144* J	0.0054 J	0.0030 U	0.0030 U	0.0055 J	0.0030 U
Mercury	0.00077	0.00077	0.00077	0.00094	mg/L	0.00016 U	0.00012 U	0.00003 U	0.00033 U	0.00015 U	0.00002 U	0.00007 U	0.00005 U	0.00004 U
Zinc	0.2685	0.3824	0.066	0.081	mg/L	0.0022 U	0.0022 U	0.0022 U	0.0155 J	0.0022 U	0.0022 U	0.0022 U	0.0022 U	0.0027 J
Miscellaneous														
Hardness	- -	- -	- -	- -	mg/L	1,220	1,260	1,220	1,250	1,220	1,210	1,280	1,460	1,260
pH (lab)	- -	- -	- -	- -	s.u.	7.72	7.94	7.83	7.96	8.02	7.85	7.82	8.01	8.09
Organic Carbon - Filtered														
Soluble Organic Carbon			- -	- -	mg/L	13.20	15.80	13.30	13.30	18.10	12.60	15.50	13.90	18.40

Notes:

1. New York Criteria: Values obtained from New York State Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, Division of Water Technical and Operational Guidance Series (1.1.1), Reissued June, 1998.
2. For saltwater criteria: Per 6 NYCRR Part 701 Classifications-Surface Waters and Groundwaters, Section §701.11 Class SB saline surface waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation a
3. Saltwater criteria: Value for total chromium, copper, lead, and zinc obtained using New York State Clas SB aquatic chronic A(C) criteria (protection for fish propagation in saline waters).
4. NY saltwater criteria: Value listed for mercury in New York State Class SB waters is defaulted to the New York State fresh water Class B aquatic chronic A(C) criteria, in the dissolved form. The only available Class SB criterion is for the protection o
5. Saltwater value for chromium reported in hexavalent form, and applies to acid-soluble form.(data collected as total chromium)
6. Saltwater criteria: Standard value for copper is 3.4 ug/L (0.0034 mg/L), except in New York/New Jersey Harbor where it is 5.6 ug/L (0.0056 mg/L).
7. Saltwater criteria: Source: USEPA National Recommended Water Quality Criteria: 2006. Current online table provided at: http://www.epa.gov/waterscience/criteria/nrwqc-2006.pdf
8. Freshwater criteria for dissolved metals of CCC from USEPA National Recommended Water Quality Criteria: 2002.
9. Pore water duplicates at four near-Site locations (SED-120, SED-134, SED-135, and SED-136) could not be analyzed due to insufficient pore water volume. In these cases the duplicates were combined with their parent samples to provide sufficient volumes
10. Hardness is set to a maximum of 400 mg/L for freshwater criteria per USEPA National Recommended Water Quality Criteria: 2002.

CCC = Criteria Continuous Concentrations for dissolved metals in saltwater or freshwater.
Chromium (VI) CCC saltwater criteria used to represent total chromium
mg/L = milligrams per liter
s.u. = standard units

Data Qualifiers:
NA = Not analyzed
U = Indicates that the analyte was analyzed for but not detected
J = Values is estimated
Shading = Value greater than the New York State Class SB Ambient Water Quality Criteria
Italic values are greater than the Saltwater CCC Criteria

TABLE 11
PORE WATER DATA
BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID:	Freshwater Criteria (mg/L)		Saltwater Criteria (mg/L)			SED101	SED102	SED103	SED104	SED105
Sample Depth (ft):						0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
Date Collected:	NYS Class B (Chronic)	USEPA NAWQC (CCC)	NYS Class SB (Chronic)	USEPA NAWQC (CCC)	Units	9/20/2006	9/20/2006	9/20/2006	9/21/2006	9/21/2006
Inorganics										
Chromium	0.2307	0.2307	0.054	0.05	mg/L	0.0061 J	0.0046 J	0.0081 J	0.0056 J	0.0078 J
Copper	0.0293	0.0293	0.0034	0.0031	mg/L	*0.0107* J	*0.0046* J	*0.0096* J	*0.0050* J	*0.0103* J
Lead	0.0165	0.0109	0.008	0.0081	mg/L	0.0030 U	0.0030 U	0.0045 J	0.0030 U	0.0071
Mercury	0.00077	0.00077	0.00077	0.00094	mg/L	0.00005 U	0.00003 U	0.00006 U	0.00005 U	0.00008 U
Zinc	0.2685	0.3824	0.066	0.081	mg/L	0.0042 J	0.0022 U	0.0022 U	0.0022 U	0.0022 U
Miscellaneous										
Hardness		- -	- -	- -	mg/L	1,160	1,270	1,310	1,150	1,110
pH (lab)		- -	- -	- -	s.u.	7.82	7.9	7.89	8	7.84
Organic Carbon - Filtered										
Soluble Organic Carbon		- -	- -	- -	mg/L	7.97	6.2	10.5	8.38	13.4

TABLE 11
PORE WATER DATA SUMMARY
BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: / Sample Depth (ft):	Freshwater Criteria (mg/L)		Saltwater Criteria (mg/L)			SED106 0 - 0.5	SED107 0 - 0.5	SED108 0 - 0.5	SED109 0 - 0.5	SED109-DUP 0 - 0.5
Date Collected:	NYS Class B (Chronic)	USEPA NAWQC (CCC)	NYS Class SB (Chronic)	USEPA NAWQC (CCC)	Units	9/20/2006	9/18/2006	9/18/2006	9/13/2006	9/13/2006
Inorganics										
Chromium	0.2307	0.2307	0.054	0.05	mg/L	0.0033 J	0.0033 J	0.0050 J	0.0066 J	0.0039 J
Copper	0.0293	0.0293	0.0034	0.0031	mg/L	*0.0052* J	*0.0037* J	*0.0070* J	*0.0113* J	*0.0112* J
Lead	0.0165	0.0109	0.008	0.0081	mg/L	0.0030 U	0.0030 U	0.0033 J	0.0066 J	0.0062 J
Mercury	0.00077	0.00077	0.00077	0.00094	mg/L	0.00003 U	0.00002 U	0.00004 U	0.00009 U	0.00008 U
Zinc	0.2685	0.3824	0.066	0.081	mg/L	0.0022 U	0.0022 U	0.0032 U	0.0040 U	0.0040 U
Miscellaneous										
Hardness		- -	- -	- -	mg/L	1,090	1,200	1,350	1,290	1,300
pH (lab)		- -	- -	- -	s.u.	7.95	7.94	7.74	7.82	7.95
Organic Carbon - Filtered										
Soluble Organic Carbon		- -	- -	- -	mg/L	10.1	20.1	14.2	12.3	13

Notes:

1. New York Criteria: Values obtained from New York State Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, Division of Water Technical and Operational Guidance Series (1.1.1), Reissued June, 1998.
2. For saltwater criteria: Per 6 NYCRR Part 701 Classifications-Surface Waters and Groundwaters, Section §701.11 Class SB saline surface waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation a
3. Saltwater criteria: Value for total chromium, copper, lead, and zinc obtained using New York State Class SB aquatic chronic A(C) criteria (protection for fish propagation in saline waters).
4. NY saltwater criteria: Value listed for mercury in New York State Class SB waters is defaulted to the New York State fresh water Class B aquatic chronic A(C) criteria, in the dissolved form. The only available Class SB criterion is for the protection o
5. Saltwater value for chromium reported in hexavalent form, and applies to acid-soluble form.(data collected as total chromium)
6. Saltwater criteria: Standard value for copper is 3.4 ug/L (0.0034 mg/L), except in New York/New Jersey Harbor where it is 5.6 ug/L (0.0056 mg/L).
7. Saltwater criteria: Source: USEPA National Recommended Water Quality Criteria: 2006. Current online table provided at: http://www.epa.gov/waterscience/criteria/nrwqc-2006.pdf
8. Freshwater criteria for dissolved metals of CCC from USEPA National Recommended Water Quality Criteria: 2002.
9. Pore water duplicates at four near-Site locations (SED-120, SED-134, SED-135, and SED-136) could not be analyzed due to insufficient pore water volume. In these cases the duplicates were combined with their parent samples to provide sufficient volumes
10. Hardness is set to a maximum of 400 mg/L for freshwater criteria per USEPA National Recommended Water Quality Criteria: 2002.

CCC = Criteria Continuous Concentrations for dissolved metals in saltwater or freshwater.
Chromium (VI) CCC saltwater criteria used to represent total chromium
mg/L = milligrams per liter
s.n. = standard units

Data Qualifiers:
NA = Not analyzed
U = Indicates that the analyte was analyzed for but not detected
J = Values is estimated
Shading = Value greater than the New York State Class SB Ambient Water Quality Criteria
Italic values are greater than the Saltwater CCC Criteria

TABLE 12
PORE WATER DATA SUMMARY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

COPC	Frequency of Detection	Range of Detected Concentrations (mg/L)	Freshwater Standards: NYS Class A (Chronic) Criteria (mg/L)	Freshwater Standards: NYS Class A (Chronic) No. Exceeding	Freshwater Standards: USEPA AWQC (CCC) Criteria (mg/L)	Freshwater Standards: USEPA AWQC (CCC) No. Exceeding	Saltwater Standards: NYS Class B Criteria (mg/L)	Saltwater Standards: NYS Class B No. Exceeding	Saltwater Standards: USEPA AWQC (CCC) Criteria (mg/L)	Saltwater Standards: USEPA AWQC (CCC) No. Exceeding
Near-Site										
Chromium	27 / 27	0.0053 - 0.0207	0.2307	0	0.2307	0	0.054	0	0.05	0
Copper	27 / 27	0.0041 - 0.0195	0.0293	0	0.0293	0	0.0034	27	0.0031	27
Lead	8 / 27	ND - 0.0144	0.0165	0	0.0109	0	0.008	1	0.0081	1
Mercury	0 / 27	ND - ND	0.00077	0	0.00077	0	0.00077	0	0.00094	0
Zinc	3 / 27	ND - 0.0155	0.2685	0	0.3824	0	0.066	0	0.081	0
Background										
Chromium	10 / 10	0.0033 - 0.0081	0.2307	0	0.2307	0	0.054	0	0.05	0
Copper	10 / 10	0.0037 - 0.0113	0.0293	0	0.0293	0	0.0034	10	0.0031	10
Lead	5 / 10	ND - 0.0071	0.0165	0	0.0109	0	0.008	0	0.0081	0
Mercury	0 / 10	ND - ND	0.00077	0	0.00077	0	0.00077	0	0.00094	0
Zinc	1 / 10	ND - 0.0042	0.2685	0	0.3824	0	0.066	0	0.081	0

Notes:

1. New York Criteria: Values obtained from New York State Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, Division of Water Technical and Operational Guidance Series (1.1.1), Reissued June, 1998.
2. For saltwater criteria: Per 6 NYCRR Part 701 Classifications-Surface Waters and Groundwaters, Section §701.11 Class SB saline surface waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival. Per 6 NYCR
3. Saltwater criteria: Value for total chromium, copper, lead, and zinc obtained using SB water class, and the aquatic chronic A(C) criteria (protection for fish propagation in saline waters).
4. NY saltwater criteria: Value for mercury is represented as the fresh water class value for the A(C) criteria, in the dissolved form. The corresponding saline value is for the protection of wildlife and is not applicable.
5. Saltwater value for chromium reported in hexavalent form, and applies to acid-soluble form.(data collected as total chromium)
6. Saltwater criteria: Standard value for copper is 3.4 ug/L (0.0034 mg/L), except in New York/New Jersey Harbor where it is 5.6 ug/L (0.0056 mg/L).
7. Saltwater criteria: Source: USEPA National Recommended Water Quality Criteria: 2006. Current online table provided at: http://www.epa.gov/waterscience/criteria/nrwqc-2006.pdf
8. Freshwater criteria for dissolved metals of CCC from USEPA National Recommended Water Quality Criteria: 2002.
9. Hardness is set to a maximum of 400 mg/L for freshwater criteria per USEPA National Recommended Water Quality Criteria: 2002.

CCC = Criteria Continuous Concentrations for dissolved metals in saltwater or freshwater
Chromium (VI) CCC saltwater criteria used to represent total chromium
mg/L = milligrams per liter
s.u. = standard units
ND = Not detected

TABLE 13
SEDIMENT TOXICITY DATA
NEAR-SITE AND BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Field ID	Lab ID	Percent survival	Growth (mg - dry weight)	Mean No. of Juveniles per Amphipod	Mean No. of Offspring per Female
Lab Control A	Lab A	81.87%	0.5912	0.30	0.72
Lab Control B	Lab B	89.37%	0.3372	0.32	0.70
Lab Control C	Lab B	96.25%	1.0864	0.36	0.77
SED100	Ref Site 01	88.33%	1.5820	0.87	1.82
SED101	Ref Site 02	83.13%	1.1454	0.25	0.49
SED102	Ref Site 03	91.25%	1.1483	0.44	0.93
SED103	Ref Site 04	89.38%	1.0091	0.52	1.12
SED104	Ref Site 05	90.00%	1.3507	1.77	3.74
SED105	Ref Site 06	82.50%	1.1874	0.36	0.92
SED106	Ref Site 07	88.75%	1.0050	0.27	0.53
SED107	Ref Site 08	73.75%	0.3891	0.10	0.28
SED108	Ref Site 09	81.88%	0.6211	0.06	0.17
SED109	Ref Site 10	43.13%	0.3767	0.16	0.38
SED110	Ref Site 11	77.50%	0.5973	0.09	0.19
SED115		82.50%	0.6371	0.22	0.52
SED116		83.75%	0.5822	0.16	0.29
SED114		88.13%	0.5823	0.09	0.24
SED113		78.13%	0.4374	0.12	0.24
SED112		87.50%	0.5012	0.20	0.57
SED111		76.88%	0.4099	0.18	0.35
SED117		77.50%	0.8593	0.22	0.44
SED118		85.63%	0.8649	0.24	0.57
SED121		80.63%	0.9256	0.15	0.31
SED124		90.63%	1.0458	0.37	0.77
SED128		88.13%	0.7943	0.30	0.68
SED127		83.13%	0.8102	0.22	0.46
SED123		89.38%	0.9517	0.63	1.26
SED139		83.75%	0.6022	0.42	0.95
SED138		87.50%	1.2547	1.04	2.29
SED119		87.50%	1.4536	1.55	3.36
SED125		88.75%	1.1907	0.51	1.71
SED126		86.80%	1.1583	0.37	0.90
SED122		90.00%	0.5861	0.28	0.65
SED129		79.79%	0.6210	0.30	0.69
SED130		83.13%	0.6182	0.34	0.77
SED131		91.25%	1.1680	0.62	1.43
SED132		75.63%	1.2721	0.26	0.49
SED133		68.13%	1.0888	0.39	0.84
SED134		76.88%	1.4335	0.47	1.07
SED135		83.13%	1.3232	0.51	1.09
SED120		88.75%	1.4241	0.53	1.31
SED136		70.00%	1.3173	0.59	1.28

TABLE 14
BACKGROUND TOXICITY TOLERANCE LIMIT SUMMARY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Survival						
Reference Data Selected	**Number of samples used (n)**	**Minimum Survival**	**Maximum Survival**	**Probability Distribution Type**	**Tolerance Limit Calculation Type**	**Survival Tolerance Limit (10th percentile) with lower 95 % Confidence Limit**
All reference sites	11	43%	91%	Lognormal	Parametric	**58.5%**
Suspect reference site removed (SED-109)*	10	74%	91%	Normal	Parametric	**76.1%**
Growth						
Reference Data Selected	**Number of samples used (n)**	**Minimum Growth (mg)**	**Maximum Growth (mg)**	**Probability Distribution Type**	**Tolerance Limit Calculation Type**	**Growth Tolerance Limit (10th percentile) with lower 95 % Confidence Limit (mg)**
All reference sites	11	0.377	1.59	Normal	Parametric	**0.377**
Reproduction						
Reference Data Selected	**Number of samples used (n)**	**Minimum Reproductive Success (amphipods/parent)**	**Maximum Reproductive Success (amphipods/parent)**	**Probability Distribution Type**	**Tolerance Limit Calculation Type**	**Reproduction Tolerance Limit (10th percentile) with lower 95 % Confidence Limit (amphipods/parent)**
All reference sites (Juveniles per amphipod)	11	0.060	1.77	Lognormal	Parametric	**0.064**
All reference sites (Offspring per female)	11	0.170	3.74	Lognormal	Parametric	**0.158**

Note:
* Mean survival in SED-109 was found to be an outlier (Dixon test, $p < 0.01$).

TABLE 15
BENTHIC MACROINVERTEBRATE SURVEY
COMMUNITY DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Area	**Background**														
Collection Date	9/20/2006			9/20/2006			9/20/2006			9/20/2006			9/21/2006		
Location and depth (in)	SED100 (0-6)			SED101 (0-6)			SED102 (0-6)			SED103 (0-6)			SED104 (0-6)		
Sample	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3
Invertebrate Species															
Lowest Taxonomic Identification															
Annelida															
Oligochaeta															
Aulodrilus sp.	10	16	32												
Haplotaxidae															
Lumbricidae		2													
Naididae															
Tubificidae															
Polychaeta															
Heteromastus filiformis											2				
Hobsonia florida	134	150	136	21	8	30		1	2					2	1
Neanthes sp.	2		4												
Spiophanes sp.			4	10		8	3	1	2	2				1	2
Streblospio sp.															
Arthropoda															
Crustacea															
Balanidae															
Balanus sp.			12												
Callinectes sapidus															
Corophium sp.															
Crangon sp.															
Cyathura polita	28	32	72			8	3	3		12	4	4	1	4	6
Edotea triloba															
Gammaridae															
Gammarus sp.				510	108	417	29	70	28	10	26	244		1	
Hyale sp.															
Leucon americanus			4												
Mysidae															
Palaemonetes sp.															
Panopeus sp.					4										
Insecta															
Chironomid pupa															
Clinotanypus sp.				94	32	38	8	31	24	6	4	8	2	10	54
Cricotopus bicinctus		8	76												
Cryptochironomus fulvus															
Dicrotendipes neomodestus	6														
Polypedilum sp.	8	6	40												
Procladius sp.			16												
Rheotanytarsus exiguus		6	28												
Rheotanytarsus sp.								1							
Tanypodinae							5								
Tanytarsus sp.						8									
Mollusca															
Amnicola sp.							1			2					
Crassostrea virginica															
Geukensia demissa															
Macoma balthica															
Macoma sp.	6		4	323	220	23	154	287	302	34	610	456		1	3
Mytilidae															
Rangia cuneata	1		1		1						2				
Nematoda			4												
Nemertea							1		2	2	2	8		2	
Total Organisms	**195**	**220**	**433**	**958**	**373**	**532**	**204**	**394**	**360**	**68**	**650**	**720**	**3**	**21**	**66**

TABLE 15
BENTHIC MACROINVERTEBRATE SURVEY
COMMUNITY DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Area	**Background**														
Collection Date	9/21/2006			9/20/2006			9/13/2006			9/18/2006			9/13/2006		
Location and depth (in)	SED105 (0-6)			SED106 (0-6)			SED107 (0-6)			SED108 (0-6)			SED109 (0-6)		
Sample	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3
Invertebrate Species															
Lowest Taxonomic Identification															
Annelida															
Oligochaeta															
Aulodrilus sp.															
Haplotaxidae											1				
Lumbricidae															
Naididae															
Tubificidae															
Polychaeta															
Heteromastus filiformis	1													1	
Hobsonia florida				8	6	1	5	10	1		3			1	
Neanthes sp.							2	2	1					1	
Spiophanes sp.	5	3	4	4	8	2	1	7	3	1		1	10		
Streblospio sp.															
Arthropoda															
Crustacea															
Balanidae															1
Balanus sp.	5			6								1			
Callinectes sapidus															
Corophium sp.															
Crangon sp.															
Cyathura polita	5	9	1	4	2	2	2	5	3	2	1	1	3	1	
Edotea triloba															
Gammaridae															
Gammarus sp.		1		86	140	23	13	1	7	8	5	1	177	30	7
Hyale sp.													3		
Leucon americanus								1							
Mysidae															
Palaemonetes sp.															
Panopeus sp.	1						1	2				1			
Insecta															
Chironomid pupa															
Clinotanypus sp.	55	38	38	74	32	16	4	4		4	11	3	28	17	5
Cricotopus bicinctus															
Cryptochironomus fulvus															
Dicrotendipes neomodestus															
Polypedilum sp.															
Procladius sp.															
Rheotanytarsus exiguus															
Rheotanytarsus sp.															
Tanypodinae															
Tanytarsus sp.															
Mollusca															
Amnicola sp.									1						
Crassostrea virginica															
Geukensia demissa															
Macoma balthica															
Macoma sp.	7	29	4	40	52	8	64	89	70	2			135	35	
Mytilidae						1		2							1
Rangia cuneata				1			1			1	1	1	1		
Nematoda															
Nemertea	3				4		10	5	1		1				2
Total Organisms	**82**	**80**	**47**	**223**	**244**	**53**	**103**	**128**	**87**	**18**	**23**	**9**	**357**	**86**	**16**

TABLE 15
BENTHIC MACROINVERTEBRATE SURVEY
COMMUNITY DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Area	**Background**			**Near-Site**											
Collection Date	9/18/2006			9/14/2006			9/13/2006			9/13/2006			9/13/2006		
Location and depth (in)	SED110 (0-6)			SED111 (0-6)			SED112 (0-6)			SED113 (0-6)			SED114 (0-6)		
Sample	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3
Invertebrate Species															
Lowest Taxonomic Identification															
Annelida															
Oligochaeta															
Aulodrilus sp.												2			
Haplotaxidae															
Lumbricidae															
Naididae															
Tubificidae															
Polychaeta															
Heteromastus filiformis				6	1	3		2						1	2
Hobsonia florida		1		1				2		1	4	8	4	1	6
Neanthes sp.				1	1	1				10	19	31			
Spiophanes sp.		2	1	2		2	5	10	21		3	4			
Streblospio sp.															
Arthropoda															
Crustacea															
Balanidae															
Balanus sp.															
Callinectes sapidus															
Corophium sp.															
Crangon sp.															
Cyathura polita		4		10	7	7	2	6	8	2	2	9	4	3	4
Edotea triloba									1			1	1		
Gammaridae															
Gammarus sp.		39	1				2	12	14	20	13	21	25	9	40
Hyale sp.															
Leucon americanus				8	1	11	2		13						
Mysidae															
Palaemonetes sp.															
Panopeus sp.															
Insecta															
Chironomid pupa											1				
Clinotanypus sp.		36	3	10	5	7	21	22	42			1	31	10	20
Cricotopus bicinctus															
Cryptochironomus fulvus														1	
Dicrotendipes neomodestus															
Polypedilum sp.										1					
Procladius sp.															
Rheotanytarsus exiguus															
Rheotanytarsus sp.															
Tanypodinae															
Tanytarsus sp.															
Mollusca															
Amnicola sp.												2			
Crassostrea virginica															
Geukensia demissa															
Macoma balthica															
Macoma sp.	4	4		8	2	3	4	6	29	7	4	5	72	23	114
Mytilidae														1	
Rangia cuneata	1		1						1						
Nematoda															
Nemertea		2		12	4	2		2	1			5		2	4
Total Organisms	**5**	**88**	**6**	**58**	**21**	**36**	**36**	**62**	**130**	**41**	**46**	**89**	**137**	**51**	**190**

TABLE 15
BENTHIC MACROINVERTEBRATE SURVEY
COMMUNITY DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Area	**Near-Site**														
Collection Date	9/12/2006			9/12/2006			9/18/2006			9/19/2006			9/21/2006		
Location and depth (in)	SED115 (0-6)			SED116 (0-6)			SED117 (0-6)			SED118 (0-6)			SED119 (0-6)		
Sample	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3
Invertebrate Species Lowest Taxonomic Identification															
Annelida															
Oligochaeta															
Aulodrilus sp.															
Haplotaxidae															
Lumbricidae															
Naididae															
Tubificidae										1					
Polychaeta															
Heteromastus filiformis	1			2	1		5	2					4		
Hobsonia florida		1	1	1	1					3					
Neanthes sp.										2					
Spiophanes sp.							3	2	4	6	8	3			
Streblospio sp.															
Arthropoda															
Crustacea															
Balanidae															
Balanus sp.										9	5				
Callinectes sapidus															
Corophium sp.										1	3	1			
Crangon sp.															
Cyathura polita	1		1	3			8	2	1	3	2	2	3	2	3
Edotea triloba						1									
Gammaridae							2								
Gammarus sp.	4	1	4	3	2	13		3	2	3		3	1		1
Hyale sp.					1										
Leucon americanus						1	1						5	2	1
Mysidae															
Palaemonetes sp.															
Panopeus sp.															
Insecta															
Chironomid pupa															
Clinotanypus sp.	20	27	2	39	15	35	2	3	1				19	1	3
Cricotopus bicinctus															
Cryptochironomus fulvus															
Dicrotendipes neomodestus															
Polypedilum sp.										1			1		
Procladius sp.	1	3					1								
Rheotanytarsus exiguus															
Rheotanytarsus sp.															
Tanypodinae															
Tanytarsus sp.															
Mollusca															
Amnicola sp.															
Crassostrea virginica															
Geukensia demissa															
Macoma balthica					1	1									
Macoma sp.	22	79	24	71	34	81	8		2	1			1	2	
Mytilidae															
Rangia cuneata															
Nematoda	1														
Nemertea	1		2		1		1	1	2		1		1	1	2
Total Organisms	**51**	**111**	**34**	**119**	**56**	**132**	**31**	**13**	**12**	**30**	**19**	**9**	**35**	**8**	**10**

TABLE 15
BENTHIC MACROINVERTEBRATE SURVEY
COMMUNITY DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Area	**Near-Site**														
Collection Date	10/10/2006			9/19/2006			10/10/2006			9/19/2006			9/19/2006		
Location and depth (in)	SED120 (0-6)			SED121 (0-6)			SED122 (0-6)			SED123 (0-6)			SED124 (0-6)		
Sample	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3
Invertebrate Species Lowest Taxonomic Identification															
Annelida															
Oligochaeta															
Aulodrilus sp.								1							
Haplotaxidae															
Lumbricidae															
Naididae														1	
Tubificidae															
Polychaeta															
Heteromastus filiformis	5			1	1	3	3	3	3	5	1		7	3	6
Hobsonia florida					2	1		1	1				1	2	3
Neanthes sp.	1							7	10			1			
Spiophanes sp.	2	2	1	2		7	3	1		3	2		3	2	1
Streblospio sp.														1	
Arthropoda															
Crustacea															
Balanidae													2		
Balanus sp.							247	91	256						
Callinectes sapidus											1				
Corophium sp.															
Crangon sp.															
Cyathura polita	7	7		3	10	8	2	2	1	10	2	2	8	8	4
Edotea triloba									1						
Gammaridae															
Gammarus sp.	9			9	1	6	1	1		3	1		70	113	70
Hyale sp.								1	2						
Leucon americanus	4	1				5	7	15	1	27	11		1	2	
Mysidae															
Palaemonetes sp.									3						
Panopeus sp.					2			1	3				4		
Insecta															
Chironomid pupa															
Clinotanypus sp.	3	5	1	8	24	15	17	17	5	4	6	2	12	13	2
Cricotopus bicinctus															
Cryptochironomus fulvus															
Dicrotendipes neomodestus															
Polypedilum sp.													2		
Procladius sp.										1		1			
Rheotanytarsus exiguus															
Rheotanytarsus sp.															
Tanypodinae															
Tanytarsus sp.															
Mollusca															
Amnicola sp.															
Crassostrea virginica							3	2	7						
Geukensia demissa							2		5						
Macoma balthica												1			1
Macoma sp.					2	2	15		2	17	8	1	3	11	4
Mytilidae									1						
Rangia cuneata				1									1		
Nematoda															
Nemertea	4	2	1	1	2	3	3	1	7	4	5		4	4	3
Total Organisms	**35**	**17**	**3**	**25**	**44**	**50**	**303**	**144**	**308**	**74**	**37**	**8**	**118**	**160**	**94**

TABLE 15
BENTHIC MACROINVERTEBRATE SURVEY
COMMUNITY DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Area	**Near-Site**														
Collection Date	10/4/2006			10/4/2006			9/19/2006			9/19/2006			10/10/2006		
Location and depth (in)	SED125 (0-6)			SED126 (0-6)			SED127 (0-6)			SED128 (0-6)			SED129 (0-6)		
Sample	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3
Invertebrate Species Lowest Taxonomic Identification															
Annelida															
Oligochaeta															
Aulodrilus sp.															
Haplotaxidae															
Lumbricidae															
Naididae															
Tubificidae															
Polychaeta															
Heteromastus filiformis	3	1						7	1	6	4	2	4	5	8
Hobsonia florida				5		1							2		1
Neanthes sp.	1	6	1	7	2	2						1	1		
Spiophanes sp.	6		5	8	4		3	3	3	3		2	3	6	9
Streblospio sp.															
Arthropoda															
Crustacea															
Balanidae															
Balanus sp.					1	1									1
Callinectes sapidus															
Corophium sp.															
Crangon sp.															
Cyathura polita	6	1	5	5	5	2	2	5	1	6	4	5	13	7	13
Edotea triloba	1			1	1		1				1				
Gammaridae															
Gammarus sp.	10	6	8	5	1	1	4	11		19	24	3	10	15	18
Hyale sp.										2	2		5	1	
Leucon americanus							5	12		5	12	4		1	
Mysidae															
Palaemonetes sp.															
Panopeus sp.	1	1											1		1
Insecta															
Chironomid pupa															
Clinotanypus sp.	15	5	10				6	12		12	9	5	3	11	7
Cricotopus bicinctus															
Cryptochironomus fulvus															
Dicrotendipes neomodestus															
Polypedilum sp.															
Procladius sp.															
Rheotanytarsus exiguus															
Rheotanytarsus sp.															
Tanypodinae															
Tanytarsus sp.															
Mollusca															
Amnicola sp.															
Crassostrea virginica															
Geukensia demissa															
Macoma balthica															
Macoma sp.	4		3	1	1		10	20	5	110	49	34		4	1
Mytilidae															
Rangia cuneata						1							1		
Nematoda															
Nemertea	5	1	6	2	2		4	4	2	6	4	5	11	4	9
Total Organisms	**52**	**21**	**38**	**34**	**17**	**8**	**35**	**74**	**12**	**169**	**109**	**61**	**54**	**54**	**68**

TABLE 15
BENTHIC MACROINVERTEBRATE SURVEY
COMMUNITY DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Area	**Near-Site**														
Collection Date	10/10/2006			10/10/2006			10/10/2006			10/5/2006			10/5/2006		
Location and depth (in)	SED130 (0-6)			SED131 (0-6)			SED132 (0-6)			SED133 (0-6)			SED134 (0-6)		
Sample	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3
Invertebrate Species Lowest Taxonomic Identification															
Annelida															
Oligochaeta															
Aulodrilus sp.															
Haplotaxidae															
Lumbricidae															
Naididae															
Tubificidae															
Polychaeta															
Heteromastus filiformis	2	2	5	4	3	3	1	2	1	1		2	3	1	5
Hobsonia florida										1		2			
Neanthes sp.				1		1			3		2			1	2
Spiophanes sp.	7		4	3	1	2	2	3	2	4	1	2		4	3
Streblospio sp.															
Arthropoda															
Crustacea															
Balanidae															
Balanus sp.									2			4		5	
Callinectes sapidus															
Corophium sp.															
Crangon sp.															
Cyathura polita	8	11	9	6	7	6	5	5	7	5	4	4	8	3	5
Edotea triloba															
Gammaridae															
Gammarus sp.	24	15	19	14	1	18	4	3		28	18	27	8	14	28
Hyale sp.	3		2												
Leucon americanus	1	5	3	2	2	1	3	2	2		1	1		1	2
Mysidae														3	
Palaemonetes sp.															
Panopeus sp.															
Insecta															
Chironomid pupa															
Clinotanypus sp.	3	23	12	20	10	12	5	7	12	2	8	9	8	5	10
Cricotopus bicinctus															
Cryptochironomus fulvus															
Dicrotendipes neomodestus															
Polypedilum sp.															
Procladius sp.						1									
Rheotanytarsus exiguus															
Rheotanytarsus sp.															
Tanypodinae															
Tanytarsus sp.															
Mollusca															
Amnicola sp.															
Crassostrea virginica															
Geukensia demissa															
Macoma balthica					1										
Macoma sp.		1	3		1	2		5	2		1		1	8	
Mytilidae															
Rangia cuneata		1								1				1	
Nematoda															
Nemertea	21	10	1	12	6	10	2	14	4	10	13	9	8	19	9
Total Organisms	**69**	**68**	**58**	**62**	**32**	**56**	**22**	**41**	**35**	**52**	**48**	**60**	**36**	**65**	**64**

TABLE 15
BENTHIC MACROINVERTEBRATE SURVEY
COMMUNITY DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Area	**Near-Site**														
Collection Date	10/5/2006			10/10/2006			10/10/2006			9/21/2006			9/20/2006		
Location and depth (in)	SED135 (0-6)			SED136 (0-6)			SED137 (0-6)			SED138 (0-6)			SED139 (0-6)		
Sample	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3	BBR1	BBR2	BBR3
Invertebrate Species Lowest Taxonomic Identification															
Annelida															
Oligochaeta															
Aulodrilus sp.															
Haplotaxidae															
Lumbricidae															
Naididae															
Tubificidae															
Polychaeta															
Heteromastus filiformis	7	4	2	6	4	2	4	2	1	8	2	13	2	2	2
Hobsonia florida			1								1			2	
Neanthes sp.	2	1				2		1			1	1		2	1
Spiophanes sp.	2	2		11	3	4	2	2	3		1				
Streblospio sp.															
Arthropoda															
Crustacea															
Balanidae															1
Balanus sp.					2	1		2	1			18			16
Callinectes sapidus															
Corophium sp.															
Crangon sp.									1						
Cyathura polita	5	3	5	3	7	7	8	1	5		2	1	4	8	2
Edotea triloba						1							1		
Gammaridae															
Gammarus sp.	3	15	11	24	14	44	31	21	14		1		6	4	13
Hyale sp.						1				1					
Leucon americanus			1			2	6			11	1		1		
Mysidae															
Palaemonetes sp.															
Panopeus sp.						1									
Insecta															
Chironomid pupa															
Clinotanypus sp.	9	7	22		2	2	3	1	1	11	3	4	2	6	3
Cricotopus bicinctus															
Cryptochironomus fulvus															
Dicrotendipes neomodestus															
Polypedilum sp.															
Procladius sp.															
Rheotanytarsus exiguus															
Rheotanytarsus sp.															
Tanypodinae															
Tanytarsus sp.															
Mollusca															
Amnicola sp.															
Crassostrea virginica												2			
Geukensia demissa															
Macoma balthica															
Macoma sp.	1	1			5	11	9	6	1	9	1	1	29	15	26
Mytilidae															
Rangia cuneata							1								
Nematoda															
Nemertea	7	11	6	4	1	7		3		1	1	3	6	3	1
Total Organisms	**36**	**44**	**48**	**48**	**38**	**85**	**64**	**39**	**27**	**41**	**14**	**43**	**51**	**42**	**65**

TABLE 16
BENTHIC MACROINVERTEBRATE SURVEY
SPECIES CHARACTERISTICS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Invertebrate Species Lowest Taxonomic Identification	Feeding Category[1]	Feeding Guild[2]	Organism Habit[2]	Epifauna Classification[3]
Annelida				
Oligochaeta				
Aulodrilus sp.	DD	Collector	Burrower	N
Haplotaxidae	DD	Collector	Clinger	N
Lumbricidae	DD	Collector	Burrower	N
Naididae	DD	Collector	Burrower	N
Tubificidae	DD	Collector	Clinger	N
Polychaeta				
Heteromastus filiformis	DD	Collector	Burrower	N
Hobsonia florida	IN			N
Neanthes sp.	CO	Predator	Burrower	N
Spiophanes sp.	IN			N
Streblospio sp.	IN			N
Arthropoda				
Crustacea				
Balanidae	SU	Filterer	Clinger	Y
Balanus sp.	SU	Filterer	Clinger	Y
Callinectes sapidus	CO	Collector	Swimmer	Y
Corophium sp.	IN			Y
Crangon sp.	CO	Collector	Sprawler	Y
Cyathura polita	CO			N
Edotea triloba	CO			Y
Gammaridae	CO	Collector	Swimmer	Y
Gammarus sp.	CO	Shredder	Swimmer	Y
Hyale sp.	CO	Gatherer	Swimmer	Y
Leucon americanus	IN		Burrower	N
Mysidae	CO	Predator	Swimmer	Y
Palaemonetes sp.	CO	Collector	Sprawler	Y
Panopeus sp.	CO	Collector	Sprawler	Y
Insecta				
Chironomid pupa	CO	Gatherer	Burrower	N
Clinotanypus sp.	CO	Predator	Burrower	N
Cricotopus bicinctus	CO	Shredder	Clinger/Burrower	N
Cryptochironomus fulvus	CO	Predator	Sprawler/Burrower	N
Dicrotendipes neomodestus	CO	Collector	Burrower	N
Polypedilum sp.	CO	Shredder	Climber/Clinger	N
Procladius sp.	CO	Predator	Sprawler	N
Rheotanytarsus exiguus	CO	Filterer	Clinger	N
Rheotanytarsus sp.	CO	Filterer	Clinger	N
Tanypodinae	CO	Predator	Swimmer/Crawler	N
Tanytarsus sp.	CO	Filterer	Climber/Clinger	N
Mollusca				
Amnicola sp.	CO	Scraper	Climber	Y
Crassostrea virginica	SU	Filterer	Clinger	Y
Geukensia demissa	IN	Filterer	Clinger	Y
Macoma balthica	IN	Siphon	Sprawler	N
Macoma sp.	IN	Siphon	Sprawler	N
Mytilidae	SU	Filterer	Clinger	Y
Rangia cuneata	SU	Filterer	Sprawler	N
Nematoda	CO	Parasite, Piercer, Shredder	Burrower	Y
Nemertea	CO	Predator	Burrower	Y

Notes:

1. Feeding category according to Chesapeake B-IBI classifications (Weisberg et al. 1997); CO = carnivore/omnivore, DD = deep deposit feeder, IN = interface feeder, SU = suspension feeder
2. Feeding Guild and Organism Habit designations are from various references including: Aquatic Insects of North America (1996), Ecology and Classification of North American Freshwater Invertebrates (1991), and Feeding of Freshwater Invertebrates (2003).
3. Species classified as epifauna according to Chesapeake B-IBI designations and reference material.

TABLE 17
BENTHIC MACROINVERTEBRATE SURVEY
SUMMARY METRICS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Location	Total Number of Organisms	Margalef Species Richness	Abundance of Epifauna (%)	Number of Infauna Species	Number of Polychaetes Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)
Background							
SED 100	848	2.22	13	14	3	89	1.72
SED 101	1863	1.06	22	7	2	6	1.12
SED 102	958	1.31	30	7	2	0	0.79
SED 103	1438	1.10	33	6	2	13	0.71
SED 104	90	1.33	29	5	2	0	0.98
SED 105	209	1.50	44	5	2	32	1.19
SED 106	520	1.44	40	6	2	51	1.39
SED 107	318	2.08	38	8	3	19	1.24
SED 108	50	2.56	36	7	2	25	1.83
SED 109	459	1.96	38	8	4	19	1.23
SED 110	99	1.52	25	6	2	13	1.38
Near-Site							
SED 111	115	1.69	11	8	4	0	1.95
SED 112	228	1.84	27	8	3	6	1.77
SED 113	176	2.32	31	9	3	0	1.78
SED 114	378	1.52	40	6	2	6	1.30
SED 115	196	1.52	33	6	2	0	1.07
SED 116	307	1.75	36	7	2	0	1.06
SED 117	56	2.24	30	7	2	0	2.09
SED 118	58	2.46	36	7	3	89	1.95
SED 119	53	1.76	25	6	1	0	1.68
SED 120	55	1.75	25	6	3	0	1.93
SED 121	119	2.09	27	8	3	6	1.87
SED 122	755	2.72	53	9	4	3792	1.03
SED 123	119	2.30	25	9	3	0	1.96
SED 124	372	2.53	25	12	4	19	1.34
SED 125	111	1.91	40	6	3	0	1.99
SED 126	59	2.21	40	6	3	19	2.04
SED 127	121	1.67	33	6	2	0	1.97
SED 128	339	1.72	36	7	3	0	1.50
SED 129	176	2.51	36	9	4	13	2.10
SED 130	195	1.71	30	7	2	6	1.90
SED 131	150	2.00	18	9	3	0	1.89
SED 132	98	1.96	30	7	3	13	2.04
SED 133	160	2.17	25	9	4	32	1.69
SED 134	165	2.15	33	8	3	38	2.00
SED 135	128	1.85	20	8	4	0	1.81
SED 136	171	2.33	46	7	3	19	1.77
SED 137	130	2.26	33	8	3	25	1.71
SED 138	98	2.62	38	8	4	115	2.07
SED 139	158	2.17	42	7	3	108	1.80

Note:
% = percent

TABLE 18
BENTHIC MACROINVERTEBRATE SURVEY
WATER QUALITY DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample Location and depth (in)[1]	Collection Date (Time)	Total Water Depth (ft)	Measurement Interval[2]	DO (mg/L)	Water Temperature (C)	Salinity (%)	ORP (mV)	pH	Conductivity (mS/cm)	Turbidity (NTU)	Water Velocity (ft/s)
Background											
SED-100 (0-6)	9/20/2006	6.5	Surface	8.84	23.1	0.5	256	7.81	8.68	20.3	0.01
	(0905)		Bottom								
SED-101 (0-6)	9/20/2006	9.9	Surface	9.69	22.9	0.5	235	7.91	8.79	15.1	-0.08
	(1000)		Bottom	9.54	23	0.5	223	7.88	8.95	14.3	-0.04
SED-102 (0-6)	9/20/2006	12	Surface	9.41	23.3	0.4	209	7.87	8.12	13.8	-0.08
	(1100)		Bottom	18.9	23.1	0.5	202	7.81	10.2	13.6	-0.05
SED-103 (0-6)	9/20/2006	12.5	Surface	9.82	23.2	0.5	237	7.93	8.5	15.1	-0.34
	(1200)		Bottom	9.48	23	0.6	236	7.87	11.1	15	-0.23
SED-104 (0-6)	9/21/2006	15.2	Surface	9.97	22.1	0.5	189	8.06	9.5	21.7	0.6
	(1315)		Bottom	8.88	22.2	0.6	186	8.01	10.5	15.1	0.52
SED-105 (0-6)	9/21/2006	10.7	Surface	10.23	22.3	0.5	196	7.96	9.6	17.7	1.16
	(1415)		Bottom	9.94	22.2	0.5	185	7.89	9.7	18.7	1.08
SED-106 (0-6)	9/20/2006	12.3	Surface	10.28	23.2	0.5	226	7.96	8.7	15.7	- -
	(1300)		Bottom	9.77	23	0.6	222	7.9	10.1	15.4	- -
SED-107 (0-6)	9/13/2006	16.7	Surface	10.58	22.3	0.8	237	8.02	13.3	10.5	-0.5
	(1530)		Bottom	10.43	22.3	0.8	215	8.01	13.4	14.2	-0.45
SED-108 (0-6)	9/18/2006	13.8	Surface	10.17	24.2	0.5	266	7.72	8.22	11.5	0.59
	(1430)		Bottom	9.85	23.8	0.5	254	7.62	8.42	10.3	0.33
SED-109 (0-6)	9/13/2006	13.3	Surface	10.61	22.6	0.8	281	7.97	13.2	9.9	-0.88
	(1400)		Bottom	10.26	22.5	0.7	274	8.01	12.9	11.2	-0.4
SED-110 (0-6)	9/18/2006	11.9	Surface	9.93	24.2	0.5	273	7.98	8.6	10.8	0.04
	(1530)		Bottom	9.83	24.1	0.5	260	7.99	8.6	12.5	0.02
Near-Site											
SED-111 (0-6)	9/14/2006	17.5	Surface	10.07	22.1	0.8	176	7.99	13.2	9.8	-0.7
	(0820)		Bottom	9.8	22.1	0.8	163	8.03	13.4	10.2	-0.86
SED-112 (0-6)	9/13/2006	13.5	Surface	10.05	22.3	0.7	287	7.99	12.9	9.2	-0.12
	(1045)		Bottom	10.06	21.8	0.8	281	7.97	13.2	9.9	-0.35
SED-113 (0-6)	9/13/2006	4.6	Surface	10.02	21.6	0.7	290	7.97	13	10.2	-0.11
	(1000)		Bottom	10.03	21.6	0.7	287	7.97	13	9.8	-0.16
SED-114 (0-6)	9/13/2006	5.9	Surface	9.63	21.7	0.8	245	7.92	13.6	12.3	-0.11
	(0915)		Bottom	9.54	21.7	0.8	237	7.91	13.7	11.1	-0.2
SED-115 (0-6)	9/12/2006	9.3	Surface	10.1	23.1	0.8	210	7.84	14.5	8	0.08
	(1520)		Bottom	8.84	22.7	0.9	190	7.79	15.6	12	0.04
SED-116 (0-6)	9/12/2006	9.8	Surface	10	23	0.8	241	7.84	14.3	10.3	0.18
	(1330)		Bottom	10	22.9	0.8	227	7.64	14.2	10.2	0.46
SED-117 (0-6)	9/18/2006	8	Surface	11.09	24.5	0.5	280	7.86	9.13	74.3	0.34
	(1630)		Bottom	10.64	24.5	0.6	271	7.7	9.79	114	0.31
SED-118 (0-6)	9/19/2006	13.9	Surface	9.76	23.3	0.5	283	7.92	9.8	13.1	-0.67
	(0830)		Bottom	9.71	23.3	0.6	271	7.87	10.2	15.3	-0.37
SED-119 (0-6)	9/21/2006	21.4	Surface	9.6	21.5	0.6	101	7.91	11.2	18.7	-0.42
	(1130)		Bottom	9.64	21.3	0.6	92	7.85	11.2	15.8	-0.5
SED-120 (0-6)	10/10/2006	- -	Surface	9.53	19.9	0.5	6	8.17	9.3	28.7	1.12
	(1530)		Bottom	9.34	20.1	0.6	5	8.21	10.3	20.5	0.26
SED-121 (0-6)	9/19/2006	15.8	Surface	9.87	23.3	0.6	278	7.97	10.3	14.5	-0.44
	(0910)		Bottom	9.77	23.3	0.6	271	7.92	10.5	13.2	-0.45
SED-122 (0-6)	10/10/2006	- -	Surface	9.39	20	0.5	255	8.16	9.4	10.6	- -
	(1445)		Bottom	9.41	19.4	0.6	252	8.14	11.2	19.9	- -
SED-123 (0-6)	9/19/2006	17.4	Surface	9.93	23.5	0.6	283	7.99	10.4	14.5	1.05
	(1405)		Bottom	7.64	22.5	1	279	7.82	16.8	15.6	0.3
SED-124 (0-6)	9/19/2006	10.5	Surface	10.01	23.2	0.6	287	7.98	10.5	12.9	-0.02
	(1030)		Bottom	9.69	23.2	0.6	282	7.97	10.7	13.4	-0.09
SED-125 (0-6)	10/4/2006	11.1	Surface	9.87	21.5	0.5	2.53	7.14	9	13.8	-0.42
	(1500)		Bottom	9.46	20.9	0.6	2.55	6.95	10.7	30.7	-0.39
SED-126 (0-6)	10/4/2006	4	Surface	9.22	21.6	0.6	1.51	6.96	11.1	18.7	0.05
	(1330)		Bottom	9.78	21.8	0.6	1.6	6.8	10.7	26	0
SED-127 (0-6)	9/19/2006	11.8	Surface	10.06	23.6	0.8	286	8	10.6	17.8	0.42
	(1300)		Bottom	8.42	22.9	0.9	279	7.92	14.7	18.9	0.37
SED-128 (0-6)	9/19/2006	7.8	Surface	10.95	23.9	0.6	274	8.09	10.5	12.4	0.52
	(1145)		Bottom	10.67	23.7	0.6	263	8.08	10.8	13.5	0.48

TABLE 18
BENTHIC MACROINVERTEBRATE SURVEY
WATER QUALITY DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample Location and depth (in)[1]	Collection Date (Time)	Total Water Depth (ft)	Measurement Interval[2]	DO (mg/L)	Water Temperature (C)	Salinity (%)	ORP (mV)	pH	Conductivity (mS/cm)	Turbidity (NTU)	Water Velocity (ft/s)
Near-Site											
SED-129 (0-6)	10/10/2006	11	Surface	9.77	19.4	0.6	269	8.2	8.64	30.1	- -
	(1030)		Bottom	9.64	19.2	0.5	262	8.32	9.41	28.9	- -
SED-130 (0-6)	10/10/2006	9	Surface	9.66	19.3	0.6	245	8.11	9.64	22.3	- -
	(1045)		Bottom	9.84	19.1	0.5	233	8.14	9.7	25.7	- -
SED-131 (0-6)	10/10/2006	10	Surface	9.78	19.6	0.6	178	8.09	9.05	22.1	- -
	(1245)		Bottom	9.83	19.6	0.5	173	8.08	8.98	20.8	- -
SED-132 (0-6)	10/10/2006	11.3	Surface	9.28	9.6	0.6	203	8.11	9.23	35.4	- -
	(1300)		Bottom	9.56	11.5	0.5	198	8.11	9.27	36.9	- -
SED-133 (0-6)	10/5/2006	6.8	Surface	11	20.7	0.5	3.14	7.85	9.14	17.9	- -
	(1530)		Bottom	10.93	20.8	0.5	3.15	7.5	9.17	19.8	- -
SED-134 (0-6)	10/5/2006	5	Surface	10.96	20.7	0.5	2.9	8.09	9.12	17.3	- -
	(1600)		Bottom	10.89	20.7	0.5	2.87	8.01	9.16	16.1	- -
SED-135 (0-6)	10/5/2006	5.9	Surface	10.93	20.7	0.5	213	8.21	9.06	18.3	- -
	(1700)		Bottom	10.95	20.7	0.5	200	8.13	9.05	18.3	- -
SED-136 (0-6)	10/10/2006	11.8	Surface	9.91	19.7	0.6	209	8.13	9.9	32	- -
	(1600)		Bottom	10.29	19.6	0.6	204	8.16	11.5	39.8	- -
SED-137 (0-6)	10/10/2006	13	Surface	9.07	19.4	0.6	224	8.12	10.6	28.1	- -
	(1315)		Bottom	9.36	19.3	0.6	214	8.17	10.7	38.3	- -
SED-138 (0-6)	9/21/2006	21.8	Surface	9.13	22.1	0.7	232	7.88	12.7	13.7	-0.6
	(1030)		Bottom	8.73	22.2	0.8	229	7.82	13.5	12.3	-0.83
SED-139 (0-6)	9/20/2006	7.8	Surface	10.43	22.9	0.6	236	8	11	222	0.97
	(1415)		Bottom	10.19	22.9	0.6	234	7.97	11.3	230	0.86

Notes:

1. Water quality monitoring was performed using a Horiba water quality instrument.
2. Surface measurements were taken within 1 meter of the water surface and bottom measurements taken within 1 meter of the sediment.

- - = Not available
% = percentage
C = degrees Celsius
DO = dissolved oxygen
ft = feet
ft/s = feet per second
mg/L = milligrams per liter
mS/cm = milliSiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
ORP = Oxidation Reduction Potential

TABLE 19
BIOLOGICAL TISSUE DATA
NEAR-SITE AND BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: / Sample Depth (ft): / Date Collected:	Units	SED100 0 - 0.5 9/20/2006	SED101 0 - 0.5 9/20/2006	SED103 0 - 0.5 9/20/2006	SED105 0 - 0.5 9/21/2006	SED106 0 - 0.5 9/20/2006	SED108 0 - 0.5 9/18/2006	SED110 0 - 0.5 9/18/2006	SED120 0 - 0.5 10/10/2006	SED121 0 - 0.5 9/19/2006	SED124 0 - 0.5 9/19/2006
Inorganics											
Chromium	mg/kg	0.97 U	0.99	1 U	0.97 U	0.95 U	0.95 U	0.97 U	0.98 U	0.95 U	0.99 U
Copper	mg/kg	2.1	3.1	3.2	4.3	1.9	4.1	4.6	2 U	3.1	2
Lead	mg/kg	4.9 U	4.8 U	5 U	4.9 U	4.8 U	4.8 U	4.9 U	4.9 U	4.8 U	5 U
Mercury	mg/kg	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Zinc	mg/kg	11	12.8	10.9	15.1	9.9	13.8	13	8.9	9.6	8

TABLE 19
BIOLOGICAL TISSUE DATA
NEAR-SITE AND BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED126 0 - 0.5 10/4/2006	SED129 0 - 0.5 10/10/2006	SED130 0 - 0.5 10/10/2006	SED133 0 - 0.5 10/5/2006	SED134 0 - 0.5 10/5/2006	SED134 0 - 0.5 10/10/2006	SED137 0 - 0.5 10/10/2006
Inorganics								
Chromium	mg/kg	1 U	1.2	1 U	1.1	1 U	0.95 U	1 U
Copper	mg/kg	4.4	2.2	2 U	3	2 U	2	2 U
Lead	mg/kg	5 U	4.8 U	5 U	5 U	5 U	4.8 U	5 U
Mercury	mg/kg	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Zinc	mg/kg	15.3	12.4	11.2	11.2	12.3	12.6	9.4

Notes:
Data Qualifiers:
J = Indicates an estimated value
U = Indicates that the analyte was analyzed for but not detected

TABLE 20
WEIGHT OF EVIDENCE SUMMARY - 2006 DATA STUDY

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

2006 Sampling Stations	Screening Level Evidence										Site-Specific Evidence											
	Sediment Chemistry [1]										Pore Water [2]					Equilibrium Benchmark [3]		Biotissue Levels [4]	Toxicity [5]			Benthic Community Indices [6]
	Exceeds BSL					Exceeds ERM					Exceeds NY SB Criteria					(AVS-SEM)/*foc*						
	Chromium	Copper	Lead	Mercury	Zinc	Chromium	Copper	Lead	Mercury	Zinc	Chromium	Copper	Lead	Mercury	Zinc	>130< 3,000	>3,000		Survival	Growth	Reproduction	
BACKGROUND REFERENCE AREA																						
SED-100	-	-	-	-	-	-	-	-	-	-	*NS*	*NS*	*NS*	*NS*	*NS*	-	-	-	-	-	-	-
SED-101	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
SED-102	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-103	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
SED-104	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-105	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-
SED-106	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
SED-107	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	+	-	-	-
SED-108	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
SED-109	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	*NS*	+	-	-	-
SED-110	-	-	-	-	-	-	-	-	-	-	*NS*	*NS*	*NS*	*NS*	*NS*	-	-	-	-	-	-	-
NEAR-SITE AREA NORTH OF OUTFALL -1																						
SED-111	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-112	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-113	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-114	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-115	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-116	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-117	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-118	-	-	-	-	-	-	-	-	-	-	*NS*	*NS*	*NS*	*NS*	*NS*	-	-	*NS*	-	-	-	-
SED-119	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-120	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-
SED-121	-	-	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-
SED-122	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-123	-	+	+	+	-	-	-	-	+	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-124	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
SED-125	-	+	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-127	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
OUTFALL -1																						
SED-126	+	+	+	-	+	-	-	+	-	+	*NS*	*NS*	*NS*	*NS*	*NS*	+	-	-	-	-	-	-
NEAR-SITE AREA SOUTH OF OUTFALL -1																						
SED-128	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-129	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-
SED-130	-	+	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-
SED-131	-	-	+	+	-	-	-	-	+	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-132	-	+	+	+	-	-	-	-	+	-	-	+	-	-	-	-	-	*NS*	+	-	-	-
SED-133	-	-	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	+	-	-	-
SED-134	-	-	-	+	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-	-	-	-
SED-135	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-136	-	+	+	-	-	-	-	-	+	-	-	+	-	-	-	-	-	*NS*	+	-	-	-
SED-137	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	*NS*	*NS*	*NS*	-
SED-138	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	*NS*	-	-	-	-
SED-139	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	*NS*	-	-	-	-

Notes:
1. COPC concentration in bulk sediment exceeds (+) Background Screening Level (BSL) or Sediment ERM?
2. COPC concentration in sediment pore water exceeds (+) NY Class SB Water Quality Criteria?
3. (SEM-AVS)/Foc exceeds equilibrium benchmark?
   - = (SEM-AVS)/foc < 130 umoles/goc (no toxicity predicted).
   + = (SEM-AVS)foc > 130 umoles/goc , < 3,000 umoles/goc (toxicity uncertain).
   ++ = (SEM-AVS)foc > 3,000 umoles/goc (potential toxicity).
4. COPC concentration in bivalve tissue comparable to background?
   - = COPC concentration similar to background.
   + = COPC concentration greater than background.
5. Endpoint measurement from L. plumulosus 28-day toxicity test below tolerance limit?
   - = Endpoint measurement below background tolerance limit.
   + = Endpoint measurement above background tolerance limit.
6. Benthic community data indicate impairment relative to background?
   - = Community data similar to background.
   + = Community data impaired relative to background.

NS = Not Sampled

TABLE 21
SUBSURFACE SEDIMENT DATA
BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED102 0 - 1 10/4/2006	SED102 1 - 2 10/4/2006	SED102 2 - 3 10/4/2006	SED102 3 - 4 10/4/2006	SED102 4 - 5 10/4/2006	SED102 5 - 6 10/4/2006	SED102 6 - 7 10/4/2006	SED102 7 - 8 10/4/2006	SED102 8 - 8.5 10/4/2006
Inorganics										
Chromium (Total)	mg/kg	28.1	26.7	29	28.3	24.4	28.8	26.8	27.6	27.2
Copper	mg/kg	16.4	15.6	14.4	15.1	13.5	16.3	15.8	15.6	14.9
Lead	mg/kg	13.6	13.1	12.6	12.8	10.9	13.1	13.2	13.3	12.7
Mercury	mg/kg	0.06 U	0.06 U	0.06 U	0.05 U	0.05 U	0.05 U	0.06 U	0.05 U	0.06 U
Zinc	mg/kg	78.8	73.5	76.2	74.5	66.9	75.8	77.3	77.4	74.7
Total Organic Carbon (TOC)										
TOC	mg/kg	13,800	13,600	11,300	17,400	11,100	8,660	11,500	11,000	10,300

TABLE 21
SUBSURFACE SEDIMENT DATA
BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED103 0 - 1 10/4/2006	SED103-DUP 0 - 1 10/4/2006	SED103 1 - 2 10/4/2006	SED103 2 - 3 10/4/2006	SED103 3 - 4 10/4/2006	SED103 4 - 5 10/4/2006	SED103 5 - 6 10/4/2006	SED103 6 - 7 10/4/2006	SED103 7 - 8 10/4/2006
Inorganics										
Chromium (Total)	mg/kg	27.3	31	24.9	24.4	23.6	24.7	26	23.7	24.3
Copper	mg/kg	17.5	22.9	12.9	11.8	11.9	13.1	14.7	12.2	13.9
Lead	mg/kg	16	22.6	11.5	10.9	10.5	11.4	11.1	9.8	11.8
Mercury	mg/kg	0.07	0.16	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.04 U	0.05 U
Zinc	mg/kg	79.7	89.7	68.6	63.7	64.1	66.9	68.4	65.8	70.1
Total Organic Carbon (TOC)										
TOC	mg/kg	12,300	10,700	11,600	12,500	8,890	9,450	11,500	7,840	9,500

TABLE 21
SUBSURFACE SEDIMENT DATA
BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED104 0 - 1 10/4/2006	SED104 1 - 2 10/4/2006	SED104 2 - 3 10/4/2006	SED104 3 - 4 10/4/2006	SED104 4 - 5 10/4/2006	SED104 5 - 6 10/4/2006	SED104 6 - 7 10/4/2006	SED104 7 - 7.3 10/4/2006
Inorganics									
Chromium (Total)	mg/kg	31.5	25	29.5	26.2	26	27.3	31.2	31.9
Copper	mg/kg	58	18.4	19.4	16.5	16.1	16.8	19.1	18.7
Lead	mg/kg	70.1	23.1	17.1	14.7	13.6	14.4	16.8	16.4
Mercury	mg/kg	0.37	0.13	0.05 U	0.05	0.05 U	0.05 U	0.05 U	0.05 U
Zinc	mg/kg	171	78.4	85.9	77.6	77.7	77	87	85.3
Total Organic Carbon (TOC)									
TOC	mg/kg	16,200	12,900	14,900	11,700	15,100	15,500	14,300	15,200

Notes:
mg/kg = milligrams per kilogram (concentration in parts per million)

Data Qualifiers:
J = Indicates an estimated value
U = Indicates that the analyte was analyzed for but not detected

TABLE 22
SUBSURFACE SEDIMENT DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED119 0 - 1 10/4/2006	SED119-DUP 0 - 1 10/4/2006	SED119 1 - 2 10/4/2006	SED119-DUP 1 - 2 10/4/2006	SED119 2 - 3 10/4/2006	SED119 3 - 4 10/4/2006	SED119 4 - 5 10/4/2006	SED119 5 - 6 10/4/2006	SED119 6 - 7 10/4/2006
Inorganics										
Chromium (Total)	mg/kg	15.8	13.9	11.9	12.7	11.3	13.2	13.4	12.5	12.8
Copper	mg/kg	14.1	12.3	8.9	9.4	8	9.1	10.3	9	8.9
Lead	mg/kg	11.2	9.6	5.9 U	6 U	5.8 U	6 U	6.2 U	6.1 U	5.7 U
Mercury	mg/kg	0.21	0.23	0.08	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Zinc	mg/kg	48.8	45.3	39.6	44.1	38.2	44.9	45.4	41.7	42.6
Total Organic Carbon (TOC)										
TOC	mg/kg	1,120	2,280	970	887	1,000	1,120	4,630	2,870	1,460

TABLE 22
SUBSURFACE SEDIMENT DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED119 7 - 8.2 10/4/2006	SED123 0 - 1 10/4/2006	SED123 1 - 2 10/4/2006	SED123 2 - 3 10/4/2006	SED123-DUP 2 - 3 10/4/2006	SED123 3 - 4 10/4/2006	SED123-DUP 3 - 4 10/4/2006	SED123 4 - 5 10/4/2006	SED123 5 - 6 10/4/2006
Inorganics										
Chromium (Total)	mg/kg	11.4	71.5	113	109	129	100	101	103	120
Copper	mg/kg	9.5	89.7	172	173	254	265	199	127	150
Lead	mg/kg	5.8 U	88.1	138	127	160	144	139	138	163
Mercury	mg/kg	0.04 U	1.7	1.3	1.4	1.5	1.6	1.3	1.1	1.1
Zinc	mg/kg	41.5	208	295	288	300	245	243	260	307
Total Organic Carbon (TOC)										
TOC	mg/kg	475	24,500	33,400	28,400	31,500	35,600	33,200	35,400	31,200

TABLE 22
SUBSURFACE SEDIMENT DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED123 6 - 7 10/4/2006	SED123 7 - 8 10/4/2006	SED123 8 - 9 10/4/2006	SED123 9 - 10 10/4/2006	SED126 0 - 1 10/11/2006	SED127 0 - 1 10/11/2006	SED127 1 - 2 10/11/2006	SED127 2 - 3 10/11/2006	SED127 3 - 4 10/11/2006
Inorganics										
Chromium (Total)	mg/kg	58.5	28.9	12.7	17.6	257	144	94.7	94.1	130
Copper	mg/kg	69.6	33.1	10.8	11.3	124 J	185	129	104	200
Lead	mg/kg	63.1	31.1	6.4	7.9	1,530 J	215	112	120	159
Mercury	mg/kg	0.58	0.5	0.1	0.04 U	0.72	5.1	1.7	2.5	7.7
Zinc	mg/kg	148	79.9	42.9	49.9	3,030 J	333	246	232	294
Total Organic Carbon (TOC)										
TOC	mg/kg	15,500	12,500	1,860	3,030	32,500	25,600	26,600	21,700	22,300

TABLE 22
SUBSURFACE SEDIMENT DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED127 4 - 5 10/11/2006	SED127 5 - 6 10/11/2006	SED127 6 - 7 10/11/2006	SED127 7 - 8 10/11/2006	SED127 8 - 9 10/11/2006	SED127 9 - 9.5 10/11/2006	SED128 0 - 1 10/11/2006	SED128-DUP 0 - 1 10/11/2006	SED128 1 - 2 10/11/2006
Inorganics										
Chromium (Total)	mg/kg	96.9	121	122	123	126	101	60.2	62.2	66.5
Copper	mg/kg	157	145	167	184	191	212	74.3	78	83.1
Lead	mg/kg	131	145	153	153	157	139	72.5	78.2	84.7
Mercury	mg/kg	8.8	5.8	6.3	3.1	1.4	1.3	0.75	0.75	0.77
Zinc	mg/kg	259	310	315	295	305	284	183	195	201
Total Organic Carbon (TOC)										
TOC	mg/kg	24,400	27,900	30,900	37,800	32,800	26,000	19,100	29,400	22,500

TABLE 22
SUBSURFACE SEDIMENT DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED128 2 - 3 10/11/2006	SED128 3 - 4 10/11/2006	SED128 4 - 5 10/11/2006	SED128 5 - 6 10/11/2006	SED138 0 - 1 10/11/2006	SED138 1 - 2 10/11/2006	SED138 2 - 3 10/11/2006	SED138-DUP 2 - 3 10/11/2006	SED138 3 - 4 10/11/2006
Inorganics										
Chromium (Total)	mg/kg	92.7	150	27.8	19.8	47.8	35.6	37	37.6	37.6
Copper	mg/kg	111	168	21.5	13.5	94.4 J	78.6 J	50.4 J	57 J	45.5 J
Lead	mg/kg	104	258	17.5	9.2	86	79.5	89.6	97	97
Mercury	mg/kg	1	7.9	0.11	0.04 U	1.2 J	1.1 J	1.3 J	1.2 J	1.3 J
Zinc	mg/kg	243	430	71.1	51.4	178	174	150	159	153
Total Organic Carbon (TOC)										
TOC	mg/kg	26,900	46,100	6,400	5,440	21,600	24,800	56,900	23,600	13,900

TABLE 22
SUBSURFACE SEDIMENT DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED138 4 - 5 10/11/2006	SED138 5 - 6 10/11/2006	SED138 6 - 7 10/11/2006	SED138 7 - 8 10/11/2006	SED138 8 - 9 10/11/2006	SED138 9 - 9.5 10/11/2006
Inorganics							
Chromium (Total)	mg/kg	33.7	42.6	43.5	40.9	36.7	37.2
Copper	mg/kg	38.9 J	49.4 J	49 J	37.8 J	36.6 J	37.4 J
Lead	mg/kg	86.1	115	121	95.2	86.7	82
Mercury	mg/kg	0.93 J	1.7 J	1.9 J	1.4 J	0.91 J	0.93 J
Zinc	mg/kg	140	161	155	133	127	127
Total Organic Carbon (TOC)							
TOC	mg/kg	18,900	17,300	17,400	30,000	12,900	11,900

Notes:
mg/kg = milligrams per kilogram (concentration in parts per million)

Data Qualifiers:
J = Indicates an estimated value
U = Indicates that the analyte was analyzed for but not detected

TABLE 23
SUBSURFACE SEDIMENT DATA
LOCATIONS NEAR OF-1

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED140 0 - 1.5 10/5/2006	SED141 0 - 2 10/5/2006	SED141 2 - 4 10/5/2006	SED141 4 - 6 10/5/2006	SED141 6 - 8 10/5/2006	SED142 0 - 2 10/5/2006	SED142 2 - 4 10/5/2006	SED142-DUP 2 - 4 10/5/2006	SED142 4 - 6 10/5/2006
Inorganics										
Chromium (Total)	mg/kg	437 J	147 J	298 J	145 J	27.4 J	59.7	63.6	74	91.4
Copper	mg/kg	72	73.6	77.3	40.4	19.9	64.4	66.2	74.5	41.6
Lead	mg/kg	8,420	588	738	178	20.6	81.3	79.5	97.7	233
Mercury	mg/kg	0.41	0.75	0.74	0.28	0.09	0.59	0.64	0.78	0.39
Zinc	mg/kg	3,080 J	806 J	1,220 J	574 J	74.8 J	192	223	208	538
Total Organic Carbon (TOC)										
TOC	mg/kg	12,200 J	32,300 J	38,100 J	25,000 J	8,170 J	28,300	30,900	26,300	724

TABLE 23
SUBSURFACE SEDIMENT DATA
LOCATIONS NEAR OF-1

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED142 6 - 6.5 10/5/2006	SED143 0 - 2 10/5/2006	SED143 2 - 4 10/5/2006	SED144 0 - 2 10/6/2006	SED144 2 - 4 10/6/2006	SED144-DUP 2 - 4 10/6/2006	SED144 4 - 6 10/6/2006	SED144 6 - 8 10/6/2006	SED144 8 - 10 10/6/2006
Inorganics										
Chromium (Total)	mg/kg	13.2	206 J	18.9 J	769 J	332 J	778	1,960 J	447 J	10.8
Copper	mg/kg	9.1	98.2	10.6	94.8	89.3	111	159	65.6	5.4
Lead	mg/kg	6.1	1,130	24.9	980	798	1,270	3,280	1,060	5.4 U
Mercury	mg/kg	0.04 U	0.33	0.08	0.98	0.77	0.84	1.2	0.78	0.04 U
Zinc	mg/kg	40.5	1,060 J	55.7 J	2,220 J	2,470 J	4,230	14,500 J	3,380 J	33.1
Total Organic Carbon (TOC)										
TOC	mg/kg	1,620	12,600 J	3,290 J	37,400 J	50,800 J	55,200	85,700 J	70,000 J	426

TABLE 23
SUBSURFACE SEDIMENT DATA
LOCATIONS NEAR OF-1

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: / Sample Depth (ft): / Date Collected:	Units	SED145 0 - 2 10/5/2006	SED145-DUP 0 - 2 10/5/2006	SED145 2 - 4 10/5/2006	SED145 4 - 6 10/5/2006	SED145 6 - 6.5 10/5/2006	SED146 0 - 2 10/5/2006	SED146 2 - 2.3 10/5/2006	SED149 0 - 2 10/6/2006	SED149-DUP 0 - 2 10/6/2006
Inorganics										
Chromium (Total)	mg/kg	67.3 J	74.3	101 J	350 J	724	215 J	197 J	95.1	76
Copper	mg/kg	70.4	78	83.6	91.5	177	76.9	76.4	72.3	73.1
Lead	mg/kg	91.1	96.2	216 J	800	1,200	927	494	132	115
Mercury	mg/kg	0.72	0.68	1	1.3	2.4	0.82	0.91	0.72	0.69
Zinc	mg/kg	200 J	216	407	1,450 J	3,300	1,200 J	975 J	288	238
Total Organic Carbon (TOC)										
TOC	mg/kg	25,000 J	23,000	32,700	45,700 J	65,700	29,200 J	32,800 J	30,000	33,400

TABLE 23
SUBSURFACE SEDIMENT DATA
LOCATIONS NEAR OF-1

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED149 2 - 4 10/6/2006	SED149 4 - 6 10/6/2006	SED149 6 - 8 10/6/2006	SED151 0 - 2 10/6/2006	SED151 2 - 4 10/6/2006	SED151 4 - 6 10/6/2006	SED151 6 - 8.25 10/6/2006	SED152 0 - 2 10/6/2006	SED152 2 - 4 10/6/2006
Inorganics										
Chromium (Total)	mg/kg	115	437	511	57.5	91	261	468	756 J	33.4 J
Copper	mg/kg	86.7	114	56.1	61.1	80.5	114	162	111	21.5
Lead	mg/kg	334	1,350	1,120	74.3	149	524	1,110	2,680	144
Mercury	mg/kg	0.86	1	1.4	0.61	0.96	1.5	2.3	1.2	0.64
Zinc	mg/kg	1,170	3,710	4,440	191	270	1,140	4,270	5,910 J	185 J
Total Organic Carbon (TOC)										
TOC	mg/kg	29,800	109,000	32,000	35,000	24,100	30,800	48,100	100,000 J	64,400 J

TABLE 23
SUBSURFACE SEDIMENT DATA
LOCATIONS NEAR OF-1

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED152 4 - 6 10/6/2006	SED152 6 - 8 10/6/2006	SED153 0 - 2 10/6/2006	SED153 2 - 4 10/6/2006	SED153 4 - 6 10/6/2006	SED153 6 - 8 10/6/2006	SED153 8 - 8.5 10/6/2006	SED154 0 - 2 10/5/2006	SED154 2 - 4 10/5/2006
Inorganics										
Chromium (Total)	mg/kg	13.3 J	14.2 J	65.8	82.8	149	396	362	160 J	281 J
Copper	mg/kg	5.7	8.1	67.7	97.5	122	120	102	160	158
Lead	mg/kg	5.6 U	6.6	92.1	108	235	2,150	843	269	729
Mercury	mg/kg	0.04 U	0.04 U	0.71	0.98	1.6	1.5	1.1	0.85	2
Zinc	mg/kg	31.2 J	43.2 J	204	216	469	1,870	1,900	470 J	1,240 J
Total Organic Carbon (TOC)										
TOC	mg/kg	354 J	2,120 J	19,700	21,900	30,500	51,400	32,900	27,500 J	27,600 J

TABLE 23
SUBSURFACE SEDIMENT DATA
LOCATIONS NEAR OF-1

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED155 0 - 2 10/6/2006	SED155 2 - 4 10/6/2006	SED155 4 - 6 10/6/2006	SED155 6 - 8 10/6/2006
Inorganics					
Chromium (Total)	mg/kg	72.3	196	66.5	99.3
Copper	mg/kg	75.7	139	71.4	117
Lead	mg/kg	111	317	102	245
Mercury	mg/kg	0.72	3.5	1.8	3.5
Zinc	mg/kg	379	895	190	392
Total Organic Carbon (TOC)					
TOC	mg/kg	26,300	32,800	24,400	39,200

Notes:
mg/kg = milligrams per kilogram (concentration in parts per million)

Data Qualifiers:
J = Indicates an estimated value
U = Indicates that the analyte was analyzed for but not detected.

TABLE 24
SURFACE SEDIMENT GRAIN SIZE DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED111 0 - 0.5 9/14/2006	SED112 0 - 0.5 9/13/2006	SED113 0 - 0.5 9/13/2006	SED114 0 - 0.5 9/13/2006	SED115 0 - 0.5 9/12/2006	SED116 0 - 0.5 9/12/2006	SED117 0 - 0.5 9/18/2006	SED118 0 - 0.5 9/19/2006	SED119 0 - 0.5 9/21/2006	SED120 0 - 0.5 10/10/2006
Grain size											
Coarse Gravel	%	0.8	0	1.5	8.5	1.1	0.5	2.2	19.1	0	NA
Coarse Sand	%	0.8	0	3.5	12.5	3.7	0.7	2.6	15.2	0.4	2.6
Medium Sand	%	3.5	6.9	5.5	22.1	7.9	2.9	5.3	16.9	6.5	8.2
Fine Sand	%	8.4	13.2	86.2	31.9	22.7	11	44.6	42.4	4.7	23.7
Silt/Clay	%	86.5	79.9	3.3	24.9	64.6	84.9	45.3	6.4	88.4	65.5

TABLE 24
SURFACE SEDIMENT GRAIN SIZE DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED121 0 - 0.5 9/19/2006	SED121-DUP 0 - 0.5 9/19/2006	SED122 0 - 0.5 10/10/2006	SED123 0 - 0.5 9/19/2006	SED124 0 - 0.5 9/19/2006	SED125 0 - 0.5 10/4/2006	SED126 0 - 0.5 10/4/2006	SED127 0 - 0.5 9/19/2006	SED128 0 - 0.5 9/19/2006	SED129 0 - 0.5 10/10/2006
Grain size											
Coarse Gravel	%	0	0	NA	0	0	0.4	10.4	0	0	NA
Coarse Sand	%	0.2	0.6	0.1	0.1	0.5	1.3	7.4	0	0.5	0.9
Medium Sand	%	3.1	2.1	5.3	2.3	2	3.5	29.4	1.5	5.1	12
Fine Sand	%	10.1	9.7	23.9	9.1	5.6	8.6	50.2	6.7	7.3	21.8
Silt/Clay	%	86.6	87.6	68.7	88.5	91.9	86.2	2.6	91.8	87.1	64.9

TABLE 24
SURFACE SEDIMENT GRAIN SIZE DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED130 0 - 0.5 10/10/2006	SED131 0 - 0.5 10/10/2006	SED132 0 - 0.5 10/10/2006	SED133 0 - 0.5 10/10/2006	SED134 0 - 0.5 10/10/2006	SED135 0 - 0.5 10/10/2006	SED136 0 - 0.5 10/10/2006	SED137 0 - 0.5 10/10/2006	SED138 0 - 0.5 9/21/2006	SED139 0 - 0.5 9/20/2006
Grain size											
Coarse Gravel	%	NA	NA	NA	NA	NA	NA	NA	NA	2.5	0.7
Coarse Sand	%	1	2.6	0.3	1.1	1	1.1	1.1	1	0.7	0.7
Medium Sand	%	4.3	10.6	7.5	7	6.5	16.5	8.6	14.6	3.4	3.3
Fine Sand	%	15.9	19.1	22	13.3	18	34.6	16	30.1	15	9.4
Silt/Clay	%	78.4	67.7	70.2	78	73.2	45.2	70.8	50.9	78.4	85.9

TABLE 25
SURFACE SEDIMENT GRAIN SIZE DATA
BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED100 0 - 0.5 9/20/2006	SED101 0 - 0.5 9/20/2006	SED102 0 - 0.5 9/20/2006	SED103 0 - 0.5 9/20/2006	SED103-DUP 0 - 0.5 9/20/2006	SED104 0 - 0.5 9/21/2006	SED105 0 - 0.5 9/21/2006	SED106 0 - 0.5 9/20/2006	SED107 0 - 0.5 9/13/2006	SED108 0 - 0.5 9/18/2006	SED 109 0 - 0.5 9/13/2006	SED 110 0 - 0.5 9/18/2006
Grain size													
Coarse Gravel	%	9.6	5.2	0	1.5	0	0.9	11.4	7.5	9.1	4.7	17.3	4
Coarse Sand	%	8.9	1.9	0.4	0.6	0.3	2.1	1.6	0.7	4.3	0.6	1.9	0.4
Medium Sand	%	51.5	37.5	1.8	3.3	3.3	10.7	2.4	3.6	15.3	3.8	9.3	1
Fine Sand	%	26.2	23.9	5.3	5.2	5.2	36.4	16.4	7.9	16.2	9.4	16.6	2.9
Silt/Clay	%	3.8	31.5	92.5	89.4	91.2	49.9	68.2	80.3	55.1	81.5	54.9	91.7

TABLE 26
SEDIMENT CHRONOLOGY DATA
NEAR-SITE LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED123 0 - 0.2 10/4/2006	SED123 0.2 - 0.3 10/4/2006	SED123 0.3 - 0.5 10/4/2006	SED123 0.5 - 0.7 10/4/2006	SED123 0.7 - 0.8 10/4/2006	SED123 0.8 - 1 10/4/2006	SED123 1.3 - 1.7 10/4/2006	SED123 2 - 2.3 10/4/2006
Radiochemical Parameter									
Beryllium-7	pCi/g	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cesium-137	pCi/g	0.186 ± 0.074	0.199 ± 0.034	0.185 ± 0.049	0.092 ± 0.049	0.01 U	0.01 U	0.01 U	0.01 U
Lead-210	pCi/g	1.7 ± 0.14	1.61 ± 0.15	1.22 ± 0.13	0.65 ± 0.11	0.69 ± 0.11	0.72 ± 0.11	0.78 ± 0.11	0.69 ± 0.11

TABLE 26
SEDIMENT CHRONOLOGY DATA
NEAR-SITE LOCATIONS

Draft Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED123 2.7 - 3 10/4/2006	SED123 3.3 - 3.7 10/4/2006	SED123 4 - 4.3 10/4/2006	SED123 4.7 - 5 10/4/2006	SED123 5.3 - 5.7 10/4/2006	SED123 6 - 6.3 10/4/2006	SED123 6.7 - 7 10/4/2006	SED123 7.3 - 7.7 10/4/2006	SED123 8 - 8.3 10/4/2006
Radiochemical Parameter										
Beryllium-7	pCi/g	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
Cesium-137	pCi/g	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Lead-210	pCi/g	0.54 ± 0.10	0.76 ± 0.10	0.73 ± 0.10	0.77 ± 0.11	0.72 ± 0.09	0.54 ± 0.09	0.48 ± 0.09	0.54 ± 0.10	0.33 ± 0.07

TABLE 26
SEDIMENT CHRONOLOGY DATA
NEAR-SITE LOCATIONS

Draft Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED126 0 - 0.2 10/10/2006	SED126 0.2 - 0.3 10/10/2006	SED126 0.3 - 0.5 10/10/2006	SED126 0.5 - 0.7 10/10/2006	SED126 0.7 - 0.8 10/10/2006	SED126 0.8 - 1 10/10/2006	SED128 0 - 0.17 10/12/2006
Radiochemical Parameter								
Beryllium-7	pCi/g	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cesium-137	pCi/g	0.053 ± 0.027	0.082 ± 0.021	0.186 ± 0.048	0.276 ± 0.054	0.299 ± 0.033	0.234 ± 0.032	0.244 ± 0.099
Lead-210	pCi/g	0.31 ± 0.11	0.44 ± 0.12	1.01 ± 0.14	1.03 ± 0.13	0.83 ± 0.15	0.95 ± 0.14	2.15 ± 0.27

TABLE 26
SEDIMENT CHRONOLOGY DATA
NEAR-SITE LOCATIONS

Draft Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED128 0.17 - 0.33 10/12/2006	SED128 0.33 - 0.5 10/12/2006	SED128 0.5 - 0.67 10/12/2006	SED128 0.67 - 0.83 10/12/2006	SED128 0.83 - 1 10/12/2006	SED128 1.33 - 1.67 10/12/2006	SED128 2 - 2.33 10/12/2006	SED128 2.67 - 3 10/12/2006
Radiochemical Parameter									
Beryllium-7	pCi/g	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cesium-137	pCi/g	0.207 ± 0.053	0.46 ± 0.175	0.242 ± 0.055	0.25 ± 0.042	0.283 ± 0.067	0.254 ± 0.080	0.448 ± 0.071	0.434 ± 0.036
Lead-210	pCi/g	2.14 ± 0.17	2.33 ± 0.19	1.75 ± 0.14	1.99 ± 0.16	2.12 ± 0.14	1.6 ± 0.15	0.72 ± 0.09	1.71 ± 0.15

TABLE 26
SEDIMENT CHRONOLOGY DATA
NEAR-SITE LOCATIONS

Draft Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED128 3.33 - 3.67 10/12/2006	SED128 4 - 4.33 10/12/2006	SED128 4.67 - 5 10/12/2006	SED138 0 - 0.17 10/12/2006	SED138 0.17 - 0.33 10/12/2006	SED138 0.33 - 0.5 10/12/2006	SED138 0.5 - 0.67 10/12/2006	SED138 0.67 - 0.83 10/12/2006
Radiochemical Parameter									
Beryllium-7	pCi/g	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cesium-137	pCi/g	0.801 ± 0.068	0.01 U	0.01 U	0.232 ± 0.051	0.01 U	0.01 U	0.01 U	0.01 U
Lead-210	pCi/g	0.65 ± 0.10	0.69 ± 0.10	0.21 ± 0.08	1.17 ± 0.13	0.62 ± 0.13	0.66 ± 0.12	0.34 ± 0.09	0.38 ± 0.10

TABLE 26
SEDIMENT CHRONOLOGY DATA
NEAR-SITE LOCATIONS

Draft Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED138 0.83 - 1 10/12/2006	SED138 1.33 - 1.67 10/12/2006	SED138 2 - 2.33 10/12/2006	SED138 3.33 - 3.67 10/12/2006	SED138 4.67 - 5 10/12/2006	SED138 6 - 6.33 10/12/2006	SED138 7.33 - 7.67 10/12/2006	SED138 8.67 - 9 10/12/2006
Radiochemical Parameter									
Beryllium-7	pCi/g	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cesium-137	pCi/g	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Lead-210	pCi/g	0.32 ± 0.08	0.29 ± 0.07	0.36 ± 0.10	0.35 ± 0.08	0.5 ± 0.10	0.4 ± 0.10	0.39 ± 0.09	0.42 ± 0.08

Notes:
Data Qualifiers:
U = Indicates that the analyte was analyzed but not detected.

TABLE 27
SEDIMENT CHRONOLOGY DATA
BACKGROUND LOCATIONS

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED103 0 - 0.2 10/5/2006	SED103 0.2 - 0.3 10/5/2006	SED103 0.3 - 0.5 10/5/2006	SED103 0.5 - 0.7 10/5/2006	SED103 0.7 - 0.8 10/5/2006	SED103 0.8 - 1 10/5/2006	SED103 1.3 - 1.7 10/5/2006	SED103 2 - 2.3 10/5/2006
Radiochemical Parameter									
Beryllium-7	pCi/g	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cesium-137	pCi/g	0.246 ± 0.064	0.175 ± 0.071	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Lead-210	pCi/g	0.94 ± 0.12	0.48 ± 0.10	0.33 ± 0.09	0.28 ± 0.09	0.39 ± 0.09	0.38 ± 0.10	0.3 ± 0.09	0.39 ± 0.09

TABLE 27
SEDIMENT CHRONOLOGY DATA
BACKGROUND LOCATIONS

Draft Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED103 2.7 - 3 10/5/2006	SED103 3.3 - 3.7 10/5/2006	SED103 4 - 4.3 10/5/2006	SED103 4.7 - 5 10/5/2006	SED103 5.3 - 5.7 10/5/2006	SED103 6 - 6.3 10/5/2006	SED103 6.7 - 7.2 10/5/2006	SED104 0 - 0.2 10/5/2006
Radiochemical Parameter									
Beryllium-7	pCi/g	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cesium-137	pCi/g	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.113 ± 0.043
Lead-210	pCi/g	0.4 ± 0.10	0.38 ± 0.09	0.46 ± 0.09	0.41 ± 0.09	0.41 ± 0.09	0.39 ± 0.11	0.39 ± 0.09	1.21 ± 0.12

TABLE 27
SEDIMENT CHRONOLOGY DATA
BACKGROUND LOCATIONS

Draft Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED104 0.2 - 0.3 10/5/2006	SED104 0.3 - 0.5 10/5/2006	SED104 0.5 - 0.7 10/5/2006	SED104 0.7 - 0.8 10/5/2006	SED104 0.8 - 1 10/5/2006	SED104 1.3 - 1.7 10/5/2006	SED104 2 - 2.3 10/5/2006	SED104 2.7 - 3 10/5/2006
Radiochemical Parameter									
Beryllium-7	pCi/g	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cesium-137	pCi/g	0.157 ± 0.026	0.207 ± 0.047	0.431 ± 0.058	0.133 ± 0.025	0.01 U	0.01 U	0.01 U	0.01 U
Lead-210	pCi/g	1.12 ± 0.11	0.67 ± 0.10	0.59 ± 0.10	0.44 ± 0.08	0.48 ± 0.09	0.41 ± 0.08	0.42 ± 0.09	0.47 ± 0.11

TABLE 27
SEDIMENT CHRONOLOGY DATA
BACKGROUND LOCATIONS

Draft Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth (ft): Date Collected:	Units	SED104 3.3 - 3.7 10/5/2006	SED104 4 - 4.3 10/5/2006
Radiochemical Parameter			
Beryllium-7	pCi/g	0.1 U	0.1 U
Cesium-137	pCi/g	0.01 U	0.01 U
Lead-210	pCi/g	0.41 ± 0.13	0.44 ± 0.12

Notes:
Data Qualifiers:
U = Indicates that the analyte was analyzed for but not detected.

TABLE 28
GEOTECHNICAL TESTING DATA

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

Sample ID: Sample Depth(ft BGS): Date Collected:	Units	SED147 0 - 0.8 10/10/06	SED149 0 - 2 10/11/06	SED149 2 - 4 10/11/06	SED149 4 - 6 10/11/06	SED149 6 - 8 10/11/06	SED150 0 - 1 10/10/06	SED150 1 - 2 10/10/06	SED150 2 - 4 10/10/06	SED150 4 - 6 10/10/06	SED150 6 - 7.5 10/10/06
Geotech											
Atterberg Liquid Limit (LL)	%	51	94	89	95	NP	69	69	67	66	36
Atterberg Plasticity Index (PI)	%	11	47	51	50	NV	15	17	15	16	9
Bulk Density	pcf	NA	84.41	99.09	94.86	134.3	NA	NA	NA	NA	NA
Percent Moisture	%	61.8	117.3	87.9	89	18.4	139.6	133.6	117	99.9	42.9
Specific gravity	unitless	2.627	2.559	2.616	2.55	2.702	2.461	2.624	2.638	2.503	2.518
Grainsize											
Coarse Sand	%	4.4	0.4	0.6	1	0.3	0	0	0	0	1.7
Medium Sand	%	29.5	12.7	7.4	6.5	23.4	0	0.2	1.4	0.6	19.5
Fine Sand	%	17.9	4.2	6	7.6	58	0.8	0.6	2	2.2	32.8
Cobbles	%	0	0	0	0	0	0	0	0	0	0
Gravel	%	4.7	0	0	0.8	0	0	0	0	0	0.4
Sand	%	51.8	17.3	14	15.1	81.7	0.8	0.8	3.4	2.8	54
Silt	%	34.3	49.8	61.7	55.5	13.4	66.5	64.4	58.3	60.1	31.5
Clay	%	9.2	32.9	24.3	28.6	4.9	32.7	34.8	38.3	37.1	14.1

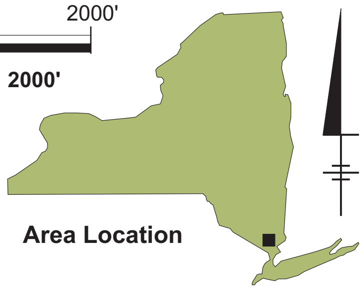
Notes:
NA = Not analyzed
pcf = pounds per cubic feet

Figures

REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., WHITE PLAINS, NY, 1967, PHOTOREVISED 1979.

2000' 0 2000'

Approximate Scale: 1" = 2000'



Area Location

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

SITE LOCATION MAP

ARCADIS

FIGURE
1A

01/30/2012 SYRACUSE, NY-ENV/CAD DJHOWES
B0064462/0001/00041/CDR/64462N01.CDR

SOURCE: EARTH ATTRIBUTES
DATE OF PHOTOGRAPH: APRIL 24, 2000

REFERENCE: FIGURE FROM DEIS FOR LIGHTHOUSE LANDING AT SLEEPY HOLLOW, NOVEMBER 2004, PREPARED BY DIVNEY TUNG SCHWALBE.

N

DIVNEY • TUNG • SCHWALBE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

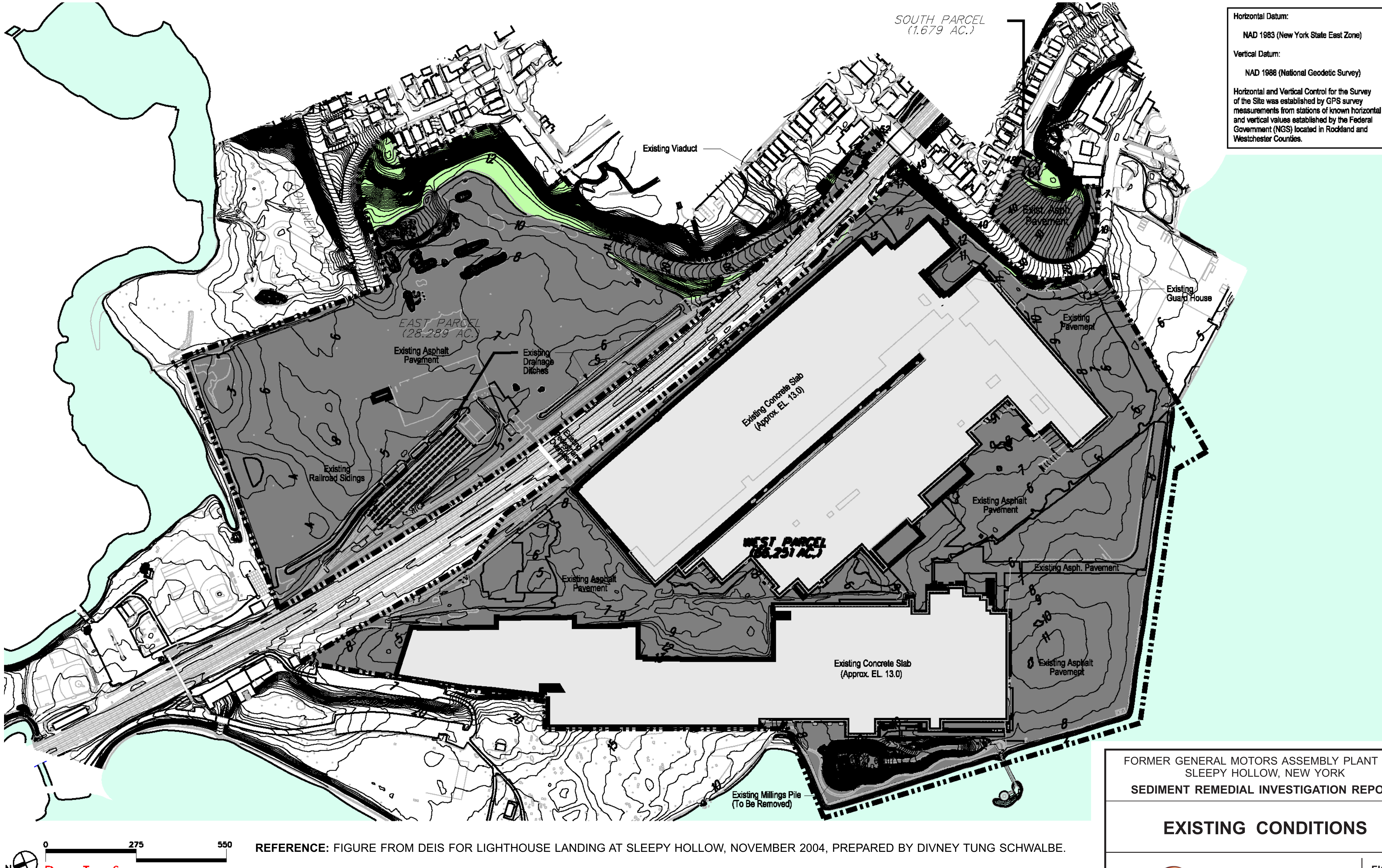
SEDIMENT REMEDIAL INVESTIGATION REPORT

EXISTING AERIAL PHOTOGRAPH

ARCADIS

FIGURE
1B

01/30/2012 SYRACUSE, NY-ENV/CAD DJHOWES
B0064462/0001/00041/CDR/64462G01.CDR



REFERENCE: FIGURE FROM DEIS FOR LIGHTHOUSE LANDING AT SLEEPY HOLLOW, NOVEMBER 2004, PREPARED BY DIVNEY TUNG SCHWALBE.

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

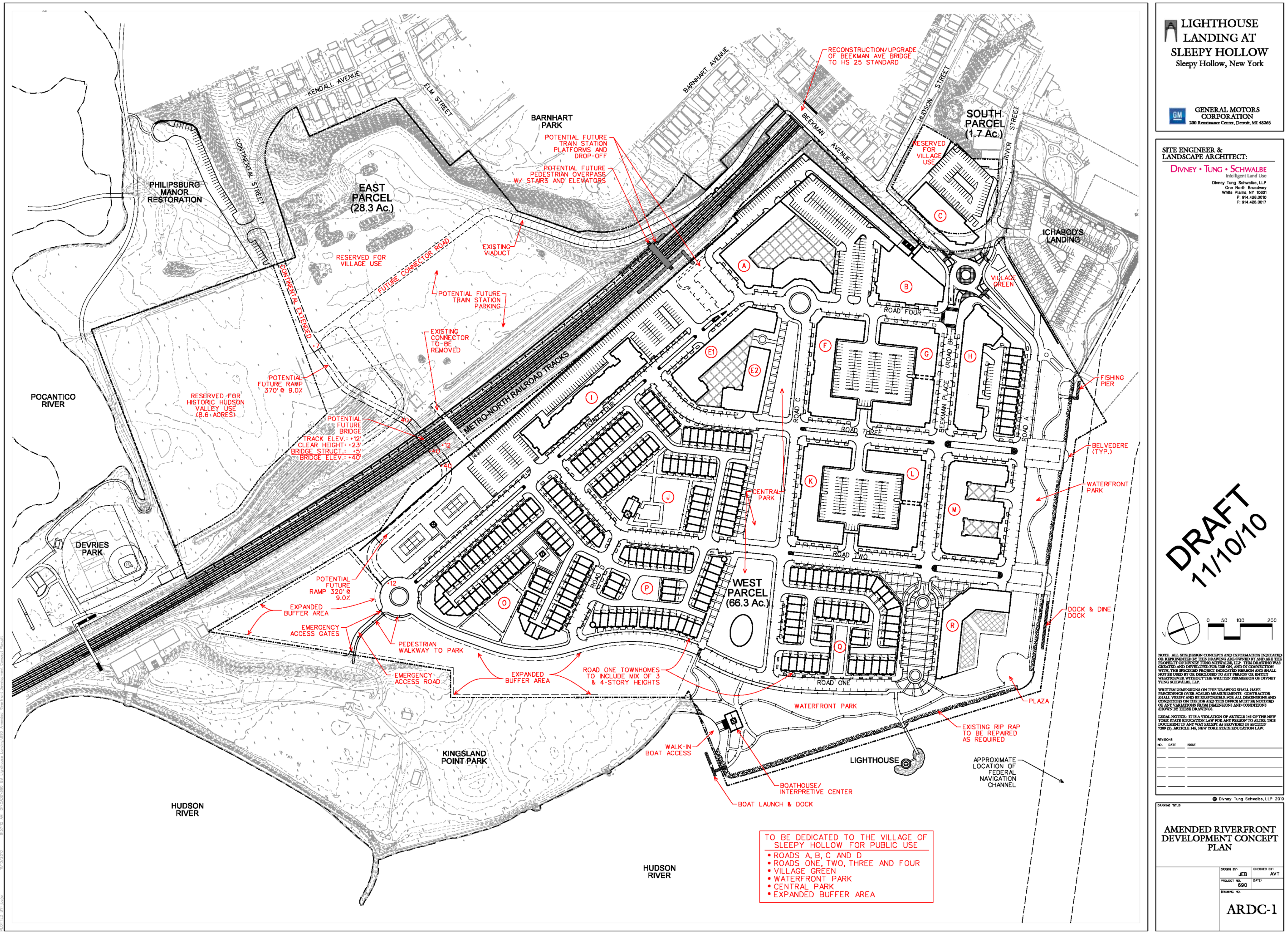
SEDIMENT REMEDIAL INVESTIGATION REPORT

EXISTING CONDITIONS

ARCADIS

FIGURE
1C

01/30/2012 SYRACUSE, NY-ENV/CAD DJHOWES
B0064462/0001/00041/CDR/64462G03.CDR



FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK
SEDIMENT REMEDIAL INVESTIGATION REPORT

AMENDED RIVERFRONT DEVELOPMENT CONCEPT PLAN

ARCADIS

FIGURE **1D**

01/30/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G01.CDR

City: SYR Div/Group: Sed Created By: M.Kohberger Last Saved By: jrapp
GM - Tarrytown (64462.1.00041)
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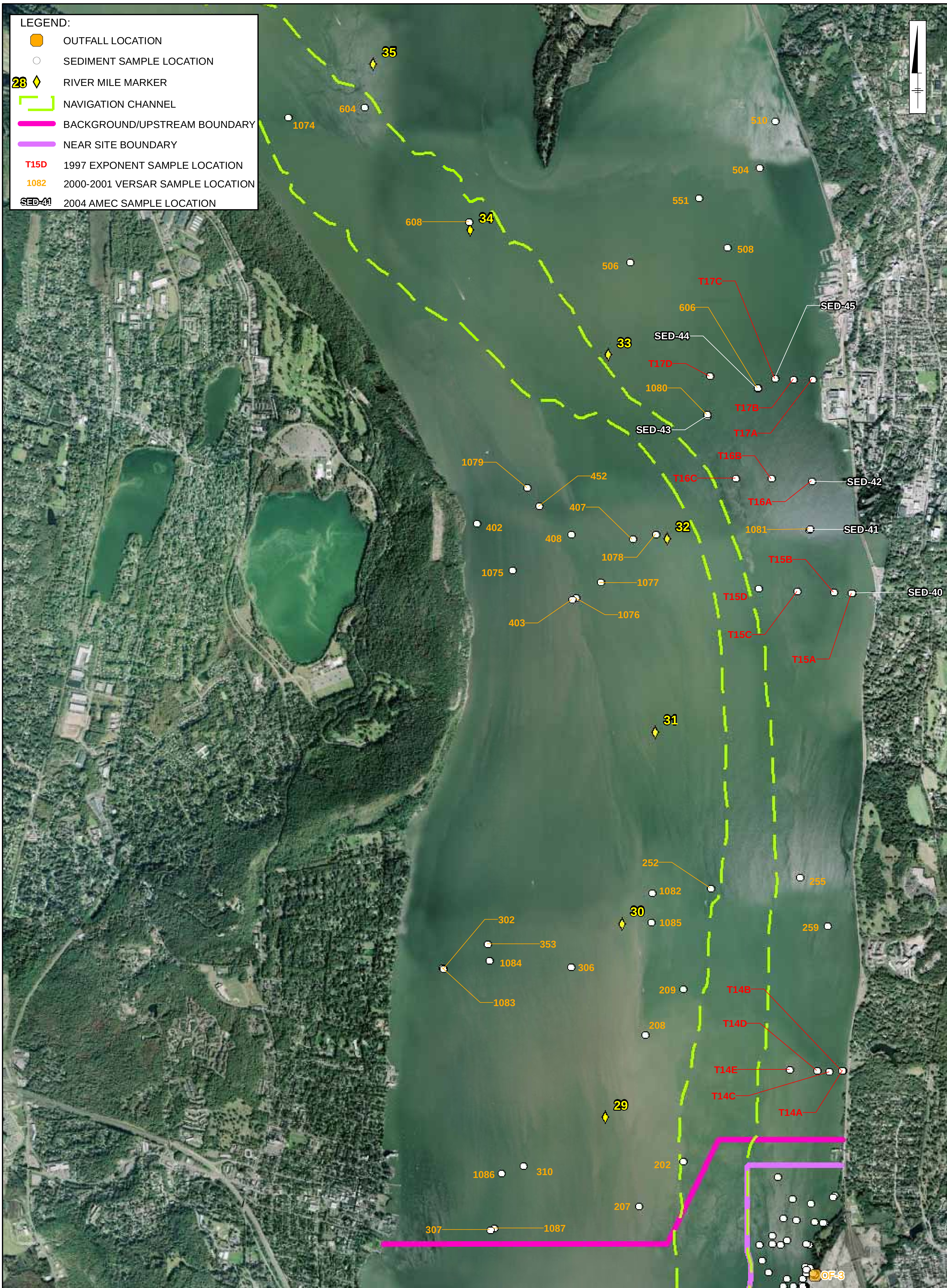


NOTES:

1. DIGITAL ORTHO QUARTER QUADS PROVIDED BY THE NEW YORK STATE GIS CLEARINGHOUSE.
2. NAVIGATION CHANNEL DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 2,500 5,000 Feet
GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

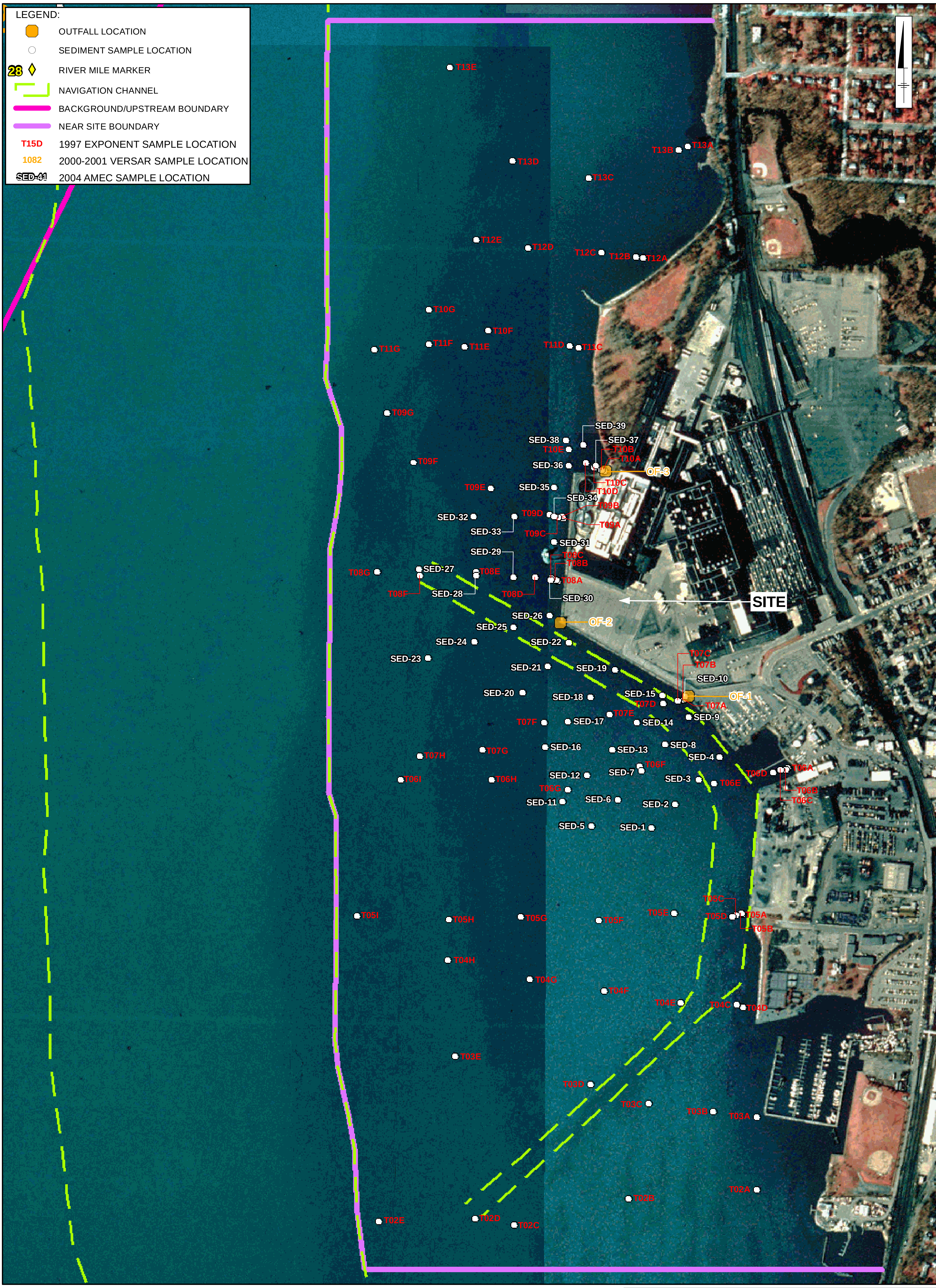
SEDIMENT REMEDIAL INVESTIGATION REPORT

1997 - 2004 BACKGROUND SAMPLE LOCATIONS

ARCADIS

FIGURE
2

City: SYR Div/Group: Sed Created By: M.Kohberger Last Saved By: jrapp
GM - Tarrytown (64462.1.00041)
Q:\GeneralMotors\Tarrytown\RemedialInvestigation\mxd\97_04_NearSiteSampleLocations_revd2012.mxd 1/30/2012 8:37:36 AM



NOTES:

1. DIGITAL ORTHO QUARTER QUADS PROVIDED BY THE NEW YORK STATE GIS CLEARINGHOUSE.
2. NAVIGATION CHANNEL DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 600 1,200 Feet
GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

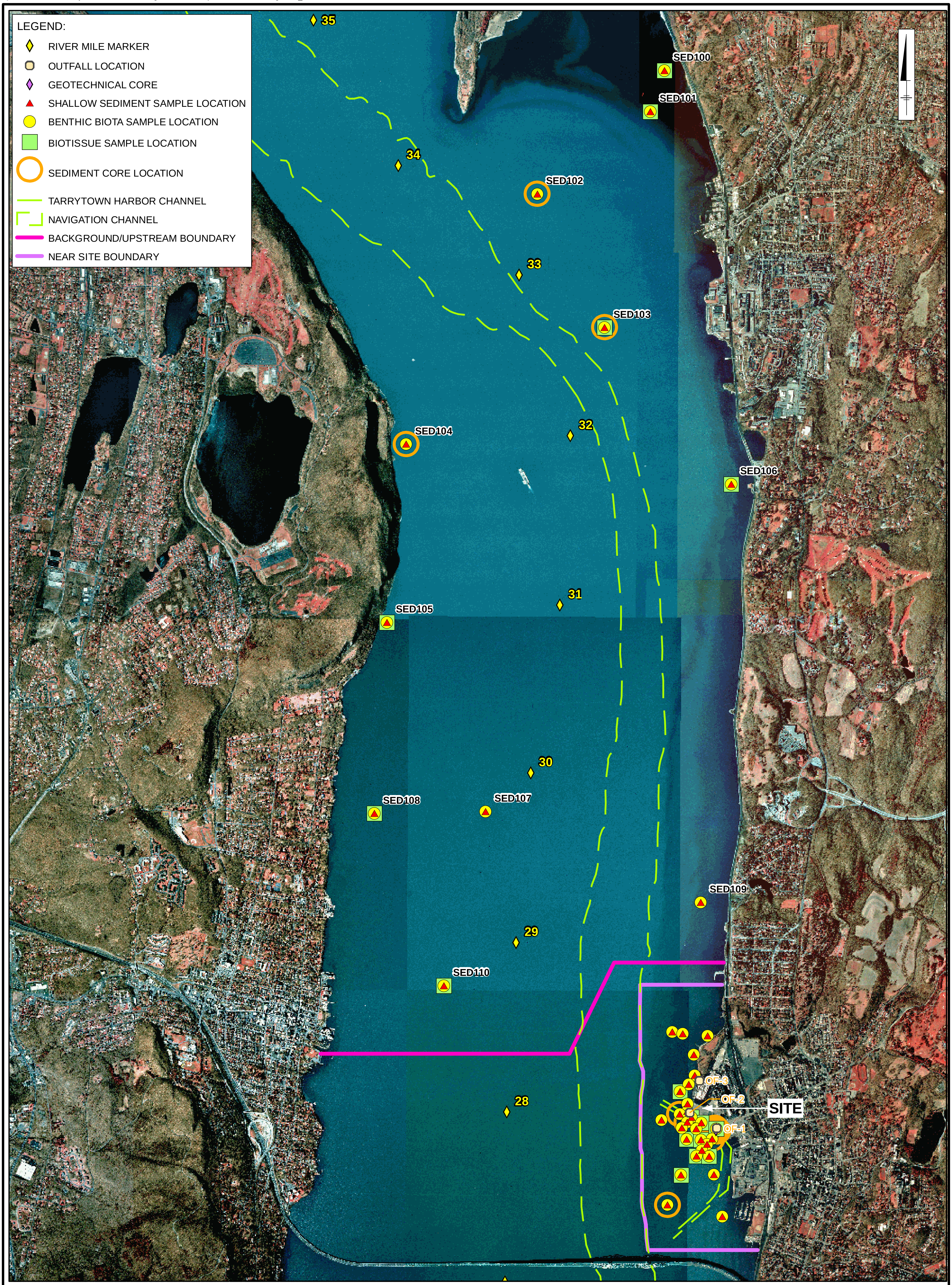
SEDIMENT REMEDIAL INVESTIGATION REPORT

1997 - 2004 NEAR-SITE SAMPLE LOCATIONS

ARCADIS

FIGURE
3

City: SYR Div/Group: Sed Created By: M.Kohberger Last Saved By: jrapp
GM - Tarrytown (64462.1.00041)
Q:\GeneralMotors\Tarrytown\RemedialInvestigation\mxd\Sample Locations - Background_revd2012.mxd 1/30/2012 8:30:17 AM



NOTES:

1. DIGITAL ORTHO QUARTER QUADS PROVIDED BY THE NEW YORK STATE GIS CLEARINGHOUSE.
2. NAVIGATION CHANNEL DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 2,800 5,600 Feet

GRAPHIC SCALE

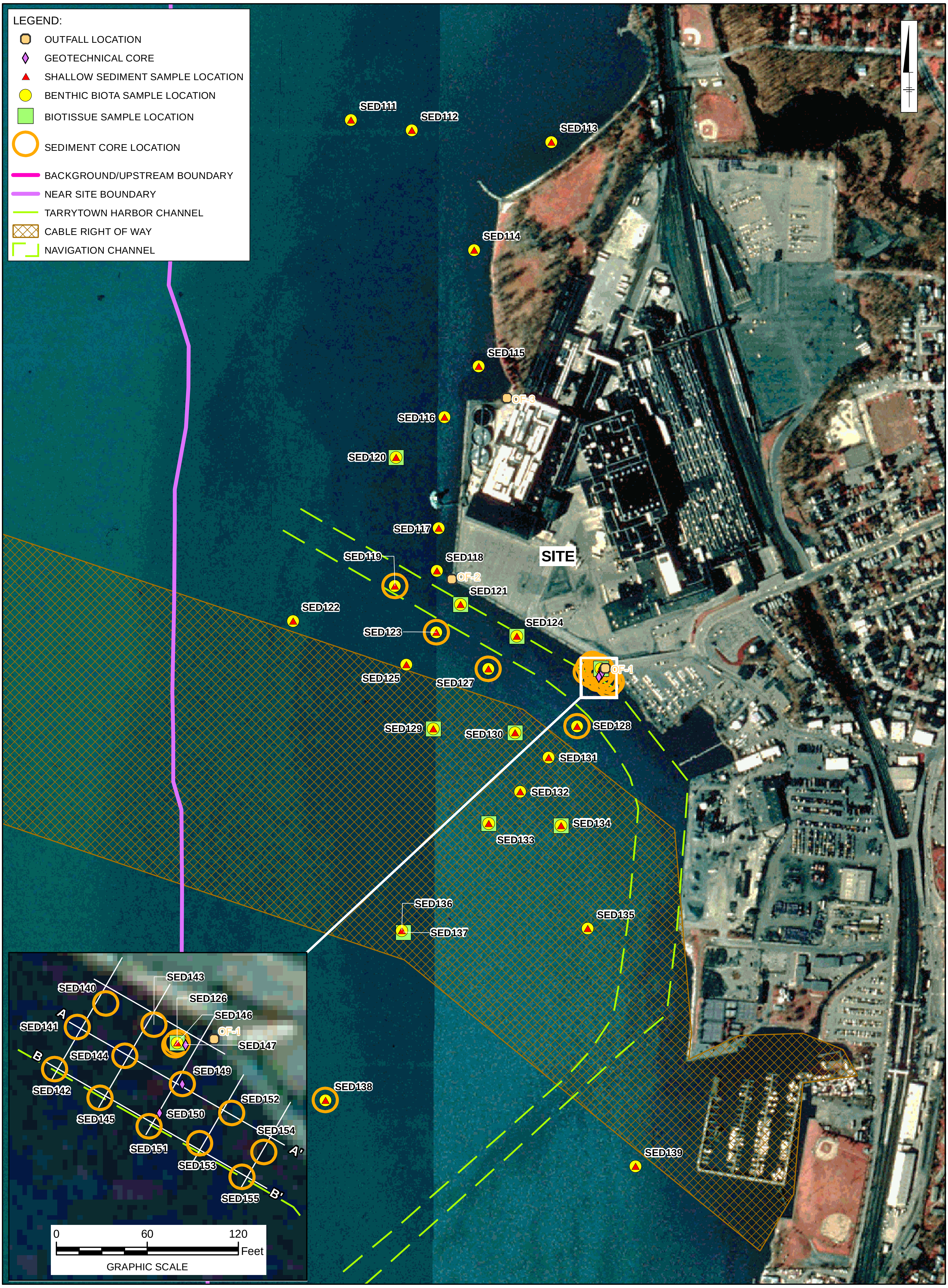
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

2006 BACKGROUND SAMPLE LOCATIONS

ARCADIS

FIGURE
4



NOTES:

1. DIGITAL ORTHO QUARTER QUADS PROVIDED BY THE NEW YORK STATE GIS CLEARINGHOUSE.
2. NAVIGATION CHANNEL DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 500 1,000 Feet
GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

2006 NEAR-SITE SAMPLE LOCATIONS

ARCADIS

FIGURE
5

City: SYR Div/Group: Sed Created By: K.Sinsabaugh Last Saved By: jrapp
GM - Tarrytown (64462.1.00041)
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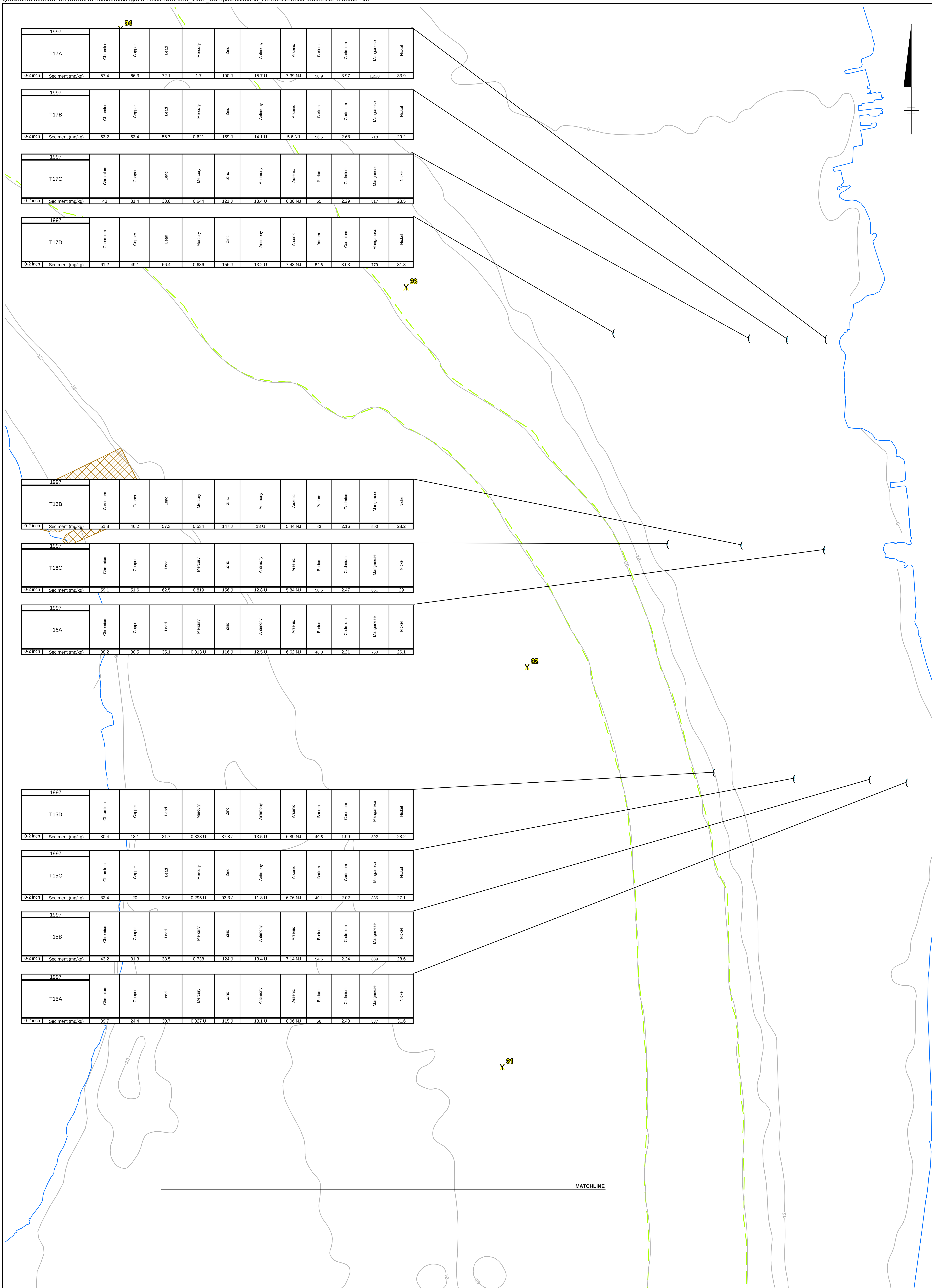


1997	Depth	Matrix	Chromium	Copper	Lead	Mercury	Zinc	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel
T17A	0-2 inch	Sediment (mg/kg)	57.4	66.3	72.1	1.7	190 J	15.7 U	7.39 NJ	90.9	3.97	1,220	33.9
T17B	0-2 inch	Sediment (mg/kg)	53.2	53.4	56.7	0.621	159 J	14.1 U	5.6 NJ	56.5	2.68	718	29.2
T17C	0-2 inch	Sediment (mg/kg)	43	31.4	38.8	0.644	121 J	13.4 U	6.88 NJ	51	2.29	817	28.5
T17D	0-2 inch	Sediment (mg/kg)	61.2	49.1	66.4	0.686	156 J	13.2 U	7.48 NJ	52.6	3.03	779	31.8
T16B	0-2 inch	Sediment (mg/kg)	51.8	46.2	57.3	0.534	147 J	13 U	5.44 NJ	43	2.16	590	28.2
T16C	0-2 inch	Sediment (mg/kg)	59.1	51.6	62.5	0.819	156 J	12.8 U	5.84 NJ	50.5	2.47	661	29
T16A	0-2 inch	Sediment (mg/kg)	38.2	30.5	35.1	0.313 U	116 J	12.5 U	6.62 NJ	46.8	2.21	760	26.1
T15D	0-2 inch	Sediment (mg/kg)	30.4	18.1	21.7	0.338 U	87.8 J	13.5 U	6.89 NJ	40.5	1.99	892	28.2
T15C	0-2 inch	Sediment (mg/kg)	32.4	20	23.6	0.295 U	93.3 J	11.8 U	6.76 NJ	40.1	2.02	835	27.1
T15B	0-2 inch	Sediment (mg/kg)	43.2	31.3	38.5	0.738	124 J	13.4 U	7.14 NJ	54.6	2.24	839	28.6
T15A	0-2 inch	Sediment (mg/kg)	39.7	24.4	30.7	0.327 U	115 J	13.1 U	8.06 NJ	56	2.48	887	31.6

LEGEND:
- SEDIMENT SAMPLE LOCATION
- 28 RIVER MILE MARKER
- BATHYMETRY
- CABLE RIGHT OF WAY
- TARRYTOWN HARBOR CHANNEL
- NAVIGATION CHANNEL
- BACKGROUND/UPSTREAM BOUNDARY
- NEAR SITE BOUNDARY
- SHORELINE

NOTE:
1. NAVIGATION CHANNEL AND BATHYMETRY DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 600 1,200 Feet
GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

1997 SEDIMENT DATA- SEGMENT 1

ARCADIS

FIGURE
6

Sample (1997)	Depth	Matrix	Chromium	Copper	Lead	Mercury	Zinc	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel
T14A	0-2 inch	Sediment (mg/kg)	28.8	28	28.2	0.437	95.6 J	8.85 U	3.63 NJ	48.1	1.47	409	20.1
T14B	0-2 inch	Sediment (mg/kg)	28.2	25.6	26.8	0.308	90.3 J	8.65 U	3.2 NJ	41.8	1.44	318	18.3
T14C	0-2 inch	Sediment (mg/kg)	40.6	40.6	38.6	0.854 NJ	117 J	11.7 U	8.68	50.1	2.64	635	26.8
T14D	0-2 inch	Sediment (mg/kg)	42.4	60.1	60.1	0.727 NJ	145 J	11.8 U	8	47.2	2.46	485	27.1
T14E	0-2 inch	Sediment (mg/kg)	85.8 [75.6]	102 [86.2]	100 [84.3]	1.77 NJ [1.54 NJ]	195 J [167 J]	14.2 U [14.1 U]	9.41 [8.22]	62.6 [55.7]	4.08 [3.47]	514 [457]	34.1 [29.5]
T13A	0-2 inch	Sediment (mg/kg)	41.3	36.4	42.1	0.335	119 J	12.4 UNJ	4.73 NJ	52.5	1.96	705	24.4
T13B	0-2 inch	Sediment (mg/kg)	42.7	33.3	37.8	0.348	112 J	12.8 UNJ	7.52 NJ	58.5	2.18	650	28
T13C	0-2 inch	Sediment (mg/kg)	71.2	67	73.3	0.921 NJ	156 J	14 UNJ	6.7	56.7	3.26	514	29.1
T13E	0-2 inch	Sediment (mg/kg)	36.1	30.3	41.4	0.434 NJ	103 J	12.3 UNJ	10.1	51.2	3.11	576	29.5
T13D	0-2 inch	Sediment (mg/kg)	48.2	48.7	52.9	0.87 NJ	139 J	13.5 UNJ	5.81	57.4	2.87	675	25.3
T12A	0-2 inch	Sediment (mg/kg)	16.7	10.7	16.8	0.201 U	54.1 J	8.02 UNJ	3.25 NJ	17.5	0.944	295	12.2
T12B	0-2 inch	Sediment (mg/kg)	24.3	16.5	21.2	0.215 U	65.8 J	8.58 UNJ	3.83 NJ	26.6	1.23	365	14.6
T12C	0-2 inch	Sediment (mg/kg)	57.1	61.5	60.1	1.11 NJ	153 J	13.8 UNJ	14.9	67	4.15	789	34.4
T12D	0-2 inch	Sediment (mg/kg)	48.3	47.5	49.8	0.757 NJ	123 J	11.3 UNJ	4.36	58.3	2.57	415	23.2
T12E	0-2 inch	Sediment (mg/kg)	51.1	47.1	49.8	1.67 NJ	130 J	13.5 UNJ	6.05	55.6	2.83	558	25.1
T11C	0-2 inch	Sediment (mg/kg)	20.5	19.2 U	20.7	0.491	59.5 J	8.3 UNJ	3.24	38.5	1.51	353	13.7
T11D	0-2 inch	Sediment (mg/kg)	37.6	34.2 J	42.2	0.532 NJ	100 J	10.2 UNJ	4.92	65.1	2.06	388	18.1
T10G	0-2 inch	Sediment (mg/kg)	36.2 J [33 J]	31.1 U [27.3 U]	1.3 *NJ [27.7 *N	0.32 U [0.32 U]	98.3 [91.5]	12.8 UNJ [12.8 UNJ]	7.59 [6.93]	39.4 * [41.4 *]	2.03 [1.88]	490 [435]	23 [22]
T10F	0-2 inch	Sediment (mg/kg)	70.5	66 J	73.5 *NJ	0.45	179	15 UNJ	7.82	58 *	2.98	595	32.5
T11G	0-2 inch	Sediment (mg/kg)	33.2	34.2 J	36.3	0.456 NJ	89.9 J	9.19 UNJ	4.24	30.5	1.91	291	18.1
T11F	0-2 inch	Sediment (mg/kg)	38.8	31.3 U	32.1	0.688 NJ	108 J	13.4 UNJ	6.38	50	2.54	893	25.4
T11E	0-2 inch	Sediment (mg/kg)	64.8	64.5 J	67.4	1.09 NJ	159 J	15.7 UNJ	8.12	55.4	3.13	945	29.5

NOTE:

1. NAVIGATION CHANNEL AND BATHYMETRY DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

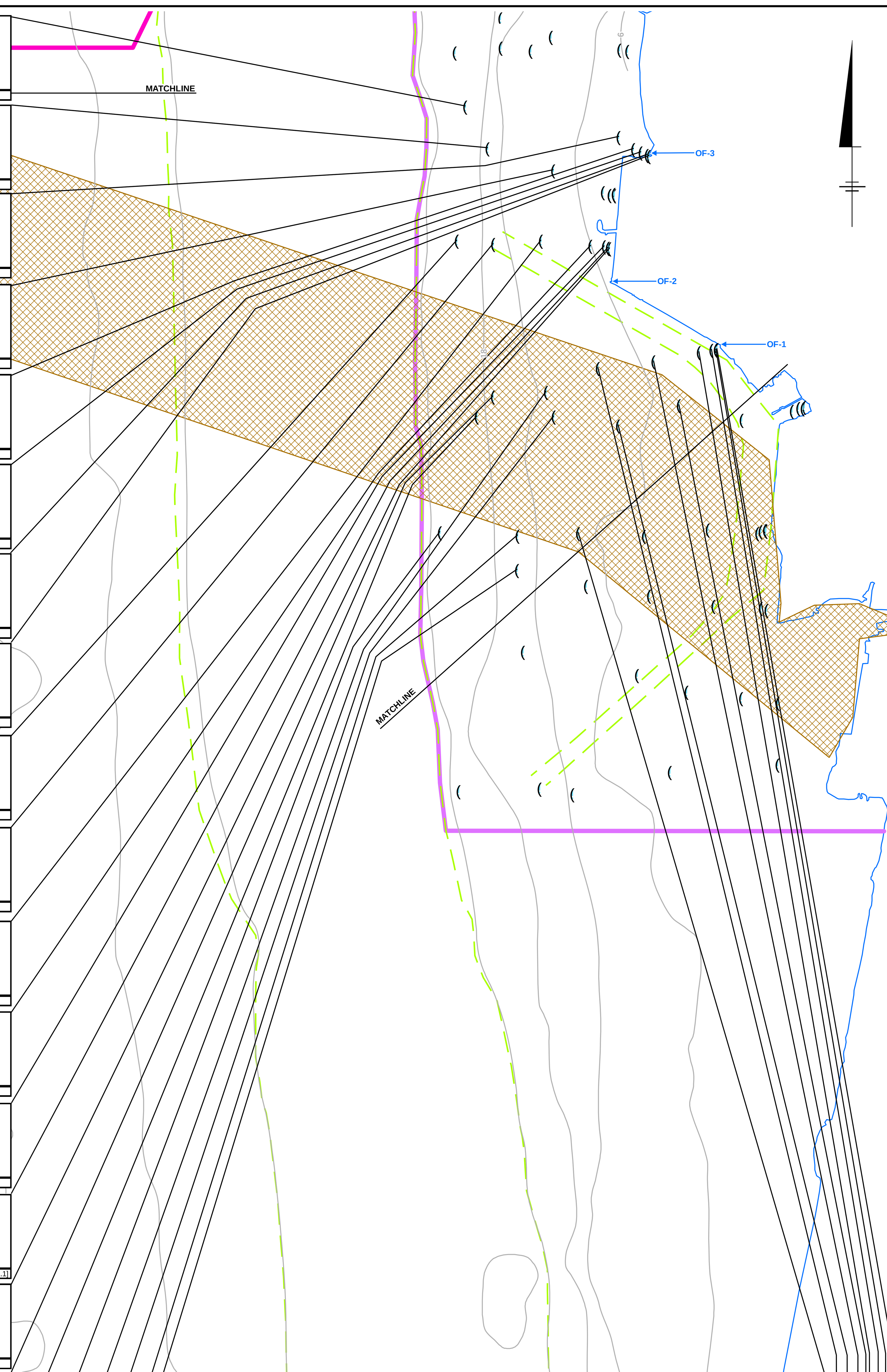
SEDIMENT REMEDIAL INVESTIGATION REPORT

1997 SEDIMENT DATA- SEGMENT 2

ARCADIS

FIGURE
7

City: SYR Div/Group: SED GIS Created By: K.Sinsabaugh Last Saved By: jrapp
Tarrytown (64462.0041)
Q:\GeneralMotors\Tarrytown\RemedialInvestigation\mxd\Southern_West_1997_SampleLocations_revd2012.mxd 1/30/2012 8:21:35 AM



Sample	Year	Depth	Matrix	Chromium	Copper	Lead	Mercury	Zinc	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel
T09G	1997	0-2 inch	Sediment (mg/kg)	83.2	55 J	73.5 *NJ	0.616	157	13.2 UNJ	7.46	50.3 *	4.19	486	28.3
T09F	1997	0-2 inch	Sediment (mg/kg)	34.2 J	26.2 U	35.6 *NJ	0.336 U	89.3	13.4 UNJ	7.11	43 *	2.73	577	28.2
T10E	1997	0-2 inch	Sediment (mg/kg)	58.9	57.8 J	58.3 *NJ	0.545	155	16.3 UNJ	9.56	62.4 *	2.59	894	29.2
T09E	1997	0-2 inch	Sediment (mg/kg)	52.2	44.6 J	63.8 *NJ	0.556	110	11.4 UNJ	5.12	49.1 *	2.38	404	21.7
T10D	1997	0-2 inch	Sediment (mg/kg)	14.4 J	8.03 U	30.6 *NJ	0.2 U	68.3	7.99 UNJ	2.05	17.4 *	0.752	164	12.9
T10C	1997	0-2 inch	Sediment (mg/kg)	17.1 J	12 U	35.4 *NJ	0.19 U	82.1	7.6 UNJ	2.02	137 *	0.951	136	13.6
T10B	1997	0-2 inch	Sediment (mg/kg)	15.8 J	26 J	49.4 *NJ	0.176 U	91.8	7.03 UNJ	2.56	140 *	1.45	789	19.2
T10A	1997	0-2 inch	Sediment (mg/kg)	13.4 J	9.57 U	35 *NJ	0.186 U	76.5	7.45 UNJ	2.14	38.9 *	0.796	161	9.98
T08G	1997	0-2 inch	Sediment (mg/kg)	31.4	30.4	48.4	0.318 U	103	2.12 UNJ	8.85	39.9	2.06	556	28.9
T08F	1997	0-2 inch	Sediment (mg/kg)	40.7	45.2	48.5	0.515	120	1.96 UNJ	7.14	43.8	2.09	452	25.8
T08E	1997	0-2 inch	Sediment (mg/kg)	80.9	77.3	117	1.16	174	2.44 UNJ	13.4	69.9	4.28	809	35.7
T08D	1997	0-2 inch	Sediment (mg/kg)	13.2	14.5	27.2	0.205 U	81.3	1.37 UNJ	3.01	54.1	1.16	321	21.4
T08C	1997	0-2 inch	Sediment (mg/kg)	41	51.1	118	0.393	189	1.63 UNJ	4.46	244	1.74	397	29.2
T08B	1997	0-2 inch	Sediment (mg/kg)	22.9 [24.5]	24.7 [24.1]	38.6 [38.2]	0.237 [0.259]	94.3 [92.4]	1.46 UNJ [1.42 UNJ]	4.41 [3.97]	83.3 [87]	1.57 [1.52]	341 [378]	17.6 [18.1]
T08A	1997	0-2 inch	Sediment (mg/kg)	34.9	44.3	72.5	0.419	125	1.61 UNJ	6.8	151	2.16	390	27.9
T07H	1997	0-2 inch	Sediment (mg/kg)	53.6	61.3	65.4	0.799	148	2.14 UNJ	8.57	45.7	2.33	419	28.2
T06I	1997	0-2 inch	Sediment (mg/kg)	53.3	52.4 J	57.1	0.668	151	14.2 UNJ	4.17	48.1	3.41	607	32
T05I	1997	0-2 inch	Sediment (mg/kg)	32.4	31.9 J	37	0.628	90.6	10.3 UNJ	8.06	25.2	2.57	439	23
T07G	1997	0-2 inch	Sediment (mg/kg)	45.6	77.6	67.5	0.9	146	1.69 UNJ	11.2	46.1	2.05	386	23.6
T06H	1997	0-2 inch	Sediment (mg/kg)	38.7	67.3	73.4	0.833	161	11.2 UNJ	15.6	47.2	3.16	533	28.4
T05H	1997	0-2 inch	Sediment (mg/kg)	47.4	54.8 J	61.2	0.753	130	12 UNJ	7.31	32.5	3.19	468	29.1
T04H	1997	0-2 inch	Sediment (mg/kg)	42.3	50.3 J	64 *NJ	1.15	116	10.2 UNJ	12.9	30 *	2.29	345	23.4
T05G	1997	0-2 inch	Sediment (mg/kg)	75.3	117	94.3	1.51	192	12.7 UNJ	11.9	57.7	3.62	533	31.7
T07F	1997	0-2 inch	Sediment (mg/kg)	29.6	32.7	34.7	0.412	93.7	1.66 UNJ	6.31	42.4	1.5	553	18.1
T06G	1997	0-2 inch	Sediment (mg/kg)	41.7	66	75.1	0.833	158	11.7 UNJ	10.9	56.1	2.99	454	27.4
T07E	1997	0-2 inch	Sediment (mg/kg)	62.7	71.5	80.1	0.814	187	2.14 UNJ	8.44	170	2.7	630	31.5
T06F	1997	0-2 inch	Sediment (mg/kg)	79.8	81.8	115	2.23	202	12.1 UNJ	7.71	265	4.17	431	30.2
T07D	1997	0-2 inch	Sediment (mg/kg)	59.8	65.2	72.9	0.576	184	3.05 UNJ	9.39	64	2.56	1,080	33.5
T07C	1997	0-2 inch	Sediment (mg/kg)	62	74	90.9	0.734	216	2.77 UNJ	8.95	93.1	2.62	978	33.2
T07B	1997	0-2 inch	Sediment (mg/kg)	88.9	74.5	380	0.315	257	1.98 UNJ	7.33	477	2.26	483	23.2
T07A	1997	0-2 inch	Sediment (mg/kg)	90.7 *NJ	146 *	1,010 *	0.19 U	374	10.3 NJ	17.7 *NJ	830 *NJ	4.03 *NJ	350 *	34.3 *

LEGEND:
- (SEDIMENT SAMPLE LOCATION
- 28 Y RIVER MILE MARKER
- BATHYMETRY
- CABLE RIGHT OF WAY
- TARRYTOWN HARBOR CHANNEL
- NAVIGATION CHANNEL
- BACKGROUND/UPSTREAM BOUNDARY
- NEAR SITE BOUNDARY
- SHORELINE

NOTE:
1. NAVIGATION CHANNEL AND BATHYMETRY DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 600 1,200 Feet
GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

1997 SEDIMENT LOCATION- SEGMENT 3

ARCADIS

FIGURE
8

City: SYR Div/Group: SED GIS Created By: K.Sinsabaugh Last Saved By: jrapp
Tarrytown (64462.0041)
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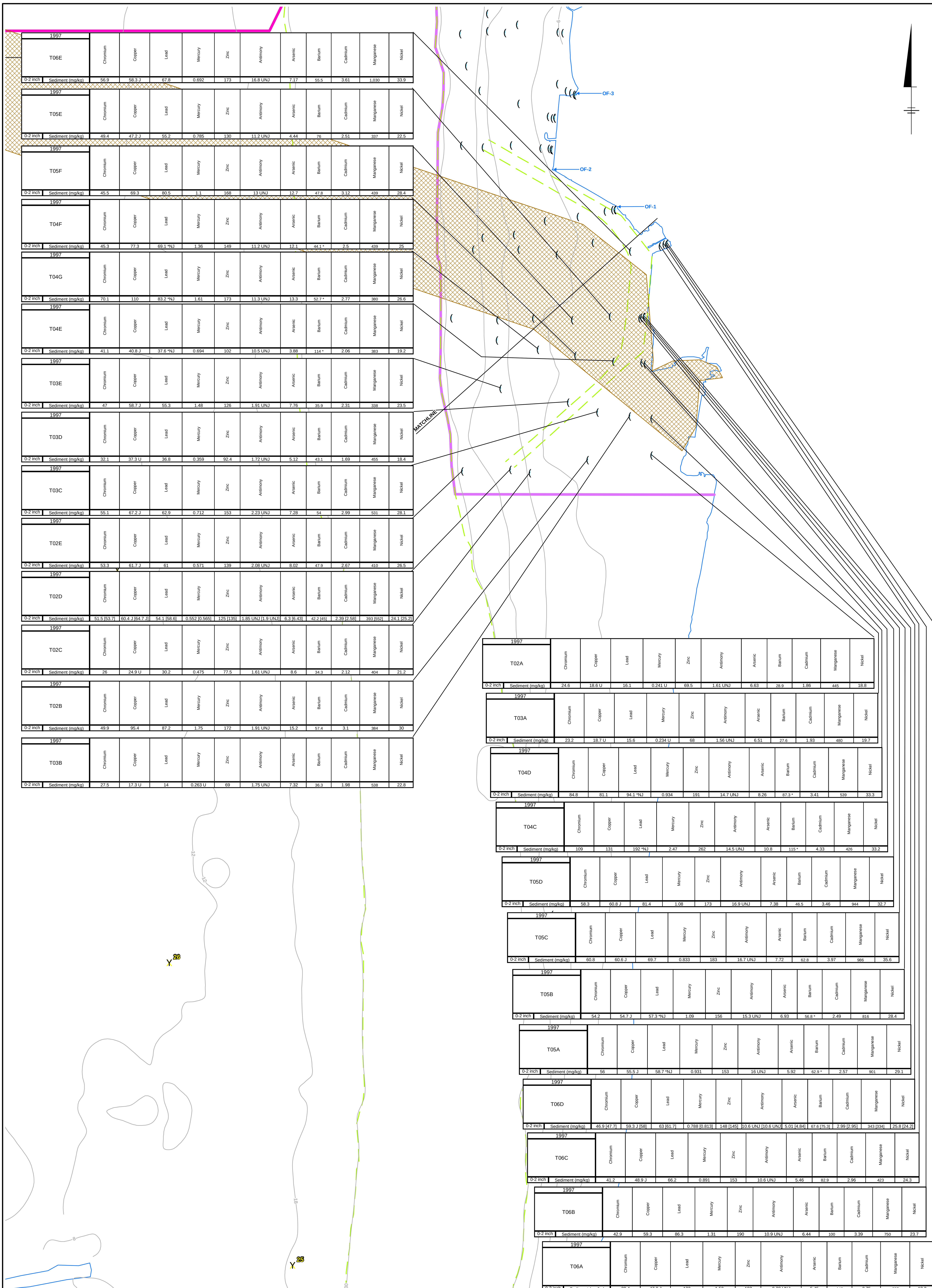


Location	Year	Depth	Matrix	Chromium	Copper	Lead	Mercury	Zinc	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel
T06E	1997	0-2 inch	Sediment (mg/kg)	56.9	58.3 J	67.8	0.692	173	16.8 UNJ	7.17	55.5	3.61	1,030	33.9
T05E	1997	0-2 inch	Sediment (mg/kg)	49.4	47.2 J	55.2	0.785	130	11.2 UNJ	4.44	76	2.51	337	22.5
T05F	1997	0-2 inch	Sediment (mg/kg)	45.5	69.3	80.5	1.1	168	13 UNJ	12.7	47.8	3.12	439	28.4
T04F	1997	0-2 inch	Sediment (mg/kg)	45.3	77.3	69.1 *NJ	1.36	149	11.2 UNJ	12.1	44.1 *	2.5	439	25
T04G	1997	0-2 inch	Sediment (mg/kg)	70.1	110	83.2 *NJ	1.61	173	11.3 UNJ	13.3	52.7 *	2.77	380	26.6
T04E	1997	0-2 inch	Sediment (mg/kg)	41.1	40.8 J	37.6 *NJ	0.694	102	10.5 UNJ	3.88	114 *	2.06	383	19.2
T03E	1997	0-2 inch	Sediment (mg/kg)	47	58.7 J	55.3	1.48	126	1.91 UNJ	7.76	35.9	2.31	338	23.5
T03D	1997	0-2 inch	Sediment (mg/kg)	32.1	37.3 U	36.8	0.359	92.4	1.72 UNJ	5.12	43.1	1.69	455	18.4
T03C	1997	0-2 inch	Sediment (mg/kg)	55.1	67.2 J	62.9	0.712	153	2.23 UNJ	7.28	54	2.99	531	28.1
T02E	1997	0-2 inch	Sediment (mg/kg)	53.3	61.7 J	61	0.571	139	2.08 UNJ	8.02	47.9	2.67	410	26.5
T02D	1997	0-2 inch	Sediment (mg/kg)	51.5 [53.7]	60.4 J [64.7 J]	54.1 [58.6]	0.552 [0.565]	125 [135]	1.85 UNJ [1.9 UNJ]	6.3 [6.43]	42.2 [45]	2.39 [2.58]	393 [552]	24.1 [25.2]
T02C	1997	0-2 inch	Sediment (mg/kg)	26	24.9 U	30.2	0.475	77.5	1.61 UNJ	8.6	34.3	2.12	404	21.2
T02B	1997	0-2 inch	Sediment (mg/kg)	49.9	95.4	87.2	1.75	172	1.91 UNJ	15.2	57.4	3.1	384	30
T03B	1997	0-2 inch	Sediment (mg/kg)	27.5	17.3 U	14	0.263 U	69	1.75 UNJ	7.32	36.3	1.98	538	22.8
T02A	1997	0-2 inch	Sediment (mg/kg)	24.6	18.6 U	16.1	0.241 U	69.5	1.61 UNJ	6.63	28.9	1.86	445	18.8
T03A	1997	0-2 inch	Sediment (mg/kg)	23.2	18.7 U	15.6	0.234 U	68	1.56 UNJ	6.51	27.6	1.93	480	19.7
T04D	1997	0-2 inch	Sediment (mg/kg)	84.8	81.1	94.1 *NJ	0.934	191	14.7 UNJ	8.26	87.3 *	3.41	539	33.3
T04C	1997	0-2 inch	Sediment (mg/kg)	109	131	192 *NJ	2.47	262	14.5 UNJ	10.8	115 *	4.33	426	33.2
T05D	1997	0-2 inch	Sediment (mg/kg)	58.3	60.8 J	81.4	1.08	173	16.9 UNJ	7.38	46.5	3.46	944	32.7
T05C	1997	0-2 inch	Sediment (mg/kg)	60.8	60.6 J	69.7	0.833	183	16.7 UNJ	7.72	62.8	3.97	986	35.6
T05B	1997	0-2 inch	Sediment (mg/kg)	54.2	54.7 J	57.3 *NJ	1.09	156	15.3 UNJ	6.93	56.8 *	2.49	816	28.4
T05A	1997	0-2 inch	Sediment (mg/kg)	56	55.5 J	58.7 *NJ	0.931	153	16 UNJ	5.92	62.9 *	2.57	901	29.1
T06D	1997	0-2 inch	Sediment (mg/kg)	46.9 [47.7]	59.3 J [58]	63 [61.7]	0.788 [0.813]	148 [145]	10.6 UNJ [10.6 UNJ]	5.01 [4.84]	67.6 [75.3]	2.99 [2.95]	343 [334]	25.8 [24.2]
T06C	1997	0-2 inch	Sediment (mg/kg)	41.2	48.9 J	66.2	0.891	153	10.6 UNJ	5.46	82.9	2.96	423	24.3
T06B	1997	0-2 inch	Sediment (mg/kg)	42.9	59.3	86.3	1.31	190	10.9 UNJ	6.44	100	3.39	750	23.7
T06A	1997	0-2 inch	Sediment (mg/kg)	39.4	47.8 J	132	1.53	192	9.38 UNJ	5.45	148	2.75	297	18.3

LEGEND:
- (SEDIMENT SAMPLE LOCATION
- 28 Y RIVER MILE MARKER
- BATHYMETRY
- CABLE RIGHT OF WAY
- TARRYTOWN HARBOR CHANNEL
- NAVIGATION CHANNEL
- BACKGROUND/UPSTREAM BOUNDARY
- NEAR SITE BOUNDARY
- SHORELINE

NOTE:
1. NAVIGATION CHANNEL AND BATHYMETRY DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 600 1,200 Feet
GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

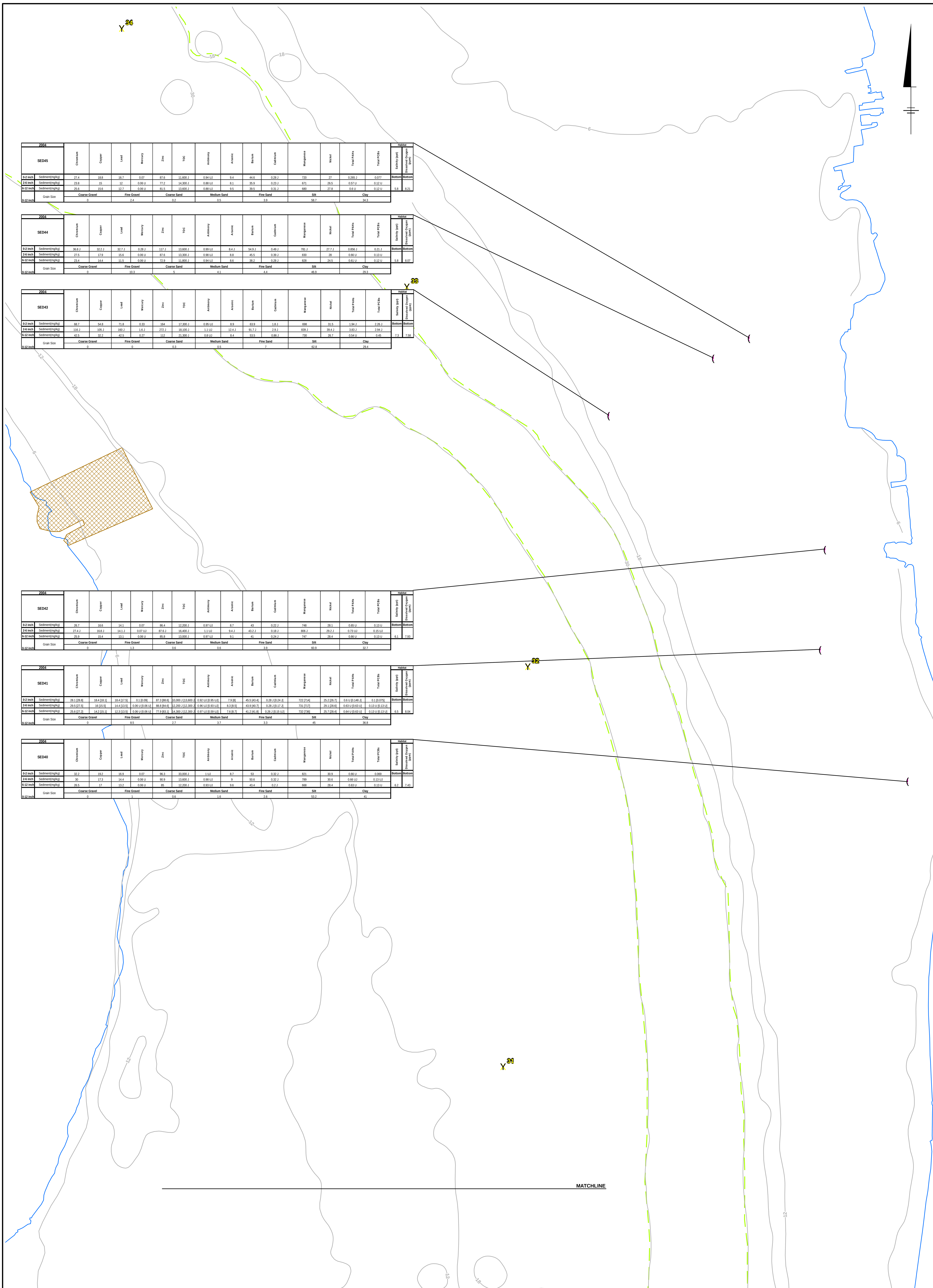
SEDIMENT REMEDIAL INVESTIGATION REPORT

1997 SEDIMENT DATA- SEGMENT 4

ARCADIS

FIGURE
9

City: SYR Div/Group: SED GIS Created By: K.Sinsabaugh Last Saved By: jrapp
Tarrytown (64462.0041)
Q:\GeneralMotors\Tarrytown\RemedialInvestigation\mxd\Northern_2004_SampleLocations_revd2012.mxd 1/30/2012 8:32:43 AM



2004 SED45		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat Salinity (ppt)	Habitat Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	27.4	18.8	16.7	0.07	87.6	11,600 J	0.94 UJ	9.4	44.6	0.28 J	720	27	0.265 J	0.077	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	23.8	15	12	0.06 U	77.2	14,300 J	0.88 UJ	8.1	35.9	0.23 J	671	26.5	0.57 U	0.12 U		
6-12 inch	Sediment(mg/kg)	25.6	15.6	12.7	0.06 U	81.5	13,600 J	0.88 UJ	9.5	39.5	0.31 J	680	27.8	0.6 U	0.12 U	5.8	8.21

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	2.4	0.2	0.5	3.9	58.7	34.3

2004 SED44		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat Salinity (ppt)	Habitat Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	36.8 J	32.2 J	32.7 J	0.28 J	117 J	13,600 J	0.99 UJ	8.4 J	54.9 J	0.49 J	781 J	27.7 J	0.856 J	0.21 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	27.5	17.9	15.6	0.06 U	87.6	13,300 J	0.98 UJ	8.8	45.5	0.39 J	830	28	0.66 U	0.13 U		
6-12 inch	Sediment(mg/kg)	23.4	14.4	11.5	0.06 U	72.9	11,800 J	0.94 UJ	8.6	38.2	0.28 J	828	24.5	0.61 U	0.12 U	5.8	8.07

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	10.3	5	4.1	4.4	46.9	29.3

2004 SED43		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat Salinity (ppt)	Habitat Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	68.7	54.8	71.8	0.33	164	17,300 J	0.95 UJ	8.9	63.9	1.8 J	698	31.5	1.94 J	2.26 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	116 J	105 J	160 J	1.6 J	272 J	18,100 J	1.1 UJ	12.4 J	91.7 J	2.9 J	839 J	39.4 J	3.83 J	2.94 J		
6-12 inch	Sediment(mg/kg)	42.5	32.2	42.5	0.27	112	21,300 J	0.8 UJ	8.4	53.5	0.86 J	730	26.7	0.54 U	0.45	7.3	7.58

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0	0.3	0.5	7	62.8	29.4

2004 SED42		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat Salinity (ppt)	Habitat Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	26.7	16.6	14.1	0.07	86.4	12,200 J	0.97 UJ	8.7	43	0.22 J	748	28.1	0.65 U	0.13 U	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	27.4 J	16.8 J	14.1 J	0.07 UJ	87.6 J	16,400 J	1.1 UJ	9.4 J	43.2 J	0.18 J	806 J	29.2 J	0.73 UJ	0.15 UJ		
6-12 inch	Sediment(mg/kg)	25.9	15.4	13.1	0.06 U	85.8	13,000 J	0.97 UJ	9.1	41	0.24 J	747	28.4	0.66 U	0.13 U	6.1	7.93

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	1.3	0.6	0.6	3.9	60.9	32.7

2004 SED41		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat Salinity (ppt)	Habitat Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	28.1 [28.8]	18.4 [18.1]	18.4 [17.5]	0.1 [0.09]	87.3 [88.6]	10,000 J [13,600 J]	0.92 UJ [0.95 UJ]	7.9 [8]	45.5 [43.4]	0.28 J [0.24 J]	722 [714]	25.2 [26.7]	0.6 U [0.148 J]	0.1 [0.075]	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	29.5 [27.5]	16 [15.5]	14.4 [13.5]	0.06 U [0.06 U]	88.8 [84.6]	12,200 J [12,300 J]	0.96 UJ [0.93 UJ]	8.3 [8.5]	43.9 [40.7]	0.28 J [0.17 J]	731 [717]	29.1 [28.6]	0.63 U [0.63 U]	0.13 U [0.13 U]		
6-12 inch	Sediment(mg/kg)	25.6 [27.2]	14.2 [15.1]	12.3 [13.5]	0.06 U [0.06 U]	77.9 [83.1]	14,300 J [12,300 J]	0.97 UJ [0.59 UJ]	7.6 [8.7]	41.2 [41.8]	0.26 J [0.15 UJ]	732 [736]	25.7 [28.4]	0.64 U [0.63 U]	0.13 U [0.13 U]	6.5	8.04

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	8.5	2.7	3.7	3.3	45	36.8

2004 SED40		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat Salinity (ppt)	Habitat Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	32.2	19.2	16.9	0.07	96.3	33,000 J	1 UJ	8.7	53	0.32 J	821	30.9	0.66 U	0.069	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	30	17.3	14.4	0.06 U	90.9	13,600 J	0.98 UJ	9	50.6	0.32 J	789	30.6	0.66 UJ	0.13 UJ		
6-12 inch	Sediment(mg/kg)	26.5	17	13.2	0.06 U	85	12,200 J	0.93 UJ	9.6	43.4	0.2 J	668	28.4	0.63 U	0.13 U	6.2	7.43

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	1	0.6	1.6	2.6	53.2	41

LEGEND:

- SEDIMENT SAMPLE LOCATION
- 28 RIVER MILE MARKER
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NOTE:

1. NAVIGATION CHANNEL AND BATHYMETRY DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 600 1,200 Feet

GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

2004 SEDIMENT DATA- SEGMENT 1

ARCADIS

FIGURE

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2004

SED39		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	37.5	36.4	52	0.51 N	118	7,490	0.52 UJ	5.8 J	109	0.29 J	555	21.3	2.14 J	0.246 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	47.5	42.7	144	3.5 N	213	9,240	3 J	9.7 J	212	1.2 J	505	26.3	1.41 J	0.241		
6-12 inch	Sediment(mg/kg)	31.8	28.2	116	0.42	136 J	6,240	3.4 B	6.1	92	1.5 J	270	18.6	1.62 J	0.096	6.7	8.44

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0.6	1	9.1	40.2	43.1	6

2004

SED38		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	46.3 [49.8 J]	52.9 [57.4 J]	64.2 [59.5 J]	0.63 N [0.63 J]	147 [154 J]	23,800 [22,700 J]	0.61 UJ [0.67 UJ]	7 J [8.4 J]	106 [96.6 J]	0.29 J [0.33 UJ]	769 [815 J]	25.1 [26.8 J]	7.82 J [7.27 J]	0.42 [0.57 J]	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	97 [113]	86.8 [95.8]	121 [144]	0.64 N [1.5 N]	231 [251]	19,700 [23,400]	1 J [1.3 J]	9.5 J [10.8 J]	231 [229]	1.8 J [2.2 J]	650 [647]	32.2 [35.3]	5.32 J [5.69 J]	1.9 [6.33]		
6-12 inch	Sediment(mg/kg)	102 [76.9]	91.5 [67.5]	138 [99]	3.4 N [0.87 N]	243 [191]	14,300 [15,900]	1.3 J [0.68 J]	11.5 [11.7]	260 [180]	1.9 J [1.1 J]	642 [644]	35.3 [32.1]	2.4 J [2.946 J]	2.8 [3.03 J]	7.8	7.54

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0.4	0.7	3.7	11.6	53.8	29.8

2004

SED37		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	14.1	8.6	39.1	0.06 N	82.5	980	0.65 J	1.9 J	78.5	0.14 UJ	192	11.9	0.42 U	0.085 U	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	13.1	9	53.7	0.09 N	76.1	707	0.93 J	1.7 J	44.2	0.12 UJ	107	12.5	0.41 U	0.083 U		
6-12 inch	Sediment(mg/kg)	17.4	16.5	127	0.07 N	111	788	4 J	2.3 J	256	0.1 UJ	157	15	0.81 U	0.083 U	7	7.93

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	11.2	3.5	15.1	66.2	2.9	1.1

2004

SED36		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	52.2	58.9	61.5	0.67 N	156	16,100	0.65 UJ	7 J	65.6	0.26 UJ	577	27.3	3.42 J	0.7 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	70 J	82.8 J	83.7 J	0.86 J	188 J	19,500 J	0.66 UJ	8.4 J	80.7 J	0.11 J	682 J	31.4 J	3.96 J	0.79 J		
6-12 inch	Sediment(mg/kg)	107 J [106]	95.1 J [93.6]	123 J [120]	1.3 J [1.4]	245 J [237 J]	25,400 J [23,700]	4.4 J [3.9 B]	11.4 J [10.4]	206 J [212]	2.7 J [2.7 J]	585 J [548]	36.4 J [34.1]	3.6 J [2.27 J]	4.18 J [1.91 J]	7.1	7.54

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0.4	0.9	1.4	7.5	53.7	36.1

2004

SED35		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	57.6 J	66.6 J	74.9 J	0.74 J	168 J	26,700 J	0.68 U	9.3 J	161 J	0.47 J	779 J	27.7 J	6.69 J	0.68 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	61.3	65.8	76.9	0.72 N	166	26,900	0.57 UJ	7.5 J	142	0.55 J	680	27.3	7.2 J	0.66		
6-12 inch	Sediment(mg/kg)	106 J	99.6 J	117 J	1.2 J	242 J	26,600 J	4.3 J	13.2 J	148 J	2.3 J	864 J	39.9 J	4.72 J	1.01 J	7.2	7.58

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0.4	1.7	4.1	19.8	46	28

2004

SED34		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	74.1 J	83.3 J	98.6 J	1.1 J	210 J	24,100 J	0.67 UJ	9.9 J	218 J	0.88 J	652 J	32 J	9.7 J	0.88 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	110	120	167	4.9 N	352	22,500	1.7 UJ	14	652	1.9 J	605	42.2	4.28 J	2.41 J		
6-12 inch	Sediment(mg/kg)	28.6	24.9	25.9	0.54 N	92.7	14,400	0.56 UJ	13.2	51.3	0.08 UJ	571	27.4	0.782 J	0.068	7.2	7.51

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	2.2	0.1	0.9	5.4	64.3	27.1

2004

SED31		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	52.7	59.3	59.6	0.59	153	19,300	1.3 UJ	7.1	69.5	0.26 UJ	643	26.6	3.24 J	0.52 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	66.4	75.4	80.5	0.94	169	34,500	1.3 UJ	7.9	101	0.42 J	596	28.3	5.11 J	0.7 J		
6-12 inch	Sediment(mg/kg)	79	78.8	110	2	226 J	22,500	2.6 B	9.9	363	2 J	572	29.8	5.08 J	1.27	7.2	8.14

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0.5	0.4	3	18.9	49.6	27.6

2004

SED33		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	49.8	59.8	63.7	0.59 N	151	25,400	0.63 UJ	8.2 J	97.1	0.18 J	740	26.7	5.15 J	0.44 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	62.1 J	77.5 J	82.3 J	1 J	186 J	17,600 J	0.74 UJ	9.8 J	130 J	0.48 J	762 J	30.2 J	8.19 J	0.63 J		
6-12 inch	Sediment(mg/kg)	83.7 J	101 J	94.5 J	1.1 J	215 J	24,800 J	2.7 J	13 J	110 J	1.6 J	998 J	34.3 J	3 J	0.64 J	7.5	7.58

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0.2	2.3	4.1	18.7	50.4	24.3

2004

SED32		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	58.8 J	66 J	70.5 J	0.74 J	178 J	19,200 J	1.7 UJ	7.7 J	73.3 J	0.16 UJ	919 J	32.2 J	3.66 J	0.56 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	46.3	52.9	59.3	0.61	142	22,100	1.3 UJ	6.9	64.2	0.09 UJ	861	25.6	2.43 J	0.46 J		
6-12 inch	Sediment(mg/kg)	70.6 J	81.5 J	82.1 J	0.98 J	194 J	26,400 J	1.6 J	12.4 J	81.9 J	1.2 J	1,160 J	33.1 J	3.84 J	0.51 J	13.5	5.82

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0	0	0.4	3.9	59.8	35.9

2004

SED30		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	32.5 [36]	33.1 [39]	115 [65.2]	0.42 [0.42]	143 [127]	13,600 [16,200]	1.1 UJ [1.2 UJ]	5.8 [5.7]	136 [133]	0.2 UJ [0.05 UJ]	489 [403]	19 [21.2]	7.58 J [16.439 J]	0.49 [0.324]	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	34.5 [37.3]	39.6 [41.5]	52.9 [57.1]	0.8 [0.58]	123 [115]	10,300 [16,900]	1.1 UJ [1.1 UJ]	8.6 [8.8]	88.1 [83.4]	0.17 UJ [0.03 UJ]	494 [542]	24 [23.6]	6.88 J [1.312 J]	0.53 [0.379]		
6-12 inch	Sediment(mg/kg)	32.6 [29.8]	39.4 [30.1]	46.2 [42.8]	0.59 [0.46]	106 [99.2]	15,300 [19,400]	1.1 UJ [0.47 UJ]	11.2 [11.2]	57 [57.9]	0.34 UJ [0.03 UJ]	545 [539]	24.6 [24.8]	2.71 J [0.767 J]	0.194 J [0.14]	7.4	7.63

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		2.9	0.5	0.5	2.9	24.7	49.2	19.3

2004

SED29		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	22.8	16.1	14.4	0.06	67.9	13,800	1.2 UJ	6.4	37	0.49 UJ	695	21.8	0.53 U	0.11 UJ	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	21.5	12.8	10	0.05 U	66	14,500	1.1 UJ	7.5	31.3	0.45 UJ	829	22.1	0.51 U	0.1 UJ		
6-12 inch	Sediment(mg/kg)	22.5	13.2	10.4	0.05 U	67.4	14,300	1.2 UJ	9.6	32.6	0.58 UJ	825	22.5	0.52 U	0.11 UJ	9.4	7.2

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		1.9	1.5	1.6	2.9	7.5	61.1	23.5

2004

SED28		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	23.8	14.7	12.6	0.06	66.4	12,500	1.2 UJ	6.8	32.3	0.44 UJ	720	21.7	0.146 J	0.06	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	18	10.9	8.9	0.04	54.5	12,300	1 UJ	4.8	26.2	0.37 UJ	523	17.4	0.46 U	0.025 J		
6-12 inch	Sediment(mg/kg)	24.9	13.7	10.5	0.05 U	69.4	13,200	1.2 UJ	6.1	36.5	0.52 UJ	714	23.1	0.53 U	0.11 UJ	13.4	5.67

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	2.6	1	1.7	14.5	55.4	24.8

2004

SED27		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	23.8	23	34.9	0.12	78.2	21,300	1.2 UJ	6.9	48.3	0.41 UJ	1,880	25.5	0.056 J	0.11 UJ	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	26.9	26.1	41.3	0.12	90.2	17,000	1.4 UJ	7.7	58.4	0.57 UJ	2,140	29.3	0.62 U	0.13 UJ		
6-12 inch	Sediment(mg/kg)	27.5	18.3	17.1	0.06	87 J	16,800	1.1 U	12.8	51.8	0.59 J	710	27.9	0.64 U	0.13 U	13.4	5.63

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0.2	0.2	0.4	6	55.7	37.5

2004

SED26		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	13.6	12.7	10.3	0.04 U	49.6	3,140	0.9 UJ	3.5	27.7	0.35 UJ	221	15.7	1.5 J	0.085 UJ	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	12.5	12.3	6.8 U	0.04 U	45.2	2,380	1 UJ	4.7	21.2	0.45 UJ	275	17	0.45 U	0.091 UJ		
6-12 inch	Sediment(mg/kg)	11.5	11.2	6.1 U	0.04 U	45.2	2,580	0.9 UJ	4.8	17.5	0.51 UJ	272	15.8	0.42 U	0.086 UJ	9.2	6.84

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	13.5	10.2	14.7	51	8.6	2

2004

SED25		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	52	55.4	52.2	0.69	139 J	22,400	1.1 UJ	14.3	73	0.09 UJ	891	33.5	1.03 J	1.27 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	85.4	110	99.9	1.5	194 J	18,700	1.1 UJ	12.3	95.6	0.6 UJ	825	36	2.77 J	2.11 J		
6-12 inch	Sediment(mg/kg)	144	162	198	5.3	324 J	29,600	1.1 UJ	15.8	129	4 J	921	39.7	5.45 J	2.69	10.7	6.27

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	10.2	1.9	4.6	6.9	45.1	31.3

2004

SED24		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	24.3 [23.7]	17.6 [17.3]	16.4 [16.1]	0.08 [0.18]	69.7 J [76.3 J]	10,200 [18,900]	1 UJ [1 UJ]	8.3 [9.9]	40.7 [37.6]	0.034 UJ [0.36 UJ]	804 [861]	20.4 [20.3]	0.59 U [0.58 U]	0.12 U [0.12 U]	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	19.9 [19.8]	11.4 [10.9]	10.3 [8.9]	0.05 U [0.05 U]	57.8 J [56.7 J]	12,000 [16,100]	0.89 UJ [1.1 UJ]	6.6 [6.2]	31.7 [32.3]	0.029 UJ [0.074 UJ]	784 [668]	19.3 [19]	0.51 U [0.49 U]	0.1 U [0.1 U]		
6-12 inch	Sediment(mg/kg)	22.4 [24]	11.5 [13.3]	9.7 [11.4]	0.05 U [0.05 U]	64 J [69 J]	11,700 [11,900]	0.9 UJ [0.91 UJ]	6.5 [9.4]	34.9 [34]	0.41 UJ [0.17 UJ]	654 [685]	21.6 [23.6]	0.52 U [0.53 U]	0.11 U [0.11 U]	8.7	7.24

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	12.1	2.5	4.2	11.6	50.5	19.1

2004

SED23		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	23.3	16.7	16.8	0.09	73.8 J	10,700	0.99 UJ	6.8	39.8	0.48 UJ	502	23.8	0.57 U	0.12 U	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	22.1	13.4	14.5	0.06 U	68.3 J	10,800	0.97 UJ	5.8	41.8	0.43 UJ	625	22.9	0.56 U	0.11 U		
6-12 inch	Sediment(mg/kg)	23.3	14	12	0.06 U	72.7 J	12,800	1 U	8.3	40.3	0.48 J	688	23.5	0.59 U	0.12 U	8.9	6.5

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0	0.2	1.4	10.8	58.5	29.1

2004

SED22		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	39.4	44.1	58.7	0.47	123	13,000	0.52 UJ	10.7	177	0.03 UJ	550	26.4	1.05 J	0.38 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	20.2	15.7	13.5	0.09	65.7	11,300	0.5 UJ	7.1	30.4	0.03 UJ	663	20.4	0.263 J	0.11 U		
6-12 inch	Sediment(mg/kg)	36.1	33.3	28.1	0.21	106 J	14,200	1 U	11.3	52.9	0.91 J	755	29	0.137 J	0.091	7.3	8.24

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0	0.1	0.5	11.6	61.8	26

2004

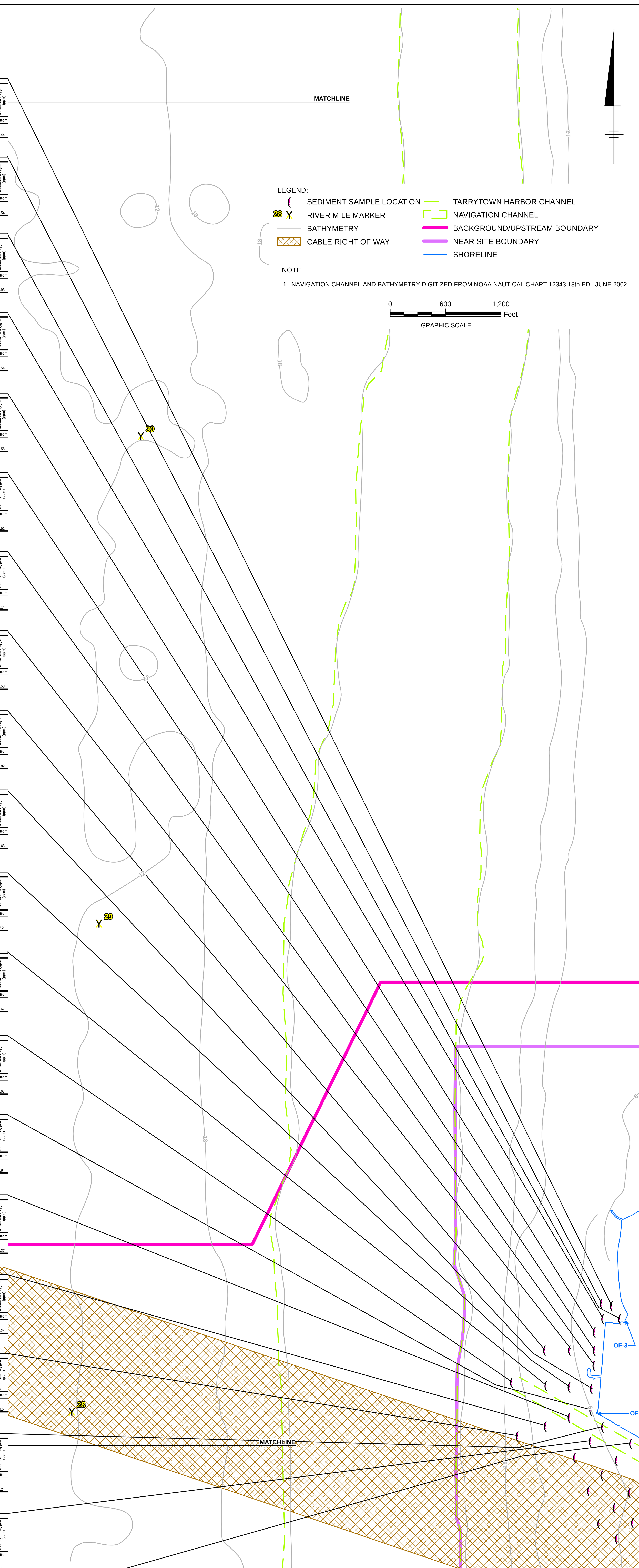
SED21		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	113 J	154 J	145 J	2.5 J	291 J	27,400 J	0.67 UJ	18.7 J	110 J	0.38 J	1,020 J	38.2 J	7.19 J	0.64 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	110 J	146 J	144 J	4.8 J	280 J	23,900 J	0.65 UJ	16.2 J	114 J	1.1 J	1,200 J	38.3 J	5.49 J	0.63 J		
6-12 inch	Sediment(mg/kg)	124 J	165 J	142 J	5 J	320 J	29,200 J	3.6 J	21.6 J	109 J	3 J	1,200 J	38.8 J	6.12 J	0.42 J	8.1	7.63

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0	0	6.6	5.4	53.1	34.9

2004

SED19		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	152 J	69.5 J	167 J	0.78 J	467 J	22,400 J	2.6 UJ	9 J	965 J	0.04 UJ	1,030 J	37.3 J	10.9 J	1.61 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	77.4 J	85.5 J	132 J	0.92 J	267 J	24,800 J	2.2 UJ	10.1 J	359 J	0.04 UJ	1,170 J	37.8 J	11.3 J	0.99 J		
6-12 inch	Sediment(mg/kg)	66 J [70.2 J]	69 J [72.2 J]	85.5 J [95.8 J]	0.84 J [0.79 J]	230 J [235 J]	25,000 J [27,000 J]	2.7 J [2.5 J]	10.1 J [10.8 J]	206 J [249 J]	1.2 J [1.2 J]	1,020 J [1,100 J]	32 J [32.9 J]	2.8 J [5.29 J]	0.55 J [0.74 J]	7.7	7.9

0-12 inch	Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
		0	0	0	1.1	5.9	55.8	37.2



FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

2004 SEDIMENT DATA- SEGMENT 2

ARCADIS

FIGURE
11

City: SYR Div/Group: SED GIS Created By: K.Sinsabaugh Last Saved By: jrapp
Tarrytown (64462.0041)
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2004 SED10		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	196	65.8	1,070	0.13	2,170	6,470	34.3 J	6.4	7,880	0.29 J	250	31.2	3.56 J	1.03	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	264	43.2	1,470	0.32	2,300	4,880	48.4	10.2	8,000	1.2 J	279	48.3	14.7 J	2.7		
6-12 inch	Sediment(mg/kg)	141	65.8	938	0.59	901	13,900	21.3	9.6	6,620	0.5 J	462	36.6	8.48 J	4.81	9.1	7.86

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	15.1	8.2	22.1	46.3	4.1	4.2

2004 SED15		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	67.7 J	69 J	106 J	0.75 J	240 J	24,300 J	1.43 UJ	9.6 J	212 J	0.05 UJ	1,380 J	34.5 J	10.3 J	1.15 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	69.7 J	76.3 J	97.9 J	0.8 J	224 J	24,500 J	1.56 UJ	10.4 J	92.6 J	0.05 UJ	1,470 J	39.5 J	4.45 J	0.55 J		
6-12 inch	Sediment(mg/kg)	69.6 J	73.3 J	89.7 J	0.74 J	215 J	27,200 J	1.46 UJ	10.3 J	108 J	0.05 UJ	1,410 J	37.5 J	5.99 J	0.84 J	8.9	7.69

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0	0	6.1	2.9	57.9	33.1

2004 SED18		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	69.1 J	76.7 J	88.7 J	0.87 J	199 J	23,400 J	0.68 UJ	9 J	118 J	0.04 UJ	733 J	33.5 J	6.07 J	0.61 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	103 J	109 J	134 J	1.7 J	242 J	22,100 J	0.67 UJ	11.3 J	226 J	0.13 UJ	706 J	38.4 J	4.66 J	1.33 J		
6-12 inch	Sediment(mg/kg)	93.1 J [95.1 J]	94.7 J [102 J]	115 J [117 J]	1.6 J [1.6 J]	237 J [228 J]	25,200 J [22,100 J]	2.7 J [3.1 J]	10.7 J [11.1 J]	125 J [164 J]	2 J [2 J]	696 J [711 J]	35 J [35.8 J]	4.52 J [3.55 J]	1 J [1.35 J]	7.5	8.04

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0	0	1.6	9.7	58.8	29.9

LEFTPLACEHOLDER

2004 SED5		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	54.9	101	105	1.3	212	20,500	1.11 UJ	19.2	83.3	0.04 UJ	515	29.6	5.36 J	0.13 U	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	46.8	97	98.7	1.2	201	19,800	1.09 UJ	18.4	84.4	0.04 UJ	543	28.9	9.14 J	0.13 U		
6-12 inch	Sediment(mg/kg)	42.8	107	89.4	1.6	221 J	21,500	1.6 B	17.8	70.2	0.75 J	540	30.1	16.2 J	0.13 U	8.7	7.99

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0.1	0.1	2	10.5	53.8	33.5

2004 SED6		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	102	141	136	3.4	246	6,890	0.63 UJ	13.7	106	0.41 J	558	33.8	4.66 J	0.89 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	51	95.3	100	1	198	19,000	0.6 UJ	17.2	76.8	1.1 UJ	499	29.8	9.31 J	0.076 J		
6-12 inch	Sediment(mg/kg)	40.2	88.6	79	0.9	178 J	17,300	1.2 B	15.1	68	0.8 J	450	25.9	9.32 J	0.12 U	9.5	7.2

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0	0.1	1.6	8.3	55.5	34.5

2004 SED7		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	81.7	113	114	1.8	214	23,500	0.55 UJ	10.9	178	0.05 UJ	453	29.3	5.9 J	0.71 J	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	106	148	161	2.3	268	17,000	0.64 J	14.3	114	0.15 UJ	554	34.2	6.43 J	0.94 J		
6-12 inch	Sediment(mg/kg)	92.9	142	132	3.2	256	21,600	0.58 UJ	15.7	101	0.34 J	562	32.6	6.45 J	0.5 J	9.2	7.2

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0	0	1.7	8.4	52.8	37.1

2004 SED1		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	67.9	67.5	82.9	1.2	172	17,500	1.08 UJ	7.3	162	0.18 UJ	508	29.1	3.93 J	1.3	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	79.2	95.3	102	2.4	194	17,000	1.03 UJ	11.3	125	0.63 J	609	32.7	4.04 J	1.2		
6-12 inch	Sediment(mg/kg)	95.7	131	176	2.7	252 J	23,000	2.7 B	15.4	129	2 J	476	31.8	10.6 J	0.79	8.8	6.3

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0	0.1	0.1	1.8	67.4	30.6

2004 SED8		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	53.2 [61 J]	61.2 [71.3 J]	67.5 [78.2 J]	0.69 [0.82 J]	162 [191 J]	19,100 [22,500 J]	0.64 UJ [0.75 UJ]	7.6 [9 J]	79 [90.6 J]	0.79 UJ [1.1 UJ]	838 [969 J]	28 [32.6 J]	3.63 J [5.56 J]	0.65 [0.48 J]	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	63.1 J [64.7 J]	71.4 J [75.1 J]	81.9 J [84.7 J]	0.87 J [1.3 J]	182 J [192 J]	22,200 J [22,800 J]	0.68 UJ [0.69 UJ]	9.2 J [9.1 J]	80 J [87.3 J]	0.8 UJ [0.88 UJ]	931 J [982 J]	30.9 J [32.5 J]	5.31 J [4.31 J]	0.81 J [0.71 J]		
6-12 inch	Sediment(mg/kg)	63.9 [59.3 J]	70.7 [65.5 J]	80.2 [78 J]	0.86 [0.61 J]	189 [177 J]	21,500 [20,000 J]	0.64 UJ [0.65 UJ]	9.6 [8.9 J]	174 [93.7 J]	0.93 UJ [0.99 UJ]	1,140 [1,070 J]	32.6 [32.1 J]	4.49 J [4.17 J]	0.78 J	9.1	7.18

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0	0.1	2.9	5.9	53.9	37.2

2004 SED2		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	121 J	158 J	170 J	3.8 J	260 J	20,000	1.15 UJ	14.3 J	362 J	1.2 J	561 J	39 J	7.54 J	1.8	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	56.6	63.7	70.4	2.2	143	16,700	0.98 UJ	11.9	89.2	0.05 UJ	603	29.2	2.76 J	0.44		
6-12 inch	Sediment(mg/kg)	94.5	119	126	2.5	246 J	19,600	3.6 B	14.2	115	3 J	653	35.3	9.18 J	0.92	8.5	7.48

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0	0	0.4	6.6	60.8	32.2

2004 SED9		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	47.5	52.5	60	0.55	155	24,700	0.61 UJ	7.4	79.9	0.8 UJ	1,020	26.8	5.34 J	0.353	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	48.8	53.6	82.7	0.62	166	25,100	0.61 UJ	7.4	149	0.8 UJ	1,100	26.1	7.26 J	0.51		
6-12 inch	Sediment(mg/kg)	53.1 J	57.2 J	67.8 J	0.57 J	169 J	25,300 J	0.66 UJ	7.6 J	76 J	0.98 UJ	1,070 J	29.1 J	2.98 J	0.38 J	9.2	7.48

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0	0	6.4	4.3	56.2	33.1

2004 SED3		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	61.3 J	65 J	70.9 J	0.63 J	197 J	28,800	1.48 UJ	9.3 J	96.1 J	0.05 UJ	1,360 J	35.3 J	4.18 J	0.45	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	70.1 J	80 J	88.5 J	0.84 J	203 J	20,200	1.33 UJ	10.8 J	93.1 J	0.04 UJ	1,280 J	35.5 J	4.27 J	0.41		
6-12 inch	Sediment(mg/kg)	64.9 J	70 J	75.5 J	0.82 J	198 J	22,300 J	2.1 J	10.6 J	85.1 J	1.1 J	1,160 J	34.4 J	1.03 J	0.45 J	9	7.6

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0	0.5	1.8	2.1	52.1	43.5

2004 SED4		Chromium	Copper	Lead	Mercury	Zinc	TOC	Antimony	Arsenic	Barium	Cadmium	Manganese	Nickel	Total PAHs	Total PCBs	Habitat: Salinity (ppt)	Habitat: Dissolved Oxygen (ppm)
0-2 inch	Sediment(mg/kg)	70.1 J	76.5 J	85.5 J	0.79 J	212 J	31,700	1.47 UJ	9.5 J	92.1 J	0.05 UJ	1,220 J	37.5 J	3.96 J	0.43	Bottom	Bottom
2-6 inch	Sediment(mg/kg)	67.7 J	73.5 J	81.1 J	0.76 J	201 J	25,400	1.4 UJ	11 J	91.9 J	0.05 UJ	1,150 J	35.8 J	5.02 J	0.52		
6-12 inch	Sediment(mg/kg)	75 J	80.1 J	84.1 J	0.85 J	225 J	27,000 J	1.9 J	12.2 J	96.3 J	1.5 J	1,310 J	37.5 J	4.63 J	0.49 J	8.3	8.4

0-12 inch Grain Size	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay
	0	0	0	1.7	2.6	52.8	42.9

LEGEND:
- SEDIMENT SAMPLE LOCATION
- 26 Y RIVER MILE MARKER
- BATHYMETRY
- CABLE RIGHT OF WAY
- TARRYTOWN HARBOR CHANNEL
- NAVIGATION CHANNEL
- BACKGROUND/UPSTREAM BOUNDARY
- NEAR SITE BOUNDARY
- SHORELINE

NOTE:
1. NAVIGATION CHANNEL AND BATHYMETRY DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 600 1,200
Feet
GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

2004 SEDIMENT DATA- SEGMENT 3

ARCADIS

FIGURE 12

City: SYR Div/Group: SED GIS Created By: K.Sinsabaugh Last Saved By: jrapp
Tarrytown (64462.0041)
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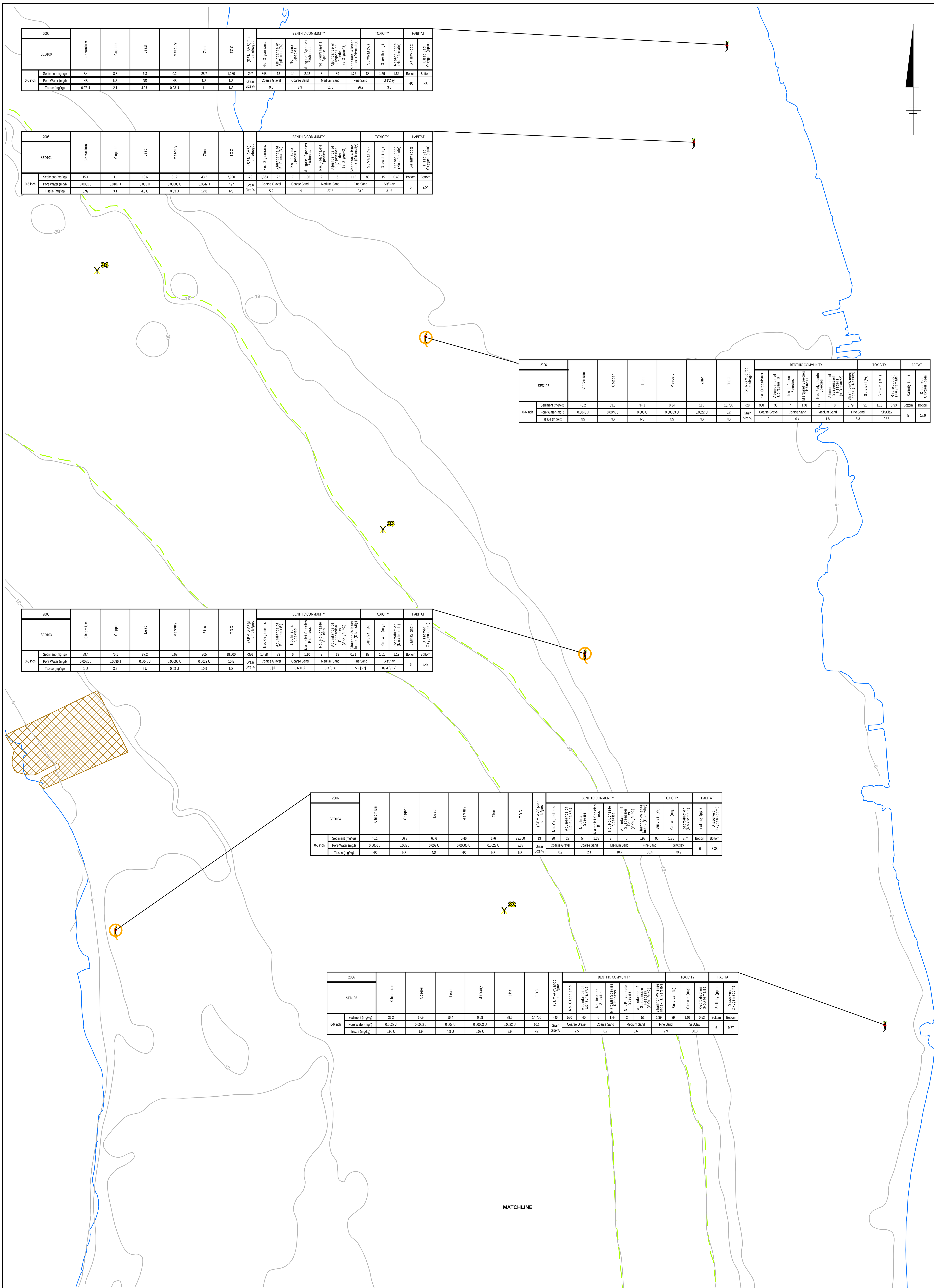

2006 – SED100

2006 SED100		Chromium	Copper	Lead	Mercury	Zinc	TOC
0-6 inch	Sediment (mg/kg)	8.4	8.3	6.3	0.2	28.7	1,280
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS
	Tissue (mg/kg)	0.97 U	2.1	4.9 U	0.03 U	11	NS

(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY: No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	TOXICITY: Survival (%)	Growth (mg)	Reproduction (No./female)	HABITAT: Salinity (ppt)	Dissolved Oxygen (ppm)
-247	848	13	14	2.22	3	89	1.72	88	1.59	1.82	Bottom	Bottom

Grain Size %	Coarse Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/Clay	Salinity (ppt)	Dissolved Oxygen (ppm)
	9.6	8.9	51.5	26.2	3.8	NS	NS

2006 – SED101

2006 SED101		Chromium	Copper	Lead	Mercury	Zinc	TOC
0-6 inch	Sediment (mg/kg)	15.4	11	10.6	0.12	43.2	7,920
	Pore Water (mg/l)	0.0061 J	0.0107 J	0.003 U	0.00005 U	0.0042 J	7.97
	Tissue (mg/kg)	0.99	3.1	4.8 U	0.03 U	12.8	NS

(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY: No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	TOXICITY: Survival (%)	Growth (mg)	Reproduction (No./female)	HABITAT: Salinity (ppt)	Dissolved Oxygen (ppm)
-28	1,863	22	7	1.06	2	6	1.12	83	1.15	0.49	Bottom	Bottom

Grain Size %	Coarse Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/Clay	Salinity (ppt)	Dissolved Oxygen (ppm)
	5.2	1.9	37.5	23.9	31.5	5	9.54

2006 – SED102

2006 SED102		Chromium	Copper	Lead	Mercury	Zinc	TOC
0-6 inch	Sediment (mg/kg)	40.2	33.3	34.1	0.34	115	16,700
	Pore Water (mg/l)	0.0046 J	0.0046 J	0.003 U	0.00003 U	0.0022 U	6.2
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS

(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY: No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	TOXICITY: Survival (%)	Growth (mg)	Reproduction (No./female)	HABITAT: Salinity (ppt)	Dissolved Oxygen (ppm)
-28	958	30	7	1.31	2	0	0.79	91	1.15	0.93	Bottom	Bottom

Grain Size %	Coarse Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/Clay	Salinity (ppt)	Dissolved Oxygen (ppm)
	0	0.4	1.8	5.3	92.5	5	18.9

2006 – SED103

2006 SED103		Chromium	Copper	Lead	Mercury	Zinc	TOC
0-6 inch	Sediment (mg/kg)	89.4	75.1	87.2	0.69	205	18,500
	Pore Water (mg/l)	0.0081 J	0.0096 J	0.0045 J	0.00006 U	0.0022 U	10.5
	Tissue (mg/kg)	1 U	3.2	5 U	0.03 U	10.9	NS

(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY: No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	TOXICITY: Survival (%)	Growth (mg)	Reproduction (No./female)	HABITAT: Salinity (ppt)	Dissolved Oxygen (ppm)
-336	1,438	33	6	1.10	2	13	0.71	89	1.01	1.12	Bottom	Bottom

Grain Size %	Coarse Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/Clay	Salinity (ppt)	Dissolved Oxygen (ppm)
	1.5 [0]	0.6 [0.3]	3.3 [3.3]	5.2 [5.2]	89.4 [91.2]	6	9.48

2006 – SED104

2006 SED104		Chromium	Copper	Lead	Mercury	Zinc	TOC
0-6 inch	Sediment (mg/kg)	46.1	56.3	65.6	0.46	176	23,700
	Pore Water (mg/l)	0.0056 J	0.005 J	0.003 U	0.00005 U	0.0022 U	8.38
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS

(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY: No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	TOXICITY: Survival (%)	Growth (mg)	Reproduction (No./female)	HABITAT: Salinity (ppt)	Dissolved Oxygen (ppm)
13	90	29	5	1.33	2	0	0.98	90	1.35	3.74	Bottom	Bottom

Grain Size %	Coarse Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/Clay	Salinity (ppt)	Dissolved Oxygen (ppm)
	0.9	2.1	10.7	36.4	49.9	6	8.88

2006 – SED106

2006 SED106		Chromium	Copper	Lead	Mercury	Zinc	TOC
0-6 inch	Sediment (mg/kg)	31.2	17.9	16.4	0.08	89.5	14,700
	Pore Water (mg/l)	0.0033 J	0.0052 J	0.003 U	0.00003 U	0.0022 U	10.1
	Tissue (mg/kg)	0.95 U	1.9	4.8 U	0.03 U	9.9	NS

(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY: No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	TOXICITY: Survival (%)	Growth (mg)	Reproduction (No./female)	HABITAT: Salinity (ppt)	Dissolved Oxygen (ppm)
-46	520	40	6	1.44	2	51	1.39	89	1.01	0.53	Bottom	Bottom

Grain Size %	Coarse Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt/Clay	Salinity (ppt)	Dissolved Oxygen (ppm)
	7.5	0.7	3.6	7.9	80.3	6	9.77

LEGEND:

- GEOTECHNICAL CORE
- SHALLOW SEDIMENT SAMPLE LOCATION
- BENTHIC BIOTA SAMPLE LOCATION
- BIOTISSUE SAMPLE LOCATION
- SEDIMENT CORE LOCATION
- 28 RIVER MILE MARKER
- BATHYMETRY
- CABLE RIGHT OF WAY
- TARRYTOWN HARBOR CHANNEL
- NAVIGATION CHANNEL
- BACKGROUND/UPSTREAM BOUNDARY
- NEAR SITE BOUNDARY
- SHORELINE

NOTE:

1. NAVIGATION CHANNEL AND BATHYMETRY DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 600 1,200 Feet
GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

2006 SEDIMENT DATA- SEGMENT 1

ARCADIS

FIGURE
13

City: SYR Div/Group: SED GIS Created By: K.Sinsabaugh Last Saved By: jrapp
Tarrytown (64462.0041)
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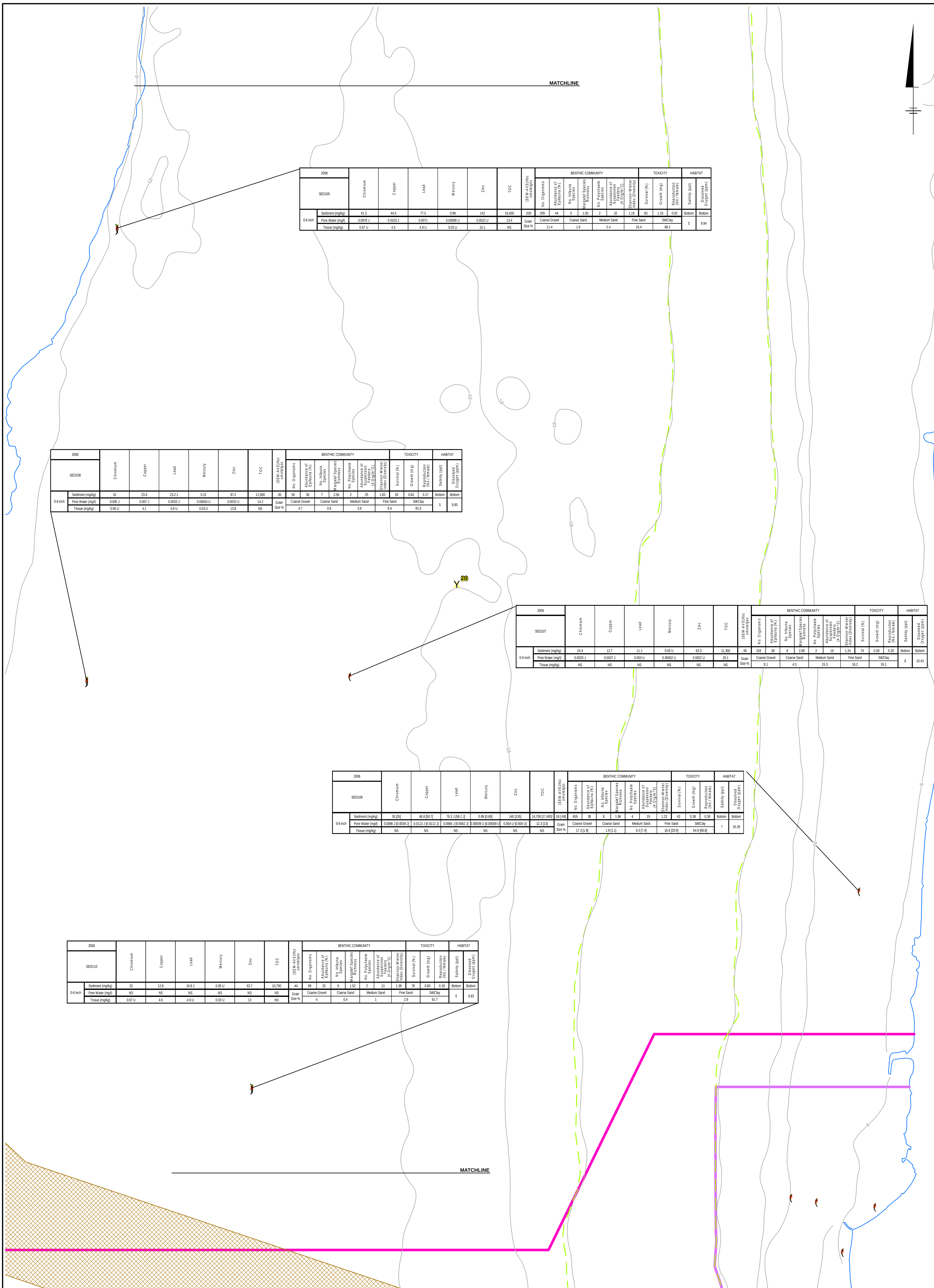


2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED105									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	41.3	44.5	77.5	0.99	142	19,400	-200	209	44	5	1.50	2	32	1.19	83	1.19	0.92	Bottom	Bottom
	Pore Water (mg/l)	0.0078 J	0.0103 J	0.0071	0.00008 U	0.0022 U	13.4	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		5	9.94
	Tissue (mg/kg)	0.97 U	4.3	4.9 U	0.03 U	15.1	NS		11.4		1.6		2.4		16.4		68.2			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED108									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	31	23.6	23.2 J	0.21	87.2	11,900	-35	50	36	7	2.56	2	25	1.83	82	0.62	0.17	Bottom	Bottom
	Pore Water (mg/l)	0.005 J	0.007 J	0.0033 J	0.00004 U	0.0032 U	14.2	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		5	9.85
	Tissue (mg/kg)	0.95 U	4.1	4.8 U	0.03 U	13.8	NS		4.7		0.6		3.8		9.4		81.5			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED107									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	24.4	12.7	11 J	0.05 U	63.3	11,300	-36	318	38	8	2.08	3	19	1.24	74	0.39	0.28	Bottom	Bottom
	Pore Water (mg/l)	0.0033 J	0.0037 J	0.003 U	0.00002 U	0.0022 U	20.1	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		8	10.43
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		9.1		4.3		15.3		16.2		55.1			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED109									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	35 [35]	48.8 [50.7]	76.3 J [58.1 J]	0.89 [0.69]	140 [135]	14,700 [17,400]	18 [-59]	459	38	8	1.96	4	19	1.23	43	0.38	0.38	Bottom	Bottom
	Pore Water (mg/l)	0.0066 J [0.0039 J]	0.0113 J [0.0112 J]	0.0066 J [0.0062 J]	0.00009 U [0.00008 U]	0.004 U [0.004 U]	12.3 [13]	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		7	10.26
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		17.3 [1.8]		1.9 [1.1]		9.3 [7.4]		16.6 [20.9]		54.9 [68.8]			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED110									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	23	12.8	10.8 J	0.05 U	63.7	10,700	-44	99	25	6	1.52	2	13	1.38	78	0.60	0.19	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		5	9.83
	Tissue (mg/kg)	0.97 U	4.6	4.9 U	0.03 U	13	NS		4		0.4		1		2.9		91.7			

LEGEND:

- GEOTECHNICAL CORE
- SHALLOW SEDIMENT SAMPLE LOCATION
- BENTHIC BIOTA SAMPLE LOCATION
- BIOTISSUE SAMPLE LOCATION
- SEDIMENT CORE LOCATION
- 28 RIVER MILE MARKER
- BATHYMETRY
- CABLE RIGHT OF WAY
- TARRYTOWN HARBOR CHANNEL
- NAVIGATION CHANNEL
- BACKGROUND/UPSTREAM BOUNDARY
- NEAR SITE BOUNDARY
- SHORELINE

NOTE:

1. NAVIGATION CHANNEL AND BATHYMETRY DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 600 1,200 Feet

GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

2006 SEDIMENT DATA- SEGMENT 2

ARCADIS

FIGURE
14

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED111		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch 9/14/2006	Sediment (mg/kg)	56	65.6	66.2 J	0.67	164	21,600	-312	115	11	8	1.69	4	0	1.95	77	0.41	0.35	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		8	9.8
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	0.8		0.8		3.5		8.4		86.5			
0-6 inch 10/11/2006	Sediment (mg/kg)	52	65.2	64.9	0.58	168	18,700	-31	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	0.0084 J	0.0061 J	0.003 U	0.00003 U	0.0022 U	13.7	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	NS		NS		NS		NS		NS			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED114		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	60.8	28.4	29.1 J	0.27	72.2	10,400	-57	378	40	6	1.52	2	6	1.30	88	0.58	0.24	Bottom	Bottom
	Pore Water (mg/l)	0.0071 J	0.0185 J	0.0077 J	0.00004 U	0.0022 U	7.54	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		8	9.54
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	8.5		12.5		22.1		31.9		24.9			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED115		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	47.5	60.5	65.7 J	0.5	139	15,600	36	196	33	6	1.52	2	0	1.07	83	0.64	0.52	Bottom	Bottom
	Pore Water (mg/l)	0.0086 J	0.0053 J	0.0041 J	0.00004 U	0.0022 U	12.6	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		9	8.84
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	1.1		3.7		7.9		22.7		64.6			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED116		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	63.5	77.6	76.2 J	0.94	181	16,700	-123	307	36	7	1.75	2	0	1.06	84	0.58	0.29	Bottom	Bottom
	Pore Water (mg/l)	0.0091 J	0.0056 J	0.003 U	0.00003 U	0.0022 U	12.6	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		8	10
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	0.5		0.7		2.9		11		84.9			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED120		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	56.3	75	77.9	1.1	152	10,900	-265	55	25	6	1.75	3	0	1.93	89	1.42	1.31	Bottom	Bottom
	Pore Water (mg/l)	0.0053 J	0.0171 J	0.003 U	0.00009 U	0.0022 U	14.4	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	9.34
	Tissue (mg/kg)	0.98 U	2 U	4.9 U	0.03 U	8.9	NS	Size %	NS		2.6		8.2		23.7		65.5			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED117		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	36.1	38.2	129 J	0.48	121	15,200	-301	56	30	7	2.24	2	0	2.09	78	0.86	0.44	Bottom	Bottom
	Pore Water (mg/l)	0.0087 J	0.0059 J	0.0039 J	0.00007 U	0.0022 U	12.8	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	10.64
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	2.2		2.6		5.3		44.6		45.3			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED119		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	43.5	43.2	45.3	0.35	122	33,900	-42	53	25	6	1.76	1	0	1.68	88	1.45	3.36	Bottom	Bottom
	Pore Water (mg/l)	0.0054 J	0.0066 J	0.003 U	0.00004 U	0.0022 U	11.6	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	9.64
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	0		0.4		6.5		4.7		88.4			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED122		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	30.3	30.5	29.8	0.22	93.6	14,200	-224	755	53	9	2.72	4	3792	1.03	90	0.59	0.65	Bottom	Bottom
	Pore Water (mg/l)	0.0058 J	0.0073 J	0.003 U	0.00002 U	0.0022 U	11.8	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	9.41
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	NS		0.1		5.3		23.9		68.7			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED118		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	16	12.2	19.5	0.04 U	52.3	5,630	-25	58	36	7	2.46	3	89	1.95	86	0.86	0.57	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	9.71
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	19.1		15.2		16.9		42.4		6.4			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED121		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	61.6	59.9	89	0.95	186	23,700	-43	119	27	8	2.09	3	6	1.87	81	0.93	0.31	Bottom	Bottom
	Pore Water (mg/l)	0.0062 J	0.0051 J	0.003 U	0.00003 U	0.0022 U	10.1	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	9.77
	Tissue (mg/kg)	0.95 U	3.1	4.8 U	0.03 U	9.6	NS	Size %	0 [0]		0.2 [0.6]		3.1 [2.1]		10.1 [9.7]		86.6 [87.6]			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED123		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	102	135	122	1.8	269	27,500	-149	119	25	9	2.30	3	0	1.96	89	0.95	1.26	Bottom	Bottom
	Pore Water (mg/l)	0.0056 J	0.0045 J	0.003 U	0.00004 U	0.0022 U	8.69	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		10	7.64
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	0		0.1		2.3		9.1		88.5			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED125		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	97.2	152	130	1.2	269	27,700	-187	111	40	6	1.91	3	0	1.99	89	1.19	1.71	Bottom	Bottom
	Pore Water (mg/l)	0.0114	0.0082 J	0.003 U	0.00004 U	0.0027 J	14.7	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	9.46
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	0.4		1.3		3.5		8.6		86.2			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED124		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	62.2	68.1	77.5	0.68	197	29,500	-862	372	25	12	2.53	4	19	1.34	91	1.05	0.77	Bottom	Bottom
	Pore Water (mg/l)	0.0085 J	0.0049 J	0.003 U	0.00002 U	0.0022 U	14.9	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	9.69
	Tissue (mg/kg)	0.99 U	2	5 U	0.03 U	8	NS	Size %	0		0.5		2		5.6		91.9			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED127		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	55.5	65.9	67.7	0.63	174	24,700	-236	121	33	6	1.67	2	0	1.97	83	0.81	0.46	Bottom	Bottom
	Pore Water (mg/l)	0.0063 J	0.0057 J	0.003 U	0.00003 U	0.0022 U	8.83	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		9	8.42
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	0		0		1.5		6.7		91.8			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED129		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	35.4	75.2	70	0.81	154	18,600	-334	176	36	9	2.51	4	13	2.10	80	0.62	0.69	Bottom	Bottom
	Pore Water (mg/l)	0.0053 J	0.005 J	0.003 U	0.00004 U	0.0022 U	16.2	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		5	9.64
	Tissue (mg/kg)	1.2	2.2	4.8 U	0.03 U	12.4	NS	Size %	NS		0.9		12		21.8		64.9			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED130		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	110	112	151	1.6	265	24,100	-101	195	30	7	1.71	2	6	1.90	83	0.62	0.77	Bottom	Bottom
	Pore Water (mg/l)	0.0117	0.0188 J	0.0062 J	0.0001 U	0.0022 U	10.9	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		5	9.84
	Tissue (mg/kg)	1 U	2 U	5 U	0.03 U	11.2	NS	Size %	NS		1		4.3		15.9		78.4			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED133		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	44	91.1	92.7	1	185	15,600	-205	160	25	9	2.17	4	32	1.69	68	1.09	0.84	Bottom	Bottom
	Pore Water (mg/l)	0.0073 J	0.0064 J	0.003 U	0.00003 U	0.0022 U	13.3	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		5	10.93
	Tissue (mg/kg)	1.1	3	5 U	0.03 U	11.2	NS	Size %	NS		1.1		7		13.3		78			

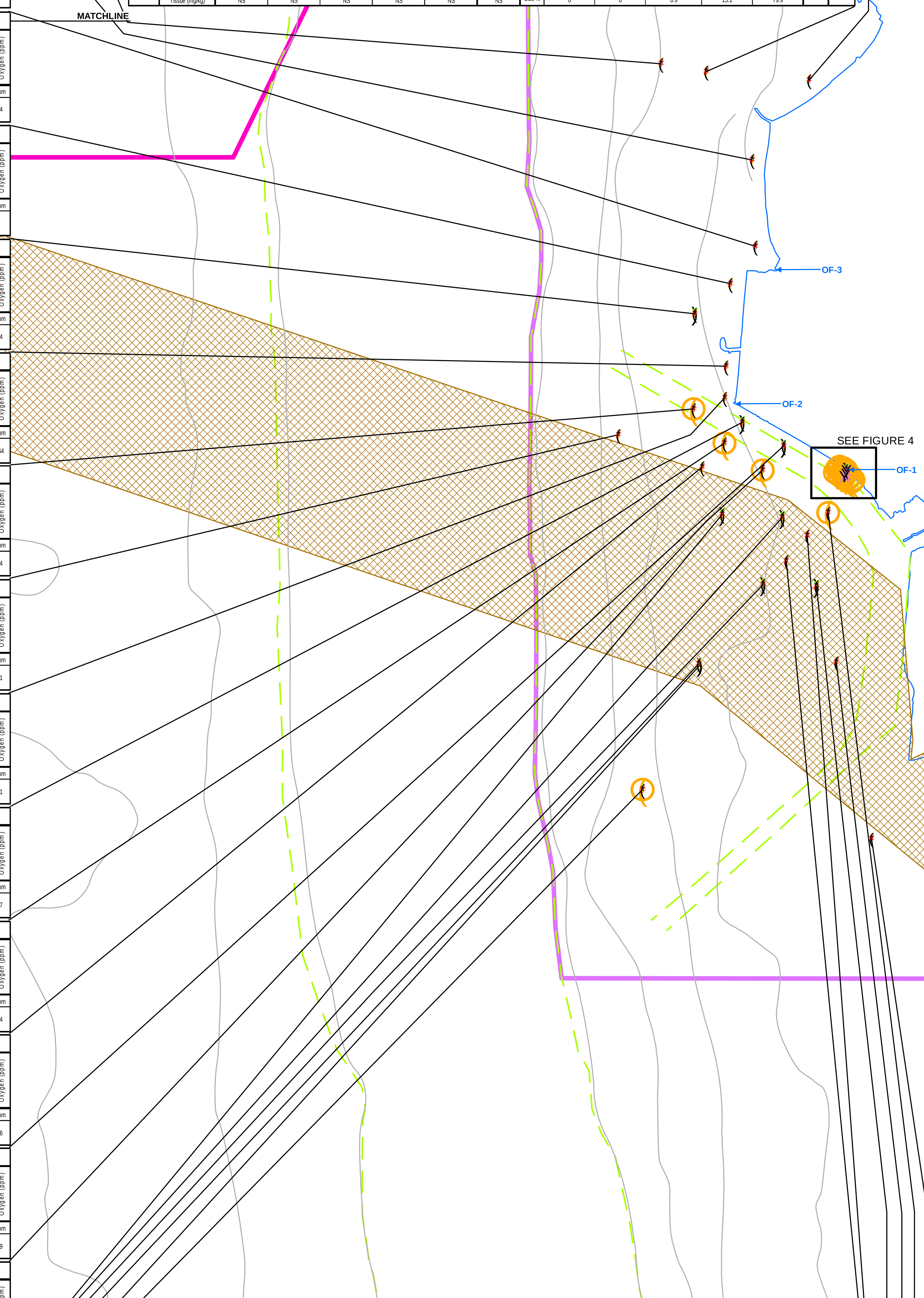
2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED136		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	69.2	128	102	1.3	201	16,400	-278	171	46	7	2.33	3	19	1.77	70	1.32	1.28	Bottom	Bottom
	Pore Water (mg/l)	0.0055 J	0.005 J	0.003 U	0.00002 U	0.0022 U	12.6	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	10.29
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	NS		1.1		8.6		16		70.8			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED137		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	48.1	70.2	66	1.4	148	21,300	-216	130	33	8	2.26	3	25	1.71	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	0.0074 J	0.008 J	0.003 U	0.00007 U	0.0022 U	15.5	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	9.36
	Tissue (mg/kg)	1 U	2 U	5 U	0.03 U	9.4	NS	Size %	NS		1		14.6		30.1		50.9			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED138		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	52.2	84.1	77.4	1	162	12,400	98	98	38	8	2.62	4	115	2.07	88	1.25	2.29	Bottom	Bottom
	Pore Water (mg/l)	0.0086 J	0.0081 J	0.0055 J	0.00005 U	0.0022 U	13.9	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		8	8.73
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	2.5		0.7		3.4		15		78.4			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED113		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch 9/13/2006	Sediment (mg/kg)	13.8	9.3	15.8 J	0.09	43.1	1,630	-93	176	31	9	2.32	3	0	1.78	78	0.44	0.24	Bottom	Bottom
	Pore Water (mg/l)	0.0053 J	0.0043 J	0.003 U	0.00003 U	0.0022 U	8.91	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		7	10.03
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	1.5		3.5		5.5		88.2		3.3			
0-6 inch 10/11/2006	Sediment (mg/kg)	13.9	10.2	14.3	0.08	43.4	1,700	-75	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	NS		NS		NS		NS		NS			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED112		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	69.4	76.3	80.7 J	0.89	177	20,000	20	228	27	8	1.84	3	6	1.77	88	0.50	0.57	Bottom	Bottom
	Pore Water (mg/l)	0.006 J	0.006 J	0.003 U	0.0001 U	0.0022 U	9.75	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		8	10.06
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	0		0		6.9		13.2		79.9			



2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED132		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	83.8	116	116	2.6	207	19,400	-391	98	30	7	1.96	3	13	2.04	76	1.27	0.49	Bottom	Bottom
	Pore Water (mg/l)	0.0135	0.0133 J	0.0055 J	0.00012 U	0.0022 U	15.8	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		5	9.56
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	NS		0.3		7.5		22		70.2			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED131		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	74.2	78.3	92.9	2.3	182	10,600	-139	150	18	9	2.00	3	0	1.89	91	1.17	1.43	Bottom	Bottom
	Pore Water (mg/l)	0.01	0.0067 J	0.003 U	0.00016 U	0.0022 U	13.2	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		5	9.83
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	NS		2.6		10.6		19.1		67.7			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED134		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch 10/5/2006	Sediment (mg/kg)	NS	NS	NS	NS	NS	NS	NS	165	33	8	2.15	3	38	2.00	77	1.43	1.07	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		5	10.89
	Tissue (mg/kg)	1 U	2 U	5 U	0.03 U	12.3	NS	Size %	NS		NS		NS		NS		NS			
0-6 inch 10/10/2006	Sediment (mg/kg)	57.7	67.8	68.3	2.6	155	17,400	-109	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	0.0207	0.0195 J	0.0144 J	0.00033 U	0.0155 J	13.3	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	0.95 U	2	4.8 U	0.03 U	12.6	NS	Size %	NS		1		6.5		18		73.2			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED135		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	65.8	84.8	85.6	1.5	160	21,200	-88	128	20	8	1.85	4	0	1.81	83	1.32	1.09	Bottom	Bottom
	Pore Water (mg/l)	0.0116	0.0109 J	0.0054 J	0.00015 U	0.0022 U	18.1	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		5	10.95
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	NS		1.1		16.5		34.6		45.2			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED128		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	57.2	65	66.5	0.67	175	26,400	-270	339	36	7	1.72	3	0	1.50	88	0.79	0.88	Bottom	Bottom
	Pore Water (mg/l)	0.01 J	0.0041 J	0.003 U	0.00002 U	0.0022 U	13.6	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	10.67
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	NS		0		0.5		7.3		87.1			

2006									BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED139		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	24.4	11.5	10.2	0.05 U	62.9	11,600	-31	198	42	7	2.2	3.0	108	1.80	83.75	0.60	0.95	Bottom	Bottom
	Pore Water (mg/l)	0.0055 J	0.0055 J	0.003 U	0.00004 U	0.0027 J	18.4	Grain	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	10.19
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS	Size %	NS		0.7		3.3		9.4		85.9			

LEGEND:

- GEOTECHNICAL CORE
- SHALLOW SEDIMENT SAMPLE LOCATION
- BENTHIC BIOTA SAMPLE LOCATION
- BIOTISSUE SAMPLE LOCATION
- SEDIMENT CORE LOCATION
- 26 RIVER MILE MARKER
- BATHYMETRY
- CABLE RIGHT OF WAY
- TARRYTOWN HARBOR CHANNEL
- NAVIGATION CHANNEL
- BACKGROUND/UPSTREAM BOUNDARY
- NEAR SITE BOUNDARY
- SHORELINE

NOTE:
1. NAVIGATION CHANNEL AND BATHYMETRY DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 600 1,200 Feet
GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

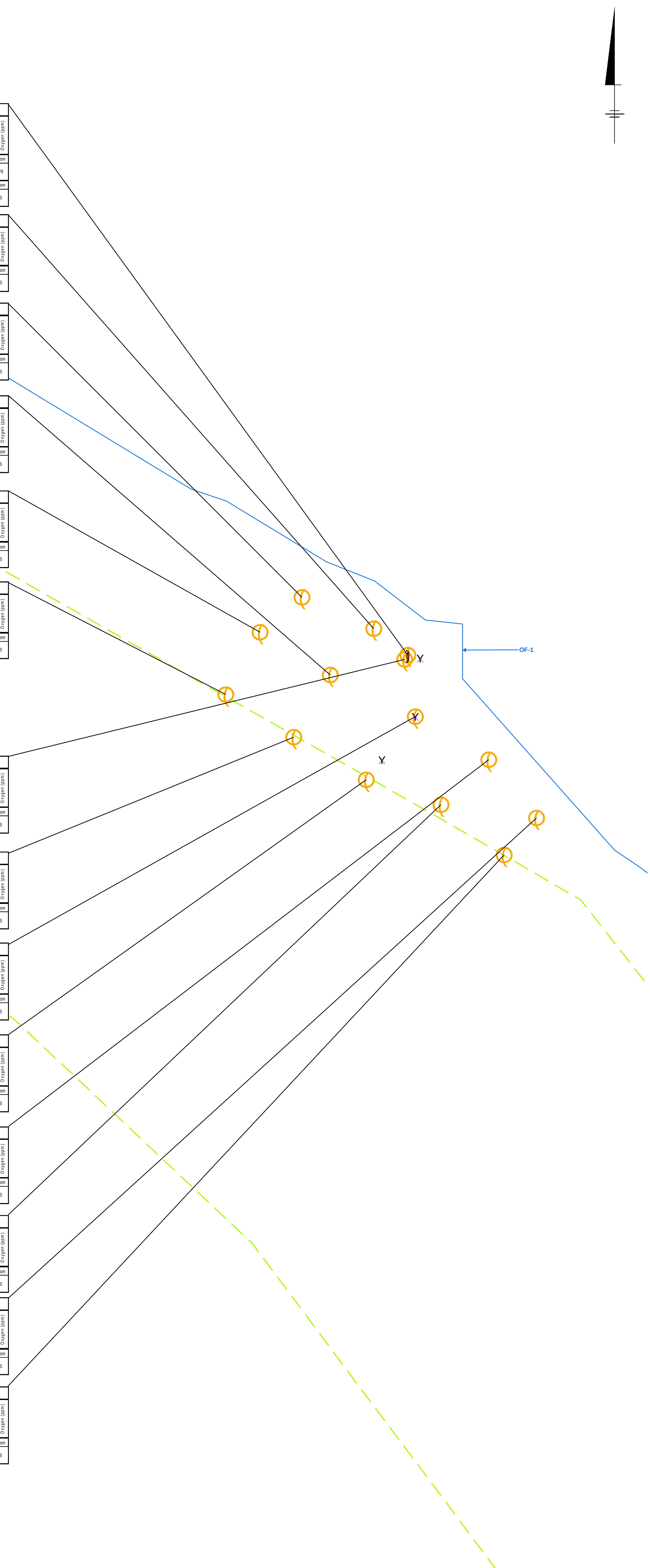
SEDIMENT REMEDIAL INVESTIGATION REPORT

2006 SEDIMENT LOCATION- SEGMENT 3

ARCADIS

FIGURE
15

City: SYR Div/Group: SED GIS Created By: K.Sinsabaugh Last Saved By: jrapp
Tarrytown (64462.0041)
Q:\GeneralMotors\Tarrytown\RemedialInvestigation\mxd\Southern_Inset_Zoomin_2006_SampleLocations_revd2012.mxd 1/29/2012 2:07:36 PM



2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED126									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-6 inch	Sediment (mg/kg)	148	111	1,520	0.27	1,260	7,700	2189	59	40	6	2.21	3	19	2.04	87	1.16	0.90	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		6	9.78
	Tissue (mg/kg)	1 U	4.4	5 U	0.03 U	15.3	NS		10.4		7.4		29.4		50.2		2.6			
0-1 foot	Sediment (mg/kg)	257	124 J	1,530 J	0.72	3,030 J	32,500	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED143									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	206 J	98.2	1,130	0.33	1,060 J	12,600 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED140									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-1.5 feet	Sediment (mg/kg)	437 J	72	8,420	0.41	3,080 J	12,200 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED144									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	769 J	94.8	980	0.98	2,220 J	37,400 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED141									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	147 J	73.6	588	0.75	806 J	32,300 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED142									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	59.7	64.4	81.3	0.59	192	28,300	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED146									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	215 J	76.9	927	0.82	1,200 J	29,200 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED145									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	67.3 J [74.3]	70.4 [78]	91.1 [96.2]	0.72 [0.68]	200 J [216]	25,000 J [23,000]	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED149									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	95.1 [76]	72.3 [73.1]	132 [115]	0.72 [0.69]	288 [238]	30,000 [33,400]	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED151									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	57.5	61.1	74.3	0.61	191	35,000	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED152									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	756 J	111	2,680	1.2	5,910 J	100,000 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED153									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	65.8	67.7	92.1	0.71	204	19,700	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED154									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	160 J	160	269	0.85	470 J	27,500 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

2006		Chromium	Copper	Lead	Mercury	Zinc	TOC	(SEM-AVS)/foc umole/goc	BENTHIC COMMUNITY							TOXICITY			HABITAT	
SED155									No. Organisms	Abundance of Epifauna (%)	No. Infauna Species	Margalef Species Richness	No. Polychaete Species	Abundance of Suspension Feeders (# Org/m^2)	Shannon-Wiener Index (Diversity)	Survival (%)	Growth (mg)	Reproduction (No./female)	Salinity (ppt)	Dissolved Oxygen (ppm)
0-2 feet	Sediment (mg/kg)	72.3	75.7	111	0.72	379	26,300	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Bottom	Bottom
	Pore Water (mg/l)	NS	NS	NS	NS	NS	NS	Grain Size %	Coarse Gravel		Coarse Sand		Medium Sand		Fine Sand		Silt/Clay		NS	NS
	Tissue (mg/kg)	NS	NS	NS	NS	NS	NS		NS		NS		NS		NS		NS			

LEGEND:

- GEOTECHNICAL CORE
- SHALLOW SEDIMENT SAMPLE LOCATION
- BENTHIC BIOTA SAMPLE LOCATION
- BIOTISSUE SAMPLE LOCATION
- SEDIMENT CORE LOCATION
- 26 RIVER MILE MARKER
- BATHYMETRY
- TARRYTOWN HARBOR CHANNEL
- NAVIGATION CHANNEL
- BACKGROUND/UPSTREAM BOUNDARY
- NEAR SITE BOUNDARY
- SHORELINE

NOTE:

1. NAVIGATION CHANNEL AND BATHYMETRY DIGITIZED FROM NOAA NAUTICAL CHART 12343 18th ED., JUNE 2002.

0 25 50 Feet

GRAPHIC SCALE

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

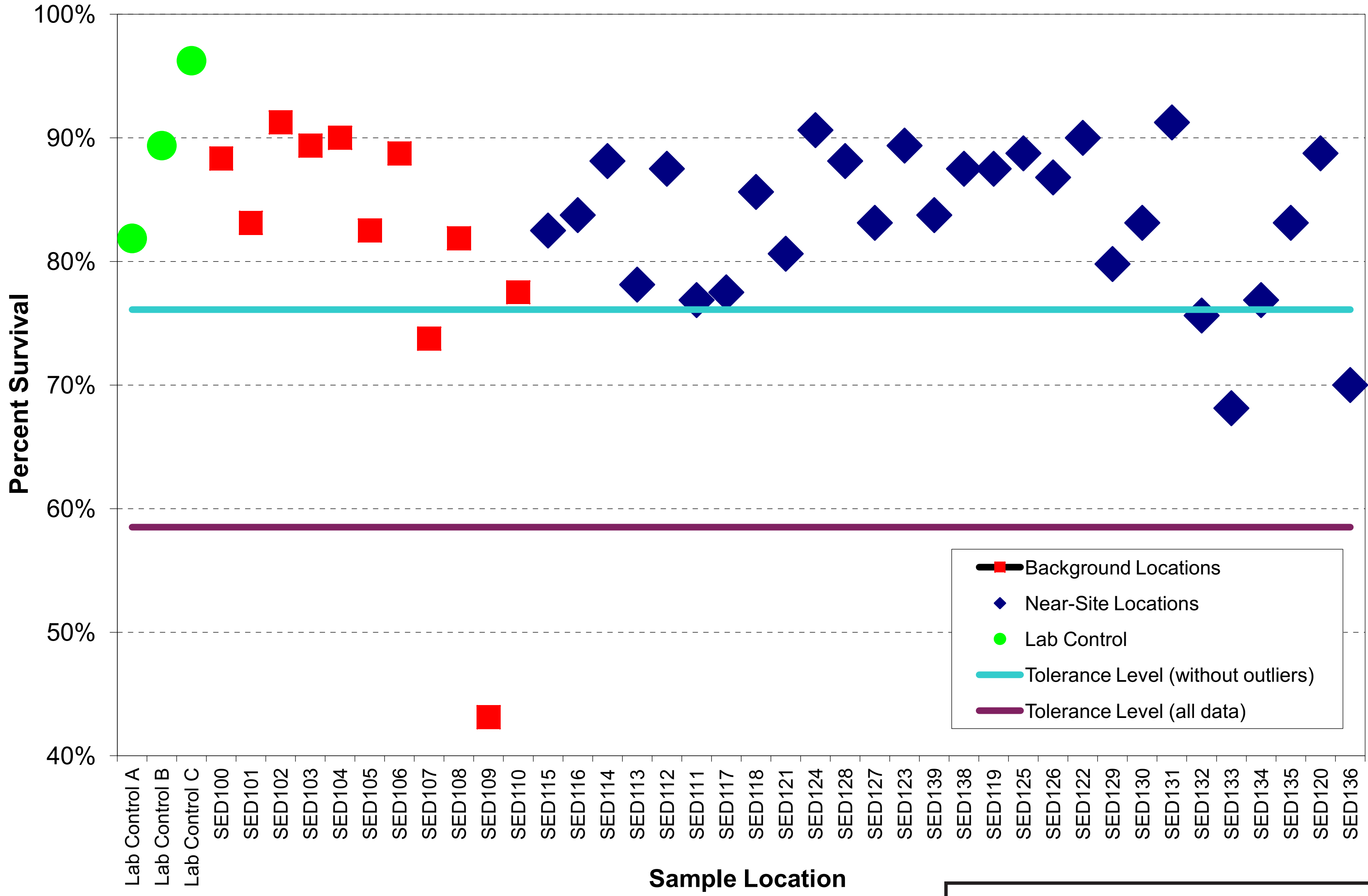
SEDIMENT REMEDIAL INVESTIGATION REPORT

2006 SEDIMENT DATA- SEGMENT 4

ARCADIS

FIGURE
16

01/31/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G10.CDR



FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

LEPTOCHEIRUS - PERCENT SURVIVAL

ARCADIS

FIGURE
17

01/31/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G10.CDR

FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

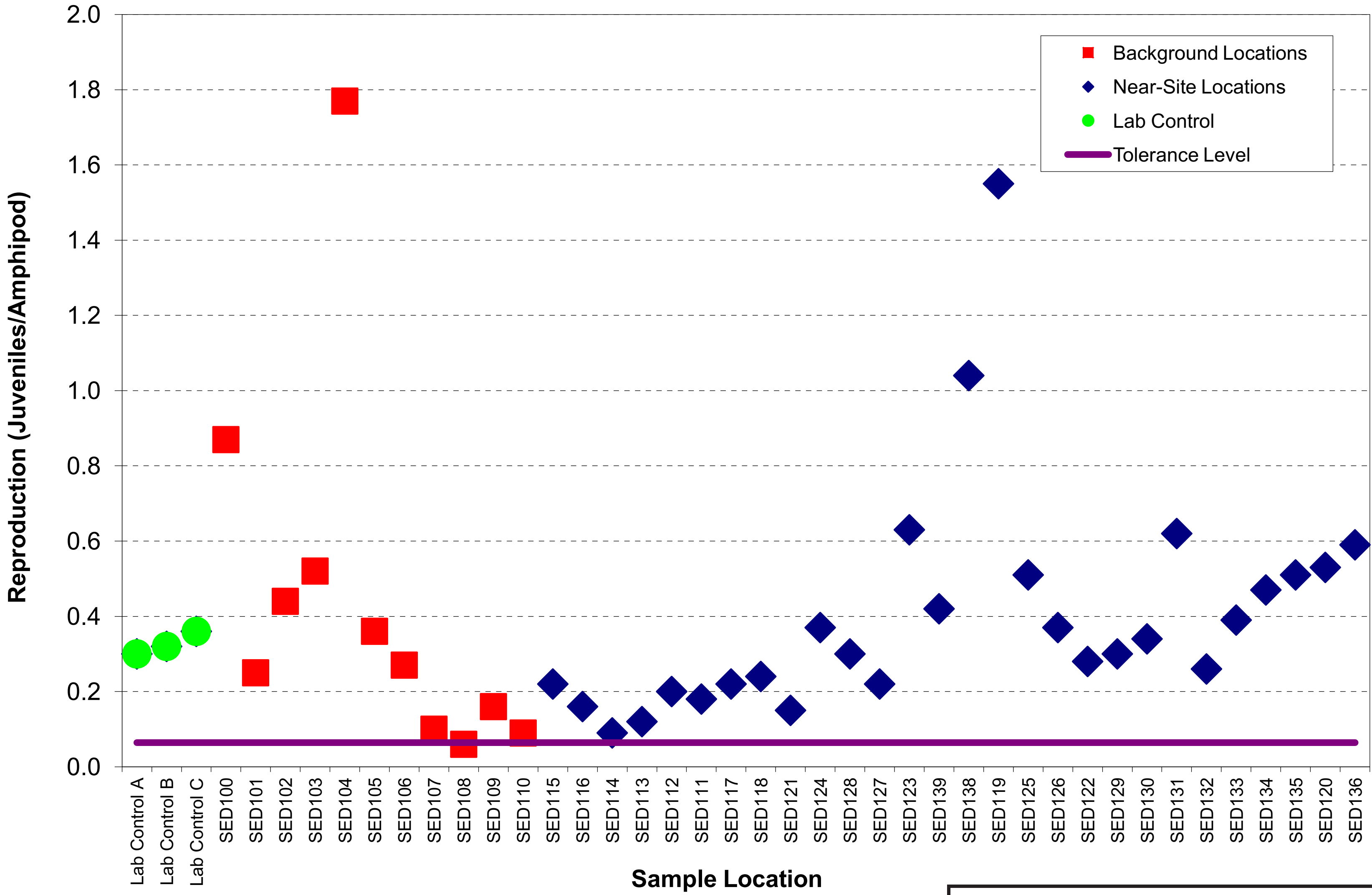
SEDIMENT REMEDIAL INVESTIGATION REPORT

LEPTOCHEIRUS - GROWTH

ARCADIS

FIGURE
18

01/31/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G12.CDR



FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

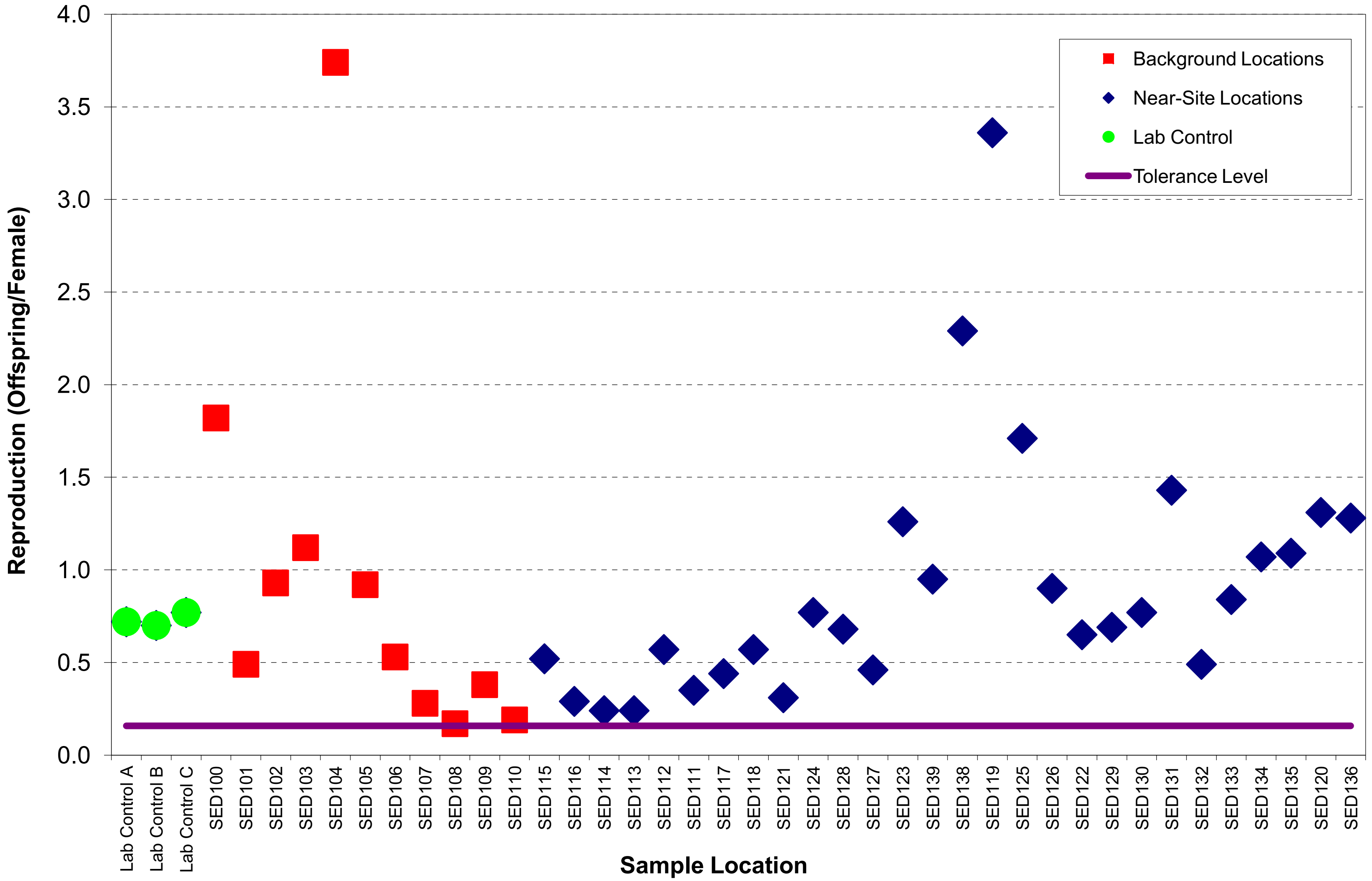
SEDIMENT REMEDIAL INVESTIGATION REPORT

**LEPTOCHEIRUS -
JUVENILES PER AMPHIPOD**

ARCADIS

FIGURE
19

01/31/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G13.CDR



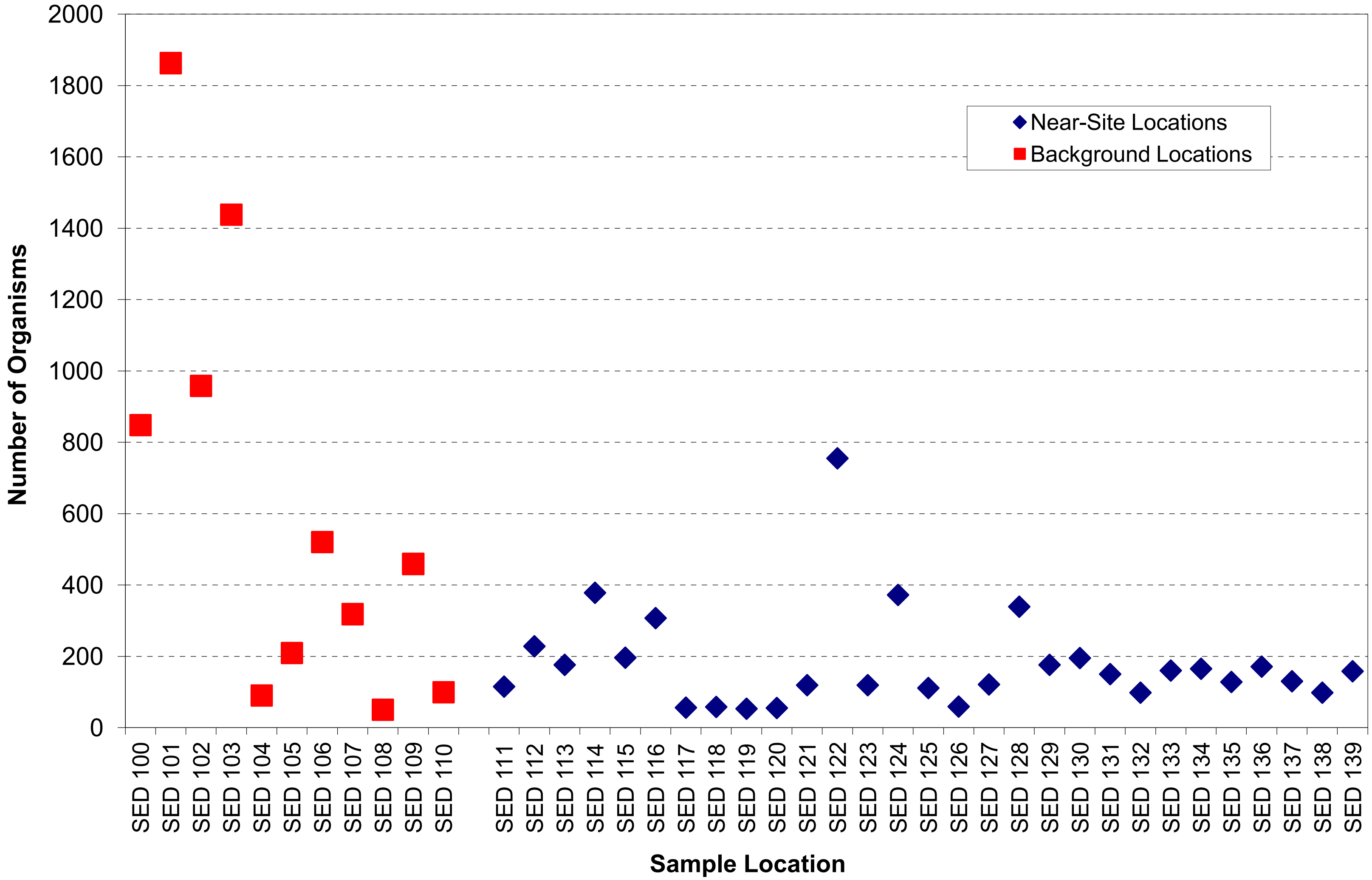
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

LEPTOCHEIRUS - OFFSPRING PER FEMALE

ARCADIS

FIGURE
20



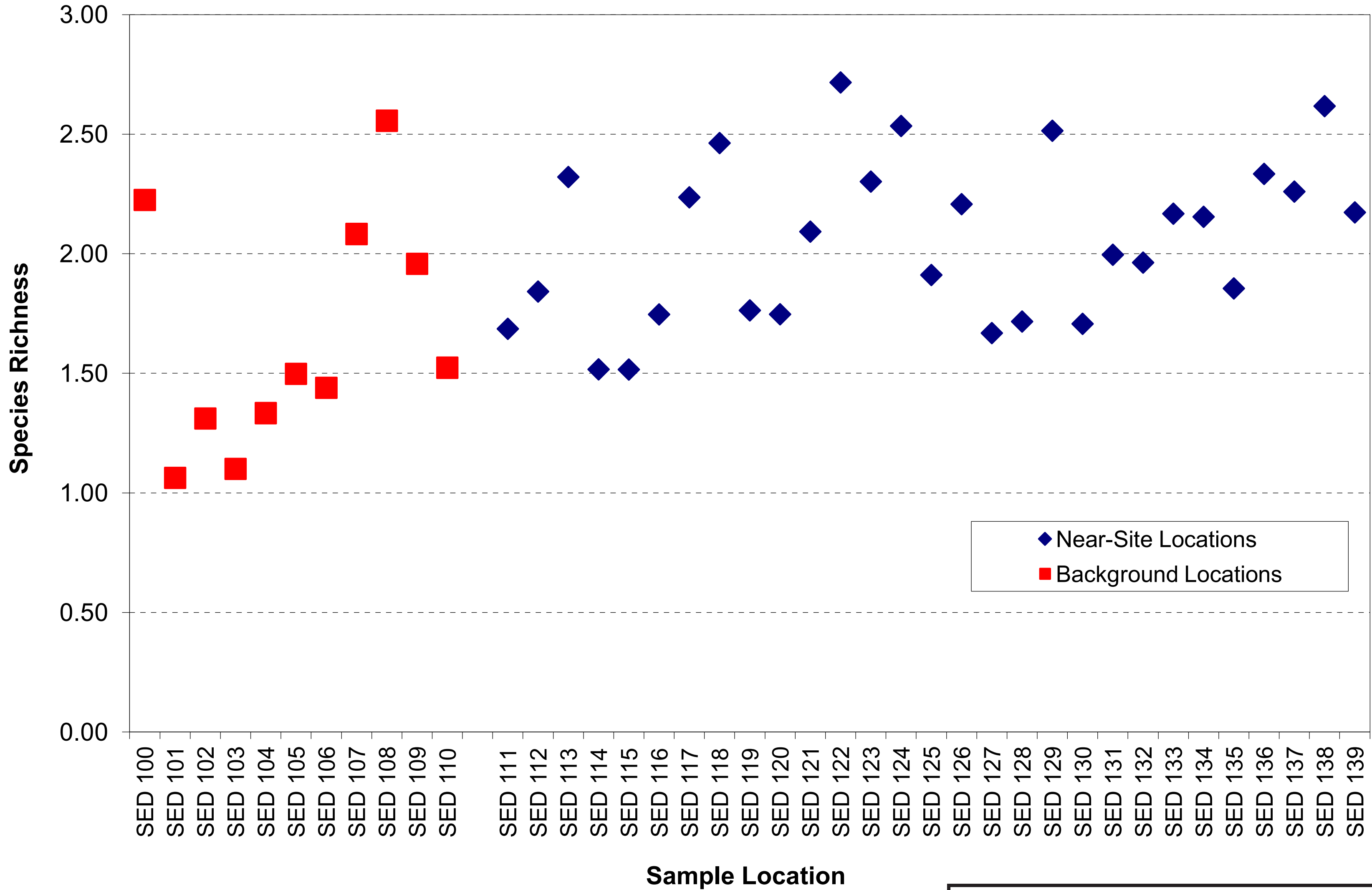
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

TOTAL NUMBER OF ORGANISMS

ARCADIS

FIGURE
21



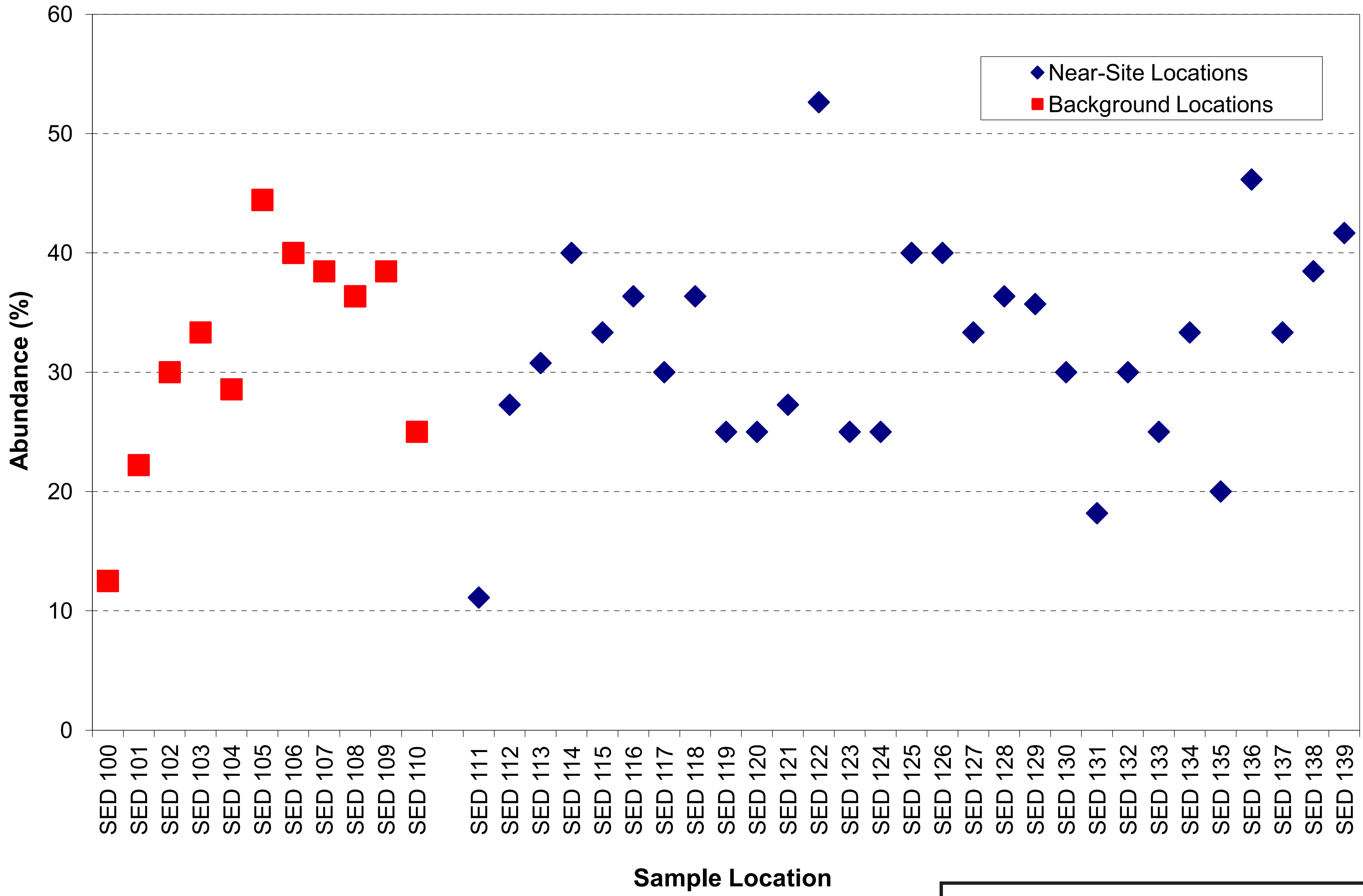
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

MARGALEF SPECIES RICHNESS

ARCADIS

FIGURE
22



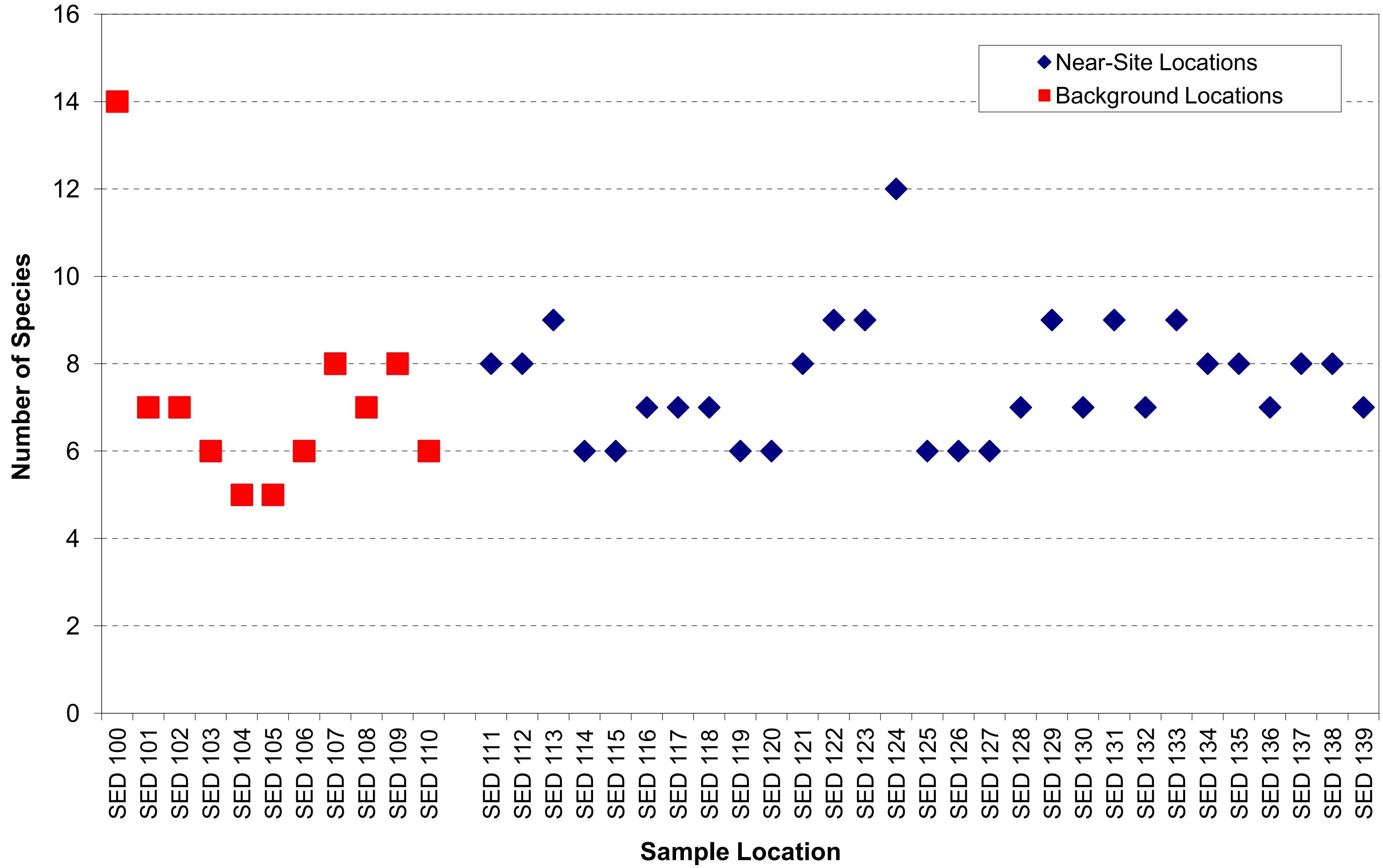
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

ABUNDANCE OF EPIFAUNA (%)

ARCADIS

FIGURE
23



FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

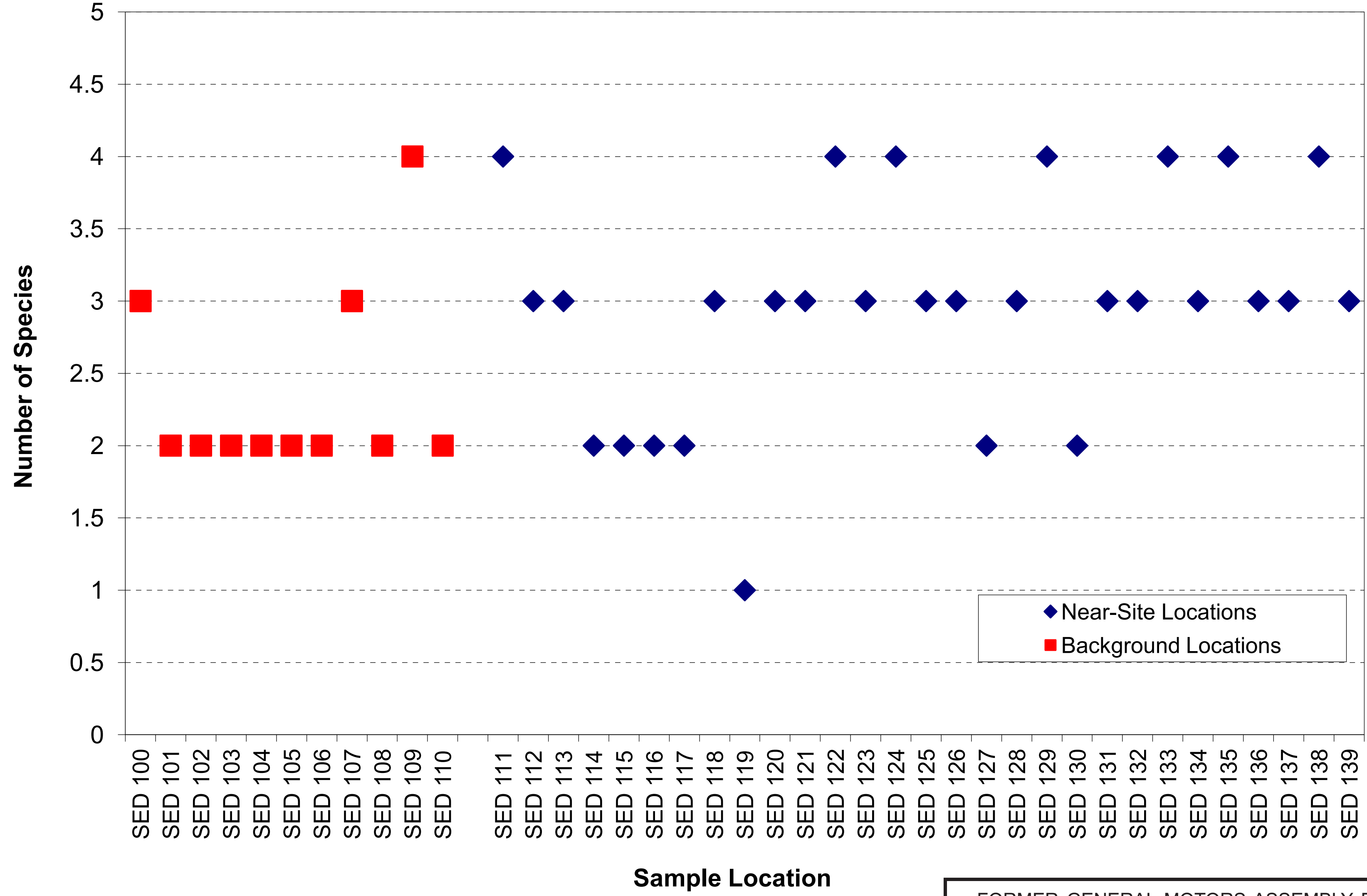
SEDIMENT REMEDIAL INVESTIGATION REPORT

NUMBER OF INFAUNA SPECIES

ARCADIS

FIGURE
24

02/01/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G19.CDR



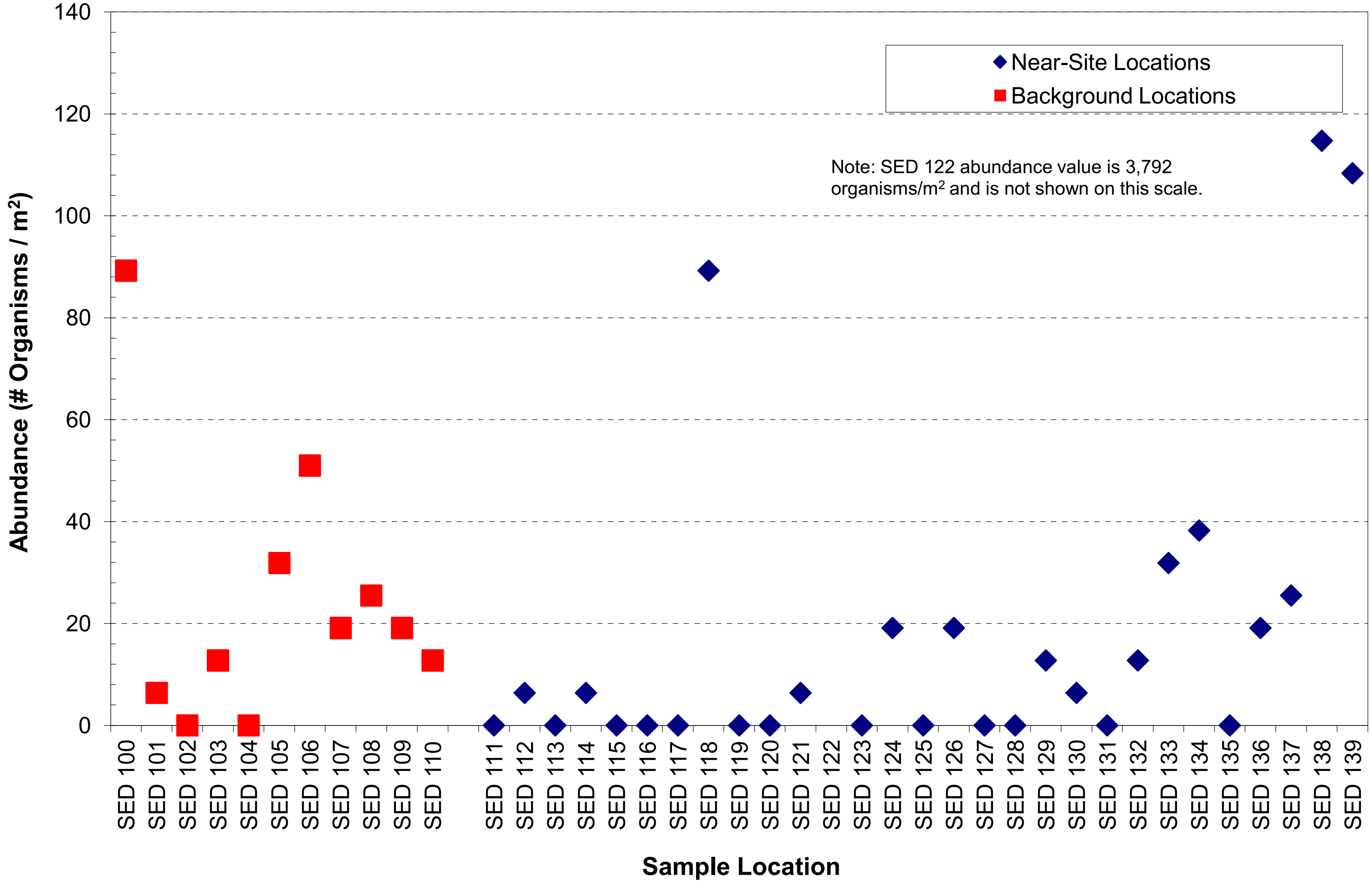
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

NUMBER OF POLYCHAETE SPECIES

ARCADIS

FIGURE 25



FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

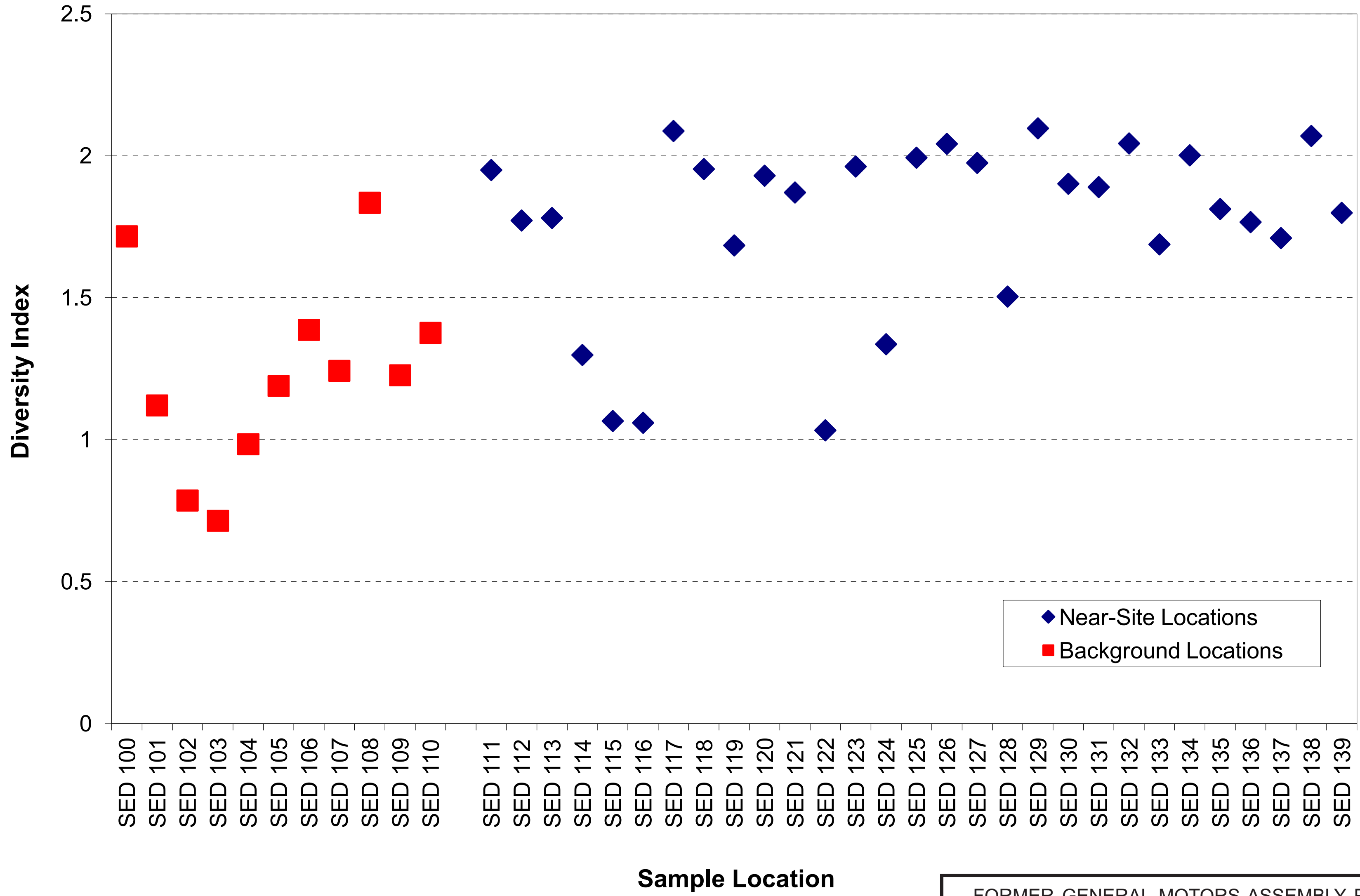
SEDIMENT REMEDIAL INVESTIGATION REPORT

ABUNDANCE OF SUSPENSION FEEDERS (# ORGANISMS / m²)

ARCADIS

FIGURE
26

02/01/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G20.CDR



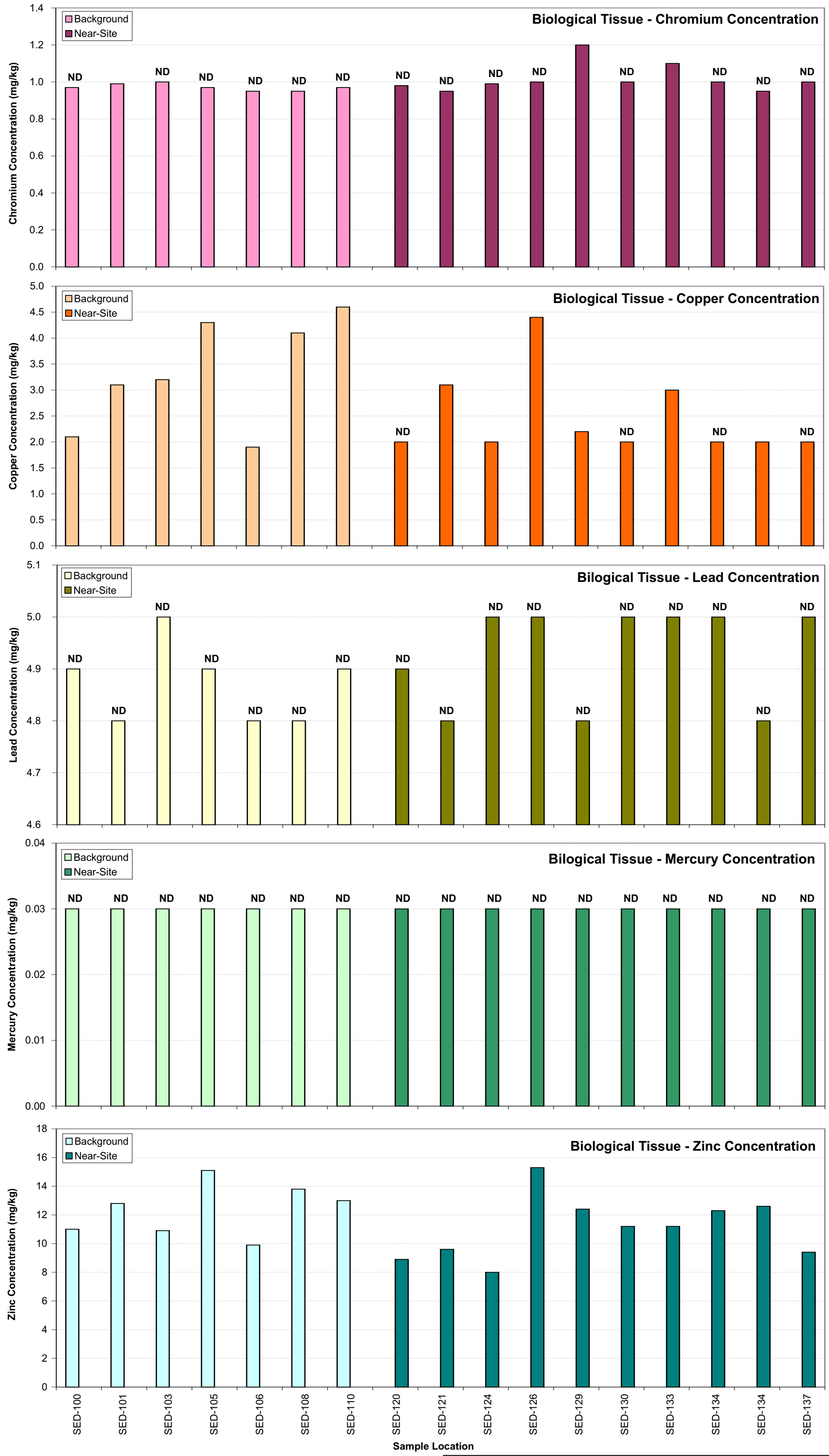
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

SHANNON-WIENER DIVERSITY INDEX

ARCADIS

FIGURE
27



FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

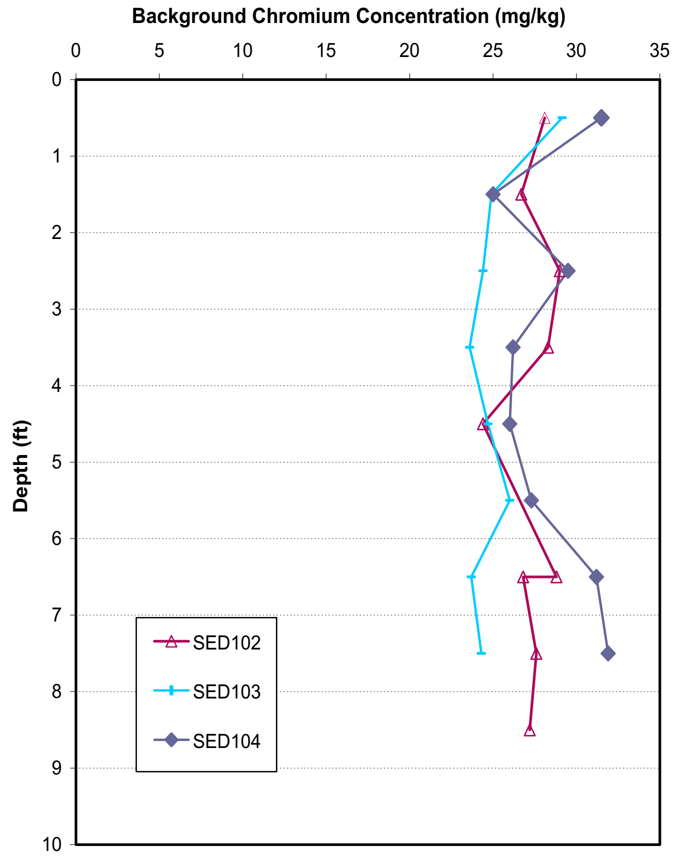
SEDIMENT REMEDIAL INVESTIGATION REPORT

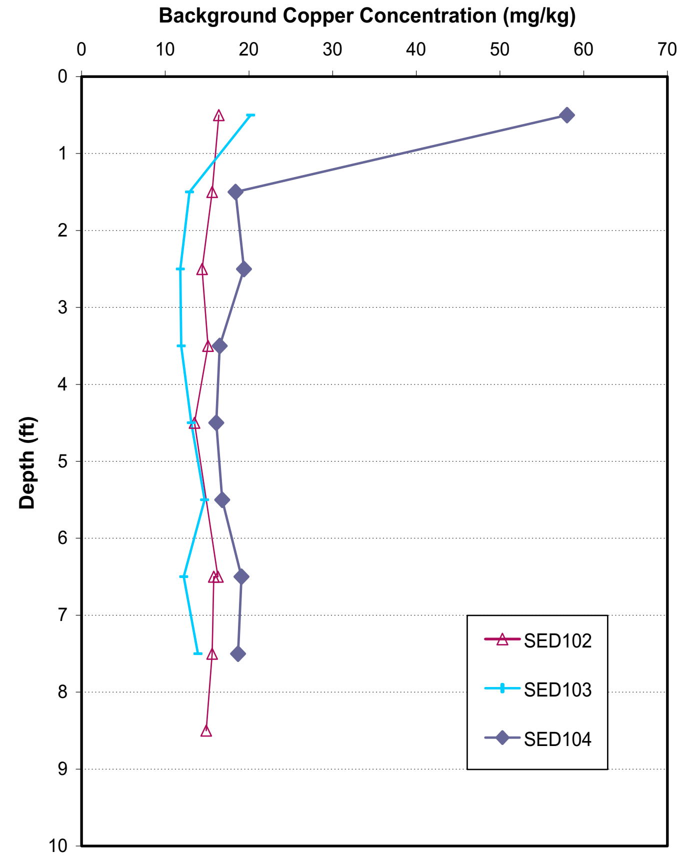
COPC CONCENTRATIONS IN BIVALVE TISSUE

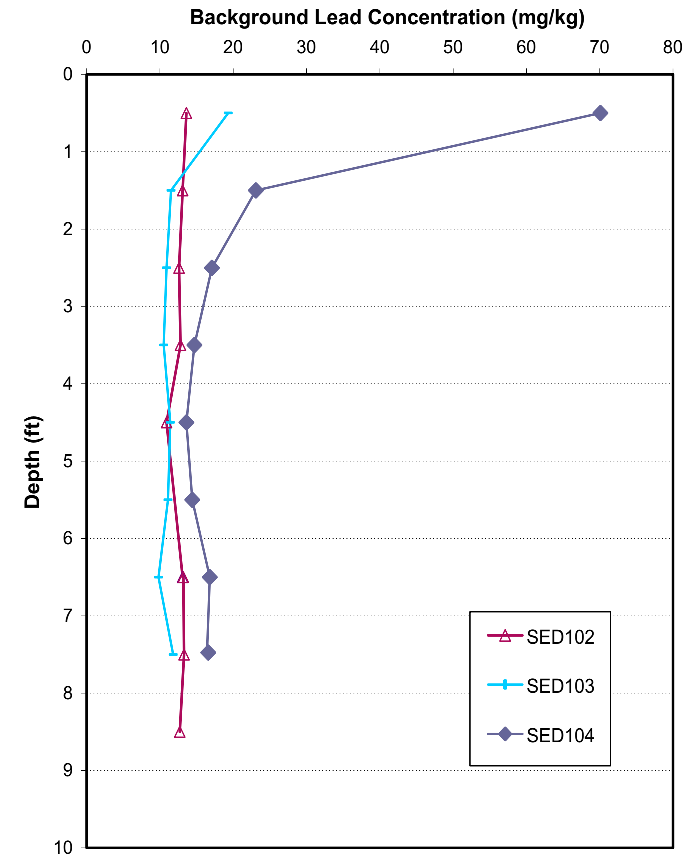
ARCADIS

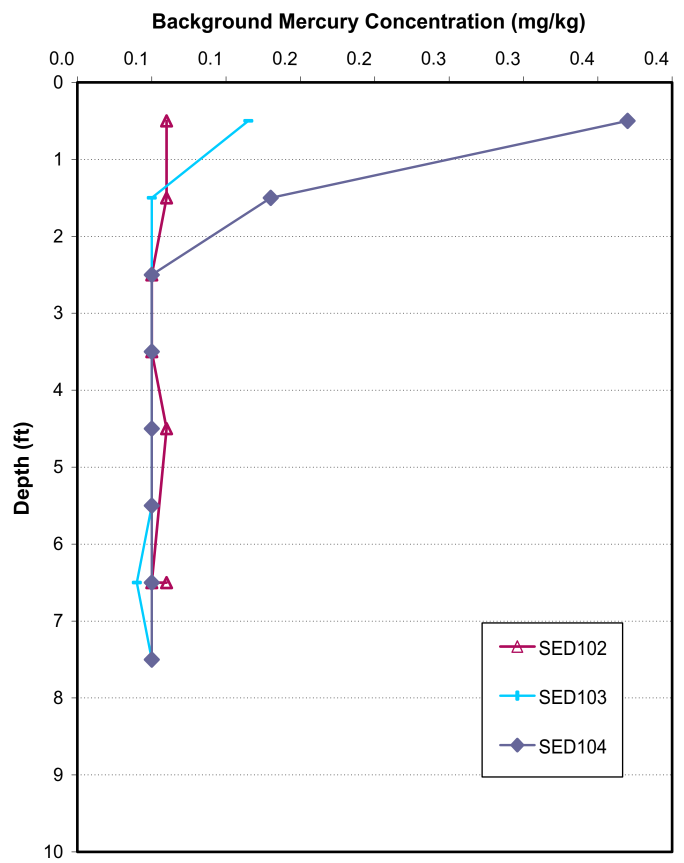
FIGURE
28

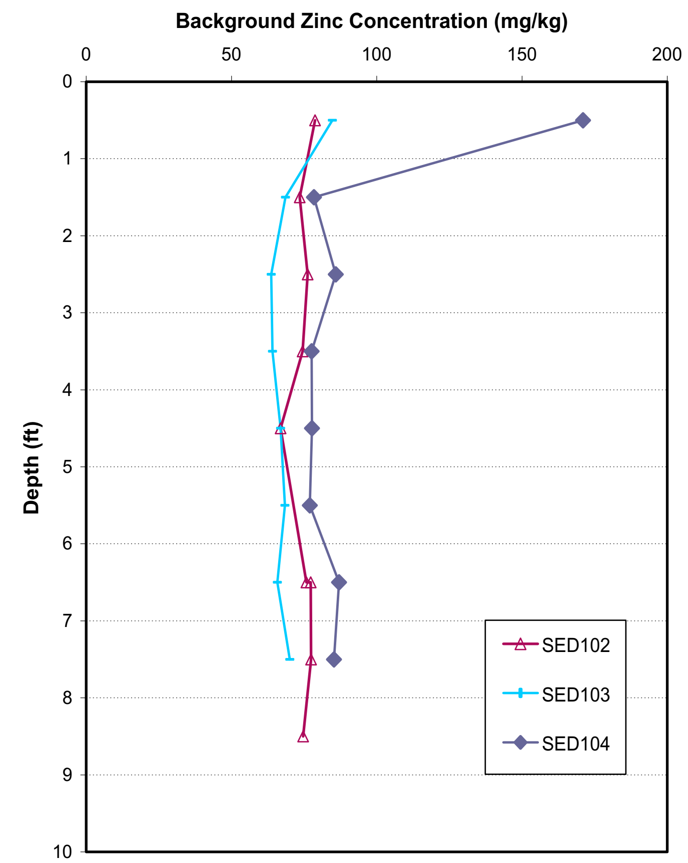
02/01/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G04.CDR











FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

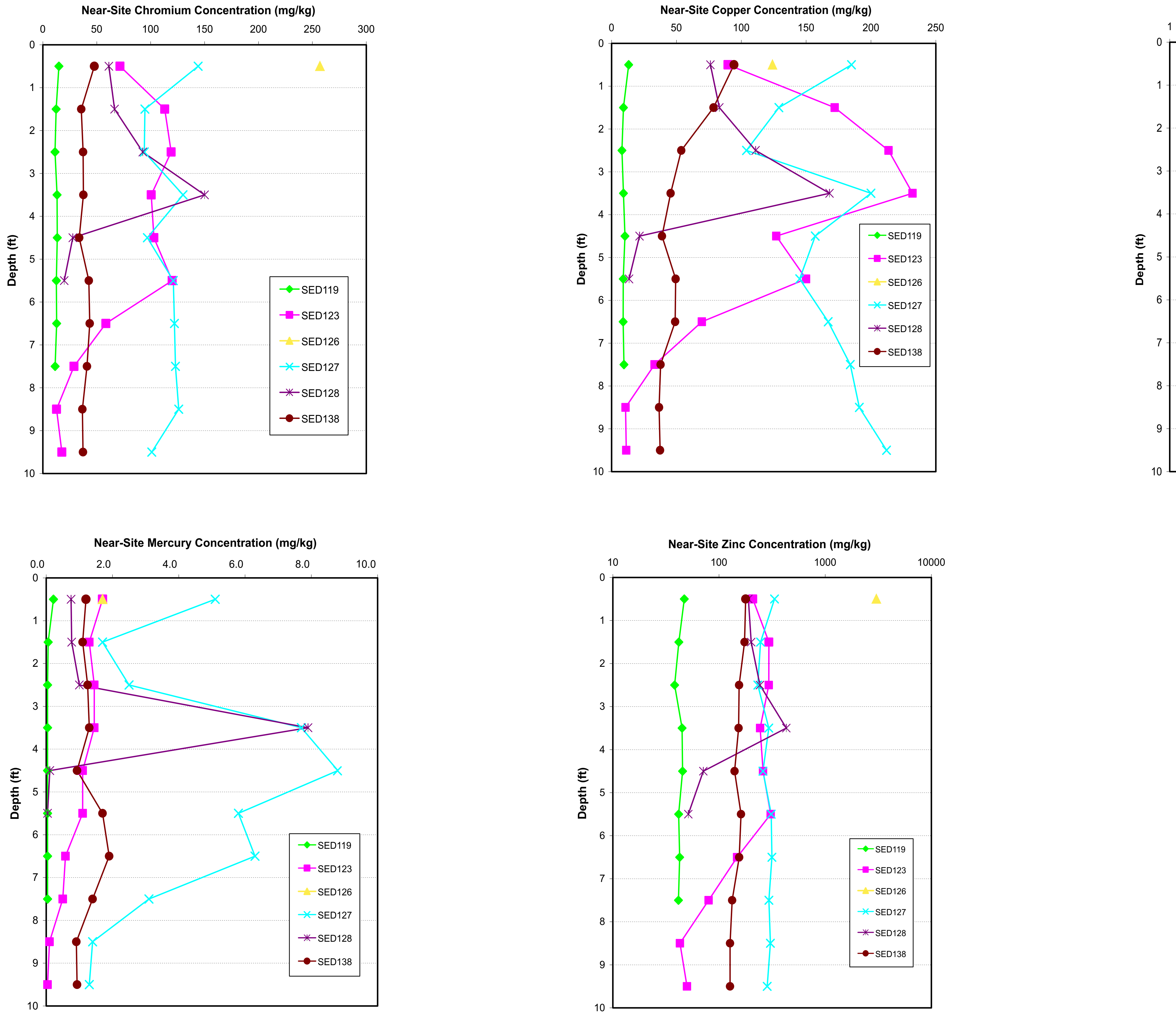
SEDIMENT REMEDIAL INVESTIGATION REPORT

COPC CONCENTRATION PROFILES IN DEEP CORES - BACKGROUND LOCATIONS

ARCADIS

FIGURE
29

01/30/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G05.CDR



FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

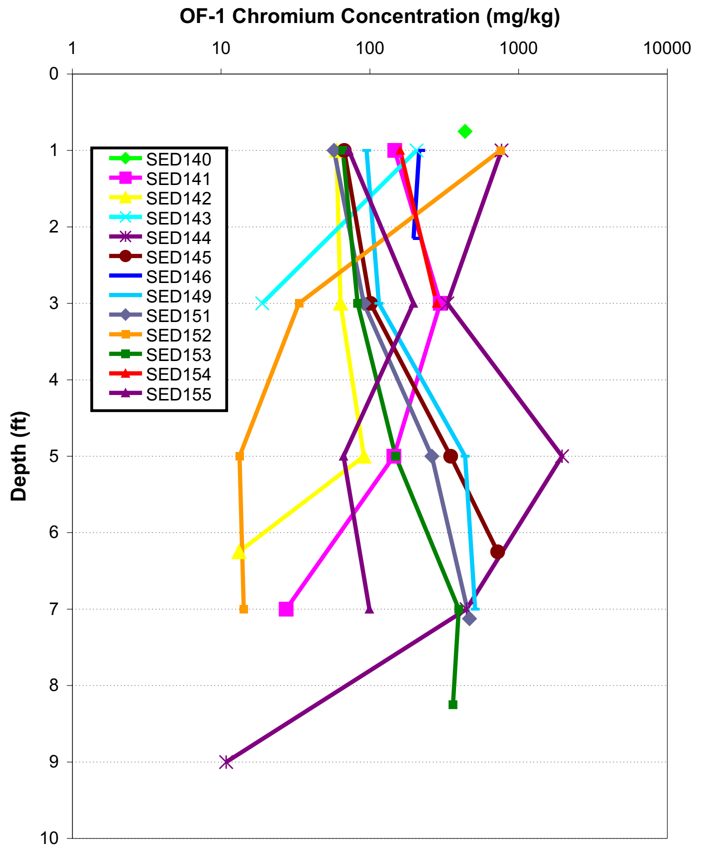
SEDIMENT REMEDIAL INVESTIGATION REPORT

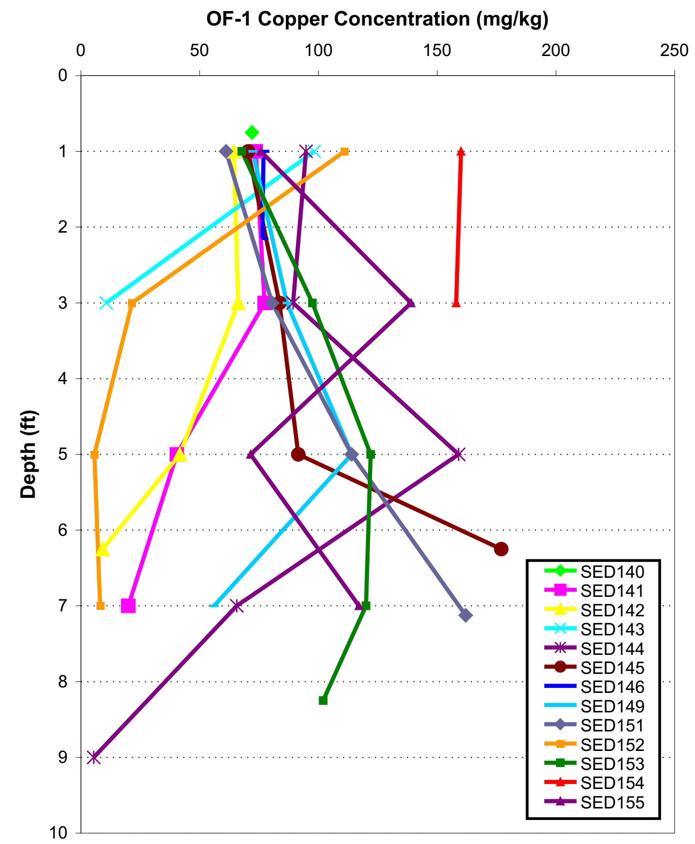
COPC CONCENTRATION PROFILES IN DEEP CORES - NEAR-SITE LOCATIONS

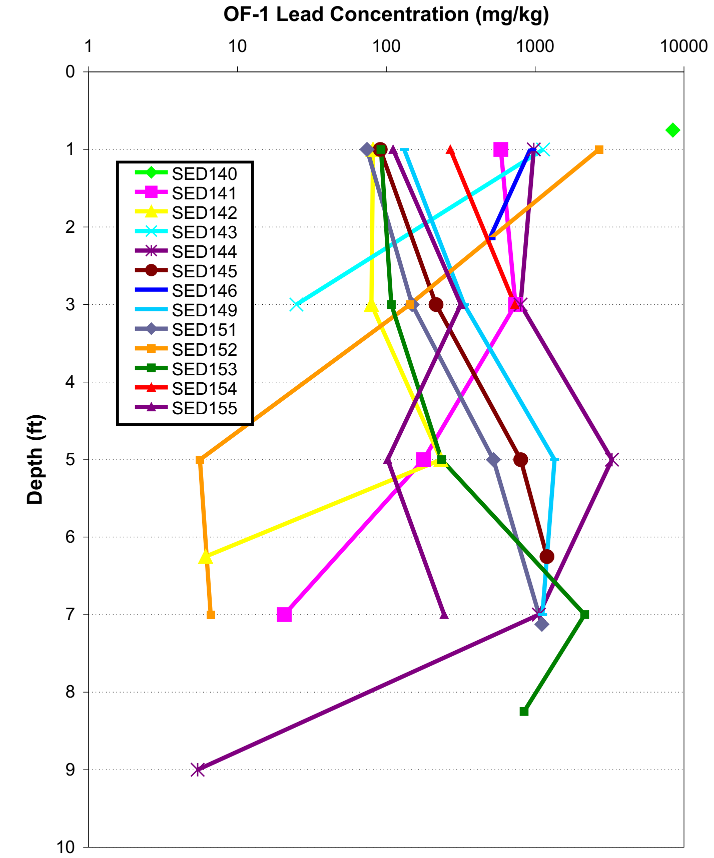
ARCADIS

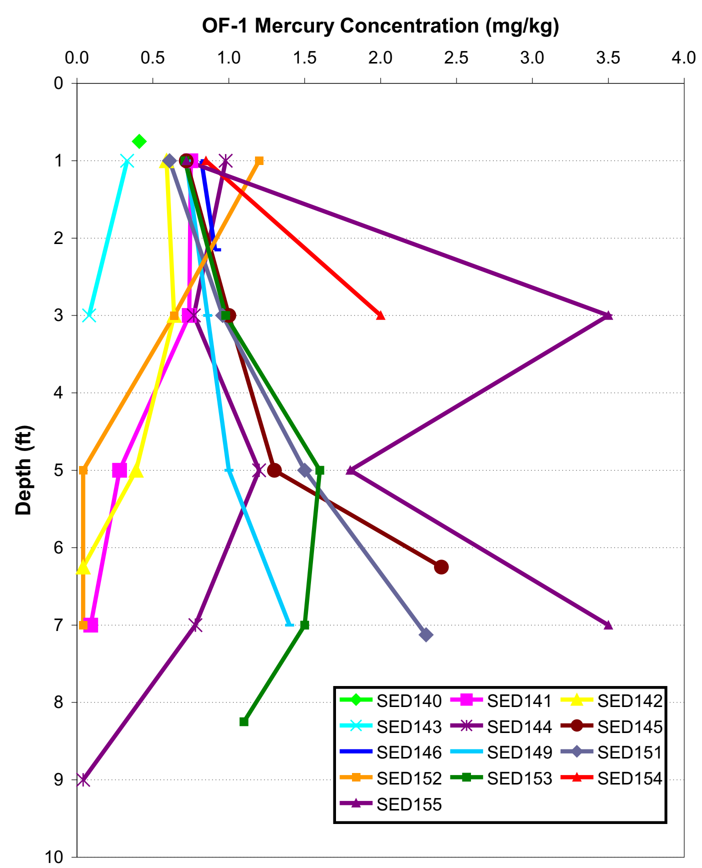
FIGURE 30

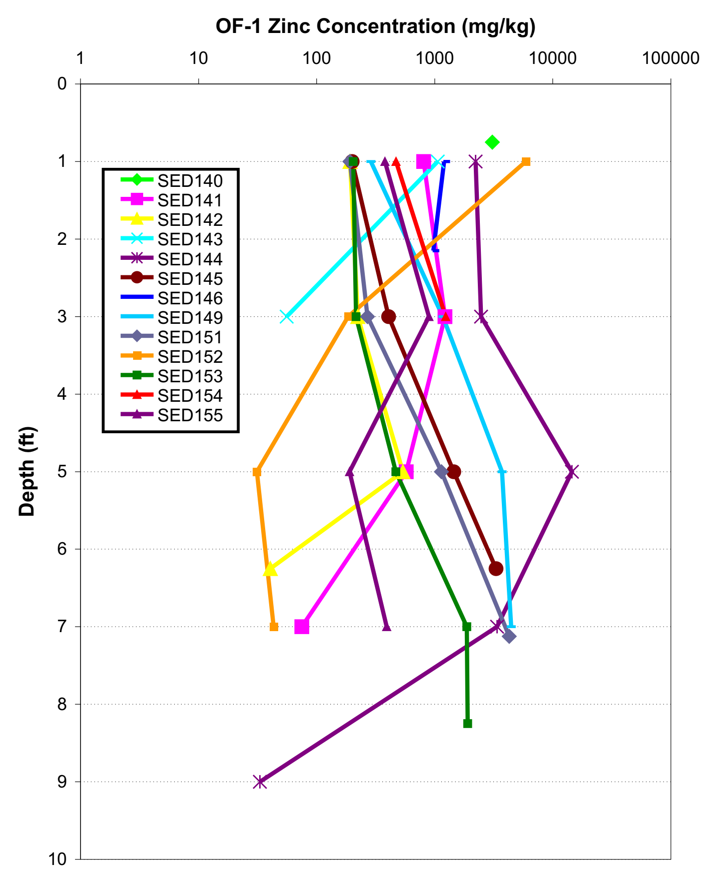
01/30/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G06.CDR











01/30/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G07.CDR

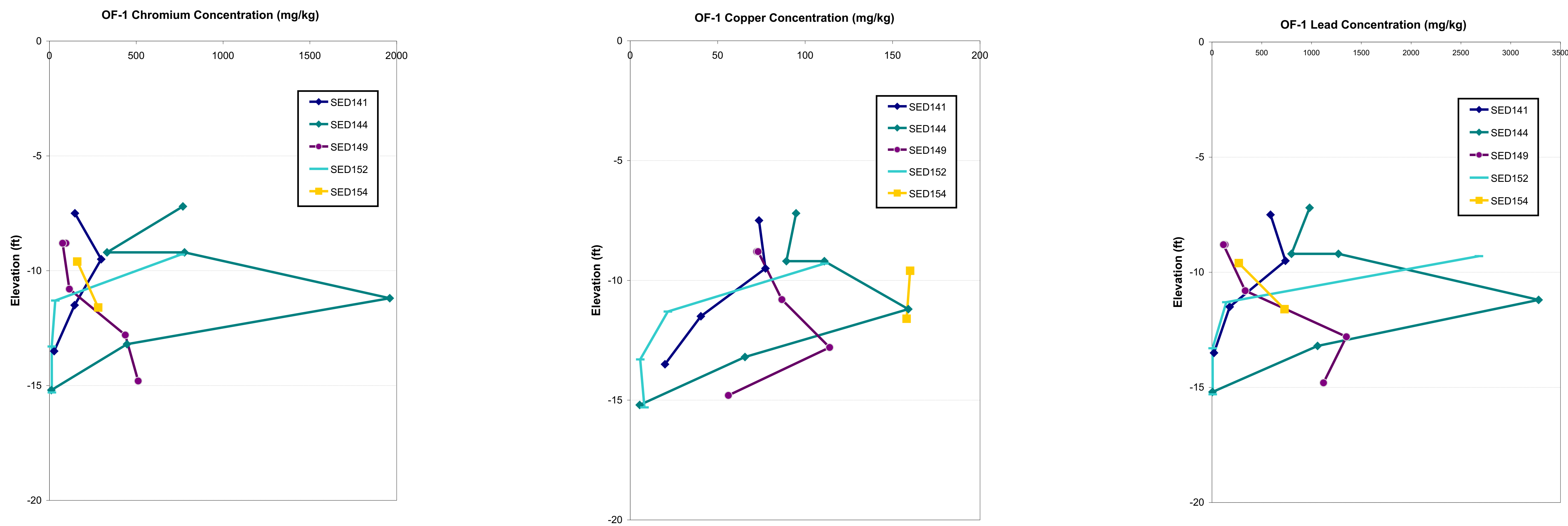
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

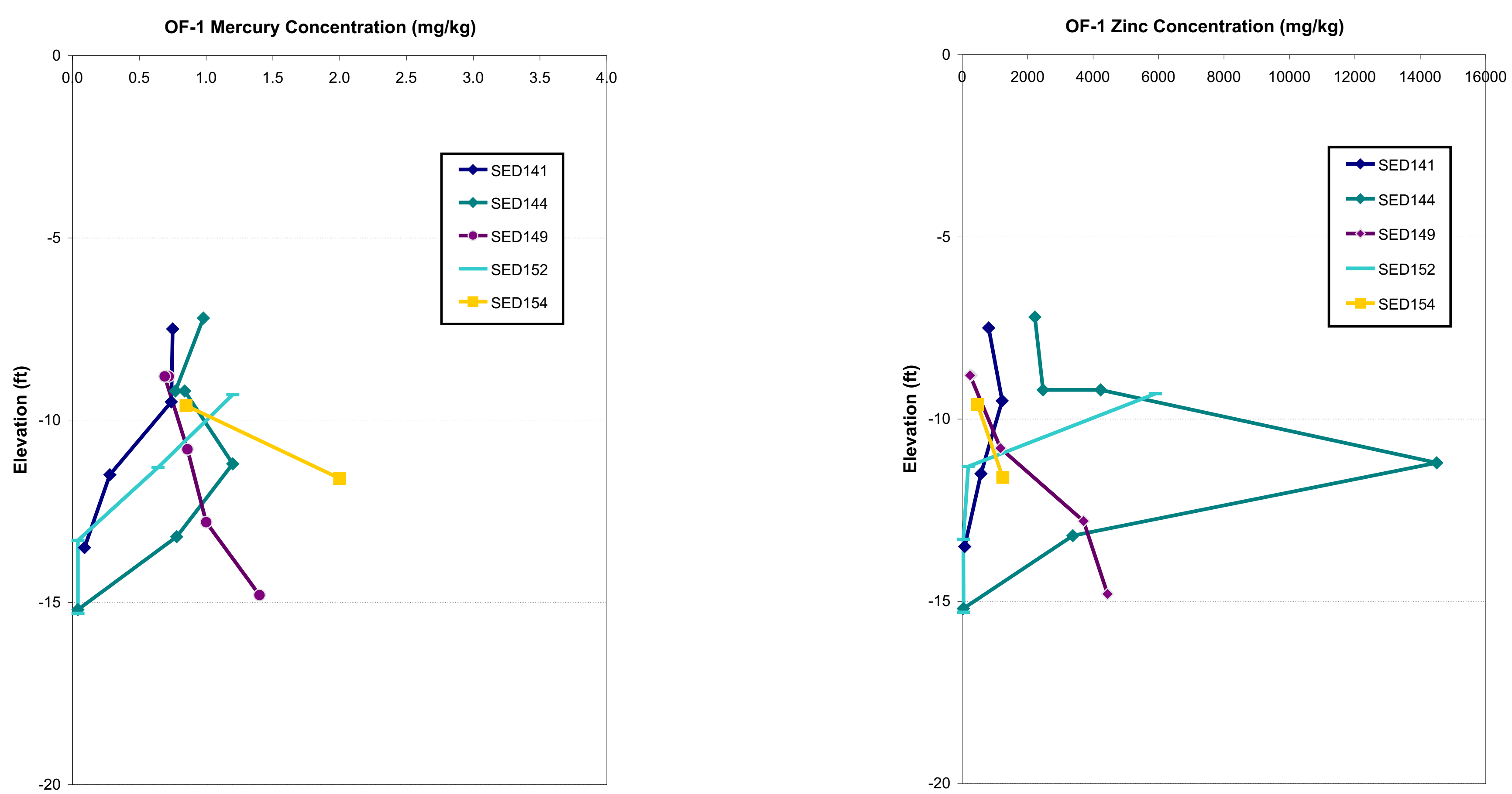
SEDIMENT REMEDIAL INVESTIGATION REPORT

COPC CONCENTRATION PROFILES IN DEEP CORES - OF-1 GRID

ARCADIS

FIGURE
31





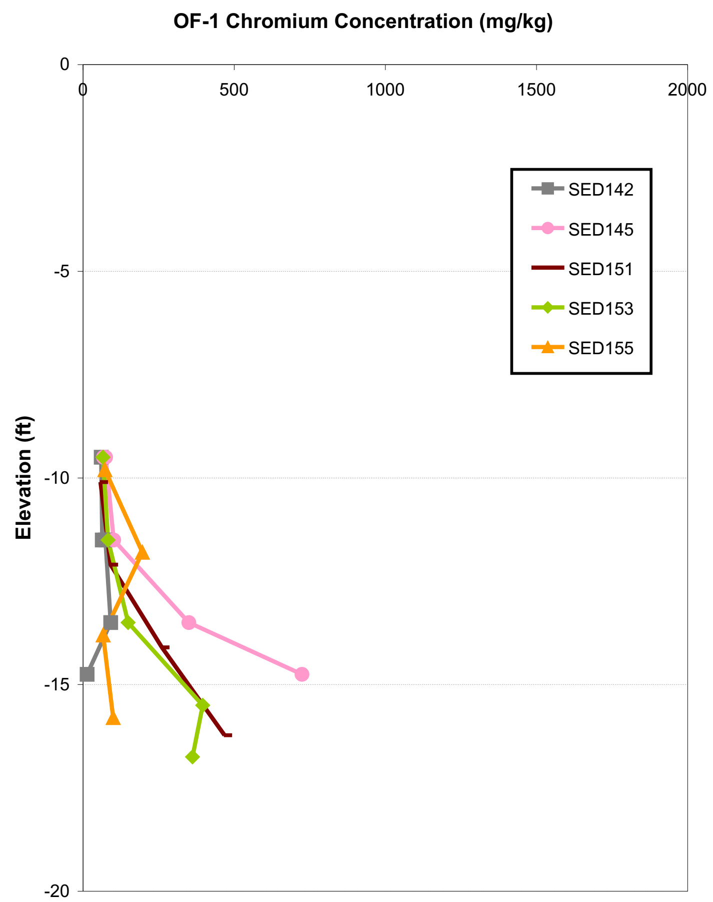
FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

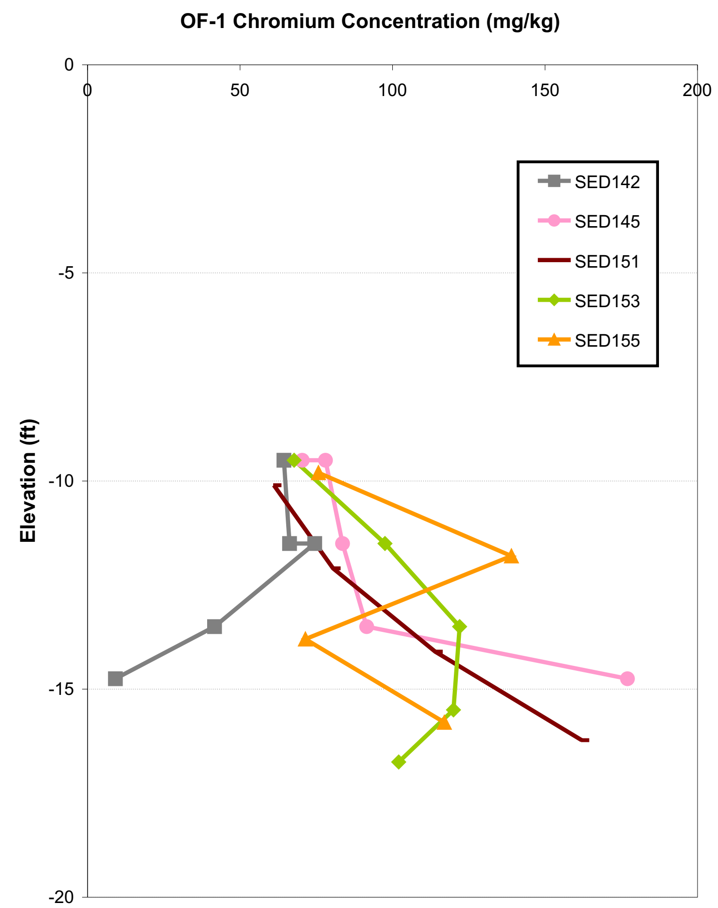
SEDIMENT REMEDIAL INVESTIGATION REPORT

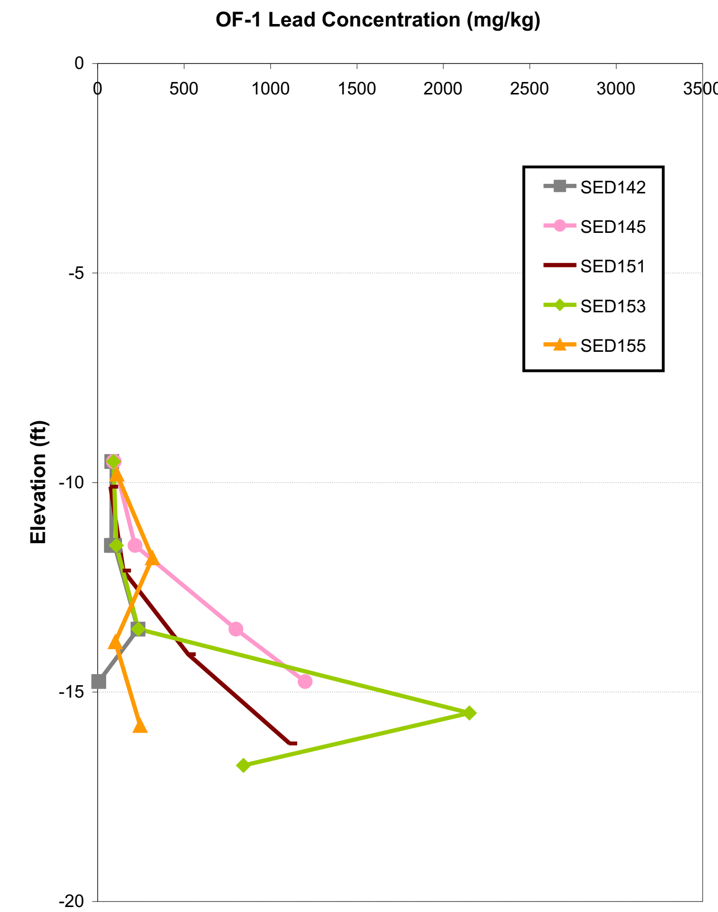
COPC CONCENTRATION PROFILES BY ELEVATION - OF-1 CROSS SECTION AA'

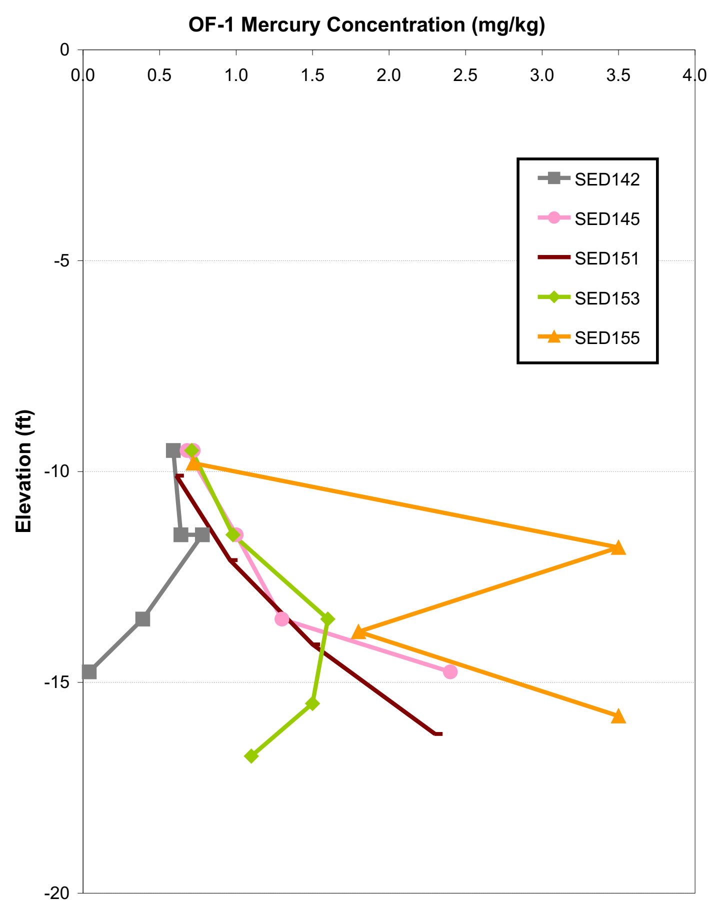
ARCADIS

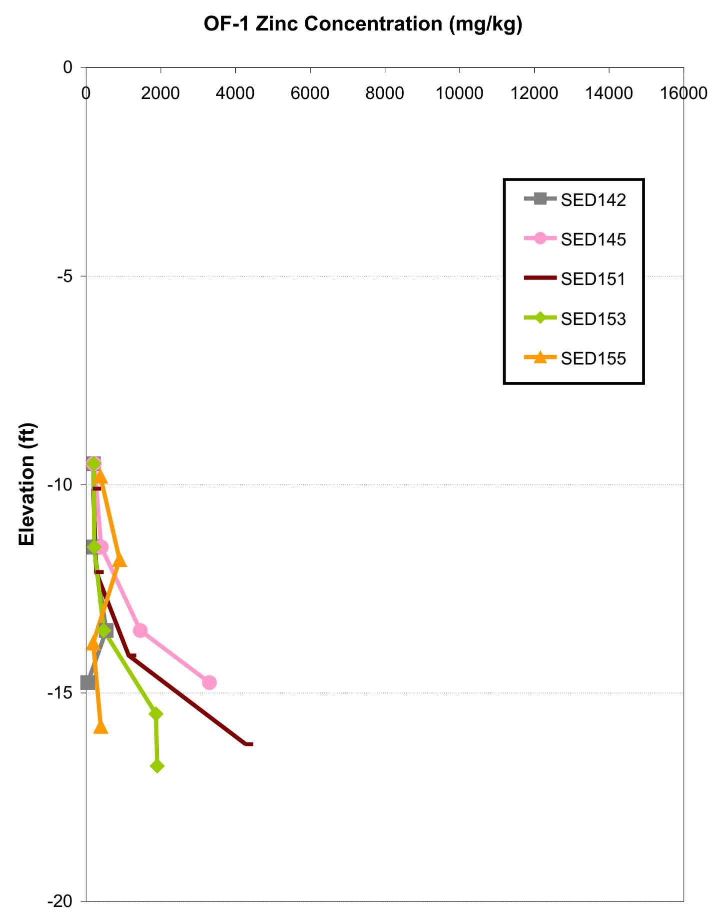
FIGURE
32











FORMER GENERAL MOTORS ASSEMBLY PLANT SITE
SLEEPY HOLLOW, NEW YORK

SEDIMENT REMEDIAL INVESTIGATION REPORT

COPC CONCENTRATION PROFILES BY ELEVATION - OF-1 CROSS SECTION BB'

ARCADIS

FIGURE
33

01/30/2012 SYRACUSE, NY-ENV/CAD-DJHOWES
B0064462/0001/00041/CDR/64462G09.CDR

Appendix A

Sampling logs 2004

GM Tarrytown, NY
Gear Deployment Log

Station: SED 1
Date: 7-7-04
Sample Type: Sediment
Sample Number: SED 1

Gear Deployment 1
Water Depth: 1.65 meters
Time: 1005
GPS Coord.: 665309.1 818617.1
Penetration depth: - only ½ tripped

Gear Deployment 2
Water Depth: 1.65
Time: 1006
GPS Coord.: 665309.1 818617.1
Penetration depth: - only ½ tripped

Gear Deployment 3
Water Depth: Same
Time: 10:10
GPS Coord.: Same
Penetration depth: only ½ tripped

Gear Deployment 4
Water Depth: Same
Time: 10:22
GPS Coord.: Same
Penetration depth: 11 inches

Gear Deployment 5
Water Depth: Same
Time: 10:50
GPS Coord.: Same
Penetration depth: 15 inches

Gear Used: 1) Box Corer 2) Box Corer 3) Box Corer 4) Piston Corer 5) Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.80	DO (~~g/L~~ RMK mg/L)	6.25	TDS (g/L)	9.2
Conductivity	1.49	Turbidity (NTU)	35-39	ORP (mV)	128
pH	7.4	Salinity (%)	0.87		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	24.7	DO (~~g/L~~ RMK mg/L)	6.3 ~~g/L~~ RMK	TDS (g/L)	9.3
Conductivity	1.51 S/m	Turbidity (NTU)	49-53	ORP (mV)	134
pH	7.3	Salinity (%)	0.88		

NOTES:

Sampler: [signature]

GM Tarrytown, NY
Gear Deployment Log

Station: SED 2
Date: 7/7/04
Sample Type: Sediment
Sample Number: SED 2

Gear Deployment 1

Water Depth: 1.85 meters
Time: 1130
GPS Coord.: 665463.5 818771.0
Penetration depth: 14.75 inches

Gear Deployment 2

Water Depth: Same
Time: 1140
GPS Coord.: Same
Penetration depth: 11.5 inches

Gear Deployment 3

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1) + 2) Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None mg/L

Temp. (°C)	25.73	DO (~~mg/L~~ g/L)	RMK 7.20	TDS (g/L)	8.7
Conductivity	1.40	Turbidity (NTU)	12-15	ORP (mV)	146
pH	7.45	Salinity (%)	0.81		

2 Feet Above Sediment Surface: Observations: None mg/L

Temp. (°C)	25.38	DO (~~mg/L~~ g/L)	RMK 7.48	TDS (g/L)	9.1
Conductivity	1.47	Turbidity (NTU)	18-21	ORP (mV)	154
pH	7.4	Salinity (%)	0.85		

NOTES:

Sampler: LG/CC

GM Tarrytown, NY
Gear Deployment Log

Station: 3 — Sample Type: Sediment
Date: 7-7-04 — Sample Number: SED 3

Gear Deployment 1
Water Depth: 3.45m — Time: 1310
GPS Coord.: 665619.3 818934.8 — Penetration depth: * no sample

Gear Deployment 2
Water Depth: ~~3.45m~~ same — Time: 1314
GPS Coord.: Same — Penetration depth: no sample

Gear Deployment 3
Water Depth: Same — Time: 13:17
GPS Coord.: Same — Penetration depth: 17 inches

Gear Deployment 4
Water Depth: Same — Time: 13:28
GPS Coord.: Same — Penetration depth: 18 inches

Gear Deployment 5
Water Depth: — Time:
GPS Coord.: — Penetration depth:

Gear Used: 1) Piston Corer 2, 3 + 4 Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	25.67	DO (~~mg/L~~ g/L mg/L RMK)	7.50	TDS (g/L)	8.9
Conductivity	1.44	Turbidity (NTU)	32	ORP (mV)	6
pH	7.53	Salinity (%)	0.83		

2 Feet Above Sediment Surface: Observations: None mg/L RMK

Temp. (°C)	25.05	DO (~~mg/L~~ g/L)	7.60	TDS (g/L)	9.6
Conductivity	1.55	Turbidity (NTU)	32	ORP (mV)	-97
pH	7.29	Salinity (%)	0.90		

NOTES:

Sampler: [signature]

GM Tarrytown, NY
Gear Deployment Log

Station: 04
Sample Type: Sediment
Date: 07-07-04
Sample Number: Sed 04

Gear Deployment 1

Water Depth: 4.9 M
Time: 14:20
GPS Coord.: 665759.7 819084.8
Penetration depth: 13.5 inches

Gear Deployment 2

Water Depth: Same
Time: 1427
GPS Coord.: Same
Penetration depth: 15 inches

Gear Deployment 3

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1 + 2 Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None mg/L RMK

Temp. (°C)	26.10	DO (~~mg/L~~ g/L)	8.14	TDS (g/L)	8.7
Conductivity	1.41	Turbidity (NTU)	39-42	ORP (mV)	37
pH	7.56	Salinity (%)	0.81		

2 Feet Above Sediment Surface: Observations: None mg/L RMK

Temp. (°C)	26.15	DO (~~mg/L~~ g/L)	8.40	TDS (g/L)	8.8
Conductivity	1.45	Turbidity (NTU)	31-36	ORP (mV)	9
pH	7.39	Salinity (%)	0.83		

NOTES:

Samplers: LG/CC

GM Tarrytown, NY
Gear Deployment Log

Station:	5	Sample Type:	Sediment
Date:	7-7-04	Sample Number:	Sed 05

Gear Deployment 1

Water Depth:	3.3m	Time:	1535
GPS Coord.:	664913.4 818631.4	Penetration depth:	9.5 - lost sample

Gear Deployment 2

Water Depth:	Same	Time:	1542
GPS Coord.:	Same	Penetration depth:	8.0 inches

Gear Deployment 3

Water Depth:	Same	Time:	1552
GPS Coord.:	Same	Penetration depth:	10 inches

Gear Deployment 4

Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Deployment 5

Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Used: 1,2 + 3 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	25.63	DO (mg/L)	7.96	TDS (g/L)	8.9
Conductivity	1.42	Turbidity (NTU)	24-27	ORP (mV)	133
pH	7.49	Salinity (%)	0.83		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	25.21	DO (mg/L)	7.99	TDS (g/L)	9.3
Conductivity	1.50	Turbidity (NTU)	80-110	ORP (mV)	141
pH	7:43	Salinity (%)	0.87		

Comments: Gear Deployment #1 - noticed oil in the sediment.

Sampler: JJ / CC

GM Tarrytown, NY
Gear Deployment Log

Station: 6
Date: 7-8-04
Sample Type: Sediment
Sample Number: Sed06

Gear Deployment 1
Water Depth: 2.05 m
Time: 0836
GPS Coord.: 665087.4 818803.6
Penetration depth: 16 inches

Gear Deployment 2
Water Depth: Same
Time: 0844
GPS Coord.: Same
Penetration depth: 18 inches

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1 1/2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.58	DO (mg/L)	6.88	TDS (g/L)	10.0
Conductivity	~~#~~ 1.62	Turbidity (NTU)	11-17	ORP (mV)	165
pH	7.35	Salinity (%)	0.95		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	24.56	DO (mg/L)	7.20	TDS (g/L)	10.1
Conductivity	1.62	Turbidity (NTU)	24-47	ORP (mV)	172
pH	7.33	Salinity (%)	0.95		

NOTES:

Sampler: DS/CC

GM Tarrytown, NY
Gear Deployment Log

Station: 7 Sample Type: Sediment
Date: 7-8-04 Sample Number: Sed07

	Gear Deployment 1	
Water Depth: 1.8 m		Time: 0910
GPS Coord.: 665244.7 818996.1		Penetration depth: 12.5 inches
	Gear Deployment 2	
Water Depth: Same		Time: 0919
GPS Coord.: Same		Penetration depth: 12 inches
	Gear Deployment 3	
Water Depth:		Time:
GPS Coord.:		Penetration depth:
	Gear Deployment 4	
Water Depth:		Time:
GPS Coord.:		Penetration depth:
	Gear Deployment 5	
Water Depth:		Time:
GPS Coord.:		Penetration depth:

Gear: 1, 2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.65	DO (mg/L)	7.20	TDS (g/L)	9.8
Conductivity	6.58	Turbidity (NTU)	35-47	ORP (mV)	124
pH	7.48	Salinity (%)	0.92		

2 Feet Above Sediment Surface: Observations: - See notes below

Temp. (°C)		DO (mg/L)		TDS (g/L)	
Conductivity		Turbidity (NTU)		ORP (mV)	
pH		Salinity (%)			

NOTES: - Very shallow water - only one reading taken

Sampler:

GM Tarrytown, NY
Gear Deployment Log

Station: 8
Date: 7-8-04
Sample Type: Sediment
Sample Number: Sed 08

Gear Deployment 1
Water Depth: 1.8 m
Time: 0956
GPS Coord.: 665398.7 819168.2
Penetration depth: 17 inches

Gear Deployment 2
Water Depth: Same
Time: 1005
GPS Coord.: Same
Penetration depth: 17 inches

Gear Deployment 3
Water Depth: Same
Time: 1009
GPS Coord.: Same
Penetration depth: 19 inches

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2,3 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.81	DO ~~(mg/L)~~ g/L	7.18	TDS (g/L)	9.6
Conductivity	1.56	Turbidity (NTU)	16	ORP (mV)	134
pH	7.42	Salinity (%)	0.91		

2 Feet Above Sediment Surface: Observations: See notes below

Temp. (°C)		DO (mg/L)		TDS (g/L)	
Conductivity		Turbidity (NTU)		ORP (mV)	
pH		Salinity (%)			

NOTES: Too shallow to get 2nd water quality reading

Sampler: LG/CC

GM Tarrytown, NY
Gear Deployment Log

Station: 09
Date: 7-8-04
Sample Type: Sediment
Sample Number: Sed 09

Gear Deployment 1

Water Depth: 3.05 m
Time: 10:42
GPS Coord.: 665553.8 819348.6
Penetration depth: 18.5 inches

Gear Deployment 2

Water Depth: Same
Time: 10:46
GPS Coord.: Same
Penetration depth: 13 inches

Gear Deployment 3

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.91	DO (mg/L)	7.03	TDS (g/L)	9.6
Conductivity	1.55	Turbidity (NTU)	11-13	ORP (mV)	32
pH	7.43	Salinity (%)	0.91		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.94	DO (mg/L)	7.48	TDS (g/L)	9.7
Conductivity	1.58	Turbidity (NTU)	84-110	ORP (mV)	53
pH	7.36	Salinity (%)	0.92		

NOTES:

Sampler:

GM Tarrytown, NY
Gear Deployment Log

Station: 10
Date: 7-8-04
Sample Type: Sediment
Sample Number: Sed 10

Gear Deployment 1

Water Depth: 1.2 M
Time: 1135
GPS Coord.: 665533.9 819485.2
Penetration depth: 10 inches

Gear Deployment 2

Water Depth: Same
Time: 1142
GPS Coord.: Same
Penetration depth: 17.5

Gear Deployment 3

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1/2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	25.38	DO (mg/L)	7.86	TDS (g/L)	9.7
Conductivity	1.57	Turbidity (NTU)	4-6	ORP (mV)	165
pH	7.56	Salinity (%)	0.91		

2 Feet Above Sediment Surface: Observations: See Notes below

Temp. (°C)		DO (mg/L)		TDS (g/L)	
Conductivity		Turbidity (NTU)		ORP (mV)	
pH		Salinity (%)			

NOTES: Too Shallow to take 2nd water quality reading

Sampler:

GM Tarrytown, NY
Gear Deployment Log

Station: 11
Date: 7-8-04
Sample Type: Sediment
Sample Number: Sed 11

Gear Deployment 1
Water Depth: 3.15
GPS Coord.: 664720.7 818793.4
Time: 1335
Penetration depth: 10 inches

Gear Deployment 2
Water Depth: Same
GPS Coord.: Same
Time: 1344
Penetration depth: 12 inches

Gear Deployment 3
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	25.30	DO (mg/L)	7.76	TDS (g/L)	8.7
Conductivity	1.40	Turbidity (NTU)	19-22	ORP (mV)	30
pH	7.46	Salinity (%)	0.81		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	25.29	DO (mg/L)	8.18	TDS (g/L)	9.5
Conductivity	1.53	Turbidity (NTU)	210-260	ORP (mV)	6
pH	7.40	Salinity (%)	0.90		

NOTES:

Samplers:

GM Tarrytown, NY
Gear Deployment Log

Station: 12
Date: 7-8-04
Sample Type: Sediment
Sample Number: Sed 4

Gear Deployment 1
Water Depth: 3.15m
GPS Coord.: 664887.0 8189659
Time: 14:25
Penetration depth: 13 inches

Gear Deployment 2
Water Depth: Same
GPS Coord.: Same
Time: 14:30
Penetration depth: 11.5

Gear Deployment 3
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	25.74	DO (mg/L)	8.09	TDS (g/L)	8.1
Conductivity	1.30	Turbidity (NTU)	1	ORP (mV)	136
pH	7.52	Salinity (%)	0.75		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	25.56	DO (mg/L)	cc ~~8.35~~ 8.14	TDS (g/L)	9.3
Conductivity	1.51	Turbidity (NTU)	cc ~~[illegible]~~ 9	ORP (mV)	145
pH	7.54	Salinity (%)	0.88		

NOTES:

Sampler:

GM Tarrytown, NY
Gear Deployment Log

Station: 13
Date: 7-8-04
Sample Type: Sediment
Sample Number: Sed 13

Gear Deployment 1
Water Depth: 3.1 m
Time: 1520
GPS Coord.: 665053.9 819132.5
Penetration depth: 13 inches

Gear Deployment 2
Water Depth: Same
Time: 1536
GPS Coord.: Same
Penetration depth: 11.5 inches

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	25.99	DO (mg/L)	8.14	TDS (g/L)	8.6
Conductivity	1.39	Turbidity (NTU)	1-4	ORP (mV)	34
pH	7.58	Salinity (%)	0.81		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	25.99	DO (mg/L)	8.47	TDS (g/L)	8.7
Conductivity	1.40	Turbidity (NTU)	16-27	ORP (mV)	5
pH	7.57	Salinity (%)	0.81		

NOTES:

Sampler:

GM Tarrytown, NY
Gear Deployment Log

Station: 14
Date: 7-9-04
Sample Type: Sediment
Sample Number: Sed 14

Gear Deployment 1
Water Depth: 2.05 m
Time: 0845
GPS Coord.: 665211.6 819311.3
Penetration depth: 16 inches

Gear Deployment 2
Water Depth: Same
Time: 8:52
GPS Coord.: Same
Penetration depth: 16.75 inches

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1, 2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.93	DO (mg/L)	7.34	TDS (g/L)	8.8
Conductivity	1.44	Turbidity (NTU)	22.47	ORP (mV)	31
pH	7.42	Salinity (%)	0.81		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	24.80	DO (mg/L)	7.24	TDS (g/L)	9.2
Conductivity	1.54	Turbidity (NTU)	47.62	ORP (mV)	-6
pH	7.38	Salinity (%)	0.88		

NOTES:

Sampler: JK/CC

GM Tarrytown, NY
Gear Deployment Log

Station: 15
Date: 7-9-04
Sample Type: Sediment
Sample Number: Sed 15

Gear Deployment 1

Water Depth: 2.5 M
Time: 0915
GPS Coord.: 665382.9 819493.9
Penetration depth: 14.25 inches

Gear Deployment 2

Water Depth: Same
Time: 0920
GPS Coord.: Same
Penetration depth: 12.5 inches

Gear Deployment 3

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1/2 Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.86	DO (mg/L)	7.54	TDS (g/L)	9.1
Conductivity	1.46	Turbidity (NTU)	~~5~~ 15-99	ORP (mV)	39
pH	7.51	Salinity (%)	0.85		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.85	DO (mg/L)	7.69	TDS (g/L)	9.4
Conductivity	1.55	Turbidity (NTU)	200-250	ORP (mV)	113
pH	7.50	Salinity (%)	0.89		

NOTES:

Sampler: LH/CC

GM Tarrytown, NY
Gear Deployment Log

Station: 16
Date: 7/12/04
Sample Type: SED
Sample Number:

Gear Deployment 1
Water Depth: 3.2m
GPS Coord.: 664608.1 819149.9
Time: 0955
Penetration depth: 16.25"

Gear Deployment 2
Water Depth: Same
GPS Coord.: same
Time: 1002
Penetration depth: 14.75"

Gear Deployment 3
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	25.38	DO (mg/L)	7.30;32	TDS (g/L)	8.1
Conductivity	1.31	Turbidity (NTU)	0	ORP (mV)	170
pH	7.58	Salinity (%)	0.75		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	25.07	DO (mg/L)	6.72	TDS (g/L)	10.2
Conductivity	1.65	Turbidity (NTU)	0	ORP (mV)	18[illegible]
pH	7.47	Salinity (%)	0.97		

NOTES:

Sampler:

GM Tarrytown, NY
Gear Deployment Log

Station: 17
Date: 7/12/04
Sample Type: Sed
Sample Number:

Gear Deployment 1
Water Depth: 3.0 m
Time: 1035
GPS Coord.: 664755.4 819320.5
Penetration depth: 7"

Gear Deployment 2
Water Depth: 3.0m
Time: 1040
GPS Coord.: same
Penetration depth: 12"

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	25.34	DO (mg/L)	7.02	TDS (g/L)	8.1
Conductivity	1.30	Turbidity (NTU)	—	ORP (mV)	1.71
pH	7.55	Salinity (%)	0.75		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.96	DO (mg/L)	6.71	TDS (g/L)	10.3
Conductivity	1.68	Turbidity (NTU)	~~0~~	ORP (mV)	~~8~~ 182
pH	7.53	Salinity (%)	0.98		

NOTES:

Sampler:

GM Tarrytown, NY
Gear Deployment Log

Station: 18
Date: 7-9-04
Sample Type: Sediment
Sample Number: Sed 18

Gear Deployment 1
Water Depth: 3.4m
GPS Coord.: 664910.4, 819480.6
Time: 1345
Penetration depth: 18"

Gear Deployment 2
Water Depth: Same
GPS Coord.: Same
Time: 1350
Penetration depth: 15.5"

Gear Deployment 3
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	25.71	DO (mg/L)	7.98	TDS (g/L)	7.9
Conductivity	1.28	Turbidity (NTU)	8	ORP (mV)	37
pH	7.63	Salinity (%)	0.74		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	25.61	DO (mg/L)	8.04	TDS (g/L)	8.0
Conductivity	1.30	Turbidity (NTU)	260	ORP (mV)	24
pH	7.64	Salinity (%)	0.75		

NOTES:

Sampler: LY

GM Tarrytown, NY
Gear Deployment Log

Station: 19
Date: 7-9-04
Sample Type: Sediment
Sample Number: Sed 19

Gear Deployment 1

Water Depth: 2.2 m
Time: 1036
GPS Coord.: 665067.8 819662.7
Penetration depth: 19 inches

Gear Deployment 2

Water Depth: Same
Time: 1045
GPS Coord.: Same
Penetration depth: 16 inches

Gear Deployment 3

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	25.19	DO (mg/L)	7.88	TDS (g/L)	8.1
Conductivity	~~4.56~~ 1.29	Turbidity (NTU)	23-30	ORP (mV)	37
pH	7.56	Salinity (%)	~0.75		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	25.12	DO (mg/L)	7.90	TDS (g/L)	8.3
Conductivity	1.40	Turbidity (NTU)	56-100	ORP (mV)	15
pH	7.55	Salinity (%)	0.77		

NOTES:

Sampler: LS/CC

GM Tarrytown, NY
Gear Deployment Log

Station: 20
Date: 7/12/04
Sample Type: SED
Sample Number:

Gear Deployment 1
Water Depth: 3.5 m
Time: 1120
GPS Coord.: 664459.1 819509.0
Penetration depth: 15"

Gear Deployment 2
Water Depth: 3.5m
Time: 1135
GPS Coord.: Same
Penetration depth: 15.54

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	25.38	DO (mg/L)	7.43	TDS (g/L)	7.7
Conductivity	1.24	Turbidity (NTU)	–	ORP (mV)	134
pH	7.58	Salinity (%)	0.71		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	25.20	DO (mg/L)	7.09	TDS (g/L)	9.1
Conductivity	1.47	Turbidity (NTU)	–	ORP (mV)	140
pH	7.58	Salinity (%)	0.86		

NOTES:

Sampler: LY/GQ

GM Tarrytown, NY
Gear Deployment Log

Station: 21
Sample Type: Sediment
Date: 7-9-04
Sample Number: Sed 21

Gear Deployment 1
Water Depth: 4.95 m
Time: 1250
GPS Coord.: 664626.9 819685.3
Penetration depth: 10 inches

Gear Deployment 2
Water Depth: Same
Time: 1300
GPS Coord.: Same
Penetration depth: 16.75 inches

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	25.67	DO (mg/L)	7.80	TDS (g/L)	7.5
Conductivity	1.21	Turbidity (NTU)	7-10	ORP (mV)	27
pH	7.69	Salinity (%)	0.69		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	25.16	DO (mg/L)	7.63	TDS (g/L)	8.7
Conductivity	1.40	Turbidity (NTU)	17-22	ORP (mV)	8
pH	7.64	Salinity (%)	0.81		

NOTES:

Sampler:

GM Tarrytown, NY
Gear Deployment Log

Station: ~~SE~~ 22
Date: 7-9-04

Sample Type: Sediment
Sample Number: Sed 22

Gear Deployment 1
Water Depth: 3.7 m
GPS Coord.: 664763.1 819839.5
Time: 1159
Penetration depth: 17 inches

Gear Deployment 2
Water Depth: Same
GPS Coord.: Same
Time: 12:06
Penetration depth: 13.5 inches

Gear Deployment 3
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	25.46	DO (mg/L)	8.14	TDS (g/L)	7.7
Conductivity	1.25	Turbidity (NTU)	37-47	ORP (mV)	28
pH	7.59	Salinity (%)	0.71		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	25.41	DO (mg/L)	8.24	TDS (g/L)	7.9
Conductivity	1.26	Turbidity (NTU)	37-43	ORP (mV)	18
pH	7.57	Salinity (%)	0.73		

NOTES:

Sampler:

GM Tarrytown, NY
Gear Deployment Log

Station:	23	Sample Type:	SED
Date:	7/12/04	Sample Number:	

Gear Deployment 1 piston corer

Water Depth:	5.8 m	Time:	1220
GPS Coord.:	663837.3 819741.9	Penetration depth:	13.75"

Gear Deployment 2

Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Deployment 3

Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Deployment 4

Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Deployment 5

Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Used: 1) Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	25.54	DO (mg/L)	7.77	TDS (g/L)	7.0
Conductivity	1.14	Turbidity (NTU)	—	ORP (mV)	141
pH	7.74	Salinity (%)	0.64		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	25.48	DO (mg/L)	6.50	TDS (g/L)	9.7
Conductivity	1.70	Turbidity (NTU)	410	ORP (mV)	152
pH	7.43	Salinity (%)	0.89		

NOTES:

Sampler: LY/AQ

GM Tarrytown, NY
Gear Deployment Log

Station:	24	Sample Type:	SED
Date:	7/12/04	Sample Number:	

Gear Deployment 1

Water Depth:	3.8m 819	Time:	1342
GPS Coord.:	664140.9 ~~489~~849.9	Penetration depth:	15½"

Gear Deployment 2

Water Depth:	Same	Time:	1355
GPS Coord.:	Same	Penetration depth:	9.5"

Gear Deployment 3

Water Depth:	Same	Time:	1400.
GPS Coord.:	Same	Penetration depth:	10.75"

Gear Deployment 4

Water Depth:	Same	Time:	1410
GPS Coord.:	Same	Penetration depth:	10"

Gear Deployment 5

Water Depth:		Time:	
GPS Coord.:		Penetration depth:	~~TB~~

Gear Used: 1, 2, 3, 4 – Piston cores

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	25.57	DO (mg/L)	7.63	TDS (g/L)	7.2
Conductivity	1.15	Turbidity (NTU)	—	ORP (mV)	171
pH	7.64	Salinity (%)	0.66		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	25.22	DO (mg/L)	7.24	TDS (g/L)	9.4
Conductivity	1.48	Turbidity (NTU)	7	ORP (mV)	183
pH	7.61	Salinity (%)	0.87		

NOTES:

Sampler: LG/AQ

GM Tarrytown, NY
Gear Deployment Log

Station: 25
Date: 7/12/04
Sample Type: SED
Sample Number:

Gear Deployment 1

Water Depth: 5.75m
Time: 1500
GPS Coord.: 664398.3 819943.8
Penetration depth: 12"

Gear Deployment 2

Water Depth: Same
Time: 1515
GPS Coord.: Same
Penetration depth: 10"

Gear Deployment 3

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	25.42	DO (mg/L)	7.44	TDS (g/L)	7.7
Conductivity	1.26	Turbidity (NTU)	—	ORP (mV)	167
pH	7.68	Salinity (%)	0.72		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.81	DO (mg/L)	6.27	TDS (g/L)	11.1
Conductivity	1.79	Turbidity (NTU)	—	ORP (mV)	178
pH	7.43	Salinity (%)	1.07		

NOTES:

Sampler: [signature]

GM Tarrytown, NY
Gear Deployment Log

Station: 26
Date: 7/13/04
Sample Type: Sed
Sample Number:

Gear Deployment 1

Water Depth: 3.6 m
GPS Coord.: 664635.4 820022.1 ~~800~~
Time: 0932
Penetration depth: 15.5"

Gear Deployment 2

Water Depth: Same
GPS Coord.: Same
Time: 1045
Penetration depth: 18½"

Gear Deployment 3

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.47	DO (mg/L)	6.96	TDS (g/L)	7.9
Conductivity	1.28	Turbidity (NTU)	—	ORP (mV)	207
pH	7.58	Salinity (%)	0.75		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.19	DO (mg/L)	6.84	TDS (g/L)	9.7
Conductivity	1.58	Turbidity (NTU)	—	ORP (mV)	217
pH	7.54	Salinity (%)	0.92		

NOTES:

Sampler: LS/GQ

L:\laurie\gmtarrytown\gear deployment log

GM Tarrytown, NY
Gear Deployment Log

Station: 27 | Sample Type: Sed
Date: 7/13/04 | Sample Number:

Gear Deployment 1
Water Depth: 6.8 m | Time: 1037
GPS Coord.: 663774.4 820326.0 | Penetration depth: 12"

Gear Deployment 2
Water Depth: same | Time: 1055
GPS Coord.: Same | Penetration depth: 13 1/2"

Gear Deployment 3
Water Depth: | Time:
GPS Coord.: | Penetration depth:

Gear Deployment 4
Water Depth: | Time:
GPS Coord.: | Penetration depth:

Gear Deployment 5
Water Depth: | Time:
GPS Coord.: | Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.57	DO (mg/L)	6.86	TDS (g/L)	7.6
Conductivity	1.22	Turbidity (NTU)	/	ORP (mV)	144
pH	7.69	Salinity (%)	0.70		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	23.94	DO (mg/L)	5.63	TDS (g/L)	13.6
Conductivity	2.40	Turbidity (NTU)	280-670	ORP (mV)	190
pH	7.33	Salinity (%)	1.34		

NOTES:

Sampler: LH / GM

GM Tarrytown, NY
Gear Deployment Log

Station: 28
Date: 7/13/04
Sample Type: Sed
Sample Number:

Gear Deployment 1
Water Depth: 8.9m
Time: 1137
GPS Coord.: 664149.5 820288.1
Penetration depth: 8.5"

Gear Deployment 2
Water Depth: Same
Time: 1155
GPS Coord.: Same
Penetration depth: 15"

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.53	DO (mg/L)	6.9-7.12	TDS (g/L)	7.5
Conductivity	1.22	Turbidity (NTU)	—	ORP (mV)	164
pH	7.72	Salinity (%)	0.69		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	23.97	DO (mg/L)	5.67	TDS (g/L)	13.7
Conductivity	2.23	Turbidity (NTU)	—	ORP (mV)	176
pH	7.42	Salinity (%)	1.34		

NOTES:

Sampler: [illegible] / GR

GM Tarrytown, NY
Gear Deployment Log

Station: 29
Date: 7/13/04
Sample Type: SED
Sample Number:

Gear Deployment 1
Water Depth: 3.65
GPS Coord.: 664399.8 820274.3
Time: 1315
Penetration depth: 10.5"

Gear Deployment 2
Water Depth: Same
GPS Coord.: Same
Time: 1330
Penetration depth: 12"

Gear Deployment 3
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.44	DO (mg/L)	7.51	TDS (g/L)	8.1
Conductivity	1.31	Turbidity (NTU)	—	ORP (mV)	173
pH	~~7.7~~ 7.71	Salinity (%)	0.76		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.33	DO (mg/L)	~~6~~ 7.20	TDS (g/L)	9.7
Conductivity	1.66	Turbidity (NTU)	—	ORP (mV)	180
pH	7.55	Salinity (%)	0.94		

NOTES:

Sampler: [illegible]

GM Tarrytown, NY
Gear Deployment Log

Station: 30
Date: 7/13/04
Sample Type: Sed
Sample Number:

Gear Deployment 1
Water Depth: 2.0m
Time: 1402
GPS Coord.: 664 641.4 820258.5
Penetration depth: 11"

Gear Deployment 2
Water Depth: Same
Time: 1410
GPS Coord.: Same
Penetration depth: 13"

Gear Deployment 3
Water Depth: Same
Time: 1415
GPS Coord.: Same
Penetration depth: 13.75"

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2,3 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.36	DO (mg/L)	7.57	TDS (g/L)	8.0
Conductivity	1.29	Turbidity (NTU)	—	ORP (mV)	177
pH	7.72	Salinity (%)	0.74		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	24.34	DO (mg/L)	7.63	TDS (g/L)	7.9
Conductivity	1.28	Turbidity (NTU)	—	ORP (mV)	174
pH	7.73	Salinity (%)	0.74		

NOTES:

Sampler: LG/GQ

GM Tarrytown, NY
Gear Deployment Log

Station: 31
Date: 7/13/04
Sample Type: SED
Sample Number:

Gear Deployment 1
Water Depth: 1.55m
Time: 1445
GPS Coord.: 664669.1 820308.4
Penetration depth: 14"

Gear Deployment 2
Water Depth: Same
Time: 1455
GPS Coord.: Same
Penetration depth: 18½"

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.29	DO (mg/L)	7.73	TDS (g/L)	7.8
Conductivity	1.26	Turbidity (NTU)	—	ORP (mV)	74
pH	7.70	Salinity (%)	0.72		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	24.23	DO (mg/L)	8.14	TDS (g/L)	7.8
Conductivity	1.26	Turbidity (NTU)	—	ORP (mV)	62
pH	7.70	Salinity (%)	0.72		

NOTES:

Sampler: [signature]

GM Tarrytown, NY
Gear Deployment Log

Station: 32
Sample Type: sed
Date: 7/13/04
Sample Number:

Gear Deployment 1
Water Depth: 8.7m
Time: 1323
GPS Coord.: 664132.5 820674.2
Penetration depth: 18½"

Gear Deployment 2
Water Depth: Same
Time: 1535
GPS Coord.: Same
Penetration depth: 12"

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.65	DO (mg/L)	7.15	TDS (g/L)	7.9
Conductivity	1.27	Turbidity (NTU)	—	ORP (mV)	134
pH	7.69	Salinity (%)	0.73		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	23.79	DO (mg/L)	~~6.7~~ 5.82	TDS (g/L)	13.8
Conductivity	2.23	Turbidity (NTU)	—	ORP (mV)	159
pH	7.44	Salinity (%)	1.35		

NOTES:

Sampler:

GM Tarrytown, NY
Gear Deployment Log

Station: 33
Date: 7/14/04
Sample Type: SED
Sample Number:

Gear Deployment 1
Water Depth: 3.6m
Time: 0835
GPS Coord.: 664403.4 820674.9
Penetration depth: 17

Gear Deployment 2
Water Depth: Same
Time: 0837
GPS Coord.: Same
Penetration depth: 17

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.27	DO (mg/L)	7.43	TDS (g/L)	7.6
Conductivity	1.22	Turbidity (NTU)	—	ORP (mV)	189
pH	7.66	Salinity (%)	0.70		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.00	DO (mg/L)	7.58	TDS (g/L)	8.1
Conductivity	1.32	Turbidity (NTU)	—	ORP (mV)	197
pH	7.65	Salinity (%)	0.75		

NOTES:

Sampler: LG/GQ

GM Tarrytown, NY
Gear Deployment Log

Station: 34
Date: 7/14/04
Sample Type: SED
Sample Number:

Gear Deployment 1
Water Depth: 2.65
Time: 0900
GPS Coord.: 064670.6 820673.0
Penetration depth: 11.75"

Gear Deployment 2
Water Depth: Same
Time: 0905
GPS Coord.: Same
Penetration depth: 10"

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1/2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.07	DO (mg/L)	7.36	TDS (g/L)	7.8
Conductivity	1.25	Turbidity (NTU)	—	ORP (mV)	197
pH	7.59	Salinity (%)	0.72		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.03	DO (mg/L)	7.51	TDS (g/L)	7.8
Conductivity	1.26	Turbidity (NTU)	—	ORP (mV)	198
pH	7.50	Salinity (%)	0.72		

NOTES:

Sampler: LY/GQ

GM Tarrytown, NY
Gear Deployment Log

Station: 35
Date: 7/14/04
Sample Type: sed
Sample Number:

Gear Deployment 1

Water Depth: 2.45 m
Time: 0935
GPS Coord.: 664670.6 800869.6
Penetration depth: 16 1/2"

Gear Deployment 2

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 3

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1) Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.10	DO (mg/L)	7.44	TDS (g/L)	7.7
Conductivity	1.23	Turbidity (NTU)	—	ORP (mV)	90
pH	7.72	Salinity (%)	0.71		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.03	DO (mg/L)	7.58	TDS (g/L)	7.8
Conductivity	1.26	Turbidity (NTU)	—	ORP (mV)	~~27~~ 95
pH	7.68	Salinity (%)	0.72		

NOTES:

Sampler: LY/AR

GM Tarrytown, NY
Gear Deployment Log

Station: 36
Date: 7/14/04
Sample Type: Sed
Sample Number:

Gear Deployment 1
Water Depth: 2.4m
GPS Coord.: 664764.7 821012.4
Time: 1027
Penetration depth: 19½"

Gear Deployment 2
Water Depth: Same
GPS Coord.: Same
Time: 1033
Penetration depth: 12½"

Gear Deployment 3
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.17	DO (mg/L)	7.52	TDS (g/L)	7.6
Conductivity	1.22	Turbidity (NTU)	—	ORP (mV)	164
pH	7.72	Salinity (%)	0.70		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.11	DO (mg/L)	7.54	TDS (g/L)	7.7
Conductivity	1.25	Turbidity (NTU)	—	ORP (mV)	165
pH	7.70	Salinity (%)	0.71		

NOTES:

Sampler: LG/GQ

GM Tarrytown, NY
Gear Deployment Log

Station: 37
Date: 7/14/04
Sample Type: SED
Sample Number:

Gear Deployment 1

Water Depth: 1.3m
Time: 1055
GPS Coord.: 644946.3 821010.5
Penetration depth: 5"

Gear Deployment 2

Water Depth: Same
Time: 1100
GPS Coord.: Same
Penetration depth: 9½" refusal

Gear Deployment 3

Water Depth: Same
Time: 1121
GPS Coord.: Same
Penetration depth: 9½ (refusal)

Gear Deployment 4

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2,3 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.08	DO (mg/L)	7.93	TDS (g/L)	7.6
Conductivity	1.22	Turbidity (NTU)	—	ORP (mV)	171
pH	7.76	Salinity (%)	0.70		

2 Feet Above Sediment Surface: Observations: N/A Shallow

Temp. (°C)		DO (mg/L)		TDS (g/L)	
Conductivity		Turbidity (NTU)		ORP (mV)	
pH		Salinity (%)			

NOTES: Water was too shallow to take 2 readings

Sampler: LYL YQ

GM Tarrytown, NY
Gear Deployment Log

Station: 38
Date: 7/14/04
Sample Type: sed
Sample Number:

Gear Deployment 1

Water Depth: 2.15 m
GPS Coord.: 664746.4 821180.1
Time: 1147
Penetration depth: 14"

Gear Deployment 2

Water Depth: Same
GPS Coord.: Same
Time: 1157
Penetration depth: 13"

Gear Deployment 3

Water Depth: Same
GPS Coord.: Same
Time: 1202
Penetration depth: 12 3/4"

Gear Deployment 4

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2,3 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.18	DO (mg/L)	7.54	TDS (g/L)	7.7
Conductivity	1.23	Turbidity (NTU)	—	ORP (mV)	172
pH	7.69	Salinity (%)	0.71		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	23.98	DO (mg/L)	7.54	TDS (g/L)	8.3
Conductivity	1.44	Turbidity (NTU)	—	ORP (mV)	175
pH	7.62	Salinity (%)	0.78		

NOTES:

Sampler: [illegible]

GM Tarrytown, NY
Gear Deployment Log

Station: 39
Date: 7/14/04
Sample Type: sed
Sample Number:

Gear Deployment 1

Water Depth: 1.55m
Time: 1335
GPS Coord.: 664859.3 821151.1
Penetration depth: 6" refusal

Gear Deployment 2

Water Depth: Same
Time: 1345
GPS Coord.: Same
Penetration depth: 13"

Gear Deployment 3

Water Depth: Same
Time: 1350
GPS Coord.: Same
Penetration depth: 10"

Gear Deployment 4

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5

Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2,3 - piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.71	DO (mg/L)	8.44	TDS (g/L)	7.2
Conductivity	1.17	Turbidity (NTU)	-	ORP (mV)	81
pH	7.73	Salinity (%)	0.67		

2 Feet Above Sediment Surface: Observations: N/A

Temp. (°C)		DO (mg/L)		TDS (g/L)	
Conductivity		Turbidity (NTU)		ORP (mV)	
pH		Salinity (%)			

NOTES: Water was too shallow to take 2 readings

Sampler: LG/ AQ

L:\laurie\gmtarrytown\gear deployment log

GM Tarrytown, NY
Gear Deployment Log

Station: 40
Date: 7/15/04
Sample Type: sed
Sample Number:

Gear Deployment 1
Water Depth: 3.95m
Time: 0835
GPS Coord.: 666003.8 839565.3
Penetration depth: 18"

Gear Deployment 2
Water Depth: Same
Time: 0839
GPS Coord.: Same
Penetration depth: 16.5"

Gear Deployment 3
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 4
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Deployment 5
Water Depth:
Time:
GPS Coord.:
Penetration depth:

Gear Used: 1,2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.68	DO (mg/L)	7.36	TDS (g/L)	6.4
Conductivity	1.04	Turbidity (NTU)	—	ORP (mV)	218
pH	7.57	Salinity (%)	0.58		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.50	DO (mg/L)	7.43	TDS (g/L)	6.8
Conductivity	~~.0976~~	Turbidity (NTU)	—	ORP (mV)	226
pH	7.60	Salinity (%)	0.62		

NOTES:

Sampler: LG/GQ

GM Tarrytown, NY
Gear Deployment Log

Station	41	Sample Type	Sed
Date	7/15/04	Sample Number	

Gear Deployment 1

Water Depth:	~~3.85m~~	Time:	0925
GPS Coord.:	~~664855.0 841296.8~~	Penetration depth:	13½"

Gear Deployment 2

Water Depth:	3.95m	Time:	0935
GPS Coord.:	664852.5 841299.8	Penetration depth:	12"

Gear Deployment 3

Water Depth:	Same	Time:	0937
GPS Coord.:	Same	Penetration depth:	10.5"

Gear Deployment 4

Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Deployment 5

Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Used: 1, 2, 3 – Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.91	DO (mg/L)	7.49	TDS (g/L)	6.2
Conductivity	1.0	Turbidity (NTU)	–	ORP (mV)	208
pH	7.62	Salinity (%)	0.56		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.56	DO (mg/L)	8.04	TDS (g/L)	7.1
Conductivity	1.12	Turbidity (NTU)	–	ORP (mV)	216
pH	7.68	Salinity (%)	0.65		

NOTES:

Sampler: LY/GQ

GM Tarrytown, NY
Gear Deployment Log

Station: 42
Date: 7/15/04
Sample Type: Sed
Sample Number:

Gear Deployment 1			
Water Depth:	4.2m	Time:	1100
GPS Coord.:	664914.9 842619.9	Penetration depth:	13"

Gear Deployment 2			
Water Depth:	Same	Time:	1105
GPS Coord.:	Same	Penetration depth:	13"

Gear Deployment 3			
Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Deployment 4			
Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Deployment 5			
Water Depth:		Time:	
GPS Coord.:		Penetration depth:	

Gear Used: 1,2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	24.89	DO (mg/L)	7.51	TDS (g/L)	6.4
Conductivity	1.03	Turbidity (NTU)	—	ORP (mV)	199
pH	7.63	Salinity (%)	0.58		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	24.69	DO (mg/L)	7.93	TDS (g/L)	6.7
Conductivity	1.07	Turbidity (NTU)	—	ORP (mV)	207
pH	7.70	Salinity (%)	0.61		

NOTES:

Sampler: LG/GQ

GM Tarrytown, NY
Gear Deployment Log

Station: 43
Date: 7/15/04
Sample Type: Sed
Sample Number:

Gear Deployment 1
Water Depth: 3.7m
GPS Coord.: 662062.5 844387.6
Time: 1150
Penetration depth: ~~1300~~ 13"

Gear Deployment 2
Water Depth: none
GPS Coord.: none
Time: 1457
Penetration depth: 10½"

Gear Deployment 3
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5
Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston Corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - none

Temp. (°C)	24.82	DO (mg/L)	7.25	TDS (g/L)	6.6
Conductivity	1.06	Turbidity (NTU)	—	ORP (mV)	173
pH	7.64	Salinity (%)	0.60		

2 Feet Above Sediment Surface: Observations: none

Temp. (°C)	24.54	DO (mg/L)	7.58	TDS (g/L)	7.8
Conductivity	1.27	Turbidity (NTU)	—	ORP (mV)	180
pH	7.65	Salinity (%)	0.73		

NOTES:

Sampler: LY/GQ

GM Tarrytown, NY
Gear Deployment Log

Station: 44
Date: 7/15/04
Sample Type: Sed
Sample Number:

Gear Deployment 1

Water Depth: 3.15 m
GPS Coord.: 663439.3 845143.6
Time: 1343
Penetration depth: 10.5"

Gear Deployment 2

Water Depth: Same
GPS Coord.: Same
Time: 1347
Penetration depth: 12

Gear Deployment 3

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston Cores

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C)	25.34	DO (mg/L)	7.29	TDS (g/L)	6.4
Conductivity	S/m 1.03	Turbidity (NTU)	—	ORP (mV)	175
pH	7.70	Salinity (%)	0.58		

2 Feet Above Sediment Surface: Observations: None

Temp. (°C)	25.19	DO (mg/L)	8.07	TDS (g/L)	6.4
Conductivity	1.03	Turbidity (NTU)	—	ORP (mV)	181
pH	7.62	Salinity (%)	0.58		

NOTES:

Sampler: LG/GQ

GM Tarrytown, NY
Gear Deployment Log

Station: 45
Date: 7/15/04
Sample Type: Sed
Sample Number:

Gear Deployment 1

Water Depth: 3.15m
GPS Coord.: 663914.2 845408.6
Time: 1317
Penetration depth: 12"

Gear Deployment 2

Water Depth: Same
GPS Coord.: Same
Time: 1323
Penetration depth: 11"

Gear Deployment 3

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 4

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Deployment 5

Water Depth:
GPS Coord.:
Time:
Penetration depth:

Gear Used: 1,2 - Piston corer

Water Quality Readings:

2 Feet Below Surface Water: Observations - None

Temp. (°C) 25.48
DO (mg/L) 7.88
TDS (g/L) 6.4
Conductivity 1.04
Turbidity (NTU) –
ORP (mV) 177
pH 7.71
Salinity (%) 0.58

2 Feet Above Sediment Surface: Observations: None

Temp. (°C) 25.47
DO (mg/L) 8.21
TDS (g/L) 6.4
Conductivity 1.03
Turbidity (NTU) –
ORP (mV) 176
pH 7.71
Salinity (%) 0.58

NOTES:

Sampler: LG / GQ

ARCADIS

Appendix B

Sampling Logs 2006

SEDIMENT FIELD LOG

Station SED100
Equipment Ponar/Lexane
Date 9/20/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Sunny, 65F

SEDIMENT SAMPLE

Water Depth (ft) 6.5
Sample Depth (ft) 0.5

Sample Time 9:05am
Sample ID SED100

Description One additional mussel from a supplemental grab. Retained as SED100(0-6)BT (n=3). Plants(submerged eel grass). Medium sand, some fine sand/ gravel. No organic matter. One mussel from BBR1, one from BBR3

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED100

Sample Time 9:05am

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	8.84	23.1	0.5	256	7.81	8.68	20.3	0.01	none
Bottom	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical

SEDIMENT FIELD LOG

Station SED101
Equipment Ponar/Lexane
Date 9/20/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Sunny, 65F

SEDIMENT SAMPLE

Water Depth (ft) 9.9
Sample Depth (ft) 0.5

Sample Time 10:00am
Sample ID SED101

Description removed 1 mussel from BBR2 and one from the toxicity grab and one from a supplemental grab approximately 50% fine/ medium sand and 50% silt. Retained as SED101 (0-6)B (n=3)

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED101
Sample Time 10:00am

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.69	22.9	0.5	235	7.91	8.79	15.1	-0.08	none
Bottom	9.54	23	0.5	223	7.88	8.95	14.3	-0.04	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED102
Equipment Ponar/Lexane
Date 9/20/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Sunny, 65F

SEDIMENT SAMPLE

Water Depth (ft) 12
Sample Depth (ft) 0.5

Sample Time 11:00am
Sample ID SED102

Description 95% silt w/ 5% very fine organic, some relic shells and large cinders
no clams observed in 12 dredges.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED102
Sample Time 11:00am

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.41	23.3	0.4	209	7.87	8.12	13.8	-0.08	none
Bottom	18.9	23.1	0.5	202	7.81	10.2	13.6	-0.05	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED103
Equipment Ponar/Lexane
Date 9/20/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Sunny, 65F

SEDIMENT SAMPLE

Water Depth (ft) 12.5
Sample Depth (ft) 0.5

Sample Time 12:00pm
Sample ID SED103

Description 95% silt with 5% very fine organic. Some relic shells. 2 clams in BBR2.
no clams in remaining 6 dredges. Retained as SED103 (0-6)BT (n=2)

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED103
Sample Time 12:00pm

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.82	23.2	0.5	237	7.93	18.5	15.1	-0.34	none
Bottom	9.48	23	0.6	236	7.87	11.1	15	-0.23	none

SEDIMENT CORE

Water Depth 11.4
Core Penetration Depth 10.0
Core Length Recovered 7.9

Sample Time 10:15
Sample ID SED103

Depth (in)	Description/Observation	Analysis
0 - 6	Dark gray/brown very soft silt, little clay, trace fine sand, wet.	Select metals/TOC
6 - 34	Dark gray/brown soft clayey silt, trace organics (shells).	
34 - 95	Dark gray/brown clayey silt	

COMMENTS Geochronology core was also collected:

0 - 17 Dark gray/brown soft silt, little fine sand, trace organics (roots, shells), trace clay, wet.

17 - 86 Dark brown/black clayey silt, trace organics (shells)

Cesium - 137, Lead - 210 analyses were requested

SAMPLE DESTINATION

Laboratory: Columbia Analytical, Mass Spec
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED104
Equipment Ponar/Lexane
Date 9/21/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Oversight Sean Madden (NYSDEC)
Weather Windy, 65 F

SEDIMENT SAMPLE

Water Depth (ft) 15.2
Sample Depth (ft) 0.5

Sample Time 1:15
Sample ID SED104

Description SED104(NEW): 60% silt and 40% coarse organic material. Relic shells of oyster and zebra mussel. No mussels observed.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED104
Sample Time 1:15

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.97	22.1	0.5	189	8.06	9.5	11.7	0.6	none
Bottom	8.88	22.2	0.6	186	8.01	10.5	15.1	0.52	none

SEDIMENT CORE

Water Depth 14.8
Core Penetration Depth 10.0
Core Length Recovered 7.3

Sample Time 11:00
Sample ID SED104

Depth (in)	Description/Observation	Analysis
0 - 36	Dark brown/black very soft silt, little fine sand.	Select metals/TOC
36 - 88	Dark gray clayey silt, trace fine sand, trace organics (shells)	

COMMENTS water depth was 29 feet, much deeper. Moved. NYSDEC concurrence.
Geochronology core was also collected:
0 - 25 Dark brown/black soft silt, little organics (shells), trace fine to medium sand, trace clay.
25 - 56 Dark brown/black clayey silt, trace organics (shells)
Cesium - 137, Lead - 210 analyses were requested

SAMPLE DESTINATION

Laboratory: Columbia Analytical, Mass Spec
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED105
Equipment Ponar/Lexane
Date 9/21/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Oversight Sean Madden (NYSDEC)
Weather Windy, 65 F

SEDIMENT SAMPLE

Water Depth (ft) 10.7
Sample Depth (ft) 0.5

Sample Time 2:15
Sample ID SED105

Description

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED105
Sample Time 2:15

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.23	22.3	0.5	196	7.96	9.6	17.7	1.16	none
Bottom	9.94	22.2	0.5	185	7.89	9.7	18.7	1.08	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS water depth was 28', much deeper than near-site locations. Recommend moving location to new spot.
concurrence by NYSDEC oversight.
SED105(NEW): 75% silt with 10% fine organic and 10% silt. 5% shells
some small sheen producing globs
collected 2 mussels with clam rake. Retained for analysis as SED105(0-6) BT (n=2)

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED106
Equipment Ponar/Lexane
Date 9/20/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Sunny, 65F

SEDIMENT SAMPLE

Water Depth (ft) 12.5
Sample Depth (ft) 0.5

Sample Time 1:00pm
Sample ID SED106

Description 95% silt with 5% very fine organic. Some relic shells.
Clam in BBR1. No clams in remaining 6 dredges. Retained as SED106 (0-6)BT (n=1)

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED106

Sample Time 1:00pm

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.28	23.2	0.5	226	7.96	8.7	15.7	No Data	none
Bottom	9.77	23	0.6	222	7.9	10.1	15.4	No Data	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED107
Equipment Ponar/Lexane
Date 9/13/2006

Sample Type Sediment Sampling
Sampling Personnel D.Buys, J.Gutkowski, P.Doughee, A.Baird
R.Kapp, T.Merrall, S.O'Neil
Weather Overcast, Upper 60's F, windy (S to N),
white caps in afternoon

SEDIMENT SAMPLE

Water Depth (ft) 16.7
Sample Depth (ft) 0.5

Sample Time 15:30
Sample ID SED107

Description Recovery: 7cm. Silt and lots of clay (reason for shallow recovery). No vegetation observed. 1 biota tissue sample collected- 2 deep bodied clams (1-2 inches). 1 deep-bodied clam removed for tissue sample.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED107
Sample Time 15:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.58	22.3	0.8	237	8.02	13.3	10.5	-0.5	none
Bottom	10.43	22.3	0.8	215	8.01	13.4	14.2	-0.45	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED108
Equipment Ponar/Lexane
Date 9/18/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, J. Gukowski, A. Baird, P. Dougher, R. Kapp
Weather Sunny, 70 F

SEDIMENT SAMPLE

Water Depth (ft) 13.8
Sample Depth (ft) 0.5

Sample Time 14:30
Sample ID SED108

Description sediment: clay/silt, no odor/ sheen

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED108
Sample Time 14:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.17	24.2	0.5	266	7.72	8.22	11.5	0.59	none
Bottom	9.85	23.8	0.5	254	7.62	8.42	10.3	0.33	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED109
Equipment Ponar/Lexane
Date 9/13/2006

Sample Type Sediment Sampling
Sampling Personnel D.Buys, J.Gutkowski, P.Doughee, A.Baird
R.Kapp, T.Merrall, S.O'Neil
Weather Overcast, Upper 60's F, windy (S to N),
white caps in afternoon

SEDIMENT SAMPLE

Water Depth (ft) 13.3
Sample Depth (ft) 0.5

Sample Time 14:00
Sample ID SED109

Description Recovery: 10cm. Mostly silt. 1 biota tissue sample collected- 3 deep-bodied clams (1-2 inches).
1 deep-bodied clam removed for tissue sample. No vegetation observed in dredges.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED109
Sample Time 14:00

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.61	22.6	0.7	274	8.01	12.9	9.9	-0.88	none
Bottom	10.26	22.5	0.8	263	7.98	13.5	11.2	-0.4	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED110
Equipment Ponar/Lexane
Date 9/18/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, J. Gukowski, A. Baird, P. Dougher, R. Kapp
Weather Sunny, 70 F

SEDIMENT SAMPLE

Water Depth (ft) 11.9
Sample Depth (ft) 0.5

Sample Time 15:30
Sample ID SED110

Description clay with some silt; no odor/sheen

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED110
Sample Time 15:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.93	24.2	0.5	273	7.98	8.6	10.8	0.04	none
Bottom	9.83	24.1	0.5	260	7.99	8.6	12.5	0.02	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED111
Equipment Ponar/Lexane
Date 9/14/2006

Sample Type Sediment Sampling
Sampling Personnel D.Buys, J.Gutkowski, P.Doughee, A.Baird
S.O'Neil
Weather Overcast, rain, white caps on river with
1-2 foot swells

SEDIMENT SAMPLE

Water Depth (ft) 17.5
Sample Depth (ft) 0.5

Sample Time 8:15
Sample ID SED111

Description Recovery: 10cm. Mostly silt. No clams observed, no tissue sample collected
No vegetation observed in dredges. Sampling halted due to unsafe conditions on the river.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED111
Sample Time 8:15

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.7	22.1	0.8	176	7.99	13.2	9.8	-0.7	none
Bottom	9.8	21.7	0.8	163	8.03	13.4	10.2	-0.86	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical

SEDIMENT FIELD LOG

Station SED112
Equipment Ponar/Lexane
Date 9/13/2006

Sample Type Sediment Sampling
Sampling Personnel D.Buys, J.Gutkowski, P.Doughee, A.Baird
R.Kapp, T.Merrall, S.O'Neil
Weather Overcast, Upper 60's F, windy (S to N),
white caps in afternoon

SEDIMENT SAMPLE

Water Depth (ft) 13.5
Sample Depth (ft) 0.5

Sample Time 10:45
Sample ID SED112

Description Recovery- 13cm. Mostly silt with leaf litter, no vegetation observed in dredges. 1 biota tissue sample collected- 3 deep bodied clams (1-2 inches). 1 deep-bodied clam removed for tissue sample
Description continued in comments section below
Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED112
Sample Time 10:45

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.05	22.3	0.7	287	7.99	12.9	9.2	-0.12	none
Bottom	10.16	21.8	0.8	281	7.97	13.2	9.9	-0.35	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS 2 species mussels/ clams in Ponar dredges in limited number- the biggest kind deep-bodied, brown, with mostly square/round body (similar dimensions) and angular side. The other small, flat and whitish/ purple like shells seen yesterday.

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED113
Equipment Ponar/Lexane
Date 9/13/2006

Sample Type Sediment Sampling
Sampling Personnel D.Buys, J.Gutkowski, P.Doughee, A.Baird R.Kapp, T.Merrall, S.O'Neil
Weather Overcast, Upper 60's F, windy (S to N), white caps in afternoon

SEDIMENT SAMPLE

Water Depth (ft) 4.6
Sample Depth (ft) 0.5
Sample Time 10:00
Sample ID SED113

Description Recovery: 9cm. Sand and gravel sediment. No organisms in three 5mm sieve - no tissue sample collected. 1 sprig of wild celery (eel grass) in one dredge; no vegetation in 1 rake toss

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED113
Sample Time 10:00

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.63	21.7	0.8	245	7.92	13.6	12.3	-0.11	none
Bottom	9.54	21.7	0.8	237	7.91	13.7	11.1	-0.2	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A
Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED114
Equipment Ponar/Lexane
Date 9/13/2006

Sample Type Sediment Sampling
Sampling Personnel D.Buys, J.Gutkowski, P.Doughee, A.Baird
R.Kapp, T.Merrall, S.O'Neil
Weather Overcast, Upper 60's F, windy (S to N),
white caps in afternoon

SEDIMENT SAMPLE

Water Depth (ft) 5.9
Sample Depth (ft) 0.5

Sample Time 9:15
Sample ID SED114

Description Recovery: 75% -10cm. Silt on top of sand and gravel sediment
No organisms in one 5mm sieve-no tissue sample collected. No vegetation observed in dredges.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED114
Sample Time 9:15

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.63	21.7	0.8	210	7.84	14.5	8	0.08	none
Bottom	9.54	21.7	0.9	190	7.79	15.6	12	0.04	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED115
Equipment Ponar/Lexane
Date 9/12/2006

Sample Type Sediment Sampling
Sampling Personnel D.Buys, J.Gutkowski, P.Doughee, A.Baird
Weather Sunny, low 60's F

SEDIMENT SAMPLE

Water Depth (ft) 9.3
Sample Depth (ft) 0.5

Sample Time 15:20
Sample ID SED115

Description Estimated recovery in dredges: 90-95%-12cm. Sediment- mostly silt with some fine sand One dredge sieved (5mm) for tissue organisms but none observed. Observations also made in benthic community dredges. No vegetation observed in dredges.
Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED115
Sample Time 15:20

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.1	23.1	0.8	210	7.84	14.5	8	0.08	none
Bottom	8.84	22.7	0.9	190	7.79	15.6	12	0.04	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED116
Equipment Ponar/Lexane
Date 9/12/2006

Sample Type Sediment Sampling
Sampling Personnel D.Buys, J.Gutkowski, P.Doughee, A.Baird
Weather Sunny, low 60's F

SEDIMENT SAMPLE

Water Depth (ft) 9.8
Sample Depth (ft) 0.5

Sample Time 13:30
Sample ID SED116

Description Estimated recovery in dredges: 95-100%.-13cm. Sediment - mostly silt with lots of leaf litter.
One dredge sieved (5mm) for tissue organisms but none observed. Each Ponar sieved 3 times
No vegetation observed in dredges.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis Grain Size

WATER QUALITY

Sample ID SED116
Sample Time 13:00

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10	23	0.8	241	7.84	14.3	10.3	0.18	none
Bottom	10	22.9	0.8	227	7.64	14.2	10.2	0.46	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED117
Equipment Ponar/Lexane
Date 9/18/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, J. Gukowski, A. Baird, P. Dougher, R. Kapp
Weather Sunny, 70 F

SEDIMENT SAMPLE

Water Depth (ft) 8.0'
Sample Depth (ft) 0.5
Sample Time 16:30
Sample ID SED117

Description sediment was predominantly detritus (leaf, sticks) with relic shells and some silt and sand

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED117
Sample Time 16:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	11.09	24.5	0.5	280	7.86	9.13	74.3	0.34	none
Bottom	10.64	24.5	0.6	271	7.7	9.79	11.4	0.31	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A
Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED118
Equipment Ponar/Lexane
Date 9/19/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Overcast, 70F

SEDIMENT SAMPLE

Water Depth (ft) 13.9'
Sample Depth (ft) 0.5
Sample Time 8:30
Sample ID SED118

Description sediment was coarse sand/ gravels with relic shells. <5% silt and organic matter. Pulled 12 grabs with no mussels observed.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED118
Sample Time 8:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.76	23.3	0.5	2.83	7.92	9.8	13.1	-0.67	none
Bottom	9.71	23.3	0.6	271	7.87	10.2	15.3	-0.37	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A
Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED119
Equipment Ponar/Lexane
Date 9/21/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Oversight Sean Madden (NYSDEC)
Weather Windy, 65 F

SEDIMENT SAMPLE

Water Depth (ft) 21.4
Sample Depth (ft) 0.5

Sample Time 11:30
Sample ID SED119

Description 70% silt/ clay with 10% sand and 20% fine organic (detritus). No mussels in 6 grabs
Some relic oyster shells and intermittent sheen globules. No tissue samples collected

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED119
Sample Time 11:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.6	21.5	0.6	101	7.91	11.2	18.7	-0.42	none
Bottom	9.64	21.3	0.6	92	7.85	11.2	15.8	-0.5	none

SEDIMENT CORE

Water Depth 18.1
Core Penetration Depth 10
Core Length Recovered 8.1

Sample Time 12:30
Sample ID SED119

Depth (in)	Description/Observation	Analysis
0 - 3	Dark black/brown very soft silt, little fine to course sand, trace organics (shells), wet	Select metals/TOC
3 - 98	Dark gray/black fine to course sand, trace silt, trace organics (shells)	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED120
Equipment
Date 10/4/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, J. Gutkowski, P. Daugher
Weather Sunny, 65º F

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID SED120

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID SED120
Sample Time 12:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.46	20.9	0.5	2.55	6.83	9.70	18.4	-1.00	
Bottom	9.57	20.8	0.6	2.57	6.19	10.7	34.5	-0.4	

SEDIMENT CORE

Water Depth (ft)
Core Penetration Depth (ft)
Core Length Recovered (ft)

Sample Time 15:30
Sample ID SED120

Depth (in)	Description/Observation	Analysis
0 - 6	Silt over black silty sand, silt, course sand, sheen, septic odor.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED121
Equipment Ponar/Lexane
Date 9/19/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Overcast, 70F

SEDIMENT SAMPLE

Water Depth (ft) 15.8
Sample Depth (ft) 0.5

Sample Time 9:10
Sample ID SED121

Description sediment was light silt with 10% fine organic matter. Slight sheen. 1 clam was observed in 10 grabs. Retained for analysis.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED121
Sample Time 9:10

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.87	23.3	0.6	278	7.97	10.3	14.5	-0.44	none
Bottom	9.77	23.3	0.6	271	7.92	10.5	13.2	-0.45	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED122
Equipment Ponar
Date 10/10/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, P. Dougher, J. Gutkowski, R. Kipp
Weather Sunny, calm, 75ºF

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID SED122

Sample Time 14:45

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.39	20.0	0.5	255.00	8.16	9.40	10.6	-	
Bottom	9.41	19.4	0.6	252.00	8.14	11.20	19.9	-	

SEDIMENT CORE

Water Depth (ft)
Core Penetration Depth (ft)
Core Length Recovered (ft)

Sample Time 14:45
Sample ID SED122

Depth (in)	Description/Observation	Analysis
0 - 6	Silt with live oysters, silt, organics (shells), sand, no odor, no sheen.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED123
Equipment Ponar/Lexane
Date 9/19/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Overcast, 70F

SEDIMENT SAMPLE

Water Depth (ft) 17.4
Sample Depth (ft) 0.5

Sample Time 14:05
Sample ID SED123

Description Sediment was light silt with ~5% fine organic matter. No sheen. No clams observed.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED123
Sample Time 14:05

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.93	23.5	0.6	283	7.99	10.4	14.5	1.05	none
Bottom	7.64	22.5	1	279	7.82	16.8	15.6	0.3	none

SEDIMENT CORE

Water Depth 16
Core Penetration Depth 10
Core Length Recovered 8.7

Sample Time 13:30
Sample ID SED123

Depth (ft)	Description/Observation	Analysis
0 - 72	Soft dark brown clayey silt, trace fine sand, trace organics (shells)	Select metals/TOC
72 - 120	Dark gray/brown fine to course sand, little silt, trace clay, trace organics (shells)	

COMMENTS Geochronology core was also collected:

0 - 8	Dark gray/brown very soft silt, trace clay.
8 - 75	Dark gray/brown clayey silt.
75 - 104	Dark gray/brown clayey silt, light fine sand, trace organics (shells)

Cesium-137, Lead-210 analyses requested

SAMPLE DESTINATION

Laboratory: Columbia Analytical, Mass Spec
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED124
Equipment Ponar/Lexane
Date 9/19/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Overcast, 70F

SEDIMENT SAMPLE

Water Depth (ft) 10.5
Sample Depth (ft) 0.5

Sample Time 10:30
Sample ID SED124

Description sediment was light silt with ~ 10% fine organic matter, slight sheen, no odor, 1 clam observed in 10 grabs. Retained for analysis.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED124
Sample Time 10:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.01	23.2	0.6	287	7.98	10.5	12.9	-0.02	none
Bottom	9.69	23.2	0.6	282	7.97	10.7	13.4	-0.09	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED125
Equipment
Date 10/4/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, J. Gutkowski, P. Daugher
Weather Sunny, 65º F

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID SED125

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID SED125
Sample Time 15:00

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.87	21.5	0.5	2.53	7.14	9.00	13.8	-0.42	
Bottom	9.16	20.9	0.6	2.55	6.95	10.70	30.7	-0.39	

SEDIMENT CORE

Water Depth (ft)
Core Penetration Depth (ft)
Core Length Recovered (ft)
Sample Time
Sample ID

Depth (in)	Description/Observation	Analysis

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED126
Equipment Vibracore
Date 10/4/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, J. Gutkowski, P. Daugher
Weather Sunny, 65º F

SEDIMENT SAMPLE

Water Depth (ft) 4.0
Sample Depth (ft)

Sample Time
Sample ID SED126 (0-6) BT

Description Weighed 13g, 33cm long

Chemical Analysis tissue
Biological Analysis clam
Other Analysis

WATER QUALITY

Sample ID SED126

Sample Time 13:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.22	21.6	0.6	1.51	6.96	11.1	18.7	0.05	
Bottom	9.78	21.8	0.6	1.6	6.8	10.7	26	0	

SEDIMENT CORE

Water Depth (ft)
Core Penetration Depth (ft)
Core Length Recovered (ft)

Sample Time 13:30
Sample ID SED126

Depth (in)	Description/Observation	Analysis
0 - 6	Silt, fine sand, brick, glass, no odor, no sheen.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED127
Equipment Ponar/Lexane
Date 9/19/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Overcast, 70F

SEDIMENT SAMPLE

Water Depth (ft) 11.8
Sample Depth (ft) 0.5

Sample Time 13:00
Sample ID SED127

Description sediment was light silt with ~ 5% fine organic matter, small sheen- emitting globules in each no clams observed.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED127
Sample Time 13:00

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.06	23.6	0.8	286	8	10.6	17.8	0.42	none
Bottom	8.42	22.9	0.9	279	7.92	14.7	18.9	0.37	none

SEDIMENT CORE

Water Depth 12.0
Core Penetration Depth 10.0
Core Length Recovered 9.5

Sample Time 10:00
Sample ID SED127

Depth (ft)	Description/Observation	Analysis
0 - 82	Dark gray/brown soft silt, little organics (roots, vegetation, shells).	Select metals/TOC
82 - 114	Dark gray/brown silt, some fine to medium sand, trace organics (roots, vegetation, shells)	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED128
Equipment Ponar/Lexane
Date 9/19/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Overcast, 70F

SEDIMENT SAMPLE

Water Depth (ft) 7.8
Sample Depth (ft) 0.5

Sample Time 11:45
Sample ID SED128

Description sediment was light silt with ~ 5% fine organic matter. Small sheen- emitting globules in each.
no clams observed.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED128
Sample Time 11:45

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.95	23.9	0.6	274	8.09	10.5	12.4	0.52	none
Bottom	10.67	23.7	0.6	263	8.08	10.8	13.5	0.48	none

SEDIMENT CORE

Water Depth 7.0
Core Penetration Depth 9.0
Core Length Recovered 6.0

Sample Time 9:30
Sample ID SED128

Depth (ft)	Description/Observation	Analysis
0 - 24	Dark gray/brown soft silt,, trace fine sand, trace organics (vegeation).	Select metals/TOC
24 - 72	Dark gray/brown silt, trace fine to medium sand, trace organics (shells).	

COMMENTS Geochronology core was also collected:
0 - 24 Dark brown very soft silt, little organics (vegetation, shells), trace clay.
24 - 72 Dark gray/brown clayey silt, trace organics (shells), trace fine to medium sand.

Cesium-137, Lead-210 analyses requested

SAMPLE DESTINATION

Laboratory: Columbia Analytical, Mass Spec
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED129
Equipment Tech Vibracore
Date 10/10/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, P. Dougher, J. Gutkowski, R. Kipp
Weather Sunny, calm, 75ºF

SEDIMENT SAMPLE

Water Depth (ft) 11
Sample Depth (ft)

Sample Time 10:30
Sample ID SED129 (0-6) BT

Description weighed 19 g, 3.7 cm long

Chemical Analysis tissue
Biological Analysis clam
Other Analysis

WATER QUALITY

Sample ID SED 129
Sample Time 10:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.77	19.4	0.6	269.00	8.20	8.64	30.1	-	
Bottom	9.64	19.2	0.5	262.00	8.32	9.41	28.9	-	

SEDIMENT CORE

Water Depth (ft) 11.0
Core Penetration Depth (ft)
Core Length Recovered (ft)

Sample Time 10:30
Sample ID SED129

Depth (in)	Description/Observation	Analysis
0 - 6	Silt over clay, fine organics, coarse sand.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED130
Equipment Tech Vibracore
Date 10/10/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, P. Dougher, J. Gutkowski, R. Kipp
Weather Sunny, calm, 75ºF

SEDIMENT SAMPLE

Water Depth (ft) 9
Sample Depth (ft)

Sample Time 10:45
Sample ID SED130 (0-6) BT

Description Weighed 6 g, 2.4 cm long

Chemical Analysis tissue
Biological Analysis clam
Other Analysis

WATER QUALITY

Sample ID SED 130
Sample Time 10:45

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.66	19.3	0.6	245.00	8.11	9.04	22.3	-	
Bottom	9.84	19.1	0.5	233.00	8.14	9.70	25.7	-	

SEDIMENT CORE

Water Depth (ft) 9.0
Core Penetration Depth (ft)
Core Length Recovered (ft)

Sample Time 10:45
Sample ID SED130

Depth (in)	Description/Observation	Analysis
0 -6	Silt over clay, fine organics, course sand, slight sheen, slight odor.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED131
Equipment
Date 10/10/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, P. Dougher, J. Gutkowski, R. Kipp
Weather Sunny, calm, 75ºF

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID SED131
Sample Time 12:45

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.78	19.6	0.6	178.00	8.09	9.05	22.1	-	
Bottom	9.83	19.6	0.5	173.00	8.08	8.90	20.8	-	

SEDIMENT CORE

Water Depth (ft) 10.0
Core Penetration Depth (ft)
Core Length Recovered (ft)
Sample Time 12:45
Sample ID SED131

Depth (in)	Description/Observation	Analysis
0 - 6	Silt over clay, fine organics, slight sheen, no odor.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED132
Equipment
Date 10/10/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, P. Dougher, J. Gutkowski, R. Kipp
Weather Sunny, calm, 75ºF

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID SED 132
Sample Time 13:00

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.28	9.6	0.6	203.00	8.11	9.23	35.4	-	
Bottom	9.56	19.5	0.5	198.00	8.11	9.27	36.9	-	

SEDIMENT CORE

Water Depth (ft) 11.3
Core Penetration Depth (ft)
Core Length Recovered (ft)
Sample Time 13:00
Sample ID SED132

Depth (in)	Description/Observation	Analysis
0 - 6	Silt over clay, fine organics, course sand, slight sheen.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED133
Equipment Vibracore
Date 10/5/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, J. Gutkowski, P. Dougher
Weather Overcast, 60º, moderate wind

SEDIMENT SAMPLE

Water Depth (ft) 6.8
Sample Depth (ft)

Sample Time 15:30
Sample ID SED133 (0-6) BT

Description Weighed 45g, 5.5cm long

Chemical Analysis tissue
Biological Analysis clam
Other Analysis

WATER QUALITY

Sample ID SED133
Sample Time 15:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	11.00	20.7	0.5	3.14	7.85	9.14	17.9	-	
Bottom	10.93	20.8	0.5	3.15	7.50	9.17	19.8	-	

SEDIMENT CORE

Water Depth (ft) 6.8
Core Penetration Depth (ft)
Core Length Recovered (ft)

Sample Time 15:30
Sample ID SED133

Depth (in)	Description/Observation	Analysis
0 - 6	Soft silt over clay, trace organics (shells), some odor, sheen.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED134
Equipment Tech Vibracore
Date 10/5/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, J. Gutkowski, P. Dougher
Weather Overcast, 60º, moderate wind

SEDIMENT SAMPLE

Water Depth (ft) 5
Sample Depth (ft)

Sample Time 16:00
Sample ID SED134 (0-6) BT

Description Weighed 14g, 3.5cm long

Chemical Analysis tissue
Biological Analysis clam
Other Analysis

WATER QUALITY

Sample ID SED134
Sample Time 16:00

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.96	20.7	0.5	2.90	8.09	9.12	17.3	-	
Bottom	10.89	20.7	0.5	2.87	8.01	9.16	16.1	-	

SEDIMENT CORE

Water Depth (ft) 5
Core Penetration Depth (ft)
Core Length Recovered (ft)

Sample Time 16:00
Sample ID SED134

Depth (in)	Description/Observation	Analysis
0 - 6	Soft silt over clay, trace organics (shells),	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED135
Equipment Vibracore
Date 10/5/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, J. Gutkowski, P. Dougher
Weather Overcast, 60º, moderate wind

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID
Description
Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID SED135
Sample Time 17:00

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.98	20.7	0.5	213.00	8.21	9.05	18.3	-	
Bottom	10.95	20.7	0.5	200.00	8.13	9.05	18.3	-	

SEDIMENT CORE

Water Depth (ft) 5.9
Core Penetration Depth (ft)
Core Length Recovered (ft)
Sample Time 17:00
Sample ID SED135

Depth (in)	Description/Observation	Analysis
0 - 6	Soft silt over sand, some organics (shells), no sheen.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex
Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED136
Equipment Vibracore
Date 10/10/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, P. Dougher, J. Gutkowski, R. Kipp
Weather Sunny, calm, 75ºF

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID SED136

Sample Time 16:00

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.91	19.7	0.6	209.00	8.13	9.90	32.0	-	
Bottom	10.29	19.6	0.6	204.00	8.16	11.50	39.8	-	

SEDIMENT CORE

Water Depth (ft) 11.8
Core Penetration Depth (ft)
Core Length Recovered (ft)

Sample Time 16:00
Sample ID SED136

Depth (in)	Description/Observation	Analysis
0 - 6	Silt over clay/sand, silt, fine organics, coarse sand, slight sheen, no odor.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED137
Equipment Ponar
Date 10/10/2006

Sample Type Sediment Sampling
Sampling Personnel A. Baird, P. Dougher, J. Gutkowski, R. Kipp
Weather Sunny, calm, 75ºF

SEDIMENT SAMPLE

Water Depth (ft) 13
Sample Depth (ft)

Sample Time 13:15
Sample ID SED 137 (0-6) BT

Description Weighed 12 g, 3.2 cm long

Chemical Analysis tissue
Biological Analysis clam
Other Analysis

WATER QUALITY

Sample ID SED137
Sample Time 13:15

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.07	19.4	0.6	224.00	8.12	10.60	28.1	-	
Bottom	9.36	19.3	0.6	214.00	8.17	10.70	38.3	-	

SEDIMENT CORE

Water Depth (ft) 13
Core Penetration Depth (ft)
Core Length Recovered (ft)

Sample Time 13:15
Sample ID SED137

Depth (in)	Description/Observation	Analysis
0 - 6	Silt over clay/sand, silt/clay, course sand, fine organics, slight sheen.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED138
Equipment Ponar/Lexane
Date 9/21/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Oversight Sean Madden (NYSDEC)
Weather Windy, 65 F

SEDIMENT SAMPLE

Water Depth (ft) 21.8
Sample Depth (ft) 0.5

Sample Time 10:30
Sample ID SED138

Description 70% silt, 5% sand, 15% relic oyster shells. No mussels observed in 6 dredge attempts. Also, no empty mussel shells. No tissue samples collected. Observed thread-like material and approximately 10% cinders.

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED138
Sample Time 10:30

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	9.13	27.1	0.7	232	7.88	12.7	13.7	-0.1	none
Bottom	8.73	22.2	0.8	229	7.82	13.5	12.3	-0.83	none

SEDIMENT CORE

Water Depth 20.1
Core Penetration Depth 10.0
Core Length Recovered 9.5

Sample Time 10:30
Sample ID SED138

Depth (in)	Description/Observation	Analysis
0 - 53	Dark gray/brown soft silt, light fine sand, trace organics (roots, vegetation).	Select metals/TOC
53 - 114	Dark gray/brown silt, some vlay, little fine to medium sand, trace organics (shells).	

COMMENTS Geochronology core was also collected:

0 - 31	Dark black soft silt, light fine to medium sand, trace organics (shells).
31 - 108	Dark gray/brown silt, light clay, trace organics (roots, vegetation, shells).

Cesium-137, Lead-211 analyses were requested

SAMPLE DESTINATION

Laboratory: Columbia Analytical, Mass Spec
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED139
Equipment Ponar/Lexane
Date 9/20/2006

Sample Type Sediment Sampling
Sampling Personnel D. Rigg, P. Dougher, J. Gutkowski
Weather Sunny, 65F

SEDIMENT SAMPLE

Water Depth (ft) 7.8
Sample Depth (ft) 0.5

Sample Time 2:15
Sample ID SED139

Description 95% hard clay. Some silt and very little organic matter (<1%)
No mussels observed in 10 sediment grabs

Chemical Analysis 2 0-6" Lexan cores for select TAL metals/TOC
Biological Analysis 3 Ponar grabs for benthic community
Other Analysis 2 Ponar grabs for toxicity and grain, 1 extra ponar for tissue observations

WATER QUALITY

Sample ID SED139
Sample Time 2:15

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface	10.43	22.9	0.6	236	8	11	22.2	0.97	none
Bottom	10.19	22.9	0.6	239	7.97	11.3	23	0.86	none

SEDIMENT CORE

Water Depth N/A
Core Penetration Depth N/A
Core Length Recovered N/A

Sample Time N/A
Sample ID N/A

Depth (in)	Description/Observation	Analysis
N/A		

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED140
Equipment Vibracore
Date 10/5/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID
Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 6.3
Core Penetration Depth (ft) 2.5
Core Length Recovered (ft) 1.5
Sample Time 9:30
Sample ID SED140

Depth (in)	Description/Observation	Analysis
0 - 13	Dark brown/black silt, some fine to medium sand, trace organics (roots)	Casium - 137, Lead - 210
13 - 18	Red fine to medium sand, some fine to course gravel, trace organics (shells).	

COMMENTS

SAMPLE DESTINATION

Laboratory: Mass Spec
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED141
Equipment Vibracore
Date 10/5/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID

Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 8.4
Core Penetration Depth (ft) 10.0
Core Length Recovered (ft) 7.0

Sample Time 9:00
Sample ID SED141

Depth (in)	Description/Observation	Analysis
0 - 41	Dark brown/black silt, trace fine sand, trace organics (roots).	Select Metals/TOC
41 - 84	Dark brown/black silt, little fine to medium sand, trace clay, trace organics (roots, shells)	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED142
Equipment Tech Vibracore
Date 10/5/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID

Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 10.5
Core Penetration Depth (ft) 10.0
Core Length Recovered (ft) 6.5

Sample Time 8:30
Sample ID SED142

Depth (in)	Description/Observation	Analysis
0 - 41	Dark gray/brown soft silt, little fine to medium sand.	Select Metals/TOC
41 - 78	Dark gray/brown fine to course sand, some silt, little fine to medium gravel, trace organics (shells)	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED143
Equipment Vibracore
Date 10/5/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID

Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 4.8
Core Penetration Depth (ft) 4.0
Core Length Recovered (ft) 3.5

Sample Time 10:45
Sample ID SED143

Depth (in)	Description/Observation	Analysis
0 - 19	Dark brown/black fine to course sand, some silt, trace organics (roots, shells), trace fine gravel, sheen, slight odor	Select Metals/TOC
19 -29	Dark brown/black fine to course sand, some fine to medium gravel, light silt, trace organics (shells)	
29 - 42	Dark brown/black clayey silt, some fine to course gravel, trace organics (shells).	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED144
Equipment Vibracore
Date 10/6/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID
Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 8.0
Core Penetration Depth (ft) 10.0
Core Length Recovered (ft) 8.8

Sample Time 10:15
Sample ID SED144

Depth (in)	Description/Observation	Analysis
0 - 36	Dark brown/black silt, some clay, little fine to course sand, trace organics (roots).	Select Metals/TOC
36 - 86	Dark gray/red silt, some fine to course sand, trace organics (roots)	
86 - 106	Gray fine to course sand, light silt, trace organics (roots, shells)	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED145
Equipment Vibracore
Date 10/5/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID

Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 10.5
Core Penetration Depth (ft) 10.0
Core Length Recovered (ft) 6.5

Sample Time 8:15
Sample ID SED145

Depth (in)	Description/Observation	Analysis
0 - 43	Dark brown soft silt, trace fine sand, trace organics(shells).	Select Metals/TOC
43 - 78	Dark brown/black silt, little clay, trace organics (shells).	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED146
Equipment Vibracore
Date 10/5/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID

Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 5.5
Core Penetration Depth (ft) 3.8
Core Length Recovered (ft) 2.3

Sample Time 12:00
Sample ID SED146

Depth (in)	Description/Observation	Analysis
0 - 17	Dark brown/black soft silt, little fine sand, trace organics (roots)	Select Metals/TOC
17 - 27	Dark brown/black fine to course sand, some silt, trace organics (shells).	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED147
Equipment Vibracore
Date 10/10/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird,
Weather

SEDIMENT SAMPLE
Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID
Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY
Sample ID
Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE
Water Depth (ft) 5.6
Core Penetration Depth (ft)
Core Length Recovered (ft) 1.1
Sample Time 15:30
Sample ID SED147

Depth (in)	Description/Observation	Analysis
0 - 3	Cobble/fine to course gravel	Water content, atterberg limits, TOC,
3 - 13	Dark gray/black fine to course sand, some silt, little fine to course gravel.	specific gravity, grain size, buck density

COMMENTS

SAMPLE DESTINATION
Laboratory: Columbia Analytical
Delivered Via: Fed Ex
Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED149
Equipment Vibracore
Date 10/6/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID
Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 9.0
Core Penetration Depth (ft) 10.0
Core Length Recovered (ft) 7.8

Sample Time 10:45
Sample ID SED149

Depth (in)	Description/Observation	Analysis
0 - 24	Dark brown/black very soft silt, trace organics (roots).	Select Metals/TOC
24 - 49	Dark brown/black silt, little fine to medium sand, trace organics(shells), trace clay.	
49 - 94	Gray/red clayey silt, little fine to course sand, trace organics (shells, slight odor.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED150
Equipment Vibracore
Date 10/10/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird,
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID

Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 8.7
Core Penetration Depth (ft) 10.0
Core Length Recovered (ft) 7.5

Sample Time 15:45
Sample ID SED 150

Depth (in)	Description/Observation	Analysis
0 - 72	Dark gray/black soft silt, light fine sand, trace organics (roots, shells).	Water content, atterberg limits, TOC,
72 - 90	Dark gray/brown fine to medium sand, light silt, trace organics (shells).	specific gravity, grain size, buck density

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED151
Equipment Vibracore
Date 10/6/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID
Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 10.6
Core Penetration Depth (ft) 10.0
Core Length Recovered (ft) 8.3

Sample Time 10:30
Sample ID SED151

Depth (in)	Description/Observation	Analysis
0 - 46	Dark gray/brown soft silt, trace organics (shells).	Select Metals/TOC
46 - 68	Dark gray/brown/red clayey silt trace organics (roots).	
68 - 99	Dark gray/black clayey silt, little organics (roots, shells), trace fine to medium sand.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED152
Equipment Vibracore
Date 10/6/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID

Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 8.0
Core Penetration Depth (ft) 10.0
Core Length Recovered (ft) 7.0

Sample Time 12:30
Sample ID SED152

Depth (in)	Description/Observation	Analysis
0 - 16	Dark brown silt, some fine to course sand, little fine to course gravel.	Select Metals/TOC
16 - 22	Brick, slight odor.	
22 - 34	Dark brown/black fine to course sand, some silt, trace glass fragments, slight odor.	
34 - 56	Dark brown silt, some sand, slight odor.	
56 - 84	Dark brown fine to course sand, sine silt, trace organics (shells).	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED153
Equipment Vibracore
Date 10/6/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID
Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 8.4
Core Penetration Depth (ft) 10.0
Core Length Recovered (ft) 8.5

Sample Time 12:15
Sample ID SED153

Depth (in)	Description/Observation	Analysis
0 - 55	Dark gray/brown soft silt, trace organics (roots, vegitation, shells), clay	Select Metals/TOC
55 - 102	Dark gray/brown clayey silt, little fine to course sand, trace organics (shells).	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED154
Equipment Vibracore
Date 10/5/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)
Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID
Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 8.2
Core Penetration Depth (ft) 5.5
Core Length Recovered (ft) 4.0

Sample Time 12:45
Sample ID SED154

Depth (in)	Description/Observation	Analysis
0 - 24	Dark brown soft silt, little fine to medium sand, trace fine to course gravel, wet.	Select Metals/TOC
24 - 48	Sand, trace clay.	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

SEDIMENT FIELD LOG

Station SED155
Equipment Vibracore
Date 10/6/2006

Sample Type Sediment Coring
Sampling Personnel A. Baird, J. Gutkowski
Weather

SEDIMENT SAMPLE

Water Depth (ft)
Sample Depth (ft)

Sample Time
Sample ID

Description

Chemical Analysis
Biological Analysis
Other Analysis

WATER QUALITY

Sample ID

Sample Time

Depth	DO (mg/l)	Temperature (º C)	Salinity (%)	ORP (mV)	pH	Sp. Cond. (mS/cm)	Turbidity (NTU)	Flow (ft/s)	Observations
Surface									
Bottom									

SEDIMENT CORE

Water Depth (ft) 8.0
Core Penetration Depth (ft) 10.0
Core Length Recovered (ft) 7.8

Sample Time 13:00
Sample ID SED155

Depth (in)	Description/Observation	Analysis
0 - 32	Dark gray/black soft silt, trace fine sand.	Select Metals/TOC
32 - 70	Dark gray clayey silt, trace organics (roots, shells).	
70 - 94	Dark gray/black clayey silt, little fine to course sand, trace organics (shells).	

COMMENTS

SAMPLE DESTINATION

Laboratory: Columbia Analytical
Delivered Via: Fed Ex

Field Sampling Coordinator: Dave Rigg

Appendix C

Statistical Calculations and Analysis

Appendix C
Background Screening Levels

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

ARCADIS

Former GM Tarrytown Assembly Plant Site
Sediments 2006
Prepared by Phil Goodrum
Updated March 7, 2007

Table C-1. Summary statistics for background data sets from 0-0.5 ft depth interval. [6]

	Sample Size [1]				Range					Distribution Analysis			BSL [4]			
Metal	N	Detects	ND	FOD %	Min	Max	Mean	SD	CV	Dist. Type	Critical Value	Test Statistic [2]	Method	(95/95 UTL)	(99/95 UTL)	Comments [5]
Chromium	11	11	0	100%	8.4	89.4	35.0	21.3	0.607	N	0.85	0.86	N	**95**	**111**	Data are normal or lognormal; LN BSL is approx. 3 x max. Note max is extreme value based on Q-Q plot.
										LN	0.85	0.96	LN	168	265	
Copper	11	11	0	100%	8.3	75.1	31.4	22.2	0.707	N	0.85	0.89	N	**94**	**110**	Data are normal or lognormal; LN BSL is approx. 4 x max.
										LN	0.85	0.94	LN	204	357	
Lead	11	11	0	100%	6.3	87.2	37.3	30.9	0.828	N	0.85	0.84	N	NA	NA	Data are lognormal; BSL is approx. 9 x max. Data are not normal. Non-parametric is more repesentative.
										LN	0.85	0.90	LN	372	752	
										NP	NA	NA	NP	**87**	**87**	
Mercury	11	9	2	82%	0.08	0.99	0.43	0.32	0.751	N	0.83	0.909	N	1.30	1.54	GOF on detects only suggests data are normal or lognormal. MLE is preferred over normal for censored data. NP (Kaplan Meier) is plausible and provides similar result; but parametric result is sufficient based on dist. analysis.
							0.32	0.37	1.136	NA	NA	NA	MLE	**1.36**	**1.63**	
							0.43	0.32	0.751	LN	0.83	0.953	LN	7.63	19.89	
							0.36	0.33	0.917	NA	NA	NA	Robust ROS	5.77	13.67	
							0.37	0.31	0.839	NP	NA	NA	Kaplan Meier [3]	1.23	1.46	
Zinc	11	11	0	100%	28.7	205	104.6	55.9	0.534	N	0.85	0.96	N	**262**	**303**	Data are normal or lognormal; LN BSL is approx. 4 x max.
										LN	0.85	0.96	LN	495	775	

Notes

1. Small sample size (N=11) is too small for non-parametric methods to achieve desired coverage. Coverage = 1-1/(N+1) = 91.7%; minimum sample size of N=19 is needed to achieve 95% coverage.
2. GOF tests for normality and lognormality are based on Shapiro Wilk Test at alpha = 0.05.
3. Kaplan Meier is a non-parametric technique that derives adjusted mean and standard deviation parameter estimates based on FOD % and detected values.
4. "Best estimate" is given in bold. Note that parametric 99/95 UTLs all exceed maximum value; extrapolation introduces uncertainty.
5. Parametric 99/95 UTLs all exceed maximum value; extrapolation introduces uncertainty and deference is given to normal.
6. Data are from stations: SED100 - SED 110. Result for SED109 represents average of field duplicate and field sample.

99/95 UTL = 99 percent upper confidence limit for the 95th percentile
BSL = background screening level
FOD % = frequency of detects percentage
LN = lognormal
MLE = maximum likelihood estimate
N = normal
NA = not applicable
NP = non parametric
ROS = regression on ordered statistics

Appendix C
Background Screening Levels

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

ARCADIS

Former GM Tarrytown Assembly
Plant Site
Sediments 2006
Prepared by Phil Goodrum

Table C-2. Comparison of BSL to site data for 0-0.5 ft depth interval (Near Site Area).

Metal	BSL [1]		Background [2]		Site [3]							
	Method	(99/95 UTL)	Min	Max	N [4]	Min	Max	Mean	SD	Prob > BSL	# Stations > BSL	Stations > BSL
Chromium	N	**111**	8.4	89.4	31	13.8	148	58	29	3%	1	SED126
Copper	N	**110**	8.3	75.1	31	9.3	152	70	37	19%	6	SED123, SED125, SED126, SED130, SED132, SED136
Lead	NP	**87**	6.3	87.2	31	10.2	1,520	120	262	32%	10	SED117, SED121, SED123, SED125, SED126, SED130, SED131, SED132, SED133, SED136
Mercury	N (MLE)	**1.6**	0.08	0.99	31	0.04	2.60	0.92	0.71	13%	4	SED123, SED131, SED132, SED134
Zinc	N	**303**	28.7	205	31	43.1	1,260	192	207	3%	1	SED126

Notes
1. See Table 1 for details regarding BSL derivation.
2. Background data are from stations: SED100 - SED 110. Result for SED109 represents average of field duplicate and field sample.
3. Site Data results are for Field Samples only (duplicates are not averaged) and includes non-detects.
4. Data for 0-0.5 ft depth interval are from 29 stations in Near Site Area only. For 2 of 29 stations (SED111 and SED113) two samples were collected at different sampling dates.
99/95 UTL = 99 percent upper confidence limit for the 95th percentile
BSL = background screening level
FOD % = frequency of detects percentage
LN = lognormal
MLE = maximum likelihood estimate
N = normal
NA = not applicable
NP = non parametric
ROS = regression on ordered statistics

Appendix C
Background Screening Levels

Sediment Remedial Investigation Report
Former General Motors North Tarrytown Assembly Plant
Sleepy Hollow, New York

ARCADIS

Former GM North Tarrytown Assembly Plant
Site Sediments 2006
Prepared by Carolyn Meyer, Phil Goodrum
May 10, 2007

Table C-3. Summary statistics for background data sets for pore water. [1]

	Sample Size [2]				Summary Statistics [3]					Distribution Analysis [4]			BSL [5, 6]			
Metal	n	Detects	ND	FOD %	Min	Max	Mean	SD	CV	Dist. Type	Critical Value	Test Statistic	Method	95/95 UTL	99/95 UTL	Comments
Chromium	9	9	0	100%	0.0033	0.0081	0.0055	0.0017	0.31	N	0.83	0.93	N	**0.0106**	**0.0122**	Data are normal or lognormal; LN BSL 99/95 is approx. 2 x max.
										LN	0.83	0.93	LN	0.0138	0.0186	
Copper	9	9	0	100%	0.0037	0.01125	0.0075	0.0030	0.40	N	0.83	0.88	N	**0.0165**	**0.0193**	Data are normal or lognormal; LN BSL is approx. 3 x max.
										LN	0.83	0.89	LN	0.0251	0.0374	
Lead	9	4	5	44%	0.0030	0.0071	0.0053	0.0017	0.33	N	0.83	0.89	N	0.0101	0.0123	Data are normal or lognormal using ROS; LN BSL is approx. 6 x max. Detects < 5 so use maximum instead of KM or others
							0.0027	0.0029	1.08	NA	NA	NA	MLE	0.0115	0.0142	
							0.0053	0.0017	0.33	LN	0.83	0.96	LN	0.0202	0.0384	
							0.0033	0.0022	0.67	NA	NA	NA	Robust ROS	0.0223	0.0431	
							0.0042	0.0014	0.34	NP	NA	NA	KM or Maximum	**0.0071**	**0.0071**	
Zinc	9	1	9	11%	0.0022	0.0042	0.0042	N/A	N/A	N	0.83	0.93	N	0.0047	0.0057	Data are not normal or lognormal using ROS; Detects < 5 so use maximum instead of KM or others
							NA	NA	NA	NA	NA	NA	MLE	NA	NA	
							0.0042	NA	NA	LN	0.83	0.97	LN	0.0058	0.0089	
							NA	NA	NA	NA	NA	NA	Robust ROS	NA	NA	
							0.0042	NA	NA	NP	NA	NA	KM or Maximum	**0.0042**	**0.0042**	

Notes

1. Data are from stations: SED101 - SED 109. Result for SED109 represents average of field duplicate and field sample.
2. Sample size is too small for non-parametric methods to achieve desired coverage. Coverage = 1-1/(n+1) = 90% for n=9; minimum sample size of n=19 is needed to achieve 95% coverage.
3. For lead and zinc, minimum and maximum include non-detects; mean, SD, and CV are method-specific where N and LN statistics are based on detects only, and MLE, ROS, and KM generate adjusted parameter estimates based on detected values and FOD% (see USEPA, 2006).
4. GOF tests for normality and lognormality are based on Shapiro Wilk Test at alpha = 0.05.
5. "Best estimate" is given in bold.
6. Parametric 99/95 UTLs all exceed maximum value; extrapolation introduces uncertainty and deference is given to normal.

BSL = background screening level; CV = coefficient of variation (SD/mean); FOD % = frequency of detects percentage; KM = Kaplan Meier; LN = lognormal; MLE = maximum likelihood estimate; n = sample size; N = normal; NA = not applicable; NP = non parametric; ROS = regression on ordered statistics; SD = standard deviation; 99/95 UTL = 99 percent upper confidence limit for the 95th percentile

USEPA. 2006. On the Computation of 95% Upper Confidence Limit of the Unknown Population Mean Based Upon Data Sets with Below Detection Limit Observations. Prepared by A. Singh, R.W. Maichle, and S.E. Lee for USEPA ORD NERL, Las Vegas, NV. EPA/600/R-06/22. March.

ARCADIS

Former GM North Tarrytown Assembly Plant Site
Sediments 2006
Prepared by Carolyn Meyer, Phil Goodrum
May 10, 2007

Table C-4. Comparison of BSL to site data for pore water (Near Site Area). [1]

	BSL [1]		Background [2]		Site [3]							
Metal	Method	(99/95 UTL)	Min	Max	n [4]	Min	Max	Mean	SD	Prob > BSL	# Stations > BSL	Stations > BSL
Chromium	N	**0.0122**	0.0033	0.0081	27	0.0053	0.0207	0.0083	0.0034	7%	2	SED132, SED134
Copper	N	**0.0193**	0.0037	0.01125	27	0.0041	0.0195	0.0082	0.0048	4%	1	SED134
Lead	NP	**0.0071**	0.003	0.0071	27	0.0030	0.0144	0.0041	0.0024	7%	2	SED114, SED134
Zinc	NP	**0.0042**	0.0022	0.0042	27	0.0022	0.0155	0.0027	0.0026	4%	1	SED134

Notes

1. Background data are from stations: SED101 - SED 109. Result for SED109 represents average of field duplicate and field sample.
2. See Table A-3 for details regarding BSL derivation.
3. Site Data results are for Field Samples and includes non-detects.
4. There are 27 stations (N) in Near Site Area.

BSL = background screening level; n = total sample size (including non-detects); N = normal distribution; NP = nonparametric; 99/95 UTL = 99 percent upper confidence limit for the 95th percentile

Appendix D

Final Report Radiological Sediment Chronology Sediment Characterization – Geonuclear/Mass Spec Services

Mass Spec Services
Division of Geonuclear, Inc.
103 South Greenbush Road
Orangeburg, NY 10962

11/30/06

Final Report

Radiological Sediment Chronology

Sediment Characterization

Former GM Plant Site – Sleepy Hollow, NY

Tarrytown, NY

Project 64462.037

Project Manager:	Raymond Kapp	Blasland, Bouck , and Lee, Inc.
Field Leader:	Jo Ann Robertson	Blasland, Bouck , and Lee, Inc.
Chemist:	Deborah Andrasko	Conestoga-Rovers & Associates
Lab Project Manager:	Hewitt Jeter	Mass Spec Services, Division of Geonuclear, Inc.
Analytical Methods:	Jeter, H. W. (2000), "Determining the Ages of Recent Sediments Using Measurements of Trace Radioactivity", Terra Et Aqua, 78, pp. 21-28	

MASS SPEC SERVICES
Division of Geonuclear, Inc.
P.O. Box 163
Orangeburg, NY 10962

11/30/06

Blasland, Bouck & Lee, Inc.
6923 Towpath Road
Syracuse, NY 13214-0066

REPORT NARRATIVE

Sediment chronology radiochemical analyses
Project 64462.037, GM Tarrytown
MSS Work Orders Pb0118, Pb0119, Pb0120, Pb0121

Received sediment samples in glass jars, delivered by BBL personnel, on 10/05/06, 10/11/06, and 10/12/06. The samples were in good condition and were accompanied by chain-of-custody (COC) documents. Verified that the numbering of all sample jars conformed to the COC forms, and signed the forms. Assigned MSS Work Orders Pb0118 through Pb0121 to the samples, each containing a maximum of 20 field samples to constitute an analytical batch. The COC documents specified that most of the samples were to be analyzed for Pb-210, Cs-137, and Be-7, while others were to be held in archive.

Assigned MSS sample numbers and entered them on the COC forms. Wrote the MSS sample numbers on the corresponding sample jars. Sent PDF copies of the completed COC forms to CRA as required. Dried the samples for 2 days in a laboratory oven. Pulverized the dried samples with a mortar and pestle to a fine powder and returned the samples to the numbered jars.

Weighed a portion of each sample (near 9 grams) for Pb-210 analysis into a labeled beaker. Also prepared laboratory control samples consisting of soil matrix spikes and water blanks. Other portions of the dried and pulverized samples designated for Cs-137 and Be-7 analyses were sent to the Environmental Inc. Midwest Laboratory for gamma spectral analysis according to the laboratory's SOP. Those analyses were performed from 10/12/06 to 11/22/06.

Radiochemical separations for the Pb-210 analyses were performed at Mass Spec Services from 10/10/06 to 11/08/06, according to the laboratory's SOP. The resulting mounted precipitates were sent to the Environmental Inc. Midwest Laboratory and were analyzed on beta detectors from 10/12/06 to 11/09/06. Laboratory control spikes and blanks processed with the Pb-210 analytical groups produced satisfactory results. Laboratory control blanks and spikes analyzed by gamma spectral methods at the Midwest Laboratory also produced satisfactory results. Check source and blank performance tests of both the beta and the gamma detectors at the laboratory were satisfactory during the analysis periods. Standard calibration and quality control procedures were observed during all phases of the analyses. No non-conformances were observed.

Summary reports of analytical results and quality control results, as well as sediment chronology interpretations, were sent to the project manager Raymond Kapp as PDF files on 10/23, 10/26, 11/13, 11/16, 11/21, and 11/29/06. Final reports, including this narrative, are being sent to CRA and BBL as PDF files on 11/30/06. Electronic deliverables (EDD) are being entered into the CRA data system.

Hewitt W. Jeter
MSS Project Manager

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Sediments

Blasland, Bouck &Lee, Inc.
6723 Towpath Road
Syracuse, NY 13214-0066

Attn: Raymond Kapp

Report Date:	10/23/06
MSS No.:	Pb0118
Project:	64462.037 GM Tarrytown
Samples Rec'd:	10/05/06
Task Supervisor:	H. Jeter

Radiometric Results in pCi/g dry

MSS No.	Identity	Depth, in	Pb-210	Cs-137	Be-7	Beta Count	Gamma Count
Pb0118-1	SED123(0-2)GC10042006	0-2	1.70 ± 0.14	0.186 ± 0.074	< 0.37	10/12/06	10/12/06
Pb0118-2	SED123(2-4)GC10042006	2-4	1.61 ± 0.15	0.199 ± 0.034	< 0.28	10/12/06	10/12/06
Pb0118-3	SED123(4-6)GC10042006	4-6	1.22 ± 0.13	0.185 ± 0.049	< 0.35	10/12/06	10/13/06
Pb0118-4	SED123(6-8)GC10042006	6-8	0.65 ± 0.11	0.092 ± 0.049	< 0.37	10/12/06	10/14/06
Pb0118-5	SED123(8-10)GC10042006	8-10	0.69 ± 0.11	< 0.037	< 0.32	10/12/06	10/14/06
Pb0118-6	SED123(10-12)GC10042006	10-12	0.72 ± 0.11	< 0.036	< 0.29	10/12/06	10/11/06
Pb0118-7	SED123(16-20)GC10042006	16-20	0.78 ± 0.11	< 0.031	< 0.35	10/12/06	10/11/06
Pb0118-8	SED123(24-28)GC10042006	24-28	0.69 ± 0.11	< 0.049	< 0.32	10/12/06	10/14/06
Pb0118-9	SED123(32-36)GC10042006	32-36	0.54 ± 0.10	< 0.037	< 0.39	10/12/06	10/14/06
Pb0118-10	SED123(40-44)GC10042006	40-44	0.76 ± 0.10	< 0.028	< 0.31	10/12/06	10/14/06
Pb0118-11	SED123(48-52)GC10042006	48-52	0.73 ± 0.10	< 0.028	< 0.34	10/12/06	10/16/06
Pb0118-12	SED123(56-60)GC10042006	56-60	0.77 ± 0.11	< 0.042	< 0.40	10/12/06	10/17/06
Pb0118-13	SED123(64-68)GC10042006	64-68	0.72 ± 0.09	< 0.034	< 0.34	10/12/06	10/16/06
Pb0118-14	SED123(72-76)GC10042006	72-76	0.54 ± 0.09	< 0.024	< 0.23	10/12/06	10/19/06
Pb0118-15	SED123(80-84)GC10042006	80-84	0.48 ± 0.09	< 0.017	< 0.29	10/12/06	10/17/06
Pb0118-16	SED123(88-92)GC10042006	88-92	0.54 ± 0.10	< 0.031	< 0.22	10/12/06	10/17/06
Pb0118-17	SED123(96-100)GC10042006	96-100	0.33 ± 0.07	< 0.036	< 0.37	10/12/06	10/18/06
Pb0118-18	SED104(0-2)GC10052006	0-2	1.21 ± 0.12	0.113 ± 0.043	< 0.37	10/12/06	10/18/06
Pb0118-19	SED104(2-4)GC10052006	2-4	1.12 ± 0.11	0.157 ± 0.026	< 0.31	10/12/06	10/15/06
Pb0118-20	SED104(4-6)GC10052006	4-6	0.67 ± 0.10	0.207 ± 0.047	< 0.27	10/12/06	10/16/06

Target Detection Limits:	Pb-210	0.1 pCi/g	Bismuth Beta Counting Method
	Cs-137	0.1 pCi/g	Gamma Spectral Analysis
	Be-7	1.0 pCi/g	Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

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REPORT OF LABORATORY CONTROL SAMPLES

MASS SPEC SERVICES
Division of Geonuclear, Inc

Work Order Pb0118

GM Tarrytown
Project Number: 64462.037

Pb-210 Spike and Blank

MSS No.	Sample Identity	Matrix	Count Date	Pb-210 Result	Expected	Units
SSP-49	Soil Matrix Spike	Soil	10/12/06	9.48 ± 0.40	9.74 ± 0.10	pCi/g dry
WBL-74	Water Blank	Water	10/12/06	< 0.09	Non detect	pCi/g wet

SSP-49 spike level: 9.12 pCi/g spike + 0.62 ± 0.10 pCi/g from matrix = 9.74 ± 0.10 pCi/g expected

Cs-137 Spike and Blank

MSS No.	Sample Identity	Matrix	Count Date	Cs-137 Result	Expected	Units
SPSPK-1	Water Spike	Water	10/15/06	19.57 ± 0.25	19.61	pCi/g wet
SPBKG-1	Water Blank	Water	10/11/06	< 0.050	Non detect	pCi/g wet
				Be-7 < 0.34	Non detect	pCi/g wet

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MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Sediments

Blasland, Bouck &Lee, Inc.
6723 Towpath Road
Syracuse, NY 13214-0066

Attn: Raymond Kapp

Report Date:	10/25/06
MSS No.:	Pb0119
Project:	64462.037 GM Tarrytown
Samples Rec'd:	10/05/06
Task Supervisor:	H. Jeter

Radiometric Results in pCi/g dry

MSS No.	Identity	Depth, in	Pb-210	Cs-137	Be-7	Beta Count	Gamma Count
Pb0119-1	SED103(0-2)GC10052006	0-2	0.94 ± 0.12	0.246 ± 0.064	< 0.39	10/19/06	10/20/06
Pb0119-2	SED103(2-4)GC10052006	2-4	0.48 ± 0.10	0.175 ± 0.071	< 0.22	10/19/06	10/21/06
Pb0119-3	SED103(4-6)GC10052006	4-6	0.33 ± 0.09	< 0.037	< 0.34	10/19/06	10/17/06
Pb0119-4	SED103(6-8)GC10052006	6-8	0.28 ± 0.09	< 0.047	< 0.23	10/19/06	10/21/06
Pb0119-5	SED103(8-10)GC10052006	8-10	0.39 ± 0.09	< 0.031	< 0.30	10/19/06	10/22/06
Pb0119-6	SED103(10-12)GC10052006	10-12	0.38 ± 0.10	< 0.037	< 0.28	10/19/06	10/19/06
Pb0119-7	SED103(16-20)GC10052006	16-20	0.30 ± 0.09	< 0.034	< 0.28	10/19/06	10/23/06
Pb0119-8	SED103(24-28)GC10052006	24-28	0.39 ± 0.09	< 0.036	< 0.31	10/19/06	10/22/06
Pb0119-9	SED103(32-36)GC10052006	32-36	0.40 ± 0.10	< 0.043	< 0.24	10/19/06	10/22/06
Pb0119-10	SED103(40-44)GC10052006	40-44	0.38 ± 0.09	< 0.047	< 0.26	10/19/06	10/22/06
Pb0119-11	SED103(48-52)GC10052006	48-52	0.46 ± 0.09	< 0.031	< 0.26	10/19/06	10/22/06
Pb0119-12	SED103(56-60)GC10052006	56-60	0.41 ± 0.09	< 0.036	< 0.30	10/19/06	10/23/06
Pb0119-13	SED103(64-68)GC10052006	64-68	0.41 ± 0.09	< 0.034	< 0.26	10/19/06	10/21/06
Pb0119-14	SED103(72-76)GC10052006	72-76	0.39 ± 0.11	< 0.032	< 0.32	10/19/06	10/21/06
Pb0119-15	SED103(80-86)GC10052006	80-86	0.39 ± 0.09	< 0.022	< 0.23	10/19/06	10/21/06
Pb0119-16	SED104(6-8)GC10052006	6-8	0.59 ± 0.10	0.431 ± 0.058	< 0.36	10/19/06	10/22/06
Pb0119-17	SED104(8-10)GC10052006	8-10	0.44 ± 0.08	0.113 ± 0.025	< 0.31	10/19/06	10/21/06
Pb0119-18	SED104(10-12)GC10052006	10-12	0.48 ± 0.09	< 0.031	< 0.24	10/19/06	10/23/06
Pb0119-19	SED104(16-20)GC10052006	16-20	0.41 ± 0.08	< 0.037	< 0.30	10/19/06	10/21/06
Pb0119-20	SED104(24-28)GC10052006	24-28	0.42 ± 0.09	< 0.032	< 0.33	10/19/06	10/17/06

Target Detection Limits:			
	Pb-210	0.1 pCi/g	Bismuth Beta Counting Method
	Cs-137	0.1 pCi/g	Gamma Spectral Analysis
	Be-7	1.0 pCi/g	Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

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REPORT OF LABORATORY CONTROL SAMPLES

MASS SPEC SERVICES
Division of Geonuclear, Inc

Work Order Pb0119

GM Tarrytown
Project Number: 64462.037

Pb-210 Spike and Blank

MSS No.	Sample Identity	Matrix	Count Date	Pb-210 Result	Expected	Units
SSP-50	Soil Matrix Spike	Soil	10/19/06	10.95 ± 0.47	10.56 ± 0.10	pCi/g dry
WBL-75	Water Blank	Water	10/19/06	< 0.08	Non detect	pCi/g wet

SSP-50 spike level: 9.94 pCi/g spike + (0.62 ± 0.10) pCi/g from matrix = 10.56 ± 0.10 pCi/g expected

Cs-137 Spike and Blank

MSS No.	Sample Identity	Matrix	Count Date	Cs-137 Result	Expected	Units
SPSPK-1	Water Spike	Water	10/19/06	19.37 ± 0.65	19.61	pCi/g wet
SPBKG-1	Water Blank	Water	10/19/06	< 0.059	Non detect	pCi/g wet
				Be-7 < 0.38	Non detect	pCi/g wet

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MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Sediments

Blasland, Bouck &Lee, Inc.
6723 Towpath Road
Syracuse, NY 13214-0066

Attn: Raymond Kapp

Report Date:	11/21/06
MSS No.:	Pb0120
Project:	64462.037 GM Tarrytown
Samples Rec'd:	10/05/06
Task Supervisor:	H. Jeter

Radiometric Results in pCi/g dry

MSS No.	Identity	Depth, in	Pb-210	Cs-137	Be-7	Beta Count	Gamma Count
Pb0120-1	SED104(32-36)GC10052006	32-36	0.47 ± 0.11	< 0.040	< 0.51	11/02/06	11/12/06
Pb0120-2	SED104(40-44)GC10052006	40-44	0.41 ± 0.13	< 0.047	< 0.58	11/02/06	11/12/06
Pb0120-3	SED104(48-52)GC10052006	48-52	0.44 ± 0.12	< 0.037	< 0.49	11/02/06	11/14/06
Pb0120-4	SED126(0-2)GC10102006	0-2	0.31 ± 0.11	0.053± 0.027	< 0.45	11/02/06	11/13/06
Pb0120-5	SED126(2-4)GC10102006	2-4	0.44 ± 0.12	0.082± 0.021	< 0.35	11/02/06	11/13/06
Pb0120-6	SED126(4-6)GC10102006	4-6	1.01 ± 0.14	0.186± 0.048	< 0.44	11/02/06	11/14/06
Pb0120-7	SED126(6-8)GC10102006	6-8	1.03 ± 0.13	0.276± 0.054	< 0.48	11/02/06	11/14/06
Pb0120-8	SED126(8-10)GC10102006	8-10	0.83 ± 0.15	0.299± 0.033	< 0.36	11/02/06	11/14/06
Pb0120-9	SED126(10-12)GC10102006	10-12	0.95 ± 0.14	0.234± 0.032	< 0.39	11/02/06	11/15/06
Pb0120-10	SED128(0-2)GC10122006	0-2	2.15 ± 0.27	0.244± 0.099	< 1.12	11/02/06	11/15/06
Pb0120-11	SED128(2-4)GC10122006	2-4	2.14 ± 0.17	0.207± 0.053	< 1.02	11/02/06	11/15/06
Pb0120-12	SED128(4-6)GC10122006	4-6	2.33 ± 0.19	0.460± 0.175	< 1.05	11/02/06	11/16/06
Pb0120-13	SED128(6-8)GC10122006	6-8	1.75 ± 0.14	0.242± 0.055	< 0.64	11/02/06	11/16/06
Pb0120-14	SED128(8-10)GC10122006	8-10	1.99 ± 0.16	0.250± 0.042	< 0.39	11/02/06	11/16/06
Pb0120-15	SED128(10-12)GC10122006	10-12	2.12 ± 0.14	0.283± 0.067	< 0.66	11/02/06	11/16/06
Pb0120-16	SED128(16-20)GC10122006	16-20	1.60 ± 0.15	0.254± 0.080	< 0.65	11/02/06	11/17/06
Pb0120-17	SED128(24-28)GC10122006	24-28	0.72± 0.09	0.448± 0.071	< 0.71	11/02/06	11/17/06
Pb0120-18	SED128(32-36)GC10122006	32-36	1.71 ± 0.15	0.434± 0.036	< 0.49	11/02/06	11/17/06
Pb0120-19	SED128(40-44)GC10122006	40-44	0.65 ± 0.10	0.801± 0.068	< 0.30	11/02/06	11/17/06
Pb0120-20	SED128(48-52)GC10122006	48-52	0.69 ± 0.10	< 0.041	< 0.39	11/02/06	11/18/06

Target Detection Limits:	Pb-210	0.1 pCi/g	Bismuth Beta Counting Method
	Cs-137	0.1 pCi/g	Gamma Spectral Analysis
	Be-7	1.0 pCi/g	Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

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REPORT OF LABORATORY CONTROL SAMPLES

MASS SPEC SERVICES
Division of Geonuclear, Inc

Work Order Pb0120

GM Tarrytown
Project Number: 64462.037

Pb-210 Spike and Blank

MSS No.	Sample Identity	Matrix	Count Date	Pb-210 Result	Expected	Units
SSP-51	Soil Matrix Spike	Soil	11/02/06	9.68 ± 0.38	10.36 ± 0.10	pCi/g dry
WBL-76	Water Blank	Water	11/02/06	< 0.13	Non detect	pCi/g wet

SSP-51 spike level: 9.74 pCi/g spike + (0.62 ± 0.10) pCi/g from matrix = 10.36 ± 0.10 pCi/g expected

Cs-137 Spike and Blank

MSS No.	Sample Identity	Matrix	Count Date	Cs-137 Result	Expected	Units
SPSPK-1	Water Spike	Water	11/12/06	19.119 ± 0.624	19.605	pCi/g wet
SPBKG-1	Water Blank	Water	11/12/06	< 0.052	non detect	pCi/g wet
				Be-7 < 0.44	non detect	pCi/g wet

MASS SPEC SERVICES

P.O. Box 163, Orangeburg, NY 10962

Report of Analysis

Blasland, Bouck &Lee, Inc.
6723 Towpath Road
Syracuse, NY 13214-0066

Attn: Raymond Kapp

Report Date:	11/29/06
MSS No.:	Pb0121
Project:	64462.037 GM Tarrytown
Samples Rec'd:	10/12/06
Task Supervisor:	H. Jeter

Sediments

Radiometric Results in pCi/g dry

MSS No.	Identity	Depth, in	Pb-210	Cs-137	Be-7	Beta Count	Gamma Count
Pb0121-1	SED128(56-60)GC10122006	56-60	0.21 ± 0.08	< 0.038	< 0.47	11/09/06	11/19/06
Pb0121-2	SED138(0-2)GC10122006	0-2	1.17 ± 0.13	0.232 ± 0.051	< 0.57	11/09/06	11/19/06
Pb0121-3	SED138(2-4)GC10122006	2-4	0.62 ± 0.13	< 0.057	< 0.59	11/09/06	11/18/06
Pb0121-4	SED138(4-6)GC10122006	4-6	0.66 ± 0.12	< 0.065	< 0.93	11/09/06	11/18/06
Pb0121-5	SED138(6-8)GC10122006	6-8	0.34 ± 0.09	< 0.047	< 0.42	11/09/06	11/19/06
Pb0121-6	SED138(8-10)GC10122006	8-10	0.38 ± 0.10	< 0.054	< 0.52	11/09/06	11/20/06
Pb0121-7	SED138(10-12)GC10122006	10-12	0.32 ± 0.08	< 0.039	< 0.35	11/09/06	11/19/06
Pb0121-8	SED138(16-20)GC10122006	16-20	0.29 ± 0.07	< 0.042	< 0.66	11/09/06	11/21/06
Pb0121-9	SED138(24-28)GC10122006	24-28	0.36 ± 0.10	< 0.044	< 0.50	11/09/06	11/22/06
Pb0121-11	SED138(40-44)GC10122006	40-44	0.35 ± 0.08	< 0.035	< 0.46	11/09/06	11/20/06
Pb0121-13	SED138(56-60)GC10122006	56-60	0.50 ± 0.10	< 0.048	< 0.54	11/09/06	11/21/06
Pb0121-15	SED138(72-76)GC10122006	72-76	0.40 ± 0.10	< 0.033	< 0.56	11/09/06	11/21/06
Pb0121-17	SED138(88-92)GC10122006	88-92	0.39± 0.09	< 0.049	< 0.85	11/09/06	11/22/06
Pb0121-19	SED138(104-108)GC10122006	104-108	0.42 ± 0.08	< 0.038	< 0.47	11/09/06	11/22/06

Target Detection Limits:			
	Pb-210	0.1 pCi/g	Bismuth Beta Counting Method
	Cs-137	0.1 pCi/g	Gamma Spectral Analysis
	Be-7	1.0 pCi/g	Gamma Spectral Analysis

Tolerances are 2 sigma counting uncertainties.
Detection limits are at the 4.66 sigma level.

Hewitt W. Jeter

REPORT OF LABORATORY CONTROL SAMPLES

MASS SPEC SERVICES
Division of Geonuclear, Inc

Work Order Pb0121

GM Tarrytown
Project Number: 64462.037

Pb-210 Spike and Blank

MSS No.	Sample Identity	Matrix	Count Date	Pb-210 Result	Expected	Units
SSP-52	Soil Matrix Spike	Soil	11/09/06	10.79 ± 0.42	10.46 ± 0.10	pCi/g dry
WBL-77	Water Blank	Water	11/09/06	< 0.12	Non detect	pCi/g wet

SSP-52 spike level: 9.84 pCi/g spike + (0.62 ± 0.10) pCi/g from matrix = 10.46 ± 0.10 pCi/g expected

Cs-137 Spike and Blank

MSS No.	Sample Identity	Matrix	Count Date	Cs-137 Result	Expected	Units
SPSPK-1	Water Spike	Water	11/18/06	19.247 ± 0.649	19.605	pCi/g wet
SPBKG-1	Water Blank	Water	11/18/06	< 0.045	Non detect	pCi/g wet
				Be-7 < 0.31	Non detect	pCi/g wet

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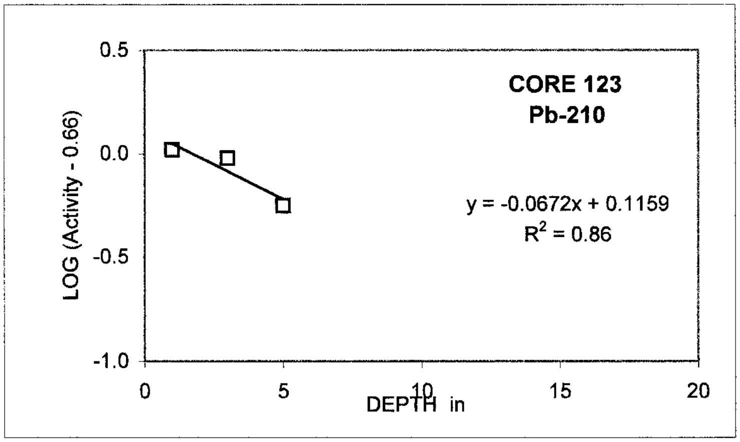
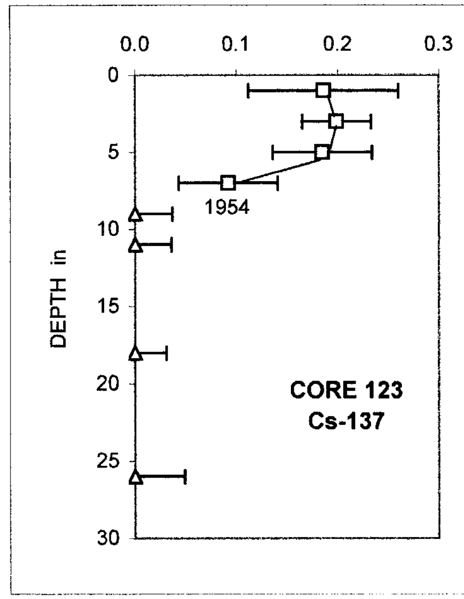
GM Tarrytown Sediment Characterization

Mass Spec Services
Sediment Chronology Interpretation

Core 123 collected 10/04/06





Pb-210 Chronology

Supported Pb-210 was measured near 0.66 pCi/g dry as the average of all values deeper than 6 inches.
Fitted curve: Y=-0.0672X + 0.1159 Correlation R square: 0.86 2 sigma slope tolerance: ±0.0549
Inferred sedimentation rate: -0.01352 / -(0.0672 ± 0.0549) = **0.20 in/y**
(0.11 - 1.10 in/y non-symmetric interval)

Cs-137 Chronology

The 1954 Cs-137 horizon lies between 7 and 9 inches depth, giving a sedimentation rate between 0.13 and 0.17 in/y: **0.15 ± 0.02 in/y**
No 1963 maximum is clearly defined when the tolerances of measurement are considered.

Preferred Sedimentation Rate = 0.15 ± 0.02 in/y

Based on the 1954 Cs-137 horizon. This chronology marker yields a narrower range of sedimentation rates than does the Pb-210 method at this station.

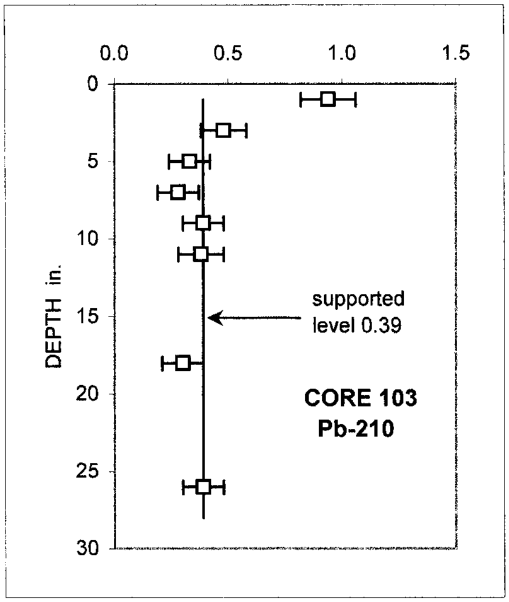
Depth in	Pb-210	Cs-137	Be-7
0-2	1.70 ± 0.14	0.186 ± 0.074	< 0.37
2-4	1.61 ± 0.15	0.199 ± 0.034	< 0.28
4-6	1.22 ± 0.13	0.185 ± 0.049	< 0.35
6-8	0.65 ± 0.11	0.092 ± 0.049	< 0.37
8-10	0.69 ± 0.11	< 0.037	< 0.32
10-12	0.72 ± 0.11	< 0.036	< 0.29
16-20	0.78 ± 0.11	< 0.031	< 0.35
24-28	0.69 ± 0.11	< 0.049	< 0.32
32-36	0.54 ± 0.10	< 0.037	< 0.39
40-44	0.76 ± 0.10	< 0.028	< 0.31
48-52	0.73 ± 0.10	< 0.028	< 0.34
56-60	0.77 ± 0.11	< 0.042	< 0.40
64-68	0.72 ± 0.09	< 0.034	< 0.34
72-76	0.54 ± 0.09	< 0.024	< 0.23
80-84	0.48 ± 0.09	< 0.017	< 0.29
88-92	0.54 ± 0.10	< 0.031	< 0.22
96-100	0.33 ± 0.07	< 0.036	< 0.37

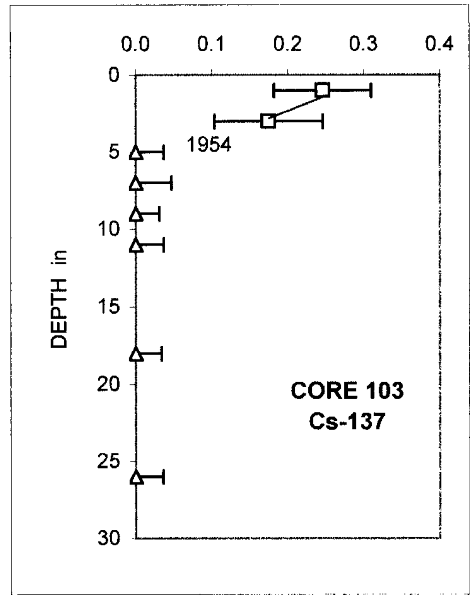
Note:
No Be-7 was detected. Because of its short half life of 53 days, Be-7 is only detectable within the last half year. This would correspond to 0.075 inches depth using the calculated sedimentation rate of 0.15 in/y. Thus, Be-7 in a thin surface layer would be diluted by mixing with the rest of the 0-2 inch sample to produce a concentration below the detection limit.

H. Jeter
10/23/2006

GM Tarrytown Sediment Characterization **Mass Spec Services**

Core 103 collected 10/05/06 **Sediment Chronology Interpretation**





Pb-210 Chronology

Supported Pb-210 was measured near 0.39 pCi/g dry by the average of all values deeper than 2 inches. Only the surface (0-2 inch) sample is significantly elevated in Pb-210. No regression line can be drawn. The Pb-210 method of chronology cannot be used unless multiple thinner samples are analyzed in the shallowest few inches of depth.

Cs-137 Chronology

The 1954 Cs-137 horizon lies between 3 and 5 inches depth, giving a sedimentation rate between 0.06 and 0.10 in/y: **0.08 ± 0.02 in/y** This is the preferred sedimentation rate. No 1963 maximum is clearly defined with the present data.

Depth in	Pb-210	Cs-137	Be-7
0-2	0.94 ± 0.12	0.246 ± 0.064	< 0.39
2-4	0.48 ± 0.10	0.175 ± 0.071	< 0.22
4-6	0.33 ± 0.09	< 0.037	< 0.34
6-8	0.28 ± 0.09	< 0.047	< 0.23
8-10	0.39 ± 0.09	< 0.031	< 0.30
10-12	0.38 ± 0.10	< 0.037	< 0.28
16-20	0.30 ± 0.09	< 0.034	< 0.28
24-28	0.39 ± 0.09	< 0.036	< 0.31
32-36	0.40 ± 0.10	< 0.043	< 0.24
40-44	0.38 ± 0.09	< 0.047	< 0.26
48-52	0.46 ± 0.09	< 0.031	< 0.26
56-60	0.41 ± 0.09	< 0.036	< 0.30
64-68	0.41 ± 0.09	< 0.034	< 0.26
72-76	0.39 ± 0.11	< 0.032	< 0.32
80-86	0.39 ± 0.09	< 0.022	< 0.23

Note:

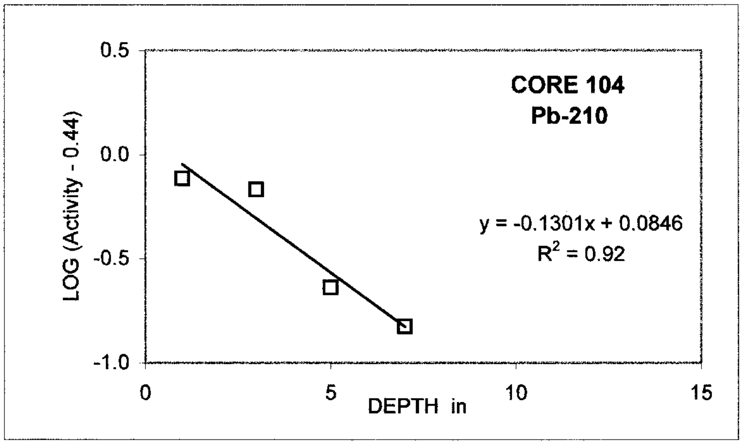
No Be-7 was detected. Because of its short half life of 53 days, Be-7 is only detectable within the last half year. This would correspond to 0.04 inches depth using the calculated sedimentation rate of 0.08 in/y. Thus, Be-7 in a thin surface layer would be diluted by mixing with the rest of the 0-2 inch sample to produce a concentration below the detection limit.

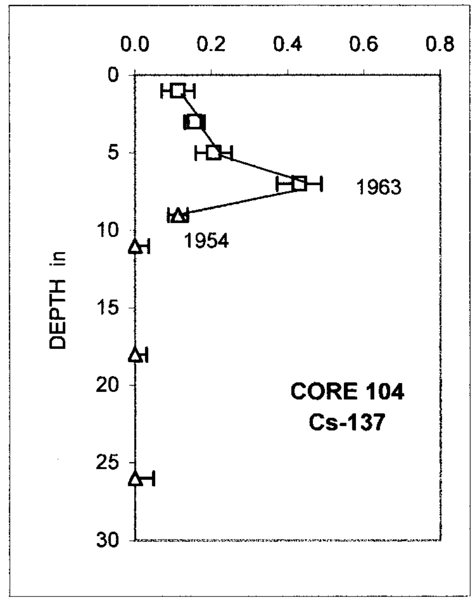
H. Jeter
10/25/06

GM Tarrytown Sediment Characterization

Mass Spec Services
Sediment Chronology Interpretation

Core 104 collected 10/05/06





Pb-210 Chronology

Supported Pb-210 was measured near 0.44 pCi/g dry as the average of all values deeper than 8 inches.
Fitted curve: Y=-0.1301X + 0.0846 Correlation R square: 0.92 2 sigma slope tolerance: ±0.0538
Inferred sedimentation rate: -0.01352 / -(0.1301 ± 0.0538) = **0.10 in/y**
(0.07 - 0.18 in/y non-symmetric interval)

Cs-137 Chronology

The 1954 Cs-137 horizon lies between 9 and 11 inches depth, resulting in a sedimentation rate between 0.17 and 0.21 in/y: **0.19 ± 0.02 in/y**

A 1963 maximum is found between 5 and 9 inches depth, resulting in a sedimentation rate between 0.116 and 0.209 in/y: **0.16 ± 0.05 in/y**

Preferred Sedimentation Rate = 0.19 ± 0.02 in/y

Based on the 1954 Cs-137 horizon. This chronology marker yields the narrowest range of sedimentation rates and is in statistical agreement with the other two rate estimates.

Depth in	Pb-210	Cs-137	Be-7
0-2	1.21 ± 0.12	0.113 ± 0.043	< 0.37
2-4	1.12 ± 0.11	0.157 ± 0.026	< 0.31
4-6	0.67 ± 0.10	0.207 ± 0.047	< 0.27
6-8	0.59 ± 0.10	0.431 ± 0.058	< 0.36
8-10	0.44 ± 0.08	0.113 ± 0.025	< 0.31
10-12	0.48 ± 0.09	< 0.031	< 0.24
16-20	0.41 ± 0.08	< 0.037	< 0.30
24-28	0.42 ± 0.09	< 0.032	< 0.32
32-36	0.47 ± 0.11	< 0.040	< 0.51
40-44	0.41 ± 0.13	< 0.047	< 0.58
48-52	0.44 ± 0.12	< 0.037	< 0.49

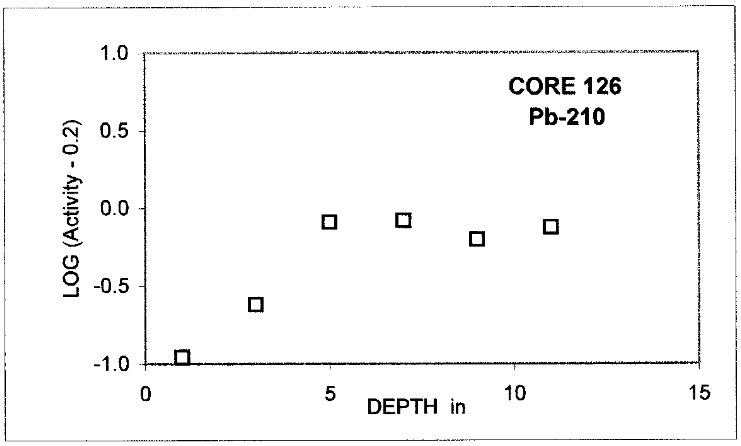
Note:
No Be-7 was detected. Because of its short half life of 53 days, Be-7 is only detectable within the last half year. This would correspond to 0.095 inches depth using the calculated sedimentation rate of 0.19 in/y. Thus, Be-7 in a thin surface layer would be diluted by mixing with the rest of the 0-2 inch sample to produce a concentration below the detection limit.

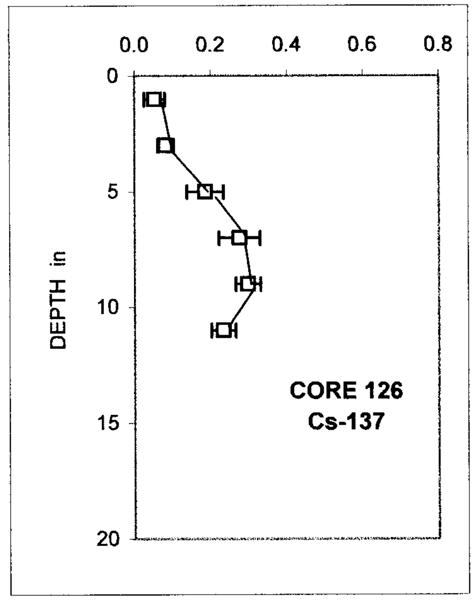
H. Jeter
11/21/06

GM Tarrytown Sediment Characterization

Core 126 collected 10/10/06

Mass Spec Services
Sediment Chronology Interpretation





Pb-210 Chronology
Supported Pb-210 is assumed to be near 0.2 pCi/g dry as measured in core 128.
This core is short in length because of sediment refusal in the sampling process. In addition, the samples contain significant quantities of fine sand, rock fragments, and cinders in addition to silt.
No trend in Pb-210 is found which could be interpreted for sediment chronology.

Cs-137 Chronology
Cs-137 was detected in samples from the surface to the maximum sampling depth of 10 - 12 inches.
The 1954 Cs-137 horizon appears to lie deeper than 11 inches. On this basis, the calculated sedimentation rate is **greater than 0.21 in/y**.

Although the Cs-137 profile suggests a maximum near 8 inches depth, it could not be confirmed unless deeper measurements were avaailable.

Preferred Sedimentation Rate = Greater than 0.21 in/y
Based on the 1954 Cs-137 horizon which appears to be deeper than 11 inches.

Depth in	Pb-210	Cs-137	Be-7
0-2	0.31 ± 0.11	0.053± 0.027	< 0.45
2-4	0.44 ± 0.12	0.082± 0.021	< 0.35
4-6	1.01 ± 0.14	0.186± 0.048	< 0.44
6-8	1.03 ± 0.13	0.276± 0.054	< 0.48
8-10	0.83 ± 0.15	0.299± 0.033	< 0.36
10-12	0.95 ± 0.14	0.234± 0.032	< 0.39

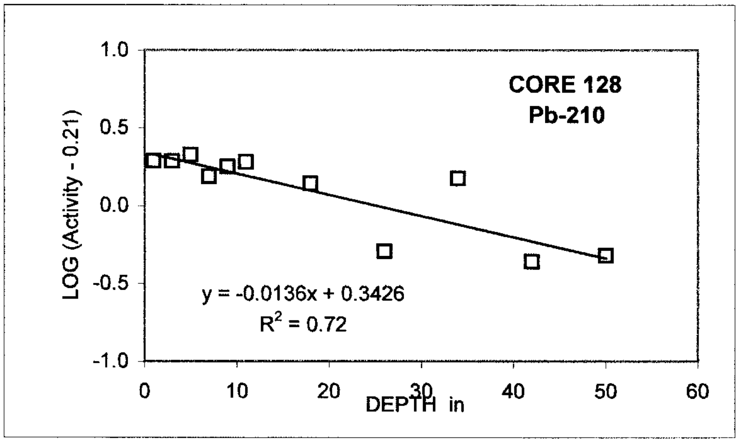
Note:
No Be-7 was detected. Because of its short half life of 53 days, Be-7 is only detectable within the last half year. It is expected that Be-7 in a thin surface layer would be diluted by mixing with the rest of the 0-2 inch sample to produce a concentration below the detection limit.

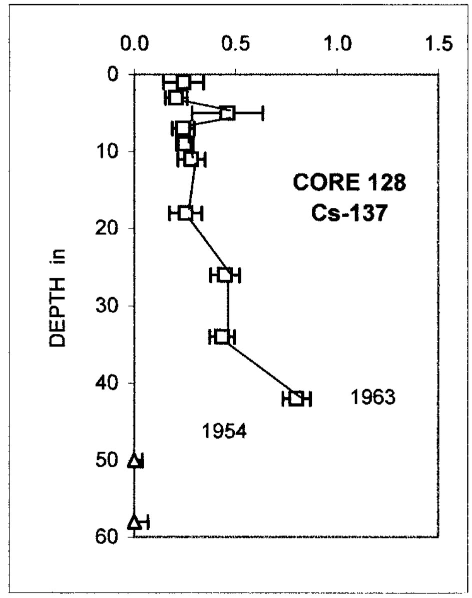
H. Jeter
11/21/06

GM Tarrytown Sediment Characterization

Core 128 collected 10/12/06

Mass Spec Services
Sediment Chronology Interpretation





Pb-210 Chronology
Supported Pb-210 was measured near 0.21 pCi/g dry in the deepest sample at 56-60 in.
Fitted curve: Y = -0.0136X + 0.3429 Correlation R square: 0.72 2 sigma slope tolerance: ±0.0056
Inferred sedimentation rate: -0.01352 / -(0.0136 ± 0.0056) = **0.99 in/y**
(0.70 - 1.70 in/y non-symmetric interval)

Cs-137 Chronology
The 1954 Cs-137 horizon lies between 42 and 50 inches depth, resulting in a sedimentation rate between 0.81 and 0.96 in/y: **0.88 ± 0.08 in/y**

A 1963 maximum is found between 34 and 50 inches depth, resulting in a sedimentation rate between 0.79 and 1.16 in/y: **0.98 ± 0.19 in/y**

Preferred Sedimentation Rate = 0.88 ± 0.08 in/y
Based on the 1954 Cs-137 horizon. This chronology marker yields the narrowest range of sedimentation rates and is in statistical agreement with the other two rate estimates.

Depth in	Pb-210	Cs-137	Be-7
0-2	2.15 ± 0.27	0.244± 0.099	< 1.12
2-4	2.14 ± 0.17	0.207± 0.053	< 1.02
4-6	2.33 ± 0.19	0.460± 0.175	< 1.05
6-8	1.75 ± 0.14	0.242± 0.055	< 0.64
8-10	1.99 ± 0.16	0.250± 0.042	< 0.39
10-12	2.12 ± 0.14	0.283± 0.067	< 0.66
16-20	1.60 ± 0.15	0.254± 0.080	< 0.65
24-28	0.72± 0.09	0.448± 0.071	< 0.71
32-36	1.71 ± 0.15	0.434± 0.036	< 0.49
40-44	0.65 ± 0.10	0.801± 0.068	< 0.30
48-52	0.69 ± 0.10	< 0.041	< 0.39
56-60	0.21 ± 0.08	< 0.038	< 0.47

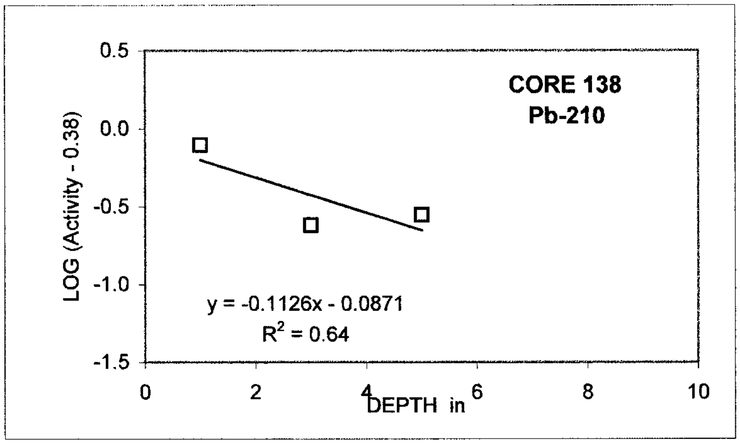
Note:
No Be-7 was detected. Because of its short half life of 53 days, Be-7 is only detectable within the last half year. This would correspond to 0.44 inches depth using the calculated sedimentation rate of 0.88 in/y. Thus, Be-7 in a thin surface layer would be diluted by mixing with the rest of the 0-2 inch sample to produce a concentration below the detection limit.

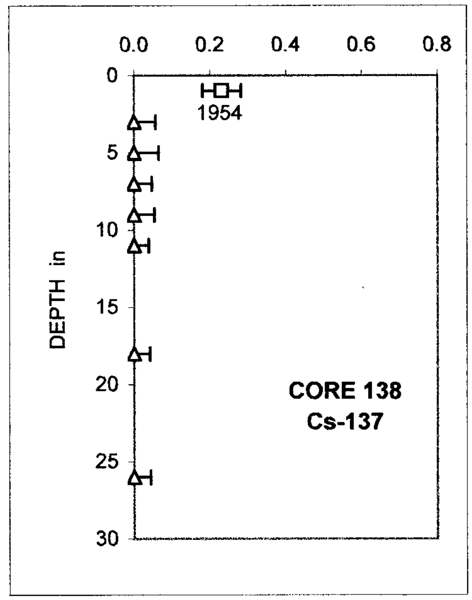
H. Jeter
11/29/06

GM Tarrytown Sediment Characterization

Core 138 collected 10/12/06

Mass Spec Services
Sediment Chronology Interpretation





Pb-210 Chronology
Supported Pb-210 was measured near 0.38 pCi/g dry as the average of all values deeper than 6 inches.
Fitted curve: Y = -0.1126X - 0.0871 Correlation R square: 0.64 2 sigma slope tolerance: ±0.1687
Inferred sedimentation rate: -0.01352 / -(0.1126 ± 0.1687) = **0.12 in/y**
(0.05 - infinite in/y non-symmetric interval)

Cs-137 Chronology
Cs-137 was detected in the surface (0 - 2 inch) sample but not a greater depths. The 1954 Cs-137 horizon appears to lie between 1 and 3 inches, resulting in a calculated sedimentation rate between 0.02 and 0.06 in/y: **0.04 ± 0.02 in/y.**

No 1963 maximum is defined with the existing sample spacing at shallow depths.

Preferred Sedimentation Rate = 0.04 ± 0.02 in/y.
Based on the 1954 Cs-137 horizon. This chronology marker yields a narrower range of sedimentation rates than does the Pb-210 method.

Depth in	Pb-210	Cs-137	Be-7
0-2	1.17 ± 0.13	0.232 ± 0.051	< 0.57
2-4	0.62 ± 0.13	< 0.057	< 0.59
4-6	0.66 ± 0.12	< 0.065	< 0.93
6-8	0.34 ± 0.09	< 0.047	< 0.42
8-10	0.38 ± 0.10	< 0.054	< 0.52
10-12	0.32 ± 0.08	< 0.039	< 0.35
16-20	0.29 ± 0.07	< 0.042	< 0.66
24-28	0.36± 0.10	< 0.044	< 0.50
40-44	0.35 ± 0.08	< 0.035	< 0.46
56-60	0.50 ± 0.10	< 0.048	< 0.54
72-76	0.40 ± 0.10	< 0.033	< 0.56
88-92	0.39 ± 0.09	< 0.049	< 0.85
104-108	0.42 ± 0.08	< 0.038	< 0.47

Note:
No Be-7 was detected. Because of its short half life of 53 days, Be-7 is only detectable within the last half year. This would correspond to 0.02 inches depth using the calculated sedimentation rate of 0.04 in/y. Thus, Be-7 in a thin surface layer would be diluted by mixing with the rest of the 0-2 inch sample to produce a concentration below the detection limit.

H. Jeter
11/29/06