SITE CHARACTERIZATION REPORT

Nathan's Waste & Paper Stock
Erie Terrace
Amsterdam, New York

Site Code # 429012
WA # D006130-05

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HRP Associates, Inc.

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1.0 INTRODUCTION

This report presents the results of the Site Characterization (SC) completed by HRP Associates, Inc. (HRP dBa HRP Engineering, P.C.), during the period of September through October 2009 in connection with the Nathan's Waste and Paper Stock Site located on Erie Terrace in the City of Amsterdam, Montgomery County, New York (Site # 429012, referred to herein as the site) (See Figure 1). The investigation assessed environmental impacts associated with use of the site as a lumber yard and a scrap metal and paper storage facility. The Site Characterization was completed for the New York State Department of Environmental Conservation (NYSDEC).

Interpretations presented within this report are based primarily on the investigations described herein. Previous investigations completed by others at the site have been reviewed by HRP. Applicable data from these reports have been included in sections of this report.

1.1 PURPOSE

The purpose of this Engineering Services Standby Contract Work Assignment (WA) was to conduct a SC to investigate on-site media potentially impacted by past operations. The primary objectives of the SC's Scope of Work (SOW) were to:

- Perform such necessary field investigations to determine the extent to which the release or threat of release poses a threat to human health and/or the environment and the types of response actions that should be considered.

- Determine the extent that historical site activities have impacted soil, sediments, and groundwater at the site and to determine the extent, if any, of the remediation that would be required to address the impacted media.

- Evaluate soil, sediment, and groundwater quality to assess if chemical concerns exist relative to NYSDEC standards and guidelines.

- Complete a property, utility and topographic survey of the site.

1.2 REPORT ORGANIZATION

The text of this report is divided into seven sections. Immediately following the text are the references, tables, figures and appendices. A brief summary of each report section is provided below.

Section 1.0 Introduction: The purpose of the SC report; the report organization; the Site background including Site description, Site history, summary of previous relevant studies, and scope of work are discussed.

Section 2.0 Study Area Investigation: Summarizes field activities associated with the site characterization, including surficial and subsurface soil investigations, groundwater investigations, and geological investigations.

Section 3.0 Physical Characteristics of the Study Area: Includes results of field activities to determine physical characteristics, including surface features, geology, soils, hydrogeology, demography and land use.

Section 4.0 Nature and Extent of Contamination: Presents the analytical results of site characterization. The results are for the following media: surface and subsurface soils, groundwater, and sediment.

Section 5.0 Contamination Fate and Transport: Discusses the mechanisms that may affect potential routes of exposure and transport of contaminants at the Site, contamination persistence, and contaminant migration.

Section 6.0 Conclusions: Summarizes the results and findings of the SC.

1.3 BACKGROUND

1.3.1 Site Description

The site is located at Erie Terrace, in the City of Amsterdam, Montgomery County, New York. The property consists of a 2.54-acre parcel of land that is asymmetrical in plan form. According to the City of Amsterdam's Code Enforcement Supervisor, the site is zoned Commercial /Light Industrial, with a section /lot/block number of 55.07-01-40. The site is improved by two structures: an approximately 53,000-ft^2 building and another building approximately 21,000-ft^2 in size. Both site buildings are currently in a dilapidated condition, and appear to be structurally unstable.

The foundation of a small cement storage building, composed of stone and mortar, is also located in the north central portion of the site. The area north and east of the 53,000 ft^2 building is cleared and has a gravelly substrate. In addition, scattered across the site are several debris piles, composed of wood, scrap metal, and soil. An abandoned rail spur is located at the north central portion of the site, and trends generally in a north to south direction. The remainder of the site is densely forested or shrub covered. The site plan is depicted on Figure 2.

The site is generally flat, with two exceptions. A hill is located at the northwest edge of the property, and steeply rises to the east. In addition, the area to the south of the main site building steeply slopes to the south, towards South Chuctanunda Creek. The southern edge of the main site building appears to be stabilized with a retaining wall, constructed out of stone and mortar.

The site and surrounding area are located in a mixed commercial/ residential area of Amsterdam, New York. At present, the areas surrounding the property include:

North:	Port Jackson Park and bocce courts
East:	Residential houses
West:	Forested land and the Canal way/Erie Canal Rail Trail
South:	South Chuctanunda Creek and Dave's Landscaping and Tree Service (101 Erie St)

1.3.2 Site History

A review of the Sanborn Fire Insurance Maps for the City of Amsterdam from 1888 to 1926, and one map labeled 1926-1950, gives a history of the site during that period. Below is a description of each Sanborn Fire Insurance Map depicting the site:

1888 Sanborn Fire Insurance Map

According to the 1888 Sanborn Fire Insurance Map for the City of Amsterdam, the site was improved with the Green Mosher & Co., planing mill. The map depicts a one main large structure, labeled "Planing Mill", a steam boiler, and several chimneys. Also depicted, is one smaller structure labeled "lumber shed", and four lumber storage piles. Fuel to heat the Planing Mill is noted as shavings. To the east, the Erie Canal is shown.

1895 Sanborn Fire Insurance Map

According to the 1895 Sanborn Fire Insurance Map for the City of Amsterdam, the site was improved with the H.C.Grieme, planing mill. The structure is the same as the one identified on the 1888 Sanborn map. The map depicts one main large structure, labeled "sawing & planing", a steam boiler, fuel is shavings, three roof tanks, and several chimneys. Also depicted are three smaller structures labeled "lumber sheds", various lumber storage piles, and a six-inch water pipe (shown on the western side of the main building and heading south over Chuctanunda Creek). To the east of the site is the Erie Canal, a few residential structures and the Mohawk River.

1901 Sanborn Fire Insurance Map

According to the 1901 Sanborn Fire Insurance Map for the City of Amsterdam, the site was still improved by the same company depicted in the 1895 map. The main "sawing & planing" building onsite remains unchanged from the 1895 map. The steam boiler remains, however coal and refuse are listed as the fuel source. The tanks previously mentioned remain. Although the size of the sheds has been altered slightly, they remain in the same general locations. The various lumber storage piles have moved to the northeast corner of the property. The six inch water pipe shown in the 1895 map remains, however an additional pipe as been added that runs east to west along the southern portion of the site, intersecting with the other pipe running south. This pipe extends under the Erie Canal to the east of the site, and travels west beyond the rail tracks to several residential homes before making a ninety degree turn south, under South Chuctanunda Creek.

1906 Sanborn Fire Insurance Map

According to the 1906 Sanborn Fire Insurance Map for the City of Amsterdam, only a few changes have been made to the site. A small addition has been added to the south side of the main building. The addition, located off the "woodworking and glazing" area, is labeled as "woodworking" and "storage". Several of the existing "lumber sheds" have been combined to make two large sheds, while several other

small sheds have been constructed. All other features remain the same as in the previous map.

1911 Sanborn Fire Insurance Map

According to the 1911 Sanborn Fire Insurance Map for the City of Amsterdam the site is still occupied by the H.C. Grieme, planing mill. Several major changes have taken place since the 1906 map. What was formerly the main building (with the addition shown in 1906) has been combined with the former lumber storage shed that was located to the south of the main building to form one large building. The building is divided into several major sections, including “box department”, “planing machinery”, “”planing”, “office/prints”, “wood working”, “storage”, “dry house”, “equipment shop” and “shavings house”. Only one chimney is shown off the shavings house, where the steam boiler remains. The fuel for the boiler is now listed as coal and shavings. Along with the changes to the main building area, there is an additional “lumber shed” located north of the main building. Several additional lumber piles are also shown in various locations throughout the property, and a rail spur is shown entering the property to the north, and runs parallel with the lumber piles in the northern portion of the property. A 5000 gallon water tank is located on the roof of the mill, used for the sprinkler system. A six inch water pipe is now shown running northwest under the Erie Canal to the site, while the other water pipes mentioned in the previous maps remain the same general configuration. Rail tracks are shown to the west of the site, while the Erie Canal is shown to the east.

1926 Sanborn Fire Insurance Map

According to the 1926 Sanborn Fire Insurance Map for the City of Amsterdam the most notable change is that the Erie Canal, formerly to the east of the site has been covered over. Two bridges are now shown spanning the South Chuctanunda Creek slightly east of the property. The property is still improved by H.C. Grieme Company, Planing Mill. The main building is shown in the same configuration as in the 1911 map, however the lumber sheds located north of the main building have been combined to form one large building. The configuration of the six inch water pipes running along the site has been altered slightly. One connection is shown off the western edge of the building, branching south, and east. A separate pipe is shown in the eastern portion of the property, running south under the Creek then veering east. Where the former lumber storage piles were located in the northern section of the property, there are now several lumber sheds, along with a cement storage shed, and the rail spur.

1926-1950 Sanborn Fire Insurance Map

The map does not have a specific date, but a date range for the map. This range indicates the date the mapmakers began work on the map and the date of completion. In later years the Sanborn Company issued revisions that were intended to be literally pasted over the original map sheet. In these cases the last date refers to the date of the most recent pasted correction. This map appears the same as the 1926 Sanborn Fire Insurance map. There are a few minor differences noted between the 1926-1950 map and the 1926 map. One difference is that on the 1926 map the name of the site is H.C. Grieme Company and on the 1926-1950 map the name is Grieme Lumber & Supply Co. A second difference is the location of the lumber sheds on-site adjacent to the railroad siding, on the northern portion of the site. On the 1926-1950 map the lumber shed on the south side of the railroad siding is shown farther to the south than the 1926 map. In addition, there is an extra lumber shed depicted on the 1926-1950 map, than on the 1926 map.

According to historical city directories, from 1950 to 1963, the site was occupied by Grieme Lumber and Supply Company. From 1971 to approximately 1993, the site was occupied by Nathan's Waste and Paper Stock. According to a previous Phase I report completed by Empire Soils Investigations, Inc., dated June 1993, the site was reportedly used as a lumber yard from at least 1926 to approximately 1971. Since 1971 the site buildings were utilized for the storage of antiques and recyclable materials, including paper products and scrap metals. According to this report, the former lumber yard boiler room was demolished in 1959. The lumber yard sheds and storage rooms were also demolished, however no dates were provided. At the time of the preparation of Empire Soils Phase I, the site was unoccupied, but was improved by two remaining structures, the 53,000-ft^2 building, and 21,000-ft^2 building.

1.3.3 Previous Investigations

Previous Investigations were supplied to HRP by the NYSDEC as part of the work assignment. Copies of the previous reports can be found in Appendix D.

Phase I Environmental Site Assessment, Empire Soils Investigations, Inc., June 1993

Empire Soils Investigations, Inc. (Empire) completed a Phase I Environmental Site Assessment (ESA) of Nathan's Waste & Paper Stock Company, Inc. on June 7, 1993. Empire reported the site contained two buildings constructed at least 67 years prior to the time of the report. Building #1 was approximately 53,000-ft^2 in size and Building #2 was approximately 21,000-ft^2 in size. The site buildings were used for storage

of antiques and recyclable materials, including paper and scrap metal. The remainder of the site had been recently cleared of stored recyclable materials. Scattered across the site were at least 15 55-gallon drums and wood/scrap metal piles.

During the site inspection, Empire observed a 2 foot by 2 foot area of stained soil adjacent to a 55-gallon drum. The soil stain was noted to have a petroleum odor. A 500-gallon aboveground storage tank was observed adjacent to Building #1. The tank reportedly contained #2 Fuel Oil and appeared in good condition. In addition, the assessor's card for the site indicated the prior occupant (lumber yard) utilized a 1,000-gallon underground gasoline storage tank. Empire Soils' interview with the site contact, Mr. Lessick, indicated the tank had been removed from the ground several years prior to1993.

Empire concluded that no evidence was discovered during the ESA that soils and groundwater had been negatively environmentally impacted. However, they stated that the potential existed for environmental concerns related to day to day operations at the site. Empire recommended a subsurface investigation be performed at the site, in the area of the former 1,000-gallon underground storage tank grave.

Phase II Environmental Site Assessment, Exploratory Test Pit Investigation, Empire Soils Investigations, Inc., July 1993

Empire Soils Investigations, Inc. (Empire) completed a Phase II Environmental Site Assessment (ESA) of Nathan's Waste & Paper Stock Company, Inc. on July 19 1993. The Phase II ESA included an exploratory test pit investigation, to assess the nature of subsurface soils at the site.

Empire mobilized to the site on June 17, 1993 and excavated a total of seven test pits (TP-1 to TP-7) from approximately 3.5 to 6 feet below the existing grade. Test pits TP-1, TP-2, and TP-3 were excavated at the western portion of the site. Test pits TP-4, TP-5, and TP-6 were excavated at the eastern portion of the site. Test pit TP-7 was excavated in the area of the former 1,000-gallon underground gasoline storage tank, at the northeast edge of building #1. Upon excavating the test pits, representative soil samples were collected and screened with a photoionization detector (PID), for gross volatile organics. Afterwards, one composite sample was collected from TP-1, TP-2, and TP-3 and another composite sample from TP-4, TP-5, and TP-6. Both composite samples were submitted for TCLP 8 RCRA metals analysis by EPA method 6010. A grab soil sample was collected from TP-7. The grab soil sample from

TP-7 was submitted for EPA method 8021 - NYSDEC Spill Technology and Remediation Series (STARS) list.

Results from field screening for gross volatile organics indicate none of the samples had positive readings, except for TP-7. The soil sample from TP-7 displayed gross volatile organics at a level of 10 to 20 parts per million (ppm).

TCLP analytical results from the two composite soil samples indicate barium, cadmium, chromium, and selenium above reported laboratory detection limits. However, the metals detected did not exceed their respective Environmental Protection Agency (EPA) limits. In addition, the analytical results for TP-7 for the NYSDEC STARS list indicate none of the analytes were detected above method detection limits.

Based on the results of field screening for gross volatile organics at TP-7, even though analytical results did not substantiate such findings, Empire concluded that the situation may constitute a release reportable to the NYSDEC under spill reporting guidelines.

Site Investigation of the Nathan's Waste & Paper Stock Company, Inc. Site, Malcolm Pirnie, Inc., October, 2000

Malcolm Pirnie, Inc. (MPI) completed a Site Investigation of the Nathan's Waste & Paper Stock Company, Inc. site on August 18, 2000. The project included the completion of a subsurface investigation that included the installation of four soil borings (SB-1 to SB-4) and the collection of one subsurface soil and groundwater sample from each boring, and the collection of three surface soil samples (SS-1 to SS-3).

Subsurface soil samples were collected using 4 foot Macrocore liners and a Geoprobe rig. Soils were logged by an attending geologist and were screened with a PID for gross volatile organics. A groundwater sample was collected from each boring using dedicated polyethylene tubing and a stainless steel check valve. Subsurface soil and groundwater samples were submitted to Hudson Laboratories for analysis of volatile organic compounds, semi-volatile organic compounds, and polychlorinated biphenyls (PCBs). Surface soil samples were submitted to Hudson Laboratories for analysis of lead, to assess potential impacts associated with historical battery storage on site.

Field results from screening subsurface soil samples with a PID indicate no volatile organics in any of the samples. Analytical results from subsurface soil samples indicate 2-butanone in sample SB-2 (adjacent to building #1 to the east) above the corresponding NYSDEC TAGM 4046

soil cleanup objective (SCO). The analyte was detected at 518 µg/kg, and the NYSDEC TAGM 4046 SCO for 2-butanone is 300 µg/kg. There were no other volatile organic compounds or semi-volatile organic compounds in the subsurface soil samples collected from borings.

Analytical results from groundwater samples indicate no volatile organic compounds, semi-volatile organic compounds, or polychlorinated biphenyls were detected in any of the samples. In addition, the results of field analysis of water quality parameters indicate pH in the samples ranged from 6.81 to 7.45. As such, MPI concluded that groundwater at the site had not been adversely impacted by the former operations of battery recycling.

Analytical results from surface soil samples indicate lead in all three samples (SS-1 to SS-3) at levels exceeding the TAGM SCO. Lead was detected in the samples at concentrations ranging from 4,065 to 8,400 mg/kg. Each of the results reported are two orders of magnitude above TAGM soil cleanup guidance for lead in developed suburban areas, which has a range of 200-500 mg/kg. These results indicate that the surface soils, in the areas sampled, have been adversely impacted by the past practices at the site.

1.3.4 Areas of Concern

For organizational purposes, HRP delineated the site into discrete Areas of Concern (AOCs) based on potential contamination sources from past on-site activities. The site was delineated into the following AOC's:

- AOC-1: Area of former battery storage with gravel substrate, located immediately to the east and northeast of the main site building.
- AOC-2: Area of former 1,000-gallon underground gasoline storage tank and aboveground storage tank concrete cradle, at the northeast edge of the main site building.
- AOC-3: All remaining areas on site, including former and current 55-gallon drum storage areas and several debris piles composed of wood, scrap metal, brick, and soil.

2.0 STUDY AREA INVESTIGATIONS

Study area investigations were completed at the site in accordance with the SC Work Plan to evaluate the surface and subsurface environmental conditions and to provide data pertaining to the extent of contamination. A description of the study area investigations conducted during this SC is presented in this Section.

This SC study and report were completed in accordance with the scope of work described in the letter issued to HRP from the NYSDEC "Work Assignment Issuance/Notice to Proceed, NYSDEC Site Code: 429012," dated May 28, 2009. The scope of work for the Site was prepared by the NYSDEC Division of Environmental Remediation. Deviations, based on field conditions are noted in Section 2.1.10. The investigation tasks described in the work plan utilized the NYSDEC's Draft DER-10 (DER-10), Technical Guidance for Site Investigation and Remediation, dated December 25, 2002 for guidance. On August 26, 2009, the Site Characterization Work Plan was approved by the NYSDEC project manager. HRP followed the procedures outlined in the previously approved generic Field Sampling Plan, Quality Assurance Project Plan, and Health and Safety Plan. As required by the NYSDEC, the Work Plan for this work assignment incorporated the following site specific components:

- Field Sampling Plan (FSP);
- Quality Assurance Project Plan (QAPP);
- Health and Safety Plan (HASP); and
- Community Air Monitoring Plan (CAMP);

Field work for this SC was conducted in several mobilizations to the site and included the following tasks:

- The installation of soil borings and the collection of soil samples using a Geoprobe 54 Series direct push rig and stainless steel hand auger (September 14-16, 2009);
- The installation of permanent groundwater monitoring wells using a Geoprobe 6610DT direct push rig and associated standpipes(September 18, 2009);
- The development of groundwater monitoring wells via traditional surge and purge techniques (October 1, 2009);
- The sampling of groundwater monitoring wells as per Environmental Protection Agency (EPA) low-flow techniques (October 8, 2009);
- The survey of the site by Shumaker Consulting Engineering and Land Surveying, P.C. Survey of the site including property boundary, utilities, and topography (October 12-14, 2009).

2.1 FIELD ACTIVITIES ASSOCIATED WITH SITE CHARACTERIZATION

To determine potential contaminant sources and the degree and extent of contaminants on-site, HRP installed subsurface soil borings, surface soil borings, collected sediment samples and permanent monitoring wells as presented in the Work Assignment Issuance/Notice to Proceed. Groundwater and soil samples were collected from the soil boring locations and submitted to a NYSDOH certified laboratory for analysis. Sampling procedures are discussed in Section 2.1. The analytical results for each medium are discussed in Section 3.0. The Data Usability Summary Report (DUSR) is included in Appendix C.

2.1.1 Surface Features: Natural and Manmade Features

HRP conducted an initial site visit in July 2009 to inspect the site and review features described in previous reports listed in section 1.3.3 of this report. During the field activities in September 2009, HRP collected field data to verify the locations of the natural and manmade features on-site. The following paragraphs describe the natural and manmade features identified during the field activities.

The site is improved by two structures: an approximately 53,000-ft^2 building and another building approximately 21,000-ft^2 in size. Both site buildings are currently in a dilapidated condition, and appear to be structurally unstable. The foundation of a small cement storage building, composed of stone and mortar, is also located in the north central portion of the site. The area north and east of the main site building is cleared and has a gravelly substrate. In addition, scattered across the site are several debris piles, composed of wood, scrap metal, and soil. An abandoned rail spur is located at the north central portion of the site, and trends generally in a north to south direction. The remainder of the site is densely forested or shrub covered.

In regards to topography, the site is generally flat, with two exceptions. A hill is located at the northwest edge of the property, and steeply rises to the east. In addition, the area to the south of the main site building steeply slopes to the south, towards South Chuctanunda Creek. The southern edge of the main site building appears to be stabilized with a retaining wall, constructed out of stone and mortar.

2.1.2 Meteorological Observations

Throughout HRP's on-site investigation, visual and thermal observations (i.e. ambient temperature, and wind direction readings) were noted and recorded in field logs.

2.1.3 Sediment Investigations

South Chuctanunda Creek borders the site to the south. Surface-water samples were not included under the scope of this investigation; however, three sediment samples (Sed-1 to Sed-3) were collected on September 16, 2009. Sediment samples were collected from the periphery of the active channel of South Chuctanunda Creek, at the upstream end, midstream part, and downstream end of the subject site. A dedicated, sterile, polyethylene scoop was used to collect each sediment sample.

Sediment samples were examined in the field for physical evidence of contamination (i.e., odor, staining). HRP personnel maintained a detailed log of each sample, and recorded all pertinent field information on the logs, including mineralogy and grain size utilizing the Udden-Wentworth Scale (1922). Upon collection, each sediment sample was placed into a sealable (i.e., Ziploc®) bag, labeled, and was subjected to a headspace analysis for gross volatile organics via a photoionization detector (PID) equipped with a 10.2 eV bulb. Sediment sample locations are depicted on Figures 4 and 6 and are summarized below. Sediment sample logs are available in Appendix B.

Sediment Sample ID	Location	Justification
Sed-1	AOC-3	Assess the potential for off-site migration of contaminants to South Chuctanunda Creek.
Sed-2	AOC-3	
Sed-3	AOC-3	

2.1.4 Geological Investigations

HRP observed the installation of soil borings and groundwater monitoring wells using a Geoprobe 54 Series and 6610DT direct push rig, and recorded soil mineralogy and grain size, per the Udden-Wentworth Scale (1922), in boring logs. The soil boring logs are provided in Appendix B. Information on the boring log includes borehole location, drilling information, sample intervals, percent recovery, and sample description information. Soil boring installations were conducted by Zebra Environmental Corporation and monitoring well installations by Aztech Technologies, Inc., both New York State Licensed drillers.

2.1.5 Soil Investigation

2.1.5.1 Soil Boring Installation and Subsurface Soil Sampling

To evaluate the condition of site's subsurface soils, HRP and Zebra Environmental Corporation (Zebra) mobilized to the site on September 14 through 16, 2009 and installed a total of twenty-four soil borings (SB-01 to SB-24). The borings were advanced to varying depths across the site, and included: two borings to 10 feet below ground surface (bgs), fifteen borings to 2 feet bgs, and seven borings to approximately 20 feet bgs. Zebra advanced the borings using a Geoprobe 54 Series machine and collected continuous soil samples using 4 foot Macrocore acetate liners. Soil boring locations were proposed in the Work Assignment, and were modified in the field due to limited access and site conditions.

The soil boring locations are shown on Figures 4 & 5 and are summarized below. Soil Boring Logs can be found in Appendix B.

Soil Boring ID	Sample Depth (ft)	Area of Concern
SB-01	0 – 2	AOC-1
SB-02	0 – 2	AOC-3
SB-03	0 – 2	AOC-3
SB-04	10 – 15	AOC-1
SB-05	0 – 2	AOC-3
SB-06	0 – 2	AOC-3
SB-07	9 – 12	AOC-1
SB-08	0 – 2	AOC-2
SB-09	0 – 2	AOC-3
SB-10	9 – 12	AOC-3
SB-11	0 – 2	AOC-3
SB-12	0 – 2	AOC-3
SB-13	0 – 2	AOC-3
SB-14	13 – 16	AOC-3
SB-15	9 – 12	AOC-3
SB-16	0 – 2	AOC-3
SB-17	0 – 2	AOC-3
SB-18	9 – 12	AOC-3
SB-19	8 – 12	AOC-3
SB-20	0 – 2	AOC-3
SB-21	0 – 2	AOC-3
SB-22	0 – 2	AOC-3
SB-23	4 – 8	AOC-2
SB-24	4 – 8	AOC-2

Soil Boring ID	Sample Depth (ft)	Area of Concern
AOC-1: Area of former battery storage. AOC-2: Area of former 1,000-gallon underground gasoline storage tank and aboveground storage tank concrete cradle. AOC-3: All remaining areas on site, including former and current 55-gallon drum storage areas and several debris piles composed of wood, scrap metal, brick, and soil.		

During the soil boring installations, samples were collected by the attending HRP geologist, placed in laboratory-provided 4-ounce and 8-ounce clear Teflon sealed glass jars, labeled, and preserved on ice in a cooler. Each sample was also reviewed for physical evidence of contamination (i.e. odor, staining).

In addition, a small portion (1-2 oz.) was also placed in a polyethylene bag, allowed to attain ambient temperature, and then subjected to a headspace analysis via a photoionization detector (PID).

All non-disposable soil sampling equipment was decontaminated between samples using an Alconox wash followed by a clean water rinse. All investigation derived waste (IDW) was backfilled in the borings subsequent to collecting representative samples.

HRP selected one soil sample from each soil boring for analysis. Samples were selected based on the results of field screening for gross volatile organics using a PID and physical evidence of contamination. When no elevated PID readings were noted, the interval at or directly above the water table surface was sampled. HRP collected twenty-four subsurface soil samples from 24 different soil borings. The soil samples that were collected and analyzed are listed below.

Sample ID	Justification	Analysis
SB-01*, SB-02	To evaluate the material and the degree and extent of contamination in shallow and deep subsurface soils.	• TCL VOCs (via NYSDEC OLM04.2) • TCL SVOCs (via NYSDEC OLM04.2) • TAL Metals + Mercury (via NYSDEC ILM04.2) • TCL Pesticides/PCBs (via NYSDEC OLM04.2)
SB-03, SB-04		
SB-05, SB-06		
SB-07, SB-08		
SB-09, SB-10		
SB-11, SB-12		
SB-13, SB-14		
SB-15, SB-16		
SB-17, SB-18		
SB-19, SB-20		
SB-21, SB-22		
SB-23*, SB-24*		
TAL: Target Analyte List, TCL: Target Compound List, PCBs: Polychlorinated Biphenyls, VOCs: Volatile Organic Compounds, SVOCs: Volatile Organic Compounds * Sample analyzed for SW 846 Method 1311 - TCLP (toxicity characteristic leaching procedure)		

2.1.5.2 Surface Soil Sampling

To evaluate the condition of site's surface soils, HRP and Zebra mobilized to the site on September 14 through 16, 2009 and collected a total of twenty-six (26) surface soil samples (SS-01 to SS-26). The samples were collected from the 0 to 2 inches bgs under a vegetative cover and 0 to 6 inches bgs under a gravelly substrate. Surface soil samples were collected using dedicated polyethylene scoops or using a stainless steel hand-auger. Surface soil sample locations were proposed in the Work Assignment, and were modified in the field due to access and site conditions. HRP placed an adequate volume of soil into the appropriate containers with Teflon-lined caps. The sample jars were appropriately labeled and placed on ice in a cooler. All observations were recorded in a field book. Equipment was either decontaminated after each use and between sample locations or disposable spoon samplers were utilized.

The surface soil sampling locations are shown on Figures 4 & 6 and summarized below. Surface Soil Logs can be found in Appendix B.

Surface Soil ID	Sample Depth (in)	Area of Concern
SS-01	0 – 6	AOC-1
SS-02	0 – 6	AOC-3
SS-03	0 – 6	AOC-3
SS-04	0 – 6	AOC-3
SS-05	0 – 6	AOC-1
SS-06	0 – 6	AOC-1
SS-07	0 – 6	AOC-1
SS-08	0 – 6	AOC-3
SS-09	0 – 6	AOC-3
SS-10	0 – 2	AOC-3
SS-11	0 – 2	AOC-3
SS-12	0 – 2	AOC-3
SS-13	0 – 2	AOC-3
SS-14	0 – 2	AOC-3
SS-15	0 – 2	AOC-3
SS-16	0 – 2	AOC-3
SS-17	0 – 2	AOC-3
SS-18	0 – 2	AOC-3
SS-19	0 – 6	AOC-1
SS-20	0 – 6	AOC-2
SS-21	0 – 6	AOC-2
SS-22	0 – 2	AOC-3
SS-23	0 – 2	AOC-3
SS-24	0 – 2	AOC-3

Surface Soil ID	Sample Depth (in)	Area of Concern
SS-25	0 – 6	AOC-1
SS-26	0 – 6	AOC-1
AOC-1: Area of former battery storage AOC-2: Area of former 1,000-gallon underground gasoline storage tank and aboveground storage tank concrete cradle AOC-3: All remaining areas on site, including former and current 55-gallon drum storage areas and several debris piles composed of wood, scrap metal, brick, and soil.		

The surface soil samples that were collected and analyzed are listed below. Each surface soil sample was submitted to a New York State Certified Laboratory for analysis of TCL VOCs via USEPA Method 8260B, TCL SVOCs via USEPA Method 8270C, PCBs via USEPA Method 8082, Pesticides via USEPA Method 8081A, TAL Metals via USEPA Method 6010B, mercury via EPA Method 7471A, and total cyanide via USEPA 9014.

Sample ID	Justification	Analysis
SS-01, SS-02, SS-03	To evaluate the material and the degree and extent of contamination in surface soils.	• TCL VOCs (via NYSDEC OLM04.2) • TCL SVOCs (via NYSDEC OLM04.2) • TAL Metals + mercury (via NYSDEC ILM04.2) • TCL Pesticides/PCBs (via NYSDEC OLM04.2)
SS-04, SS-05, SS-06		
SS-07, SS-08, SS-09		
SS-10, SS-11, SS-12		
SS-13, SS-14, SS-15		
SS-16, SS-17, SS-18		
SS-19, SS-20, SS-21		
SS-22, SS-23, SS-24		
SS-25, SS-26		

2.1.6 Groundwater Investigations

Groundwater Monitoring: Well Installation, Development, Sampling

To evaluate the condition of on-site groundwater, HRP and Aztech Technologies, Inc. (Aztech) mobilized to the site September 17-18, 2009 and installed four standpipe groundwater monitoring wells using a Geoprobe 6610dt direct push rig with three-inch outside diameter drill tooling (MW-01 to MW-04). Subsurface soil samples were not collected during well installation activities.

Methods of Installation

Monitoring well locations were proposed by the NYSDEC and were subsequently modified by HRP and NYSDEC, based on limiting field conditions. The groundwater well locations are shown on Figure 4 & 7. Monitoring Well Construction Logs can be found in Appendix B.

Soil Boring ID	Area of Concern	Justification
MW-01	AOC-1	To evaluate the degree and extent of contamination in the shallow aquifer underlying the site.
MW-02	AOC-3	
MW-03	AOC-3	
MW-04	AOC-3	

Monitoring wells were installed at the site within unconsolidated material in order to enable the monitoring of groundwater elevation and acquisition of groundwater samples for laboratory testing. Four 1.5-inch diameter, PVC monitoring wells (MW-01 to MW-04) were installed in the shallow saturated zone beneath the site. The monitoring wells were installed using the procedures described below:

- Soil bore holes were advanced to a target depth of twenty-five feet bgs, approximately 10 feet into the phreatic zone.
- A 1.5-inch diameter pre-packed Schedule 40 PVC well screen (0.010-inch slot) and riser pipe were inserted and placed on the bottom of the borehole. The riser was capped to prevent well construction materials from entering the well.
- Washed silica was poured into the annular space between the well material and the borehole sidewall. The sand pack continued to at least two feet above the top of the screen section. The sand was kept from plugging by using a weighted tape and slowly removed from the borehole, allowing for sand to properly settle.
- Above the sand, a seal (bentonite pellets) was formed in the borehole. The bentonite seal extended at least two feet above the top of the sand pack section.
- Clean water was periodically added to the borehole to hydrate the pellets. The pellets were then allowed to hydrate for at least 30 minutes.
- The well riser pipe was cut to approximately three to four feet above grade.
- A lockable gripper plug was inserted onto the top of the PVC well casing and locked.
- An approximate three foot metal stick-up pipe was installed around the PVC well, rising approximately two-inches above the height of the well, as a protective casing. Subsequently, the metal stick-up pipe was grouted into place with a concrete pad.

Methods of Development

Groundwater wells were developed according to methods detailed in the site specific and generic field activities plan. HRP mobilized to the site on October 1, 2009 to develop the four groundwater monitoring wells. HRP pumped the wells utilizing a Geopump™

Peristaltic Pump and dedicated Teflon-lined polyethylene tubing. This method was chosen as the appropriate well development method based on water depth, well productivity, and sediment content of the water. Non-disposable equipment (i.e. water level indicator) was decontaminated prior to use in each well. Care was taken not to introduce contaminants to the equipment during well development. All development waters were emptied into a clean 5-gallon pail for approximate volume measurement and were then discharged directly to the ground at a rate that allowed infiltration to occur. Groundwater showed no obvious sign of contamination (i.e. odor, sheen, etc.) during well development. The volume of water, depth to bottom of the well, and other visual observations were recorded in a field notebook. Well development logs can be found in Appendix B.

Well development was discontinued when field parameters met the following conditions:

- Well water had achieved a turbidity value of less than 50 NTU; and
- Well development was supplemented by measurements of temperature, pH, and specific conductance. Development was complete when these parameters stabilized for a minimum of three consecutive readings at 10 percent variability or less.

Groundwater samples were collected from each well, including a duplicate and matrix spike/matrix spike duplicate (MS/MSD) sample. A matrix spike is an aliquot of a field sample, which is fortified with the analyte(s) of interest and analyzed to monitor measurement bias associated with the sample matrix. A matrix spike and matrix spike duplicate are performed for every analytical batch.

Sample ID	Analyses
MW-01	• TCL VOCs (via NYSDEC OLM04.2) • TCL SVOCs (via NYSDEC OLM04.2) • TAL Metals + mercury (via NYSDEC ILM04.2) • TCL Pesticides/PCBs (via NYSDEC OLM04.2)
MW-02	
MW-03	
MW-04	

TAL: Target Analyte List TCL: Target Compound List
PCBs: Polychlorinated Biphenyls
VOCs: Volatile Organic Compounds SVOCs: Volatile Organic Compounds

Methods of Sampling

Groundwater wells were sampled according to methods detailed in the site specific and generic field activities plan. In addition, the groundwater wells were sampled according to Environmental Protection Agency (EPA) low-flow techniques.

To evaluate the groundwater quality beneath the site, groundwater samples were collected from each of the monitoring wells (MW-01 to MW-04). To collect representative groundwater samples, monitoring wells were developed prior to sampling. A minimum of 7 days following development elapsed prior to commencing groundwater sampling. Low-flow sampling equipment and procedures were used to purge and sample the monitoring wells. Purging required removing water from the well at a rate of at least 250 milliliters per minute, but not exceeding 1 liter per minute for a sufficient length of time for water quality parameters to stabilize (at least 30 minutes). Drawdown did not exceed ten percent of the standing water column. Sampling commenced immediately after purging, without adjusting the flow rate or water intake depth.

The following list describes the well purging and sampling procedures that were utilized on October 8, 2009:

- All field instruments were calibrated at the beginning of each work day.
- Monitoring well covers were unlocked and carefully removed to avoid having any foreign material enter the well.
- The water level was measured below the top of casing using an electronic water level indicator. With knowledge of the total depth of the well, it was possible to calculate the volume of water in the well. The tape and probe of the water level indicator was cleaned with an Alconox and water soaked paper towel while reeling in.
- New Teflon-lined polyethylene tubing was installed into the well and the end of the tubing was set to approximately the midpoint of the groundwater column inside the well.
- The Teflon-lined polyethylene tubing was attached to a Geopump™ Peristaltic Pump. Another section of polyethylene tubing was attached to the effluent side of the pump and was attached to a flow-through cell water quality monitor (Horiba U22).
- The pump was turned on and set to a relatively low discharge rate (less than 1 liter per minute) and drawdown rate was monitored using a water level indicator.
- The wells were purged while collecting water quality measurements (pH, Specific Conductivity, Temperature,

Dissolved Oxygen, Oxidation/Reduction Potential, and Turbidity) and water level measurements were collected every 3 to 5 minutes for at least 30 minutes.

- After water quality conditions stabilized and well purging was completed, a groundwater sample was collected into the appropriate containers.
- The VOC sample containers were filled first. The discharge tubing was directed toward the inside wall of the sample container to minimize volatilization. VOC sample containers were filled so that no headspace (air bubbles) was present.
- Each sample bottle was labeled in the field using a waterproof permanent marker and placed in a cooler with ice.
- All non-disposable equipment was decontaminated with Alconox and water, and then rinsed with deionized water prior to and after each use.
- Monitoring well sampling data was recorded in a groundwater sampling data sheet (provided in Appendix B).

2.1.7 Site Topographic, Property, and Utility Surveys

HRP obtained the services of Shumaker Consulting Engineering & Land Surveying, P.C (Shumaker) to complete the survey portion of the SC. The survey of the site involved completing a boundary, utility, and topographic survey by a NYS licensed surveyor. Shumaker was on-site from October 12-14, 2009 to collect geophysical and site data for the three surveys needed to be completed in accordance with the site specific field activities plan. All three survey plans are included as Appendix A.

Topographic Survey

A site survey was conducted in order to properly locate all sampling points such as surface soil, soil borings, monitoring wells, and sediment sample locations. The field survey included establishing project horizontal and vertical control and the collection of planimetric and topographic features including two on-site buildings, for the development of mapping. Critical terrain features were surveyed for the development of a digital terrain model (DTM) to generate contour lines at an interval of 1 foot. Surface evidence and features of storm or sanitary sewer drainage systems were located. Horizontal coordinate values were based on the North American Datum (NAD) of 1983. Vertical coordinate (elevation) values were based on the North American Vertical Datum (NAVD) of 1988. The elevations of all monitoring well casings were established to within an accuracy of plus or minus 0.01 feet based on NAVD 1988. A notch was

etched in all interior casings to provide a reference point for all future groundwater elevation measurements.

Boundary Survey

Shumaker's NYS licensed surveyors conducted research, field surveys, review, boundary determination, and mapping to place property lines within the project limits. Easements discovered during research were placed within the mapping deliverables as well. In addition, the surveyor conducted research, analysis, calculations, and interpretations of deeds, municipal plans, roadway plans, and other record documents to determine the bounds of the subject property (Nathan's Waste & Paper Stock Property). An abstract search was not available for the purpose of identifying, inventorying, and mapping easements.

The field survey was performed using global positioning system (GPS) observations, closed traverses and sideshots to locate buildings, roads, streams, and other pertinent topographical features affecting the boundary and property rights within 10 feet of the property line. Pertinent features were included as part of the finalized survey map. Property and existing easement lines were placed and annotated within the digital mapping files.

Utility Survey

Utilities within the survey limits, both overhead and underground, were included in the survey and mapping effort. Field survey were conducted to identify and locate surface evidence of underground utility systems including valves, meters, release valves, manholes, shutoffs, etc. Utility owners were contacted to procure pertinent record plans and information to assist in placing approximate utility locations. A review and comparison of utility records and field locations was performed to map utility line locations throughout the survey limits. Finalized utility locations were approximate based on surface feature locations and record information.

2.1.8 Deviations from Workplan

During the course of the Site Characterization there were no deviations from the work plan.

2.2 Technical Correspondence

No technical correspondence documenting field activities were identified between HRP and the NYSDEC. Correspondence was generally limited to e-mails and telephone conversations.

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

The following section discusses the results of field activities to determine physical characteristics.

3.1 Results of Field Activities

3.1.1 Site Features

The site is improved by two structures: an approximately 53,000-ft^2 building and another building approximately 21,000-ft^2 in size. Both site buildings are currently in a dilapidated condition, and appear to be structurally unstable. The foundation of a former building, composed of stone and mortar, is also located in the north central portion of the site. The area north and east of the main site building is cleared and has a gravelly substrate. In addition, scattered across the site are several debris piles, composed of wood, scrap metal, and soil. An abandoned rail spur is located at the north central portion of the site, and trends generally in a north to south direction. The remainder of the site is densely forested or shrub covered.

3.1.2 Meteorology

Throughout HRP's on-site investigations, the weather on-site varied due to seasonal temperature changes and precipitation.

3.1.3 Soils / Geology

Native and disturbed soils and surficial geological materials (i.e. regolith) were encountered throughout the site to an approximate depth of twenty-five feet bgs. Boring logs prepared during this investigation study are presented in Appendix B. In general, subsurface soils and underlying materials consisted of clay and silty loam soils, fine to medium-grained sandy (Wentworth Scale) soils, occasional lenses of fine to medium-grained sand, and fill soils consisting of a fine-grained matrix (clay and silt) with trace rock fragments of varying lithologies. Due to the variable nature of regolith on-site, apparently partially disturbed by historical anthropogenic activities, generalization of subsurface soils is difficult.

According to the Surficial Geology Map of New York – Hudson Mohawk Sheet (1987), the material underlying the site is classified as alluvial deposits (al). Alluvial deposits are confined to valley bottoms, are oxidized and non-calcareous, and consist of fine sand to gravel sized sediments. Alluvial deposits are frequently inundated by

flooding and have a variable thickness of 1 to 10 meters. Regolith encountered at the site (i.e. fine to medium-grained sands and sandy lenses) are generally consistent with the description of alluvial deposits in the published geologic literature.

Bedrock was not encountered during the installation of soil borings, nor was bedrock observed in the bed of South Chuctanunda Creek or adjacent to the site. According to the Bedrock Geology Map of New York State – Hudson Mohawk Sheet (1970), the site is mapped as the Ordovician aged Trenton and Black River Groups (Otbr). The Trenton and Black River Groups consist of the following formations: Dolgeville, Denley, Sugar River, Kings Falls, Glens Falls, Rockland, Amsterdam, and Lowville Limestones. According to New York State Museum Map and Chart Series No. 33, Bedrock Geology of the Central Mohawk Valley, New York (1980), bedrock at the site is classified as the Amsterdam Limestone. According to New York State Museum Bulletin 169, Geology of Saratoga Springs and Vicinity (1914), the lithology of the Amsterdam Limestone is described as a thinly bedded, fossiliferous, crystalline limestone and the thickness ranged from 40 to 60 feet.

3.1.4 Surface Soils

In general, surface soils consisted of black to dark brown organic-rich top soil, with a granular (sand sized particles, Wentworth Scale) texture, trace angiosperm roots, trace granule- to pebble-sized rock fragments, trace metal pieces, and trace woody debris.

According to the United States Department of Agriculture Natural Resource Conservation Service Web Soil Survey of the Amsterdam, soils at the site are classified as cut and fill land (CFL). A typical surface profile of CFL soils consists of a gravelly loam soil. Surface soils described at the site are generally consistent with this description; however, they also are characterized by a granular (i.e. sandy) texture. In addition, surface soils at the site are generally consistent with surface horizons in forested and densely vegetated areas, i.e. organic-rich top soils.

3.1.5 Hydrogeology

The South Chuctanunda Creek is adjacent to the southern property line of the Site. This creek is defined in 6 NYCRR Part 876-159 as entering the Mohawk River from the southwest at South Amsterdam. The NYSDEC has classified this creek as “C” which has a best use for fishing.

The other surface water bodies within a half mile of the site are the Mohawk River and the North Chuctanunda Creek. They are approximately 340 feet and 1,130 feet, respectively, to the east of the Site.

The Mohawk River is located just east of the site and is defined in 6 NYCRR Part 876-9 and is classified as "C" which has a best use for fishing.

The North Chuctanunda Creek is defined in 6 NYCRR Part 876-128 as entering the Mohawk River from the north through the center of the City of Amsterdam. The NYSDEC has classified this creek as "C" which has a best use for fishing.

In addition to this surface water bodies, there is a large New York State regulated freshwater wetland to the south east of the site. The NYSDEC Environmental Resource Mapper depicts the wetland (designated A-11) within the boundaries of the Mohawk River. The wetland begins just south of the City of Amsterdam and proceeds southeast in the river. The wetland is approximately 81 acres in size.

Groundwater

During the installation of soil borings, the soils within the macro core sampler typically appeared wet at the 13 to 16 foot interval (below ground surface).

The variability in the depth to water saturated conditions in soil borings is likely attributed to the variable nature of regolith on-site, with site regolith ranging from clay to silty loam soils, to sandy soils, to loamy fill soils.

HRP conducted a groundwater elevation survey between on-site wells on October 1 and 8, 2009. The groundwater levels recorded during the event are as follows:

Well ID	**Relative Groundwater Elevation Depth Below Grade (feet)**	
	October 1, 2009	*October 8, 2009*
MW-1	21.02	20.88
MW-2	24.74	24.70
MW-3	24.46	24.45
MW-4	19.95	19.98

Based on the results of the groundwater elevation survey, flow is estimated to be in the eastern direction towards the Mohawk River. Groundwater flow diagrams from depth to water table measurements collected on October 1 and 8, 2009 are available on Figure 8. This is consistent with expected topographic relief of the area.

Groundwater in Monitoring Wells

Groundwater was observed in the wells at depths ranging from 19.95 to 24.74 feet below ground surface with an average of approximately 22.52 feet below ground surface. HRP observed the groundwater in monitoring wells to have no odor, no sheen, and no free product. Groundwater purged from all monitoring wells was initially turbid with fine-grained sediment (i.e. clay and silt). However, with continual pumping during well development and sampling, turbidity decreased and no evidence of suspended solids in groundwater was visible.

3.1.6 Demography and Land Use

The City of Amsterdam, Montgomery County, New York is approximately 33 miles west northwest of the City of Albany and 27 miles west southwest of the City of Saratoga Springs, NY. According to the United States Census of 2000, the population of Amsterdam was 18,355 people, with 7,983 households and 4,686 families residing in the city. The population density was 3,086.5 per square mile (1,191.1/km^2).

Land use in the area of the site is mixed residential, recreational, and commercial properties. The site is located west of Erie Terrace and the Mohawk River in the City of Amsterdam. At present, the areas surrounding the property include:

North:	Port Jackson Park and bocce courts
East:	Residential houses
West:	Forested land and the Canal way/Erie Canal Rail Trail
South:	South Chuctanunda Creek and Dave's Landscaping and Tree Service (101 Erie St)

4.0 NATURE AND EXTENT OF CONTAMINATION

In order to identify the nature and extent of contamination at the subject site, HRP submitted soil, sediment and groundwater samples to a NYSDOH ELAP (environmental laboratory approval program) certified laboratory for analysis of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, Target Analyte List (TAL) Metals, mercury, and total cyanide. Selected samples were also submitted for TCLP analysis.

Test America, Inc., located in Buffalo, NY is an approved ELAP, CLP (contract laboratory protocol) and NELAP (national environmental laboratory approval program) laboratory, located in Buffalo, New York provided the analytical laboratory services for this project. A NYSDEC approved data validator, Environmental Data Services, provided data validation services for this project. Data qualifiers and their definitions are included in Appendix C. The presentation of results within this text does not include data qualifiers. Detected chemical compounds in the various media sampled as part of the SC and the analytical results are presented in Tables 1 through 21. A general description of the various media sampled and analyzed is provided below.

- Subsurface soil samples (SB-1 to SB-24) were collected from soil borings located onsite at depths varying from 0-16 feet below the ground surface. The majority of the subsurface soil borings were collected from the 0-2 foot interval below the ground surface.

- Surface soil samples (SS-01 to SS-26) were collected on-site from either the top of the landscaped area or debris pile to 6 inches below the surface.

- Groundwater samples were collected from newly installed monitoring wells (MW-1 through MW-4) on-site.

- Sediment samples were collected from the stream (SED -1 through SED-3) adjacent to the site.

In order to determine if contaminant sources remained on-site, this SC evaluated a broad range of parameters including VOCs, SVOCs, PCBs, pesticides, Target Analyte List (TAL) Metals, and mercury. In addition several samples were analyzed for TCLP compounds.

Compounds detected in the various media tested during this SC were compared to the following New York State guidance documents and standards:

- NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1); Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations dated October 1993; Revised June 1998; errata sheet dated January 1999; and Addendum dated April 2000 (NYSDEC Class GA).

- NYSDEC Regulation, 6 NYCRR Subpart 375-6, "Remedial Program Soil Cleanup Objectives" which applies to the development and implementation of the remedial programs for soil and other media set forth in subparts 375-2 through 375-4 [Inactive Hazardous Waste Disposal Site Remedial Program, Brownfield Cleanup Program, and Environmental Restoration Program] and includes the soil cleanup objective tables developed pursuant to ECL 27-1415(6).

- 40 CFR 261.21 EPA Regulatory Levels permitted for Toxicity Characteristics Leaching Procedure (TCLP) analysis.

- NYSDEC Division of Fish, Wildlife and Marine Resources, "Technical Guidance for Screening Contaminated Sediments", January 1999.

- NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 5.1.9); In-Water and Riparian Management of Sediment and Dredged Material, dated November 2004.

At the time of report completion, the City of Amsterdam was reviewing future uses of the site; however, they had not yet determined a proposed use. As a result, soil analytical results for this investigation were compared against NYSDEC 6 NYCRR Part 375-6 Unrestricted, Restricted for the Protection of Public Heath and Protection of Ecological Resources Soil Cleanup Objectives (SCO). Specifically for the Protection of Public Heath SCOs, the regulation was broken down further into Residential, Restricted Residential, Commercial, and Industrial values. The results of the soil samples are listed in the next section.

4.1 Results of Site Characterization

4.1.1 Sources

HRP did not identify any existing underground storage tanks, sludge or leachate tanks, or lagoons on-site as part of this site investigation. However, AOC-3 is defined as the area of the former 1,000-gallon underground gasoline storage tank and existing on-site aboveground

storage tank concrete cradle, at the northeast edge of the main site building.

There were several debris piles on-site, north of the main building. The one debris pile appeared to be a collection of dead tree branches. A second debris pile/mound was located adjacent to the northwest corner of the main building and it appeared to be comprised of building materials which have fallen/collapsed from the building. A third pile appeared to be comprised of discarded and scrap metal pieces and a few tires.

4.1.2 Subsurface Soils from Soil Borings

Subsurface Sample Submittal

Twenty-four subsurface soil samples were collected from soil borings during the SC on September 14-16, 2009. All twenty-four of the subsurface soil samples were submitted for analysis for VOCs (via USEPA 8260), SVOCs (via USEPA 8270), PCBs (via USEPA 8082), pesticides (via USEPA 8082), and metals including mercury (via USEPA 6010). Sample results are presented below.

Analytical Results - Subsurface Soils for Volatile Organic Compounds (VOCs)

Three VOCs were detected among the twenty-four subsurface soil samples tested. Of the three VOCs detected, only acetone was detected at a concentration exceeding its respective Unrestricted SCO. There were no other exceedances above the SCOs. The remaining two VOCs detected include 2-butanone (MEK) detected in SB-4 (adjacent to the entrance gate) and methylene chloride, which was detected in all samples analyzed. Neither of these VOCs was detected at concentrations exceeding SCOs.

The Site Investigation completed by Malcolm Pirnie, Inc. in October, 2005 also detected 2-butanone from subsurface soil samples. It was detected in their sample SB-2 (adjacent to building #1 to the east) above the corresponding NYSDEC TAGM 4046 soil cleanup objective (SCO). Malcolm Pirnie's investigation did not detect any other volatile organic compounds or semi-volatile organic compounds in the subsurface soil samples collected from borings.

The location of the 2-butanone detection in the subsurface soil samples for HRP's investigation is not in the same location as the detections in Malcolm Pirnie's October 2005 report.

It should be noted that acetone and methylene chloride are generally considered lab artifacts, and their detection could be attributed as such. VOC results for subsurface soil samples are listed in Table 1.

Analytical Results - Subsurface Soils for Semi-Volatile Organic Compounds (SVOCs)

Twenty-three SVOCs were detected among the twenty-four subsurface soil samples tested. Of the twenty-three SVOCs detected, seven exceeded one or more SCO. Exceedances only occurred in three samples SB-1, SB-17, and SB-22. In SB-1 detected concentrations exceeded Residential SCOs for benzo(k)fluoranthene, chrysene; concentrations exceeding Restricted Residential SCOs for benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene; concentrations exceeding Commerical SCOs for dibenz (a,h)anthracene; and concentration of benzo(a)pyrene exceeding all SCOs, including Protection of Ecological Resources.

Compounds found to exceed Restricted Residential SCOs in SB-17 include benzo(k)fluoranthene, chrysene; Commercial SCOs were exceeded for indeno(1,2,3-cd)pyrene; Industrial SCOs for benzo(a)anthracene, benzo(b)fluoranthene and dibenz(a,h)anthracene; and concentration of benzo(a)pyrene exceeding all SCOs including Protection of Ecological Resources.

In SB-22 exceedances include Residential SCOs for chrysene, Restricted Residential SCOs for benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene and Industrial SCOs for benzo(a)pyrene.

Other SVOCs detected, but not exceeding any Subpart 375-6 SCOs included 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(g,h,i)perylene, bis(2-ethylhexyl)phthalate, butylbenzyl phthalate, carbazole, dibenzofuran, diethyl phthalate, di-n-butyl phthalate, fluoranthene, fluorene, nitrobenzene, phenanthrene, and pyrene. SVOC results for subsurface soil samples are listed in Table 2.

Analytical Results- Subsurface Soils for Metals

Twenty-three metals were detected in the subsurface soil samples tested. Of the metals detected, six exceeded their respective SCOs in one or more of the samples. The table below is a summary of the SCO exceedances for the subsurface soils from the soil borings installed on-site. Other metals detected but not exceeding any SCOs include aluminum, antimony, beryllium, calcium, total chromium, cobalt, magnesium, nickel, total potassium, selenium, silver, sodium,

thallium, vanadium, iron and manganese. Metals results for subsurface soils from soil borings are listed in Table 3.

Parameter	Soil sample	NYSDEC Regulation Exceeded
Arsenic	SB-2, SB-3, SB-5, SB-6, SB-17	Industrial SCO
Cadmium	SB-2, SB-5	Residential SCO
	SB-3	Ecological Resources SCO
Copper	SB-2, SB-12, SB-17	Unrestricted SCO
	SB-5, SB-9	Commercial SCO
Mercury	SB-3, SB-9, SB-10, SB-16, SB-17, SB-22	Unrestricted SCO
	SB-2, SB-5	Restricted Residential SCO
	SB-15	Commercial SCO
Barium	SB-22	Residential SCO
Lead	SB-1-RE1, SB-2-RE1, SB-3-RE1, SB-9-RE1 SB-11, SB-13, SB-14, SB-16, SB-17, SB-21	Unrestricted SCO
	SB-5-RE1, SB-6-RE1, SB-15	Restricted Residential SCO

Analytical Results - Subsurface Soils for Pesticides

Five pesticides were detected among the subsurface soil samples analyzed. 4,4-DDE exceeded the Unrestricted SCO in both SB-2 and SB-3. 4,4'-DDT was detected in nine samples and exceed its respective Unrestricted SCO in seven (SB-1, SB-3, SB-5, SB-9, SB-11, SB-15 and SB-17). Dieldrin was found to exceed its Protection of Ecological Resources SCOs (and Unrestricted SCOs) in two samples (SB-3 and SB-17). Heptachlor and methoxychlor were detected among the samples tested but did not exceed any of their respective SCOs. Pesticide results for subsurface soils from soil borings are listed in Table 4.

Analytical Results - Subsurface Soils for Polychlorinated Biphenyls (PCBs)

Four PCBs were detected among the subsurface samples analyzed. Aroclor-1248 was found to exceed its Unrestricted SCO in one sample (SB-14), while Aroclor-1260 exceeded the same SCO in two samples (SB-5 and SB-20). Aroclor-1254 was found to exceed its respective Unrestricted SCO in three samples (SB-2, SB-3, and SB-5). Aroclor-1242 was also detected in one sample but not at a concentration exceeding any Subpart 375-6 SCOs. PCBs results for subsurface soils from soil borings are listed in Table 4.

4.1.3 Surface Soils from Soil Borings

Surface Soil Sample Submittal

Twenty-six surface soil samples were collected during the SC on September 14-16, 2009. The samples were collected from the 0 to 2 inches below the ground surface under a grassy substrate and 0 to 6 inches below the ground surface under a gravelly substrate. Surface soil samples were collected using dedicated polyethylene scoops or using a stainless steel hand-auger. All twenty-six of the samples were submitted for analysis for VOCs (via USEPA 8260), SVOCs (via USEPA 8270), PCBs (via USEPA 8082), pesticides (via USEPA 8082), and metals including mercury (via USEPA 6010). Sample results are presented below.

It should be noted that SS-21 and SS-20 were taken from AOC-3 which is the tank cradle area, and SS-19, SS-25, and SS-26 were collected from AOC-1, the former battery storage area.

Analytical Results – Surface Soils for Volatile Organic Compounds (VOCs)

No VOCs were detected at concentrations exceeding Subpart 375-6 Unrestricted Soil Cleanup Objectives (SCOs) among the surface soil samples collected. Two VOCs, acetone and methylene chloride were detected in several samples; however the detected concentrations did not exceed their respective SCOs. It should be noted that acetone and methylene chloride are generally considered lab artifacts, and their detection could be attributed as such. VOC results for surface soils are listed in Table 5.

Analytical Results – Surface Soils for Semi-Volatile Organic Compounds (SVOCs)

Twenty-two SVOCs were detected among the surface soil samples analyzed. Of the twenty-two detected, seven were detected at a concentration exceeding one or more of the Subpart 375-6 standards. The table below is a summary of the SCO exceedances for the surface soils on-site.

Parameter	Soil sample	NYSDEC Regulation Exceeded
Benzo(a)anthracene	SS-1, SS-5, SS-9, SS-15, SS-16, SS-20, SS-21, SS-26	Restricted Residential SCO
Benzo(a)pyrene	SS-1, SS-5, SS-18, SS-20, SS-21, SS-26	Industrial SCO
	SS-9, SS-15, SS-16	Ecological Resources SCO
Benzo(b)fluoranthene	SS-1, SS-4, SS-5, SS-9, SS-13, SS-15, SS-	Restricted Residential SCO

	18, SS-19, SS-20, SS-21, SS-25, SS-26	
	SS-16	Commercial SCO
Benzo(k)fluoranthene	SS-15, SS-20	Unrestricted SCO
	SS-9	Residential SCO
	SS-16	Restricted Residential SCO
Chrysene	SS-1, SS-5, SS-15, SS-18, SS-20, SS-21, SS-26	Residential SCO
	SS-9, SS-16	Restricted Residential SCO
Dibenz (a,h)anthracene	SS-5, SS-15, SS-20	Restricted Residential SCO
	SS-9, SS-18	Commercial SCO
	SS-16	Industrial SCO
Indeno(1,2,3-cd)pyrene	SS-1, SS-4, SS-5, SS-9, SS-13, SS-15, SS-19, SS-20, SS-21, SS-23-RE1, SS-25, SS-26	Restricted Residential SCO
	SS-16	Commercial SCO

Other SVOCs were detected, but not at concentrations that exceeded any of the Subpart 375-6 SCOs, include acenaphthene, acenaphthylene, anthracene, benzo(g,h,i)perylene, bis(2-ethylhexyl)phthalate, butylbenzyl phthalate, carbazole, dibenzofuran, di-n-butyl phthalate, di-n-octyl phthalate, fluoranthene, fluorene, naphthalene, phenanthrene and pyrene. SVOC results for surface soils are listed in Table 6.

Analytical Results – Surface Soils for Metals

Ten metals were detected at concentrations exceeding a range of Subpart 375-6 SCOs among the surface soil samples. The table below is a summary of the SCO exceedances for the surface soils on-site.

Parameter	**Soil sample**	**NYSDEC Regulation Exceeded**
Arsenic	SS-1, SS-7, SS-8, SS-12	Unrestricted SCO
	SS-2, SS-3, SS-4, SS-5, SS-9, SS-13, SS-14, SS-15, SS-16, SS-18, SS-19, SS-20, SS-21, SS-26	Industrial SCO
Cadmium	SS-2, SS-21	Residential SCO
	SS-1, SS-3, SS-9, SS-19, SS-25	Restricted Residential SCO
	SS-5, SS-6, SS-20, SS-26	Commercial SCO
	SS-4	Industrial SCO
	SS-8	Protection of Ecological Resources SCO

Parameter	Soil sample	NYSDEC Regulation Exceeded
Copper	SS-2, SS-7, SS-9, SS-12, SS-13, SS-15, SS-16, SS-18, SS-21	Unrestricted SCO
	SS-1, SS-4, SS-5, SS-6, SS-8, SS-19, SS-20, SS-25, SS-26	Commercial SCO
Mercury	SS-7, SS-10, SS-17, SS-18	Unrestricted SCO
	SS-1, SS-3, SS-6, SS-8, SS-9, SS-12 thru SS-16, SS-19, SS-20, SS-25, SS-26	Restricted Residential SCO
	SS-2, SS-4, SS-5	Industrial SCO
Barium	SS-1-RE-1	Residential SCO
	SS-6-RE-1	Commercial SCO
	SS-5-RE-1, SS-18, SS-19	Protection of Ecological Resources SCO
Lead	SS-2-RE1, SS-3-RE1, SS-10, SS-11, SS-14, SS-17, SS-21	Unrestricted SCO
	SS-7-RE-1, SS-8-RE-8, SS-9-RE-1, SS-12, SS-13, SS-15, SS-16, SS-20	Restricted Residential SCO
	SS-4-RE-1, SS-5-RE-1, SS-6-RE-1, SS-18, SS-25, SS-26	Commercial SCO
	SS-19	Industrial SCO
Nickel	SS-1, SS-6, SS-8, SS-15, SS-19, SS-20, SS-25, SS-26	Unrestricted SCO
	SS-4, SS-5	Residential SCO
Selenium	SS-5	Unrestricted SCO
Silver	SS-5, SS-15	Unrestricted SCO
Zinc	SS-1-RE1, SS-2-RE1, SS-3-RE1, SS-6-RE1, SS-7-RE1, SS-8-RE1, SS-9-RE1, SS-10 thru SS-18, SS-20, SS-21, SS-25, SS-26	Unrestricted SCO
	SS-4-RE-1, SS-5-RE-1, SS-19	Residential SCO

In addition to those metals listed above aluminum, antimony, beryllium, calcium, cobalt, magnesium, total potassium, sodium, thallium, vanadium, iron and manganese were detected among the surface samples analyzed, however not at concentrations that exceeded any Subpart 375-6 SCOs. Metals results for surface soils are listed in Table 7.

Analytical Results – Surface Soils for Pesticides

Three pesticides were detected at concentrations exceeding Subpart 375-6 Unrestricted SCOs among the surface soil samples collected. The pesticides exceeding Unrestricted SCOs include 2,2-bis(4-chlorophenyl)-1,1-dichloroethylene (4,4'-DDE), Dieldrin, and 4,4-dichlorodiphenyltrichloroethane (4,4'-DDT). 4,4'-DDE was

detected at a concentration exceeding Unrestricted SCOs in seven samples (SS-1 through SS-3, SS-5, SS-12, SS-15 and SS-26), Dieldrin in two samples (SS-8 and SS-13), and 4,4'-DDT in seventeen samples (SS-2, SS-5 through SS-9, SS-12 through SS-17, SS-19 through SS-21, SS-25 and SS-26. Dieldrin also exceeded Residential SCOs in five samples (SS-2, SS-6, SS-9, SS-15 and SS-26) and Restricted Residential SCOs in SS-5. Other pesticides detected, but not at concentrations exceeding any SCOs include beta-BHC, alpha-chlordane, endrin aldehyde, heptachlor epoxide and methoxychlor. Pesticide and PCBs results for surface soils are listed in Table 8.

Analytical Results – Surface Soils for Polychlorinated Biphenyls (PCBs)

Three PCBs were detected among the surface soils collected, however only two were detected at concentrations exceeding Subpart 375-6 Unrestricted and Commercial SCOs. Aroclor-1248 was detected in exceedance of Unrestricted SCOs in four samples (SS-19, SS-25, SS-2, SS-13) and Commercial SCOs in one sample (SS-1). Aroclor-1254 was detected in exceedance of Unrestricted SCOs in four samples (SS-3, SS-13, SS-19 and SS-25) and Commercial SCOs in eight samples (SS-2, SS-5, SS-6, SS-12, SS-15, SS-16, SS-20 and SS-26). Pesticide and PCBs results for surface soils are listed in Table 8.

4.1.4 TCLP Analysis from soil borings

TCLP Sample Submittal

Three subsurface samples and two surface soil samples were submitted for Toxicity Characteristic Leaching Procedure (TCLP) analysis (SB-1, SB-23, SB-24, SS-1 and SS-26). This test simulates the conditions in a landfill and how those conditions will affect the material being disposed over an extended time. It essentially determines how much, if any, of the forty toxicity characteristic constituents will leach from the material being tested and enter the environment. All five samples were submitted for analysis for VOCs (via USEPA 8260B-TCLP), SVOCs (via USEPA 8270C-TCLP), metals (via USPA 6010-TCLP) and herbicides and pesticides (via USEPA 8082-TCLP). All the samples were collected using the same procedures listed in section 2.0.

Findings

No leachable VOCs or SVOCs were detected among the five samples analyzed. TCLP VOC and TCLP SVOC results are listed in Table 9 and 10 respectively.

Six metals were detected among the soil samples analyzed, and of the six detected only one metal exceeded its respective EPA Regulatory Level. Lead was detected at a concentration (6.47 mg/L) that exceeded its TCLP Regulatory Level (5 mg/L) in SS-1. Other metals detected below TCLP limits include arsenic, barium, cadmium, total chromium, lead and mercury. TCLP metal results are listed in Table 11.

No herbicides were detected among the five samples submitted, however two pesticides were detected, gamma-BHC (Lindane) and heptachlor. Both pesticides were detected in SB-24, however the detected pesticides did not exceed EPA Regulatory Levels. TCLP herbicides and TCLP pesticides are listed in Tables 12 and 13, respectively.

4.1.5 Sediment samples near Chuctanunda Creek

Sample Submittal

Three sediment samples were collected during the SC on September 16, 2009. The samples (SED-1, SED-2, and SED-3) were analyzed for VOCs (via USEPA 8260), SVOCs (via USEPA 8270), PCBs (via USEPA 8082), pesticides (via USEPA 8082), and metals including mercury (via USEPA 6010). The analysis of the sediment samples did not include organic carbon content of the sediments. Sample results are presented below.

Findings

One VOC was detected among the samples analyzed. Acetone was detected in SED-1, however not at a concentration that exceeds any of the NYSDEC 6 NYCRR Part 375 Soil Cleanup Objectives. It should be noted that acetone is generally considered a lab artifact, and its detection could be attributed as such. The VOC results for the sediment samples collected are listed in Table 13.

Thirteen SVOCs were detected among the sediment samples analyzed. Of the thirteen detected, none were detected at concentrations that exceeded any NYSDEC 6NYCRR Subpart 375-6 standards. The SVOCs detected include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, p-cresol, phenanthrene and pyrene. The SVOC results for the sediment samples collected are listed in Table 14. The SVOC results from the surface soil sampling in the area between the south side of the main building and the Creek also had detections of the same SVOCs

above restricted residential SCOs. Nineteen metals were detected among the three sediment samples, however none of the metals detected exceeded any NYSDEC 6NYCRR Subpart 375-6 soil cleanup objectives. The metals detected include aluminum, arsenic, beryllium, calcium, total chromium, cobalt, copper, magnesium, mercury, nickel, total potassium, sodium, thallium, vanadium, barium, iron, lead, manganese and zinc. The metal results for the sediment samples collected are listed in Table 15. The metal results from the surface soil sampling in the area between the south side of the main building and the Creek also had a detection of lead above Unrestricted SCOs.

One pesticide was detected among the sediment samples collected. 4,4'-DDT was detected in SED-3 at a concentration (37 ug/kg) that exceeded NYSDEC 6 NYCRR Part 375-6 Unrestricted SCOs (3.3 ug/kg). No other pesticides were detected among the samples.

One PCB was detected at a concentration exceeding NYSDEC 6 NYCRR Subpart 375-6 Unrestricted SCOs among the surface soil samples collected. Aroclor-1260 was detected in SED-3 at a concentration of 310 ug/kg, exceeding its Unrestricted SCO (100 ug/kg). The pesticide and PCB results for the sediment samples collected are listed in Table 16. The pesticide/PCB results from the surface soil sampling in the southeastern corner of the site (SS-12) had a detection of Aroclor-1254 above Commercial SCOs, and 4,4-DDE and 4,4-DDT above Unrestricted SCOs.

It should be noted that the laboratory method for the analysis of PCBs will show numerous peaks (due to the numerous chemical compounds in PCBs) in the chromatograph during the analysis. One compound detection peak's retention time, Aroclor-1260, mimics the one that represents 4,4-DDT. Based on this, and the fact that the breakdown products of 4,4-DDT were not detected in the sample, the detection of 4,4,-DDT could be a product of the Aroclor-1260 analysis and not 4,4-DDT.

This mimicking event in the sediment samples does not appear to occur in the surficial or subsurface samples. In the analysis of the soil samples, when Aroclor-1260 is detected along with 4,4-DDT, the breakdown products of 4,4-DDT are also detected.

The results from sediment sampling were also compared to two NYSDEC documents:

- Sediment Quality Thresholds for In-water/Riparian Placement in NYSDEC, Division of Water, TOGS 5.1.9, "In-Water and Riparian Management of Sediment and Dredged Material", dated November 2004, and
- NYSDEC Division of Fish, Wildlife and Marine Resources, "Technical Guidance for Screening Contaminated Sediments", January 1999

The results from the sediment analysis were compared to the Sediment Quality Threshold Values for dredging, riparian or in-water placement listed in NYSDEC TOGS 5.1.9 for fresh water aquatic ecosystems. The document has established three classes of sediment quality thresholds for dredged material proposed for dredging/in-water/riparian placement (i.e. for sediments to be dredged). The concentration of 4,4-DDT at 0.037 mg/kg would classify the sediment as Class C (>0.03 mg/kg). Class C dredged material is expected to be acutely toxic to aquatic biota and therefore, dredging and disposal requirements may be stringent. The concentration of Aroclor-1260 at 0.310 mg/kg would classify the sediment as Class B (0.1-1.0 mg/kg). Class B dredged material is moderate contamination, expected to have chronic toxicity to aquatic biota and therefore, dredging and disposal requirements may be conducted with several restrictions.

Since the samples were not analyzed for organic carbon content, the results are not comparable to the levels of protection listed in the NYSDEC's Technical Guidance for Screening Contaminated Sediments.

4.1.6 Groundwater

Sample Submittal

Five groundwater samples were collected during the SC on October 8, 2009 from the newly installed monitoring wells [MW-01, Dup-1 (Duplicate sample taking from MW-1), MW-2, MW-3, and MW-4) and submitted for analytical testing. The groundwater samples were analyzed for VOCs (via USEPA 8260B), SVOCs (via USEPA 8270C), PCBs (via USEPA 8081A), pesticides (via USEPA 8081A), and metals including mercury (via NYSDEC ILM05.2 [TAL metals]). Groundwater samples collected from monitoring wells are summarized in Tables 18 through 21. Sample results are presented below.

Findings

No VOCs were detected among the four groundwater samples analyzed with EPA method 8260B. The VOC results for the groundwater samples collected are listed in Table 18.

There was one SVOC detected among the four groundwater samples tested utilizing EPA method 8270C. Levels were found to exceeded the NYSDEC TOGS guidance value of 5 ug/L for bis(2-ethylhexl)phthalate in one of the samples, MW-1 (110 ug/L). This same compound was also detected in MW-3, but at a concentration well below the NYSDEC guidance value. It should be noted that bis(2-ethylhexl)phthalate was non-detect in the MW-2 base sample, but the matrix spike sample for MW-2 had 2.26 ug/l and the matrix spike duplicate had a concentration of 51.1ug/l . The MS/MSD samples were not spiked with bis (2-ethylhexyl)phthalate, so the result is essentially a duplicate and triplicate sample for this analyte. This indicates that either the lab or sample collection process resulted in contamination problems at greatly varying levels. In addition, the trip blank analyzed along with the water samples did not detect any compounds. There were no other exceedances for the analyzed compounds above the NYSDEC TOGS values. The SVOC results for the groundwater samples collected are listed in Table 19.

Various metals were detected in the four groundwater samples tested, and four metals (aluminum, iron, magnesium, and manganese) were detected at levels exceeding NYSDEC TOGS values. Aluminum exceeded guidance values in two samples (MW-3 and MW-4), while iron and manganese exceeded guidance values in two samples (MW-2 and MW-3). Other metals detected include barium, calcium, cobalt, total potassium, sodium, and zinc. The metal results for the groundwater samples collected are for total metals, as per NYSDEC ILM05.2 method, and are listed in Table 20.

For the metal compounds detected in the groundwater on site, there appears to be no real correlation between the concentrations in up gradient (MW-2) well as compared to the down gradient wells (MW-1 and MW-4).

No pesticides or PCBs were detected among the four groundwater samples tested. The pesticides or PCBs results for the groundwater samples collected are listed in Table 21.

4.1.7 Data Limitations

The results listed within the tables of this site characterization report have been validated through the NYSDEC-required data validation process. Any change in analytical results, due to the data validation process, have been included in the report tables. Data Usability Summary Reports (DUSRs) have been generated for each set of sample packages analyzed by the laboratory. These reports can be found in Appendix C.

4.1.8 Air Monitoring during site activities

A Community Air Monitoring Plan (CAMP) was included in the NYSDEC-approved site-specific field activities plan. Real-time monitoring was conducted for volatile organic compounds (VOCs) and particulates (i.e., dust) at the upwind and downwind perimeter of each designated work area when ground intrusive activities were being conducted, including soil borings and monitoring well installation. Its intent was to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

VOCs were monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during intrusive work or as otherwise specified. Upwind concentrations were measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work was performed using a Mini Rae 2000 photo ionization detector (PID) equipped with a 10.2 eV bulb. The PID was routinely calibrated for the contaminant(s) of concern or for an appropriate surrogate. The PID was placed in a weatherproof box that sat on a tripod approximately four feet off the ground. The downwind PID readings did not exceed 5 ppm during the field investigations.

Particulate concentrations were monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations during intrusive work. The particulate monitoring was performed using a Quest Dust Trak 8520, a real-time monitor capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of

integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The Dust Trak was routinely zero checked and was placed in a weather proof box that sat on a tripod approximately four feet off the ground. The equipment was equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration was visually assessed during all work activities. The particulate readings were below 100 mcg/m^3 during all field investigations and IRM activities. All tables for VOCs and particulates concentration readings can be found in Appendix B.

5.0 CONTAMINANT FATE AND TRANSPORT

This section discusses the mechanisms that may affect migration of contaminants at the Site and the chemical behavioral characteristics of the compounds detected, including persistence of these chemical substances. This information is compared with the Site-specific data and observations to assist in assessing the extent of migration that has occurred.

5.1 Potential Routes of Exposure and Transport

5.1.1 Groundwater

Groundwater Routes of Exposure

HRP collected and analyzed groundwater samples from the four installed monitoring wells on-site. Based on the analytical results, there were no VOCs, pesticides, or PCBs detected in the groundwater. In addition, the only metals detected above the NYSDEC TOGS values were aluminum, iron, magnesium, and manganese). One SVOC detected, bis(2-ethylhexl)phthalate, exceeded its respective NYSDEC TOGS guidance value. Based upon the review of the analytical data, see section 4.1.6, there is an indication that either the lab or sample collection process resulted in SVOC contamination problems with bis(2-ethylhexl)phthalate at greatly varying levels. The site and surrounding area utilize municipal water, therefore there is no risk to exposure by ingestion of the groundwater.

Groundwater Routes of Transport

Aluminum, magnesium, and manganese were detected at levels marginally exceeding TOGS values; and iron significantly exceeded the respective TOGS value. Due to the history of the site and the fact that the Erie Canal used to be located to the East of the site and was filled in by an unknown materials in the early 1920's, the metals detected may be remnants of the past fill placed on or near the site and can not be attributed solely to the geologic conditions of the site and surrounding area. Based on the analytical results from the groundwater sampling of the four monitoring wells, there are no significant sources of contamination within the groundwater from the subject site and therefore no potential for the groundwater contamination to migrate off-site.

5.1.2 Soil

Surface Soil

Twenty-six surface soil samples (zero to six inches below the ground surface) were collected from soil borings during the SC. Of the twenty-six samples, no VOCs were detected above Subpart 375-6 Unrestricted SCOs. Seven SVOCs and ten metals were detected at concentrations exceeding one or more Subpart 375-6

SCOs (including Restricted Residential, Commerical, and Industrial). Three pesticides (4,4'-DDE, Dieldrin, 4,4'-DDT) and two PCBs (Aroclor-1248 and Aroclor-1254) were detected at concentrations exceeding Subpart 375-6 Unrestricted SCOs. PCBs also exceeded Commercial SCOs in various samples.

Subsurface Soil

Twenty-four subsurface soil samples were collected from the soil borings installed on-site. The results from these subsurface soil samples showed only one VOC, acetone, exceeded Unrestricted SCOs. Seven SVOCs and metals were detected at concentrations exceeding various Subpart 375-6 SCOs (including Restricted Residential, Commerical, and Industrial) among the subsurface soil samples. Three pesticides and PCBs were found to exceed Unrestricted SCOs in various samples. In addition, Dieldrin exceeded both Protection of Ecological Resources and Unrestricted SCOs.

Soil Routes of Exposure

Exposure associated with encountering contaminated soil is possible through dermal contact. The risk of exposure to on-site soil contamination is significant. Significant levels of metals, semi-volatiles, PCBs, and pesticides exist in on-site surface (0-6 inches below the ground surface) and subsurface (0-2 foot below the ground surface) soil. The exception being the northwest corner of the site (west of the existing historical railroad spur and encompassing the steep hill area) and the western and southern perimeter from the main building structure on-site to the property line. The extent of the sub surface soil contamination appears to be limited to the eastern half of the site.

There is a break in the fence line on the west side near the bike path that will allow people to gain access to the site and possibly have dermal contact with the soil. This break in the fence needs to be closed to eliminate the potential of residents or recreational users of the bike path to access the site and exposure to the on-site surface soils.

The other exposure risk is associated with any future development of the site that involves dermal contact and possible ingestion through soil disturbance; such as excavation, grading, underground utility service or work, demolition of on-site buildings that would require heavy equipment, and clearing and/or grubbing of the site.

Surface Soil Routes of Transport

The majority of the site is grass, gravel or wooded and not covered with asphalt or structures. Due to the vegetative cover throughout the site the majority of the stormwater should permeate the soil. For a large storm event, the stormwater will flow via overland sheet flow to the east (with a slight southeast direction) toward Chuctanunda Creek and Erie Terrace. There is little to no potential for the surface soil contamination to migrate off-site.

Subsurface Soil Routes of Transport

Even though numerous chemical compounds were detected above NYSDEC SCOs of various degrees, the groundwater at the site was not impacted with the contaminants detected in the subsurface soil samples. In addition, the TCLP results for the subsurface soil samples did not exceed the USEPA regulatory limits. Therefore, there is little to no potential for the subsurface soil contaminants to migrate off-site.

5.1.3 TCLP Samples

Routes of Exposure and Transport

Three subsurface samples and two surface soil samples were submitted for Toxicity Characteristic Leaching Procedure (TCLP) analysis (SB-1, SB-23, SB-24, SS-1 and SS-26). No VOCs, SVOCs, herbicides were detected in the TCLP soil sample analysis.

Two pesticides were detected, gamma-BHC (Lindane) and Heptachlor. Both pesticides were detected in SB-24, however the detected pesticides did not exceed EPA Regulatory Levels.

Six metals were detected (arsenic, barium, cadmium, total chromium, lead and mercury), and only lead exceeded its respective EPA Regulatory Level. Lead was detected at a concentration (6.47 mg/L) that exceeded the USEPA regulatory level (5 mg/L) in SS-1, which is in AOC-1. Since this soil surface sample exceeded the USEPA regulatory level, any soil removal activities in area of SS-1 would result in the removed soil being characterized as hazardous waste based on the toxicity characteristic (D008). This TCLP result indicates that over time this soil could leach lead into the surrounding media when placed in landfill conditions.

5.1.4 Sediment

Sediment Routes of Exposure

Three sediment samples were collected from the periphery of the active channel of South Chuctanunda Creek, at the upstream end, midstream part, and downstream end of the subject site. The results from the sediment samples detected only one VOC, acetone, exceeded Unrestricted SCOs. No SVOCs or metals were detected at levels exceeding SCOs. One pesticide, 4,4'-DDT, was detected in SED-3 at a concentration exceeding NYSDEC 6 NYCRR Part 375-6 Unrestricted & Protection of Ecological Resources SCOs. One PCB, Aroclor-1260, was detected in SED-3 at a concentration of exceeding its Unrestricted SCO.

The area where the sediment sample was collected is at the bottom of a steep slope that is not readily accessible. This area also does not appear to be easily accessible from the water due to the rocky nature of the shoreline. Therefore, exposure associated with encountering contaminated sediment is possible but risk is very low.

Sediment Routes of Transport

In a flowing creek or river, the sediment is constantly being redistributed across the bottom by erosion and water flow. This movement can expose sediment contamination, making it available to aquatic biota and the water column. The flow of the Chuctanunda Creek was not studied as part of this SC. Further sampling of the sediment and the water in the Chuctanunda Creek would need to be conducted to determine if there is any migration of chemicals from the sediment to the Chuctanunda Creek.

5.2 Contaminant Persistence

Classes of chemical compounds were detected in various environmental media at the Site. Ten metals and seven SVOCs exceeded 6 NYCRR Part 375 Protection of Human Health-Restricted Residential, Commercial, and Industrial and Protection of Ecological Resources soil cleanup objectives for surface and subsurface soils on-site.

In general, chemical compounds within a given chemical class will behave similarly in the environment. However, significant differences in behavior of chemical compounds may be observed within a chemical class. Their behavior is dependent on their physical and chemical properties as well as environmental conditions, such as the presence of bacteria, pH variations, and oxidation potential (Eh) conditions. A number of SVOCs and metals detected above applicable soil cleanup objectives in the subsurface and surface soils are expected to be persistent on site because of their chemical nature.

5.3 Contaminant Migration

5.3.1 Factors Affecting Contaminant Migration

Factors affecting contaminant migration for the surface soil, subsurface soils and sediments include future development or removal of soils from the subject property.

5.3.2 Modeling Methods and Results

Modeling methods were not included in the Scope of this SC.

6.0 CONCLUSIONS

The purpose of this SC is to characterize on-site media potentially impacted by past site operations, and to preliminarily delineate the vertical and horizontal extent of contaminated media. This site characterization identified contamination in each medium shown below which were assessed at levels exceeding applicable criteria. Based on our findings to date, the following conclusions are offered:

- According to historical city directories, from 1971 to approximately 1993, the site was occupied by Nathan's Waste and Paper Stock. According to a previous Phase I report completed by Empire Soils Investigations, Inc., dated June 1993, the site was reportedly used as a lumber yard from at least 1926 to approximately 1971. Since 1971, the site buildings were utilized for the storage of antiques and recyclable materials, including paper products and scrap metals.

- Seven SVOCs, ten metals, three pesticides and two PCBs were detected in surfaces soil samples at concentrations exceeding one or more Subpart 375-6 SCOs (including Restricted Residential, Commercial, and Industrial). Since the Site is zoned Commercial/Light Industrial, the surface soil results compared specifically to Subpart 375-6 SCOs for Commercial and Industrial. There are two metals, four SVOCs, and two PCBs that exceed these SCOs. Therefore based on the sampling results, surface soils (zero to six inches below the ground surface) in all defined areas of concern, have been impacted by past site operations. However, the concentration of exceedances is within AOC-1 and the eastern portion of AOC-3 (eastern side of railroad spur).

- Seven SVOCs, seven metals, three pesticides and three PCBs were detected the subsurface soil samples (zero to two feet) at concentrations exceeding various Subpart 375-6 SCOs (including Restricted Residential, Commercial, and Industrial). Since the Site is zoned Commercial/Light Industrial, the surface soil results compared specifically to Subpart 375-6 SCOs for Commercial and Industrial. There are two metals, four SVOCs, and one PCB that exceed these SCOs. Therefore based on the sampling results, subsurface soils in all defined areas of concern have been impacted by past site operations. The extent of the subsurface contamination was detected in the zero to two foot zone on the eastern portion of the site in AOC-1 and AOC-3 (east of the railroad spur). The deeper subsurface soil samples did not exceed Part 375 SCOs except for mercury in SB-15 (located on the eastern side of AOC-3) at the 9-12 foot interval, which exceeded the Commercial SCO.

- The result of the sediment samples revealed that no SVOCs or metals were detected at levels exceeding any Part 375-6 SCOs. One pesticide, 4,4'-DDT, exceeded Subpart 375-6 Unrestricted & Protection of Ecological Resources SCOs. One PCB, Aroclor-1260, exceeded the Subpart 375-6 Unrestricted SCO.

- Three subsurface samples and two surface soil samples were submitted for Toxicity Characteristic Leaching Procedure (TCLP) analysis. No VOCs, SVOCs, herbicides were detected in the TCLP soil sample analysis. Two pesticides were detected; however neither exceeded USEPA Regulatory Levels. Lead exceeded the USEPA Regulatory Level. Since the soil sample exceeded the USEPA regulatory level, any soil removal activities in area of SS-1 would result in the removed soil being characterized as hazardous waste based on the toxicity characteristic (D008).

- No VOCs, pesticides, or PCBs were detected in the groundwater samples analyzed. In addition, the only metals detected above the NYSDEC TOGS (1.1.1) values were aluminum, iron, magnesium and manganese.

- Based on observations during the on-site investigation, there appears to be suspected asbestos-containing materials (ACM) in the two on-site structures. The collection of suspect ACM for analysis was not included as part of the site characterization.

- Due to the age of the structures on-site, lead paint may have been used on the structures. The collection suspect lead samples for analysis was not included as part of the site characterization.

APPENDIX A

TOPOGRAPHIC, PROPERTY, AND UTILITY SURVEY (ACAD drawings)

and

GIS DATA

[ACAD drawings and GIS data are on the enclosed CD]

APPENDIX B

FIELD DATA (SOIL BORING LOGS, GROUNDWATER SAMPLING SHEETS, etc.)

[CAMP data for dust trak meters and PID's are on the enclosed CD]

APPENDIX C

ANALYTICAL DATA AND
QA/QC EVALUATION RESULTS (DUSR)

[analytical data and DUSR's are on the enclosed CD]

APPENDIX D

MUNICIPAL FILES & PREVIOUS REPORTS

[previous reports are on the enclosed CD]