SITE
INVESTIGATION
REPORT

Former Scolite Property
2 Madison Street
Troy, New York

NYSDEC Site Code # E442037

HRP # TRO2004.P2

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HRP *Associates, Inc.*

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1.0 INTRODUCTION

This report presents the results of the Site Investigation (SI) completed by HRP Associates, Inc. (HRP), during the period of April 2008 through August 2010 in connection with the Former Scolite Site located on 2 Madison Street in the City of Troy, Rensselaer County, New York (Site #E442037, referred to herein as the site) (See Figure 1). The SI was completed for the City of Troy (the City) pursuant to the State Assistance Contract between the City and 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 the investigation was to identify and define the extent of hazardous substances (as defined by Environmental Conservation Law (ECL) 56-0101.11) located on the property. The goal of the City is to obtain a "Release of Liability" from NYSDEC due to the presumed potential for on-site contamination. The "Release of Liability" will allow the City to assure any potential buyers of the site that the NYSDEC has reviewed the site and will not require any further actions with regards to the site.

1.2 BACKGROUND

1.2.1 Site Description

The Former Scolite Site is located along the east shore of the Hudson River and the south shore of the Poestenkill Creek. The site is bounded on the south by Madison Street and on the east by railroad tracks. The 5.7-acre, rectangular shaped site, consists one (1) tax parcel, which is owned by the City of Troy. Prior to a fire that occurred in May 2008, the site contained nine buildings in various stages of disrepair including an iron foundry. Currently, the site contains one building, slab foundations from the former buildings, a large yard area, and a bulkhead for docking along the Hudson River. The site also has an accumulation of materials and mechanical devices (fly wheel) from the previous historical operations, as well as, a small remaining pile of brick and asbestos mixed rubble (former buildings) as a result of a fire that occurred in May 2008.

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

North: Poestenkill Creek, then Troy Slag North (Salt Pile)

South: Bruno Commercial Building
East: New York Central Railroad
West: Hudson River, then Highway 787.

1.2.2 Site History

Reportedly, the iron former foundry on-site opened in 1846. In 1869, the property was occupied by the Rensselaer Iron Works and by 1888, the property was occupied by the Albany Rensselaer Iron Works. According to Sanborn maps of the area, a new steel foundry was under construction on-site in 1904. By 1904 and through 1930, the property was occupied by the Ludlow Valve Manufacturing Co. By 1955 and through at least 1965 the property was occupied by the Ludlow Rensselaer Valve Foundry. Reportedly, these two companies manufactured valves and fire hydrants. While used as a steel foundry, the site was broken out to processing areas, an engine room, a scratch room, a tumbling room, a furnace room and several storage areas.

The site was purchased by Scolite International after 1971 and was used to manufacture and store bags of Perlite in one building. Mixing machinery and conveyers were installed and used by Scolite at that time for the packaging of Perlite. The property was utilized as a roofing company warehouse in the 1990s, which stored drums containing asphalt and tanker truckers containing asphalt. From 1999 to 2008, the area near the bulkhead along the Hudson River was leased by Hudson Deepwater Development (HDD) to manage scrap metal prior to loading on barges for shipment. The only remaining building currently on-site was used for HDD office space and for minor equipment storage. Also, in the past the foundry building was used as a log sawmill and splitting operation. In 2001, the City of Troy purchased the site.

In May 2008, a fire consumed the majority of the buildings on-site. During the demolition of the building remnants, friable asbestos from the transite roofing was mixed in with the brick rubble. The brick and debris mixed with asbestos, was stockpiled on the northern end of the site. Drums containing petroleum based oils located near the stockpile leaked and soaked a portion of the brick debris pile. The drums and petroleum impacted bricks were removed as part of an Interim Remedial Measure (IRM) in October and November of 2008. The remaining brick is awaiting removal in the future.

1.2.3 Previous Investigations

The following provides a summary of previous environmental investigations and correspondence with the NYSDEC regarding the site. Copies of the previous reports are located in Appendix D.

Sterling Environmental Engineering, P.C. in conjunction with Chazen Co./Engineers & Environmental Professionals, River Street Planning and Development, and Gary Bowitch, Esq., were hired by the City of Troy to implement the South Troy

Brownfield Assessment Demonstration Pilot Project as part of an EPA Brownfield study.

A Phase I Environmental Site Assessment conducted for the Rensselaer Iron Works Areas of Concern (AOC) identified the potential presence of residual metals and hydrocarbon compounds. Additional site investigations were deemed necessary to determine the nature and extent of residual source areas and to evaluate if exposure to those impacts results in significant risk to human health or the environment, and what, if any, remedial action is needed. Thus, the Phase II Site Investigation Process goals were to obtain data to define site physical characteristics, contaminated source areas, and the extent of migration through potential pathways.

Report of the DRAFT Site-Specific Brownfield Site Investigation Report, Brownfields Assessment Demonstration Pilot Project, South Troy Brownfield, Troy, New York Prepared for: City of Troy, Prepared by: Sterling Environmental Engineering, P.C., Dated May 16, 2006.

Sterling conducted a Phase II Site Investigation of the property. which included seventy-six (76) soil samples, three (3) sediment samples and three (3) groundwater samples were analyzed for the CLP Target Compound List/Target Analyte List (TCL/TAL) SVOCs, PCBs and 13 Priority Pollutant Metals by Sterling. Also, sixteen (16) soil samples were analyzed for the CLP TCL/TAL SVOCs and 13 Priority Pollutant Metals. Results are as follows:

- Individual SVOCs exceeded the recommended soil cleanup objectives in the surface soils. As depth increases in the yard area, Sterling reported that fewer individual SVOCs exceed the recommended soil cleanup objectives.
- Total PCBs exceeded the recommended soil cleanup objective in the yard area.
- Individual metals exceeded the recommended cleanup objectives in the surface soils. As depth increases in the yard area, fewer individual metals exceeded the recommended soil cleanup objectives.
- According to Sterling, five (5) SVOCs compounds exceeded the detection limits of the relevant water quality standards.
- Ten Metals exceeded the water quality standards in 6 NYCRR Part
- All three sediment locations had individual SVOCs exceeding the recommended soil cleanup objective

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Sterling reported that the risks at the Rensselaer Iron Works are posed by the contaminated soil, the contaminated groundwater, and on-site perlite. The contaminated soil poses a risk from direct contact, ingestion of soil, and inhalation of fugitive emissions. Also, Sterling reported the contaminated groundwater poses a risk to anyone ingesting groundwater and to the Hudson River. A copy of the report and results are located in Appendix D.

Report of the DRAFT Site-Specific Brownfield Remedial Alternatives Report, Brownfield Assessment Demonstration Pilot Project, South Troy Brownfields, Troy, NY, Prepared for: City of Troy, Prepared by: Sterling Environmental Engineering, P.C. Dated May 16, 2006.

Based on future development options and the investigative results, Sterling recommended remedial action if the development of the site was undertaken. Please refer to the report for full details, which is located in Appendix D.

The performance of fieldwork and collection of data described in the above previous reports was performed outside of NYSDEC remedial programs without any approved work plans or oversight, the report was used only to document the presence of contamination as a supporting component of the City's application to the ERP program. The NYSDEC played no role in the development or review of the remedial alternative recommended in the report but accepted the Scolite site into the ERP program.

1.2.4 Remedial Actions to Date

Several remedial actions have occurred on-site to date:

- The removal of abandoned drums and containers associated with Hudson Deepwater (former tenant) operations (July 2008);
- Tar Mass Removal (September 29, 2008);
- Additional Asbestos Sampling (September 30, 2008);
- The removal of abandoned drums associated with on-site historical operations (October 2008); and
- The removal of oil soaked brick with friable asbestos debris clean up (November 2008).

The removal of the drums and containers associated with historical operations, as well as, the oil soaked brick with friable asbestos debris was performed as an Interim Remedial Measures (IRM) to facilitate the SI. The IRMs are described in Section 2.1.9.

1.3 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 SI report; the report organization; the Site background including Site description, Site history, summary of previous relevant studies, agency involvement, and summary of site specific environmental database search; 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, soil gas investigations, contaminant source investigations, geological investigations, and well receptor survey. Technical correspondence documenting field activities are also summarized in this section.

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 results of site characterization, both natural and chemical components and contaminants in the following media: soils, groundwater, soil gas, and surface soil.

Section 5.0 Contaminant Fate and Transport: An evaluation of potential migration pathways and contaminant persistence and/or migration is presented.

Section 6.0 Qualitative Exposure Assessment: Presents the results of a general human health and environmental impact assessment completed at the Site. The assessment includes an estimation of exposure point concentrations and a comparison of this data with established and published standards and guidance values (SGV) including: New York State Standards as well as Federal requirements.

Section 7.0 Summary and Conclusions: Summarizes the results and findings of the SI.

2.0 STUDY AREA INVESTIGATIONS

Study area investigations were completed at the site in accordance with the SI 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 SI are presented in this Section.

This SI study and report were completed in accordance with the scope of work described in the "Site Investigation Work Plan, Former Scolite Site, NYSDEC Site Code: E442037," dated March 26, 2009. The scope of work for the Site was prepared by HRP and submitted to NYSDEC for review and approval. Deviations, based on field conditions are noted in Section 2.1.9. 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 March 31, 2009, the Site Investigation Work Plan was approved by the NYSDEC. As required by the NYSDEC, the Work Plan incorporated the following basic components:

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

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

- Ground Penetrating Radar (GPR) Survey (April 27-29, 2009);
- The installation of soil borings and collection and analysis of soil samples (June 15-16, 2009);
- Completion of an on-site soil vapor investigation (June 17, 2009);
- Collection and analysis of surficial soil samples (June 17-18, 2009);
- Collection and analysis of off-site background surface samples (June 17, 2009);
- Installation and development of groundwater monitoring wells, as well as collection and analysis of groundwater (July 21-23 and August 4, 11-12, 2009);
- Professional survey of, surface soil sample locations, subsurface soil boring locations, newly installed groundwater monitoring wells, (August 2009);
- Installation of test pits and collection and analysis of subsurface soil samples (June 30, 2010);
- Collection and analysis of groundwater from on-site wells (June 30 and July 1, 2010).

2.1 FIELD ACTIVITIES ASSOCIATED WITH SITE CHARACTERIZATION

To determine potential contaminant sources and the degree and extent of contaminants on-site, HRP completed a ground penetrating radar survey and installed soil borings, permanent monitoring wells and temporary soil vapor points as presented in the approved Work Plan. Groundwater, soil, and soil vapor samples were collected from these points and submitted to a NYS 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 B.

2.1.1 Surface Features: Natural and Manmade Features

The Former Scolite Site is located along the east shore of the Hudson River and the south shore of the Poestenkill Creek. The site is bounded on the south by Madison Street and on the east by railroad tracks. Prior to a fire that occurred in May 2008, the site contained nine buildings in various stages of disrepair including the iron foundry. Currently, the site contains one building, slab foundations from the former buildings, a large yard area, and a bulkhead for docking along the Hudson River. The site also has an accumulation of materials and mechanical devices (fly wheel) from the previous historical operations, as well as, brick and asbestos mixed rubble (former buildings) as a result of a fire that occurred in May 2008. A portion of the site is proposed as the location for the Beacon Institute for Rivers & Estuaries Satellite Center. The center will support scientific and engineering infrastructure for monitoring and experimentation on the river and in its local ecosystem.

The site is situated on a relatively flat parcel of land with some elevation change at the western edge of the property towards the Hudson River. The majority of the site apparently consists of fill materials, presumably from historical operations and grading activities during the installation of the bulkhead, therefore, the original site topography cannot be determined. The yard has a wall made of large concrete blocks that runs parallel to the Hudson River, which allows the grade to transfer down from the height of the former buildings foundations and upper yard area, to an area at the level of the top of the bulkhead. According to the United States Department of the Interior Geologic Survey 7.5 minute Series Topographic Map, South Troy Quadrangle, the site elevation varies from 20 to 30 feet above mean sea level (MSL).

Surface waters were observed at the subject site's boundaries. The subject site is bound to the west by the Hudson River and to the north by the Poestenkill Creek.

2.1.2 Contaminant Source Investigations

GPR Survey Investigation

In order to evaluate the potential existence of USTs on-site associated with historical operations, as well as, document existing UST locations, HRP completed a ground penetrating radar (GPR) survey at the site on April 27-29, 2009. GPR is a non-destructive and non-intrusive geophysical exploration technique that uses radar waves to detect subsurface metallic objects. HRP's GSSI Subsurface Interface Radar System 3, coupled with a 500 MHz antenna was used to provide an instant graphic printout during the survey. Survey lines were established in the field and measured from fixed points so that reconstruction of the survey grid can be done at a later date, if necessary. In some cases, GPR technology has also been known to detect tank graves in areas of removed storage tanks. The entire site was surveyed including areas near historical boilers and around the former foundry perimeter.

HRP reviewed the GPR survey data to provide preliminary information with regard to the status and location of potential underground tanks or other underground structures. If any anomalies were identified during the GPR survey, the approximate location would be marked using stakes and would be identified with paint or flagging. The anomaly's centerline axis endpoints and depth would be documented and the anomaly's location would be entered into a portable GPS unit.

The collected information was used for executing the remaining SI and/or IRM tasks. The GPR Survey Report is located in Appendix E.

2.1.3 Meteorological Investigations

Throughout HRP's on-site investigations, visual and thermal observations (i.e. ambient temperature readings) were noted and recorded in field logs. Other meteorological investigations were conducted as part of the Soil Vapor Evaluation Task.

2.1.4 Surface-Water and Sediment Investigations

No surface-water was observed on-site during HRP's investigation. Surface-water and sediment samples were not included under the scope of this investigation.

2.1.5 Geological Investigations

HRP observed the installation of Geoprobe borings and recorded the lithology in boring logs per the Unified Soil Classification System (USCS) descriptions. The soil boring logs are provided in Appendix C. Information on the boring log includes borehole location, drilling information, sample intervals, percent recovery, and sample description information. All boring installations and test pits were conducted by a New York State Licensed driller, Aztech Technologies, Inc. (Aztech).

2.1.6 Soil and Vadose Zone Investigations

2.1.6.1 Soil Boring Installation and Sampling

To supplement existing data from previous on-site investigations, as well as, to evaluate the condition of site's subsurface soils, HRP and Zebra mobilized to the site August 22- 24, 2007 and installed a total of fifteen (15) soil borings (referred to as SB-01 through SB-15). HRP and Zebra collected representative soil samples using a Geoprobe unit. Soil boring locations were determined, with approval from the NYSDEC and NYSDOH, based on known area history, discolored soil, stressed vegetation, drainage patterns or other field observations to define the degree and extent of contamination. The soil boring locations are shown on Figure 2 and summarized below in the Soil Boring Location Summary table. Soil Boring Logs can be found in Appendix C.

SOIL BORING LOCATION SUMMARY		
SOIL BORING ID	**LOCATION**	**JUSTIFICATION**
SB-01	Eastern Property Boundary	Further evaluate source areas as well as evaluate degree and extent of known contamination.
SB-02	Below former foundry foundation	
SB-03	Eastern Property Boundary	
SB-04	Below former foundry foundation	
SB-05	Eastern Property Boundary	
SB-06	Northern Property Boundary	
SB-07	Central Yard Area	
SB-08	Central Yard Area	
SB-09	Central Yard Area	
SB-10	Central Yard Area	
SB-11	Western Area by Existing Building	
SB-12	Western Area by Existing Building	
SB-13	Western Area by Existing Building	
SB-14	Western Area by Bulkhead	Evaluate potential impacts to area closest to the Hudson River.
SB-15	Western Area by Bulkhead	

During the soil boring installations using direct push methods, continuous soil samples were obtained in new, acetate liners in a four foot, 1.75” outer diameter (O.D.) macro core sampler at each soil boring to a total depth of approximately 20 feet below ground surface, or approximately five feet into the observed groundwater or refusal. The soil samples collected from each macro core were divided into two (2) two-foot intervals.

During soil boring installation activities, a representative soil sample was collected at each two-foot interval. The samples were collected by the attending HRP geologist placed in laboratory-provided 4-ounce and 6-ounce clear tephlon sealed glass jars, labeled, and preserved on ice in a cooler. Each sample was then 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 stored in approved 55-gallon drums for proper disposal. Boreholes that were not completed as monitoring wells were abandoned (backfilled) using bentonite chips. All abandoned borings were checked 24-48 hours after abandonment to determine that curing was occurring properly.

Based on the results of the field screening and observations, HRP selected one soil sample, from the two-foot interval exhibiting the highest PID reading, from each soil boring for laboratory analysis. When no elevated PID readings were observed, the soil sample that corresponded with the water table interface was selected. Certain samples were collected to compliment existing soil characterization data collected from previous reports. HRP collected eighteen soil samples total from the fifteen soil borings. All eighteen samples were analyzed for TCL VOCs via USEPA Method 8260B, TCL SVOCs via USEPA Method 8270C, PCBs via USEPA Method 8082, Pesticides via USEPA Method 8081A, TOC via Lloyd Kahn Method, and TAL Metals via EPA Method 6010. The soil samples that were collected and analyzed are listed below.

SAMPLE LOCATION	SAMPLE DEPTH	JUSTIFICATION
SB-1	6'-8'	Interval with the highest PID reading
SB-1	16'-18'	Evaluate extent of contamination in the native soil located below fill
SB-2	2'-4'	Interval with the highest PID reading
SB-2	18'-20'	Evaluate extent of contamination in the native soil located below fill
SB-3	14'-16'	Evaluate extent of contamination in the smear zone
SB-4	4'-8'	Interval with the highest PID reading
SB-5	0'-4'	Interval with the highest PID reading
SB-6	8'-12'	Evaluate extent of contamination in the smear zone
SB-7	8'-10'	Interval with the highest PID reading
SB-8	2'-4'	Interval with the highest PID reading
SB-8	18'-20'	Evaluate extent of contamination in the native soil located below fill
SB-9	8'-10'	Interval with the highest PID reading
SB-10	6'-8'	Interval with the highest PID reading
SB-11	16'-20'	Evaluate extent of contamination in the smear zone
SB-12	8'-10'	Interval with the highest PID reading
SB-13	12'-14'	Interval with the highest PID reading
SB-14	10'-12'	Evaluate extent of contamination in the smear zone
SB-15	4'-8'	Interval with the highest PID reading
ANALYSIS		
All soil boring samples were analyzed for the following: TCL VOCS EPA 8260 TCL SVOCS EPA 8270 TAL METALS EPA 6010 PCBS EPA 8082 PESTICIDES EPA 8081 TOC BY LLOYD KAHN		

2.1.6.2 Surface Soil Sampling

Fourteen (14) surface soil samples, SS-01 through SS-14, were collected from the subject site on June 18, 2009. Surface soil sample locations were determined, with approval from the NYSDEC and NYSDOH, based on known area history, discolored soil, stressed vegetation, drainage patterns or other field observations to define the degree and extent of contamination. HRP established a grid across the site to provide adequate coverage of the site. One surface soil sample was collected from the center or nearest point center of each grid sector to total fourteen (14) surface samples (see Figure 2). Only locations where pavement and asphalt coverage does not exist was considered for surface soil sampling.

During surface soil sampling activities the following methodologies were employed. Using a pre-cleaned stainless steel trowel, HRP removed the grass layer over the soil. HRP then advanced the stainless steel hand auger into the soil approximately two-inches below the vegetative cover and removed the soil in one piece. HRP placed an adequate volume 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 field book. Equipment was decontaminated after each use and between sample locations. Finally, HRP repaired each sampling location with native soil.

Each surface soil sample was submitted to a New York State Certified Laboratory. All fourteen (14) of the surface samples were analyzed for TCL VOCs or STARS VOCs via USEPA Method 8260B, TCL SVOCs or STARS SVOCs via USEPA Method 8270C, PCBs via USEPA Method 8082, Pesticides via USEPA Method 8081A, TOC via Lloyd Kahn Method, and TAL Metals via EPA Method 6010.

2.1.6.3 Background Surface Soil Sampling

In accordance with DER-10, three (3) background surface soil samples (BS-01 through BS-03) were collected from public lands (i.e. parks, DOT right-of-ways) within 0.5 miles of the subject site on June 17, 2009. Sample locations were chosen under direction of the NYSDEC and NYSDOH in locations presumably unaffected by current and historic site operations and from locations that are presumably topographically up gradient and upwind of contaminant sources (see Figure 5).

During surface soil sampling activities the following methodologies were employed. Using a pre-cleaned steel shovel, HRP removed the grass layer and approximately two inches of soil beneath the vegetative cover. HRP collected an adequate volume of soil by hand with Nitrile gloves and placed the 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 field book. Equipment was decontaminated after each use and between sample locations. Finally, HRP repaired each sampling location with native soil.

Each surface soil sample was submitted to a New York State Certified Laboratory. Each of the three (3) of the background samples were analyzed for TCL VOCs via USEPA Method 8260B, TCL SVOCs via USEPA Method 8270C, PCBs via

USEPA Method 8082, Pesticides via USEPA Method 8081A, TOC via Lloyd Kahn Method, and TAL Metals via EPA Method 6010.

2.1.6.4 Temporary Soil Vapor Probes

Installation and Sampling

In order to evaluate the shallow soil vapor conditions at the site, soil vapor samples were collected from nine temporary soil vapor probe installations and one ambient location on June 17, 2009. HRP coordinated with the NYSDEC and NYSDOH and selected locations to collect nine (9) soil vapor samples. Five (5) sub-slab vapor samples (SSSV-01 through SSSV-05) were collected on-site within the former buildings sub-slabs and the existing buildings sub slab and four (4) soil vapor samples (SV-01 through SV-04) were collected in the yard, including points along the eastern and southern boundaries to evaluate potential off-site contaminant migration. Each of the collected samples was submitted to state certified laboratory for analysis of VOCs via Method T015. Soil vapor sampling locations and depths were based on the results of HRP's soil and groundwater sampling at the site.

Soil vapor sampling points were installed in accordance with New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October, 2006.

A direct push drill rig was used to facilitate the collection of the soil vapor samples by boring a hole into the ground to immediately above the water table. The following procedures were followed during soil vapor sampling:

- Soil vapor samples were collected using ½ inch diameter by six-inch long stainless steel screen fitted with polyethylene tubing.
- Porous backfill material (quartz filtration media) was used to create a sampling zone 1 to 2 feet in length around the stainless steel screen.
- Soil vapor probes were sealed above the sampling zone with a bentonite slurry to prevent outdoor air infiltration. The remainder of the borehole was backfilled with sand.
- One to three volumes of air was purged from the soil vapor probe using a Gil-Air pump with a low flow module. Flow rate did not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling.
- Soil vapor samples were collected into 1 liter canisters provided by the analytical laboratory.
- A tracer gas, helium, was used during soil vapor sample collection to verify that adequate sampling techniques were being implemented. Further discussion about tracer gas is provided below.

Tracer Gas

When collecting soil vapor samples, a tracer gas serves as a quality assurance/quality control device to verify the integrity of the soil vapor probe seal. Without the use of a tracer gas, there is no way to verify that a soil vapor sample has not been diluted by surface air.

HRP used balloon-grade helium as a tracer gas for this SI. After the soil vapor probe was set and the surface bentonite seal was in place, a new plastic pail was placed over the implant tubing, while allowing the tubing to protrude from the enclosure. The enclosure was sealed to the ground surface and the effluent tubing using additional bentonite slurry. Next the tracer gas was introduced into the enclosure up to a concentration of 50% helium. Using a geo-pump, a one (1) Liter Tedlar bag was filled from the protruding implant tubing. If high concentrations of the tracer gas (>20%) were noted by the MGD-2002 helium detection meter, the seal of the probe would have been re-evaluated. When high concentrations of tracer gas did not exist within the implant, purging and sampling commenced.

The volume of the sample train (implant, and tubing) was calculated and slowly removed (purged) using a Geo-Pump. After the purge was completed, a 1-liter canister was directly attached to the tubing. The summa canister valve was then opened and allowed to fill. When the pressure gauge on the canister neared ambient level or after a time of approximately 60 minutes had elapsed, the valve was closed.

All sampling equipment was removed from the borehole. The canisters were appropriately labeled and stored in a shipping container. Soil vapor boreholes were abandoned (backfilled) using bentonite chips.

2.1.6.5 Test Pit Installation and Soil Sampling

Installation and Sampling

In order to further evaluate subsurface soils across the site, HRP installed seven test pits (TP-1 through TP-7) on June 29, 2010. Test pit locations were determined, with approval from the NYSDEC, based on the preliminary results from the installation of soil borings and from preliminary analytical results of soil and groundwater. Test pits were excavated to an average depth of 8 to 10 feet below ground surface (bgs). All test pits were rectangular in shape and were large enough to permit detailed examinations of the soil in-situ. Groundwater was not encountered in any of the test pit excavations. Test pit locations are shown on Figure 2 and summarized below. Test Pit Data Sheets can be found in Appendix C.

Test Pit ID	Test Pit Location	Justification
TP-1	Southeast corner near bulk head and MW-3	Further evaluate source areas, as well as, evaluate degree and extent of known contamination.
TP-2	In area of former metal pile,	
TP-3	In central yard area	
TP-4	Northeast corner near bulk head and MW-1	
TP-5	In central yard area	
TP-6	In southwest corner, near MW-8	
TP-7	In central yard area	

Soil samples from the test pits were examined in the field for physical evidence of contamination (i.e., odor, staining). HRP personnel maintained a detailed log of each test pit, and recorded all pertinent field information on the logs, including test pit designation, date, location, depth, and geologic descriptions utilizing the New York State Department of Transportation soil description procedure (NYSDOT Soil Mechanics Bureau STP-2 dated May 1, 1975, as amended). A composite soil sample was collected at two foot intervals during the installation of test pits. The soil samples were placed into sealable (i.e., Ziploc®) bags, were labeled, and were subjected to a headspace analysis for gross volatile organics via a photoionization detector (PID) equipped with a 10.2 eV bulb. The soil samples exhibiting the highest PID reading from each test pit were collected for analysis. If no physical or olfactory evidence of contamination was noted, the sample nearest the water table (i.e. deepest sample) was collected for analysis. The following table lists the attributes of the collected samples.

Sample ID	Sample Interval	Justification	Analysis
TP-1	0 – 2 feet	Interval with highest PID reading	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals + TICs, Pesticides + TICs, PCBs + TICs,
TP-2	8 – 10 feet	Evaluate extent of contamination in the smear zone	
TP-3	8 – 10 feet	Evaluate extent of contamination in the smear zone	
TP-4	10 – 10.5 feet	Evaluate extent of contamination in the smear zone	
TP-5	4 – 6 feet	Interval with highest PID reading	
TP-6	2 – 4 feet	Interval with highest PID reading	
TP-7	8 – 10 feet	Evaluate extent of contamination in the smear zone	
DUP-1	0 – 2 feet	Interval with highest PID reading	

2.1.7 Groundwater Investigations

Groundwater Monitoring: Well Installation, Development, Sampling

In order to evaluate the condition of on-site groundwater, and to supplement existing data from previous on-site investigations, HRP and Aztech mobilized to the site July 21-23, 2009 and installed eight soil borings (MW-1 through MW-8). These borings were converted into groundwater monitoring wells using a hollow stem auger drill rig. Groundwater monitoring well sampling procedures were conducted as outlined in the Work Plan. The locations of the monitoring wells are presented on Figure 2.

Monitoring well locations were chosen with approval from NYSDEC and NYSDOH and are described as follows.

SAMPLE ID	SAMPLE LOCATION	JUSTIFICATION
MW-1	Lower bulk head by river	Evaluation of potential impacts from the historical on-site operations.
MW-2	Lower bulk head by river	Evaluation of potential impacts from the historical on-site operations.
MW-3	Lower bulk head by river	Evaluation of potential impacts from the historical on-site operations.
MW-4	Northern property boundary	Evaluation of potential impacts from the historical on-site operations.
MW-5	Central yard area	Evaluation of potential impacts from the historical on-site operations.
MW-6	Central yard area	Evaluation of potential impacts from the historical on-site operations.
MW-7	Northeastern corner of property	Evaluation of potential impacts from the historical on-site operations.
MW-8	Eastern boundary of property	Evaluation of potential impacts from the historical on-site operations.
ANALYSIS		
ALL SAMPLES WERE ANALYZED FOR THE FOLLOWING: TCL VOCS EPA 8260 TCL SVOCS EPA 8270 TAL METALS EPA 6010 (total and dissolved) PCBS EPA 8082 PESTICIDES EPA 8081		

Methods of Installation

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. Eight, two-inch diameter, PVC monitoring wells were installed in the shallow saturated zone beneath the site. The monitoring wells were installed using the procedures described below:

- Soil borings were advanced to the desired depth.
- The 2-inch diameter 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 augers 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 risers were cut to approximately 2-inches below grade and a gripper plug was inserted onto the top of each well casing. Flush mount road boxes were then installed over each well riser for protection.

In addition, the location and elevation of each monitoring well was surveyed. HRP utilized an auto level mounted to a tripod, to conduct a relative groundwater elevation survey across the site. The elevation of an on-site benchmark (stationary flat surface) was arbitrarily established as 100 ft in elevation. Each monitoring well's measuring point (black mark on casing) was then surveyed relative to the benchmark to establish the measuring point elevation. The acquired groundwater levels, which were measured from the measuring point, were subtracted from each measuring point elevation to obtain the groundwater elevation at the monitoring well. The groundwater elevations were used to construct a groundwater contour map. The contour map was used to determine the groundwater flow direction and hydraulic gradient at the site.

Methods of Development

On August 4, 2009, HRP mobilized to the site to develop the eight recently installed monitoring wells. HRP pumped the wells utilizing designated 4' 2" diameter Aqua Bailers. 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 installation. 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 showing obvious signs of contamination (i.e. odor, sheen) was collected in 55-gallon metal drums staged on-site for storage of non-hazardous waste (petroleum impacted water). The volume of water, depth to bottom of the well, and other visual observations were recorded in a field notebook.

Well development was discontinued when the discharge water was relatively clear, or a minimum of six well volumes had been removed.

Methods of Sampling

To evaluate the groundwater quality beneath the site, groundwater samples were collected from each of the eight newly installed monitoring wells. Two rounds of groundwater sampling were completed during the investigation, in August 2009 and June/July 2010. To collect representative groundwater samples, monitoring wells were adequately purged prior to sampling. A minimum of 48 hours following development elapsed prior to commencing groundwater sampling. Groundwater samples were collected from each monitoring well in accordance with USEPA Low Flow purge and sample guidelines. 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. All eight groundwater samples were analyzed for TCL VOCs via USEPA Method 8260B, TCL SVOCs via USEPA Method 8270C, PCBs via USEPA Method 8082, Pesticides via USEPA Method 8081A, TOC via Lloyd Kahn Method, and TAL Metals via EPA Method 6010 (dissolved and undissolved).

The following list describes the well purging and sampling procedures that were utilized August 11-12, 2009 and June 30 and July 1, 2010.

- 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 interior of the riser pipe was screened for organic vapors with a photoionization detector (PID).
- 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 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 polyethylene tubing was attached to a section of new silicone tubing fitted into the drive head of a peristaltic pump. Another section of polyethylene tubing was attached to the effluent side of the pump drive head.
- The tubing was attached to a Horuba flow-through cell water quality monitor.
- 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 TCL 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) were 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 C).

2.1.8 Ecological Investigations

Ecological investigations were not included in the SI scope of work as the site and surrounding area is urban. Therefore, an ecological investigation is not warranted and was not required by the NYSDEC as part of this SI.

2.1.9 Deviations from Work Plan

HRP deviated from the SI Work Plan only with approval from the NYSDEC. Deviations included minor changes to location of installations of soil borings, permanent monitoring wells surface soil samples, temporary soil vapor points, as well as, drums and debris removal operations, asbestos sampling, and additional soil sampling. It is HRP's opinion that these deviations have not affected our ability to identify and determine the degree and extent of contamination at the subject property.

Abandoned Drum Removal (July 31, 2008)
On July 31, 2008, HPR oversaw the removal of abandoned drums and containers left behind by the previous tenant, Hudson Deepwater Development (HDD). HPR consolidated several partially empty drums, emptied several full cans of motor oil, over-packed damaged drums, over-packed several aerosol cans and collected all empty drums and containers. The concrete floors in the areas of the abandoned drums and cans appeared to have been stained from leaking containers, as well as, poor housekeeping. Speedy dry was applied to the concrete floor where damaged drums had leaked and staining was present and subsequently removed using shovels. The spent speedy dry and used wipes were then drummed for proper disposal. All drums and containers were accounted for and documented on disposal manifests. The drum and container removal was documented in a letter from HRP to the City of Troy dated August 14, 2008, which included disposal manifest.

Tar Removal (September 29, 2008)
On September 29, 2008 HRP oversaw the removal operations of a large tar mass located in the central yard area of the site. The tar mass originated on-site from scrap metal operations in which a tanker truck, holding solidified asphalt tar, was cut in half and removed as scrap by Ditonno & Sons. The tar mass was left on the ground where it melted around metal debris and solid waste.

The removal, loading and disposal of the tar mass was completed by Martin Environmental Services, Inc. (MES). MES cut the tar mass into manageable pieces and placed it on poly sheeting and covered by a tarp. The tar debris was removed along with the oil soaked brick on November 25, 2008. Disposal manifests are located in Appendix F.

Additional Asbestos Sampling (September 30, 2008)

On September 30, 2008 the NYSDEC identified suspect asbestos-containing materials (ACMs) on-site including a stockpile of wire tubing encased in a cloth fabric. HRP Associates sampled the suspect material. Samples were collected by Edward Bell, a New York State DOL- certified asbestos inspector and sent to AmeriSci, NY, a state certified asbestos lab.

A total of 3 bulk samples were collected representing 1 homogeneous area. In accordance with the Scope of Services, 3 samples were analyzed for the presence of asbestos. Based on review of the laboratory results, the submitted samples analyzed did not contain asbestos. A material is considered by the EPA to be asbestos-containing if at least one sample collected from the area shows asbestos present in an amount greater than 1%. The sample results are included in Appendix C.

Oil Soaked Brick Removal (November 25, 2008)

In May 2008, a fire consumed the majority of the buildings on-site. During the demolition of the building remnants, friable asbestos from the transite roofing was mixed in with the brick rubble. The brick and debris mixed with asbestos, was stockpiled on the northern end of the site. Drums containing petroleum based oils located near the stockpile leaked and soaked a portion of the brick and debris pile.

On November 25, 2008 HRP oversaw the removal of oil soaked brick and debris mixed with friable asbestos. The removal, loading and disposal of oil soaked brick and asbestos was completed by Martin Environmental Services, Inc. (MES). Three roll off containers were filled with the oil soaked debris with asbestos and were disposed of by MES at the Ontario County Landfill. Disposal manifests are located in Appendix F.

In accordance with the Community Air Monitoring Plan (CAMP) real-time monitoring was conducted for volatile organic compounds (VOCs) and Particulates (i.e., dust) at the perimeters of the designated work area during the removal activities on a daily basis. Monitoring activities are further explained in Section 4.1.6 and the tables for VOCs and particulates concentration readings can be found in Appendix C.

Additional Soil Sampling from Asphalt Crushing Operations (July 23, 2009)

While installing the on-site monitoring wells in July 2009, HRP observed asphalt crushing operations being performed on-site by Adirondack Construction Services. Asphalt and soil from Madison St. were being crushed and screened and stored in large stockpiles on-site. Materials (i.e. slag, metal fragments, and rocks) too large or hard to be crushed were stockpiled on-site near the covered asbestos demolition debris stockpiles. A total of four piles of materials, placed on and off concrete surfaces, were created by Adirondack Construction Services. HRP noted that the materials in the stockpiles had a chemical smell.

With approval from the NYSDEC, four soil samples were collected from the asphalt piles. All four samples were analyzed for TCL VOCs, TCL SVOCs, TAL Metals, PCBs, and Pesticides. Sample results are discussed in Section 4.1.9 and the laboratory results are shown in Table 25 through 30.

<u>Test Pit Installation and Soil Sampling, and Additional Groundwater Sampling (June 29-30 and July 1 2010)</u>

Based on the qualitative assessment of subsurface soils across the site and preliminary soil and groundwater analytical data, HRP noted physical and chemical evidence of contamination. With approval from the NYSDEC, seven test pits were installed and soil samples were collected from locations across the site. All seven soil samples and a duplicate sample were analyzed for TCL VOCs and Target Identified Compounds (TICs), TCL SVOCs and TICs, TAL Metals and TICs, PCBs and TICs, and Pesticides and TICs. In addition, the NYSDEC requested HRP collect an additional round of groundwater samples from the on-site monitoring wells (MW-1 through MW-8). All eight groundwater samples and one duplicate sample were analyzed for TCL VOCs and Target Identified Compounds (TICs), TCL SVOCs and TICs, Total and Dissolved TAL Metals and TICs, PCBs and TICs, Pesticides and TICs, and Total Organic Carbon (TOC).

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 SITE

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

3.1 RESULTS OF FIELD ACTIVITIES

3.1.1 Surface Features

The Former Scolite Site is located along the east shore of the Hudson River and the south shore of the Poestenkill Creek. The site is bounded on the south by Madison Street and on the east by railroad tracks. Prior to a fire that occurred in May 2008, the site contained nine buildings in various stages of disrepair including the iron foundry. Currently, the site contains one building, slab foundations from the former buildings, a large yard area, and a bulkhead for docking along the Hudson River. The site also has an accumulation of materials and mechanical devices (fly wheel) from the previous historical operations, as well as, brick and asbestos mixed rubble (former buildings) as a result of a fire that occurred in May 2008. A portion of the site is proposed as the location for the Beacon Institute for Rivers & Estuaries Satellite Center. The center will support scientific and engineering infrastructure for monitoring and experimentation on the river and in its local ecosystem.

The site is situated on a relatively flat parcel of land. However, the majority of the site apparently consists of fill materials, presumably from grading activities during the installation of the bulkhead, therefore, the original site topography cannot be determined. The yard has a wall made of large concrete blocks that runs parallel to the Hudson River, which allows the grade to transfer down from the height of the former buildings foundations and upper yard area, to an area at the level of the top of the bulkhead. According to the United States Department of the Interior Geologic Survey 7.5 minute Series Topographic Map, South Troy Quadrangle, the site elevation varies from 20 to 30 feet above mean sea level (MSL).

Two large piles of brick with friable asbestos are located on the north side of the subject property. The piles are approximately 140’x140’ and 85’x60’ and are approximately 6’ high.

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 Surface Water Hydrology

Surface waters were observed at the subject site's boundaries. The subject site is bound to the west by the Hudson River and to the north by the Poestenkill Creek. No surface water exists on site.

3.1.4 Geology

Surficial Geology

Based on Sterling Phase I ESA, site soils are characterized as granular fills overlying glaciolacustrine silts and clays and bedrock. Alluvial strata composed of firm to compact sand and gravel were encountered beneath surficial fills in some areas.

The Former Scolite Site is located in a region described as a small delta outwash deposit in the Hudson Champlain Lowland (D. Fisher, "Geologic Map of New York, Hudson Mohawk Street", 1970). These deltaic deposits consist primarily of sand and gravel. The deltaic deposits overlie lacustrine silt and clay deposited in proglacial lakes.

During soil boring and monitoring well installation HRP observed the surficial soils to be predominately dark fill materials that included stained soils, slag, ash, and brick fragments. The fill materials were relatively consistent throughout the subject site ranging from a depth of 8-12'bgs. Clay soils were observed below the fill materials. During the installation of test pits, overburden soils were encountered from the ground surface to 10.5 feet below grade. In general, overburden soils consisted of brown to black, loamy to sandy loam to granular loam fill soils, with trace pebbles, slag, metal fragments, woody debris, plastic materials, and bricks. Soil observations were consistent between the soil boring installations and test pit installations.

Bedrock Geology

The underlying bedrock is thinly bedded, weathered, black shale of Upper Ordovician age (D. Fisher, "Geologic Map of New York, Hudson Mohawk Street", 1970). Regional geology suggests that this inclined, faulted and folded shale is of either the Normanskill or Snake Hill formations.

Bedrock was not encountered during field operations.

Groundwater

During the installation of soil borings and monitoring wells, groundwater was encountered at approximately 10-18' bgs. HRP conducted a relative groundwater elevation survey between on-site wells on January 20, 2010 and June 30, 2010. The groundwater levels recorded during the event are as follows.

Well ID	Relative Groundwater Elevation (ft) – 1/20/2010	Relative Groundwater Elevation (ft) – 6/30/2010
MW-1	100.69	102.63
MW-2	101.52	102
MW-3	101.35	101.93
MW-4	101.93	102.55
MW-5	101.94	102.37
MW-6	101.92	102.43
MW-7	101.60	102.01
MW-8	102.05	102.83

Based on the results of the groundwater elevation survey in January 2010, in general the groundwater flow is estimated to be westerly towards the Hudson River. Along the northern portion of the property, the groundwater flow is northwesterly towards the confluence of Hudson River and the Poestenkill Creek. Based on the results of the groundwater elevation survey in June 2010, in general, the flow is similar to the first survey, and estimated to be westerly-southwesterly towards the Hudson River. Along the northern portion of the property the groundwater flow is northerly towards the Poestenkill Creek. Groundwater flow diagrams are presented as Figure 4 and Figure 5. As mentioned in the previous reports by Sterling, HRP expects the groundwater elevation at the site to fluctuate with the Hudson River tides, which reportedly vary from four to six feet in magnitude.

3.1.5 Surface Soils

During the installation of soil borings, it was noted that the entire site is composed of fill material to a depth of 8-18 feet bgs. Fill material consisted predominately of stained soils, slag, ash, and brick fragments. During the installation of test pits, similar observations were noted. Fill soils were encountered from the ground surface to 10.5 feet below grade. Fill material in test pits consisted of brown to black, loamy to sandy loam to granular loam fill soils, with trace pebbles, slag, metal fragments, woody debris, plastic materials, and bricks.

3.1.6 Hydrogeology

Groundwater in Soil Borings

Groundwater was observed in the soil borings at depths on average ranging from 10 to 18 feet below grade.

Groundwater in Monitoring Wells

During the August 2009 sampling event, groundwater was observed in the wells at depths ranging from 10-20 feet below grade with an average of approximately 17 feet below grade. HRP observed a sheen on groundwater in wells, MW-1, MW-2, MW-03, MW-4, MW-5, and MW-8. The groundwater from remaining wells was observed with no odor, no sheen, and no free product.

During the June/July 2010 sampling event, groundwater was observed in the wells at depths ranging from 10.85 to 21.40 feet below grade. HRP observed a subtle sheen on groundwater in wells MW-2, MW-3, and MW-8. The groundwater from remaining wells was observed with no odor, no sheen, and no free product.

Groundwater in Test Pits

Groundwater was not encountered during the installation of test pits on June 29, 2010. Test pits were installed to an average depth of 8 to 10 feet below grade.

3.1.7 Demography and Land Use

The City of Troy is located in Rensselaer County, New York, which is approximately 21 miles southeast of Saratoga, NY and 7 miles north of Albany, NY. According to wikipedia.org, as of the census of 2000, there were 49,170 people, 19,996 households, and 10,737 families residing in the City. The population density was 4,721.8 people per square mile (1,823/km^2). In addition, there were 23,093 housing units at an average density of 2,217.6/sq mi (856.5/km^2).

Land use in the area of the site is mixed industrial, commercial and residential properties. The site is located on Madison Street in the City of Troy. The site is bordered to the north by the Poestenkill Creek, to the west by the Hudson River, to the east by railroad tracks and to the south by Madison Street.

3.1.8 Ecology

Ecological investigations at the subject site were not included in the scope of this SI.

4.0 NATURE AND EXTENT OF CONTAMINATION

In order to identify the nature and extent of contamination at the subject site, HRP submitted soil, groundwater, and soil vapor samples to a certified laboratory for analysis of Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Pesticides, Total Organic Carbon (TOC), Target Analyte List (TAL) Metals, and TO-15 (soil vapor).

Chemtech, of Mountainside, NJ and Centek Laboratories, LLC of Syracuse, NY provided the analytical laboratory services for this project. Analytical results are located in Appendix B. Alpha Geoscience of Clifton Park, New York provided data validation services for this project. Data qualifiers and their definitions, as defined by Alpha Geoscience are included in Appendix G. The presentation of results, within this text, does not include data qualifiers. Detected chemical compounds in the various media sampled as part of the SI and the analytical results are presented in Tables 1 through 30. HRP compared results of this investigation with results of the previous investigations conducted by Sterling. The analytical results are compared in Tables 31 through 39. A general description of the various media sampled and analyzed is provided below.

- Subsurface soil samples, SB-01 through SB -15, were collected from borings located on-site at varying depths (Tables 1 through 6).

- Groundwater samples were collected on-site from newly installed monitoring wells, MW-01 through MW-08 (Tables 19 through 23).

- Surface soil samples were collected on-site, SS-01 through SS-14, and three off-site, BS-01 through BS-03, for background purposes from city owned property along the Hudson River south of the site, as well as, wooded areas in the residential neighborhood east-southeast of the site (Tables 7 through 12 and Tables 13 through 18, respectively).

- Soil vapor samples, SV-01 through SV-04, were collected on-site in the yard area of the site and sub-slab soil vapor samples, SSSV-1 through SSSV-5, were collected on-site beneath the former buildings sub-slabs and the existing buildings sub-slabs (Table 24).

- Subsurface soil samples, TP-1 to TP-7, were collected from test pits located on-site at varying depths (Tables 1A through 5A).

In order to determine if contaminant sources remained on-site, this SI evaluated a broad range of parameters including Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Pesticides, Total Organic Carbon (TOC), and Target Analyte List (TAL) Metals.

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

- Groundwater and Surface Water: 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).

- Subpart 375-6: Remedial Program Soil Cleanup Objectives, Technical Support Document (TSD). "Technical Support Document" is also known as the "New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document" dated September 2006. This document presents the assumptions, rationale, algorithms and calculations utilized by the Department and the New York State Department of Health to develop the soil cleanup objectives in ECL 27-1415(6).

At the time of the ERP RI Application, the City's intent of future use for the site was commercial property to be used as the location for the Beacon Institute for Rivers & Estuaries Satellite Center. The center will support scientific and engineering infrastructure for monitoring and experimentation on the river and in its local ecosystem. The portion of the site not developed by the UHRESC was proposed to be used as green space. To be consistent with the proposed future uses of the site, soil analytical results for this investigation were compared against Unrestricted, Restricted Residential and Commercial Soil Cleanup Objectives (SCOs). The results of the soil samples are listed in the next section.

4.1 RESULTS OF SITE INVESTIGATION

The following presents the results of site investigation, both natural chemical components and contaminants in some, but not necessarily all, of the following media:

4.1.1 Sources (lagoons, sludges, tanks, etc.)

Sources including a large tar mass as well as several drums containing petroleum based oils (i.e. motor oil, waste oil) were identified on site. These sources were removed from the site and properly disposed of as part of an Interim Remedial Measure (IRM). No additional in-situ sources or other sources were found during this investigation.

4.1.2 Soils

4.1.2.1 Subsurface Soils

Soil Boring Sample Submittal

Eighteen subsurface soil samples were collected from a total of fifteen soil borings during the SI between June 15 and 16, 2009. In addition one duplicate sample (SB-13, 12'-14'), one set of matrix spike (MS) and matrix spike duplicate samples (MSD) (SB-14, 10'-12') were collected. All of the samples were analyzed for TCL VOCs (via USEPA 8260), TCL SVOCs (via USEPA

8270), PCBs (via USEPA 8082), Pesticides (via USEPA 8081), TOC (via Lloyd Kahn Method), TAL Metals (via USEPA 6010). Sample results are presented in the section to follow.

Soil Boring Findings

All analytical results were compared to parameters that have established criteria per NYSDEC.

Three VOCs were detected among the eighteen subsurface soil samples tested. Toluene was found in 11 of the samples tested, while Carbon Disulfide and 1,2,4 Trichlorobenzene were each found in one sample, SB-7 and SB-4 respectively. None of the VOCs detected exceed the Unrestricted, Restricted Residential or Commercial Use Soil Cleanup Objectives (SCOs). VOC results for subsurface soil samples collected are listed in Table 1.

Twenty-two SVOCs were detected among the eighteen subsurface soil samples tested. Of the twenty-two SVOCs detected, SVOCs detected above Unrestricted SCOs include Chrysene (SB-12), Phenol (SB-15). SVCOs detected above Restricted Residential include Benzo(b)fluoranthene (SB-12), Dibenzo(a,H)anthracene (SB-12), Dibenzofuran (SB-12), and Indeno(1,2,3-cd)pyrene (SB-12). No other compounds were found to exceed their respective SCOs. SVOC results for subsurface soil samples collected are listed in Table 2.

A total of twenty-one metals were detected in all subsurface soil samples analyzed. Of the metals detected, eight exceeded the Unrestricted SCOs in one or more samples, including Arsenic (SB-06, SB-10, SB-11), Cadmium (SB-02 (2’-4’), SB-04, SB-10), Chromium (all samples analyzed), Copper (SB-01,SB-02 (2’-4’), SB-04 through SB-08 (2’-4’), SB-9 through SB-11, SB-14, SB-15) , Lead (SB-04, SB-05, SB-08, SB-10), Mercury (SB-07), Nickel (SB-05, SB-09), and Zinc (SB-09, SB-11). Three metals were also found to exceed Restricted Residential objectives: Cadmium (SB-05, SB-09), Lead (SB-09) and Mercury (SB-09). Arsenic was found to marginally exceed Commercial SCOs in six samples, SB-02 (2’-4’), SB-04, SB-05, SB-08 (2’-4’), SB-09, and SB-11, and Cadmium slightly exceeds its respective Commercial SCO in SB-11. Metal results for subsurface soil samples collected are listed in Table 3.

No pesticides were detected among the subsurface soil samples analyzed. Pesticide results for subsurface soil samples collected are listed in Table 4.

Of the PCBs detected among the subsurface soil samples analyzed, total PCB’s slightly exceed the Unrestricted SCOs in two samples, SB-09 and SB-15. PCB results for subsurface soil samples collected are listed in Table 5.

Total Organic Carbon results for subsurface soil samples collected are listed in Table 6.

Test Pit Sample Submittal
Seven test pit soil samples, TP-1 through TP-7, were collected on-site from the subject property on June 29, 2010. One duplicate sample (DUP TP-1), was collected (no matrix spike (MS) nor matrix spike duplicate samples (MSD) were collected). All of the samples were analyzed for TCL VOCs (via USEPA 8260), STARS VOCs (via USEPA 8260B), TCL SVOCs (via USEPA 8270), STARS SVOCs (via USEPA 8270B), PCBs (via USEPA 8082), Pesticides (via USEPA 8081), TOC (via Lloyd Kahn Method), and TAL Metals (via USEPA 6010). Sample results are presented below.

Test Pit Findings
All analytical results were compared to parameters that have established criteria per NYSDEC.

Fifteen VOCs were detected among the seven subsurface soil samples tested. Toluene and 1,2,4-Trimethylbenzene were the only compounds detected at a concentration above the Unrestricted Soil Cleanup Objectives (SCOs). None of the other VOCs detected exceed the Unrestricted, Restricted Residential or Commercial Use SCOs. VOC results for subsurface soil samples collected are listed in Table 1A.

Twenty-two SVOCs were detected among all of the subsurface soil samples tested. Of the twenty-two SVOCs detected above Unrestricted SCOs include Benzo(b)fluoranthene (TP-6 and TP-7), Benzo(k)fluoranthene (TP-1, TP-5, and TP-7). Three SVOCs detected above Restricted Residential SCOs include benzo(a)anthracene (TP-1, TP-5, and TP-7), Benzo(b)fluoranthene (TP-1 and TP-5), Benzo(k)fluoranthene (TP-6). SVOCs detected, above Commercial Use SCOs include benzo(a)anthracene (TP-6), Benzo(a)pyrene (TP-1 and TP-5 through TP-7). No other compounds were found to exceed their respective SCOs. SVOC results for subsurface soil samples collected are listed in Table 2A.

A total of twenty three metals were detected in all subsurface soil samples analyzed. Of the metals detected, eleven exceeded the Unrestricted SCOs in one or more samples, including Arsenic (TP-6 and TP-7), Cadmium (TP-3, TP-5, TP-7), Chromium (TP-2 through TP-7), Copper (TP-3, TP-5, TP-7), Lead (TP-2, TP-3, TP-5 throughTP-7), Manganese (TP-3), Mercury (TP-5, TP-6), Nickel (TP-1, TP-5, TP-6), Selenium (TP-1, TP-3), Silver (TP-1) and Zinc (TP-1, TP-4 through TP-6). Three metals were also found to exceed Restricted Residential objectives in the following: Chromium (DUP-1/TP-1), Lead (TP-1) and Mercury (TP-1). Four metals were also found to exceed the Commercial Use SCO, including: Arsenic (TP-1 through TP-3, TP-5), Cadmium (TP-1), Chromium (TP-1), and Copper (TP-1, TP-2, TP-6, TP-7). No other compounds were found to exceed their respective SCOs. The metal results for subsurface soil samples collected are listed in Table 3A.

No pesticides were detected among the subsurface soil samples analyzed. Pesticide results for subsurface soil samples collected are listed in Table 4A.

Of the PCBs detected among the subsurface soil samples analyzed, total PCB's exceed the Commercial Use SCOs in one sample, TP-1. PCB results for subsurface soil samples collected are listed in Table 5A.

In addition, the seven subsurface soil samples were also analyzed for VOC plus TICs, SVOC plus TICs, Metal plus TICs, PCBs plus TICs and Pesticides plus TICs. Several VOC TICs were detected within TP-1 including Napthalene, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, 4-Isopropyltoluene, n-Butylbenzene, n-propylbenzene, sec-Butylbenzene, Tert-Butylbenzene, xylene-total, 1,3-Dichloropropene (total). Of the TICS detected only 1,2,4-Trimethylbenzene exceeded Unrestricted SCOs in TP-1.

4.1.2.2 Surface Soils

Sample Submittal

Fourteen surface soil samples, SS-01 through SS-14, were collected on-site from the subject property from June 17, 2009 to June 18, 2009. Three surface soil samples, SB-01 to SB-03, were collected off-site for background purposes, on June 17, 2009. The surface soil samples were collected approximately two (2) inches below vegetative cover. The background surface soil samples were collected off-site from an area of trees along the Hudson River south of the site as well as wooded areas in the residential neighborhood east-southeast of the site. Along with the background samples, one duplicate sample (SS-01, 0'-2') and two sets of matrix spike (MS) and matrix spike duplicate samples (MSD) were collected. All of the samples were analyzed for TCL VOCs (via USEPA 8260), STARS VOCs (via USEPA 8260B), TCL SVOCs (via USEPA 8270), STARS SVOCs (via USEPA 8270B), PCBs (via USEPA 8082), Pesticides (via USEPA 8081), TOC (via Lloyd Kahn Method), and TAL Metals (via USEPA 6010). Sample results are presented below.

Findings- Industrial Area and Background Samples

Four VOCs were detected in trace amounts in on-site surface soil samples analyzed. Toluene, Ethylbenzene, m/p-Xylenes, and Methylene Chloride were all found in various samples tested. Trace amounts of the two compounds, Toluene, and Methylene Chloride were also found in the background surface soil samples that were submitted for analysis. The levels detected on-site and off-site are well below the Unrestricted, Restricted-Residential and Commercial SCOs. It should be noted that Methylene Chloride is generally considered a lab artifact, and its detection could be attributed as such. VOC results for on-site and background surface soil samples collected are listed in Tables 7 and 13, respectively.

Three STARS VOCs were detected in ten of the fourteen surface soil samples tested. Of the STARS VOCs detected, none exceed the Unrestricted, Restricted-Residential or Commercial SCOs. The STARS VOCs detected include Toluene, Benzene, and o-Xylene. STARS VOC results for subsurface soil samples collected are listed in Table 7, along with TCL VOCs.

There were twenty-one SVOCs detected among the on-site samples tested and nineteen among the off-site background samples. Of the SVOCs that were detected on-site, two exceed the Unrestricted SCOs in one or more samples, including Benzo(k)fluoranthene (SS-01, SS-02, SS-03, SS-07, SS-08, SS-09, SS-14), and Chrysene (SS-1, SS-2, SS-07, SS-08, SS-09, SS-14). Six compounds exceed Restricted-Residential SCOs in one or more samples: Benzo(a)anthracene (SS-01, SS-02, SS-03, SS-07, SS-08, SS-09, SS-14), Benzo(b)fluoranthene (SS-01, SS-02, SS-07, SS-08, SS-09, SS-12, SS-14), Benzo(k)fluoranthene (SS-06), Chrysene (SS-03, SS-04, SS-06), Dibenzo(a,H)anthracene (SS-01, SS-07), and Indeno(1,2,3-cd)pyrene (SS-01, SS-02, SS-03, SS-07, SS-08, SS-09, SS-12, SS-14). Five compounds were found to exceed the Commercial SCOs in one or more samples: Benzo(a)pyrene (SS-01, SS-02, SS-03, SS-06, SS-07, SS-08, SS-09, SS-12, SS-14), Benzo(a)anthracene (SS-04, SS-06), Benzo(b)fluoranthene (SS-03, SS-04, SS-06), Dibenzo(a,H)anthracene (SS-02, SS-03, SS-06) and Indeno(1,2,3-cd)pyrene (SS-06). The compounds detected in SS-06 significantly exceed (up 16 times the SCO values) the respective SCOs listed above.

Among the background samples, only BS-03 had compounds that exceeded their respective SCOs. Benzo (k)flouranthene and Chrysene exceeded Unrestricted SCOs; Benzo(a)anthracene, Benzo(b)fluoranthene, and Indeno(1,2,3-cd)pyrene exceeded Restricted-Residential SCOs; and Benzo(a)pyrene exceeded Commercial SCOs.

Twelve STARS VOCs were detected in the surface soil samples tested. These results are the same as those listed above. The STARS VOCs detected include Toluene, Benzene, and o-Xylene. SVOC results for on-site and background surface soil samples collected are listed in Tables 8 and 14, respectively.

Of the fourteen on-site samples collected, ten were tested for STARs SVOCs and thirteen were detected in the tested samples. The results of the STARS SVOCs analysis are the same as those summarized above, with the exception of SS-01, SS-04, SS-06, and SS-13 not being included in the results, as they were not included as part of this analysis. Background samples were also not included in this analysis. STARS SVOC results for subsurface soil samples collected are listed in Table 8, along with TCL SVOCs.

Various metals were detected in all fourteen on site surface soil samples and all three off-site background samples analyzed. Metals found to exceed Unrestricted SCOs in one or more samples include Arsenic (SS-06), Chromium

(SS-01 through SS-04, SS-06 through SS-10, SS-12, SS-13) Copper (SS-01), Lead (SS-01, SS-04, SS-06, SS-09, SS-12), Mercury (SS-01, SS-04, SS-06, SS-12), Nickel (SS-01, SS-04, SS-06, SS-13), Selenium (SS-08, SS-11), Silver (SS-13, SS-14), and Zinc (SS-04, SS-06, SS-11, SS-13). Metals found to exceed Restricted Residential SCOs in one or more samples include Cadmium (SS-01, SS-08, SS-09), Chromium (SS-05, SS-14), Lead (SS-05, SS-07, SS-08, SS-11), and Mercury (SS-05, SS-09, SS-11, SS-13, SS-14). Metals found to exceed Commercial SCOs in one or more samples include Arsenic (SS-01, SS-02, SS-07, SS-11), Cadmium (SS-02, SS-05, SS-06, SS-07, SS-11, SS-13, SS-14), Chromium (SS-11), and Copper (SS-04, SS-06, SS-11, SS-13), Lead (SS-13, SS-14), Mercury (SS-08), and Nickel (SS-11). In general, the metals slightly or marginally exceed the standards described above, with the exception of Arsenic in SS-01, and Cadmium, Chromium, Copper and Nickel in SS-11, which all significantly exceed (up 21 times the SCO values) Commercial values.

Of the metals detected in the background samples five exceeded Unrestricted SCOs: Chromium (BS-01, BS-02, BS-03), Copper (BS-01, BS-02), Lead (BS-01, BS-02), Mercury (BS-03), and Zinc (BS-01, BS-03). Three metals also exceeded Commercial SCOs in sample BS-03: Barium, Copper and Lead. Metal results for on-site and background surface soil samples collected are listed in Tables 9 and 15, respectively.

There are no standards established for Iron in Part 375 regulations. However, the Iron concentrations detected in the background samples ranged from 23,500 ppm to 36,500 ppm. The Iron concentrations from SS-01, SS-06, SS-11, and SS-13 ranged from 72,150 ppm to 192,360 ppm, which are significantly higher than the concentrations in the background samples.

Only one pesticide, 4,4'-DDT, was detected and found to slightly exceed Unrestricted SCOs in on-site surface soil samples (SS-01, SS-06) collected. Two pesticides detected slightly exceed the Unrestricted limits among background surface soil samples: 4,4'-DDE (BS-03) and 4,4'-DDT (BS-01, BS-03). Pesticide results for on-site and background surface soil samples collected are listed in Tables 10 and 16, respectively.

Four PCBs were found in various on-site samples tested, however only Total PCBs were found in exceedance of SCOs among the samples tested. Total PCBs slightly exceed Unrestricted SCOs in three samples (SS-08, SS-09, SS-12), slightly exceed Commercial SCOs in five samples (SS-05, SS-07, SS-11, SS-13, and SS-14). No PCBs were found to exceed Restricted-Residential or Commercial SCOs in any of the three background samples tested. PCB results for on-site and background surface soil samples collected are listed in Tables 11 and 17, respectively.

TOC was found in five samples (SS-01, SS-04, SS-04, SS-11, SS-13), as well as the duplicate tested. TOC was also found in all three background soil samples tested. TOC results for on-site and background surface soil samples collected are listed in Tables 12 and 18, respectively.

4.1.3 Soil Vapor and Sub Slab

Sample Submittal

Soil vapor samples were collected during a Soil Vapor Survey on June 17, 2009, and the samples were submitted for analytical testing from a total of four locations (SV-01 through SV-04) on site (see Figure 2). Along with the soil vapor samples, five sub slab vapor samples (SS SV-01 through SS SV-05) were collected from the former and existing buildings concrete sub slabs site (see Figure 2). A duplicate sample (SS SV-1) was also submitted for analytical testing. The soil vapor samples and sub slab soil vapor samples were analyzed for VOCs via TO-15 analysis. All soil vapor samples collected are summarized in Table 24.

Findings

The results of the vapor sample analysis showed a total of twenty-seven (27) VOC compounds detected above their respective reporting limit across the four soil vapor sampling locations and five sub slab soil vapor sampling locations.

Compounds detected in all samples analyzed are Acetone, Benzene, Carbon Disulfide, Cyclohexane, Ethylbenzene, Freon (11 and 12), Heptane, Hexane, m&p-Xylene, o-Xylene, and Toluene. Other compounds detected in some, but not all, of the soil gas samples collected include 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, 2,2,4-Trimethylpentane, 4-Ethyltoluene, Chloroform, Chloromethane, Freon 113, Methyl Butyl Ketone, Methyl Ethyl Ketone, Methylene Chloride, Styrene, Tetrachloroethene, and Trichloroethene.

See Table 24 for complete list of parameters analyzed and concentrations detected.

In summary, chlorinated compounds and non-chlorinated compounds were detected at low levels across the site. It would be difficult to identify a source area of contamination solely from the soil vapor samples analyzed. New York State does not currently have a set of standard criteria of guidance values for many of the compound concentrations detected in the subsurface soil vapors, with the exception of Methylene Chloride, Tetrachloroethene (PCE) and Trichloroethene. Therefore, the soil vapor results were reviewed as a whole in conjunction with results of other environmental sampling media including subsurface soil results and groundwater results. If comparing the detections of the soil vapor points to each other, SV-3 has the highest compound concentrations out of the four soil vapor samples collected. If comparing the detection of the sub-slab soil vapor points to each other, SSSV-3 and SSSV-5 have the highest compound concentrations out of the five sub-slab soil vapor samples collected.

Groundwater

Sample Submittal

A total of sixteen groundwater samples, along with two duplicates and field blank, were collected August 11 to 12, 2009 and June 30 to July 1, 2010 from the newly installed monitoring wells and submitted for analytical testing. The following observations were made in the field concerning on-site groundwater:

The groundwater samples were analyzed for TCL VOCs (via USEPA 8260), TCL SVOCs (via USEPA 8270), PCBs (via USEPA 8082), Pesticides (via USEPA 8081), TOC (via Lloyd Kahn Method), and TAL (Total and Dissolved) Metals (via USEPA 6010). Groundwater samples collected from monitoring wells are summarized in Tables 19 through 23.

Findings

Trace levels of one VOC, Methyltertbutyl ether (MtBE), were detected in two wells (MW-1 and MW-3) among the sixteen groundwater samples tested. The levels detected were well below the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) Ambient Water Quality Standards and Guidance Values. The VOC results for the groundwater samples collected are listed in Table 19.

Two SVOCs were detected among the groundwater samples tested, 2-pentanone, 4-hydroxy-4-methyl and Butane, 2-methoxy-2-methyl. However, there are no respective TOGS values for these compounds. The SVOC results for the groundwater samples collected are listed in Table 20.

Eighteen metals were detected in the groundwater samples tested. Two Metals, Iron and Manganese, were detected at concentrations exceeding TOGS values in all groundwater samples collected. The most significant exceedances were detected in MW-4. The same metals were found in exceedance of TOGS values when the samples were tested for Total Dissolved metals. The metal results for the groundwater samples collected are listed in Table 21.

One pesticide compound, heptachlor epoxide was detected in MW-8 at concentrations exceeding TOGS values. No PCBs were detected among the sixteen groundwater samples tested. The pesticides and PCBs results for the groundwater samples collected are listed in Table 22 and 23, respectively.

In summary, no VOCs or SVOCs were detected among the sixteen groundwater samples tested that exceeded their respective TOGS limit. Two metals (Iron and Manganese) and one pesticide (heptachlor epoxide) were detected at levels marginally exceeding (up to 70 times the TOGS values) TOGS values in all groundwater samples collected. No PCBs were detected.

In addition, the second round of groundwater samples collected in June/July 2010 were analyzed for VOC plus TICs, SVOC plus TICs, Metals plus TICs, PCB plus TICs and Pesticides plus TICs. No TICs were identified in the groundwater results.

4.1.4 Surface Water and Sediments

No open bodies of water or water detention/retention ponds were observed on-site. Therefore, no surface water investigations were conducted as part of this RI. However it should be noted that the Hudson River boarders the site to the West and the Poestenkill Creek to the North.

4.1.5 Air

A Community Air Monitoring Plan (CAMP) was included in the scope of work as presented and approved in the RI Work Plan. Real-time monitoring was conducted for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when ground intrusive activities were being conducted, including soil borings and monitoring wells 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 helped 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 weather proof 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 or IRM activities.

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 (0) 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 majority of particulate readings were below 100 mcg/m³ during all field investigations and IRM activities. Limited exceedances were detected for a few seconds before returning to acceptable levels.

All tables for VOCs and particulates concentration readings can be found in Appendix C.

4.1.6 Sample Exceedances

The following table contains results for samples collected from the subject site and background locations that exceed Restricted Residential and/or Commercial SCOs for soil samples and TOGs values for groundwater samples. The samples are listed by the parameter that exceeds the regulatory values. Please note that only samples with exceedances are listed below.

Sample Exceedances

SOIL RESULTS

				Table 375-6 Soil Cleanup Objectives	
Sample ID	Date of Collection	Parameter	Concentration	Restricted Residential	Commercial
Soil Boring Samples					
SB-12	6/16/09	Benzo(a)pyrene (ug/kg)	1,700	1,000 f	1,000 f
SB-12	6/16/09	Benzo(b)fluoranthene (ug/kg)	2,800	1,000 f	5,600
SB-12	6/16/09	Dibenz (a,H)anthracene (ug/kg)	460	330 e	560
SB-12	6/16/09	Indeno(1,2,3-cd)pyrene (ug/kg)	1,800	500 f	5,600
SB-02	6/15/09	Arsenic (mg/kg)	16.6	16 f	16 f
SB-04	6/15/09	Arsenic (mg/kg)	24.3	16 f	16 f
SB-08	6/15/09	Arsenic (mg/kg)	16.8	16 f	16 f
SB-09	6/16/09	Arsenic (mg/kg)	39.1	16 f	16 f
SB-11 D	6/16/09	Arsenic (mg/kg)	17.7	16 f	16 f
SB-05	6/15/09	Cadmium (mg/kg)	6.77	4.3	9.3
SB-09	6/16/09	Cadmium (mg/kg)	6.94	4.3	9.3
SB-11	6/16/09	Cadmium (mg/kg)	10.9	4.3	9.3
SB-09	6/16/09	Lead (mg/kg)	488	400	1,000
SB-09	6/16/09	Mercury (mg/kg)	1.5	0.81j	2.8 j
Test Pit Subsurface Soil Samples					
TP-1	6/29/10	Benzo(a)anthracene (ug/kg)	2120	1,000 f	5,600
TP-5	6/29/10	Benzo(a)anthracene (ug/kg)	1580	1,000 f	5,600
TP-6	6/29/10	Benzo(a)anthracene (ug/kg)	7310	1,000 f	5,600
TP-7	6/29/10	Benzo(a)anthracene (ug/kg)	1170	1,000 f	5,600
TP DUP-1	6/29/10	Benzo(a)anthracene (ug/kg)	1950	1,000 f	5,600
TP-1	6/29/10	Benzo(a)pyrene (ug/kg)	1670	1,000 f	1,000 f
TP-5	6/29/10	Benzo(a)pyrene (ug/kg)	1090	1,000 f	1,000 f
TP-6	6/29/10	Benzo(a)pyrene (ug/kg)	5890	1,000 f	1,000 f
TP-7	6/29/10	Benzo(a)pyrene (ug/kg)	1020	1,000 f	1,000 f
TP DUP-1	6/29/10	Benzo(a)pyrene (ug/kg)	1630	1,000 f	1,000 f
TP-1	6/29/10	Benzo(b)fluoranthene (ug/kg)	2700	1,000 f	1,000 f
TP-5	6/29/10	Benzo(b)fluoranthene (ug/kg)	1320	1,000 f	5,600
TP-5	6/29/10	Benzo(k)flouranthene (ug/kg)	1630	3,900	56,000
TP-5	6/29/10	Chrysene (ug/kg)	7380	3,900	56,000
TP-1	6/29/10	Arsenic (mg/kg)	21.5	16	16
TP-2	6/29/10	Arsenic (mg/kg)	24.8	16	16
TP-3	6/29/10	Arsenic (mg/kg)	44.3	16	16
TP-5	6/29/10	Arsenic (mg/kg)	20.7	16	16
TP DUP-1	6/29/10	Arsenic (mg/kg)	16	16	16
TP-1	6/29/10	Cadmium (mg/kg)	12.2	4.3	9.3
TP-1	6/29/10	Chromium (mg/kg)	716	110	400
TP DUP-1	6/29/10	Chromium (mg/kg)	126	110	400
TP-1	6/29/10	Copper (mg/kg)	747	270	270
TP-2	6/29/10	Copper (mg/kg)	1260	270	270
TP-6	6/29/10	Copper (mg/kg)	2760	270	270
TP DUP-1	6/29/10	Copper (mg/kg)	518	270	270
TP-1	6/29/10	Lead (mg/kg)	579	400	1,000
TP DUP-1	6/29/10	Lead (mg/kg)	681	400	1,000
TP-1	6/29/10	Mercury (mg/kg)	1.1	0.81	2.8
TP DUP-1	6/29/10	Mercury (mg/kg)	1.05	0.81	2.8

TP-1	6/29/10	PCBs- Total	3.753	1	1
TP DUP-1	6/29/10	PCBs- Total	5.061	1	1
Surface Soil Samples					
SS-01	6/17/09	Benzo(a)anthracene (ug/kg)	3,000	1,000 f	5,600
SS-02	6/17/09	Benzo(a)anthracene (ug/kg)	2,400	1,000 f	5,600
SS-03	6/18/09	Benzo(a)anthracene (ug/kg)	3,800	1,000 f	5,600
SS-04	6/18/09	Benzo(a)anthracene (ug/kg)	5,600	1,000 f	5,600
SS-06	6/18/09	Benzo(a)anthracene (ug/kg)	16,000	1,000 f	5,600
SS-07	6/18/09	Benzo(a)anthracene (ug/kg)	1,900	1,000 f	5,600
SS-07 RE	6/18/09	Benzo(a)anthracene (ug/kg)	1,900	1,000 f	5,600
SS-08	6/18/09	Benzo(a)anthracene (ug/kg)	2,000	1,000 f	5,600
SS-09	6/18/09	Benzo(a)anthracene (ug/kg)	2,700	1,000 f	5,600
SS-14	6/18/09	Benzo(a)anthracene (ug/kg)	2,800	1,000 f	5,600
SS-14 RE	6/18/09	Benzo(a)anthracene (ug/kg)	2,800	1,000 f	5,600
DUP-2	6/17/09	Benzo(a)anthracene (ug/kg)	1,100	1,000 f	5,600
SS-01	6/17/09	Benzo(a)pyrene (ug/kg)	2,600	1,000 f	1,000 f
SS-02	6/17/09	Benzo(a)pyrene (ug/kg)	4,200	1,000 f	1,000 f
SS-03	6/18/09	Benzo(a)pyrene (ug/kg)	4,400	1,000 f	1,000 f
SS-06	6/18/09	Benzo(a)pyrene (ug/kg)	13,000	1,000 f	1,000 f
SS-07	6/18/09	Benzo(a)pyrene (ug/kg)	1,900	1,000 f	1,000 f
SS-07 RE	6/18/09	Benzo(a)pyrene (ug/kg)	1,800	1,000 f	1,000 f
SS-08	6/18/09	Benzo(a)pyrene (ug/kg)	1,900	1,000 f	1,000 f
SS-09	6/18/09	Benzo(a)pyrene (ug/kg)	2,200	1,000 f	1,000 f
SS-12	6/18/09	Benzo(a)pyrene (ug/kg)	1,000	1,000 f	1,000 f
SS-14	6/18/09	Benzo(a)pyrene (ug/kg)	2,000	1,000 f	1,000 f
SS-14 RE	6/18/09	Benzo(a)pyrene (ug/kg)	1,900	1,000 f	1,000 f
DUP-2	6/18/09	Benzo(a)pyrene (ug/kg)	1,200	1,000 f	1,000 f
SS-01	6/17/09	Benzo(b)fluoranthene (ug/kg)	4,000	1,000 f	5,600
SS-02	6/17/09	Benzo(b)fluoranthene (ug/kg)	4,700	1,000 f	5,600
SS-03	6/18/09	Benzo(b)fluoranthene (ug/kg)	6,900	1,000 f	5,600
SS-04	6/18/09	Benzo(b)fluoranthene (ug/kg)	7,300	1,000 f	5,600
SS-06	6/18/09	Benzo(b)fluoranthene (ug/kg)	19,000	1,000 f	5,600
SS-07	6/18/09	Benzo(b)fluoranthene (ug/kg)	2,600	1,000 f	5,600
SS-07 RE	6/18/09	Benzo(b)fluoranthene (ug/kg)	2,500	1,000 f	5,600
SS-08	6/18/09	Benzo(b)fluoranthene (ug/kg)	2,600	1,000 f	5,600
SS-09	6/18/09	Benzo(b)fluoranthene (ug/kg)	3,100	1,000 f	5,600
SS-12	6/18/09	Benzo(b)fluoranthene (ug/kg)	1,600	1,000 f	5,600
SS-12 RE	6/18/09	Benzo(b)fluoranthene (ug/kg)	1,500	1,000 f	5,600
SS-14	6/18/09	Benzo(b)fluoranthene (ug/kg)	2,900	1,000 f	5,600
SS-14 RE	6/18/09	Benzo(b)fluoranthene (ug/kg)	3,000	1,000 f	5,600
DUP-2	6/18/09	Benzo(b)fluoranthene (ug/kg)	1,600	1,000 f	5,600
SS-06	6/18/09	Benzo(k)fluoranthene (ug/kg)	5,600	3,900	56,000
SS-03	6/18/09	Chrysene (ug/kg)	3,900	3,900	56,000
SS-04	6/18/09	Chrysene (ug/kg)	5,500	3,900	56,000
SS-06	6/18/09	Chrysene (ug/kg)	15,000	3,900	56,000
SS-01	6/17/09	Dibenzo(a,H)anthracne (ug/kg)	490	330 e	560
SS-02	6/17/09	Dibenzo(a,H)anthracne (ug/kg)	580	330 e	560
SS-03	6/18/09	Dibenzo(a,H)anthracne (ug/kg)	820	330 e	560
SS-06	6/18/09	Dibenzo(a,H)anthracne (ug/kg)	2,600	330 e	560
SS-07	6/18/09	Dibenzo(a,H)anthracne (ug/kg)	400	330 e	560
SS-07 RE	6/18/09	Dibenzo(a,H)anthracne (ug/kg)	440	330 e	560
SS-01	6/17/09	Indeno(1,2,3-cd)pyrene (ug/kg)	1,400	500 f	5,600
SS-02	6/17/09	Indeno(1,2,3-cd)pyrene (ug/kg)	2,900	500 f	5,600
SS-03	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	3,000	500 f	5,600
SS-06	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	6,500	500 f	5,600
SS-07	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	1,200	500 f	5,600

SS-07 RE	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	1,200	500 f	5,600
SS-08	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	930	500 f	5,600
SS-09	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	1,300	500 f	5,600
SS-12	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	700	500 f	5,600
SS-12 RE	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	680	500 f	5,600
SS-14	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	1,200	500 f	5,600
SS-14 RE	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	950	500 f	5,600
DUP-2	6/18/09	Indeno(1,2,3-cd)pyrene (ug/kg)	670	500 f	5,600
SS-01	6/17/09	Arsenic (mg/kg)	25.9	16 f	16 f
SS-01 D	6/17/09	Arsenic (mg/kg)	30.2	16 f	16 f
SS-02	6/17/09	Arsenic (mg/kg)	16.1	16 f	16 f
SS-05	6/15/09	Arsenic (mg/kg)	31.0	16 f	16 f
SS-07	6/18/09	Arsenic (mg/kg)	18.3	16 f	16 f
SS-11	6/18/09	Arsenic (mg/kg)	18.1	16 f	16 f
SS-11 D	6/18/09	Arsenic (mg/kg)	25.1	16 f	16 f
DUP-2	6/17/09	Arsenic (mg/kg)	20.8	16 f	16 f
SS-13	6/18/09	Barium (mg/kg)	728	400 f	2,700 f
SS-01	6/17/09	Cadmium (mg/kg)	6.77	4.3	9.3
SS-02	6/17/09	Cadmium (mg/kg)	11.2	4.3	9.3
SS-05	6/18/09	Cadmium (mg/kg)	20.5	4.3	9.3
SS-06	6/18/09	Cadmium (mg/kg)	10.9	4.3	9.3
SS-07	6/18/09	Cadmium (mg/kg)	10.7	4.3	9.3
SS-08	6/18/09	Cadmium (mg/kg)	5.72	4.3	9.3
SS-09	6/18/09	Cadmium (mg/kg)	4.33	4.3	9.3
SS-11	6/18/09	Cadmium (mg/kg)	57.1	4.3	9.3
SS-11 D	6/18/09	Cadmium (mg/kg)	43.1	4.3	9.3
SS-13	6/18/09	Cadmium (mg/kg)	29	4.3	9.3
SS-14	6/18/09	Cadmium (mg/kg)	11.1	4.3	9.3
DUP-2	6/17/09	Cadmium (mg/kg)	5.61	4.3	9.3
SS-05	6/18/09	Chromium (mg/kg)	257	110	400
SS-11	6/18/09	Chromium (mg/kg)	6812	110	400
SS-11 D	6/18/09	Chromium (mg/kg)	8640	110	400
SS-13	6/18/09	Chromium (mg/kg)	146	110	400
SS-14	6/18/09	Chromium (mg/kg)	188	110	400
SS-04	6/18/09	Copper (mg/kg)	557	270	270
SS-06	6/18/09	Copper (mg/kg)	174	270	270
SS-11	6/18/09	Copper (mg/kg)	891	270	270
SS-11 D	6/18/09	Copper (mg/kg)	939	270	270
SS-13	6/18/09	Copper (mg/kg)	823	270	270
DUP-2	6/17/09	Copper (mg/kg)	152	270	270
SS-05	6/18/09	Lead (mg/kg)	826	400	1,000
SS-07	6/18/09	Lead (mg/kg)	736	400	1,000
SS-08	6/18/09	Lead (mg/kg)	549	400	1,000
SS-11	6/18/09	Lead (mg/kg)	589	400	1,000
SS-11 D	6/18/09	Lead (mg/kg)	634	400	1,000
SS-13	6/18/09	Lead (mg/kg)	1410	400	1,000
SS-14	6/18/09	Lead (mg/kg)	1230	400	1,000
SS-05	6/18/09	Mercury (mg/kg)	2.1	0.81 j	2.8 j
SS-08	6/18/09	Mercury (mg/kg)	6.2	0.81 j	2.8 j
SS-09	6/18/09	Mercury (mg/kg)	0.903	0.81 j	2.8 j
SS-11	6/18/09	Mercury (mg/kg)	1.5	0.81 j	2.8 j
SS-11 D	6/18/09	Mercury (mg/kg)	1.5	0.81 j	2.8 j
SS-13	6/18/09	Mercury (mg/kg)	2.3	0.81 j	2.8 j
SS-14	6/18/09	Mercury (mg/kg)	1	0.81 j	2.8 j
SS-11	6/18/09	Nickel (mg/kg)	843	310	310
SS-1 D	6/18/09	Nickel (mg/kg)	908	310	310

SS-05	6/18/09	PCBs-Total (mg/kg)	1.2	1	1
SS-05 DL	6/18/09	PCBs-Total (mg/kg)	1.6	1	1
SS-07	6/18/09	PCBs-Total (mg/kg)	4.5	1	1
SS-07 DL	6/18/09	PCBs-Total (mg/kg)	7.3	1	1
SS-11	6/18/09	PCBs-Total (mg/kg)	1.9	1	1
SS-11 DL	6/18/09	PCBs-Total (mg/kg)	2.4	1	1
SS-13	6/18/09	PCBs-Total (mg/kg)	1.5	1	1
SS-13 DL	6/18/09	PCBs-Total (mg/kg)	3	1	1
SS-14	6/18/09	PCBs-Total (mg/kg)	3.1	1	1
SS-14 DL	6/18/09	PCBs-Total (mg/kg)	4.6	1	1
Off-site Background Surface Soil Samples					
BS-03	6/17/09	Benzo(a)anthracene (ug/kg)	1,600	1,000 f	5,600
BS-03	6/17/09	Benzo(a)pyrene (ug/kg)	1,900	1,000 f	1,000 f
BS-03	6/17/09	Benzo(b)fluoranthene (ug/kg)	3,600	1,000 f	5,600
BS-03	6/17/09	Dibenzo(a,H)anthracene (ug/kg)	450	330 e	560
BS-03	6/17/09	Indeno(1,2,3-cd)pyrene (ug/kg)	1,200	500 f	5,600
BS-03	6/17/09	Barium (mg/kg)	1,100	400	400
BS-03	6/17/09	Chromium (mg/kg)	128	110	400
BS-03	6/17/09	Copper (mg/kg)	623	270	270
BS-03	6/17/09	Lead (mg/kg)	2,590	400	1,000

Sample Exceedances (cont.)

GROUNDWATER RESULTS (all results are in ug/L)

Total Metals

Sample ID	Date of Collection	Parameter	Concentration	NYSDEC Class GA Criteria
MW-1	8/11/09	Aluminum	0.129	0.1
MW-2	6/30/10	Aluminum	0.145	0.1
MW-4	8/11/09	Aluminum	1.55	0.1
MW-5	8/11/09	Aluminum	0.421	0.1
MW-7	8/11/09	Aluminum	1.79	0.1
MW-8	8/11/09	Aluminum	0.51	0.1
MW-1	8/11/09	Iron	6.92	0.3
MW-1	7/1/10	Iron	6.24	0.3
MW-2	8/11/09	Iron	9.88	0.3
MW-2	6/30/10	Iron	42.3	0.3
MW-3	8/11/09	Iron	1.49	0.3
MW-3	6/30/10	Iron	11.2	0.3
MW-4	8/11/09	Iron	13.5	0.3
MW-4	6/30/10	Iron	15.5	0.3
MW-5	8/11/09	Iron	5.98	0.3
MW-6	8/11/09	Iron	0.955	0.3
MW-6	6/30/10	Iron	1.14	0.3
MW-7	8/11/09	Iron	3.23	0.3
MW-8	8/11/09	Iron	0.92	0.3
DUP-1	8/11/09	Iron	9.66	0.3
MW-1	8/11/09	Manganese	1.43	0.6
MW-1	7/1/10	Manganese	0.97	0.6
MW-2	8/11/09	Manganese	1.39	0.6
MW-2	6/30/10	Manganese	0.866	0.6
MW-3	8/11/09	Manganese	0.683	0.6
MW-3	6/30/10	Manganese	1.45	0.6
MW-4	8/11/09	Manganese	4.03	0.6
MW-4	6/30/10	Manganese	4.28	0.6

MW-5	8/11/09	Manganese	1.35	0.6
MW-5	6/30/10	Manganese	0.685	0.6
MW-6	8/11/09	Manganese	0.608	0.6
MW-6	6/30/10	Manganese	1.96	0.6
MW-7	8/11/09	Manganese	0.856	0.6
MW-7	6/30/10	Manganese	0.481	0.6
MW-8	8/11/09	Manganese	1.43	0.6
MW-8	7/1/10	Manganese	0.535	0.6
DUP-1	8/11/09	Manganese	1.39	0.6
DUP-1	7/1/10	Manganese	0.661	0.6
Dissolved Metals				
MW-2	6/30/10	Aluminum	0.25	0.1
MW-6	6/30/10	Aluminum	0.228	0.1
MW-7	8/11/09	Aluminum	0.129	0.1
MW-1	8/11/09	Iron	0.518	0.3
MW-1	7/1/10	Iron	6.33	0.3
MW-2	8/11/09	Iron	0.995	0.3
MW-2	6/30/10	Iron	42.9	0.3
MW-3	6/30/10	Iron	11.4	0.3
MW-4	8/11/09	Iron	0.735	0.3
MW-4	6/30/10	Iron	16.6	0.3
MW-5	8/11/09	Iron	0.977	0.3
MW-5	6/30/10	Iron	0.544	0.3
MW-6	6/30/10	Iron	1.73	0.3
MW-1	8/11/09	Manganese	1.39	0.6
MW-1	7/1/10	Manganese	0.977	0.6
MW-2	8/11/09	Manganese	1.28	0.6
MW-2	6/30/10	Manganese	0.884	0.6
MW-3	8/11/09	Manganese	0.68	0.6
MW-3	6/30/10	Manganese	1.49	0.6
MW-4	8/11/09	Manganese	3.85	0.6
MW-4	6/30/10	Manganese	4.63	0.6
MW-5	8/11/09	Manganese	1.34	0.6
MW_5	6/30/10	Manganese	0.685	0.6
MW-6	8/11/09	Manganese	0.622	0.6
MW-6	6/30/10	Manganese	2.15	0.6
MW-7	8/11/09	Manganese	0.798	0.6
MW-7	6/30/10	Manganese	0.464	0.6
MW-8	8/11/09	Manganese	1.31	0.6
MW-8	7/1/10	Manganese	0.449	0.6
DUP-1	8/11/09	Manganese	1.26	0.6

4.1.7 Comparison to Previous On-site Results

As previously mentioned, in 2005 Sterling Environmental Engineering, P.C. in conjunction with Chazen Co./Engineers & Environmental Professionals, River Street Planning and Development, and Gary Bowitch, Esq., were hired by the City of Troy to implement the South Troy Brownfield Assessment Demonstration Pilot Project.

According to the report provided by Sterling Environmental (Sterling), at the Rensselaer Iron Works, seventy-six (76) soil samples, three (3) sediment samples and three (3) groundwater samples were analyzed for the CLP Target Compound List/Target Analyte List (TCL/TAL) SVOCs, PCBs and 13 Priority Pollutant Metals during the previous SI. In addition, sixteen (16) supplementary soil samples were analyzed for the CLP TCL/TAL SVOCs and 13 Priority Pollutant Metals.

Of the samples collected by Sterling, a number of sample locations, depths, and sampled media correlated with samples collected and analyzed during the current SI, performed by HRP. The following provides a comparison of the results found during the previous environmental investigation. A summary of the sample location and depth correlations are shown in Figure 3. Please note that due to unknown dilution factors used during analysis of the previous SI, some comparisons cannot be made, despite a similar location and depth of the sample taken.

Surface Soils

It is not clear if the surface soils existing during the Sterling sampling event have remained intact during the elapsed time between the two site investigations, the on-site fire, the demolition of the on-site buildings and the subsequent debris removal. Therefore, no specific comparisons of sample locations between the sampling events can be made. However, in general, the surface soil samples collected in 2005 by Sterling indicat that several SVOCs, which exceeded Unrestricted, Residential, and Commercial Standards, also exceeded these standards during HRP's sampling event in 2009. Total PCBs were also detected across the site in both the 2005 and 2009 sampling events. A summary of the Surface Soil comparison data can be found in Table 31 through 33.

Groundwater

During the previous site investigation, three monitoring wells were installed, developed, and sampled by Sterling Environmental. Two of the monitoring wells installed by HRP in 2009 are in approximately the same location as those sampled by Sterling Environmental in 2005. MW-1 (HRP) is located in the northwest corner of the site, in the general area where S-W-1 (Sterling) was also located, and MW-3 (HRP) is located in the southwest corner of the site, in the general area of S-W-2 (Sterling). The third well sampled by Sterling (S-W-3) is located approximately 100 feet west of MW-5 (HRP). Sterling performed TAL Metals and TCL SVOC (15 SVOCs) analysis on the ground water samples collected in March 2005.

The current SI performed by HRP yielded results showing no detections of the 15 SVOCs tested during the previous SI. When compared to MW-1, S-W-1 (Sterling) showed identical results, with the exception of a concentration of 5 ug/L of Fluoranthene found in 2005. When comparing the second sampling point, MW-3 and S-W-2, the previous SI results shows trace amounts of nine of the 15 SVOCs tested. The results from both investigations show no detections of the 15 SVOCs tested in SW-3 and MW-5.

Of the 13 metals tested, concentrations have decreased in all three newly installed wells between Sterling's 2005 sampling event and HRP's 2009 and 2010 sampling events. Most notably, the concentration of Lead, which was a contaminant of concern during the previous investigation, has decreased in all three locations. While ten metals exceeded the standards in the previous investigation, only Iron and Manganese exceedances were found during this investigation in the three newly installed wells. A summary of the Groundwater comparison data can be found in Table 34 through 36.

Subsurface Soils

During the previous site investigation, Sterling Environmental sampled a number of soil borings, primarily from the west half of the site, specifically the northwest portion. A number of comparisons can be made between the current and previous SI analysis results, however with the exception of two points located in the northwest corner, SB-14 (HRP) and SB-15 (HRP), the location of the previous soil borings vary by as much as 50 feet from the soil borings recently installed during the SI by HRP. VOCs, SVOCs, PCBs, and TAL Metals were analyzed during both investigations.

SB-14 (HRP) and TP-4 (HRP) are located in the general location of S-B-2 (Sterling), adjacent to the concrete bulkhead and Hudson River, in the northwest portion of the site. The samples, SB-14 (HRP), TP-4 (HRP) and S-B-2 (Sterling), were taken from a similar depth, 10-12 feet, 8-10 feet, and 8-12 feet respectively. The VOC and SVOC results for both investigations indicate no compounds detected above Unrestricted SCOs in that area. The PCB results indicated a decrease in total PCBs from concentrations above Unrestricted SCOs in 2005 to no detection in 2009 and 2010. The detected metal concentrations between 2005 and 2009 remain consistent, no Unrestricted exceedances except for Chromium and Zinc. However, there was a significant increase in Copper within SB-14 in the 2009 sampling event in which the concentration exceeded the Unrestricted SCOs.

SB-15 (HRP) is north of SB-14 (HRP), in the northwest corner of the site, at approximately the same location as S-W-1 (Sterling). Both samples were taken from a similar depth, 4-8 feet and 2-6 feet respectively. The VOC and SVOC results for both investigations indicate no compounds detected above Unrestricted SCOs in that area. Recent results indicate a decrease in all SVOCs detected in this area. With the exception of Copper, which concentration remained the same, all metal concentrations appear to have decreased significantly between the two sampling events. Lead concentrations have decreased from 649 mg/kg previously, to 59.6 mg/kg reported during the current SI.

SB-13 (HRP) is located approximately 50 feet northeast of S-B-3 (Sterling). Both were sampled at depths of 12-14 feet and 8-14 feet, respectively. However, SB-13 (HRP) is located at a higher elevation than S-B-3 (Sterling). Results show an increase in the concentration of a number of the SVOCs tested, however the concentrations detected did not exceed Unrestricted SCOs. TAL metal concentrations generally remained the same. One notable increase was in the concentration of Mercury, from 0.044 mg/kg to 0.259 mg/kg.

SB-08 (HRP) is located approximately 75 feet southeast of S-W-3. Both have sample depths that range from 18 to 22 feet. Results from both investigations show no detections of SVOCs, and Metal concentrations have remained relatively consistent, with slight decreases in Lead and Mercury concentrations.

SB-10 (HRP) is located approximately 100 feet south southeast of S-U-Y2 (Sterling), and was sampled at a depth of 6-8 feet compared to a 4 foot sampling depth for the previous SI. There has been a significant decrease in SVOC concentrations at this location; however this could be attributed to the varying sample depth; since the general trend is concentrations decrease with depth. The majority of Metal Concentrations have also decreased at this sample location. Most notably the concentration of Lead was reduced from 173 mg/kg to 89.7 mg/kg.

A summary of the subsurface soil sample comparison data can be found in Table 36 through 39.

Summary

The conclusions drawn by Sterling Environmental are generally supported by the findings of this SI performed by HRP. Individual SVOCs were found to exceed the recommended SCOs in the majority of surface samples collected throughout the site. However, as depth of the sample increased, fewer individual SVOCs exceed the recommended soil cleanup objectives.

Sterling Environmental found low levels of Total PCBs at depth that exceed the Unrestricted SCOs throughout the site. The current SI found no PCBs at depth that exceed SCOs for on-site soil samples, with the exception of SB-15 which marginally exceed the Unrestricted SCOs, thus indicating PCBs in the subsurface soils is limited to that specific area.

As reported by Sterling Environmental, individual metals exceeded the recommended cleanup objectives at a number of surface sampling points across the site. As depth increases, fewer individual metals exceeded the recommended soil cleanup objectives. In particular, lead concentrations were found to generally decrease with depth, as supported by the findings of this SI. However a number of metals continue to exceed mostly Unrestricted SCOs and a few Commercial SCOs.

Groundwater results from the two sampling events indicate concentrations of Total Metals and SVOCs decreased over time. In 2005 several metals were detected in exceedance of TOGs values while in 2009, only Iron and Manganese were detected in exceedance of TOGs values. In 2005, trace levels of SVOCs were detected in exceedance of TOGs values while in 2009, no SVOCs were detected in exceedance of TOGs values.

4.1.9 Asphalt Soil Sample Results

While installing the on-site monitoring wells on July 23, 2009, HRP observed asphalt crushing operations being performed on-site by Adirondack Construction Services. Asphalt and soil from Madison St. were being crushed and screened and stored in large stockpiles on-site. Materials (i.e. slag, metal fragments, and rocks) too large or hard to be crushed were stockpiled on-site near the covered asbestos demolition debris stockpiles. A total of four piles of materials, placed on and off concrete surfaces, were created by Adirondack Construction Enterprises, LLC. HRP noted that the materials in the stockpiles had a chemical smell. With approval from the NYSDEC, soil samples were collected from each of the four asphalt piles (AS-1 through AS-4). All four samples were analyzed for TCL VOCs, TCL SVOCs, TAL Metals, PCBs, and Pesticides. Laboratory results are listed in Table 25 through 30 and Figure 2 shows the locations of the Asphalt Stockpiles. All analytical results were compared to parameters that have established criteria per NYSDEC.

Asphalt stockpiles #1 and #2 are located in the central yard portion of the site. Asphalt stockpile #1 is the southern pile and asphalt stockpile #2 is the northern pile. The results for sample AS-1, collected from asphalt stockpile #1, did not exhibit any exceeding compounds with the exception of five metals that marginally exceed Unrestricted SCOs (Chromium, Copper, Lead, Mercury and Zinc) and one metal that slightly exceeds Restricted Residential SCOs (Cadmium).

The results for sample AS-2, collected from asphalt stockpile #2, did not exhibit any exceeding compounds with the exception of several SVOCs that slightly exceed Unrestricted SCOs (Chrysene), Restricted Residential SCOs (Benzo(a)anthracene, Benzo(b)fluoranthene, and Indeno(1,2,3-cd)pyrene), Commercial SCOs (Benzo(a)pyrene), and six metals that marginally exceed Unrestricted SCOs (Chromium, Copper, Lead, Mercury, Nickel and Zinc) and one metal that slightly exceeds Restricted Residential SCOs (Cadmium).

Asphalt stockpile #3 is located in the central northern area of the yard, adjacent to the existing asbestos containing debris pile. The results for sample AS-3, collected from asphalt stockpile #3, did not exhibit any exceeding compounds with the exception of one SVOC that slightly exceed Restricted Residential SCOs (Benzo(b)fluoranthene), and six metals that marginally exceed Unrestricted SCOs (Chromium, Copper, Lead, Mercury, Nickel and Zinc) and one metal that slightly exceeds Restricted Residential SCOs (Cadmium).

Asphalt stockpile #4 is located in the eastern portion of the site, in the area of the former building. The results for sample AS-4, collected from asphalt stockpile #4, did not exhibit any exceeding compounds with the exception of two metals that marginally exceed Unrestricted SCOs (Chromium and Mercury) and total PCBs that slightly exceed Unrestricted SCOs.

5.0 CONTAMINANT FATE AND TRANSPORT

This section discusses the mechanisms that may affect migration of contaminants at the Site and Study Area, 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 MIGRATION

5.1.1 Soil Vapor

Volatilized contamination from groundwater is expected to migrate in soil gas above the groundwater table. The soil gas survey conducted on the site detected compounds that include Acetone, Benzene, Carbon Disulfide Cyclohexane, Ethylbenzene, Freon 11 and 12, Heptane, Hexane, Xylenes, and Toluene in all five of the sub-slab soil gas samples and all four soil vapor samples collected. In addition, low levels of Methylene Chloride Tetrachloroethene, and Trichloroethane were detected in a few of the soil gas samples across the site. The detected levels of these compounds were well below the suggested DOH guidance values. Migration of soil gas contaminated with VOCs is possible but is less predictable than groundwater migration due to subsurface heterogeneities and subsurface structures (e.g., utilities, building foundations). The petroleum compounds detected could be attributed to possible historical petroleum releases from trucks or heavy equipment historically used by the roofing company or scrap metal company on-site. No other specific sources for the other contaminates detected were identified and could not be attributed to historical operations. The soil vapor results show a minimal to low impact to the subject property. Therefore, HRP believes there is little to no potential for the soil vapor to migrate off-site.

5.1.2 Groundwater

Primary route of contaminant migration within the site is via groundwater. The groundwater flow direction at the site generally flows in a westerly, northwesterly direction (see Figure 3). No significant source of contamination was noted as exceedances of Iron and Manganese were detected within all the wells across the site. Because of the close proximity to the Hudson River there is a potential for these contaminants to migrate into the water column of the river.

5.1.3 Surface Soil

The primary route of off-site contaminant migration identified for the Site is via surface soils and groundwater. Surface soil erosion, airborne soils, and off-site transportation by vehicles are potential off-site migration pathways.

5.2 CONTAMINANT PERSISTENCE

Classes of chemical compounds were detected in various environmental media at the Site. The detected classes were at relatively low concentrations, with the exception of SVOCs and metals at concentrations marginally above Part 375 Commercial Cleanup Objectives values for Commercial land use in the soils and above TOGS values in the groundwater.

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. Certain metals, such as arsenic, cadmium, chromium, lead and mercury, as well as, a number of SVOCs and PCBs detected above applicable soil clean up objectives in the subsurface and surface soils, are expected to be persistent on site because of their chemical nature or natural occurrence in the area.

5.3 CONTAMINANT MIGRATION

5.3.1 Factors Affecting Contaminant Migration

Factors affecting contaminant migration for the media of importance (i.e. soil vapor, groundwater and surface soils) include future development of the subject property, on-site visitors tracking surface soils off-site, airborne surface soils, removal of the grossly contaminated subsurface and surface soils, and the potential for vapors to migrate to the sub-slab area of any potential foundations constructed on-site.

5.3.2 Modeling Methods and Results

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

6.0 EXPOSURE ASSESSMENT

A qualitative baseline exposure assessment was completed based on the information presented in Sections 1.0 through 5.0. Generally, the human health evaluation involves an exposure assessment, an evaluation of Site occurrence, hazard identification and comparison to New York State risk-based criteria.

6.1 QUALITATIVE PUBLIC EXPOSURE ASSESSMENT

This section discusses the exposure assessment, an evaluation of site occurrence and a comparison to State criteria related to potential impacts to human health. It should be noted that several conservative assumptions were used in completing this assessment; and, thus, the risks identified are expected to be "worse case scenarios".

6.1.1 Exposure Assessment

This exposure assessment discusses potential migration routes by which chemicals in the environment may be able to reach human receptors. This discussion is based on current and hypothetical future site conditions at the site and study area.

It is assumed for the purpose of this evaluation, that the site use will remain unchanged. As discussed in Sections 1.2.1 and 1.2.2, the former Scolite Site is located along the east shore of the Hudson River and the south shore of the Poestenkill Creek. The site is bounded on the south by Madison Street and on the east by railroad tracks. The 5.7-acre, rectangular shaped site consists of one (1) tax parcel, which is owned by the City of Troy. Reportedly, the former iron foundry that existed on-site opened in 1846. According to Sanborn maps of the area, a new steel foundry was under construction on-site in 1904. By 1904 and through 1961 the property was occupied by the Ludlow Valve Manufacturing Co. and then Ludlow Rensselaer Valve Foundry. Reportedly, these two companies manufactured valves and fire hydrants. While used as a steel foundry, the site was broken out to processing areas, an engine room, a scratch room, a tumbling room, a furnace room and several storage areas.

The site was purchased by Scolite International after 1971 and was used to manufacture and store bags of Perlite in one building. Mixing machinery and conveyers were installed and used by Scolite at that time for the packaging of Perlite. During the 1990's, the property was utilized as a roofing company warehouse. Drums and tanker trucks containing asphalt were stored on the property. From 1999 to 2008, the area near the bulkhead along the Hudson River was leased by Hudson Deepwater Development (HDD) to manage scrap metal prior to loading on barges for shipment. The only remaining building on-site was used for HDD office space and for minor equipment storage. Also, the foundry building was previously used as a log sawmill and splitting operation. In 2001, the City of Troy purchased the site.

In May 2008, the fire consumed the majority of the buildings on-site. Prior to a fire, the site contained nine buildings in various stages of disrepair including the iron foundry. Currently, the site contains one building, slab foundations from the former buildings, a large yard area, and a bulkhead for docking along the Hudson River. The site also has an accumulation of materials and mechanical devices (fly wheel) from the previous historical operations, as well as, a small remaining pile of brick and asbestos mixed rubble (former buildings) as a result of a fire that occurred in May 2008. A portion of the site is proposed as the location for the Beacon Institute for Rivers & Estuaries Satellite Center. The center will support scientific and engineering infrastructure for monitoring and experimentation on the river and in its local ecosystem. The site and surrounding area are located in a mixed commercial/ residential area of Troy, New York.

The hypothetical future conditions for the site include:

- the development of a portion of the site for restricted residential use as recreational/park area;
- the development of a portion of the site for commercial use as the research center; the possibility of intrusive work at the site;
- the site to remain vacant and unused;
- the possibility for the site to be abandoned and left unattended;
- or trespassers;
- or workers completing work at the site, unaware of potential contamination.

A complete exposure pathway must exist for an exposure to occur to the population from chemicals at the Site. A complete exposure pathway includes the following:

1. a source and mechanism of chemical release;
2. a transport medium;
3. a point of potential human contact with the contaminated medium;
4. an exposure route at the contact point; and
5. receptor population.

The Sections below focus primarily on identifying potential points of human contact with contaminated media and exposure pathways identified for the site and study area.

6.1.1.1 Overburden Groundwater

Exposure to overburden groundwater, if used as a drinking water supply, includes ingestion, dermal contact and inhalation of vapors.

At the time of investigation, the site vicinity utilized municipal water for drinking water only. Therefore, a possible potential threat would occur during future development or utility repair upon the site should excavation and dewatering occur, exposing workers to groundwater. A second possible threat could occur if visitors or trespassers were to come on-site during future development and be exposed to the groundwater. The likelihood for these exposure scenarios to occur is considered low.

6.1.1.2 Surface Water

No surface water is present on the subject site. Exposure to surface water is feasible during temporary ponding subsequent to a rainfall or snowmelt event. Population receptors could include trespassers, site visitors, or future site workers. The overall likelihood for exposure to surface water is considered minimal at the subject site.

6.1.1.3 Potential Exposure to Volatile Vapors

When volatile organics are detected within soil gas, soils and/or groundwater it creates a potential exposure to building occupants when vapors accumulate beneath structures. They can also negatively impact indoor air quality within a structure.

The majority of the site is currently undeveloped with the exception of the existing building in the southwest corner of the site as well as the remaining foundry slab located in the central eastern portion of the site. The undeveloped area is located in the most eastern portion of the site, the central portion of the site, and the most western portion of the site. The receptor population at this time includes trespassers and site visitors. The present exposure to volatile vapors is expected to be minimal in the areas of the existing building and foundry slab and minimal to low in the undeveloped area. There is a potential exposure to volatile vapors to site visitors, future workers and trespassers during future development in the undeveloped areas of the site. If the site is developed in the future, vapors could possibly accumulate in enclosed areas such as basements, crawl spaces, etc. Should future site development occur in the existing building or other areas of the site, soil vapor should then be evaluated. In addition, there is the potential for contaminants in soil vapor to migrate off-site and into off-site structures through soil vapor intrusion. HRP suggests continued evaluation of the potential for vapor intrusion during building development on site including provision of mitigations if impacts are identified.

6.1.1.4 Subsurface and Surface Soils

Potential routes of exposure to subsurface and surface soils include dermal contact, ingestion and inhalation of soil particulates. Exposure to surface soils is possible for site visitors, trespassers or future site workers. Exposure through dermal contact and ingestion is moderate to high due to the lack of vegetation or cap (i.e. asphalt) covering the soils. In addition, there is a possibility of passerby's and fishermen being exposed to contaminated dust and/or vapors from the site during remedial ground intrusive activities or development, particularly in the area of the bulkhead located at the end of Madison Street. However, the presence of site security such as fencing, the existing building and former foundry slabs, and the presence of the on-site brick piles and debris piles helps to lessen the risk. Exposure through inhalation is considered low since no intrusive activities occur on-site that disturb soils and generate inhalable dust. At present, the exposure to subsurface soils is minimal since the site is undeveloped and unused.

During development, specifically disturbance of soils, as well as removal of the on-site brick and debris stockpiles, the potential for exposures to soils would increase for on-site workers, utility workers, trespassers and visitors. During development periods, the existing fence should remain or construction fencing should be installed for safety reasons. This scenario would limit trespassers and exposure to soils would be minimal to low.

6.1.2 Hazard Identification and Comparison to State Risk-Based Criteria

The potential Site hazards due to human exposures were reviewed based on chemical-specific health exposure based criteria. State values believed potentially applicable to the medium or pathway were examined (see Tables 1 through 32).

6.1.2.1 Subsurface Soils

The State risk-based criteria used for the Site subsurface soils include the following:

- Subpart 375-6: Remedial Program Soil Cleanup Objectives, Technical Support Document (TSD). "Technical Support Document" is also known as the "New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document" dated September 2006. This document presents the assumptions, rationale, algorithms and calculations utilized by the New York State Department of Environmental Conservation and the New York State Department of Health to develop the soil cleanup objectives in ECL 27-1415(6).

Soil analytical results for this investigation were compared against Unrestricted, Restricted Residential, and Commercial Soil Cleanup Objectives (SCOs). A comparison of soil risk-based criteria and site occurrence information compiled from analytical testing results of subsurface soil samples and test pit samples collected from the site are included on Tables 1-7 and Tables 1A-5A respectively.

From the eighteen subsurface soil samples collected from soil borings, four SVOC and four metals were detected at levels that exceed the Restricted Residential and Commercial SCOs. The majority of compounds detected, as described above, were concentrated in two borings: SB-9 (metals), located in the central yard area and SB-12 (SVOCs) located directly north of the only remaining building.

Of the seven subsurface soil samples collected from the test pits, five SVOC and six metals were detected at levels that exceed the Restricted Residential and

Commercial SCOs. The majority of compounds detected, as referenced above, were concentrated in four test pits: TP-1 (SVOCs and metals) located by the bulk head, TP-5 and TP-7 (SVOCs) located in the central yard area and TP-6 (SVOCs) located in the southwest corner of the site.

The potential for exposure due to dermal contact of sub-soils is considered low. However, if future development requires excavation of the subsurface, soil contamination exposure may be likely at the site.

6.1.2.2 Surface Soils

The State risk-based criteria used for the Site surface soils include the following:

- Subpart 375-6: Remedial Program Soil Cleanup Objectives, Technical Support Document (TSD). "Technical Support Document" is also known as the "New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document" dated September 2006. This document presents the assumptions, rationale, algorithms and calculations utilized by the New York State Department of Environmental Conservation and the New York State Department of Health to develop the soil cleanup objectives in ECL 27-1415(6).

Soil analytical results for this investigation were compared against Unrestricted, Restricted Residential, and Commercial Soil Cleanup Objectives (SCOs). A comparison of soil risk-based criteria and site occurrence information compiled from analytical testing results of subsurface soil samples collected from the site is included on Tables 8-12.

In summary, of the fourteen surface soil samples, SS-01 through SS-14 collected on-site, there were seven SVOCs detected above the Restricted Residential and/or Commercial SCOs in all surface soil samples, with the exception of three samples (SS-5, SS-10 and SS-11). Five SVOCs were detected above the Restricted Residential and/or Commercial SCOs in background sample BS-03 only. There were seven Metals detected above the Restricted Residential and/or Commercial SCOs in all surface soil samples collected on-site with the exception of three samples (SS-3, SS-10 and SS-12). Four Metals were detected above the Restricted Residential and/or Commercial SCOs in background sample BS-03 only. Total PCBs were detected in five samples (SS-5, SS-7, SS-11, SS-13, and SS-14) above the Restricted Residential and/or Commercial SCOs and no PCBs were detected above the Restricted Residential and/or Commercial SCOs in the background samples. These SVOCs were detected randomly across the site and were not limited to one specific area. Metals were detected across the site in surface soil samples, however the locations with the highest metal concentrations were located by the bulk head, as well as the north central part of yard. PCBs detected above SCOs were also located by the bulk head, as well as the northern central part of yard.

The potential for exposure due to dermal contact of surface soils is considered low to moderate since the site is protected by a fence and covered by vegetation, a building, and former building slabs. If uncontrolled access (e.g., excavation on-site by unknowing personnel) to surface soils occurs, contaminant exposure may be likely at the Site.

6.1.2.3 Groundwater

Human health risks associated with exposure to groundwater were examined by considering both:

- Use of the overburden groundwater as a drinking water source; and
- Potential exposure to overburden groundwater at a point of contact, by construction or utility workers.

The State criteria used for human health risks associated with use of overburden groundwater at the Site as drinking water source includes the following.

- NYSDEC Division of Water Technical and Operational Guidance Series (TOGS 1.1.1)

Only two metals, Iron and Manganese, were detected above the TOGS values within all sixteen groundwater samples collected in two separate rounds of sampling. The groundwater wells are in various locations across the site. A comparison of groundwater risk-based criteria and site occurrence information compiled from analytical testing results of groundwater samples collected from the site is included on Tables 19-23.

The potential for exposure due to use of overburden groundwater as a drinking water source or for cooling, dewatering, or irrigation is considered low. If developed, the site would use municipal drinking water and construction or utility workers would have minimal contact of the overburden groundwater.

6.1.2.4 Volatile Vapors at Site and Downgradient Locations

Human health risks associated with temporary exposure to vapor inhalation at the Site were evaluated. Based on soil and groundwater analytical data and the fact that an obvious source of contamination was not identified during this investigation and that contamination exists across the subject property, it is possible that potential exposure to vapor inhalation does exist if portions of the site are developed.

The majority of the site is currently undeveloped. As such, the present exposure to volatile vapors is minimal to low. However, based on the low levels of volatile organics detected in the soil vapor analysis, there is a potential inhalation exposure from chlorinated and non-chlorinated compound volatilization from the subsurface under the future development scenarios if structures are constructed on-site in the central area. It is expected that the utilization of engineering controls (i.e., vapor barriers or sub slab depression systems) would significantly reduce potential future exposure.

7.0 SUMMARY AND CONCLUSIONS

The purpose of this SI is to identify and define the extent of hazardous substances, as well as assess the lateral and vertical extent of contamination at the site. This investigation identified contamination in each medium shown below which were assessed at levels exceeding applicable criteria.

7.1 SUMMARY

7.1.1 Nature and Extent of Contamination

- Of the eighteen subsurface soil samples collected, four SVOC and four metals were detected at levels that exceed the Restricted Residential and Commercial SCOs. No VOCs, pesticides or Total PCBs were detected in exceedance of the Restricted Residential or Commercial SCOs.
- The majority of compounds detected in the subsurface soil samples from soil borings, were concentrated in two borings: SB-9 (exceeding metals), located in the central yard area and SB-12 (exceeding SVOCs) located directly north of the only remaining building.
- The majority of compounds detected in subsurface soil samples from the test pits were concentrated in four test pits: TP-1 (exceeding SVOCs and metals) located by the bulk head, TP-5 and TP-7 (exceeding SVOCs) located in the central yard area and TP-6 (exceeding SVOCs) located in the southwest corner of the site.
- Of the fourteen surface soil samples collected on-site, there were seven SVOCs detected above the Restricted Residential and/or Commercial SCOs in all surface soil samples, with the exception of three samples (SS-5, SS-10 and SS-11). There were seven Metals detected above the Restricted Residential and/or Commercial SCOs in all surface soil samples collected on-site with the exception of three samples (SS-3, SS-10 and SS-12). Total PCBs were detected in five samples (SS-5, SS-7, SS-11, SS-13, and SS-14) above the Restricted Residential and/or Commercial SCOs.
- The SVOCs in the surface soil samples were detected randomly across the site and do not relate to an identifiable source. Metals in surface soil samples were detected across the site, however the locations with the highest metal concentrations were located by the bulk head, as well as the north central yard area. PCBs detected above SCOs were also located by the bulk head, as well as the north central yard area.
- Of the three background samples collected, only BS-03 exhibited concentrations above the Restricted Residential and/or Commercial SCOs including five SVOCs and four Metals. No PCBs were detected above the Restricted Residential and/or Commercial SCOs in the background samples.
- Only three metals, Aluminum, Iron and Manganese, were detected above the TOGS values within all sixteen groundwater samples collected in two

separate sampling rounds. The groundwater wells are in various locations across the site. The wells with the highest concentrations of metals are located near the bulkhead along the river, (MW-1 and MW-2) as well as the north central yard area (MW-4 and MW-5).

- Trace to low levels of volatile organics including acetone, benzene, carbon disulfide, cyclohexane, ethylbenzene, Freon, heptane, hexane, xylenes, and toluene were noted in soil vapor samples analyzed across the site. Other compounds detected in some, but not all, of the soil gas samples collected include Methylene Chloride, Tetrachloroethene , and Trichloroethane.
- The conclusions drawn by the previous 2005 investigation are generally supported by the findings of this SI performed by HRP. Individual SVOCs were found to exceed the recommended SCOs in the majority of surface samples collected throughout the site. However, as depth of the sample increased, fewer individual SVOCs exceed the recommended soil cleanup objectives.
- In 2005 several metals were detected in exceedance of the TOGs values and in 2009 and 2010, only Aluminum, Iron and Manganese were detected in exceedance of the TOGs values. In 2005, trace levels of SVOCs were detected in exceedance of the TOGs values and in 2009 and 2010, no SVOCs were detected in exceedance of the TOGs values.
- Based on this investigation, the extent of the subsurface contamination appears to be limited to the central yard area as well as north of the existing building. Contaminant concentrations appear to decrease with depth. The extent of the surface soil contamination is not limited to a specific area. Metals, PCBs and SVOCs were detected in the surface soils above Restricted Residential and/or Commercial SCOs across the entire site. Elevated concentrations of metals (Iron and Manganese) exist across the site within the groundwater.

7.1.2 Fate and Transport

Soil

Low levels of semi-volatile organics and marginal levels of metals exist in on-site in subsurface soils. Low to marginal levels of semi-volatile organics and PCBs and moderate levels of metals exist in on-site surface soils. The concentrations in surface soils detected across the site, could potentially impact soil vapor thus, impacting future development. Exposure to surface soils is possible for site visitors, trespassers or future site workers. Exposure through dermal contact and ingestion is moderate to high due to the lack of vegetation or a cover over the soils. In addition, there is a possibility of passerby's and fishermen being exposed to contaminants through dust and/or vapors from the site during remedial ground intrusive activities or development, particularly in the area of the bulkhead located at the end of Madison Street. However, the presence of site security such as fencing, the existing building and former foundry slabs helps to lessen the risk. Exposure through inhalation is considered low since no intrusive activities occur on-site that disturb soils and generate inhalable dust. At present, the exposure to subsurface soils is minimal since the site is undeveloped and unused.

During development, specifically disturbance of soils, as well as removal of the on-site brick and debris stockpiles, the potential for exposures to soils would increase for on-site workers, utility workers, trespassers and visitors.

Groundwater

Groundwater samples exhibited low levels of two metals, Iron and Manganese, detected above the TOGS values within all sixteen groundwater samples collected. Groundwater could migrate off-site to impact downgradient receptors specifically the Hudson River.

Vapor Migration

Trace to low levels of VOCs, including non-chlorinated and chlorinated compounds, were detected in the soil vapor samples collected. Migration of soil gas contaminated with VOCs could occur and is less predictable than groundwater migration due to subsurface heterogeneities and subsurface structures (e.g., utilities, building foundations). The majority of the site is currently undeveloped. Should development occur in the future, potential exposure should be evaluated at that time. It is hard to determine at this point if significant vapors could accumulate in future enclosed areas such as basements, crawl spaces, or narrow/deep excavations with the absence of analytical structure data. The western portion of the site is currently developed with the only remaining building. Because a specific source area was not located and contamination was detected in the surface soils across the site, the future exposure to volatile vapors is possible.

7.1.3 Risk Assessment

Vapor Migration

Elevated levels of VOC vapors could migrate to areas including: future building interiors, subsurface structures, underground utilities, and building foundations and/or basements, and outdoors. Exposure to contaminated vapors is possible and likely due to the low levels of contaminants detected in the surface soils across the site.

Groundwater

Exposure associated with encountering contaminated groundwater is possible but risk is low to minimal. The site and surrounding area utilize municipal water and there are no known uses of shallow contaminated groundwater in the site vicinity.

Soils

Exposure to surface soils is possible for site visitors, trespassers or future site workers. Exposure risks through dermal contact and ingestion is moderate to high due to the lack of vegetation or a cover over the soils. Exposures risks would increase during development, specifically disturbance of soils, as well as removal of the on-site brick and debris stockpiles for on-site workers, utility workers, trespassers and visitors.

7.2 CONCLUSIONS

7.2.1 Data Limitations and Recommendations for Future Work

Data limitations were identified in the course of HRP's investigations. These limitations include the remaining debris stockpiles which exist on site. The debris piles limited the open areas from which samples could be collected.

Based on HRP's findings, the nature and extent of on-site contamination has been determined to include Metals, PCBs and non-chlorinated petroleum compounds that exist in the surface soils across the site. The extent of the subsurface contamination appears to be limited to the central yard area as well as north of the existing building. Metals and non-chlorinated petroleum compounds concentrations appear to decrease with depth. Based on analytical results of the groundwater the level of contamination on-site is low and would require limited remedial measures.

HRP conducted additional activities during the investigation to address debris left behind by previous on-site tenants, the on-site debris produced by the May 2008 fire, as well as, asphalt work being conducted on Madison Street. Stockpiles of asphalt materials, that contain exceeding levels of metals and SVOCs, are located on-site. Stockpiles of debris mixed with asbestos produced by the fire and stockpiles of soil mixed with metal fragments left behind by the previous tenant are also located on site. HRP recommends that these stockpiles be removed from the site in order to reduce the potential for additional contamination to the surface soils.

As soil and groundwater contamination levels did not achieve the unrestricted SCGs across the site, HRP recommends that a Remedial Alternative Analysis (RAA) be completed for the site. The RAA would will summarize the findings of the RI, discuss the probable future use of the site, compare potential remedial alternatives for remediation of the site and recommend a remedy. The RAA could include, but would not be limited to, an Activity Use Limitation (i.e. industrial use, restricted residential use), Institutional Controls (i.e. groundwater use restrictions), Engineering Controls (i.e. application of protective soil cover or barrier) or a Site Management Plan.

APPENDIX A

PHOTOGRAPHS

APPENDIX B

ANALYTICAL DATA

APPENDIX C

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

APPENDIX D

PREVIOUS REPORTS

APPENDIX E

GPR SURVEY REPORT

APPENDIX F

DISPOSAL MANIFESTS

APPENDIX G

QA/QC EVALUATION RESULTS (DUSR)

HRP Associates, Inc.

Please see enclosed CD