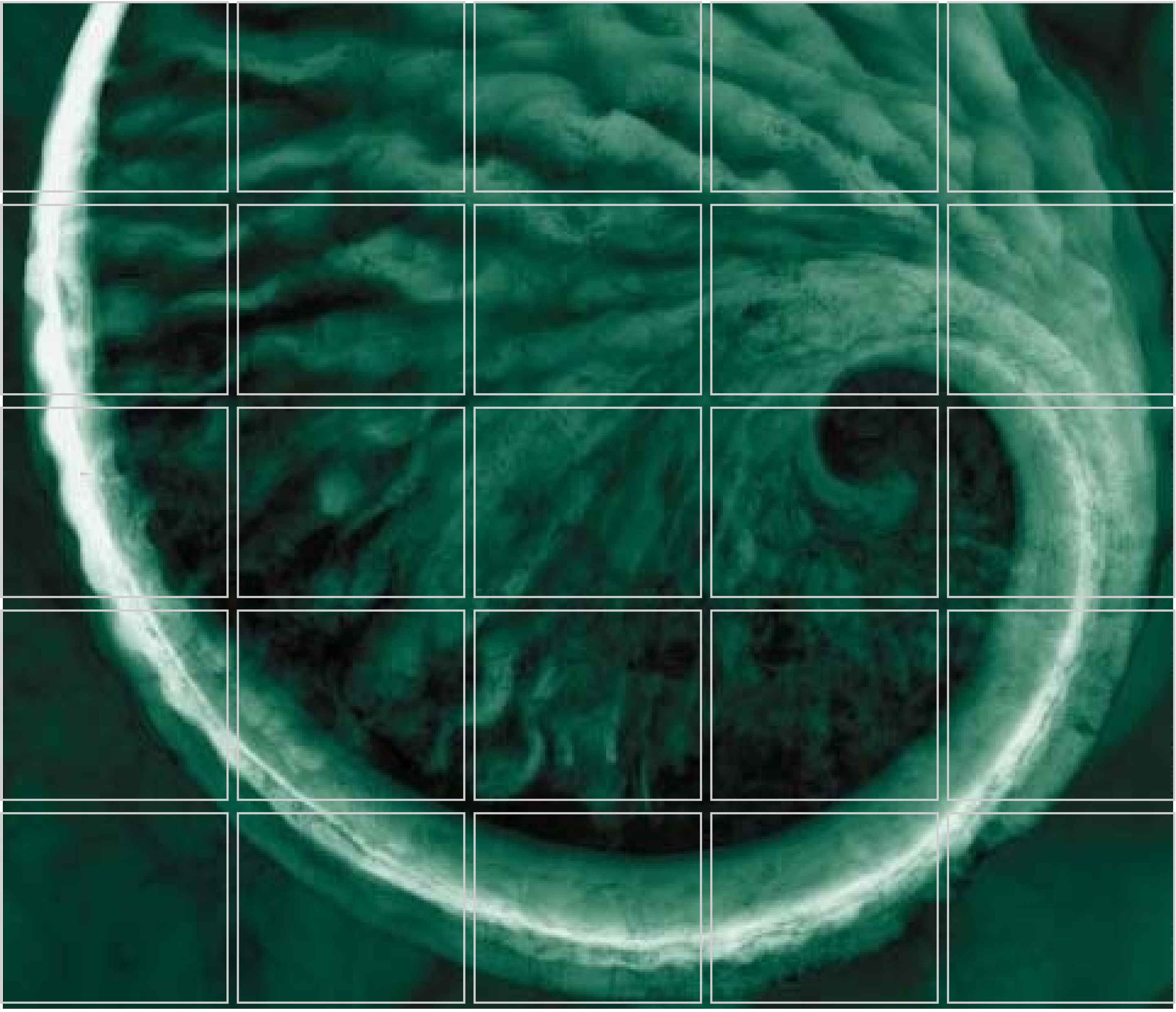

For Internal Use Only by New York State Dept. of Environmental Conservation

Remedial Investigation Report

Former Raeco Products Site
Rochester, New York
Site No. 8 -28-107

ERM Project No. 0021427

13 February 2007

DELIVERING SUSTAINABLE SOLUTIONS TO A MORE COMPETITIVE WORLD

ERM

For Internal Use Only by the New York State Department of Environmental Conservation

REMEDIAL INVESTIGATION REPORT

Former Raeco Products Site
Rochester, New York
Site No. 8-28-107
Work Assignment No. D003970-22

13 February 2007

0021427.4

Prepared for:

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233

Prepared by:

Environmental Resources Management
520 Broad Hollow Road, Suite 210
Melville, New York 11747

And

Environmental Resources Management
1159 Pittsford-Victor Road, Suite 200
Pittsford, New York 14534

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

ENDNOTES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS

AGCs	Annual Guideline Concentrations
ASP	Analytical Services Protocol
ASTM	American Society for Testing & Materials
ASTs	Above Ground Storage Tank
bgs	Below Grade Surface
CLP	Contract Laboratory Program
CMC	Criteria Maximum Concentration
COPCs	Chemicals of Potential Concern
CPRD	Coastal Protection & Restoration Division
DO	Dissolved Oxygen
DQO	Data Quality Objective
DUSR	Data Usability Summary Report
EDS	Environmental Data Services
ELAP	Environmental Laboratory Accreditation Program
ERM	Environmental Resources Management
FAP	Field Action Plan
FID	Flameionization Detector
FS	Feasibility Study
Ft	Feet
FWRIA	Fish and Wildlife Resources Impact Analysis
GPR	Ground Penetrating Radar
GWQS	Groundwater Quality Standards
HSA	Hollow Stem Auger
LEL	Lower Explosive Limit
LNAPL	Light Non-Aqueous Phase Liquid
LOEL	Lowest Observed Effect Level
MCHD	Monroe County Health Department
MeCl	Methylene Chloride
mg/l	Milligrams per Liter
Ml/min	Milliliters per Minute
MNA	Monitored Natural Attenuation
msl	Mean Sea Level
MW	Monitoring Well
NOAA	National Oceanic & Atmospheric Administration
NOEL	No Observable Effect Level
NTUs	Nephelometric Turbidity Units
NYCRR	New York Code of Rules and Regulations
NYLD	New York Leak Detection
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NWI	National Wetlands Inventory
ORNL	Oak Ridge National Laboratory

LIST OF ACRONYMS

ORP	Oxidation/Reduction Potential
P&P	P&P Properties
PCE	Tetrachloroethene
Pdf	Portable Document Format
PID	Photoionization Detector
ppb	parts per billion
ppm	parts per million
PSI	Preliminary Site Investigation
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservations & Recovery Act
RG&E	Rochester Gas and Electric
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROI	Radius of Influence
RSCOs	Recommended Soil Cleanup Objectives
SB	Soil Boring
SCGs	Standards, Criteria and Guidance
SCOs	Soil Cleanup Objectives
Site	Former Raeco Products Site
SOW	Scope of Work
SQuiRT	Screening Quick Reference Tables
STL	Severn Trent Laboratories
SVOCs	Semivolatile Organic Compounds
TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TIC	Tentatively Identified Compound
TOGS	Technical and Operational Guidance Series
UFPO	Underground Facilities Protection Organization
ug/kg	Micrograms per kilogram (ppb)
ug/l	Micrograms per Liter (ppb)
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
USTs	Underground Storage Tanks
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This Remedial Investigation (RI) Report has been prepared by Environmental Resources Management (ERM) on behalf of the New York State Department of Environmental Conservation (NYSDEC) under Work Assignment No. D003970-22 for the Former Raeco Products Site, Rochester, New York. The Registry of Inactive Hazardous Waste Disposal Sites in New York identifies the Former Raeco Products Site as Site Number 8-28-107.

1.1 PURPOSE AND ORGANIZATION OF REPORT

The purpose of the RI report is to present the findings of the RI performed at the Former Raeco Products Site (Site). The RI was conducted in two phases, an initial Site investigation was performed from April through June 2005 (Phase I RI). After review and interpretation of the Phase I RI data, a subsequent investigation was completed from July through September 2006 (Phase II RI) to obtain further information at the Site. The report is divided into the following sections:

- Introduction: the Site description and background information, a summary of physical characteristics of the Site and a discussion of the operational and disposal history;
- Remedial Investigation Activities: the scope of field activities conducted during the RI;
- Site Environmental Conditions: a discussion of the sampling program conducted during the RI, the analytical results, and the applicable Standards, Criteria and Guidance values (SCGs). This section also includes the Human Health Exposure Assessment and the Fish and Wildlife Resources Impact Analysis (FWRIA);
- Pilot Test: a discussion of the background and objectives of the pilot test, the equipment and procedures employed during the test and an analysis and interpretation of the pilot test data; and
- Conclusions: an evaluation of the source of contamination, migration paths, actual or potential receptors of contaminants, and the potential public health exposure pathways as well as any potential impacts to biota. This section also identifies any data gaps and/or areas for further investigation. The final section presents the reference documents used to prepare this report.

1.2 SITE DESCRIPTION

The Site is located at 24 Spencer Street, in the City of Rochester, Monroe County, New York. A Site Location Map is presented in Figure 1-1. The Site is bounded by Spencer Street to the south, Cliff Street to the west, the Genesee River to the east and an abandoned railroad right of way to the north. The Site includes four buildings with the remaining majority of the Site consisting of dirt and poorly maintained asphalt/gravel parking areas and drives. Some foliage and unmaintained grassy areas exist on the eastern portion of the Site along the steep banks of the river gorge. The Site is serviced by public water and sanitary sewer. A Site Feature Map is presented in Figure 1-2.

1.3 SITE GEOLOGY AND HYDROLOGY

The topography of the western portion of the Site is relatively flat and dips gently to the east/northeast towards the Genesee River gorge. The elevation of this portion of the Site is approximately 460-feet above mean sea level (msl). The eastern portion of the Site, which consists of the gorge wall and Genesee River dips steeply to the east to the river approximately 70-feet below.

The levels of the section of the river adjacent to the Site fluctuate slightly and are controlled by the high falls dam located approximately three-quarters of a mile upstream of the Site. River levels provided by Rochester Gas and Electric (RG&E) on 29 June 2005 at Station #2 (former RG&E Bebe Power Plant located approximately one-half-mile south of the Site) and Station #5 (head gate at RG&E Brewer Street facility located approximately one-half -mile north of Site) were recorded at 393-feet above msl and 390.9-feet above msl respectively.

Surficial overburden at the Site consists primarily of fill material including silty sand and gravel, which often contained fragments of concrete, brick and wood. Deeper overburden consists primarily of silty clays and silty fine sands. Gravelly sands and clays were also encountered at some areas of the Site. Depth to bedrock at the Site varied from a couple of feet below ground surface (bgs) on the eastern portion of the site (i.e., SB-12) to depths exceeding 49-feet bgs (i.e., MW-5D) in the west/southwest portion of the Site. Generally, groundwater was not encountered in Site overburden, however, some of the gravelly intervals and portions of the Site where depths to rock exceeded 20-feet bgs were saturated above bedrock. The bedrock identified at the Site is classified as dolomite and was observed to be fractured. The first significant water producing fractures were generally encountered at depths approximately 40 to 50-feet bgs.

Regional groundwater flow direction is assumed to follow topography and flow generally north, toward Lake Ontario. Locally, shallow groundwater appears to have a source of recharge centrally located at the Site, which flows radially to the Genesee River and surrounding area. This trend is also apparent in deeper groundwater monitored at the Site, but deeper groundwater appears to have a steeper gradient of flow to the Genesee River to the east and a strong component of flow to the south/southeast.

1.4 SURFACE WATER HYDROLOGY

Surface drainage generally follows Site topography, and flow is east/northeast toward the Genesee River. Storm sewers observed on the Site appear to discharge to the river gorge to the east. Storm sewer drains are also present along the right of way for Cliff Street and Ambrose Street on the west side of the Site. Surface run-off that collects in these drains flows through the City of Rochester storm water collection system which is discharged to the Genesee River and Lake Ontario.

1.5 SITE HISTORY

Copies of historic city directories, aerial photographs, topographic maps and Sanborn fire insurance maps were reviewed to assess historical uses of the Site. Copies of the historic records are presented in Appendix A. Historic topographic maps indicate that the now abandoned railroad right of way bordering the western site property boundary was active as early as 1898. Records with information on the Site were not available prior to this date. The Sanborn map from 1911 indicates that Buildings A and D were present at the Site but the structures were much larger than the present day buildings. The 1911 Sanborn map lists the use of Building D as a wholesale paint warehouse owned by F.B. Rae Company. The ownership and use of Building A is not clear from the 1911 map.

Buildings A through F and several above ground storage tanks (ASTs) are illustrated on the 1950 Sanborn map. It appears that Building A was part of a separate parcel, at the time occupied by a seed company listed as L.P. Gunson & Co. The remainder of the buildings and ASTs to the north (Buildings B through F) were owned by a wholesale paint and oil company listed as J.H. Rae Oil Co. Aerial photographs from 1958, 1966 and 1971 support the information presented on the Sanborn maps. Sanborn maps for the Site were not available after 1971.

Aerial photographs from 1980 and 1994 were available however the resolution of the prints was very poor. It appears from the 1994 aerial that Building C, E and large portions of Building A and D had been razed. It is difficult to determine, from these photos, if the Site ASTs were still present.

The Rochester Police Department reported the presence of waste chemicals on the property in June of 1994, discovered during a drug related investigation being conducted at the Site. As a result of this finding, the New York State Department of Environmental Conservation (NYSDEC), the Monroe County Health Department (MCHD), the United States Environmental Protection Agency (USEPA), and the City of Rochester completed inspections of the Site in 1994, 1995, and 1996. These Site inspections identified approximately seventeen storage tanks and over five hundred containers (55-gallon drums and smaller containers) in on-Site buildings and storage trailers. The containers reportedly contained a variety of chemicals including corrosive, flammable, and chlorinated liquids, ammonia, formaldehyde and oxidizers including peroxides. Some of the containers were found to be deteriorating and staining on containers and surfaces beneath the containers indicated that some containers had leaked.

The Site was reportedly purchased by P&P Properties (P&P) from John Rae, the Sites former owner in early 1995. The containers were still observed at the site during the 1996 site visit and both parties were notified at that time that the contents of the containers were considered waste and needed to be properly disposed of. At that time the owner of P&P responded that the chemicals were left behind by the Sites previous owner and that an agreement was reportedly made between P&P and Mr. Rae to remove the containers. Subsequent correspondence from both parties (P&P and John Rae) indicated that both parties were unwilling to assume responsibility for removal of the containers and disposal of the waste. As a result, in 1997, the USEPA removed over five hundred containers (drums and 5-gallon pails) from the Site.

NYSDEC performed a preliminary site investigation (PSI) of the Site from 1999-2000. The results of the NYSDEC investigation revealed widespread volatile organic compound (VOC) and semivolatile organic compound (SVOC) impacted soil and groundwater at the Site. NYSDEC recommended further investigation to fully define the nature and extent of contamination at the Site and gather the data necessary to evaluate remedial alternatives for the Site. ERM initiated the follow up investigation (i.e., Phase I RI) in 2005.

2.0 REMEDIAL INVESTIGATION ACTIVITIES

The purpose of the RI was to:

- comprehensively characterize environmental conditions at the Site;
- identify, to the extent practical, the source and extent of previously identified VOC, SVOC and metal impacted soil and groundwater at the Site;
- evaluate the potential exposure to Site-related contaminants; and
- provide the necessary data to conduct a Feasibility Study (FS) to identify alternatives to remediate the site.

The RI was performed after reviewing the reports and analytical data from previous work.

A discussion of the investigation activities that were completed as part of the RI is presented in the following sections. Table 2-1 presents a comprehensive summary of all analytical sample identifications and the corresponding laboratory analyses. Additional details regarding the sampling and analytical methods and procedures used during the RI are presented in the Remedial Investigation/Feasibility Study Work Plan (RI Work Plan) dated February 2005 (ERM, 2005), the Scope of Work for Supplemental Remedial Investigation (Supplemental RI Work Plan) provided in a project memorandum dated 28 July 2006 (ERM, 2006) and the Quality Assurance Project Plan (QAPP) dated February 2005 (ERM, 2005). Any modifications to activities specified in the RI Work Plan and/or Supplemental RI Work Plan, necessitated and/or required by the field conditions, were reviewed and approved by the NYSDEC, and are also detailed in the following sections. Field Notes documented by ERM's personnel are presented as Appendix B of this report.

2.1 INDOOR AIR SAMPLING

On 18-19 April 2005, ERM conducted a Site visit with a representative from New York State Department of Health (NYSDOH) to evaluate the placement of air sampling equipment for collection of air samples at the Site. After a review of the current use and occupancy of the existing Site structures and correspondence with the NYSDEC, it was determined that Buildings B and D would not be included in the RI air sampling program as specified in the RI Work Plan. Buildings B and D are not occupied and are only occasionally used for storage of construction equipment (e.g., road signs, cones and mechanized equipment) by the current tenant. These buildings are in very poor condition, have numerous holes in the walls and ceilings and are not equipped with electricity, heat or running water so it is assumed that the future use of these buildings likely will not change.

Six air samples were collected during the air sampling program conducted at the Site on 21 and 22 April 2005. The samples collected enabled ERM to relate indoor air concentrations with corresponding soil vapor concentrations under Building A, and to consider the effects of ambient "background" concentrations on the indoor air quality. Prior to the collection of the indoor air samples, flameionization detector (FID) measurements were taken to identify potential areas of interference and to remove possible sources of VOCs. All air samples were collected using laboratory certified clean 6-liter Summa canisters. With the exception of the ambient air sample, which was fitted with a regulator adjusted to collect a 2-hour sample, flow regulators attached to the remaining canisters, allowed samples to be collected over a 24-hour period.

Two sub-slab samples (SV-A01 and SV-A02) were collected at Building A. SV-A01 was collected from below the basement slab in the main basement on the north end of the building (north basement) and SV-A02 was collected below the slab of the smaller basement in the southeast corner of the building (south basement). Both basements are separated by a concrete block wall and accessed via different staircases. The south basement appeared to serve as the old boiler room for the building and contained an abandoned boiler no longer in service. The concrete basement slabs were penetrated using a $^1/_2$-inch (diameter) drill bit and a rotary hammer drill. A small "sump" for the beeswax seal was created at the surface of the penetration using a 1-inch drill bit. After penetration through the basement slab, a VOC measurement was recorded beneath the slab using the FID. Teflon tubing was placed through the penetration in the slab to the desired sample depth and the penetration was sealed with melted beeswax. The tubing was then connected to the Summa canister's flow regulator for the 24-hour sampling period. After the samples were collected, all Teflon tubing and sampling supplies were removed and disposed of in the general refuse dumpster utilized by the Sites current tenant (Intrastate America). All penetrations of the concrete slab were sealed with a cement epoxy patch.

Two indoor air samples (IA-A01 and IA-A02) were collected from Building A at locations proximal to the sub slab samples. One indoor air sample was also collected from the second floor of Building A (IA-A03) in the office area occupied by the current tenant. The indoor air samples were collected using identical equipment utilized for the subsurface samples however the inlet(s) for the Teflon sample tubing was set up approximately 4-feet above the floor. The samples were collected at approximately the same 24-hour period as the corresponding sub-slab samples.

One ambient air sample (AA-R01) was collected at the northeast exterior corner of Building A. This sample was collected over a 2-hour period during the collection of the sub-slab and indoor air samples discussed above.

All air samples were analyzed for VOCs by Air Toxics LTD. (Air Toxics) in Folsom, California, a NYSDOH Environmental Laboratory Accreditation Program (ELAP)–certified laboratory, using the USEPA Method TO-15. The analytical results of the air sampling are presented in Table 2-2 and discussed in Section 3.1.1.

The sampling protocol for the air samples was developed using the NYSDOH "Soil Vapor Intrusion Guidance for Public Comment - Draft" dated February 2005 (NYSDOH, 2005), and in consultation with the NYSDOH. Further details for the air sampling protocol are presented in the RI/FS Work Plan. Prior to the collection of samples, ERM completed a NYSDOH "Indoor Air Quality Questionnaire and Building Inventory Form" for Building A (NYSDOH, 2005). An ERM Indoor Air Sampling Form was completed for each sample location. These forms are provided in Appendix C.

2.2 *SITE FEATURE INVENTORY/UTILITY MARKOUT*

On 20 April 2005, ERM conducted a Site feature inventory to document current Site features including; tanks, containers, storm sewers, drainpipes, outfalls, building foundations, existing buildings, etc. The findings and observations of the Site feature inventory are documented on Table 2-3 and the corresponding Figure 2-1.

ERM's drilling subcontractor (Nothnagle Drilling, Inc.) contacted the Underground Facilities Protection Organization (UFPO), Dig Safely New York, to provide mark-outs of underground facilities (e.g., gas, electric, and sewer) that might be present in areas where ground intrusive work was proposed. UFPO member companies are only required to mark-out utilities they own, and are not required to mark-out facilities located on private property, however in this case some of the UFPO member companies (i.e., RG&E, Monroe County Pure Waters and Rochester Water Works) elected to mark the location of underground facilities present within the property boundary. Due to the presence of underground facilities, some drilling locations were adjusted from the locations proposed in the RI Work Plan. The location of all final drilling locations are illustrated on the Site Feature and Sample Location Map provided as Figure 1-2.

2.3 SOIL INVESTIGATION

Twelve test pits were installed at the Site during the PSI. On 25-28 April 2005, Nothnagle Drilling, Inc. (Nothnagle) installed twenty seven soil borings (SB-01 through SB-27) at the Site to supplement the data obtained from the test pit sampling conducted during the PSI. The locations of the soil borings are shown on Figure 1-2. The soil borings were installed from grade, to bedrock or refusal, using the Geoprobe /direct-push method.

Continuous soil samples, for the purpose of logging soil lithology, were collected and logged by ERM's site personnel. Samples were collected with a Macrocore sampler fitted with disposable polyethylene sleeves. Soil boring logs are included in Appendix D. ERM also conducted headspace screening of the borings at 2-foot intervals, using an FID, to identify intervals where it would be appropriate to collect soil samples for laboratory analysis.

In addition to the soil borings, ERM collected two soil samples (SS-Bldg B-01 and SS-Bldg B-02) from the basement of Building B. Samples were collected from the sediment present in the weathered rock directly beneath the concrete slab.

The analytical samples collected from the soil borings and the Building B soil samples were analyzed by Severn Trent Laboratories (STL) of Shelton, Connecticut, an ELAP-certified laboratory. The samples were analyzed for Target Compound List (TCL) VOCs and TCL SVOCs using Contract Laboratory Program (CLP) Method OLM04.2, and Target Analyte List (TAL) Metals using ILM04.2. The analytical results from the soil boring samples and soil samples collected in the Basement of Building B are shown on Tables 2-4 through 2-6 and discussed in Section 3.1.2. Figures 2-2 through 2-4 presents a Site map showing the location of all soil borings and soil samples, and the concentrations of all detected VOCs, SVOCs, and metals that exceed the New York State Codes, Rules and Regulations; Title 6, Chapter IV, Subpart 375-6 (6 NYCRR Subpart 375-6) Remedial Program Soil Cleanup Objectives (SCOs) for unrestricted use property. The SCOs for restricted use commercial property presented in 6 NYCRR Subpart 375-6 and the Recommended Soil Cleanup Objectives (RSCOs) presented in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 (NYSDEC, 1994) are also presented for comparison on Tables 2-4 through 2-6.

Boreholes were abandoned by backfilling with boring spoils and capped with a bentonite seal placed a minimum of 0-2 feet bgs. Grossly contaminated borings, borings where free product was observed or borings where spoils could not be returned to the subsurface due to subsurface lithology (e.g., "fat clays") were backfilled entirely with bentonite. The ground surface at all boring locations were restored to pre-drilling conditions and remaining boring spoils were collected and containerized in 55-gallon drums and stored on-Site for waste characterization and disposal.

2.4 GROUNDWATER INVESTIGATION

Three shallow bedrock monitoring wells (MW-1D, MW-2D and MW-3D) were installed at the Site during the PSI. At each location, the overburden was cased off and an open-borehole was cored inside of the casing. The borehole was advanced until the first significant water-bearing unit was encountered.

As part of the RI, one shallow and four deep bedrock monitoring wells were installed to further evaluate groundwater flow and the horizontal and vertical distribution of contaminants in bedrock. A shallow bedrock monitoring well (MW-4D) was installed in the southeastern portion of the Site. This well was installed in the same manner as the shallow bedrock wells installed during the PSI and was advanced to the first significant water bearing unit within bedrock. The four deep bedrock wells (MW-1DD through MW-4DD) were installed adjacent to the shallow monitoring wells (MW-1D through MW-4D) to evaluate deeper groundwater conditions. The locations of all monitoring wells are shown on Figure 1-2.

2.4.1 *Installation of Deep Bedrock Monitoring Wells*

The deep bedrock monitoring wells were installed using a truck-mounted rotary drilling rig. Initially, 6 ¼-inch (diameter) Hollow Stem Augers (HSA) were advanced to the top of competent bedrock. The augers were removed and 8-inch temporary steel casing was installed in the open borehole to case off the overburden while drilling continued. A 7 7/8-inch roller bit was then used to advance a rock socket a minimum of 2-feet into competent rock. Six-inch permanent steel casing was pressure grouted in place to isolate the overburden and the temporary 8-inch casing was removed. The grout was allowed to set for a minimum of 24-hours before drilling continued. Drilling continued through the permanent 6-inch steel casing with a 5 7/8-inch roller bit. The roller bit was advanced to the well completion depth of the corresponding adjacent shallow well in the well cluster (because core information was already available to this depth). A standard NX bedrock core was then advanced an additional 10-feet and a 5 7/8-inch roller bit was used to enlarge the borehole created by the core so that permanent 4-inch steel casing could be pressure grouted in place to isolate the upper portion of the bedrock monitored by the shallow well. The grout was allowed to dry for a minimum of 24-hours before drilling continued through the 4-inch casing. Drilling continued with continuous 10-foot NX core runs until the next significant water bearing unit was encountered. All cores were logged by an ERM geologist and results were recorded on boring logs presented in Appendix D. The boring was completed by reaming out the NX corehole with a 3 7/8-inch roller bit. All monitoring well borings were left open below the 4-inch steel casing with the exception of monitoring well MW-1DD. At MW-1DD, 2-inch wire wrapped polyvinyl chloride (PVC) well screen and riser was installed due to the friable nature of the surrounding bedrock. Monitoring well construction logs are provided as Appendix E.

2.4.2 *Installation of Shallow Bedrock Monitoring Well*

The shallow groundwater monitoring well (MW-4D) was installed in a manner similar to the deep wells. Initially, 4 ¼-inch HSAs were advanced to the top of competent bedrock. The augers were removed and 6-inch temporary steel casing was installed in the open borehole to case off the overburden while drilling continued. A 5 7/8-inch roller bit was used to advance a rock socket a minimum of 2-feet into competent rock and 4-inch permanent steel casing was pressure grouted in place to isolate the overburden. The temporary 6-inch casing was removed and the grout was allowed to set for a minimum of 24-hours. Drilling continued through the permanent 4-inch steel casing with a 3 7/8-inch roller bit. The roller bit was advanced to the well completion depth at the first significant water bearing fracture based on the core information obtained from the adjacent monitoring well, MW-4DD. Coring was not performed at MW-4D because an NX-core was collected the entire length of MW-4DD. The portion of the monitoring well boring at depths below the 4-inch steel casing was left open. The well boring log and monitoring well construction log for MW-4DD are provided in Appendix D and E respectively.

2.4.3 *Well Completion and Well Development*

Monitoring wells MW-1DD, MW-2DD and MW-3DD were completed with flush mounted steel well vaults per the specifications provided in the RI Work Plan. After consultation with the NYSDEC, it was decided that, monitoring wells MW-4D and MW-4DD would be completed with an above grade standpipe. The 4-inch steel casing at both wells was left approximately 3-feet above grade and was protected by two pair of 6-inch diameter steel pipe ballards. Each ballard was set a minimum of 3-feet bgs and secured in place with a portland cement/concrete mixture. The ballards and standpipes were painted bright yellow and each standpipe was fitted with a locking cap.

Monitoring wells were developed by the drilling subcontractor using the air-lift and/or submersible pump methods specified in the RI Work Plan.

Because of the limited yield (i.e., slow recharge) from most of the wells, ERM performed additional well development during May through 1 June 2005 with the assistance of NYSDEC personnel. This development was completed with a submersible pump and/or dedicated polyethylene bailers. Details regarding well development are recorded in the field notes provided as Appendix B and on monitoring well development logs provided as Appendix F.

2.4.4 *Monitoring Well Sampling*

Groundwater sampling of all Site wells (MW-1D through MW-4D and MW-1DD through MW-4DD) was conducted by ERM from 7 through 13 June 2005. The RI Work Plan anticipated the use of the USEPA low stress well sampling techniques (USEPA, 2002), however, due to the very slow recharge at several of the wells, and after discussion with NYSDEC the groundwater purging and sampling program was modified as described below.

Monitoring wells MW-3D, MW-3DD and MW-4D were purged and sampled with a 1 ¾-inch diameter stainless steel QED bladder pump using the USEPA low stress technique. The bladder pump was fitted with a new disposable polyethylene bladder and new disposable polyethylene tubing at each well location. After the depth to water was measured, the pump was slowly lowered to approximately the middle of the open interval in the bedrock well and purging was initiated. Groundwater samples were collected using the protocol described in the RI Work Plan after the water quality stabilization criteria for the water quality indicator parameters was achieved (i.e., pH (±0.1 pH Unit), specific conductance (± 3 percent), dissolved oxygen (±10 percent), oxidation-reduction potential (± 10 millivolts [mv]), temperature and turbidity is less than 50 Nephelometric Turbidity Units (NTUs or ± 10 percent)). In addition, sampling was conducted only after drawdown in the well stabilized for a minimum of three consecutive readings (for a minimum of 15-minutes). A notable deviation from USEPA protocol was that in some cases total drawdown during purging exceeded 0.33-feet as specified in the USEPA low stress guidelines.

Purging using the low stress techniques, described above, was initiated at MW-1DD and MW-2DD however drawdown and/or the purge parameters did not stabilize. These wells were purged dry with a dedicated polyethylene bailer and allowed to recharge. Samples were collected after the water level in the well recovered at least ninety percent of the initial measured elevation or, if the well did not achieve ninety percent recovery by the end of the week that sampling was conducted, a sample was collected from whatever groundwater had accumulated in the well.

MW-2D was purged dry with a dedicated polyethylene bailer because the well initially did not have enough volume to purge with the bladder pump. After sufficient recharge, a groundwater sample was obtained with a new disposable polyethylene bailer.

MW-4DD was not purged or sampled because of the lack of groundwater in the well.

MW-1D was sampled using the USEPA low stress technique described above, however, because light non-aqueous phase liquid (LNAPL) was present in the well a peristaltic pump fitted with new disposable polyethylene tubing was used to purge the well and collect a groundwater sample.

Groundwater sampling records for all wells are presented in Appendix G. Groundwater samples were analyzed by STL of Shelton, Connecticut for TCL VOCs and TCL SVOCs using CLP Method OLC02.1 and TAL Metals using ILM04.2. A sample of LNAPL was obtained from MW-1D and analyzed for TCL VOCs using CLP Method OLM04.2.

The monitoring well purge water was purged to the ground surface in the vicinity of the well during sampling of all wells with the exception of water purged from MW-1D and MW-1DD. Purge water from these wells was containerized in and stored on-Site in the dedicated 1500-gallon polyethylene AST because of prior knowledge that MW-1D contained LNAPL.

The groundwater monitoring data are shown on Tables 2-7 through 2-9, and discussed in Section 3.1.4. Figures 2-5 through 2-7 presents a Site map showing the location of all monitoring wells, and the concentrations of all detected VOCs, SVOCs, and RCRA metals in groundwater that exceed Class GA groundwater quality standards and guidance values from NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 (NYSDEC, 1998). The information presented in the subsequent 1999 TOGS 1.1.1 errata sheet and the 2000 and 2004 addenda were also included in the comparison.

Water levels from Site wells were collected at the time of the June 2005 groundwater sampling event. A second synoptic round of Site water level measurements was collected on 13 March 2006. The purpose of the second round of water levels was to obtain a synoptic set of measurements that included water levels from existing monitoring wells present at an off-Site property (10 White Street) located to the southwest of the Site. The 10 White Street property is currently also undergoing an environmental investigation. Access to the White Street Property and monitoring well construction information was obtained through correspondence with the NYSDEC. The groundwater elevations from the

March 2006 gauging event are presented in Table 2-10. The groundwater elevations were plotted on the Site basemap, and water level contours were developed, as shown on Figures 2-8 and 2-9.

2.5 SITE SURVEY

A survey of the Site was conducted by Larsen Engineers (Larsen) of Rochester, New York. This firm is a New York State licensed and registered surveyor. Larsen conducted an initial Site survey and prepared a Site basemap as part of the PSI. This map included the location of existing structures, former buildings/foundations, monitoring wells, test pits, surface soil samples and also included approximate property boundaries. During the RI, Larsen conducted an additional survey to update the Site basemap to include locations of the new monitoring wells, soil borings and surface sample locations. In addition the Site plan was revised to reflect the current Site conditions (e.g., buildings that were demolished since the PSI, fences that were removed, etc.). The updated Site basemap is presented in Figure 1-2 and was used for all subsequent Figures in this report.

2.6 SURFACE WATER AND SEDIMENT SAMPLING

On 29 June 2005 ERM collected surface water samples from the Genesee River adjacent to the Site. With permission from RG&E, ERM launched a small aluminum boat from the RG&E Brewer Street facility approximately ½-mile downstream (north) of the Site, which was utilized to collect the samples. Surface water samples were collected from three locations; upstream, downstream and adjacent to the Site. Sampling locations are illustrated on Figure 1-2. Samples were collected from the center of the river channel approximately 0 to 6-inches below the water surface by dipping a new laboratory provided glass bottle at the surface at each location. The sample was then transferred to the appropriate laboratory supplied containers for shipment to the laboratory. Samples were analyzed by STL for TCL VOCs and TCL SVOCs using CLP Method OLC02.1 and TAL Metals using ILM04.2. Results of the surface water samples are shown on Tables 2-11 through 2-13 and discussed further in Section 3.1.5. Figure 2-10 presents the concentrations of all detected VOCs, SVOCs and metals that exceed Class B (freshwater) standards and guidance values from TOGS 1.1.1.

As specified in the RI Work Plan, ERM attempted to collect sediment samples at the locations where surface water samples were collected, however, after probing the bottom at several locations it was discovered that sediment was not present above bedrock in the river channel. ERM reported this finding to NYSDEC prior to returning to the boat launch.

2.7 SUPPLEMENTAL REMEDIAL INVESTIGATION

After a preliminary review of the RI results and discussions with NYSDEC, ERM conducted a supplemental RI at the Site in July through September 2006 (Phase II RI). The supplemental investigation activities were conducted to:

- further investigate groundwater conditions on the southern end of the Site;
- confirm the presence of underground storage tank(s) (USTs) beneath Building D tentatively identified during the Phase I RI;
- attempt to determine the specific depth and location of the 6-foot diameter sanitary sewer beneath the Site and estimate how it might affect local groundwater flow; and
- further investigate overburden soils at several areas of the Site.

This investigation consisted of the installation of two new monitoring wells (MW-5D and MW-6D), installation of thirteen soil borings (SB-28 through SB-40), completion of a Geophysical survey and collection of a second round of groundwater samples from all ten Site monitoring wells.

On 1 June 2006, ERM prepared a Scope of Work (SOW) memorandum to document the proposed Supplemental RI activities (ERM, 2006). Prior to initiating ground intrusive activities at the Site, New York Leak Detection Inc. (NYLD), conducted a Geophysical survey at the Site on 24 July 2006. The UFPO was contacted prior to initiating the Geophysical survey to locate and mark-out underground facilities at the Site to facilitate the Geophysical survey.

The intent of the Geophysical survey was to clear all proposed drilling locations, locate/confirm the presence of USTs beneath Building D tentatively identified during the Phase I RI and attempt to locate and determine the depth of the sanitary sewer beneath the Site. NYLD initiated the survey with a thorough visual inspection of the Site followed by the use of ground penetrating radar and various magnetic and electrical acoustic locators to investigate subsurface conditions. Based on the results of the Geophysical survey the locations of several of the drilling locations proposed in the Supplemental RI SOW were modified. The final drilling locations are presented in Figure 1-2.

The Geophysical survey did not conclusively identify the location and depth of the sanitary sewer beneath the Site, however, after conducting interviews with personnel from Monroe County Department of Environmental Services (i.e., Monroe County Pure Waters), several drawings documenting the construction, depth and location of the sewer were obtained. These drawings are presented in Appendix H. NYLD did not discover any USTs beneath or in the area proximal to Building D, however, the access hatch/fill port identified near the foundation on the south end of Building D during the Phase I RI was identified to likely be part of a UST abandoned in place. A photo of the hatch is included as Appendix I.

The new monitoring wells (MW-5D and MW-6D) were installed by ERMs drilling subcontractor, Parratt Wolff Inc. Monitoring well MW-6D was installed consistent with the specifications outlined in the Supplemental RI SOW however bedrock was encountered at a depth greater than anticipated at 45-feet bgs. Drilling was completed at MW-5D at a depth of 49-feet bgs without encountering bedrock. After discussions with NYSDEC, an overburden PVC monitoring well was installed at this location because significant groundwater was observed during drilling. Boring logs and monitoring well construction logs for the new monitoring wells are provided in Appendix D and E respectively.

Upon monitoring well completion, Parratt Wolff developed the wells with a Watera pump (MW-6D) and submersible pump (MW-5D) to ensure the removal of any drilling fines and to restore the hydraulic properties of the surrounding formation. The turbidity, pH and volume of groundwater removed from the well was monitored during development and recorded in the field notes on the 3rd and 8th of August 2006 presented in Appendix B.

Soil borings were installed consistent with the protocol outlined in the Supplemental RI SOW however only two 45-degree from horizontal borings (SB-38 and SB-39) were installed beneath the debris pile on the southeast corner of the Site because access to the perimeter of the pile was limited by a pile of asphalt millings staged at the Site during the time field activities were conducted. Alternatively, a soil boring (SB-40) was installed with the Geoprobe through the access hatch/fill port of the presumed UST on the south end of Building D. Soil boring logs are provided as Appendix D.

On 10 August 2006, upon completion of drilling activities, Larsen returned to the Site to survey the locations of the new monitoring wells and soil borings. The updated Site basemap which includes the location of the new monitoring wells and additional soil borings is presented as Figure 1-2.

The analytical samples collected from the soil borings and groundwater monitoring well borings were analyzed by STL of Shelton, Connecticut.

The samples were analyzed for TCL VOCs and TCL SVOCs using CLP Method OLM04.2 and TAL Metals using ILM04.2. The analytical results from the soil boring samples and monitoring well boring samples are shown on Table 2-4 through Table 2-6 and discussed in Section 3.1.2. Figures 2-2 through 2-4 presents a map showing the location of all soil borings, and monitoring wells and the concentrations of all detected VOCs, SVOCs, and metals detected in soil samples that exceed the 6 NYCRR Subpart 375-6 Remedial Program SCOs for unrestricted use.

Approximately three weeks following well development, a second round of groundwater samples were collected from the existing Site monitoring wells and the new monitoring wells, and analyzed for TCL VOCs and SVOCs using CLP Method OLC02.1 and TAL Metals using ILM04.2. A second sample of LNAPL was obtained from MW-1D and analyzed for TCL VOCs using CLP Method OLC02.1, TCL SVOCs using CLP Method OLM04.2 and TAL Metals using ILM04.2 by STL. Results of the groundwater monitoring well data are shown on Tables 2-7 through 2-9, and discussed in Section 3.1.4. Figures 2-5 through 2-7 presents a Site map showing the location of all monitoring wells, and the concentrations of all detected VOCs, SVOCs, and metals in groundwater that exceed Class GA groundwater quality standards and guidance values from TOGS 1.1.1 (NYSDEC, 1998).

The sampling methodology identified in Section 2.4 was also followed for this groundwater sampling event. MW-2D, MW-2DD, MW-4D and MW-5D were purged dry with a dedicated bailer and sampled with a disposable polyethylene bailer after sufficient recharge. MW-1DD and MW-3D were initially purged with a dedicated polyethylene bailer to remove some of the water column and head pressure in the well, followed by purging and sampling with a bladder pump. MW-3DD and MW-5D were purged and sampled with the bladder pump and MW-1D was purged and sampled with a peristaltic pump because of the presence of LNAPL in the well. A ground water sample was not collected from MW-4DD because of the lack of recharge in the well after the well was purged dry with a dedicated bailer.

Water levels were gauged at all ten Site wells prior to sampling. The groundwater elevations from the August/September 2006 sampling event are presented in Table 2-14. Groundwater contour maps based on these water levels is presented on Figures 2-11 and 2-12.

2.8 MANAGEMENT OF INVESTIGATIVE DERIVED WASTE

During the RI several waste streams were generated. In the course of installing the shallow soil borings, soils that were not utilized as backfill were containerized in 55-gallon drums. Drilling spoils (e.g., soil cuttings, rock chips, unused grout) generated during the installation of Site groundwater monitoring wells were also containerized in 55-gallon drums. All groundwater generated during monitoring well installation, development and sampling was discharged to the surface in areas proximal to the wells with the exception of the MW-1D and MW-1DD well cluster. Liquids and sludge generated from these locations were stored in the 1500-gallon polyethylene tank staged at the Site because of prior knowledge that LNAPL was present in MW-1D. Decontamination water pumped from the temporary decontamination pad was also pumped to 55-gallon drums. These waste streams were stored on-Site and waste characterizations samples were collected to aid with waste characterization. On the basis of the waste characterization samples and process knowledge relating to the waste streams, all wastes were deemed non–hazardous. Due to the non-hazardous nature of the wastes, they were removed from the site by a licensed waste hauler, and disposed of at a USEPA Title D disposal facility. The waste disposal manifests are included as part of Appendix J.

2.9 ANALYTICAL DATA QUALITY EVALUATION

The QAPP details the Data Quality Objectives (DQO) and the analytical requirements for this project. Quality Assurance (QA) protocols, from both USEPA CLP SOW and NYSDEC Analytical Services Protocols (ASP), are provided in the QAPP. All samples collected during this investigation were obtained as described in the QAPP. The analytical laboratories utilized for this project maintained NYSDOH Environmental ELAP certification in all applicable categories of analytical testing for the duration of the project. A NYSDEC ASP Category "B" deliverable package, as described in Exhibit B, Section 3 of the NYSDEC ASP, was provided by all laboratories for all samples. A portable document format (pdf) file containing each of the hard copy deliverables can be found in Appendix K. A Data Validation Report (DVR) was prepared consistent with DER's guidance on preparing Data Usability Summary Reports (DUSRs) for all samples, except those collected as part of the management of derived waste. There are a total of twenty one DVRs. A pdf file containing each of the DVRs can be found in Appendix L. Included with each DVR are the validated and qualified organic and inorganic analysis data sheets (Form I's) for each sample referenced by the DVR. These validated Form I results have been transferred to each applicable analytical results summary table.

2.10 RELIABILITY OF LABORATORY ANALYTICAL DATA

The following section summarizes the results of the laboratory analysis QA. Included in this section is the discussion of the analytical procedures performed for the analysis of all environmental samples of various media collected during the investigation. A discussion pertaining to the validation and qualification of the analytical results is also provided.

2.10.1 Laboratories Performing Analyses

Air Toxics analyzed all indoor air, ambient air, and sub-slab vapor samples collected during the investigation. Air Toxics, located at 180 Blue Ravine Road, Suite B, Folsom, California 95630 is a NYSDOH ELAP certified laboratory (ELAP certification number 11291). Air Toxics met the requirements for documentation, data reduction and reporting and was certified to perform the analytical methods utilized in this investigation.

STL located at 128 Long Hill Cross Road, Shelton, Connecticut 06484, analyzed all soil, groundwater, and surface water samples collected during the investigation. STL meets the requirements for documentation, data reduction and reporting (ELAP certification number 10602) and is certified to perform the USEPA CLP analytical methods used in this investigation.

2.10.2 Analytical Procedures

The samples collected at the Site, which included indoor air, ambient air, sub-slab vapor, soil, groundwater, and surface water, were analyzed following the methods detailed in the QAPP and the CLP. The methods provide the technical and contractual background for environmental laboratories to conduct analytical methods for the preparation, detection and quantitative measurement of organic target compounds and inorganic target analytes in various matrices.

The indoor air, ambient air, and sub-slab vapor samples collected during the investigation were analyzed for the list of VOCs detailed in Table C-12 of the QAPP by USEPA Method TO-15.

The soil samples collected during the investigation were analyzed for TCL VOCs and TCL SVOCs by CLP SOW for Organics Analysis Multi-Media, Multi-Concentration, OLM04.2 (May 1999), and for TAL Metals by CLP SOW for Inorganics Analysis Multi-Media, Multi-Concentration, ILM04.2 The TCL and TAL are detailed in Exhibit C of the most recent version of the CLP SOW.

The aqueous samples collected during the investigation were analyzed for TCL VOCs and TCL SVOCs by CLP SOW for Organics Analysis Low Concentration Water OLC02.1 (February 1996), and for TAL Metals by CLP SOW ILM04.2.

The surface water samples collected during the investigation were analyzed for TCL VOCs and TCL SVOCs by CLP SOW OLC02.1 and for TAL Metals by CLP SOW ILM04.2.

The investigative derived waste soil and aqueous samples collected during the investigation were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) VOCs by USEPA SW-846 Method 8260B, TCLP SVOCs by USEPA SW-846 Method 8270C, and TCLP Metals by USEPA SW-846 Methods 6010B and 7470A. All TCLP samples were also prepared in accordance with USEPA SW-846 Method 1311. The compound lists for all TCLP samples are detailed in QAPP Tables C-13 through C-15. The samples were also analyzed for Reactivity to Sulfide and Cyanide by USEPA SW-846 Methods 9034 and 9014 respectively, Corrosivity by USEPA SW-846 Method 9045C and Flammability (Ignitability) by USEPA SW-846 Method 1010.

2.11 DATA VALIDATION

2.11.1 Objectives

Data validation is the assessment of data quality with respect to method requirements and technical performance of the analytical laboratory. The overall objective of the data validation process is to determine the degree of confidence that may be placed on the analytical results. The validation process identifies deviations from the methods, poor quality control (QC) results, matrix interference, and other analytical problems that may compromise the potential uses of the data. Analytical data packages were examined to ensure that all required laboratory components are included, all QA/QC requirements were performed, and the data use restrictions were well defined. The analytical data were qualified and appropriately flagged by the data validator. All data collected on this project, except those collected as part of the management of investigative derived wastes, were validated by a third party. Data was validated by Environmental Data Services (EDS) of Williamsburg, Virginia. This information was taken into account during the interpretation of the data.

2.11.2 *Procedures*

The ERM QA/QC officer carried out a preliminary review of the data to verify that all of the necessary paperwork, such as Chains-of-Custody, traffic reports, analytical reports, and deliverable packages were present. A detailed QA review was then performed by an independent third party validator to verify the qualitative and quantitative reliability of the data as the laboratory provided it.

EDS of 1156 Jamestown Road, Suite A, Williamsburg, Virginia 23185 performed the data validation for all data collected. The review of the sampling data was performed in accordance with the protocols and procedures of the following:

- the Analytical methods;
- the NYSDEC ASP;
- the USEPA CLP National Functional Guidelines for Organic Data Review (October 1999);
- the USEPA CLP National Functional Guidelines for Low Concentration Organic Data Review (June 2001);
- the USEPA CLP National Functional Guidelines for Inorganic Data Review (July 2002);
- the USEPA Region II Data Review Standard Operating Procedure (SOP) Number HW-6, Revision 12, March 1993: CLP Organics Data Review and Preliminary Review (Method OLM04.2);
- the USEPA Region II Data Review SOP Number HW-13, Revision 3.2, July 2001: Organic Data Review for Low Concentration Water;
- the USEPA Region II Data Review Standard Operating Procedure (SOP) Number HW-6, Revision 12, March 1993: CLP Organics Data Review and Preliminary Review;
- the USEPA Region II Data Review SOP Number HW-18, Revision 0, August 1994: Validating Canisters of Volatile Organics in Ambient Air;
- and the reviewer's professional judgment.

The order in which the aforementioned guidance documents and/or criteria were listed to be used for validation did not imply a hierarchy of reliance on a particular document. The most comprehensive reference sources of criteria were used to perform a complete validation.

The following items/criteria were reviewed for Organics:

- Case narrative and deliverables compliance;
- Holding times both technical and procedural and sample preservation (including pH and temperature);
- System Monitoring Compound (Surrogate) recoveries and summaries;
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) results, recoveries and summaries;
- Laboratory Control Sample (LCS) or Blank spike (BS) results, recoveries and summaries;
- Method blank results and summaries;
- Gas Chromatography (GC)/Mass Spectroscopy (MS) tuning and performance;
- Initial and continuing calibration summaries;
- Internal standard areas, retention times and summaries;
- Field and Trip Blank Data when applicable;
- Blind Field Duplicate sample results when applicable
- Organic analysis data sheets (Form I);
- GC/MS chromatograms, mass spectra and quantitation reports
- Quantitation/detection limits; and
- Qualitative and quantitative compound identification.

The following items/criteria were reviewed for the Inorganics:

- Case narrative and deliverable requirements;
- Holding times and sample preservation;
- Detection limits;
- Inorganic analysis data sheets (Form I);
- Initial and continuing calibration verifications;
- Contract Required Detection Limit (CRDL) standard analysis;
- Lab blank data;
- Inductively Coupled Plasma Spectroscopy (ICP) interference check sample (ICS) analysis;
- Matrix Spike analysis;
- Matrix Duplicate analysis;
- Laboratory control sample (LCS) results;
- ICP serial dilution analysis;
- Field Blank results when applicable; and
- Blind Field Duplicate results when applicable.

The data validation performed by EDS indicated that all data are valid and usable with some exceptions as described in the validation reports, with the applicable data qualifiers on the data summary tables, and as described below. The data were, however, deemed of sufficient quality to make informed decisions at the Site.

Based upon the results of the data review, detailed DVRs were prepared for all samples, except those collected as part of the management of derived waste. There are a total of twenty one DVRs. A pdf of each of the DVRs can be found in Appendix L.

The DVRs consist of a section that contains an assessment of the deliverables, followed by a section that describes, on an item-by-item basis, the analytical results and any qualifications that should be considered when using the data. The qualifications were made by assessing the results submitted by the laboratory in terms of the technical requirements of the analytical methods (including quality assurance/quality control [QA/QC] criteria) and the data validation requirements. The DVRs/reports highlight the data results that did not meet QC limits and therefore may have required data qualification. The reports also indicate the data qualification actions taken as a result of these criteria.

Based upon the data validation process, qualifications of data, where appropriate, are made by the use of qualifier codes. These qualifiers serve as an indication of the qualitative and quantitative reliability of the data.

The qualifier codes utilized are as follows:

- No qualifier – Positive Detect. The compound was analyzed for and was positively identified above the sample detection limit. The reported value is valid and useable.
- U – Non Detect. The compound was analyzed for, but not detected above the reported detection limit. The associated numerical value is the detection limit. The value is usable as a non-detect at the detection limit.
- J - Estimated value. The compound was analyzed for and was positively identified above the sample detection limit. The value was designated as estimated as a result of the data validation criteria. Also used to indicate TICs or when an organic compound is present (mass spectral identification criteria are met), but the concentration is less than the detection limit. The value is usable as an estimated result.
- UJ – Non Detect at an estimated value. The compound was analyzed for, but not detected above the reported detection limit. The associated numerical value is the detection limit, however the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. The value is usable as a non-detect at the estimated detection limit.
- R - Rejected. The sample results are rejected due to deficiencies in the ability to analyze the sample and meet quality control criteria. The data are unusable. The presence or absence of the analyte cannot be verified.

- UX – The compound was analyzed for, but not detected. The extraction of the samples was performed outside holding time, however instead of rejecting the data, the end user decided that data was useable since no SVOCs were suspected in the surface water. The value is usable as a non-detect at the estimated quantitation limit.

The ERM Quality Assurance Officer reviewed all validation reports.

2.11.3 *Results*

The analytical results for all samples collected as part of the investigation are valid and usable with qualifications as noted in each DVR except those deemed unusable and rejected by the validation process. All data qualifiers were taken into account during the interpretation of the analytical results. Analytical results were simplified for preparation of the analytical results summary tables and are presented in Tables 2-2, 2-4 through 2-9, 2-11, 2-12, 2-13, and 4-2. Qualifier flags were limited to "U" for non-detects, "J" for estimated values based upon results of the validation, "UJ" for non-detect values that were estimated based on the validation, "UX" for surface water SVOC samples that were non–detects analyzed outside holding time and "R" for values that were deemed as unusable during the validation process based on quality control deficiencies. Overall there was no significant impact regarding the usability of the data set. The validator and the ERM QA officer have determined that after thorough review of the entire data set, all samples collected during the investigation are valid and should be considered usable except the limited number of non-detects that were rejected.

2.12 *HUMAN HEALTH EXPOSURE ASSESSMENT*

A qualitative Human Health Exposure Assessment was completed as part of the RI. The purpose of the Exposure Assessment is to identify potential exposure pathways for contaminants at the Site and identify how any unacceptable exposure pathways might be eliminated/mitigated. The Human Health Exposure Assessment is presented in Section 3.2.

2.13 *FISH AND WILDLIFE RESOURCES IMPACT ANALYSIS*

A Fish & Wildlife Resource Impact Analysis (FWRIA) was conducted after completion of the Phase I RI. The FWRIA was conducted in accordance with NYSDEC's Draft DER-10 Technical Guidance for Site Investigation and Remediation, dated December 2002 (NYSDEC, 2002) and the guidance contained in the memorandum entitled Fish and Wildlife Impact

Analysis for Inactive Hazardous Waste Sites (NYSDEC, 1994). This FWRIA was prepared according to Section 3.10.1 Part I (Resource Characterization) of the draft document, which is consistent with Step 1: Site Description and Step 2: Contaminant Specific Impact Assessment of the 1994 memorandum. Results of the FWRIA are presented in Section 3.3.

3.0 DESCRIPTION OF ENVIRONMENTAL CONDITIONS

The validated results of the sampling and analyses carried out as part of the RI are presented in Tables 2-2, 2-4 through 2-9, and 2-11, 2-12 and 2-13. Data were evaluated by comparison of the results with the SCOs for unrestricted use and restricted use commercial property presented in 6 NYCRR Subpart 375-6, the RSCOs presented in NYSDEC TAGM-4046 (NYSDEC, 1994), Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006 prepared by NYSDOH (NYSDOH, 2006), and groundwater and surface water standards and guidance values presented in NYSDEC TOGS No. 1.1.1 (NYSDEC, 1998).

3.1 EVALUATION OF DATA

The following sections evaluate the data collected during the RI. The evaluation is organized by sample media (i.e., air, soil, groundwater and surface water) and is broken down by compounds of concern (i.e., VOCs, SVOCs and Metals).

3.1.1 Air Samples

As discussed in Section 2.1, a total of six air samples were collected as part of the RI. These included two sub-slab soil vapor samples, three indoor air samples, and one ambient air sample. The samples were analyzed for VOCs using USEPA Method TO-15. A summary of all air sampling results is presented in Table 2-2.

3.1.1.1 Sub-slab Vapor Samples

The two sub-slab soil vapor samples (SV-A01 and SV-A02) were collected at Building A. SV-A01 was collected from below the basement slab in the main basement on the north end of the building (north basement) and SV-A02 was collected below the slab of the smaller basement on the south east corner of the building (south basement).

Several VOCs were detected in both sub-slab samples. NYSDOH currently only has published guideline values for three VOCs which include; methylene chloride (MeCl), tetrachloroethene (PCE) and trichloroethene (TCE). These guideline values are 60 micrograms per cubic meter (mcg/m^3) for MeCL, 100 mcg/m^3 for PCE and 5 mcg/ m^3 for TCE (NYSDOH, 2006). The concentrations of PCE detected in SV-A01 and SV-A02 and TCE detected in SV-A02 exceeded the NYSDOH guideline values. In addition, the NYSDOH has developed two matrices, to use as tools when making decisions when soil vapor may be entering buildings. The four chemicals assigned to the matrices (Soil Vapor Indoor Air Matrix 1 and Soil Vapor Indoor Air Matrix 2) to date include; carbon tetrachloride, PCE, 1,1,1-Trichloroetehene and TCE (NYSDOH, 1996).

3.1.1.2 *Indoor Air Samples*

Two indoor air samples (IA-A01 and IA-A02) were collected from building A at locations proximal to the sub slab samples. The third indoor air sample was collected from the second floor of building A (IA-A03) in the office area occupied by the current tenant. Although several VOCs were detected in all three air samples, TCE was the only compound detected in IA-A01, IA-A02 and IA-A03 at concentrations that exceeded the current NYSDOH guideline value of 5 mcg/m^3.

3.1.1.3 *Ambient Air Sample*

One ambient air sample (AA-R01) was collected at the northeast exterior corner of Building A. Several VOCs were detected in AA-R01 however no exceedences of current NYSDOH guideline values occurred.

3.1.1.4 *Air Summary*

Results of the sub-slab and indoor air monitoring samples indicate that two compounds; PCE and TCE, were detected at the Site at concentrations that exceed the NYSDOH guideline values. When the results of the indoor and sub-slab air monitoring are compared to the NYSDOH Soil Vapor Indoor Air Matrix 1 and Matrix 2, the NYSDOH advises that mitigation is needed to minimize current or potential exposures associated with intrusion of TCE into building A (NYSDOH, 2006). NYSDEC has made numerous attempts to contact the current property owner regarding mitigation of this situation; to date these attempts have been unsuccessful.

3.1.2 *Soil Samples*

During the RI, soil samples were collected from forty soil borings (SB-1 through SB-40), split spoon samples collected during the construction of two of the Site monitoring wells (MW-5D and MW-6D) and two locations in the basement of Building B (SS-BLDGB-01 and SS-BldgB-02). Details on the installation of the soil borings and collection of the samples are provided in Section 2.3 and Section 2.7. An ERM geologist visually inspected each sample to describe the soil, observe the presence of any stained soils and detect any obvious odors. In addition, all samples were screened using a calibrated FID to detect the presence of VOCs. All findings were recorded on boring logs presented in Appendix D and on field notes presented in Appendix B.

Elevated FID readings and/or olfactory or visual evidence of impacted soils was observed in twenty eight of the soil borings (SB-02, SB-03, SB-06 through SB-11, SB-13 through SB-21, SB-28 through SB-37 and SB-40) and soils collected from both monitoring wells (MW-5D and MW-6D). LNAPL was observed in soils from six soil borings (SB-06, SB-07, SB-19, SB-20, SB-30 and SB-32).

The locations of all soil borings, monitoring wells and soil samples are presented on Figure 1-2. The analytical results for soil samples collected at the Site are presented in Tables 2-4 through 2-6. Analytical results for soil samples collected at the Site were compared to 6 NYCRR Subpart 375-6 SCOs for unrestricted use (NYSDEC, 2006). For comparison purposes, SCOs for restricted use commercial property and RSCOs from TAGM-4046 (NYSDEC, 1994) are also presented on the tables.

It should be noted that the column for restricted use SCOs presented in Tables 2-4 through 2-6 were derived from both the restricted use commercial SCOs and the protection of groundwater SCOs presented in 6 NYCRR Supart 375-6. 6 NYCRR Subpart 375-6.5 indicates that "the protection of groundwater soil cleanup objectives are applicable at restricted use sites where contamination has been identified in on-site soil by the remedial investigation and groundwater standards are, or are threatened to be, contravened by the presence of soil contamination at concentrations above the protection of groundwater soil cleanup objectives" (NYSDEC, 2006). Therefore, on the Tables 2-4 through 2-6, the SCOs for restricted use commercial property were replaced on a compound specific basis, with the protection of groundwater SCOs for those compounds that were detected in groundwater samples, collected at the Site, at concentrations that exceeded their Class GA groundwater standard and/or guidance value.

3.1.2.1 VOCs

Numerous borings at the site are affected with VOCs including one or more of the following compounds; acetone, 2-butanone, isopropylbenzene, numerous chlorinated solvents and/or BTEX compounds (i.e., benzene, toluene, ethylbenzene and xylene) at concentrations that exceed 6 NYCRR Subpart 375-6 SCOs for unrestricted use. These borings include; SB-03, SB-04, SB-06 through SB-10, SB-14 through SB-21, and SB-28 through SB-35. In addition, the sum of the estimated concentrations of TICs (i.e., total TICs) reported by STL exceed 1,000 parts per billion (ppb) in SB-03, SB-06 through SB-10, SB-13 through SB-21, SB-30 through SB-33, SB-35, SB-36 and SB-39. Both soil samples collected in the Building B basement (SS-BLDGB-01 and SS-BLDGB-02) also had total TIC concentrations exceeding 1,000-ppb. TICs are non-target compounds (i.e., organic compounds not on the TCL). Frequently, TICs are petroleum product constituents not regulated under Superfund. Elevated TIC concentrations therefore can be a secondary indicator of contamination.

3.1.2.2 *SVOCs*

Several SVOCs, including one or more of the following polycyclic aromatic hydrocarbons (PAHs); 4-methylphenpol, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene were frequently detected in soil borings at concentrations that exceeded 6 NYCRR Subpart 375-6 SCOs for unrestricted use. These borings include; SB-01, SB-04, SB-05, SB-07, SB-09, SB-10, SB-13, SB-14, SB-19, SB-23, SB-25 through SB-28, SB-30, SB-32, SB-33, SB-34, SB-36, SB-38, SB-39 and SB-40. SVOC concentrations that exceed 6 NYCRR Subpart 375-6 SCOs for unrestricted use were also found in soils sampled at MW-5D. The total SVOC TICs exceeded 10,000-ppb in numerous borings. These borings included; SB-01, SB-04 through SB-10, SB-13 through SB-16, SB-19, SB-20, SB-23, SB-25 through SB-28, SB-30 through SB-36, SB-38, SB-39 and SB-40. Total SVOC TIC concentrations also exceeded 10,000-ppb at both soil samples collected in the basement of Building B (SS-BLDGB-01 and SS-BLDGB-02) and soils collected at MW-5. SVOC TICs are usually alkylated PAHs contained in petroleum products and like VOC TICs can be a secondary indicator of contamination.

3.1.2.3 *Metals*

Detections of metals in Site soils was widespread and in numerous occasions exceeded the generic SCOS for inorganics provided in 6 NYCRR Subpart 375-6 for unrestricted use. Metals are commonly found as naturally occurring elements in native soils in this region (Shacklette and Boerngen, 1984) so it is difficult to determine if the concentrations detected at the Site are directly related to historical Site operations. Background sampling from off-Site locations free from the influences of the Site and any other source of contaminants is preferable to determine local inorganic background concentrations for Site soils (NYSDEC, 1994) however, this may not be feasible due to the urban surrounding and the presence of numerous properties in the surrounding area that have historical releases (Appendix A). The detection of several metals that are typically an environmental concern including; Arsenic, Barium, Cadmium, Lead, Mercury, Selenium and Silver in one or more of the soil samples collected at the Site would indicate that further evaluation to determine the feasibility of collecting valid background samples to establish Site specific background concentrations for inorganics (i.e., Site background) is necessary.

3.1.2.4 *Soil Summary*

The majority of the soil samples collected at the Site contain VOCs and SVOCs at concentrations that exceed the SCOs for unrestricted use from 6 NYCRR Subpart 375-6. These samples include soils collected from; SB-01, SB-03 through SB-10, SB-13 through SB-21, SB-23, SB-25 through SB-36, SB-38, SB-39, SB-40 and MW-5D. Significant TIC concentrations (secondary indicators of contamination) were also detected in these samples and two samples collected beneath Building B (SS-BLDGB-01 and SS-BLDGB-02). The widespread distribution of VOCs and SVOCs in Site soils indicate that previous Site activities have contributed significantly to the contamination detected in soil at the Site.

For comparison purposes, SCOs for restricted use commercial property from 6 NYCRR Subpart 375-6 and RSCOs from TAGM-4046 (NYSDEC, 1994) are also presented on Tables 2-4 through 2-6. As previously discussed in Section 3.1.2, the SCOs for restricted use commercial property presented in the tables were derived from both the restricted use commercial SCOs and the protection of groundwater SCOs presented in 6 NYCRR Supart 375-6.

3.1.3 *Groundwater Elevation and Flow*

The evaluation of groundwater flow at the Site was based on two rounds of groundwater level elevations collected during the two phases of the RI. The first data set was collected in March of 2006 after completion of the Phase I RI and the second was collected in August/September 2006 during groundwater sampling conducted for the Phase II RI.

The first synoptic round of Site groundwater level measurements was collected on 13 March 2006 from the existing Site monitoring wells and included measurements collected at monitoring wells present at the 10 White Street property, which is located to the southwest of the Site. Based on these data, two groundwater elevation contour maps were prepared by comparing measured depths to groundwater to the surveyed elevations of the top of each well casing. This data is presented in Table 2-10 and the groundwater elevation contour maps are presented as Figures 2-8 and 2-9. The shallow groundwater contour map (Figure 2-8) includes elevations recorded at the Sites shallow bedrock wells (MW-1D through MW-4D) and three of the 10 White Street property shallow wells (MW-1B, MW-2B and MW-3B). The deep groundwater contour map (Figure 2-9) includes elevations recorded only at the Sites deep bedrock groundwater monitoring wells (MW-1DD through MW-4DD).

The second round of groundwater levels was collected after two new shallow monitoring wells were installed at the Site (MW-5D and MW-6D) during the Phase II RI. Both monitoring wells are installed at the first significant water bearing interval however MW-5D was installed in overburden and MW-6D was installed in bedrock. Groundwater levels were recorded during groundwater sampling conducted over a four day period at the end of August and early September 2006. This data is summarized in Table 2-14. Two additional maps, presenting shallow and deep groundwater elevation contours, are presented as Figures 2-11 and 2-12.

As expected the data recorded from the two rounds of groundwater measurements (i.e., March 2006 and August/September 2006) is consistent. Shallow Site groundwater appears to have a source of recharge centrally located at the Site, which flows radially to the Genesee River and surrounding area. This trend is also apparent in deeper groundwater at the Site, however, the deeper groundwater regime appears to have a steeper gradient of flow toward the Genesee River to the east and another strong component of flow to the south/southeast.

The local source of recharge may be due to the large diameter sanitary sewer (approximately 6-feet diameter) which runs south to north beneath the entire length of the Site. Historical drawings (Appendix H) indicate that the sewer was present as early as 1911 and was installed by tunneling horizontally into bedrock from several vertical access shafts from depths of approximately 35 to 45-feet bgs. As-built drawings dated from 1993 (Appendix H), prepared when the sewer tunnel was rehabilitated as a result of a partial collapse, confirm details presented on the earlier period drawings. The details provided in the as-builts also confirm that the sewer is only partially lined (with brick and concrete) in some areas beneath the Site which would suggest leakage to the surrounding formation is feasible.

A large diameter (8-foot) vertical access shaft is visible on both period drawings. The access manhole for this shaft was located during the RI and is located in the vicinity of SB-24. Based on the construction methods available at the turn of the 19th century there is a likely potential that a large area radially surrounding the shaft was excavated/blasted during the shafts construction. Drawings indicate that the top of bedrock at the shaft is approximately 40-feet bgs which indicates that a large amount of bedrock was likely removed and replaced with fill. There are also several related sub surface sewer structures (e.g., older tunnels, overflow structures) located beneath (or near the property boundary) on the south end of the site. Large wood timbers and red brick present in split spoon samples collected at MW-6D at depths as deep as 45-feet bgs confirm that this area contains fill and disturbed soil and/or bedrock at depth. The resulting removal of bedrock and backfill in these areas might be responsible for the lower groundwater elevations observed at the south end of the site, resulting in the component of flow to the south.

3.1.4 Groundwater Samples

As discussed in Section 2.4, groundwater samples were collected from the Site groundwater monitoring wells during two sampling events. The first sampling event was conducted in June of 2005 during the Phase I RI and included monitoring wells MW-1D through MW-4D and MW-1DD through MW-3DD. A groundwater sample was not collected at MW-4DD because the well did not generate sufficient recharge to obtain a sample after it was purged dry. The second sampling event was conducted in August/September 2006 during the Phase II RI. This sample event included monitoring wells MW-1D through MW-6D and MW-1DD through MW-3DD. Again, a sample was not obtained from MW-4DD due to slow recharge after the well was purged dry. The data from the groundwater investigation attempted to identify possible sources of contamination and to locate the horizontal and vertical extents of impact to groundwater. Groundwater results are shown in Tables 2-7 through 2-9, and detections of VOCs, SVOCs and metals that exceed the TOGS 1.1.1 standards and guidance values for Class GA groundwater are presented in Figures 2-5 through 2-7.

3.1.4.1 VOCs

Groundwater collected from four of the Site monitoring wells contained VOCs at concentrations that exceed Class GA groundwater standards and guidance values. These wells include MW-3D, a shallow bedrock well located on the upgradient Site boundary, and two shallow bedrock wells (MW-4D, MW-1D) and one deep bedrock well (MW-1DD) all located downgradient of the site proximal to the gorge wall and/or suspected source areas at the Site.

Benzene and chloroethane were the only two VOCs detected in the upgradiant shallow well (MW-3D) above the Class GA standards and guidance values. No other VOCs exceeding TOGS 1.1.1 standards and guidance values were detected in the three other upgradient Site wells (MW-5D, MW-6D and MW-3DD).

Two of the downgradient wells (MW-1D and MW-1DD) are heavily impacted with several chlorinated solvents and/or BTEX compounds. These wells are located downgradient of the former trichloroethene (TCE) AST and Building D. A thin layer of LNAPL was also observed in MW-1D during both groundwater sampling events. The third impacted downgradient well (MW-4D) also contains similar compounds including vinyl Chloride, 1,1-dichloroethane, cis-1,2-dichloroethene, benzene and TCE.

3.1.4.2 *SVOCs*

Three of the Site groundwater monitoring wells contained SVOCs at levels that exceeded the Class GA groundwater standards and guidance values. These wells include two shallow downgradient bedrock wells (MW-1D, and MW-2D) and one upgradient well (MW-6D) located on the southwest corner of the Site. One or more SVOCs including; 2-methylphenol, 4-methylphenol, 2,4-dimethylephenol, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene and indeno(1,2,3-cd)pyrene were detected in MW-1D and MW-2D and one SVOC (bis(2-ethylhexyl)phthalate) was detected at MW-6D that exceeded the TOGS standards and guidance values. It should be noted however that the laboratory detection limit (i.e., MDL) for several SVOCs is above the TOGS 1.1.1. standard or guidance value for the corresponding compound. Significant total SVOC TIC concentrations, which are also secondary indicators of contamination in groundwater, were detected at the majority of the Site wells including MW-1D, MW-1DD, MW-2D, MW-2DD, MW-3D, MW-3DD and MW-4D.

3.1.4.3 *Metals*

Several of the Site monitoring wells contained concentrations of iron, magnesium and sodium above the Class GA standards and guidance values. The presence of these elements does not present an environmental concern at the Site and can likely be considered naturally occurring because of their widespread detections/distribution in Site groundwater. Additional metals including cadmium, lead and manganese were detected in one or more of the following wells; MW-1D, MW-2D and MW-5D. These metals are typically considered an environmental concern, but are also commonly found as naturally occurring elements in soils in this region. The turbidity at two of the wells (MW-2Dand MW-5D) was elevated during collection of groundwater samples and the high turbidity likely resulted in the elevated detections of these elements.

3.1.4.4 *Groundwater Summary*

Based on the distribution of compounds detected in upgradient and downgradient Site monitoring wells it appears that previous Site activities have also contributed VOC and SVOC contaminants to groundwater at the Site. VOCs exceeding the Class GA groundwater standards and guidance values were detected at MW-1D, MW-1DD, MW-3D and MW-4D. SVOCs exceeding the Class GA standards and guidance values were detected at MW-1D, MW-2D and MW-6D. Total SVOC TIC concentrations, which are also secondary indicators of contamination in groundwater, were detected at the majority of the Site wells including MW-1D, MW-1DD, MW-2D, MW-2DD, MW-3D, MW-3DD and MW-4D. Although metals were detected at the Site in several of the Site monitoring wells there presence is likely due to naturally occurring elements in Site soils and unrelated to prior activities at the Site.

3.1.5 *Surface Water Samples*

As discussed in Section 2.6, three surface water samples were collected from the Genesee River at locations upstream (SW-01), adjacent to (SW-02) and downstream (SW-03) of the Site. The Genesee River is classified as a Class B surface water. The best usages of Class B waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival (NYSDEC, 1999).

The surface water samples were analyzed for the same parameters as the groundwater collected from the Site monitoring wells. Two metals; aluminum and iron, were detected in all three samples (SW-01, SW-02 and SW-03) at concentrations that exceeded the standards and guidance values for Class B surface water (fresh water) presented in TOGS 1.1.1. These metals are typically not an environmental concern and similar concentrations were detected in the upgradient, downgradient and surface water sample collected adjacent to the Site which suggests that the Site is not contributing to these metals in the river.

3.2 *HUMAN HEALTH EXPOSURE ASSESSMENT*

On the basis of the evaluation of data presented in Section 3.1, a qualitative Human Health Exposure Assessment for the Site was completed. The purpose of the Exposure Assessment was to identify potential exposure pathways for contaminants identified at the Site and determine how any unacceptable exposure pathways may be eliminated/mitigated.

3.2.1 *Identification of Potential Exposure Pathways*

As part of the RI four media (air, soil, groundwater and surface water) were investigated at the Site. As previously discussed all four media are affected with chemicals (i.e., VOCs, SVOCs and metals) at concentrations which exceeded the relevant SCGs. Potential exposure pathways for each of these media are described below.

3.2.1.1 *Soil*

Most of the Site consists of unpaved parking areas and drives, covered with dirt or crushed stone, with the remaining area occupied by Site structures. Under current conditions, potential exposure pathways include direct contact with affected Site soil in the unpaved areas (incidental ingestion and dermal absorption), leaching of chemicals in soil to groundwater and surface water (e.g., Genesee River), volatilization of chemicals in soil to overlying indoor and/or outdoor air, and contact with storm water runoff to the storm sewer and Genesee River.

3.2.1.2 *Groundwater*

There are currently no groundwater uses at the Site itself or in the immediate vicinity (e.g., domestic or industrial groundwater wells), and no expected future use of groundwater at the Site. There are also no public groundwater supply wells in the City of Rochester. The potable water supply for the City of Rochester is currently obtained from Lake Ontario and supplemented with water from two reservoirs located approximately 30-miles south of the city.

The presence of VOCs in Site groundwater, could result in the volatilization of chemicals in groundwater to overlying indoor and/or outdoor air as discussed in Section 3.2.1.3.

A component of Site groundwater flows to the east and discharges to surface water (i.e., the Genesee River) located on the eastern Site boundary. The exposure pathways associated with surface water are discussed in Section 3.2.1.4.

3.2.1.3 *Air*

The Site is currently occupied by a commercial trucking firm (Intrastate America). Therefore, inhalation of chemicals that have volatilized to indoor and/or outdoor air from Site soil and/or groundwater could result in inhalation exposures for Site workers. Sample results from indoor air samples collected at the Site in Building A indicate that VOCs detected in Site soil and/or groundwater are affecting indoor air quality.

3.2.1.4 *Surface Water*

Surface water of the Genesee River, in contact with groundwater discharge from the Site was previously identified as a potential exposure pathway. Based on telephone correspondence with NYSDEC it was confirmed that the Genesee River is designated as a Class B surface water.

The best usage of Class B waters are primary and secondary contact recreation and fishing (6 NYCRR 701.7). Therefore, direct contact with Genesee River water and ingestion of fish from the river represent potential exposure pathways.

Storm water which has contacted soils at the Site could present an additional exposure pathway. Storm water runoff from the Site consists of overland flow which discharges directly to the Genesee River or is collected in storm grates which discharge directly to the Genesee River or to the City of Rochester storm water collection system. The cities system discharges to the Genesee River and/or Lake Ontario. The water that discharges to the storm water collection system is expected to be significantly diluted however individuals in contact with storm water contained in the system or at the systems discharge point(s) could be subject to incidental ingestion and/or dermal absorption.

3.2.2 *Evaluation of Exposure Pathways*

3.2.2.1 *Soil*

SVOCs, VOCs and metals were detected in Site soils at concentrations, which in some cases significantly exceed the human health based SCOs for unrestricted use presented in 6 NYCRR Subpart 375-6. Some of these soil samples were collected from unpaved areas of the Site. Identification of remedial alternatives that are appropriate for the Site will be carried out during the Feasibility Study (FS) however the exposure pathways identified above (i.e., direct contact, volatilization and leaching of compounds present in soil to other media, incidental ingestion and/or dermal absorption) could be eliminated/mitigated by capping impacted areas with an impermeable barrier (e.g., asphalt), imposing deed restrictions, and or improved Site control (e.g., improving existing perimeter fences).

3.2.2.2 *Groundwater*

As noted in Section 3.2.1.2, groundwater is not currently used for drinking water or for any purposes at the Site or in the Site area. Potential exposure pathways for groundwater at the site therefore is related to groundwater contamination affecting other media (i.e., air and surface water) through volatilization of VOCs to overlying indoor or outdoor air and discharge of groundwater (and its contaminants) to the surface water adjacent to the Site (i.e., Genesee River). Evaluation of the exposure pathways associated with indoor air and surface water is discussed in Sections 3.2.3.3 and 3.2.3.4.

3.2.2.3 *Air*

Results of indoor air sampling conducted in Building A indicate that VOCs detected in soil and groundwater at the Site are affecting indoor air quality. When the results of the indoor and sub-slab air monitoring are compared to the NYSDOH Soil Vapor Indoor Air Matrix 1 and Matrix 2, mitigation appears to be needed to minimize current or potential exposures associated with intrusion of TCE into Building A (NYSDOH, 2006). The remedial alternative presented in the FS should address the affect of Site groundwater and soil on indoor air.

3.2.2.4 *Surface Water*

Significant dilution of groundwater is expected following discharge of groundwater to the Genesee River. This was confirmed because few SVOCs and VOCS were detected in the surface water samples (SW-01 though SW-03) at significantly lower concentrations than what was detected in groundwater. None of the SVOCS or VOCS detected in surface water exceed the TOGS 1.1.1 standards and guidance values for Class B surface water. Two metals; aluminum and iron, were detected in the river at concentrations that exceed the TOGS 1.1.1 standards and guidance values for Class B surface water.

The section of the Genesee River adjacent to the Site is isolated on the south by large waterfalls and a dam approximately three-quarters of a - mile south of the Site, to the north by the dam and smaller falls at the RGE facility approximately one-half-mile north of the Site, to the west by the steep gorge walls and to the east by chain-link fence, dense vegetation and private properties along the eastern bank of the river. Because this section of the river is isolated and because of the urban setting, direct human contact with the river water in this area or ingestion of fish from this section is unlikely.

3.3 FISH AND WILDLIFE RESOURCE IMPACT ANALYSIS

This section presents the Fish and Wildlife Resource Impact Analysis (FWRIA) for the Site. The FWRIA was conducted in accordance with the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation, Section 3.10.1, dated December 2002 (NYSDEC, 2002). Section 3.10.1 (Part 1: Resource Characterization) is consistent with previous guidance contained in the memorandum entitled Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (NYSDEC, 1994). The initial phase of the FWRIA involves two steps: Step I – Site Description, and Step II – Contaminant-Specific Impact Assessment.

The objectives of Part 1 of the FWRIA are to: (1) identify the fish and wildlife resources that presently exist at and in the vicinity of the Site and (2) identify actual or potential impacts of site-related chemicals on fish and wildlife resources. The first step of the FWRIA is to determine if fish or wildlife resources are present. If no resources are present or no migration pathway exists for site-related contaminants to impact resources, then no further analysis is required. If resources are determined to be present within a 0.5-mile radius, and a migration pathway is present (either currently or historically) to these resources, contaminants of concern are identified by comparing site-specific chemical levels with numerical criteria for the protection of biota in each media of concern. If contaminants are present at concentrations exceeding criteria, then a Part 2: Ecological Impact Assessment will be recommended.

3.3.1 *Fish and Wildlife Resources*

A Site description is provided in Section 1.2. A Site location map showing 0.5-mile radius is provided as Figure 3-1. Documented fish and wildlife resources exist within a 0.5-mile radius of the Site, including the Genesee River gorge along the eastern side of the Site and three forest upland areas to the east on the opposite side of the Genesee River (0.16-miles from the Site), southeast (0.28-miles from the Site), and north (0.19-miles from the Site).

Figure 3-2 presents the National Wetland Inventory (NWI) map for the Site and a 0.5-mile radius of the Site. No federally designated freshwater wetlands occur on the Site. Within a 0.5-mile radius of the Site, the NWI map designates Genesee River as L1UBHh (lacustrine, limnetic, unconsolidated bottom, permanently flooded). There is a portion of the Genesee River just outside of the 0.5-mile radius of the Site that is designated as R3UBH (riverine, upper perennial, unconsolidated bottom, permanently flooded).

Figure 3-3 presents the New York State Freshwater Wetland Maps for the Site and a 0.5-mile radius of the Site (Rochester West and Rochester East Quadrangles). No state designated freshwater wetlands occur within a 0.5-mile radius of the Site.

The Site is situated at the bottom of a hill that slopes downward from Lake Avenue to the east. The Site terrain is relatively flat and slopes gently from the western boundary of the Site to the edge of the Genesee River gorge. The site then slopes steeply downward toward the east from the top of the gorge to the Genesee River approximately 75-feet below.

Analysis of groundwater data from Site monitoring wells and monitoring wells at the 10 White Street property suggest there is a strong vertically downward gradient in the groundwater toward the Genesee River.

The Genesee River is classified as an unconfined river by State and Federal agencies. The bank of Genesee River closest to the Site is steeply sloped and sparsely vegetated as indicated in Photos 1 and 2 provided as Appendix M. A cover-type map of the Site is provided as Figure 3-4. The ecological communities indicated on this map were determined based on aerial photos and historical site information.

The cover types shown in this figure are defined as follows based on the Ecological Communities of New York State: Second Edition (NYSDEC, 2002):

Terrestrial Systems

Terrestrial Cultural (City of Rochester)

This subsystem characterizes the Site and the majority of the 5-mile radius surrounding the Site. The five communities that are present are created and maintained by human activities or modified by human influence. These communities include:

- Urban Vacant Lot: an open site in a developed, urban area. Sparsely vegetated with areas of exposed soil, rubble and other debris;
- Urban Structure Exterior: exterior surface of structures in an urban area. Surfaces may provide substrate for vegetation, invertebrates, nesting or resting areas for wildlife;
- Interior of Non-Agricultural Building: interior space of a building used primarily by people for work or storage space;
- Paved Road/Path: a road or pathway paved with asphalt, concrete, etc.; and
- Unpaved: a sparsely vegetated road or pathway of gravel or bare soil.

Open Uplands (Genesee River Gorge)

The Genesee River gorge is located along the eastern side of the Site. It originates south of the Site and extends north where it flattens prior to Lake Ontario.

The Genesee River gorge is classified as a Calcareous Cliff Community, which is a community that occurs on vertical exposures of resistant, calcareous bedrock and includes ledges and small areas of talus. There is minimal soil development, and vegetation is sparse.

Forested Uplands

Forested Uplands are present along portions of the Genesee River banks. A Forested Upland has more than 60% canopy cover of trees and occurs on substrates with less than 50% rock outcrop or shallow soil over bedrock.

Riverine Systems

Natural Streams (Genesee River)

The Genesee River is located along the eastern side of the Site at the base of the Genesee River gorge. The Genesee River is classified as an Unconfined River. An Unconfined River is an aquatic community with a relatively large, quiet, base level section of streams with a very low gradient. These streams are typically dominated by runs with interspersed pool sections and a few short or no distinct riffles.

3.3.2 Contamination Migration Pathways

Contamination at the Site is related to historical releases to the soil from deteriorating drums and leaking storage tanks and drums. There is evidence of soil contamination on the Site, but habitat for endangered, threatened, or special concern species is not present on the Site. There are no ecological habitats on the Site, and the surrounding area is primarily commercial/industrial which is characterized as a terrestrial cultural (upland) community type. The Site is bordered on the east by the Genesee River gorge and forested areas are present within a half mile radius of the Site. Based on shallow soils samples collected at the Site during the PSI and the RI, VOCs, SVOCs, and metals exceeded NYSDEC SCOs and RSCOs. Since there are no ecological habitats on the Site, there are no direct exposure pathways from these soils to wildlife populations. Contaminated soil at the Site could be eroded during storm events and enter storm drains discharging to the Genesee River. However, no bottom/sediments/soil were observed during ERM's sampling of the river. Therefore, soils are not addressed further in the FWIA.

The only contaminant migration pathway identified for the Site is the potential for ground water to discharge to surface water. Based on previous investigations, ground water flows towards the Genesee River. Therefore, this pathway will be addressed in the FWIA.

3.3.3 *Description of Resources Potentially Impacted by the Site*

Because the ground water flows toward the Genesee River, biological communities in the Genesee River will be the focus of this FWIA. The Genesee River is generally characterized as being deep, wide, having a high low flow discharge, and represents a network of 5th and 6th order stream segments.

Based on the response from New York State Natural Heritage Program, a state-listed animal and a state-listed plant may be found on or within the immediate vicinity of the Site. The peregrine falcon (*Falco peregrinus*) and purple bluets (*Houstonia purpurea var. purpurea*) were noted as state-listed endangered species within a 0.5-mile radius of the Site. See Appendix N for the New York State Natural Heritage Program response.

According to New York State Office of Parks, Recreation, and Historic Preservation (NYS OPRHP), the area surrounding and including the Site is classified as archeologically sensitive and the banks of the Genesee River are classified as critical environment. See Appendix O for the United States Department of Interior, Fish and Wildlife Service response.

3.3.4 *Identification of Fish & Wildlife Regulatory Criteria and Contaminants of Ecological Concern*

A criteria-specific analysis uses numerical criteria to assess potential ecological impacts associated with the constituents of concern. The numerical criteria are obtained from the NYSDEC Water Quality Regulations: 6 NYCRR Chapter X Parts 700-706 Surface Water and Groundwater Classifications and Standards, Amendments through August 4, 1999 (NYSDEC, 1999). If constituent concentrations are less than the numerical criteria, it is assumed that the constituent does not pose an unacceptable risk, and additional analysis is unnecessary. Where constituent concentrations exceed the numerical criteria, an analysis of toxic effects is required.

3.3.4.1 *Groundwater and Surface Water Screening*

To evaluate the potential for site-related impacts to surface water, the detected concentrations of constituents in ground water and surface water were compared to the lowest applicable NYSDEC Ambient Water Quality Standards. Where no NYSDEC standard was available, the guidance values found in TOGS 1.1.1 were used. If a TOGS 1.1.1 guidance value was not available, the chronic ambient water quality criterion (reported as criteria continuous concentration, or CCC value) as presented in the National Oceanic and Atmospheric Administration (NOAA) Screening

Quick Reference Tables (SQuiRT) was used (NOAA, 1999). When only a Lowest Observed Effect Level (LOEL) benchmark was available from the SQuiRT, the value was divided by 10 to adjust it to a No Observable Effect Level (NOEL) benchmark. Finally, in the absence of the preceding benchmarks, the Oak Ridge National Laboratory (ORNL) Tier II secondary chronic values were applied where available (ORNL, 1996).

The guidance value for mercury was the exception to these rules. Based on an e-mail correspondence dated 20 September 2005 with Scott Stoner, Chief of the NYSDEC Standards and Classification Unit, "the wildlife criterion for mercury contained in Table 4 of 40 CFR Part 132 shall apply to the waters of the Great Lakes System in the State of New York".

For the screening of ground water, the NOAA Coastal Protection and Restoration Division (CPRD) uses 10 times the applicable surface water quality criterion to account for the dilution expected during migration and upon discharge to surface water. Because the Genesee River is a large unconfined river, the methodology of NOAA CPRD was considered conservative for screening ground water in this analysis. Therefore, the applicable surface water quality criterion were multiplied by 10 to derive a freshwater screening level for comparison to ground water data.

Table 3-1 presents the sources of all screening levels used to evaluate the data.

Ground Water Screening Results

The screening of VOCs, SVOCs and metals detected in the groundwater sampling event conducted in June 2005 during the Phase I RI is presented on Table 3-2. Based on review of historical ground water data, and the Phase II RI groundwater sampling results, the June 2005 results are representative of the ground water conditions at the Site. The following Site wells were sampled in June of 2005: MW-1D through MW-4D, MW-1DD, MW-2DD and MW-3DD. The locations of the monitoring wells are illustrated on Figure 1-2.

Four VOCs (1,1-dichloroethane, cis-1,2-dichloroethene, ethylbenzene, and xylene) and six metals (aluminum, barium, copper, iron, lead and zinc) were detected above their associated screening levels. Two VOCs (chloroethane and vinyl chloride) were detected, but no screening levels are available. SVOCs were not detected above their associated screening levels.

Surface Water Screening Results

Three surface water samples were collected from the Genesee River. As shown on Figure 1-2, SW-01 was collected upstream of the Site, SW-02 was collected adjacent to the Site and SW-03 was collected downstream of the Site. These samples were collected from the center of the river channel approximately 0 to 6-inches below the water surface. These samples were analyzed for VOCs, SVOCs and metals and the screening results are presented on Table 3-3.

Three metals (aluminum, barium and iron) were detected above their associated screening level. Two VOCs were detected in the surface water samples; toluene and chloromethane. Toluene was detected below its screening level and chloromethane was detected, but no screening level is available. SVOCs were not detected.

3.3.5 *Summary and Conclusions*

The VOCs that were detected in the ground water samples above surface water protection screening levels were not detected in the surface water samples. The two VOCs that were detected in the surface water samples were very low estimated values; toluene was reported below the screening level and no screening level was available for chloromethane.

Three metals were detected in both the ground water and surface water samples above screening levels; aluminum, barium and iron. As shown on Table 3-3, the results of these three metals are similar in all three surface water samples. Therefore, similar concentrations were found upstream of the Site, adjacent to the Site and downstream of the Site. Thus, the Site does not appear to be the source of the detections in the surface water.

Based upon the fish and wildlife resources and exposure pathways identified in this assessment, and the results of the ground water screening analysis, it does not appear that the Site has caused adverse impacts to fish and wildlife resources.

4.0 SOIL VAPOR EXTRACTION PILOT TEST

4.1 BACKGROUND AND OBJECTIVES

Data collected during the PSI and RI indicate that VOC contamination is present in the vadose zone and LNAPL has been observed in Site soil borings and Site a monitoring well. Specifically, LNAPL has been observed in soil borings located to the south and west of Building D (SB-06, SB-07, SB-19, SB-20, SB-30 and SB-32) and in monitoring well MW-1D, located to the south east of Building D. Elevated concentrations of VOCs have been detected in test pits installed during the PSI (NYSDEC, 2001) and numerous soil borings installed during the RI (See Section 3.1.2). VOC contaminants detected include both petroleum hydrocarbons and chlorinated solvents. The concentrations of VOCs detected in the vadose zone exceed NYSDEC Part 375-6 unrestricted use SCOs and NYSDEC TAGM 4046 RSCOs.

Soil Vapor Extraction (SVE) is potentially an applicable technology for remediation of VOCs and LNAPL impacts in the vadose zone at the Site. To evaluate whether SVE is applicable for remediation of contamination at the Site and to assess whether on-Site vadose zone contamination could be addressed using this technology, a pilot test was conducted in the area south of Building D on 30 November 2006 and 1 December 2006.

The goals of the pilot testing were as follows:

- determine the SVE vacuum and air flow requirements;
- characterize the SVE off-gas; and
- determine SVE radius of influence (ROI).

4.2 WELL INSTALLATION

On 28 through 29 November 2006 eight temporary SVE monitoring wells and one temporary SVE extraction well were installed on-Site. The wells were installed by ERMs drilling subcontractor (Nothnagle) under the oversight of an ERM geologist. Eight 1-inch (diameter) vapor monitoring wells were installed in four soil borings (SB-41 and SB-43 through SB-45) and a single 4-inch vapor extraction well was installed in soil boring SB-42. All monitoring well borings were completed with 4 ¼-inch HSA rotary drilling methods except for the vapor extraction well which was installed with 6 ¼-inch HSAs.

For the purpose of logging soil lithology, continuous soil sampling was carried out using a Macrocore sampling device equipped with disposable polyethylene sleeves. An ERM Geologist visually inspected each sample to describe the soil conditions, observe the presence of any stained soils and detect any obvious odors. In addition, all samples were screened using a calibrated photoionization detector (PID) to detect the presence of VOCs. All findings were recorded on boring logs presented in Appendix D and on field notes presented in Appendix B. Figure 4-1 shows the location of the temporary SVE wells.

The four-inch (diameter) extraction well, SB-42, was constructed of Schedule 40 PVC screened 3 to 12-feet below grade. The one-inch monitoring wells consist of two nested wells screened over two separate intervals to allow for monitoring of vacuum at different depths. These wells were constructed of two-foot Schedule 40 PVC screen and PVC riser. The tops of the screens were set at approximately 4-feet bgs for the shallow well (e.g., SB-41S) and 10-feet bgs for the deep well (e.g., SB-41D). A 2-foot bentonite seal was placed immediately above each screened interval. The monitoring points were installed at distances of 12, 25, 40, and 55-feet from the extraction well.

The SVE well construction logs are presented in Appendix E.

4.3 *EQUIPMENT AND PROCEDURES*

A trailer-mounted 1.5-horsepower SVE blower was used to conduct the test, and connected to the extraction well. The outlet of the blower was connected to two 200-pound activated carbon vessels connected in series for vapor treatment. The trailer also contained a moisture separator, in-line air filter, and dilution air valve. This blower could provide from 30-cubic feet per minute (cfm) at 55-inches water column vacuum, to 100-cfm at 20-inches water column vacuum.

The instrumentation used during the test included:

- PID for measuring total VOCs;
- explosimeter for measuring the levels of explosive vapors as well as percent oxygen;
- tedlar bag apparatus for obtaining air samples;
- velocity meter for measuring air flow in pipes; and
- vacuum pressure gauges of various ranges with 1-inch and 4-inch diameter caps with air petcocks for measuring applied vacuum and response.

On the first day of testing, vapors were extracted from SB-42 while also pulling ambient air with the dilution valve fully open. The dilution air valve was slowly closed, which increased air flow from the extraction well. After operating for 95-minutes with the dilution valve partially (50%) open, the vapor concentration in the blower discharge exceeded the lower explosive limit (LEL), and the unit was shut down for safety concerns. The unit was then restarted with a significant volume of dilution air added to vapors extracted from SB-42. The dilution air valve was slowly closed while the % LEL of the extracted vapors decreased. It was anticipated that after removing the initial pore volume of concentrated vapors, that the % LEL levels would decrease. After operating for another 4-hours, the system was shut down for the night.

On the second day of pilot testing, the system was operated for 3-hours before the dilution valve was fully closed and the blower was extracting vapors entirely from SB-42. The system was operated in this manner for another 4.5-hours. At the conclusion of testing, the trailer was demobilized, and all wells were cut flush with grade and capped. Wells were abandoned the following week by ERMs drilling subcontractor by pressure grouting the screen and riser in place and restoring the surface to pre drilling conditions.

4.4 OPERATING DATA

During the pilot test, regular measurements of the following parameters were collected:

- applied vacuum at the SVE well;
- extracted air flow;
- operating hours;
- VOC concentration of the extracted soil vapor, and at the outlet of each carbon vessel;
- LEL of extracted vapors;
- oxygen level in extracted vapors;
- vacuum at the monitoring points (shallow and deep zones); and
- blower discharge temperature.

These data are presented in Table 4-1.

The vacuum applied at the SVE well head varied from 27-inches water column (w.c.) when the dilution air valve was fully open to 61-inches w.c. when the dilution air valve was closed. At 61-inches w.c. applied vacuum, the air flow from the extraction well was approximately 6 to 8-standard cubic feet per minute (scfm).

The monitoring points were constructed to measure the vacuum response at a shallow (4 to 6-feet bgs) and a deep (10 to 12-feet bgs) zone. On the first day of testing, vacuum was not observed at the shallow or deep monitoring points. The closest monitoring point is 12-feet from the extraction well. The lack of vacuum observed even at this close point, indicates the possibility of air short-circuiting from the surface (the pilot test area is not paved). The presence of tight soils in some of the borings (e.g., silty clays) also may contribute to the reduced vacuum response.

There was a significant rain event overnight prior to the second day of testing. Heavy intermittent rain also continued throughout the second day. This may have saturated the soil at the surface and served as a surface seal. Immediately after startup, the vacuum measurements at the shallow 12-foot monitoring point (SB-41S) were 0.44 to 0.66-inches w.c. At the deep 12-foot monitoring point (SB-41D), one vacuum measurement of 0.40-inches w.c. was observed before declining to 0.00-inches w.c. At the shallow 25-foot monitoring point (SB-43S), vacuum measurements ranged from 0.015-inches w.c. to 0.20-inches w.c. A vacuum was not detected at the further monitoring points. These data indicate that an SVE system may be capable of achieving an effective radius of influence of 25-feet in the shallow zone. However, as testing progressed, a vacuum was only present at the 12-foot monitoring point, at 0.015 to 0.075-inches w.c. This may be indicative of air short-circuiting again from the surface as the pore spaces dried.

4.5 VOC EMISSIONS

Regular field VOC measurements were collected at the blower exhaust, and the outlet of each carbon vessel. These data are presented in Table 4-1. In addition, a sample of the vapors at the carbon inlet and outlet was collected over a 1-hour period near the end of the pilot test, and analyzed via EPA Method TO-15. The analytical results are provided in Table 4-2. These data show non-detectable levels of VOCs in the carbon effluent, indicating that the carbon was effective in controlling vapor emissions during the pilot test. At the carbon influent, several VOCs were detected including; toluene (120 ppmv), vinyl chloride (38 ppmv), xylenes (17.5 ppmv), chloroethane (8.7 ppmv), and cis-1,2-dichloroethene (7.0 ppmv). The total VOC concentration was 214 ppmv.

An estimate of mass removal rates and carbon use rates was derived using the VOC data. As shown in Table 4-3, at the maximum flow of extracted vapors, the estimated mass removal rate was 0.6-pounds per day (lb/day). At this loading, the estimated carbon life before breakthrough is 21-days. Since the pilot test operated for 13.2-hours, this is consistent with the lack of detectable VOCs in the carbon effluent. At an assumed full-scale system air flow of 100-cfm, the carbon use would be approximately 118-lb/day. Because vinyl chloride is not efficiently removed by activated carbon, more than half of the daily carbon would be used to remove vinyl chloride. Assuming 2000-lb carbon vessels, this translates into breakthrough, and subsequent carbon replacement, occurring every 34-days.

The VOC data were also used to identify VOCs present in the effluent from the carbon treatment unit whose concentrations would exceed the NYSDEC risk screening model. Table 4-4 presents the NYSDEC Division of Air Resources (DAR) 1 Point Source screening method to determine the flow rate at which emission controls will be needed using the VOC concentrations observed during the pilot test. At flow rates greater than 16.7-scfm, emission controls would be required based on the presence of vinyl chloride. As indicated previously, vinyl chloride is removed inefficiently by carbon. Therefore, if a full-scale SVE system was implemented, alternative emission controls would need to be evaluated.

4.6 CONCLUSIONS AND RECOMMENDATIONS

As indicated previously, the goals of the pilot testing were as follows:

- determine the SVE vacuum and air flow requirements;
- characterize the SVE off-gas; and
- determine SVE radius of influence (ROI).

The pilot testing indicated that an air flow of 6 to 8-scfm may be generated at an applied vacuum of 62-inches w.c. This was the maximum air flow that could be generated with the pilot test equipment. Under these conditions, a vacuum was not observed at any of the deep monitoring points. A low vacuum was consistently detected at the shallow zone of the 12-foot monitoring point (SB-41S). However, this vacuum gradually decreased during the course of the testing, even as the air flow from the extraction well was increased. This reduced vacuum response may be due to the lack of a surface seal at the site, and subsequent short-circuiting of air from the surface. At a distance of 25-feet from the vapor extraction well, vacuums were observed for a short period of time during a rain event. It is possible that the saturated ground may have created a temporary surface seal which improved vacuum response initially, but decreased as the SVE system operations removed water from the pore spaces.

Assuming an optimistic 12-foot radius of influence in the shallow zone for the duration of the pilot testing (13.2-hours) and an extracted vapor flow of 8-scfm, the SVE system extracted approximately eight pore volumes during testing.

Even with the limited area of influence, the emissions monitoring showed highly concentrated vapors were recovered. During the initial phase of testing, vapor concentrations exceeded the LEL. At the end of testing, a sample of extracted vapor indicated a total VOC concentration of 214 ppmv. These vapors were effectively removed by the activated carbon. However, vinyl chloride was present in the extracted soil vapor at a concentration of 38 ppmv. To treat this amount of vinyl chloride would require significant amounts of activated carbon. Therefore, if a full-scale system is considered for this area, other vapor emission controls, such as catalytic oxidation, should be evaluated. The high LEL readings indicate the potential for reduced fuel usage for a catalytic oxidizer.

Although a narrow radius of influence was observed during the pilot test, the presence of concentrated VOCs in the extracted soil vapor may still render a full-scale SVE system practical. However, for this to occur, additional pilot testing should be conducted with a surface seal in place to determine if the lack of a surface seal, or the tight soils, resulted in the reduced radius of influence. Also, a larger SVE blower would be beneficial in creating a greater applied vacuum and flow.

5.0 CONCLUSIONS

5.1 SUMMARY OF IMPACTS AND POTENTIAL SOURCES OF CONTAMINATION

The Former Raeco Products Site, located in Rochester, New York, has a history of paint, solvent, bulk chemical and petroleum storage and distribution dating back to as early as 1911. The Site currently includes four buildings with the remaining major portion of the Site consisting of poorly maintained asphalt/gravel /dirt parking areas and drives. Some foliage and unmaintained grassy areas exist on the eastern portion of the Site along the steep banks of the river gorge.

The RI focused on comprehensively characterizing environmental conditions at the Site and to the extent practical, identification of the sources and extent of previously identified VOC, SVOC and metal impacted soil and groundwater at the Site. As part of the RI four media (air, soil, groundwater and surface water) were investigated.

Results of the sub-slab and indoor air monitoring samples collected at Building A, indicate that two compounds; PCE and TCE, were detected at vapor intrusion concentrations that exceed the NYSDOH guidance (NYSDOH, 2006).

The majority of the soil samples collected at the Site contain VOCs and SVOCs at concentrations that exceed the SCOs for unrestricted use from 6 NYCRR Subpart 375-6. These samples include soils collected from; SB-01, SB-03 through SB-10, SB-13 through SB-21, SB-23, SB-25 through SB-36, SB-38, SB-39, SB-40 and MW-5D. Significant TIC concentrations (secondary indicators of contamination) were also detected in these samples and two samples collected beneath Building B (SS-BLDGB-01 and SS-BLDGB-02). The widespread distribution of VOCs and SVOCs in Site soils indicate that previous Site activities have contributed significantly to the contamination detected in soil at the Site.

Detections of metals in Site soils was widespread and in numerous occasions exceeded the generic SCOS for inorganics provided in 6 NYCRR Subpart 375-6 for unrestricted use. Metals are commonly found as naturally occurring elements in native soils in this region (Shacklette and Boerngen, 1984) so it is difficult to determine if the concentrations detected at the Site are directly related to historical Site operations.

Based on the distribution of compounds detected in upgradient and downgradient Site monitoring wells it appears that previous Site activities have also contributed VOC and SVOC contaminants to groundwater at the Site. VOCs exceeding the Class GA groundwater standards and guidance values were detected at MW-1D, MW-1DD, MW-3D and MW-4D. SVOCs exceeding the Class GA standards and guidance values were detected at MW-1D, MW-2D and MW-6D. Total SVOC TIC concentrations, which are also secondary indicators of contamination in groundwater, were detected at the majority of the Site wells including MW-1D, MW-1DD, MW-2D, MW-2DD, MW-3D, MW-3DD and MW-4D. Although metals were detected at the Site in several of the Site monitoring wells there presence is likely due to naturally occurring elements in Site soils and unrelated to prior activities at the Site.

Three surface water samples were analyzed for the same parameters as the groundwater collected from the Site monitoring wells. Two metals; aluminum and iron, were detected in all three samples (SW-01, SW-02 and SW-03) at concentrations that exceeded the standards and guidance values for Class B surface water (fresh water) presented in TOGS 1.1.1. These metals are typically not an environmental concern and similar concentrations were detected in the upgradient, downgradient and surface water sample collected adjacent to the Site which suggests that the Site is not contributing to these metals in the river.

5.2 CONTAMINANT MIGRATION PATHWAYS AND POTENTIAL RECEPTORS

A qualitative Human Health Exposure Assessment for the Site was completed. The purpose of the Exposure Assessment was to identify potential exposure pathways for contaminants identified at the Site (i.e., VOCs, SVOCs and metals) and determine how any unacceptable exposure pathways may be eliminated/mitigated.

Sample results from indoor air samples collected at the Site in Building A indicate that VOCs detected in Site soil and/or groundwater are affecting indoor air quality. When the results of the indoor and sub-slab air monitoring are compared to the NYSDOH Soil Vapor Indoor Air Matrix 1 and Matrix 2, the NYSDOH advises that mitigation is needed to minimize current or potential exposures associated with intrusion of TCE into Building A (NYSDOH, 2006). NYSDEC has made numerous attempts to contact the current property owner regarding mitigation of this situation; to date these attempts have been unsuccessful.

SVOCs, VOCs and metals were detected in Site soils at concentrations, which in some cases significantly exceed the human health based SCOs for unrestricted use presented in 6 NYCRR Subpart 375-6. The exposure pathways identified for Site soils (i.e., direct contact, volatilization and leaching of compounds present in soil to other media, incidental ingestion and/or dermal absorption) could be eliminated/mitigated in the interim by capping impacted areas with an impermeable barrier (e.g., asphalt), imposing deed restrictions, and or improved Site control (e.g., improving existing perimeter fences) before remedial measures are implemented at the Site.

Groundwater is not currently used for drinking water or for any purposes at the Site or in the Site area. Groundwater is in contact with surface water adjacent to the Site (i.e., The Genesee River) however, samples collected indicate that contaminants present in groundwater are not affecting the surface water quality of the Genesee River.

A FWRIA was also conducted at the Site. Based upon the fish and wildlife resources and exposure pathways identified in this assessment, and the results of the ground water screening analysis, it does not appear that the Site has caused adverse impacts to fish and wildlife resources.

5.3 DATA GAPS AND AREAS FOR FURTHER INVESTIGATION

The widespread distribution of VOCs and SVOCs in Site soils and groundwater indicate that previous Site activities have contributed significantly to the affected soil and groundwater found at the Site. As noted above, secondary indicators of contamination, (i.e., TICs) often represent a substantial percentage of the contamination present in individual soil samples. As discussed in Section 3.1.2, the VOCs and SVOC TICs appear to be compounds of petroleum products. Because Forensic analysis of the LNAPL and TICs was not carried out, it is not possible to determine if the source may be from past operations at Raeco Products, or potentially sources present on-Site subsequent to the cessation of operations at the Site by Raeco Products.

Detections of metals in Site soils was widespread and in numerous occasions exceeded the generic SCOS for inorganics provided in 6 NYCRR Subpart 375-6 for unrestricted use. Background sampling from off-Site locations free from the influences of the Site and any other source of contaminants is preferable to determine local inorganic background concentrations for Site soils (NYSDEC, 1994) however, this may not be feasible due to the urban surrounding and the presence of numerous properties in the surrounding area that have historical releases. Further evaluation to determine the feasibility of collecting valid background samples to establish Site specific background concentrations for inorganics (i.e., Site background) is necessary.

Although a narrow radius of influence was observed during the SVE pilot test conducted at the Site, the presence of concentrated VOCs in the extracted soil vapor may still render a full-scale SVE system practical. However, for this to occur, additional pilot testing should be conducted with a surface seal in place to determine if the lack of a surface seal, or the tight soils, resulted in the reduced radius of influence. Also, a larger SVE blower would be beneficial in creating a greater applied vacuum and flow.

6.0 REFERENCES

ERM, 2005. Remedial Investigation / Feasibility Study Work Plan, Former Raeco Products Facility. February 2005.

ERM, 2005. Quality Assurance Project Plan, Former Raeco Products Facility. February 2005.

ERM, 2006. Scope of Work for Supplemental Remedial Investigation (RI), Former Raeco Products Site. Project Memorandum. 28 July 2006.

NOAA, 1999. Screening Quick Reference Tables (SQuiRT). 1999 Available on-line at http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html.

New York State Registry of Inactive Hazardous Waste Disposal Sites.

NYSDEC, 1994. Determination of Soil Clean Up Objectives and Clean Up Levels. Technical and Administrative Memorandum #4046. January 1994 (latest amendment 20 December 2000).

NYSDEC, 1994. Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites. 1994.

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. Division of Water Technical and Operational Guidance Series 1.1.1. June 1998 (latest addendum June 2004).

NYSDEC, 1999. Water Quality Regulations: Surface Water and Groundwater Classifications and Standards. New York State Codes, Rules and Regulations; Title 6, Chapter X Parts 700-706, Amendments through August 4, 1999.

NYSDEC, 2001. Preliminary Site Investigation Report, Former Raeco Products Site #828107, City of Rochester, Monroe County, New York. April 2001.

NYSDEC, 2002. Draft DER-10 Technical Guidance for Site Investigation and Remediation. Section 3.10.1. December 2002.

NYSDEC, 2002. Ecological Communities of New York State. New York Natural Heritage Program. Second Edition. January 2002.

NYSDEC, 2006. Remedial Program Soil Cleanup Objectives (SCOs). New York State Codes, Rules and Regulations; Title 6, Chapter IV, Subpart 375-6. 14 December 2006.

NYSDOH, 2005. Soil Vapor Intrusion Guidance for Public Comment – Draft. February 2005.

NYSDOH, 2006. Guidance for Evaluating Soil Vapor Intrusion in the State of New York. October 2006.

ORNL, 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. ES/ER/TM-96/R2.

Shacklette, H.T. and Boerngen, J.G., 1984. Element concentrations in soils and other surficial materials of the conterminous United States. Unites States Geological Survey Professional Paper 1270, Government Printing Office, Washington D.C., 105pp.

Stoner, Scott. 20 September 2005. E-mail correspondence. Chief of the NYSDEC Standards and Classification Unit. NYSDEC.

USEPA, 2001. Water Quality Guidance for the Great Lakes System. 40 CFR Protection of Environment. Subchapter D – Water Programs. Part 132. October 2001. Available on-line at http://www.dec.state.ny.us/website/dow/togs/tog_cont.htm**.**

USEPA, 2002. Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers. USEPA Ground Water Forum Issue Paper. Douglas Yeskis and Bernard Zavala. May 2002