

FINAL REMEDIAL INVESTIGATION (RI) REPORT

**FORMER EDGEWOOD WAREHOUSE SITE
(NYSDEC No. E907032)
320 SOUTH ROBERTS ROAD
CITY OF DUNKIRK, CHAUTAUQUA COUNTY, NEW YORK**

Prepared for:

Chautauqua County Department of Public Facilities
454 North Work Street
Falconer, New York 14733

Prepared by:

TVGA CONSULTANTS

One Thousand Maple Road
Elma, NY 14059-0264

(716) 655-8842
(fax) (716) 655-0937

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1.0 INTRODUCTION

1.1 Purpose

The Chautauqua County Department of Public Facilities (County) entered into a State Assistance Contract with the New York State Department of Environmental Conservation (NYSDEC) to complete a Remedial Investigation (RI) program at the Former Edgewood Site located at located at 320 South Roberts Road, Dunkirk, New York (project site). The location and layout of the project site is shown on Figure 1. The RI was completed pursuant to the Environmental Restoration, or Brownfield, Program component of Title 5 of the Clean Water/Clean Air Bond Act of 1996, which is administered by the NYSDEC. The purpose of the RI program described herein was to characterize the nature and extent of contamination occurring on, and emanating from, the project site. Following the completion of the Final RI Report, an Alternatives Analysis (AA) Report will be developed to evaluate remedial alternatives, as appropriate.

TVGA Consultants (TVGA) has prepared this report on behalf of the County to provide a detailed description of the RI program implemented at the Former Edgewood site. In addition to summarizing and documenting the methods used to investigate the project site, this RI Report describes the physical characteristics of the site; defines the nature, magnitude and extent of contamination encountered; and assesses the contamination with respect to fate, transport and exposure.

1.2 Site Background

1.2.1 Site Description

The project site consists of three parcels (SBL 79.16-2-2, 79.16-2-77 and 79.12-4-32) that equal approximately 7.0 acres located in the City of Dunkirk, as shown on Figure 2. Figure 3 shows the layout of the project site, including the on-site structures. The project site is occupied by two structures that include a large warehouse building occupying approximately 167,400 square feet and a building that is believed to have been a scale house that occupies approximately 830 square feet. The remaining portions of the property generally consist of aged asphalt, concrete and gravel parking areas.

1.2.2 Site History

The project site, formerly part of a larger complex, was owned and operated by the American Locomotive Company (ALCO), which first developed the site in 1910. ALCO manufactured locomotives at this complex until 1930, at which time operations were converted to manufacturing process equipment, primarily consisting of heat exchangers, feed water heaters, tunnel shields, pressure vessels and steel pipe, fittings and conduits. During and after World War II, manufacturing operations at the plant were expanded to include military equipment. This equipment included gun carriages, fragmentation bombs, thrust shafts and king posts for navel vessels, missile housings, nozzles, boosters and other components. Following the war, ALCO was contracted by the Atomic

Energy Commission to manufacture nuclear reactor components and packaged reactor units. Work on nuclear reactors at the Dunkirk plant included the development, production, and testing of a skid-mounted, portable nuclear reactor, built to power a remote Army base on the Greenland icecap. In addition to nuclear reactors, ALCO manufactured components for the crawler for the Apollo/Saturn V space rocket. ALCO closed the Dunkirk plant in 1963 due to a combination of labor, union and management problems. From 1963 until 1966, the project site was owned by Progress Park, Inc., whose mission was to facilitate the re-occupation of the shuttered industrial complex containing the project site.

Following Progress Park Inc., the site was occupied by the Plymouth Tube Company, which began operations in the existing main building in 1967 but went out of business in 1982. The Plymouth Tube Company manufactured stainless steel feed water heater tubes for heat exchangers. During this time period, Cenedella Wood Products also occupied a 4-story building that was formerly located on the project site that was demolished in 1988. Cenedella Wood Products manufactured wooden pallets, crates and boxes that were utilized by the Plymouth Tube Company to ship their final products.

The project site was owned by Edgewood Investments, Inc., which operated a warehouse within the existing main building from 1982 until recent years. The warehouse was used for the storage of packaging supplies, operational supplies and equipment from the former Dunkirk Ice Cream and current Fieldbrook Farms Dairy facility. Since approximately 1997, the warehouse also accommodated a few small businesses: a limousine company utilized the southern annex portion of the building; a spray-on truck bed liner company utilized a room midway along the southern wall of the warehouse; and a home improvement company operated out of the eastern end of the warehouse. The buildings are currently vacant and owned by Chautauqua County.

In the past, the project site also contained another building that housed the facility power plant, a repair shop, a development area for experimental equipment, and the plant hospital. That building was demolished in 1988. A second building, presently vacant, is located near the northeastern corner of the property, and appears to be a former scale house associated with the rail access to the industrial complex.

1.2.3 Previous Environmental Investigations

1.2.3.1 Phase I ESA

In 1997, a Phase I Environmental Site Assessment (ESA) Report was prepared to identify potential environmental conditions in connection with the property. The following conclusions were developed during the Phase I ESA:

- An asbestos survey identified the presence of asbestos containing materials (ACMs) in the warehouse building which included pipe insulation, exterior siding, piping, and boiler insulation. Interviews with

local residents also indicated that asbestos waste from within the former power plant building was potentially buried onsite during the building demolition activities.

- Information obtained from interviews indicated that a 350,000-gallon underground brick cistern originally utilized to store water for fire protection at the ALCO complex is located on the southern portion of the site. The cistern was reportedly filled in with gravel.
- A site plan contained within a report summarizing a 1973 appraisal of the Plymouth Tube Company facility indicated the presence of an x-ray building to the east of the warehouse building. This building may have contained radiological sources.
- Local record sources indicate that a petroleum spill occurred onsite in connection with the demolition of the former power plant and Cenedella Wood Products building in 1988. According to those records, the suspected source of that spill, which entered the storm sewer extending beneath South Roberts Road via a floor drain in the basement, was one or more tanks damaged during demolition activities. The spill was not suspected to have impacted soil or groundwater on the site.
- Three uncovered drums containing a solid material resembling ash were noted on the eastern portion of the property in 1997.
- Several small piles of debris were noted on the eastern side of the project site in the vicinity of the former scale house. The piles appeared to consist of demolition debris; however, one pile consisted of potential ACM debris.
- Several areas of surface staining were noted on the site in the area between the former warehouse and the scale house. Vegetation generally present in this vicinity was not present within the limits of the spill areas, the largest of which measured approximately ten feet by ten feet.
- Staining of the concrete surface along the southern exterior of the warehouse building was noted during the Phase I ESA. Minor staining of the floor surface was also observed throughout the inside of the warehouse. Historical engineering drawings indicated that the affected areas may have been associated with process areas in the building's manufacturing past.
- A number of what appeared to be former pits / vaults filled with concrete were noted along the eastern and southern side of the former warehouse exterior. The pits may have been used in the pickling operations, lime storage area, and neutralizing room of the former ALCO facility.
- Numerous pipes were observed to be protruding through the northern exterior wall of the former warehouse. These structures may represent potential discharge points for storm water, interior drains and / or process water.

-
- Two capacitor assemblies labeled as containing polychlorinated biphenyls (PCBs), along with other potential PCB-containing transformers and equipment, were stored within the warehouse building. Some of the fluorescent and high intensity discharge (HID) light fixtures within the building are also likely to be equipped with PCB-containing ballasts.
 - A small brick incinerator associated with the operation of the former ALCO plant was observed along the north side of the warehouse building. The types of material burned in the incinerator and the location of the ash disposal is unknown.
 - Numerous storm water drains were observed along the perimeter of the warehouse building, while one storm water catch basin was noted in the parking lot on the southeastern portion of the property. Significant quantities of sediment were noted in all of the drains.
 - Several floor drains and one covered pit or vault was observed inside the warehouse building and three other covered pits were noted on the exterior northern side of the building. Solid steel plates covered these pits, preventing their inspection.

1.2.3.2 Phase II ESA

In May 1999, a Phase II ESA was performed on the project to identify PCB-containing electrical equipment and investigate potential sediment, soil and groundwater contamination. The scope of the field investigation included the following major tasks:

- Examination of installed and stored electrical equipment within the onsite structures to define those items that contain or have the potential to contain PCBs.
- Collection and chemical analysis of surface soil samples. Surface soil sample locations are shown on Figure 4.
- Drilling of 16 test borings across the site and in areas of potential concern to collect, screen, and classify on-site soil/fill. The locations of the borings are shown on Figure 5.
- Installation of eight groundwater monitoring wells to determine groundwater flow direction and facilitate the collection of representative groundwater samples. The well locations are shown on Figure 6.
- Inspection of pits, drains, and sumps located on the project site to identify and sample potentially contaminated sediments, and to determine the function of these structures, if possible. The locations of the inspected structures are shown on Figure 7.
- Chemical analysis of sediment samples. Sampling locations are shown on Figure 4.

1.2.3.2.1 Electrical Equipment

The results of the survey of potential PCB-containing electrical equipment indicated that the eight on-site step-down transformers are air cooled units that do not contain PCBs. No potentially PCB-containing electrical equipment was observed to be in storage within the warehouse at the time of the inspection. However, approximately 72 fluorescent lighting fixtures and 37 HID lighting fixtures equipped with ballasts that likely contain PCBs were identified in the two buildings. Federal regulations require that PCB ballasts are properly transported to, and disposed of in, a Toxic Substance and Control Act (TSCA) approved disposal facility upon removal from service.

1.2.3.2.2 Drainage Features

The investigation of known and suspected vaults, sumps and drains resulted in the identification of several interior floor drains and a number of exterior trench drains and catch basins containing suspect sediment. Suspect sediment was also identified in a potential waste water separator and a drain/sump that are situated along the north side of the warehouse. Although the specific function of these structures was not determined, the former appeared to be designed to separate floating chemicals from an aqueous solution. Sediment samples were collected from both structures and from interior and exterior drains for chemical analysis.

Additionally, two other structures were identified to the east of the warehouse. The first was identified along the eastern perimeter of the warehouse, in the vicinity of the former pickling house, and consisted of a rectangular steel cover equipped with drain or ventilation slots installed in a circular pattern with a diameter of three feet. Because the cover could not be removed, the internal configuration, function or contents of this structure were not determined. The second structure was identified in the gravel area directly east of the warehouse, and was demarcated by a round, steel manhole cover. This structure was estimated to be approximately nine feet deep and was filled to the ground surface with water, which could not be evacuated sufficiently for inspection. Although originally suspected to be related to the on-site sewer system, the RI investigation determined that the structure was an electrical conduit through markings on the manhole cover.

1.2.3.2.3 Field Observations

Field observations and geologic samples collected during the performance of the drilling program at the project site indicated the presence of a relatively thin layer (0 to 5 feet) of industrial fill containing foundry sand, slag and other debris across the site. This material overlies fine-grained glacial deposits, which are underlain by shale bedrock at approximate depths ranging from 12 to 20 feet across the site.

With the exception of the industrial fill material, evidence of potential contamination was noted during the drilling of only two of the sixteen test borings. A moderately strong petroleum odor and a slight sheen on fill and soil samples obtained from one to six feet below the ground surface were noted during the drilling of PH II-MW-5, which is located in the center of the warehouse. However, total organic vapor (TOV) measurements were only slightly above background levels in this boring. Petroleum odors were also noted in soil samples obtained from 14 to 16 feet below the ground surface at PH II-MW-6, as were elevated TOV concentrations. This monitoring well was drilled down gradient from the former power plant building, wherein a basement petroleum spill occurred during the late 1980s.

1.2.3.2.4 Analytical Results

Tables 3 through 7 summarize the analytical results from the Phase II ESA and compare the results to the Residential Use, Commercial Use and Industrial Use Soil Cleanup Objectives (SCOs) presented in 6 NYCRR Part 375 or the applicable ambient water quality standards and guidance values from NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 (1998), as appropriate. A prefix of PH II (Phase II) has been added to the sample names for those samples collected during the Phase II investigation to distinguish these samples from those collected during the RI.

Analytical data resulting from this investigation confirmed the presence of soil, groundwater, and sediment contamination on the project site. Soil and sediment contaminants detected at concentrations that exceeded the Commercial Use and/or Industrial Use Soil Cleanup Objectives (SCOs) include aromatic and chlorinated hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), PCBs and metals. Additionally, groundwater contaminants included chlorinated hydrocarbons and metals. The probable sources of these compounds include new and used petroleum products, solvents, dielectric fluid, and pickling fluids that were used in connection with historic industrial operations on the property and adjoining industrial complex.

PAHs and metals were the primary contaminants detected in the surface soil samples collected from the project site. Many of the PAHs detected were also detected in the background soil samples at similar concentrations. Only the metal arsenic and a few PAHs were detected at concentrations exceeding Part 375 Commercial Use SCOs.

Although a few VOCs were detected in nearly all of the subsurface soil samples, all of the concentrations were below the Part 375 Commercial Use SCOs. A limited number of PAHs were detected at concentrations that exceeded the Part 375 Commercial Use SCOs in three of the ten subsurface soil samples. These results appear to reflect the presence of the slag and foundry sand contained

within the samples. Concentrations of metals that significantly exceeded the Part 375 Commercial Use SCOs were detected in the samples.

Chlorinated hydrocarbons were detected at concentrations that exceeded the groundwater standards in two monitoring wells (PH II-MW-2 and PH II-MW-4) installed along the downgradient site boundary. The compounds detected included trichloroethene (TCE) and its daughter products. These compounds were detected in the subsurface soil samples collected during the drilling of these wells, and have also been documented in groundwater on the former Roblin Steel and Alumax sites. Considering the relatively high solubility of these compounds in water and their high mobility in the subsurface, these contaminants may have originated from an on-site source, such as the industrial fill or past chemical discharges to the ground surface, or may have migrated on-site.

The concentrations of inorganic parameters in groundwater samples collected from the site were relatively uniform across the site, and were generally below the groundwater standards. Exceptions to this include iron and manganese, which were detected in all of the wells at concentrations above groundwater standards. Additionally, elevated concentrations of numerous metals were detected in the samples from two (PH II-MW-5 and PH II-MW-6) of the eight wells. However, elevated turbidity levels in these wells may have contributed to the high concentrations.

Lastly, the sediments in drainage features contained the greatest number and highest concentrations of contaminants found in any of the environmental media analyzed. Although concentrations of VOCs were detected in each of the sediment samples, none of the concentrations exceeded the Part 375 Commercial Use SCOs. One PCB Aroclor was detected at the concentration of 40,000 parts per billion (ppb) in the trench drain located along the eastern perimeter of the warehouse (PH II-SED-4), which exceeds the Industrial Use SCOs. The high PCB concentration is likely related to leakage from electrical equipment formerly located near the southwestern corner of the building. Additionally, PCBs were detected in four sediment locations at concentrations exceeding the Commercial Use SCOs. Elevated concentrations of several PAHs and metals were also noted, and the concentrations exceeded the Part 375 Commercial Use and/or Industrial SCOs many of the samples.

1.2.3.2.5 Phase II ESA Discussion

The data collected during the course of the Phase II ESA indicated the presence of contamination in soil, groundwater, and sediments occurring on the project site. The types of contaminants detected are reflective of the past usage of the project site and adjacent properties for heavy industrial purposes for nearly 100 years. With the exception of the contamination detected in the sediments in the

drainage features, the levels of contamination identified in soil and groundwater samples appear to be consistent with levels typically found in industrialized areas.

Potential mechanisms for the release of these contaminants to environmental media include chemical spills or leaks, discharges of process waste waters (e.g., rinsates containing pickling fluid residues), and storm water that was in contact with raw or waste materials. However, no existing or former confirmed point sources of contamination (e.g., leaking storage tanks, drums, or transformers; process discharges; etc.) were identified during the course of this investigation. Other potential sources of these contaminants include air emissions containing PAHs from the power plant formerly located on the project site and the industrial fill deposited on the site. Because the types of contaminants detected on the property site are very similar to those that have been documented on the adjacent former Roblin Steel and Alumax sites, which are situated directly upgradient from the project site, contaminant migration from adjacent properties onto the project site is another potential source of the on-site soil and groundwater contamination.

1.2.4 Areas of Potential Environmental Concern

Based upon previous documentation, including the results of the Phase I and II ESAs, the following environmental concerns were identified in connection with the project site:

- Asbestos containing materials (ACMs) were present in the warehouse building and asbestos waste from previous building renovation and demolition activities may be buried on the site. The condition, location and quantity of ACM need to be verified.
- Contaminated soil/fill and groundwater has been documented on the property.
- Electrical lighting equipment containing polychlorinated biphenyls (PCBs) is likely to be present within the on-site buildings.
- As radiological sources were historically utilized on-site, there is the potential for the presence of radioactive materials.
- Contaminated sediment and/or sludge were documented in on-site pits, drains, and vaults.
- The project site is hydrogeologically downgradient from the adjacent Roblin Steel and Alumax sites, where historic soil and groundwater contamination has been documented.

2.0 METHODS OF INVESTIGATION

The scope of the Remedial Investigation program was generally consistent with that outlined in the NYSDEC-approved April 2008 Remedial Investigation/Alternatives Analysis Work Plan (Work Plan). Modifications made to the Work Plan during the completion of the RI were approved by NYSDEC and the County and are discussed within this report.

The purpose of the Remedial Investigation program was to determine the nature and extent of contamination associated with the areas of environmental concern discussed in Section 1.2.4. To accomplish these goals, the following tasks were completed during the field investigation:

- Completion of a boundary and topographic survey of the project site to establish the boundaries of the project site and to locate on-site structures with respect to site boundaries. The surveying work also included the surface soil sample locations, test pit locations, soil probe locations, monitoring well locations and the sediment sample locations.
- Completion of a geophysical survey to investigate density anomalies (e.g., potential buried tanks, cisterns, tunnels, underground utilities) present in suspect areas identified during the historical review and site reconnaissance.
- Completion of a radiological survey over the interior and exterior ground surfaces and during the subsurface investigation to locate any areas of elevated radiation.
- Completion of a container inventory that included the marking of each container with a reference number and determining contents, if sufficient information was available.
- Collection and analysis of on-site surface soil/fill samples to classify and characterize surface soil/fill.
- Completion of test pits, test borings and soil probes to enable the classification, screening, sampling and chemical characterization of subsurface soil/fill.
- Installation, development and sampling of groundwater monitoring wells to enable the determination of groundwater flow direction and gradient, as well as the collection and chemical analysis of groundwater samples.
- Evaluation of sumps, vaults and pits that were not investigated during previous assessments to determine their probable functions and characterization of the contents of the drainage features.
- Evaluation of the resulting data and preparation of a report to:
 - Summarize and document the activities performed during the RI
 - Describe the physical characteristics of the project site
 - Describe the nature, magnitude and extent of contamination
 - Compare the analytical data to applicable regulatory levels
 - Assess the implications of the conditions encountered
 - Provide recommendations relative to future work requirements and remedial action objectives.

The following section describes the field tasks in detail.

2.1 Field Investigation

The following subsections describe the scope of field activities implemented during the remedial investigation program. This scope reflects minor deviations and/or additions from the initial scope, as some minor modifications were necessary to account for information obtained during the field investigation. The methods employed during the execution of the field tasks were detailed in the Field Sampling Plan (FSP), while the procedures implemented to ensure the quality of the resulting field and laboratory data were in accordance with the Quality Assurance/Quality Control (QA/QC) Plan. Table 1 summarizes the number of samples collected during both the RI and Phase II ESA investigative tasks, including QA/QC samples, and target analytes. Figures 4 through 7 show the sampling locations.

2.1.1 Site Survey

Abate Engineering Associates, P.C. completed a boundary survey of the project site. TVGA performed a topographic survey of the project site and located the surface soil sample, test pit, soil probe, monitoring well and the sediment sample locations. Elevations of the monitoring wells are based on the NAVD 88 datum of 608.82 obtained from the north bolt of a fire hydrant located at the northwest corner of Talcott Street and South Roberts Road. A copy of the boundary survey and metes and bounds description is included as Appendix A and a copy of the topographic survey is included as Appendix B. Appendix C includes a copy of the documentation of the County's temporary incidents of ownership for the property.

2.1.2 Geophysical Survey

A frequency domain geophysical survey was performed on June 4, 2008 across the project site to determine if underground storage tanks (USTs) and/or other metallic anomalies existed in the subsurface. A subcontractor to TVGA Consultants, Geomatrix Consultants, Inc. (Geomatrix), employed a Geonic EM31 Terrain Conductivity meter to measure and record the ground conductivity along the survey lines. The survey was conducted utilizing a spacing of ten feet over all exterior portions of the property that were not obstructed by the buildings or dense vegetation to locate major anomalies. Based on the results of the EM31 survey as well as historical information, five areas measuring 50 feet by 100 feet were selected for a more focused survey. Geomatrix completed a time-domain terrain conductivity geophysical survey on June 12, 2008 across the project site to further characterize metallic anomalies in the subsurface. A GEONICS EM61 High Sensitivity Metal Detector (EM61) and solid-state data logger were utilized for the focused geophysical survey. The survey was conducted utilizing a spacing of three feet over the selected areas. The Geomatrix letter report, presented in Appendix D, includes a map that illustrates the location of identified anomalies.

2.1.3 Radiological Survey

A radiological survey of the interior and exterior ground surfaces was completed for the project site using a Ludlum 3 Radiation Meter which detects radiation in counts per minute (CPM). CPM is a measure of radioactivity and is the number of atoms in a given quantity of radioactive material that is detected to have decayed in one minute. The fluctuations detected by the meter were within background ranges. Radiation measurements were generally recorded in 20 foot increments in the exterior and interior portions of the site. Additionally, a Victoreen ASM 990 radiological meter was utilized during the test pit portion of the investigation. CPM measurements were recorded on the field logs.

2.1.4 Container Inventory

A container inventory was completed in July 2008 to determine the number of containers on-site; the contents of the containers, if readily available; and approximate volume of each container. Each container was labeled with a reference number and the general location of the container was noted on a site map. The majority of the containers were either empty or contained expired food grade materials. A few of the containers contained petroleum products (i.e., used oil, hydraulic fluid, or transmission fluid). The container inventory is included in Appendix E.

2.1.5 Surface Soil/Fill Sampling

Fourteen surface soil samples (SS-7 through SS-20) were collected on June 5, 2008 to further characterize surface soil/fill contaminants identified during the Phase II investigation as well as to evaluate areas that were not previously characterized. Each of these samples was analyzed for TCL SVOCs, PCBs and TAL metals. Table 1 identifies the analysis performed on each of the surface soil/fill samples, and Figure 4 shows the locations of the samples.

The surface soil/fill samples were collected from zero to two inches below the vegetative layer in accordance with Section 13.2 of the FSP. If a vegetative layer was not present (i.e., gravel/dirt parking areas) samples were collected two to four inches below grade, immediately below the gravel layer at the surface.

2.1.6 Test Pit Excavations

Twenty-two test pits were excavated on June 30 through July 2, 2008 in accordance with the FSP. The test pit locations are shown on Figure 5. The purposes of the test pits were to characterize the near-surface geology across the project site; investigate the potential presence of underground tunnels; investigate the area of the former ALCO power plant building; investigate magnetic anomalies identified during the geophysical survey; investigate areas potentially containing fuel tanks or cisterns; and identify and

delineate areas of subsurface contamination via the field screening and chemical analysis of soil/fill samples.

Chautauqua County Department of Public Works provided an excavator and operator for the excavation of the test pits, while TVGA personnel completed field oversight, sample collection, and screening. Excavation occurred in one- to two-foot increments until a subsurface feature such as piping, sheet metal or a concrete floor was encountered, or until native soils were encountered. Excavated material was staged directly adjacent to the test pit. Visual characterization was performed for all test pits and the soil was screened for total organic vapors (TOVs) using a photoionization detector (PID). Additionally, soils from the test pits were screened for radiation. Measurements were recorded on the field sheets. Following characterization and sample collection, the excavated soil/fill was returned to the test pit from which it originated. Logs that detail the observations made during the test pit activities are included in Appendix F.

A total of sixteen soil/fill samples were collected from thirteen test pits for chemical analysis. The samples were collected from excavated soil/fill with building demolition debris, fill material, metal slag; areas with elevated TOV measurements; and/or soil/fill that exhibited visual and olfactory evidence of contamination. The test pit samples were analyzed for TCL VOCs, SVOCs and PCBs and TAL metals. Additionally, eight samples were analyzed for bulk asbestos using polarized light microscopy (PLM).

2.1.7 Soil Probes

A total of eighteen soil probes were advanced on July 29 and 30, 2008 to characterize the near-surface geology under the flooring in the warehouse and to define the extent of subsurface contamination, if any. Additionally, two soil probes were advanced in the parking lot along South Roberts Road to investigate potential vapor pathways, if any, from the warehouse to residences across South Roberts Road. The soil probes were advanced at the locations shown on Figure 5 using direct-push soil sampling equipment to collect continuous samples. The soil probe activities were conducted in accordance with Section 8.1 of the FSP. A subcontractor to TVGA, Nature's Way Environmental Consultants Inc., provided and operated the direct-push drilling rig. The County provided a jackhammer and operators to remove the flooring to facilitate the drilling activities. The depths of the soil probes ranged from 1 to 12 feet below grade. In the warehouse, the flooring generally consisted asphalt with concrete underlying the asphalt. In some areas, wood block flooring was identified between the asphalt and concrete, and is further discussed in Section 2.1.11. Additionally, some areas contained a second concrete layer below the asphalt, concrete and a soil/fill layer.

Soil samples from each probe were screened with a PID upon retrieval by separating the soil column with a decontaminated stainless steel spoon and placing the PID probe tip near the void. This was recorded as a "direct" TOV reading. The direct TOV measurement and soil descriptions were recorded on Soil Probe Logs, which are

included in Appendix F. Following characterization and sample collection, the excess soil/fill was placed back into the probe hole from which it originated.

Twenty-one soil/fill samples were collected from the soil probes for chemical analysis, which included TCL VOCs, SVOCs, PCBs and/or TAL metals. The selected analyses, which are listed in Table 1, were based on visual and olfactory observations.

2.1.8 Test Borings and Monitoring Well Installation

A total of six test borings were advanced on the project site on September 3 through 5, 2008 to characterize the subsurface soil/fill and facilitate the installation of groundwater monitoring wells and the collection of groundwater samples. Samples were collected to further delineate VOC and metal groundwater contamination identified during the Phase II investigation as well as to characterize the groundwater quality at the project site. The test boring/monitoring well locations and resulting groundwater contours are shown on Figure 6.

The drilling, split-spoon sampling, and monitoring well installation procedures were completed in accordance with Section 9.0 of the FSP. A track-mounted rotary drilling rig equipped with hollow-stem augers was used to advance the test borings into the overburden materials. The depths of the monitoring wells ranged from 12.3 to 22.4 feet below grade and the wells were screened in the uppermost water-bearing zone within the overburden.

Retrieved soil samples from each test boring were screened for TOVs using a PID. The TOV values and soil descriptions are recorded on Test Boring Logs. These logs and Monitoring Well Completion Reports are included in Appendix F.

2.1.9 Groundwater Sampling

The six new groundwater monitoring wells and two wells from the Phase II ESA (MW-3 and MW-5) were developed and sampled in accordance with the procedures detailed in Section 13.4 of the FSP. The remaining six wells from the Phase II ESA were either severely damaged or could not be located. Prior to the initiation of groundwater sampling, each well was screened for TOVs using a PID and the TOV values were recorded on the development/sampling field logs. Additionally, groundwater levels were measured to determine the groundwater flow direction and gradient using an electronic oil/water interface indicator. Light non-aqueous phase liquids (LNAPL) and dense non-aqueous phase liquids (DNAPL) layers were not identified in any of the monitoring wells. Groundwater development consisted of the evacuation of a minimum of five well volumes from each of the wells using a peristaltic pump and dedicated polyethylene tubing or a bailer. After the completion of development, the monitoring wells were allowed to recharge. The samples were collected within 24 hours of completion of well development using dedicated polyethylene bailers in accordance with the SMP. Well Development and Sampling Logs are included in Appendix F.

The groundwater samples collected from each well were submitted for analysis of TCL VOCs and SVOCs and TAL metals. Additionally, groundwater samples collected from MW-5, MW-9, MW-10, and MW-11 were also submitted for analysis of PCBs. Due to the elevated turbidity of the sample collected from MW-12, a field filtered metals sample was also collected from this location.

2.1.10 Sediment Sampling

Six sediment samples were collected during the Phase II ESA and an additional nine sediment samples were collected during the RI in order to characterize the level of contamination in trenches, drains, sumps, pits, and the brick incinerator. Each of the samples was analyzed for TCL VOCs, SVOCs and PCBs and TAL metals and was collected in accordance with Section 13.3 of the FSP.

2.1.11 Interior Wood Flooring Investigation

A sampling and analysis program was implemented to characterize the wood block flooring located beneath the asphalt in two portions of the warehouse. The wood block flooring contained a tar coating, likely used as an adhesive, on the bottom portion of the flooring. Some of the tar has been absorbed into the wood blocks. One wood flooring sample (FLOOR) was collected from an area where the wood flooring and asphalt had buckled and was analyzed for TCL SVOCs and PCBs. To determine the extent of the wood flooring in the building, a backhoe was utilized to remove the asphalt overlying the flooring in small test pit areas.

Based on the results of these analyses, two additional wood floor samples (FLOOR-2 and FLOOR-3) were collected from other areas in the warehouse. Each of these samples was analyzed for toxicity characteristic leaching procedure (TCLP) VOCs, SVOCs, PCBs and metals for disposal profiling purposes. Due to the high TCLP lead results in the sample FLOOR-3, two additional samples (FLOOR-4 and FLOOR-5) were collected and analyzed for TCLP lead. An additional sample from the FLOOR-3 location (FLOOR-3RE) was also collected and analyzed for TCLP lead to confirm the initial result. Additional samples (FLOOR-6 through FLOOR-11) were collected and analyzed for TCLP lead to determine the approximate extent of the wood block flooring that was determined to contain hazardous levels of lead. The locations of the samples and the estimated extent of the wood flooring are illustrated in Figure 7.

2.1.12 Pre-Demolition Asbestos Survey

A pre-demolition survey for asbestos-containing material (ACM) was completed by Stohl Environmental, LLC (Stohl) to evaluate the potential presence of ACM on and within the two on-site structures. A New York State Department of Labor (NYSDOL) certified asbestos inspector completed an inspection of accessible portions of the on-site structures to visually identify, quantify and assess the condition of potential ACMs, including surface treatments, thermal system insulation, roofing and siding, and other

miscellaneous materials (e.g., floor and ceiling tiles, etc.). A total of 79 bulk samples of potential ACM were collected using standard protocols and submitted for asbestos analysis.

Stohl provided a July 2008 report, which is included as Appendix G, detailing the findings of the survey. The report includes a description of the samples collected and figures and tables indicating sample locations. The report also describes the location of and details the estimated volume of ACMs identified during the survey. The report includes all laboratory reports and Chain-of-Custody documents.

2.2 Sample Analysis/Validation

2.2.1 Laboratory Analysis

Mitkem Laboratories (Mitkem) performed the chemical analyses of all samples collected during the RI. Mitkem is accredited under the New York State Environmental Laboratory Approval Program (ELAP) Contract Laboratory Program (CLP). All samples collected during the RI were analyzed using the applicable methods prescribed by the NYSDEC Analytical Services Protocol (ASP), June 2000. Category B deliverables were generated for these samples. The target analytes for the project are identified and summarized in Table 1.

2.2.2 Quality Assurance/Quality Control Samples

In addition to field samples, Quality Assurance/Quality Control (QA/QC) samples were collected to evaluate the effectiveness of the QA/QC procedures implemented during the field and laboratory activities associated with the project. These QA/QC samples were collected and analyzed in accordance with the April 2008 QA/QC Plan developed for the project site. As reflected by Table 1, QA/QC samples included matrix spike (MS), matrix spike duplicate (MSD) and matrix duplicate (MD) samples, trip blanks, blind field duplicates and rinsate (i.e. equipment) blank samples.

2.2.3 Data Validation

A subcontractor to TVGA, Data Validation Services (DVS), performed the validation of the laboratory data in accordance with the *NYSDEC Guidance for the Development of Data Usability Summary Reports* (DUSRs). The data packages were first reviewed for completeness and compliance relative to the criteria specified in the aforementioned NYSDEC document. DVS then conducted a detailed comparison of the reported data with the raw data submitted as part of the supporting documentation package, and applied protocol-defined procedures for the identification and quantitation of the individual analytes to determine the validity of the data. The DUSR includes a narrative summary discussing all quality issues and their impact on the reported results. The DUSR is included in Appendix H.

3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

3.1 Site Structures

The project site includes two separate structures, including a large warehouse occupying approximately 167,400 square feet and a single-story former scale house that is approximately 830 square feet. Each of the two buildings contains ACMs. Remnants of railroad tracks were observed during the surface and subsurface investigation performed throughout the site, including inside the warehouse.

3.2 Site Geology and Hydrology

Based upon a review of the Soil Survey of Chautauqua County, New York, the predominant soil unit occurring on the site is the Niagara silt loam (NgA). The Niagara soils are nearly level, very deep and somewhat poorly drained. The permeability of the Niagara silt loam is categorized as moderate to moderately slow, and the erosion hazard is characterized as slight. The *Surficial Geologic Map of New York – Niagara Sheet (1988)* indicates that the overburden underlying the site consists of lacustrine silt and clay deposits. The site is located within the Erie-Ontario Plain physiographic province and is underlain by bedrock consisting of Upper Devonian shale belonging to the Canadaway Group, according to the Geologic Map of New York – Niagara Sheet (1970).

A Flood Insurance Rate Map of the area indicates that the site is not within the boundaries of the 100- and/or 500-year floodplains.

Stormwater drainage on the site primarily occurs by overland flow and infiltration to the subsurface. The on-site drainage and wastewater systems are abandoned and not well understood. Limited site utility maps and historical information are available, and interviews with former employees provided little information on the drainage systems. A City of Dunkirk representative provided a historical facility map that depicted a cistern to the south of the eastern portion of the warehouse. This historical map is included as Figure 8. The cistern was not identified during test pit activities.

The New York State Department of Environmental Conservation (NYSDEC) Freshwater Wetland Map and the U.S. Department of Interior Fish and Wildlife Service National Wetlands Inventory Map for Dunkirk, New York Quadrangle were reviewed. These maps indicate that no state or federally designated wetland areas are located on or adjoining the site.

3.3 Geology

An evaluation of the subsurface stratigraphy of the project site was completed by integrating the data collected during the subsurface investigation with existing published information on the geology and hydrogeology of the project area.

The subsurface stratigraphy can be divided into four significant units, which are described in descending order as follows:

- Soil/fill material
- Reworked native material
- Lacustrine native material
- Shale bedrock

3.3.1 Soil/Fill Material

The soil/fill material on the project site is present as the uppermost unit at the site and varies in thickness from zero to seven feet. The composition of this material reflects the various historical operations conducted on the project site. In general, the uppermost soil/fill material primarily consists of five types of material that included topsoil; clay and sandy soils; brick; railroad materials (i.e. buried railroad ties); slag, construction and demolition debris; and a mixture of soil/fill materials. Topsoil was typically encountered to the north of the warehouse and consisted of dark brown to black silty sand with various amounts of gravel and organic material. In areas not overlain with topsoil, the uppermost soil/fill material consisted of dark brown to light brown silty sands soils with varying amounts of gravel and brick fragments. Some areas contained remnants of old brick roads and railroad beds that have been partially covered with brown silty sand soils. In the former ALCO Power Plant area, demolition debris, concrete footers and brick basement walls were encountered to approximately seven feet below grade, at which depth refusal was generally encountered. Former pits and low areas were typically filled with various demolition type materials including pipes, bricks and slag mixed with sand, gravel and soil.

In addition to these five common layers of soil/fill material, several other types of soil/fill were encountered. These soil/fill types as well include:

- Gray gravel with petroleum odors and staining was encountered in TP-15 from 5 to 5.2 feet below grade.
- Gray, stained sandy soils and angular gravel with a solvent odor was encountered in TP-8 and TP-22 from 2 to 4.5 feet below grade.
- Stained soils and petroleum odors were observed in soil probes SP-6, SP-7 and SP-8 from four to five feet below grade.
- Gray, stained saturated gravel with a solvent odor was encountered in soil probe SP-15 from 5 to 5.5 feet below grade. Additionally, an oily residue and gray stained soils were encountered in SP-15 from 9.5 to 11 feet below grade.

A summary of contaminant impacts associated with soil/fill identified in the bullets above is presented in Section 4.2.

3.3.2 Reworked Native Material

A layer of reworked native material was sporadically encountered immediately below the soil/fill material in test pits and geoprobe holes throughout the site. This material was identified as native material based on comparisons to subsurface soil encountered at greater depths and was determined to be reworked based on chaotic layering and the presence of anthropogenic materials (viz., brick, slag, pipes, plastic and metal). This material ranges in thickness from 0.2 to 8 feet and consists of the clay native soils that were encountered at greater depths throughout the site.

3.3.3 Lacustrine Native Material

A layer of lacustrine deposits, consisting of clayey silts and silty clay, was observed across the entire site during the subsurface investigation. This layer typically ranged in thickness from one to fourteen feet. The thickest areas of native materials were encountered north of the warehouse building. Some of the locations contained mottled silty clay and a thin layer (less than two inches) of saturated sand and/or gravel overlying lightly to heavily mottled silty clay. The silty clays were typically gray to tan in color and contained trace shale fragments.

3.3.4 Shale Bedrock

Weathered shale was encountered in several subsurface investigation points across the site. The weathered shale is part of the upper Dunkirk Shale, which is the uppermost bedrock layer that underlies the entire project site. This layer is friable and ranges in color from gray to dark gray. Below the shale bedrock is competent shale bedrock that is also part of the Dunkirk Shale.

3.4 Hydrogeology

Hydrogeologic conditions across the project site were evaluated through the installation of six new wells (MW-9 through MW-14), review of Phase II ESA results, and re-sampling the two remaining Phase II ESA wells. The Monitoring Well Construction Reports completed as part of this investigation as well as Development and Sampling Logs are included in Appendix E. Each of the wells was screened in the upper-most water-bearing zone in the overburden soil/fill.

Groundwater was present in both the soil/fill and native materials. Static water levels were measured on October 9, 2008, and Table 2 summarizes the groundwater elevation measurements. These measurements and resulting groundwater contours are shown on Figure 6. The depths to groundwater generally ranged from 3 to 12 feet below grade. The groundwater contour map indicates that the groundwater flow direction is generally to the west and northwest.

4.0 NATURE AND EXTENT OF CONTAMINATION

The following sections summarize and discuss the analytical results generated during the RI. Surface and subsurface soil/fill, groundwater, sediment, and building material and component samples were collected for chemical analysis to determine the magnitude and extent of potential contamination occurring in various media at the site. A summary of the RI sampling program, including the number and type of QA/QC samples is presented in Table 1. Additionally, the following discussions include the results of the Phase II ESA to facilitate a more thorough characterization of the various media.

For discussion purposes, this data is compared with the Standards Criteria and Guidance values (SCGs) applicable to each medium sampled, and include:

- Soil/Fill/Sediment/Wood Flooring: NYSDEC's 6NYCRR Part 375 Environmental Remediation Programs: Part 375-6.8: Residential, Commercial and Industrial Use Soil Cleanup Objectives
- Groundwater: NYSDEC's June 1998 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations in the Technical and Operational Guidance Series (TOGS) 1.1.1
- Wood Flooring analyzed by TCLP: 40 CFR Part 261.24: Maximum Contaminant Levels for Toxicity Characteristics

A series of summary tables (Tables 3 through 7) comparing the data to the applicable SCGs has been integrated into the following discussions. Table 8 includes the list of qualifiers used in Tables 3 through 7. The analytical laboratory reports are included in Attachment A.

The laboratory analytical packages for the RI samples prepared by Mitkem were reviewed by an independent validator, Data Validation Services (DVS), to assess compliance with the analytical method protocols described in the NYSDEC ASP. A DUSR was prepared by DVS that compares the quality of the performance of the laboratory analyses to that described in the ASP. The DUSR has been included in Appendix G. All analytical results from the remedial investigation have been validated and the analytical results summary tables incorporate the results of the data validation efforts.

The validation of the analytical results for samples collected from the project site indicate that the samples were processed in general compliance with applicable protocols, and the majority of results are usable as reported, or usable with minor edits or qualification as estimated or edits to non-detection. None of results were rejected. However, many of the soil and sediment samples showed matrix interferences which resulted in the qualification of detected and non-detected results for many analytes reported in those samples as quantitatively estimated in value. The remaining samples generally showed good accuracy and precision.

4.1 Surface Soil/Fill

Six soil/fill samples were collected during the Phase II ESA (PH II-SS-1 through PH II-SS-6) and fourteen surface soil/fill samples were collected during this investigation (PH II-SS-7 through PH II-SS-20). Each of the surface soil/fill samples collected from the project site were analyzed for TCL SVOCs and PCBs and TAL metals. Additionally, the surface soil/fill samples collected during the Phase II ESA were analyzed for TCL VOCs. The analytical results are summarized in Table 3, and Figure 4 shows the sampling locations.

SVOCs, primarily polycyclic aromatic hydrocarbons (PAHs), were detected in each of the surface soil/fill samples, and one or more of the compounds exceeded Industrial Use SCOs in each surface soil/fill sample.

PCBs were detected in nine of the surface soil/fill samples. None of the detected concentrations exceeded the Industrial Use SCOs. However, detected concentrations of PCBs in SS-7, SS-10 and SS-20 exceeded the Commercial Use SCOs. The remaining detected concentrations were below the Residential Use SCOs.

Arsenic was detected at concentrations that exceeded the Industrial Use SCOs in seven samples. No other inorganic analytes were detected at concentrations exceeding the Industrial Use SCOs. In addition to arsenic in the seven samples identified above, concentrations exceeding the Commercial Use SCOs were limited to barium in SS-14 and cadmium in SS-17. Additionally, cadmium, chromium, lead and manganese were detected at concentrations that exceeded the Residential Use SCOs in at least one surface soil/fill sample.

Figure 9 shows the approximate surface soil/fill areas with concentrations which exceed SCOs.

4.2 Subsurface Soil/Fill

Forty-eight subsurface soil/fill samples were collected from test pits and soil probes from across the project site to characterize the subsurface soil/fill material. The subsurface soil/fill samples collected from the site were analyzed for one or more of the following: TCL VOCs, SVOCs, and PCBs, and TAL metals. Additionally, eight samples were also analyzed for asbestos. Because asbestos was not detected in any of the eight samples, asbestos is not discussed in the following paragraphs. The analytical results for the subsurface soil/fill samples are summarized in Table 4, and the locations of subsurface investigation points are depicted on Figure 5.

Staining and solvent odors were observed in TP-22, SP-6, SP-7, SP-8 and SP-15 and staining and petroleum odors were observed in TP-15, SP-1, SP-14, and SP-15. Although VOCs were detected in most of the subsurface soil/fill samples, none of the samples contained VOCs at concentrations exceeding the Residential Use SCOs.

SVOCs were detected in each of the subsurface soil/fill samples. Although the concentrations of SVOCs in the subsurface soil/fill samples were typically lower than in the surface soil/fill samples. Six samples (PH II-MW-4, PH II-MW-8, TP-2, TP-5, TP-22 and SP-9) contained SVOCs at concentrations exceeding the Industrial Use SCOs. One sample (PH II-MW-6) also contained a SVOC concentration that exceeded the Commercial Use SCO and two samples (TP-2 and TP-11) contained SVOC concentrations that exceeded the Residential Use SCOs. Remaining locations contained concentrations below the Residential Use SCOs.

Arsenic and mercury were detected at concentrations exceeding the Industrial Use SCOs in at least one subsurface soil/fill sample. No other metals concentrations exceeded Industrial Use SCOs in the subsurface soil/fill samples. Concentrations exceeding the Commercial Use SCO included barium in TP-4, TP-12, TP-17 and SP-12 and chromium in TP-10 and TP-11. Additionally, concentrations of barium, chromium, lead and manganese in one or more location exceeded Residential Use SCOs.

As indicated in Section 3.3.1, petroleum and/or solvent odors and staining were identified in SP-6, SP-7, SP-8, TP-8, TP-15 and TP-22 in the subsurface soil/fill. These intervals were sampled, and the detected concentrations of VOCs in these samples were all below the Residential Use SCOs. With the exception of the soil/fill sample collected from TP-22, in which SVOCs were detected at concentrations above the Industrial Use SCOs, SVOCs concentrations were also all below the Residential Use SCOs. Although the concentrations of aluminum, calcium, iron and magnesium exceeded the Industrial Use SCOs in one or more of the samples collected from these locations, concentrations of the remaining metals were below the Residential Use SCOs. No PCBs were detected in any of the samples collected from these locations.

Figures 10, 11, and 12 show the approximate subsurface soil/fill areas with concentrations which exceed Industrial Use SCOs, Commercial Use SCOs, and Residential Use SCOs, respectively.

4.3 Groundwater

Groundwater samples were collected from the six newly installed monitoring wells and the two remaining wells from the Phase II ESA (PH II-MW-3 and PH II-MW-5). Based on the groundwater sampling results from the Phase II ESA and the analytical results of the soil/fill samples collected during the RI, the monitoring wells were analyzed for TCL VOCs and SVOCs and TAL metals. Additionally, samples collected from PH II-MW-5, MW-9, MW-10 and MW-11 were also analyzed for PCBs. The groundwater results from the Phase II ESA were also reviewed and are summarized in the following paragraphs. Analytical results for PH II-MW-3 and PH II-MW-5 are presented from both the Phase II and RI sampling events. The analytical results for the groundwater samples are summarized in Table 5 and the locations of monitoring wells are depicted on Figure 6.

Prior to the initiation of groundwater sampling an electronic oil/water interface probe was lowered into each monitoring well to evaluate for the presence of Light non-aqueous phase liquids (LNAPL) and dense non-aqueous phase liquids (DNAPL). LNAPL and DNAPL layers were not identified in any of the monitoring wells.

One or more VOCs were detected in eight of the sixteen groundwater samples. However, only five monitoring wells (PH II-MW-2, PH II-MW-4, MW-11, MW-12 and MW-13) contained VOC concentrations exceeding the SCGs. SVOCs were detected in five monitoring wells; however, none of the detected concentrations exceeded the SCGs.

One or more metals was detected in each of the sixteen groundwater samples at concentrations exceeding the SCGs. The highest concentrations of metals were detected in samples from PH II-MW-5 and PH II-MW-6, which were collected during the Phase II ESA. PH II-MW-5 was re-sampled during the RI and significantly lower concentrations were detected, indicating that the high metals concentrations detected during the Phase II ESA may have been related to the elevated turbidity levels. Iron, magnesium, manganese, and sodium were also detected in many of the groundwater samples at concentrations exceeding the SCGs. However, these parameters are commonly encountered in uncontaminated, natural environments and are associated more with the groundwater aesthetics than toxicity. Thallium was also detected in four of the groundwater at concentrations exceeding SCGs.

Figure 13 shows analytes that exceed groundwater standards and an estimated area of groundwater with elevated concentrations of VOCs.

4.4 Sediment

Six sediment samples were collected during the Phase II ESA and nine sediment samples were collected during the RI from drains, trenches, sumps, pits and the brick incinerator. Each sediment sample was analyzed for TCL VOCs, SVOCs and PCBs as well as TAL metals. The analytical results for the sediment samples are summarized in Table 6, while the locations of these samples are depicted on Figure 7.

With the exception of PH II-SED-6, at least one VOC was detected in each of the sediment locations. None of the detected concentrations of VOCs exceeded Commercial Use SCOs. VOC concentrations detected in three samples (PH II-SED-1, PH II-SED-2 and PH II-SED-3) exceeded the Residential Use SCOs.

SVOCs were detected in each of the sediment samples and the concentrations in ten sediment samples exceeded Industrial Use SCOs. Two samples contained concentrations exceeding Commercial Use SCOs and two sediment samples contained concentrations exceeding Residential Use SCOs. Only one of the sediment samples (PH II SED-5) contained SVOC concentrations below the Residential Use SCOs.

PCBs were detected in eleven of the fifteen sediment samples. Only one of the sediment samples (PH II-SED-4) contained a concentration above the Industrial Use SCOs. Four other sediment samples (PH II-SED-1, PH II-SED-2, PH II-SED-3, and SED-6) contained concentrations above the Commercial Use SCOs. The remaining concentrations were below the Residential Use SCOs.

Metals that were detected at concentrations exceeding the Industrial Use SCOs in at least one sediment sample included aluminum, arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese and zinc. In addition to the above listed metals, nickel was detected at concentrations exceeding the Commercial Use SCOs in four samples and mercury was detected at concentrations exceeding the Residential Use SCOs in four samples.

4.5 Interior Wood Flooring

A sample was collected from the wood block flooring (FLOOR) in the warehouse building to determine if the tar adhesive material and tar saturated wood flooring contained elevated SVOCs and/or PCBs. Although the wood block flooring is a building material and not technically a soil, the analytical results were compared to the Part 375 Soil Cleanup Objectives for evaluation purposes.

Several SVOCs were detected at concentrations exceeding the Industrial Use SCOs. One PCB Aroclor was detected; however, the concentration was below Residential Use SCOs. Based on these analytical results, two additional wood flooring samples (FLOOR-2 and FLOOR-3) were collected and analyzed for TCLP VOCs, SVOCs, PCBs and metals for disposal profiling purposes. The results from the FLOOR-3 sample indicated the wood block flooring was considered to be hazardous for lead. A second sample was collected from the FLOOR-3 location (FLOOR-3RE), confirming the hazardous characteristics concentration.

An additional eight samples (FLOOR-4 through FLOOR 11) were collected to determine the extents of lead hazardous wood block flooring. Four of these additional samples contained hazardous characteristic concentration of lead. The analytical results for these samples are summarized in Table 7, while the locations of these samples, approximate extents of the wood block flooring and the hazardous extent of wood block flooring areas are depicted on Figure 7.

4.6 Pre-Demolition Asbestos Survey

As described in the *Pre-Demolition Asbestos Inspection* report, included in Appendix F, substantial quantities of non-friable (approximately 32,045 square feet and 90 linear feet) and limited quantities of friable (approximately 820 linear feet) asbestos containing materials (ACM) were identified throughout the on-site structures. The friable ACM that were identified in the warehouse building consisted of pipe and duct flue insulation. The majority of the non-friable ACM consisted of exterior siding and roofing tar on the

warehouse. The remainder of non-friable ACM consisted of floor tile, piping, wire insulation and caulk.

4.7 Container Inventory

The container inventory identified 91 total containers, 16 of which contained a suspect liquid that would require analytical testing prior to disposal. The container inventory is included in Appendix E.

5.0 CONTAMINATION ASSESSMENT

5.1 Contaminant Fate and Transport

The probable fate and transport of contaminants detected on the project site is a function of the properties of the individual contaminants and available pathways for the contaminants to migrate. The project site is currently an unutilized industrial property, and the planned future use of the project site is for commercial or industrial development. The degree to which, as well as the route by which, contaminants migrate is dependent on the physical characteristics of the site and the type and distribution of contaminants. The following sections discuss the probable fate and transport of contaminants in the different types of media at the Former Edgewood Warehouse site.

5.1.1 Surface Soil/Fill

Contaminants of concern detected in the surface soil/fill primarily consist of SVOCs and metals. Figure 9 shows the approximate surface soil/fill areas with concentrations which exceed SCOs. The SVOCs detected include PAHs, seven of which are known carcinogens (cPAHs). The SVOCs are characterized by low solubilities and high octanol-water partition coefficients, and therefore, have a tendency to adsorb onto soil particles. In addition, the PAHs have relatively low vapor pressures and are expected to remain in a solid or liquid state and undergo degradation via naturally occurring microbes. Due to the low solubility, SVOCs are not expected to impact groundwater quality or migrate substantially into the subsurface. This is supported by the lack of or low concentrations of these compounds in the on-site groundwater.

Arsenic was detected in seven surface soil/fill samples at concentrations above Industrial Use SCOs. Arsenic has a low solubility and does not readily degrade under natural conditions. Due to the low solubility, arsenic is not expected to impact groundwater quality or migrate substantially in the subsurface. With the exception of the area around PH II-MW-6, this is supported by the absence of arsenic in the on-site groundwater.

The estimated area of impacted surface soil/fill is site-wide with the exception of areas with structures and/or concrete. While the surface soil/fill samples were collected from zero to two inches below the vegetative layer, for the purpose of evaluating remedial alternatives at the site, the depth of the impacted surface soil/fill was assumed to extend to one foot below grade. This depth was based upon field observations and analytical results from the test pits and soil probes. With this thickness over 170,000 square feet, the approximate volume of the impacted surface soil is 6,300 cubic yards. Assuming that one cubic yard weighs 1.6 tons, the weight of the contaminated soil/fill is 10,100 tons. Additionally, to address the surface soil/fill contamination to the north of the warehouse, clearing and grubbing will be required. The estimated area for clearing and grubbing is 0.5 acre.

5.1.2 Subsurface Soil/Fill

The analytical results indicate that the primary contaminants of concern in the subsurface soil/fill consist of SVOCs, primarily PAHs and metals. Due to low solubility, SVOCs are not expected to impact groundwater quality or migrate substantially into the subsurface. This is supported by the lack of or low concentrations of these compounds in the on-site groundwater.

Arsenic was detected in several subsurface soil/fill samples and mercury was detected in one subsurface soil/fill sample at concentrations above the Industrial Use SCOs. Due to the low solubility, arsenic is not expected to impact groundwater quality or migrate substantially in the subsurface. With the exception of the area around PH II-MW-6, this is supported by the absence of arsenic in the on-site groundwater. Mercury was detected in the groundwater in PH II-MW-6 at a concentration above SCGs but also appears to be limited to the area surrounding PH II-MW-6. Aluminum, calcium magnesium and iron were also detected several subsurface soil/fill samples at concentrations above Industrial Use SCOs. These metals were also detected in groundwater samples at concentrations exceeding groundwater standards.

The estimated areal extent of subsurface contamination exceeding Industrial Use SCOs were identified as Area A through Area F, which are depicted on Figure 10. The estimated areal extent of areas with subsurface contamination exceeding Commercial Use SCOs was identified as Area G and Area H, which are depicted on Figure 11. The areas with subsurface contamination exceeding Residential Use SCOs were identified as Area I and Area J, which are depicted on Figure 12. Because the uppermost one foot of soil/fill that exceeds the Industrial Use SCOs is addressed as surface soil/fill as described in Section 5.1.1, the volume estimates for these areas do not include this material. The areas of contamination in the subsurface soil/fill have not been fully delineated and post-excavation sampling will be used to confirm that the contaminated material has been addressed. Each area is discussed in detail below.

5.1.2.1 Area A

Contaminants of concern in Area A include SVOCs exceeding the Industrial Use SCOs. Based on analytical results and field observations, contaminants are estimated to extend to six feet below grade. With this thickness over 3,860 square feet, the approximate volume of the impacted soil/fill is 715 cubic yards. Assuming that one cubic yard weighs 1.6 tons, the weight of the contaminated soil is 1,145 tons.

5.1.2.2 Area B

Contaminants of concern in Area B include SVOCs and arsenic exceeding the Industrial Use SCOs. Based on analytical results and field observations contaminants are estimated to extend to six feet below grade. With this

thickness over 2,980 square feet, the approximate volume of the impacted soil/fill is 555 cubic yards. Assuming that one cubic yard weighs 1.6 tons, the weight of the contaminated soil is 890 tons.

5.1.2.3 Area C

Contaminants of concern in Area C include SVOCs and metals exceeding the Industrial Use SCOs. Based on analytical results and field observations, contaminants are estimated to extend to eight feet below grade. With this thickness over 63,135 square feet, the approximate volume of the impacted soil/fill is 16,370 cubic yards. Assuming that one cubic yard weighs 1.6 tons, the weight of the contaminated soil is 26,195 tons.

5.1.2.4 Area D

Contaminants of concern in Area D include SVOCs exceeding the Industrial Use SCOs. Based on analytical results and field observations, contaminants are estimated to extend to seven feet below grade. With this thickness over 4,955 square feet, the approximate volume of the impacted soil/fill is 1,105 cubic yards. Assuming that one cubic yard weighs 1.6 tons, the weight of the contaminated soil is 1,770 tons.

5.1.2.5 Area E

Contaminants of concern in Area E include SVOCs and arsenic exceeding the Industrial Use SCOs. Based on analytical results and field observations, contaminants are estimated to extend to four feet below grade. With this thickness over 940 square feet, the approximate volume of the impacted soil/fill is 105 cubic yards. Assuming that one cubic yard weighs 1.6 tons, the weight of the contaminated soil is 170 tons.

5.1.2.6 Area F

Contaminants of concern in Area F are limited to iron exceeding the Industrial Use SCO. Based on analytical results and field observations, contaminants are estimated to extend to five feet below grade. With this thickness over 635 square feet, the approximate volume of the impacted soil/fill is 95 cubic yards. Assuming that one cubic yard weighs 1.6 tons, the weight of the contaminated soil is 155 tons.

5.1.2.7 Area G

Contaminants of concern in Area G include metals exceeding the Commercial Use SCOs. Based on analytical results and field observations, contaminants are estimated to extend to seven feet below grade. With this thickness over 2,845

square feet, the approximate volume of the impacted soil/fill is 635 cubic yards. Assuming that one cubic yard weighs 1.6 tons, the weight of the contaminated soil is 1,020 tons.

5.1.2.8 Area H

Contaminants of concern in Area H include metals exceeding Commercial Use SCOs. Based on analytical results and field observations, contaminants are estimated to extend to five feet below grade. With this thickness over 27,750 square feet, the approximate volume of the impacted soil/fill is 4,115 cubic yards. Assuming that one cubic yard weighs 1.6 tons, the weight of the contaminated soil is 6,585 tons.

5.1.2.9 Area I

Contaminants of concern in Area I include metals and SVOCs exceeding Residential Use SCOs. Based on analytical results and field observations, contaminants are estimated to extend to eight feet below grade. With this thickness throughout the 49,210-square-foot area, the approximate volume and weight of the impacted soil/fill are 12,760 cubic yards and 20,415 tons, respectively.

5.1.2.10 Area J

Contaminants of concern in Area J include metals exceeding Residential Use SCOs. Based on analytical results and field observations, contaminants are estimated to extend to five feet below grade. With this thickness throughout the 23,425-square-foot area, the approximate volume and weight of the impacted soil/fill are 4,800 cubic yards and 7,680 tons, respectively.

Contaminants of concern in the subsurface soil/fill include SVOCs and metals. Estimated extents of contamination are depicted in Figures 10 through 12. Based on the contaminant concentrations and field observations, an estimated 18,945 cubic yards (30,325 tons) of subsurface soil/fill contain contaminants of concern at concentrations exceeding the Industrial Use SCOs, 23,600 cubic yards (37,760 tons) exceeding the Commercial Use SCOs and 25,200 cubic yards (56,320 tons) exceeding the Residential Use SCOs.

5.1.3 Groundwater

The analytical results indicate that the primary contaminants of concern in the groundwater are VOCs and metals. VOCs were identified in the groundwater in PH II-MW-2, PH II-MW-4, MW-11, MW-12 and MW-13 at concentrations exceeding the SCGs. Although VOCs were not identified as contaminants of concern in the soil/fill, VOCs have high solubility in water. Additionally, 18 of the 23 analyzed metals were detected in at

least one location at concentrations exceeding SCGs. Concentrations of groundwater quality standards for each well are depicted on Figure 13. The lack of local reliance on groundwater as a source of potable water minimizes the potential for direct human exposure to groundwater contaminants. Residences and businesses surrounding the project site and within the City of Dunkirk are serviced by the municipal water supply system that relies upon water withdrawn from Lake Erie. In addition, the nearest body of water to which the groundwater at the site will discharge, Lake Erie, is 0.5 mile north of the project site, also limiting the potential for direct human exposure to groundwater contaminants.

The potential for soil vapor intrusion (SVI) from contaminated groundwater into off-site buildings was also evaluated. Because VOCs in the soil/fill samples were detected at concentrations below the Residential Use SCOs, the source of elevated VOCs in the groundwater at the Edgewood Warehouse site is not likely on-site. The immediately upgradient former Roblin Steel and Alumax Extrusions sites represent likely sources of VOCs detected in the groundwater on the Edgewood Warehouse site based on elevated concentrations of VOCs previously detected at both sites. The concentrations of VOCs in groundwater at the three sites are highest at the Roblin and Alumax sites and decline significantly along the inferred groundwater flow direction across the three sites, resulting in relatively low concentrations (less than 0.5 mg/L) in the downgradient portion of the Edgewood Warehouse site. Downgradient of the Edgewood Warehouse site is a rail yard, across which groundwater contaminant concentrations, if any, would continue to decline prior to reaching any occupied structures. Based upon the relatively low VOC concentrations at the project site and the continued decline in VOC concentrations that would occur off-site, SVI into off-site buildings is not expected.

The estimated areal extent of groundwater VOC contamination is 111,400 square feet as depicted on Figure 13. The uppermost groundwater depths range from approximately three feet to twelve feet below grade.

5.1.4 Sediments in the Trench Drains, Sumps, Pits and Incinerator

Contaminants of concern detected in the sediment collected from the on-site trenches, drains, pits and brick incinerator included SVOCs, metals and PCBs. Some of these structures appear to be isolated structures, and therefore, contaminants are not anticipated to migrate offsite. However, some structures are full of sediment and debris so the system can not be fully inspected.

Each of the sediment samples contained contaminant concentrations in excess of the Industrial Use SCOs. Each sediment location is described in the table below with an approximate volume of contaminated sediment shown in cubic feet.

Locations	Description	Length (feet)	Width (feet)	Approximate Sediment Depth (feet)	Volume (cubic feet)
SED-1	Brick Incinerator	5.8	6.2	2	72
SED-2	Loading Dock Area	27.2	1.4	2	76
SED-3	Trench Drain along Concrete	28.2	1.6	2.5	113
SED-4	Trench Drain In Concrete Pad	48.1	1.2	1	58
SED-5	8-Inch Round Drain	1	2	1	2
SED-6	5x7 Steel Sheet to east of Building	5	7	5	175
SED-7	Sump in West Portion of Building	1	1	1	1
SED-8	Sump in West Portion of Building	3	3	1	9
SED-9	Scale House Sump	4.5	4.25	0.2	4
PH II -SED-1	Sump in Paint Booth	1	1.4	1	1
PH II -SED-2	Sump in Paint Booth	2.5	2.5	3	19
PH II -SED-3	Roof Drains	4	4	4	64

Locations	Description	Length (feet)	Width (feet)	Approximate Sediment Depth (feet)	Volume (cubic feet)
PH II -SED-4	Trench along east side of Building	86.3	1.5	2.5	324
PH II -SED-5	Behind Building	6	7	3	126
PH II -SED-6	Possible Oil water Separator to North of Building	4	4	6	96

The total approximate volume of the impacted sediments is 45 cubic yards. Assuming that one cubic yard weighs 1.6 tons, the weight of the contaminated sediments are approximately 70 tons. Based on the analytical results and field observations, with the exception of SED-7 and SED-8, this material would likely be disposed off-site as non-hazardous material. Sediment samples from SED-7 and SED-8 contained significantly elevated SVOC concentrations; therefore, sediment disposal profiling might indicate that this material should be disposed off-site as hazardous material.

5.1.5 Interior Wood Flooring

Contaminants of concern detected in the wood flooring primarily include SVOCs and lead. Additionally, some of the wood flooring is hazardous for lead. The wood flooring is located between asphalt and concrete flooring and, therefore, contaminant migration is

limited. However, due to the condition of the warehouse, the flooring is often exposed to precipitation and as a result the asphalt and wood flooring have buckled in a few locations. The high TCLP lead results and exposure to precipitation indicates the possibility for lead to leach from the wood flooring to other media.

Two areas of wood block flooring were identified in the warehouse. Disposal profiling of the two areas indicated that one area contains wood flooring that would be considered non-hazardous material, while the other area contains lead at characteristic hazardous waste concentrations. Therefore, each area is discussed separately below. The approximate extents of each area are depicted on Figure 7.

5.1.5.1 Non-Hazardous Wood Block Flooring

The larger of the two areas, which is primarily located in the center portion of the warehouse, contains wood block flooring that has elevated concentrations of SVOCs. Disposal profiling completed from the wood block flooring in this area indicated the wood block flooring would likely be disposed off-site as non-hazardous material. This area occupies an estimated 38,875 square feet. Assuming that the material weighs 60 pounds per cubic foot and the depth of the wood flooring is 4 inches, the weight of the contaminated non-hazardous wood block flooring is 410 tons.

5.1.5.2 Hazardous Wood Block Flooring

Disposal profiling completed from several flooring in several locations within the northeast portion of the building indicated the wood block flooring is considered to be hazardous for lead. This area occupies an estimated 4,060 square feet. Assuming that the material weighs 60 pounds per cubic foot and the depth of the wood flooring is 4 inches, the weight of the hazardous wood block flooring is 43 tons.

5.1.6 Asbestos

Non-friable ACM are relatively resistant to weathering and are not expected to migrate from the project site. However, asbestos fibers released as a result of the degradation of friable ACM are susceptible to dispersion via wind currents and/or transport via stormwater. Based upon the condition of the warehouse building, some of the friable ACM are exposed directly to the environment and could be subject to wind and water erosion.

The asbestos survey report identified approximately 32,045 square feet and 90 linear feet of non-friable ACM and approximately 820 linear feet of friable ACM throughout the on-site structures.

5.1.7 Containers

The container inventory identified 91 total containers, 16 of which contained a suspect liquid that would require analytical testing prior to disposal. The containers were not noted to be leaking at time of inspection and therefore, the potential for the migration of contaminants is limited. The total estimated quantity of suspect liquid is 540 gallons.

5.2 Evaluation of Potential Receptors

The project site is located in an area that is characterized by residential, commercial, and industrial properties. A railroad bounds the property to the north, unutilized industrial properties are located to the east, active commercial properties are located to the south and northwest, and residences are located beyond South Roberts Road to the west of the project site. The surrounding area is serviced by the municipal water supply system of the City of Dunkirk that relies on water withdrawn from Lake Erie.

The project site is currently an unutilized industrial property and was utilized for industrial purposes for over 90 years. Access to the site is partially restricted by perimeter fencing. However, access to trespassers is possible due to the deteriorating condition of the warehouse and former scale house buildings and unrestricted entry to the buildings.

Under current conditions, potential human receptors include persons working or trespassing on the project site; persons living and working in the area surrounding the project site; and persons involved in utility work on and adjacent to the project site. In addition, potential environmental receptors include wildlife living on and migrating through the project site (e.g., rodents, birds, etc.).

The planned future use of the project site following remedial activities is for commercial and/or industrial purposes. The redevelopment of the site will be controlled through the implementation of engineering and institutional controls. These controls may include the following:

- Implementation of a Soil/Fill Management Plan
- Treatment and/or disposal of contaminated soil/fill that exceeds SCOs
- Implementation of a long-term groundwater monitoring plan
- Placement of a final surface coverage over the entire site that includes a minimum of twelve inches of vegetative cover over all exposed soil areas, asphalt pavement, buildings, and/or concrete to limit exposure as a pre-condition of occupancy
- Implementation of erosion and dust control measures
- Implementing a Community Air Monitoring Plan
- Maintenance of fencing around the project site or areas undergoing redevelopment
- Limiting property use through deed and zoning restrictions
- Adhering to NYSDEC/NYSDOH notification and reporting requirements

-
- Instituting health and safety procedures for construction activities and protection of the surrounding community

Under the intended future use scenario for the project site, the primary consideration in the determination of acceptable clean-up levels is the potential risk to human health posed by residual chemical constituents in the soil/fill.

No human and/or environmental receptors have been identified in connection with the post-redevelopment period, assuming that the contaminated media has been removed or controlled through the implementation of engineering and institutional controls.

5.3 Potential Exposure Pathways

5.3.1 Surface Soil/Fill

Under the current use scenario, persons living and working in the vicinity of the project site and/or persons trespassing on the site could be exposed to SVOCs and metals in the surface soil/fill via inhalation of airborne particles, incidental ingestion of, or dermal contact with the contaminated media.

Construction workers, site visitors and persons living, working and traveling through the area near the project site could be exposed to these contaminants in the surface soil/fill during excavation of the contaminated soil/fill in connection with remediation and/or site redevelopment. Potential exposure routes for these receptors include inhalation of contaminated dust and incidental ingestion of, and/or dermal contact with the contaminated soil/fill. However, the use of appropriate personal protective equipment, dust suppression techniques, and the development and implementation of a Soil/Fill Management Plan would minimize the risk of exposure during remediation and/or construction activities.

No complete exposure pathways to the contaminated surface soil/fill have been identified in connection with the post-redevelopment period, assuming that the contaminated surface soil/fill has been removed or covered.

5.3.2 Subsurface Soil/Fill

The presence of elevated concentrations of SVOCs and metals in subsurface soil/fill is not interpreted to represent a human or environmental exposure risk because no complete exposure pathways were identified under the current use scenario for the project site. This is a function of the subsurface disposition of the contamination and the low solubility of contaminants in water, which effectively minimizes the potential for the incidental ingestion of, or dermal contact with the contaminated media. These factors also reduce the potential for the emission of vapors and particulates that could pose an exposure risk via inhalation. This applies to persons living, working and traveling through

the area surrounding the project site, as well as persons visiting, working or trespassing on the project site.

Environmental receptors, construction workers, site visitors and persons living, working and traveling through the project site could be exposed to the contaminants in the subsurface soil/fill during excavation of the contaminated soil/fill in connection with the remedial and/or site redevelopment activities. Potential exposure routes for these receptors include inhalation of organic vapors and/or contaminated dust and incidental ingestion of and/or dermal contact with the contaminated soil/fill. However, the use of appropriate personal protective equipment, dust suppression techniques, and the development of a Soil/Fill Management Plan would minimize the risk of exposure during the remedial and/or site redevelopment construction activities.

No complete exposure pathways have been identified in connection with the post-redevelopment period, assuming that the subsurface soil/fill has been removed or covered.

5.3.3 Groundwater

Groundwater in the vicinity of the project site is not utilized as a source of potable water. Therefore, no exposure via ingestion of contaminated groundwater is likely. However, because little information is available regarding the abandoned drainage systems, the potential exists for VOCs and metals in the water and sediment located in the storm water systems to enter the City system. Under this scenario, there is the potential for utility workers involved with the cleaning and/or maintenance of the drainage structures to be exposed to the contaminated groundwater present in these structures. Construction workers could also be exposed to the contaminated groundwater during excavation activities performed in connection with redevelopment activities. Potential exposure routes for these receptors include inhalation or organic vapors, and/or incidental ingestion or, and/or dermal contact with, the contaminated groundwater. However, the use of appropriate personal protective equipment and groundwater management techniques would likely minimize the risk of exposure during site redevelopment.

No complete exposure pathways have been identified in connection with the post-redevelopment period, assuming that all drainage systems have been properly cleaned and closed.

5.3.4 Sediments

Under the current use scenario, site workers, persons trespassing on the project site and utility workers involved with the cleaning and/or maintenance of the stormwater sewers could be exposed to SVOCs, metals and PCBs via inhalation of airborne particles, incidental ingestion of, or dermal contact with the contaminated sediments.

Construction workers, site visitors and persons working on and traveling through the project site could be exposed to the SVOCs, metals and PCBs in the sediment during cleaning/removal activities performed in connection with remediation and/or site redevelopment. Potential exposure routes for these receptors include inhalation of contaminated dust and the incidental ingestion of, and/or dermal contact with, the contaminated sediment. However, the use of appropriate personal protective equipment and dust suppression techniques would limit the risk of exposure during site redevelopment.

No complete exposure pathways for on-site sediment contamination have been identified in connection with the post-redevelopment period, assuming that the sediment has been removed and the drainage features property closed.

5.3.5 Interior Wood Block Flooring

Under the current use scenario, site workers and/or persons trespassing in the warehouse could be exposed to SVOCs and metals on wood block flooring via incidental ingestion of or dermal contact with the contaminated media.

Construction workers, site visitors and persons, working and traveling through the project site could be exposed to the SVOCs and metals in the flooring and/or within airborne particles during remedial activities performed in connection with site redevelopment. Potential exposure routes for these receptors include inhalation of contaminated dust, and the incidental ingestion of, and/or dermal contact with the wood flooring. However, the use of appropriate personal protective equipment and dust suppression techniques would limit the risk of exposure during site redevelopment.

No complete exposure pathways for the SVOC and metals in the wood block flooring have been identified in connection with the post-redevelopment period, assuming that all wood block flooring is removed from the project site.

5.3.6 Asbestos

Under the current use scenario, persons living and working in the area immediately surrounding the project site have the potential to be exposed to asbestos via the inhalation of asbestos fibers released from damaged, suspect friable ACMs that are exposed to wind currents. The risk of asbestos exposure during building demolition or renovation activities would be minimized through the implementation of proper abatement, control and monitoring procedures as required by applicable state and federal regulations. The future risk posed by the ACMs would be eliminated with the removal and proper disposal of the asbestos-containing demolition debris.

5.3.7 Containers

Under the current use scenario, site workers and/or persons trespassing in the warehouse could be exposed to potential contaminants via incidental ingestion of or dermal contact with the contaminated media.

Construction workers, site visitors and persons working and traveling through the project site could be exposed to the potential contaminants in the containers during remedial activities performed in connection with site redevelopment. Potential exposure routes for these receptors include the incidental ingestion of and/or dermal contact with the contents of the containers. However, the use of appropriate personal protective equipment would limit the risk of exposure during site redevelopment.

No complete exposure pathways have been identified in connection with the post redevelopment period, assuming that all containers are removed from the project site.

6.0 SUMMARY AND CONCLUSIONS

A Remedial Investigation (RI) program was implemented at the Former Edgewood Warehouse site on behalf of Chautauqua County Department of Public Facilities (County). The project site is located at 320 South Roberts Road, Dunkirk, New York. The project site is occupied by two structures and is currently vacant. The County received State financial assistance to conduct this RI program under the Environmental Restoration, or Brownfield, component of Title 5 of the Clean Water/Clean Air Bond Act of 1996. The objective of this program was to characterize the site and determine the nature and extent of contamination in the surface soil, subsurface soil/fill, groundwater, sediments and building materials. The resulting data was used to qualitatively evaluate potential risks to human health and the environment associated with current site conditions and potential future use scenarios.

6.1 Site Conditions

The project site consists of approximately 7.0 acres located within the City of Dunkirk limits. The project site was first developed in 1910 and was utilized for various industrial purposes including the production of locomotives, nuclear reactor components, steel tubing, and pallets among other purposes. This site has been vacant following cessation of manufacturing and warehousing activities.

The project site is occupied by two structures which include a large warehouse occupying approximately 167,400 square feet, and a single-story building was likely a former scale house approximately 830 square feet in size. Additionally, the property also contained another building that housed the facility power plant, which was demolished in 1989.

Based on the historical use of the project site, Phase I and II Environmental Site Assessments (ESA) were completed in 1997 and 1999, respectively. These studies identified the following environmental concerns in connection with the project site:

- Asbestos containing materials (ACMs) were present in the warehouse building and asbestos waste from previous building renovation and demolition activities may be buried on the site. The condition, location and quantity of ACM were unknown.
- Contaminated soil/fill and groundwater has been documented on the property.
- Electrical lighting equipment containing polychlorinated biphenyls (PCBs) is likely to be present within the on-site buildings.
- Because radiological sources were historically utilized on-site, the potential for the presence of radioactive materials exists.
- Contaminated sediments and sludges were documented in on-site pits, drains, and vaults.
- The project site is hydrogeologically downgradient from the adjacent former Roblin Steel and Alumax sites, where historic soil and groundwater contamination has been documented.

6.2 Investigation Approach

The Remedial Investigation was conducted in accordance with the NYSDEC-approved January 2008 Remedial Investigation/Alternatives Analysis Work Plan (Work Plan). This investigative work included the following activities:

- Site Topographic Survey
- Surface Soil Sampling
- Test Pit Excavations
- Soil Probe Advancement
- Subsurface Soil/Fill Sampling
- Test Boring Advancement
- Monitoring Well Installation
- Groundwater Elevation Monitoring
- Groundwater Sampling
- Sediment Sampling
- Interior Wood Block Flooring Sampling
- Asbestos Survey
- Container Inventory
- Data Validation
- Data Evaluation

6.3 Site Structures

The project site includes two separate structures, a large warehouse and a former scale house, which both contain ACM. All other former site structures have been demolished.

6.4 Physical Setting

The topography of the project site, as shown on Figure 1, is generally flat-lying and has an average elevation of approximately 610 feet above mean sea level. This site is located in an inactive industrial complex and is bounded to the north by an active railroad. The site is bounded to the west by South Roberts Road beyond which are residential properties.

The results of the remedial investigation indicate that soil/fill overlies native material and shale bedrock across the site. The overburden stratigraphy can be divided into four significant units, which are listed in descending order.

- Soil/Fill Material
- Reworked Native Material
- Lacustrine Native Material
- Shale bedrock

Groundwater was present in both the soil/fill material as well as the native material. The depths to groundwater generally ranged from approximately 3 to 12 feet below the existing ground surface, and groundwater flows generally to the west and northwest.

6.5 Nature and Extent of Contamination

6.5.1 Surface Soil/Fill

Surface soil/fill throughout the site contains elevated concentrations of SVOCs and metals. Based on the contaminant concentrations and field observations, approximately 6,300 cubic yards (10,100 tons) of surface soil/fill contain contaminants of concern exceeding the Industrial Use SCOs.

6.5.2 Subsurface Soil/Fill Material

Contaminants of concern in the subsurface soil/fill include SVOCs and metals. Estimated extents of contamination are depicted in Figures 10 through 12. Based on the contaminant concentrations and field observations, an estimated 18,945 cubic yards (30,325 tons) of subsurface soil/fill contain contaminants of concern at concentrations exceeding the Industrial Use SCOs, 23,600 cubic yards (37,760 tons) exceeding the Commercial Use SCOs and 25,200 cubic yards (56,320 tons) exceeding the Residential Use SCOs.

6.5.3 Groundwater

Groundwater at the project site was encountered at relatively shallow depths, within the soil/fill material as well as native material. Concentrations of VOCs and/or metals exceeding the regulatory values were detected in eight of the fourteen monitoring wells. The direction of the groundwater flow is generally to the west and northwest. In addition to historical operations onsite, the presence of VOCs in the groundwater may potentially be related to the flow of groundwater from adjoining sites. The estimated extent of contamination is depicted in Figure 13.

6.5.4 Sediments

Contaminants of concern in the sediments consist of SVOCs and metals.

6.5.5 Interior Wood Block Flooring

SVOCs were found at elevated concentrations in the wood block flooring in the warehouse. Additionally, the wood block flooring in the northeast portion of the building contained hazardous levels of lead. The estimated extent of wood block flooring and hazardous wood block flooring is depicted in Figure 7.

6.5.6 Asbestos

Friable and non-friable asbestos was found in both of the on-site buildings.

6.5.7 Containers

The container inventory identified 91 total containers, 16 of which contained a suspect liquid that would require analytical testing prior to disposal.

6.6 Contamination Assessment

6.6.1 Potential Receptors

Under current (vacant) and planned future use (commercial or light industrial uses) conditions, potential human receptors for onsite contaminants include:

- Persons living and working in the area surrounding the project site
- Persons trespassing on the site and entering onsite structures
- Remediation and construction contractors working on the project site
- Persons working on the project site (future use)
- Persons involved in utility work on and adjacent to the project site

Potential environmental receptors include wildlife utilizing the project site (e.g., rodents, birds, etc.).

If remedial activities were implemented at the project site, potential human receptors during construction would include site workers involved in excavation activities and persons living in and traveling through the area surrounding the project site.

6.6.2 Exposure Pathways

Under current conditions, human and environmental receptors could be exposed to onsite contaminants via inhalation of airborne fibers, particles or vapors, or the incidental ingestion of, or dermal contact, with the contaminated media.

During remediation activities, receptors at and near the project site could be exposed to the on-site contaminants via the inhalation of asbestos fibers and/or contaminated dust and vapors, and incidental ingestion of and/or dermal contact with the contaminated media. However, the use of appropriate personal protective equipment, dust suppression techniques, and the development and implementation of a Soil/Fill Management Plan would minimize the risk of exposure during the remedial activities.

No complete exposure pathways to the contaminants at the project site have been identified in connection with the post-remediation period, assuming that the on-site

contaminants have been properly removed, treated, and/or engineering controls are instituted.

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