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Remedial Investigation Work Plan – BCP ID C915286

945 Kenmore Avenue
Tonawanda, New York

December 2014 (Revised)
LCS Project #14B286.26

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REMEDIAL INVESTIGATION WORK PLAN FOR BROWNFIELD CLEANUP PROGRAM

945 KENMORE AVENUE
TONAWANDA, ERIE COUNTY, NEW YORK

BCP ID C915286

Prepared for:

945 KENMORE GROUP LLC

DECEMBER 2014 (REVISED)

REMEDIAL INVESTIGATION WORK PLAN
TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVE

The purpose of this Remedial Investigation (RI) Work Plan is to document planned investigative activities at the subject site located at 945 Kenmore Avenue in the Town of Tonawanda, Erie County, New York (Figure 1-1), referred to herein as the "Site." This work plan also includes a summary of environmental work previously completed at the Site. LCS understands that 945 Kenmore Group LLC, acting as an innocent owner, has agreed to participate in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) and has entered into a Brownfield Cleanup Agreement (BCA) for remedial investigation/remedial action. This BCA was fully executed on August 26, 2014, following the submittal and NYSDEC acceptance of a BCP application for the Site.

The objective of the remedial investigation outlined in this Work Plan is to further assess the environmental quality of the soils and groundwater within the area subject to the BCA, for which a release from liability is desired. Specifically, the objective of the remedial investigation is to define the nature and extent of contamination on-site, such that if deemed necessary, an Interim Remedial Measures/Remedial Action Work Plan for the Site can be developed and implemented.

1.2 PROJECT BACKGROUND AND SITE HISTORY

The 945 Kenmore Avenue Site encompasses approximately 0.552 acres in the Town of Tonawanda, Erie County, New York (Town of Tonawanda Parcel No. 78.34-3-15.1 in its entirety). The subject property is described as developed land with one structure, located in a highly developed, predominantly residential and commercial area north of the City of Buffalo, New York (Figure 1-2). The Site and surrounding area were historically utilized for commercial and residential purposes.

According to historical records, the Site was utilized as a gasoline station from at least 1950 to 1986 and as an automotive repair facility from at least 1958 to 2010; such operations included automotive body repair work from at least 1994 to 2010. The Site included at least four pump islands and at least six underground storage tanks (USTs): two 5,000-gallon tanks, one 10,000-gallon tank, two 3,000-gallon tanks, and one 4,000-gallon tank. Limited sampling associated with three tank removals (two 5,000-gallon tanks and one 10,000-gallon tank) identified volatile organic compounds (VOCs) at concentrations such that the NYSDEC indicated that remediation was warranted (Spill 9211433); however, it does not appear that remediation was completed. In addition, no information has been uncovered pertaining to the removals of the three remaining tanks. Furthermore, during a site inspection performed by the NYSDEC in 2013, associated with currently "active" Spill 1306828, the NYSDEC noted two suspected fill ports on-site. During a site inspection conducted by Lender Consulting Services, Inc. (LCS) on March 24-25, 2014, LCS confirmed that each of these two fill ports is currently connected to a UST. One of the tanks appeared to be mostly full of water, and the other tank contained what appears to be approximately two feet of used oil.

No information has been discovered by LCS relative to the soil and groundwater conditions at the Site upon removal of the four known pump islands. However, observations made in 2011 during utility work along the front of the Site (adjacent to three of the former pump islands) included "very strong gasoline odors" along nearly the entire front of the Site along Kenmore Avenue (Spill 1104845). Other spills reported in the utility area along Kenmore Avenue, adjacent to the former pump islands, identified gasoline and lubricating oil compounds at concentrations above NYSDEC regulatory guidance at the time in soil samples submitted for analysis, as well as observations of a sheen on the soil (Spills 8600802, 9515189, and 9211433).

Lastly, the environmental quality of soil and groundwater at the Site as a result of the historic automotive repair/auto body repair operations are unknown. Field observations suggest that environmental media have been impacted. In 2013, "floating oil, a heavy sheen, and pooled oil" were reported as "running off of" the concrete slab associated with a former building located on the western side of the Site (Spill 1306828). Upon demolition of this building, several historic hydraulic lifts were exposed in the ground, which appeared to be intact. LCS confirmed during a site inspection in March 2014 that there are at least four in-ground hydraulic lifts remaining within the building footprint. One of the lifts was surrounded by suspected heavy oil staining. During a site inspection performed as part of a Phase I Environmental Site Assessment by Hazard Evaluations, Inc. (HEI) in 2010, floor drains, a parts washer, and evidence of release was noted in this former building, including granular absorbent and oily staining surrounding a drum. Staining was also noted in the current building on the eastern portion of the Site during this inspection, as well as unlabeled drums, a floor drain, and poor housekeeping of hazardous/regulated materials.

Soils at the Site, and potentially groundwater, have been impacted by historic on-site gasoline station operations. There is evidence suggesting that the Site has also been impacted by historic automotive repair/auto body operations. The current contaminant levels at the Site are unknown. Further investigation and potential remediation of soil and/or groundwater at the Site is required.

1.2.1 Previous Studies

To date, most of the environmental work that has been completed at the Site has been related to utility work. The following section documents previous work completed at the Site to date and a summary of currently known environmental impacts at the Site. Figure 1-3 provides a summary of sampling and environmental work completed at the Site to date. Documentation pertaining to the work described in this section is located in Appendix A.

<u>August 2010 – Phase I Environmental Site Assessment (ASTM Practice E 1527-00)</u>
LCS reviewed "*Phase I Environmental Site Assessment for Commercial Property, 945 Kenmore Avenue, Tonawanda, New York*," dated August 2010, prepared by Hazard Evaluations, Inc. (HEI) for Northwest Savings Bank.

At the time of this assessment, the Site was developed with one vacant, single-story, approximate 1,995 square foot service/office building ("Western Building") and one vacant, single-story, approximate 1,702 square foot service/storage building ("Eastern Building"). This study delineated the history of the Site and its condition in 2010; findings are summarized below.

- The "Western Building" was constructed in 1947. The following were noted within the structure at the time of HEI's inspection: four garage doors, one above-ground lift, two in-ground lifts (suspected hydraulic, in eastern repair area), floor drains, and a parts washer. Staining and evidence of releases were noted proximate to the lifts and a stored drum in the eastern repair area; the drum was surrounded by a granular absorbent and oily staining.
- The "Eastern Building" was constructed in 1949. The following were noted within the structure at the time of HEI's inspection: three service bays, one above-ground mechanical lift, and floor drains. Staining was noted proximate to a compressor.
- Hazardous substances and petroleum products were noted throughout the two buildings during HEI's site inspection, including several unlabeled 55-gallon drums.
- Exterior portions of the Site included paved areas, one above-ground storage tank (AST) of unknown size on the east exterior wall of the Western Building, which was not in secondary containment; two unlabeled 55-gallon drums on the south exterior of the Western Building; and an approximate 5-inch metal lid (possibly a fill port) in the parking lot north of the Western Building. Staining and petroleum odors were noted proximate to this lid.
- The Site was serviced by public water, sewer, natural gas, and electric in at least 2010.

- The Site was utilized as a filling station from at least 1950 to 1965 and as an automotive repair facility from at least 1970 to 1998, including automotive body repair in at least 1998. The Site was vacant in at least 2010.

Regulatory and municipal listings associated with the Site which were reported in the Phase I are summarized below:

- The Site was a registered Petroleum Bulk Storage (PBS) facility (PBS 9-600023) with two underground storage tanks (USTs) identified: one 10,000 gallon gasoline tank (Tank #1) and one 5,000-gallon gasoline tank (Tank #2), both classified as closed/removed on January 1, 1993.
- Three NYSDEC Spills were reported for the Site: Spill No. 8600802, Spill No. 9211433, and Spill No. 9515189. These three spills were classified as "closed." Additional information regarding spills at the Site are discussed below.
- A permit dated July 21, 1975, indicated the replacement of one 4,000-gallon gasoline tank.
- A permit dated September 29, 1980, indicated the removal of two 3,000-gallon gasoline USTs, the filling of one 4,000-gallon gasoline UST with water, and the installation of one 10,000-gallon UST.
- A permit dated January 4, 1993, indicated the removal of one 5,000-gallon UST and one 10,000-gallon UST.

Additional municipal information reviewed by LCS pertaining to former operations included the following:

- Property record cards
- Building permit to demolish the "Western Building," dated January 4, 2012
- List of permits
- Sketch for Permit 50210, indicating the locations of two 3,000-gallon tanks, one 4,000-gallon tank, one 5,000-gallon tank, and three pump islands
- Permit to replace an attendants booth, dated September 8, 1975
- Permit to install a replacement 4,000-gallon gasoline UST, dated July 21, 1975
- Permit to remove two 3,000-gallon gasoline tanks, fill one 4,000-gallon tank with water, and install one 10,000-gallon tank, dated September 29, 1980
- Permit to remove one 5,000-gallon UST and one 10,000-gallon UST, dated January 4, 1993
- NYSDEC Petroleum Bulk Storage listing

<u>NYSDEC Spill No. 8600802</u>
LCS reviewed the NYSDEC file for Spill No. 8600802, which was reported for the Site on May 1, 1986, due to the discovery of gasoline odors and a sheen in a 6-foot excavation during replacement of a fire hydrant. According to a site sketch in the spill file, the fire hydrant was located along Kenmore Avenue due south of a pump island and associated 5,000-gallon unleaded UST and 10,000-gallon "regular" (presumably leaded) UST. There were a total of two active pump islands at the Project Site and one former pump island. The potential spiller was identified as Ken-Hy Auto. Pertinent findings are summarized below.

- A sheen was observed in the excavation, on the soil in a dump truck, and on water dripping from the dump truck. Absorbent pads were placed in the excavation.
- The property owner indicated that there were two USTs in use: one nine-year-old 5,000-gallon gasoline tank and one seven-year-old 10,000-gallon gasoline tank. The property owner indicated that the tanks are usually near empty.
- The property owner indicated that Brown Motors was located one block away from the Project Site. A representative from the Town of Tonawanda Sewer Maintenance department indicated on May 8, 1986 that the gasoline impact could only have originated from Ken-Hy Auto because "the whole area has a clay base."
- On May 21, 1986, the property owner's attorney indicated that it had not been confirmed that the spill originated from Ken-Hy Auto, and that the property owner would not be testing the tanks but instead

would be removing them. The attorney indicated that Ken-Hy Auto would be terminating gasoline sales on May 31, 1986.

- In June 1986, a representative from the Town of Tonawanda Water and Sewer Maintenance department indicated that no gasoline was spilled during the automobile accident responsible for damaging the fire hydrant, and that the gasoline came from the excavation.
- In August 1986, Marshall Tank was hired to investigate the spill. They indicated that a pump had broken, spilling approximately 200-300 gallons of gasoline.
- Upon testing the tanks in October 1986, five months after the spill was reported and a month after their statement about the broken pump, Marshall Tank identified a leak in the discharge line from the 10,000-gallon tank. The spill file includes results of a tightness test conducted on the 5,000-gallon tank on October 15, 1986, which appeared to indicate that the tank failed the test. The results of the reported testing on the 10,000-gallon tank were not included in the spill file.
- The lines in the "regular" tank were reportedly subsequently repaired between November 3 and 7, 1986, and both tanks reportedly retested. The spill file only includes results from a tightness test conducted on the 10,000-gallon tank dated December 20, 1986, which indicated that the tank passed the test; this tank was also listed as "unleaded" on the test results (previously labeled as "regular" on site sketch). It should be noted that the property owner indicated that this tank had been retested on November 8-9; the reason for the discrepancy in the dates is unknown.
- On November 14, 1986, the NYSDEC visited the Site and was told by the property owner that "the one line from the unleaded tank" had been kinked by a broken slab of concrete, eliminating this line and the entire pump island. The property owner indicated that the NYSDEC was notified to inspect the excavation of the line failure, but that no one responded. The property owner indicated that Marshall Tank indicated that the excavation was clean. The NYSDEC spill notes indicate that the cleanup was satisfactory. If any sampling was conducted, results were not provided.
- Various letters were issued by the NYSDEC in 1987 requesting results of the tank tightness tests.
- The NYSDEC spill notes indicate that documentation was received on March 19, 1987, and the spill was closed with a "meets standards" classification.
- During the course of the spill investigation, two 35-gallon drums of waste oil and sloppy housekeeping were identified behind the Eastern Building.

<u>NYSDEC Spill No. 9211433</u>

LCS reviewed the NYSDEC file for Spill No. 9211433, which was reported for the Site on January 4, 1993 (spill date listed as January 1, 1993), due to the discovery of contaminated soil during removal of one 5,000-gallon tank and one 10,000-gallon tank between the Eastern and Western buildings (herein referred to as the tank nest). The contaminated soil excavated from the tank nest was stored on-site behind the Western Building. The potential spiller was identified as Patrick Ruggiero (property owner). Pertinent findings are summarized below.

- The NYSDEC visited the Site on January 1, 1993, and indicated that the contamination visually appeared to have affected the majority of the Site via tank line failures.
- The NYSDEC visited the Site in April 1993 and was informed that Nature's Way had collected soil samples. No results were provided.
- In June 1993, the NYSDEC received a proposal from Nature's Way indicating that carbon filtration would be used to remediate water found in a 6,000-gallon UST on-site (presumably a 5,000-gallon UST, which was the only known tank remaining on-site after the January 1993 removals). Water sampled from this UST contained concentrations of benzene, toluene, ethylbenzene, and xylene (BTEX) and Total Petroleum Hydrocarbons (TPH) of 24.9 parts per million (ppm) and 21.8 ppm, respectively (*Lozier Laboratories, Report dated 1/20/93*).
- In September 1993, DiPaolo Excavating Inc. (DiPaolo) indicated that one 5,000-gallon UST remained at the Site (north of Western Building), and that all water and product had been removed and disposed of using carbon filtration. DiPaolo also indicated that the excavated tank nest had been backfilled pending remediation. DiPaolo outlined a remedial plan including cleaning and filling in-place of the remaining 5,000-gallon tank, installation of four monitoring/product recovery wells in the tank nest area, installation

of a blower or air stripper for vapor collection, and periodic sampling of the wells until the Spill Technology and Remediation Series (STARS) requirements were achieved.

- The NYSDEC was notified in July 1994 that four wells had been bailed and no product, sheen, or odor was identified, and that the vent system had not been completed.
- One 5,000-gallon gasoline tank was removed in December 1994, and soil sample(s) were collected. The results from the reported sampling were not provided to the NYSDEC. In addition, DiPaolo indicated that the tank nest would be re-excavated and confirmatory samples collected.
- A Petroleum Bulk Storage certificate dated March 23, 1995, appears to indicate that one 10,000-gallon UST and one 5,000-gallon UST were removed from the Site in January 1993, and one 5,000-gallon UST was removed from the Site in January 1995 (presumably the December 1994 removal).
- The NYSDEC received the analytical results in July 1995 for the soil sampling conducted on April 26, 1995, reportedly from the tank nest and from the area excavated during removal of the 5,000-gallon tank in December 1994 (*ACTS Testing Labs, Report dated May 4, 1995*). Samples were submitted for volatile organic compounds (VOCs) via USEPA 8021. According to the NYSDEC notes, the samples indicated "high levels" that warranted remediation. The results from both samples were above the STARS #1 guidance. It should be noted that the sample collected from the tank nest was a composite, and only one sample was collected from the area of the 5,000-gallon tank excavation (sample named west excavation). A map with the sample locations was not provided and the methods outlining how the samples were collected were not provided.
- Various letters were sent in January and February 1996 regarding the failure to remediate and the property owner's financial troubles.
- In February 1996, a representative from the Town of Tonawanda Sewer Maintenance department reported discovery of contaminated soils around the hydrant water main. The excavation was at the curb, directly opposite the tank field at Hy-Grade Auto, and extended to a depth of 10 feet below grade. Contaminated soils were reportedly observed at 2 feet below grade and at 7 feet below grade. The contamination was suspected to be the result of contamination found in the tank area located fifteen feet to the north of the fire hydrant. One soil sample was collected and submitted for analysis for STARS VOCs via USEPA 8021.
- The analytical results for the soil samples collected from the fire hydrant excavation indicated the presence of gasoline, lubricating oil, and other volatile organic compounds (VOCs) above the STARS guidance (*Kanti Technologies Inc., Report dated March 4, 1996*), but the NYSDEC did not require further work in the area of the fire hydrant due to the presence of utilities and VOC concentrations not high enough to warrant further soil removal. This incident was reported as a separate spill (Spill 9515189), and was subsequently closed out and continued under Spill Number 921143.
- In a NYSDEC update dated March 13, 1996, the NYSDEC indicated that National Fuel identified contaminated soil in a utility trench in front of Ken-Hy Auto in February, which tested positive for gasoline and lubricating oil. It is unclear if this was the same as the incident attributed to the sewer authority.
- In May 1996, the NYSDEC indicated that the proposed extraction system had been installed but had never been operational. The NYSDEC recommended penalties for failing to clean up a spill site. In August 1996, the property owner gave the NYSDEC permission to do a cleanup on the Site. Soils were reportedly scheduled to be excavated from the tank pit, based on the previous analytical results.
- Environmental Products & Services (EP&S) and the NYSDEC inspected the old tank field and staged soils at the Site in August 1996, and discovered that the wells that the tank contractor had indicated were installed in May 1994 had not been installed. One monitoring well was identified at the southeastern corner of the old tank field. EP&S indicated that they could not advance test borings via a Geoprobe in the tank pit area due to the crushed stone used as backfill; however, they would sample the existing monitoring well for VOCs. VOC levels above the NYSDEC Class GA groundwater standards were identified (*Environmental Laboratory Services, Report dated September 3, 1996*). No information regarding well construction or methods of sample collection was provided.
- EP&S removed the stockpiled soil in October 1996. Analytical results for soil samples collected from the stockpiled soil indicated the presence of gasoline and lubricating oil (*Environmental Laboratory Services, Report dated September 24, 1996*).

- EP&S resampled the well in December 1996. No VOCs were detected in the groundwater sample (*Environmental Laboratory Services, Report dated December 12, 1996*). No further action was required.
- The NYSDEC issued a letter to the property owner on November 4, 1997, indicating that based on the analytical results for the excavated soils from the tank field, the soils can be used as backfill and the spill has been closed. The spill was closed with a status of "meets standards." [It is unclear which soils the letter was referring to, as the contaminated soil pile had been removed from the Site.]

<u>NYSDEC Spill No. 9515189</u>
LCS reviewed the NYSDEC file for Spill No. 9515189, which was reported for the Site on February 26, 1996, due to the discovery of gasoline odors during excavation of a sewer line. The potential spiller was identified as Ken Hy Auto. This spill was tied into Spill 9211433 and therefore closed out the day it was reported.

<u>NYSDEC Spill No. 1104845</u>
LCS reviewed the NYSDEC file for Spill No. 1104845, which was reported for the Site on July 28, 2011, due to the discovery of gasoline contamination at the roadside under the sidewalk during preparation for a new water line. A potential spiller was not identified, but Ken Hy Auto was named as the potentially responsible party in subsequent letters written by the NYSDEC. Pertinent findings are summarized below.

- At the time of the spill report, the Project Site was not operational.
- During excavation work for the sewer line in August 2011, the contaminated was observed to start 20 feet east of the intersection "in the frontage" and continue to nearly the eastern edge of the Site. The excavation was 5 feet deep. Gasoline odors were reported as very strong in much of the soil removed. One sample was collected from a stockpile – petroleum hydrocarbons were reportedly not detected (*Upstate Laboratories, Report dated August 17, 2011, included in attached spill file*).
- Two USTs were noted to remain at the Site – described as "one in front and one in back." According to a site sketch in the spill file, one fill port was noted north adjacent to the Western Building.
- The spill was closed on December 26, 2012, with a status of "does not meet standards."

<u>NYSDEC Spill No. 1306828</u>
LCS reviewed the NYSDEC file for Spill No. 1306828, which was reported for the Site on September 1, 2013, due to the discovery of oil floating on a concrete slab after removal of the Western Building. The potential spiller was identified as 945 Kenmore LLC. Pertinent findings are summarized below.

- Four to five lifts and potential waste oil USTs were exposed after removal of the Western Building. Potential remote fill ports were identified. On a site sketch, potential fill ports were depicted on the eastern and western exterior sides of the Western Building, an oil stain was depicted on the western exterior side of the Western Building, three lifts were depicted on the southern interior side of the Western Building, one lift was depicted on the central portion of the Western Building, and one potential lift was depicted near the northeastern corner of the Western Building. A heavy sheen, pooled oil, and staining were noted as running off the slab.
- In October 2013, the NYSDEC indicated that remediation of the Site would be required.
- On December 16, 2013, the NYSDEC was informed that the property owner wished to enter the Site into the Brownfield Cleanup Program. The NYSDEC indicated that mitigation of the current spill would be needed, and suggested covering the footprint of the former building and USTs with 6-mil plastic and blocking off the area.
- On January 23, 2014, the NYSDEC was informed that the property owner agreed to cover the area of concern with plastic and restrict traffic in the area.

On March 13, 2014, LCS was instructed to begin preparations for entering the Site into the Brownfield Cleanup Program. As of the date of submission of the application, Spill No. 1306828 was classified as "active."

<u>LCS' Site Inspection</u>
On March 24-25, 2014, LCS performed an inspection at the Site to further evaluate environmental concerns. Limitations included debris and snow. The following was noted:

- The two fill ports noted during the NYSDEC's spill inspection in 2013 were identified: one on the northwestern edge of the footprint of the former Western Building and one on the southeastern edge of the footprint of the former Western Building.
- After opening the fill port on the northwestern edge of the former Western Building, LCS discovered that it was associated with an approximate 4-foot diameter (≤1,000 gallons) UST. The tank appeared to be full of water. Petroleum odors were detected.
- Upon opening the fill port on the southeastern edge of the former Western Building, LCS discovered that it was also associated with an approximate 4-foot diameter (≤1,000 gallons) UST. The tank had approximately two feet of oil product in it. Petroleum odors were detected.
- Two, possibly three, suspected cut vent pipes were identified on the southeastern edge of the former Western Building.
- A circular structure of unknown origin was identified south of the Eastern Building. This structure appeared to be encased in concrete.
- Four in-ground hydraulic lifts were identified in the footprint of the former Western Building. One of the lifts was surrounded by suspected heavy oil staining. The lifts appeared to be fully intact.
- The locations of four historic pump islands were noted.
- One permanent groundwater monitoring well was identified west of the Eastern Building.
- Due to debris in the Eastern Building, observations within this building were limited.

1.2.2 Summary of Known and Suspected Contaminants at the Site

Based on analytical results for soil samples collected from tank excavations at the Site, known contaminants at the Site include petroleum-related volatile organic compounds in soil. These previous sampling events were very limited, and did not include all areas of concern, or additional contaminants that may be present; in particular, no investigation or sampling has been performed proximate to the former pump islands and automotive repair operations. Very limited sampling has been performed proximate to the historic tanks. Known sources of the soil contamination at the Site include historic on-site gasoline station operations. Maximum contaminant levels at the Site are currently unknown.

The following table lists maximum concentrations of contaminants detected in soil and groundwater samples collected at the Site during previous spill investigations/tank removals. Based on field observations and results for samples collected from the utility area along Kenmore Avenue in front of the Site, these contaminants are suspected to still be present in soil and/or groundwater at the Site.

Contaminants Previously Identified at the Site (by USEPA 8021)

Contaminant	Media Affected	Maximum Concentration Detected * Soil: µg/kg Groundwater: µg/L
Benzene[1]	Soil	31.0 (60)
Benzene[2]	Groundwater	34.4 (1)
Toluene[1]	Soil	27.0 (700)
Toluene[2]	Groundwater	1.7 (5)
Ethylbenzene[1]	Soil	270 (1,000)
Ethylbenzene[2]	Groundwater	22.2 (5)
m,p-Xylenes[1]	Soil	730 (260, total xylenes)
o-Xylene[1]	Soil	85.0 (260, total xylenes)
Total Xylenes[2]	Groundwater	4.6 (5, total xylenes)
Isopropylbenzene[1]	Soil	35.0 (2,300)
Isopropylbenzene[2]	Groundwater	2.0 (5)
n-Propylbenzene[1]	Soil	270 (3,900)
n-Propylbenzene[2]	Groundwater	7.3 (5)
1,3,5-Trimethylbenzene[1]	Soil	780 (8,400)
1,2,4-Trimethylbenzene[1]	Soil	2,900 (3,600)
1,2,4-Trimethylbenzene[2]	Groundwater	7.2 (5)
Sec-Butylbenzene[1]	Soil	33.0 (11,000)
Sec-Butylbenzene[2]	Groundwater	0.7 (5)
p-Isopropyltoluene[1]	Soil	30.0 (10,000)
n-Butylbenzene[1]	Soil	130 (12,000)
n-Butylbenzene[2]	Groundwater	2.3 (5)
Naphthalene[1]	Soil	460 (12,000)
Naphthalene[2]	Groundwater	7.5 (10)
MTBE[2]	Groundwater	4.2 (10)

(60) = current New York State standard or guidance criteria[3]
[1] = ACTS Testing Labs, Report dated May 4, 1995, for 945 Kenmore Avenue
[2] = Environmental Laboratory Services, Report dated September 3, 1996, for 945 Kenmore Avenue
[3] = Soil Standard is CP-51 (October 21, 2010, Table 3). Groundwater Standard is NYSDEC Class GA Groundwater Criteria (6 NYCRR Part 703, June 1998 and April 2000 Addendum)

<u>Petroleum-Related Volatile Organic Compounds and Semi-Volatile Organic Compounds</u>
Analytical results for soil samples collected in the utility area adjacent to the Site identified petroleum-related volatile organic compounds in soil. Previous sampling of a monitoring well located adjacent to the tank nest identified petroleum-related VOCs in groundwater. Although a subsequent sampling event did not identify VOCs in a groundwater sample collected from this well, sufficient evidence exists to suspect that groundwater may still be impacted by VOCs. In addition, analytical results for soil samples collected from stockpiled soil excavated during tank removals on-site indicated the presence of lubricating oil; such may have included petroleum-related SVOCs. Lubricating oil was also detected in a soil sample collected from the utility area along Kenmore Avenue in the front of the Site.

Observations made during spills reported for the Site included very strong gasoline odors in the utility area along Kenmore Avenue along nearly the entire front of the Site, oil staining, a sheen in soil excavated from this utility area, pooled oil running off of the concrete slab associated with the former Western Building, poor housekeeping of petroleum/hazardous materials, staining, and apparent leaking drum(s).

LCS confirmed that there are at least two USTs currently on-site, the ages and integrities of which are unknown.

Petroleum odors were detected proximate to both fill ports, and approximately two feet of oil product was measured in one of the tanks during LCS' March 25, 2014, site inspection. Lastly, at least four in-ground hydraulic lifts remain on-site, which appeared to be fully intact. The ages and integrities of these lifts are unknown. Heavy oil staining was noted by one of these lifts.

Solvent-Related Volatile Organic Compounds

The Site was utilized for automotive repair for at least 52 years and for automotive body repair work for at least 16 years. Poor housekeeping, including unlabeled drums and evidence of releases were noted.

Polychlorinated biphenyls (PCBs)

Based on LCS' March 25, 2014, site inspection, at least four in-ground hydraulic lifts remain at the Site. Heavy staining was noted surrounding one of the lifts.

The following table lists suspected contaminants at the Site and a summary of the reasons for suspicion.

Contaminants Suspected at the Site

Contaminant	Media Affected	Reasons for Suspicion
Petroleum-related VOCs	Soil and Groundwater	Analytical results for samples collected at the Project Site[1,2,3] Analytical results for samples collected in the utility area along Kenmore Avenue[4] Observations made during NYSDEC spill inspections[5-9] At least two USTs and four in-ground hydraulic lifts currently present at the Project Site; petroleum odors detected and petroleum product and staining noted[10]
Petroleum-related SVOCs	Soil, Possibly Groundwater	Analytical results for samples collected at the Project Site[1,2,3] Analytical results for samples collected in the utility area along Kenmore Avenue[4] Observations made during NYSDEC spill inspections[5-9] At least two USTs and four in-ground hydraulic lifts currently present at the Project Site; petroleum odors detected and petroleum product and staining noted[10]
PCBs	Soil, Possibly Groundwater	At least four in-ground hydraulic lifts currently present at the Project Site[9,10]
Solvent-related VOCs	Soil, Possibly Groundwater	Historic on-site automotive repair and auto body repair operations with poor housekeeping and evidence of releases noted[11,12]

[1] = ACTS Testing Labs, Report dated May 4, 1995, for 945 Kenmore Avenue
[2] = Environmental Laboratory Services, Report dated September 3, 1996, for 945 Kenmore Avenue
[3] = Environmental Laboratory Services, Report dated September 24, 1996, for 945 Kenmore Avenue
[4] = Kanti Technologies Inc., Report dated March 4, 1996, for 945 Kenmore Avenue
[5] = NYSDEC Spill 8600802
[6] = NYSDEC Spill 9211433
[7] = NYSDEC Spill 9515189
[8] = NYSDEC Spill 1104845
[9] = NYSDEC Spill 1306828
[10] = LCS' March 24-25, 2014 site inspection
[11] = Phase I Environmental Site Assessment report by Hazard Evaluations Inc., August 2010
[12] = LCS' municipal research

1.3 SITE GEOLOGY/HYDROGEOLOGY

According to the Bedrock Geologic Map of New York State (1970), bedrock underlying the Site consists of the Upper Silurian Akron Dolostone and Salina Group; specifically, the Camillus, Syracuse, and Vernon Formations, described as shale, dolostone, salt, and gypsum. Thickness generally ranges between 400 and 700 feet. Boreholes completed with a Geoprobe direct push unit by LCS at sites within two miles of the Site generally encountered refusal at depths less than 15 feet below ground surface (ft. bgs), likely due to the presence of very stiff native clays. However, several borings which were advanced to depths ranging between approximately 20 and 35 feet below ground surface did not encounter bedrock.

According to the Surficial Geologic Map of New York State (1988), surficial deposits in the area of the Site consist of lacustrine silt and clay. Lacustrine silt and clay deposits are characterized by generally laminated, generally calcareous silt and clay, and were deposited in proglacial lakes. There is potential land instability associated with these deposits. Thickness is variable, and generally ranges up to 330 feet. Sediments encountered in boreholes completed with a Geoprobe direct push unit by LCS at sites within two miles of the Site consisted primarily of silt and clay to depths greater than 30 ft. bgs. Groundwater was encountered within several boreholes at depths ranging between approximately 10 and 20 feet below the ground surface; however, some borings were advanced to depths greater than 20 feet below ground surface and did not encounter groundwater.

According to a topographic map, regional groundwater flow in the area of the Site is likely to be to the west, towards the Niagara River.

1.4 PROJECT DESCRIPTION

This RI Work Plan outlines the scope of work (SOW) for investigation of the Site, including the field activities, rationale, and quality control/quality assurance basis for this scope of work. Additional tasks include completion of a qualitative on-site and off-site public health exposure assessment, which will be included within the final RI report. Based on the results of the RI, if additional activities pertaining to the public health exposure assessment are deemed necessary, a plan for such will be submitted under separate cover. On-site worker and community health and safety plans, including a community air monitoring plan, are included in Appendix C.

1.5 PROJECT MANAGEMENT AND ORGANIZATION

LCS will manage the Brownfield remedial investigation activities on behalf of the property owner, including selection of subcontractors for completion of the RI. The NYSDEC Division of Environmental Remediation will monitor the remedial investigation to verify that the work is performed in accordance with the Brownfield Cleanup Agreement (BCA).

1.5.1 Personnel

The general responsibilities of key project personnel are listed below.

Project Manager and Professional Engineer	Mr. Douglas Reid and Ms. Marie A. Nowak, P.E. will have responsibility for the implementation of the project.
Field Team Leader	Mr. Jeffrey Rowley will have responsibility for project management of field activities and LCS/N&C staff and coordination with the NYSDEC.
Health and Safety Officer	Mr. Jeffrey Rowley will be responsible for the preparation of the project health and safety plan, and tracking its implementation.
Quality Assurance / Quality Control Officers	Mr. Jeffrey Rowley and Ms. Margaret Popek will ensure the collection of reliable and defendable data and review data usability summary reports (DUSRs) prepared by an independent third party data validator.
Sample Team Leaders	Mr. Jeffrey Rowley and Ms. Margaret Popek will be the field personnel responsible for overseeing the collection of environmental samples.
Surveying	Mr. Michael Borowiak, PLS, will have responsibility for surveying activities.

1.5.2 Specific Tasks and Services

LCS has obtained subcontractor specialists for services relating to soil sampling and monitoring well installation, laboratory/analytical services, data validation services, and field surveying. The planned subcontractors for utilization at the Site are as follows.

Laboratory Analysis -	Accutest Laboratories
Data Validation -	Environmental Data Services, Inc.
Geoprobe®/Well Installation/Geophysical-	To be determined

1.5.3 Project Schedule

The proposed project schedule relative to the remedial investigation, including the associated reporting, is included as Table 1. If appropriate, based on the results of the remedial investigation, remediation of the site may occur as an interim remedial measure rather than as a remedial action. If this path is chosen, an interim remedial measure work plan with a brief summary of the results of the remedial investigation would be submitted to the NYSDEC and NYSDOH for review, and the interim remedial measure would begin immediately upon approval of the work plan. The Remedial Investigation Report and Alternatives Analysis Report recommending no further action would then be included as sections in the Final Engineering Report. This would decrease the number of individual report submittals and public comment periods required. If this path is chosen, a revised timeline will be included with the Interim Remedial Measure Work Plan.

2.0 REMEDIAL INVESTIGATION SCOPE AND RATIONALE

The purpose of the field activities is to better determine the environmental quality of the overburden soils and groundwater such that if deemed necessary, an interim remedial measure/remedial action work plan can be designed for the Site. On-site field activities will include the completion of a ground-penetrating radar (GPR) survey over the Site, direct-push (e.g., Geoprobe®) soil sampling, installation of permanent groundwater monitoring wells using hollow stem auger drilling methods, groundwater sampling of newly installed monitoring wells, collection of hydraulic data, completion of a site survey of key features and sample points, and monitoring of VOC and dust concentrations in air. If necessary, soil sampling may also be completed via hollow stem auger drilling methods and/or completion of test pits utilizing a backhoe or excavator.

The field activities are focused on collecting current environmental data and supplementing data from previous work on-site to obtain a better understanding of current on-site conditions. Environmental sampling and other field activities will be performed in general accordance with the techniques outlined below. A listing of appropriate guidance documents are appended to this document.

The estimated number of samples collected for analytical testing from each environmental media, including appropriate quality assurance samples, is summarized in Table 2. Locations of proposed direct push boreholes are shown on Figure 2-1; locations are subject to change pending the results of the proposal geophysical survey and utility mark-out. Locations of the proposed permanent groundwater monitoring wells will be chosen following review of the analytical results for the soil samples collected from the direct push test borings.

Note that the Eastern Building remains on-site; such will be demolished as part of site redevelopment.

The following field activities are planned.

2.1 PRE-INVESTIGATION TASKS

Several tasks will be completed prior to the on-site investigation. These tasks include obtaining any necessary permits, notifying Dig Safely New York to locate buried utilities, constructing a temporary decontamination pad on-site, reviewing the HASP (Appendix C), inspecting the site for potential health and safety hazards, and marking proposed borehole locations.

2.1.1 Decontamination Pad

Prior to the initiation of intrusive field activities, a temporary equipment decontamination pad will be constructed by the drilling subcontractor in the equipment decontamination area. The decontamination pad will be constructed so that liquid and solid wastes can be contained and subsequently collected. The decontamination pad will be constructed using wood and high-density polyethylene (HDPE) plastic or similar material as a barrier with raised berms on each side to contain decontamination water and constructed of a sufficient size to accommodate any equipment to be decontaminated. The pad will be equipped with a sump area to allow for ready collection of decontamination waters. Decontamination wastes will be stored in covered drums located adjacent to the decontamination pad. [Testing of the decontamination water for eventual disposal will be completed at a later date.] The decontamination pad will be reconstructed as necessary to maintain its integrity. The decontamination area will be chosen based on field conditions. Equipment will be decontaminated as specified in Section 3.8 of this work plan.

2.2 GEOPHYSICAL SURVEY

All readily accessible exterior portions of the Site will be surveyed utilizing a combination of ground-penetrating radar (GPR) and utility tracing instruments. The geophysical survey will better assist in determining the number and sizes of the historic USTs and in-ground hydraulic lifts present on-site, and in determining if additional structures of potential concern are present (i.e., oil/water separators, drain discharge piping). The geophysical survey will also assist in the identification of underground utilities proximate to the anticipated soil boring locations.

2.3 DIRECT PUSH SAMPLING

Up to twenty direct push test borings will be advanced to approximately 20 ft. bgs. or until equipment refusal is encountered, whichever occurs first. Test borings will be conducted in accordance with SOPs as defined in Section 3.1 of this work plan. Refer to Section 3.1 for a discussion of alternate soil sampling methods if equipment refusal is encountered before a depth of 20 ft. bgs. Refer to Figure 2-1 for proposed test boring locations. Boreholes will be designated as follows:

BCP BH # – Boreholes proposed for this investigation.

2.3.1 Subsurface Soil Samples

Based on previous analytical testing, VOCs commonly associated with petroleum are located on-site.

Twelve subsurface soil samples will be collected on-site for analytical testing parameters comprised of Target Compound List (TCL) and Final Commissioner Policy-51 (CP-51) list VOCs, TCL semi-volatile organic compounds (SVOCs), Target Analyte List (TAL) metals with cyanide, and polychlorinated biphenyls (PCBs) using SW-846 methods and Category B deliverables.

2.4 MONITORING WELL INSTALLATION/GROUNDWATER SAMPLING

According to LCS' file review for the Site, groundwater quality on-site has not been adequately assessed. This investigation will include installation of five permanent overburden groundwater monitoring wells. Monitoring wells will be installed following receipt of the analytical results for the soil samples collected from the direct push test borings (Section 2.3), such that appropriate locations for the monitoring wells can be determined and the locations approved by the NYSDEC. Monitoring wells installed during this investigation will be designated as follows:

BCP MW - Monitoring well proposed for this investigation

2.4.1 Monitoring Well Installation

Groundwater monitoring well installations will be conducted in accordance with SOPs as defined in Section 3.2 of this work plan. Five monitoring wells will be installed on-site to straddle the groundwater table when constructed with a 10-ft. screened interval to a depth not greater 20 ft. bgs. Monitoring wells will be installed with the screened interval spanning the groundwater/vadose zone interface.

2.4.2 Groundwater Sampling

Groundwater sampling will be conducted in accordance with SOPs as defined in Section 3.3 of this work plan. The newly installed monitoring wells will be sampled for analytical testing parameters comprised of TCL and CP-51 list VOCs, TCL SVOCs, TAL metals with cyanide, and PCBs using SW-846 methods and Category B deliverables. These samples will be collected to document the condition of on-site groundwater for general site characterization and to assess groundwater quality on-site.

2.5 HYDRAULIC ASSESSMENT

Hydraulic data, including determination of hydraulic conductivity and estimated groundwater flow direction, will be collected. Hydraulic conductivity data will be collected from each newly installed well. Such will be collected employing a slug test or pump test method as described in Section 3.7 of this work plan.

2.6 SURVEY

Vertical and horizontal control will be established for newly installed monitoring wells and completed test borings as well as the limits of the property. The survey will also identify other site features, structures, etc. where horizontal and/or vertical measurements are required. Vertical measurements will include the ground surface, top of casing, and top of riser at each monitoring well and the ground surface only at the test borings/soil sampling locations. A mark made into the north side of the top of the riser will serve as the water level monitoring point. Vertical measurements will be made relative to the National Geodetic Vertical Datum. Monitoring point measurements and top of protective casing measurements will be accurate to within 0.01 foot. Horizontal measurements will be accurate to within 0.1 foot.

Data from the land survey will be utilized for the development of a base map. The base map will include site boundary lines and other key site features. The site property lines will be determined via a boundary survey.

2.7 SCHEDULE

It is anticipated that the field work phase of this project will require approximately ten field days, which will not be consecutive. Please refer to Table 1 for an anticipated project schedule pertaining to the remedial investigation.

3.0 SITE INVESTIGATION PROCEDURES AND RATIONALE

The fieldwork is focused on collecting high-quality current environmental data and supplementing information from previous work on-site to obtain a better understanding of current site specific conditions. Environmental sampling and other field activities will be performed in general accordance with the appropriate techniques as outlined below. Appropriate guidance documents are appended to this document. All work will be conducted according the SOPs as described in this work plan and according to the HASP (Appendix C).

Table 2 contains a list of the media to be sampled and the expected number of samples, including those required for quality assurance/quality control, for each matrix.

3.1 TEST BORINGS

Test borings will be advanced into the overburden using direct-push (i.e., Geoprobe) methods. Samples will be obtained by driving an approximate two-inch outside diameter (O.D.) by 48-inch long steel sampling rod equipped with a dedicated liner into the ground. The sampler will be driven its entire length (unless refusal is encountered) with a hydraulic and percussion drive system mounted to a pick-up truck. No drilling fluids will be used during Geoprobe work. This technique generates limited spoil; however, any spoil or excess samples will be containerized for future characterization and/or disposal.

In anticipation of a Track 2 Residential or Restricted-Residential Soil Cleanup Objective being chosen for the Site, boreholes will be advanced to a depth of approximately 20 feet below ground surface (ft. bgs) such that the upper fifteen feet of the subsurface can be characterized. If groundwater is not encountered within the upper 20 feet of the subsurface, test borings will not be advanced deeper than 20 ft. bgs in an attempt to characterize the environmental quality of on-site groundwater; the Volunteer acknowledges that without the characterization of the environmental quality of groundwater, a Track 1 Unrestricted Cleanup Objective will not be attainable and an environmental easement, deed restriction, and/or site management plan may be required with the Track 2 Restricted Cleanup.

If equipment refusal with the direct push method is obtained before test borings can be advanced to a depth of at least 20 ft. bgs, provisions will be made for alternate soil sampling methods to meet this target depth; such will include either completion of additional test borings with hollow stem auger drilling methods or completion of test pits with a backhoe or excavator. If such provisions are required after the initial attempt at completing the twenty planned borings with the direct push method, a plan will be submitted to the NYSDEC and NYSDOH for approval.

Soil samples will be classified by LCS in the field by visual examination in general accordance with the Unified Soil Classification System (USCS) (visual-manual method) soil description procedure. A log of each boring will be prepared with sample identification, sample depth interval, recovery and date. A sample subsurface log is included in Appendix B.

As detailed above, the direct-push and hollow stem auger rig, backhoe/excavator, tools, sample rods, etc. will be decontaminated between holes at an on-site temporary decontamination pad constructed in an area acceptable to the NYSDEC.

3.1.1 Borehole Abandonment

Following the completion of each borehole, the driller will abandon the borehole location using excess soil removed from the borehole. The surface will then be restored with native soil or repaired with asphalt cold patch, if applicable.

3.2 MONITORING WELL INSTALLATION

Overburden monitoring wells will be constructed of 2 inch I.D. flush jointed Schedule 40, PVC riser and screen. The actual installation depth of the screen will be selected based upon the intended purpose of the well (the zone to be monitored), observation of subsurface materials and headspace screening test results. The screen will consist of a maximum 10-foot long section of 0.010-inch factory slotted PVC. The actual length of the well screen may vary depending upon subsurface conditions encountered. Attempts will be made to limit the well screen to the zone being monitored. Schematics of the well construction details are provided in Appendix B.

Following determination of the monitoring zone and placement of the assembled screen and riser, the annular space of the borehole will be backfilled. Generally, this will include the placement of a sand filter pack consisting of Morie #0 sand around the well screen such that the sand extends a minimum of 1 foot above the top of the screen. A minimum 3-foot layer of bentonite pellets will be placed above the sand filter, tap water will be poured over pellets and they will be allowed time to hydrate. A mixture of cement/bentonite extending to about 3 feet below the ground surface will be placed above the bentonite seal. The monitoring well will be completed by placing a flush-mounted protective casing over the riser. Each riser pipe will be secured using an expandable plug capable of being locked

Materials used in well installation will be stockpiled in an on-site storage area (provided a secure and appropriate location can be identified) for use as necessary. Items will be brought to the site clean and in like-new condition and kept clean and in satisfactory condition for potential use. Well materials (screen and riser pipe), will not be cleaned on-site prior to use unless the protective wrap is compromised. The cleaning procedure (if necessary) is described in Section 3.8. Following cleaning, well materials will be wrapped in clean plastic sheeting for transportation to the well location. Site personnel handling well equipment after cleaning are required to wear clean rubber gloves. A typical well installation diagram is included in Appendix B.

3.3 GROUNDWATER SAMPLING

Groundwater sampling from the newly installed monitoring wells includes initial recording of data, purging of the well, and collection of the sample. The text below addresses these items. Installation of monitoring wells is discussed in Section 3.2.

3.3.1 Initial Data Recording

Groundwater sampling begins by locating the well to be sampled and recording the appropriate field data, as summarized below.

- Observations of the well (conditions of cap, collar, casing, etc.) and the ambient conditions (weather, surrounding area, date and time, sampling crew members, and observers, if any.) Refer to Section 6.0 for information to be recorded in the field notebook.
- Removing the well and well plug cover, surveying ambient air, upwind air, and air directly at the top of the well
- Taking a water level measurement, noting the reference point from which the measurement is made (typically a mark on the north lip of the inner casing).
- Sounding the bottom of the well and agitating/loosening accumulated silt/sediment (this assumes sounding indicates minimal sediment accumulation and no need for well redevelopment).

3.3.2 Well Development/Purging

Each newly installed overburden monitoring well will be developed prior to sampling. The wells will be developed to remove residual sediments and to ensure good hydraulic connection with the water-bearing zone. Monitoring wells will be developed after a minimum of two days subsequent to installation (to allow grout utilized in well installation to set). Monitoring wells will be developed as follows:

After the initial observations are recorded, the total volume of water within the well is calculated. The well is then purged of at least three well volumes of standing water. Purging will be accomplished by bailing and/or pumping, using a centrifugal pump connected to dedicated Teflon® tubing connected to a foot valve set within the well, to remove water from the well. Prior to removal of the first volume of water, and after each subsequent volume of water removed, field parameters (pH, turbidity, temperature and specific conductance) will be measured and recorded to document the presence of representative water in the well (i.e., equilibration to steady readings), or as an indicator that conditions have not reached a steady state. Prior to sample collection, the variability of field testing results between successive well volumes should not vary by more than 10% for turbidity and specific conductance, $\pm$0.2 units for pH, and $\pm$0.5^{o}C for temperature. The turbidity objective is less than 50 nephelometric turbidity units (NTUs); if parameters are stable but turbidity is still greater than 50 NTU, purging will continue until 50 NTU is achieved, or five well volumes are evacuated (whichever comes first). A minimum of three well volumes and a maximum of five volumes will be removed from each well prior to sampling.

In the event that groundwater recharge is slow, the purging process will continue until the well is purged "dry". After the water level has returned to its pre-purge level (or within a maximum of two hours), samples will be collected. If the water level is slow to recharge and does not reach to its pre-purge level within two hours, then samples can be collected after sufficient water has recharged, and the degree of recharge indicated in field notes with time and depth to water noted.

3.3.3 Groundwater Sampling

Prior to groundwater sampling, monitoring wells will have been developed in accordance with the SOPs described in Section 3.3.2. Bailers will be used for sample collection and will be equipped with a bottom check-valve. Bailers will be dedicated and made of disposable PVC. Bailers will be clean upon arrival at the site, therefore, site decontamination of bailers will not be necessary. Bailers will be lowered gently with minimal water agitation into the well with dedicated polyethylene or polypropylene line.

Sample Collection

Once field parameters are within specific limits as described within Section 3.3.2, groundwater will be collected for analysis. Groundwater for VOC analysis will be collected first.

Two or three (depending on laboratory-specific requirements) 40-ml glass vials (with Teflon septa) will be used to collect samples for VOCs. The vials will be filled by gently pouring water from the top of the bailer into the vial until a convex meniscus is formed. The vials will be filled concurrently, alternating between vials. The vials will then be capped, inverted and inspected for air pockets/bubbles that may be present on the inside surfaces of the vial. If any bubbles or aggregate of bubbles are observed, then a new sample will be obtained either using a new vial or the same vial.

Subsequent sampled water will be collected for the remaining analyses. The remaining sample bottles will be filled sequentially in the following order:

- Semi-volatile organic compounds (SVOCs);
- PCBs;
- TAL metals;
- Cyanide

Sample bottles are discussed in more detail in Section 4.0.

3.4 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC) SAMPLING

In order to provide control over the collection of environmental measurements and subsequent validation, review and interpretation of generated analytical data, QA/QC samples are required.

3.4.1 Non-Aqueous Matrix

Equipment (Rinsate) Blanks

The purpose of this sample is to assure proper decontamination of the soil sampling equipment. The performance of rinsate blanks requires two sets of identical bottles; one set filled with demonstrated analyte-free water provided by the laboratory and one empty set of bottles. The bottles will be either 40 ml septum vials or 1L wide mouth bottles. At the field location, in an area suspected to be contaminated, the water will be passed from the full set of bottles through the decontaminated sampling devices (steel macrocore sampler) into the empty set of bottles. This will constitute identical bottle-to-bottle transfer. The blanks must be preserved in the same manner as samples and will only be analyzed for volatile organics. One rinsate blank will be collected for every 20 soil samples submitted to the laboratory or one each week, whichever is more frequent. For logistical purposes, the laboratory will provide at least one additional 40 ml vial to perform the field blank.

Trip Blanks

Trip blanks will not be required for non-aqueous matrix samples.

Duplicate Samples

The purpose of this sample is to assess the quality of the laboratory analyses. Field duplicate non-aqueous matrix samples will be collected at a frequency of one per 20 soil samples submitted to the laboratory for analysis. These samples will be collected on different days (first and last days). Obtaining duplicate samples in soil requires homogenization of the sample aliquot prior to the filling of sample containers. Regardless, volatile organic samples must always be taken from discrete locations or intervals without compositing or mixing.

Homogenization and sample collection will be accomplished as discussed in section 3.7. Each duplicate soil sample will be analyzed for each of the analytical parameters for the respective sample location. All duplicate samples must be submitted to the laboratory as blind samples. A note within the field log shall be made referencing the sample location of all duplicate samples (e.g., DUP1 = BH 1 6-8 ft.).

3.4.2 Aqueous Matrix

Equipment (Rinsate) Blanks

The performance of field blanks requires two sets of identical bottles; one set filled with demonstrated analyte free water provided by the laboratory and one empty set of bottles. The bottles should be either 40 ml septum vials or 1L wide mouth bottle. At the field location, in an area suspected to be contaminated, the water is passed from the full set of bottles through the decontaminated sampling devices (disposable bailer) into the empty set of bottles. This will constitute identical bottle-to-bottle transfer. Field blanks must be preserved in the same manner as samples and will be analyzed for all the same parameters as samples collected that day. One field blank will be collected per week. For logistical purposes, the laboratory will provide at least one additional 40 ml vial to perform the field blank. Aqueous water samples will be analyzed for volatile organics only.

Trip Blanks

The purpose of the trip blank is to determine whether the sample vials and/or samples have been impacted by contaminants throughout their use. Trip blanks consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte free water. These bottles will accompany the bottles that are prepared at the lab into the field and back to the laboratory, along with the collected samples for analysis. These bottles are never to be opened by LCS personnel. Each trip blank will be analyzed for volatile organic parameters only. Trip blanks must be included at a rate of one per sample shipment except that a trip blank is not required when the only aqueous samples in a shipment are QC samples (rinsate blanks).

Duplicate Samples

The purpose of these samples is to assess the quality of the laboratory analyses. Duplicate aqueous matrix samples will be collected at a frequency of one per 20 environmental samples submitted for laboratory analysis.

Each duplicate sample should be created by alternating filling sample containers in nearly equal portions. This will help to assure that the two samples are homogenous.

3.5 AIR SURVEILLANCE AND MONITORING

Air surveillance, via screening of volatile compounds (VOCs) and particulate concentrations (i.e., dust) for health and safety concerns will be performed with portable Photovac photoionization detectors (PID) and DustTrack air monitoring stations. Continuous monitoring of VOC and dust concentrations will be performed at areas both upwind and downwind of the work area during all invasive activities, such as drilling, monitoring well installation, building demolition, and soil sampling. Periodic monitoring of VOC concentrations will be performed with a PID during non-invasive activities such as completion of the geophysical survey, well development, and well sampling. Additional details are presented in the site specific HASP (Appendix C).

3.6 SOIL AND SOIL VAPOR SAMPLING

Test Boring/Geoprobe soil will be sampled by opening the PVC liners (direct push), bisecting the core (if intact) vertically down the middle with a cleaned sharp knife or similar blade, and scooping sufficient sample from the long axis of the split core with a decontaminated stainless steel spoon or spatula. If the core is not intact, then upon opening the barrel the contents can be scooped directly with the spoon or spatula. Samples for VOCs will be collected and transferred to sample containers immediately after opening and bisecting the core. If the core consists of native soils as well as fill materials (excluding asphalt, asphalt-based gravel, and concrete), representative portions of the native soils and the fill materials will be collected from the core. There may also be situations where it will be appropriate to grab-sample specific zones due to textural variations, the presence of apparent staining, or "hot spot" preliminary screening results. Soil samples collected for analysis, with the exception of those for VOCs, will be homogenized. The homogenization will be completed by removing the soil from the sampling equipment and transferred to a clean surface (steel pan, bowl, etc.) and mixed to provide a more homogeneous sample to the lab. The soil will be scraped from the sides, corners, and bottom of the clean surface, rolled to the middle, and thoroughly mixed until the material appears homogenous. An aliquot of this mound will then be transferred to the required sample containers, slightly tamped-down, filled to near the top of the container, and sealed with the appropriate cap. Any soil or sediment on the threads of the container will be wiped off with a clean paper towel or equivalent prior to placing the cap on the sample container.

VOC soil samples will not be mixed, but will be placed directly from the sampling equipment into the sample container (a 4 oz. wide mouth glass jar) in a manner limiting headspace by compacting the soil into the container. Samples for VOC analysis will be placed into the appropriate container prior to sample homogenization for the remaining analyses.

3.6.1 Headspace Screening

Soil screening will be performed by headspace screening with the PID. A representative portion of each two-foot sample interval will first be collected for potential VOC analysis and containerized to minimize loss of potential VOC constituents present in the soil sample. The remainder of each sample interval will be placed into PVC container bags and allowed to equilibrate to ambient temperature. The container will be slightly opened and the PID probe will be placed within the headspace of the container to allow for a reading of the VOCs within the headspace. The PID readings will be recorded on the subsurface logs and the field book.

3.6.2 Soil Vapor Sampling

Completion of soil vapor sampling will not be completed as part of the Remedial Investigation, as the extent of the anticipated soil excavation is not yet known; areas on-site which may present a possible soil vapor exposure concern may be part of the anticipated soil excavation in order to meet the Soil Cleanup Objectives for this site. Completion of soil vapor sampling will be completed after the Remedial Investigation, either before or after any Interim Remedial Measure or Remedial Action, if the NYSDEC and NYSDOH require such after review of the results of the Remedial Investigation. If required, a work plan for completion of a soil vapor assessment will be provided to the NYSDEC and NYSDOH for review at that time. Any soil vapor assessment will be completed in accordance with the NYSDOH "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York," dated October 2006.

3.7 HYDRAULIC ASSESSMENT

Hydraulic assessment includes the completion of hydraulic conductivity tests and measurement of water levels in monitoring wells.
Hydraulic conductivity testing will be done on the newly installed monitoring wells using a variable head method. Variable head tests will be completed using a stainless steel or PVC slug to displace water within the well or by removing water from the well with a bailer or pump. The recovery of the initial water level is measured with respect to time. Data obtained using this test procedures will be evaluated using procedures presented in "The Bouwer and Rice Slug Test - An Update", Bouwer, H., Groundwater Journal, Vol. 27, No. 3, May-June 1989, or similar method.

Water level measurements will include measuring the depth of water within the wells from a monitoring point mark of known elevation established at the top of the well riser. The depth to surface water will be measured relative to the monitoring point. The water elevations will then be calculated based on the known elevation and measured depth to water. Wells will be allowed to equilibrate a minimum of 48 hours after purging or testing prior to measuring the water level.

3.8 EQUIPMENT DECONTAMINATION

To avoid cross contamination, non-dedicated sampling equipment (defined as any piece of equipment that may contact a sample) will be decontaminated according to the following procedures outlined below.

3.8.1 Non-Dedicated Reusable Equipment

Non-dedicated reusable equipment such as knives, steel macrocores, stainless steel mixing bowls and spoons, pumps used for groundwater evacuation (and sampling, if applicable), etc. will require field decontamination. Acids and solvents will not be used in the field decontamination of such equipment. Decontamination typically involves scrubbing/washing with a laboratory grade detergent (e.g. Alconox) to remove visible contamination, followed by potable (tap) water and analyte-free water rinses (as provided by the analytical laboratory). Tap water may be used from any treated municipal water system. Equipment will be allowed to air dry prior to use. Steam cleaning or high pressure hot water cleaning may be used in the initial removal of gross, visible contamination. Any tubing will be dedicated (new tubing will be used for each well).

3.8.2 Disposable Sampling Equipment

Disposable sampling equipment includes disposable bailers, bailer cords, direct push sampling tubes, tubing associated with groundwater sampling/purging pumps; etc. Such equipment will not be field-decontaminated; equipment other than bailers may be rinsed with laboratory-provided analyte-free water prior to use. Non-disposable spoons or spatulas will be decontaminated using steam or high pressure hot water rinse, followed by analyte free water rinse. The equipment will be allowed to air dry prior to use.

3.8.3 Heavy Equipment

Certain heavy equipment such as Geoprobe sampling tubes, drilling augers, etc., may be used to obtain samples. Such equipment will be subject to high pressure hot water or steam cleaning between uses. A member of the sampling team will visually inspect the equipment to check that visible contamination has been removed by this procedure prior to sampling. The drilling rods will be cleaned between test borings; decontamination between samples at a single test boring will not be done. Samples submitted for analysis will not include material that has been in contact with the sampling tubes/drilling augers. Decontamination of heavy equipment will be completed on the decontamination pad.

3.8.4 Monitoring Well Construction Materials

Well construction materials including well screens, well riser and end caps/tailpieces will not be cleaned prior to installation unless the plastic packaging is damaged. If decontaminating of the well piping is deemed necessary, it will be washed by steam cleaning or high pressure hot water rinse. If necessary, the cleaned materials will then be wrapped in plastic to limit the potential for contamination.

3.9 STORAGE AND DISPOSAL OF INVESTIGATION-DERIVED WASTE

The sampling methods and equipment selected limit both the need for decontamination and the volume of waste material to be generated. Personal protective equipment and disposable sampling equipment will be placed in plastic garbage bags for disposal as a solid waste.

Excess soil cuttings not returned to the borehole and from the decontamination pad will be drummed and stored on-site for future characterization and/or disposal. The NYSDEC will be contacted for approval of the disposal method.

Excess well purge water and decontamination water will be drummed for testing prior to determining disposal details. It is currently assumed that any waters can eventually be discharged through the municipal sanitary sewer system.

3.10 SURVEY

The survey of the Site will include a layout survey at the project onset for the exploration locations, and will also include development of a base map. The base map will include property lines and other key site features. The Site property lines will be obtained via a boundary survey.

A site survey will be completed to measure the vertical and horizontal locations of the new monitoring wells and test borings, and the limits of the property. Vertical measurements will include the ground surface, top of casing and top of riser. The top of riser will serve as the water level monitoring point. Vertical measurements will be made relative to the National Geodetic Vertical Datum. Monitoring point measurements and top of protective casing measurements will be accurate to within 0.01 foot. Horizontal measurements will be accurate to within 0.1 foot.

4.0 SAMPLE HANDLING

4.1 SAMPLE IDENTIFICATION/LABELING

Samples will be assigned a unique identification using the sample location or other sample-specific identifier. The general sample identification format follows.

SL-XX-YY

Where:

SL = Location identifier (see below)

BCP BH = Geoprobe direct push boring installed as part of this investigation
BCP MW = Groundwater monitoring well installed as part of this investigation
EB = Equipment (Field Rinsate) Blank
TB = Trip Blank

XX = Numerical location identifier (1 or 2 characters). This will ordinarily be a number corresponding to the probe, well, etc. location.

YY = Numerical sample identifier (2 or 3 characters). This will ordinarily be the depth or depth interval at which the sample was collected.

QC field duplicate samples will be submitted blind to the laboratory; a fictitious sample ID will be created using the same system as the original. The sample identifications (of the original sample and its field duplicate) will be marked in the field book and on the copy of the chain-of-custody kept by the sampler and copied to the project manager. To the extent possible, sample containers will be labeled in the field prior to the collection of samples (the exact depth of soil samples to be collected are unknown, thus these containers cannot be fully labeled prior to collection). Affixed to each sampling container will be a non-removable label on which the following information will be recorded with permanent water-proof ink.

- Site name, location, and job number;
- Sample identification code;
- Date and time;
- Sampler's name;
- Preservative;
- Type of sample (e.g., water, soil, sludge, sediment); and
- Requested analyses.

4.2 SAMPLE, BOTTLES, PRESERVATION, AND HOLDING TIME

Table 3 specifies the analytical method, matrix, holding time, containers, and preservatives for the various analyses to be completed. Sample bottle requirements, preservation, and holding times are discussed further below.

4.2.1 Sample Bottles

The selection of sample containers used to collect samples is based on the criteria of sample matrix, analytical method, potential contaminants of concern, reactivity of container material with the sample, QA/QC requirements and any regulatory protocol requirements. All sample containers will be certified clean as provided by the analytical laboratory under sample bottle tracking sheets.

4.2.2 Sample Preservation

Samples will be preserved as detailed below and summarized on Table 3.

Soil Samples

Analytical (all analyses) - cooled to 4 +/-2^{o}C with ice; VOC extractions will be performed in the field with sodium bisulfate and methanol added. No chemical preservatives will be used for the remaining analyses.

Aqueous Samples

Volatile Organics (VOCs) - cooled to 4 +/-2^{o}C; HCl added.

Semi-volatile organics - cooled to 4 +/-2^{o}C; no chemical preservatives added.

PCBs/Pesticides - cooled to 4 +/-2^{o}C; no chemical preservatives added.

Metals - HNO_3 to pH $\leq$2; cool to 4 +/-2^{o}C.

Chemical preservatives will be added to the sample bottles (prior to sample collection) by the analytical laboratory. Sample preservation is checked upon sample receipt by the laboratory; this information is reported to the LCS quality assurance officer within two business days of sample receipt. If it appears that the level of chemical preservation added is not adequate, laboratory preservative preparation and addition will be modified or additional preservative will be added in the field by the sampling team.

Liquid Product Samples

Liquid product samples, if collected, will not require preservatives. At this time, no liquid product samples are anticipated to be collected.

4.2.3 Holding Times

Holding times are judged from the verified time of sample receipt (VTSR) by the laboratory; samples will be shipped from the field to arrive at the lab no later than 48 hours from the time of sample collection. Holding time requirements will be those specified in the NYSDEC Analytical Services Protocol (ASP) (June 2000); it should be noted that for some analyses, these holding times are more stringent than the holding time for the corresponding USEPA method. Holding times for analytical parameters are included on Table 3.

Although trip blanks are prepared in the analytical laboratory and shipped to the Site prior to the collection of environmental samples, for the purposes of determining holding time conformance, trip blanks will be considered to have been generated on the same day as the environmental samples with which they are shipped and delivered. Procurement of bottles and blanks will be scheduled to prevent trip blanks from being stored for excessive periods prior to their return to the laboratory; the goal is that trip blanks should be held for no longer than one week prior to use.

4.3 CHAIN OF CUSTODY AND SHIPPING

A chain-of-custody form will trace the path of sample containers from the Site to the laboratory. Sample/bottle tracking sheets or the chain-of-custody will be used to track the containers from the laboratory to the containers' destination. The project manager will notify the laboratory of upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. All sample bottles within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory. Project personnel receiving the sample containers from the laboratory will check each cooler for the condition and integrity of the bottles prior to field work.

Once the sample containers are filled, they will be immediately placed in the cooler with ice (in sealable plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at 4 ^{o}C. The field sampler will indicate the sample designation/location number in the space provided on the chain-of-custody form for each sample. The chain of custody forms will be signed and placed in a sealed plastic sealable bag in the cooler. The completed shipping container will be closed for transport with shipping tape, and two paper seals will be affixed to the lid. The seals must be broken to open the cooler and will indicate tampering if the seals are broken before receipt at the laboratory. A label may be affixed identifying the cooler as containing "Environmental Samples" and the cooler will be picked up by, shipped by an overnight delivery service to or hand delivered to the laboratory. When the laboratory receives the coolers, the custody seals will be checked and lab personnel will sign the chain-of-custody form and provide one copy to the Project Manager to verify receipt.

5.0 DATA QUALITY REQUIREMENTS

5.1 ANALYTICAL METHODS

Analyses for volatile and semi-volatile organic compounds, and inorganics (metals and cyanide) will utilize USEPA SW-846 methods as follows:

Volatile Organics (TCL + CP-51)	SW-846 8260B
Semi-volatile Organics	SW-846 8270C
PCBs	SW-846 8082
Metals	SW-846 6010C/7470A/7471B
Cyanide	SW-846 9012

Analytical methods used during this project are presented in the NYSDEC Analytical Services Protocol (ASP), July 2005. Specific methods and references for each parameter are shown above. It is the laboratory's responsibility to be familiar with this document and procedures and deliverables within it.

LCS has subcontracted an analytical laboratory approved by NYSDEC. A single laboratory (Accutest Laboratories) will be utilized. Accutest is certified by the NYSDOH Environmental Laboratory Approval Program and is in good standing for all the ASP/CLP parameter groups.

5.2 QUALITY ASSURANCE OBJECTIVES

Data quality objectives (DQOs) for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this document will be used in assessing the uncertainty associated with decisions related to this site.

5.2.1 Sensitivity

The sensitivity or detection limit desired for each analysis or compound is established by NYSDEC as part of the ASP-CLP. It is understood that such limits are dependent upon matrix interference. Quantitation limits are defined for each parameter and matrix within the NYSDEC ASP.

5.2.2 Precision

The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on similar samples. Precision is evaluated by the analyses of laboratory and field duplicates. Laboratory duplicate analyses will be performed once for every twenty samples for metals as specified in the NYSDEC ASP.

Relative Percent Difference (RPD) criteria, prescribed by the NYSDEC, and those determined from laboratory performance data, are used to evaluate precision between duplicates. A matrix spike duplicate will be performed once for every twenty samples for volatile organics.

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is usually stated in terms of standard deviation but other estimates such as the coefficient of variation, relative standard deviation, range (maximum value minus minimum value), and relative range are common, and may be used pending review of the data.

Overall system (sampling plus analytical) precision will be determined by analysis of field duplicate samples. Analytical results from laboratory duplicate samples will provide data on measurement (analytical) precision.

Precision will be determined from field duplicates, as well as laboratory matrix duplicate samples for analyses, and matrix spikes and matrix spike duplicates for organic analyses. It will be expressed as the relative percent difference (% RPD):

$$\% \text{ RPD} = 100 \times (X_1 - X_2) / (X_1 + X_2)$$

where:

X_1 and X_2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values.

Criteria for evaluation of laboratory duplicates are specified in the applicable methods. The objective for field duplicate precision is $\leq$ 50% RPD for all matrices.

5.2.3 Accuracy

The laboratory objective for accuracy is to equal or exceeding the accuracy demonstrated for the applied analytical method on similar samples. Percent recovery criteria, published by the NYSDEC as part of the ASP, and those determined from laboratory performance data, are used to evaluate accuracy in matrix (sample) spike and blank spike quality control samples. A matrix spike and blank spike will be performed once for every sample delivery group (SDG) as specified in the ASP. This will apply to inorganics and volatile and semi-volatile organics analyses. Other method-specific laboratory QC samples (such as laboratory control samples for metals, and continuing calibration standards) may also be used in the assessment of analytical accuracy. Sample (matrix) spike recovery is calculated as:

$$\%R = (SSR - SR)/SA \times 100,$$

where:

SSR = Spiked sample Result
SR = Sample Result, and
SA = Spike Added

Accuracy measures the bias in a measurement system. It is difficult to measure accuracy for the entire data collection activity. Accuracy will be assessed through use of known QC samples.

Accuracy values can be presented in a variety of ways. Accuracy is most commonly presented as percent bias or percent recovery. Percent bias is a standardized average error, that is, the average error divided by the actual or spiked concentration and converted to a percentage. Percent bias is unitless and allows accuracy of analytical procedures to be compared.

Percent recovery provides the same information as percent bias. Routine organic analytical protocol requires a surrogate spike in each sample. Surrogate recovery will be defined as:

$$\% \text{ Recovery} = (R/S) \times 100$$

where:

S = surrogate spike concentration

R = reported surrogate concentration

Recovery criteria for laboratory spikes and other laboratory QC samples through which accuracy may be evaluated are established in the applicable analytical method.

5.2.4 Representativeness

The representativeness of data is only as good as the representativeness of the samples collected. Sampling and handling procedures, and laboratory practices, are designed to provide a standard set of performance-driven criteria to provide data of the same quality as other analyses of similar matrices using the same methods under similar conditions. Representativeness will be determined by a comparison of the quality controls for these samples against data from similar samples analyzed at the same time.

5.2.5 Comparability

Comparability of analytical data among laboratories becomes more accurate and reliable when all labs follow the same procedure and share information for program enhancement. Some of these procedures include:

- Instrument standards traceable to National Institute of Standards and Technology (NIST), the U.S. Environmental Protection Agency (USEPA), or the New York State Departments of Health or Environmental Conservation;
- Using standard methodologies;
- Reporting results for similar matrices in consistent units;
- Applying appropriate levels of quality control within the context of the laboratory quality assurance program; and,
- Participation in inter-laboratory studies to document laboratory performance.

By using traceable standards and standard methods, the analytical results can be compared to other labs operating similarly. The QA Program documents internal performance. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

5.2.6 Completeness

The goal of completeness is to generate the maximum amount possible of valid data. The highest degree of completeness would be to find all deliverables flawless, valid and acceptable. The lowest level of completeness is excessive failure to meet established acceptance criteria and consequent rejection of data. The completeness goal is 95% useable data. It is acknowledged that this goal may not be fully achievable; for example, individual analytes (e.g., 2-hexanone) may be rejected within an otherwise acceptable analysis. The impact of rejected or unusable data will be made on a case-by-case basis. If the site investigation can be completed without the missing datum or data, no further action would be necessary. However, loss of critical data may require resampling or reanalysis.

5.3 FIELD QUALITY ASSURANCE

Blank water generated for use during this project must be "demonstrated analyte-free". The criteria for analyte-free water is based on the USEPA assigned values for the Contract Required Detection Limits (CRDLs) and

CRQLs. If the levels of detection needed on a specific site are lower than the CLP CRDLs/CRQLs, then those levels are used to define the criteria for analyte-free water.

The analytical testing required for the water to be demonstrated as analyte free must be performed prior to the start of sample collection; thus, blank water will be supplied by the laboratory.

5.3.1 Equipment (Rinsate) Blanks

To the extent possible, based on known site conditions, samples expected to be the least impacted will be collected first, so as to limit the potential for cross-over contamination. However, to confirm the adequacy of the decontamination process, equipment blanks will be collected. These blanks consist of demonstrated, analyte-free water that show if sampling equipment has the potential for contaminant carryover to give a false impression of contamination in an environmental sample. When blank water is used to rinse a piece of sampling equipment (before it is used to sample), the rinsate is collected and analyzed to see if sampling could be biased by contamination from the equipment.

One rinsate blank will be collected for every 20 Geoprobe samples collected and submitted to the laboratory or one each per week, whichever is more frequent, and analyzed for volatile organics. The rinsate blanks will be collected from the soil sampling equipment. One rinsate blank will be collected per week from the groundwater sampling equipment and analyzed for volatile organics. Disposable bailers will be obtained from a single vendor for this project.

5.3.2 Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method. For soil samples, these samples are separate aliquots of the same sample; prior to dividing the sample into "sample" and "duplicate" aliquots, the samples are homogenized (except for the VOC aliquots, which are not homogenized). Aqueous field duplicate samples are second samples collected from the same location, at the same time, in the same manner as the first, and placed into a separate container (technically, these are co-located samples). Each duplicate sample will be analyzed for the same parameters as the original sample collected that day. The blind field duplicate Relative Percent Difference (RPD) objective will be ±50% percent RPD for all matrices. Field duplicates will be collected at a frequency of 1 per 20 environmental samples for both matrices (aqueous and non-aqueous) and all test parameters.

5.3.3 Trip Blanks

The purpose of a VOC trip blank (using demonstrated analyte-free water) is to place a mechanism of control on sample bottle preparation and blank water quality, and sample handling. The trip blank travels from the lab to the site with the empty sample bottles and back from the site with the collected samples. There will be a minimum of one trip blank per shipment containing aqueous samples for VOC analysis. Trip blanks will be collected only when aqueous volatile organics are being sampled and shipped; except that a trip blank is not required when the only aqueous samples in a shipment are QC samples (rinsate blanks).

5.4 FIELD TESTING QC

Field testing of groundwater will be performed during purging of wells prior to sampling for laboratory analyses. Field QC checks of control limits for pH, specific conductance (conductivity), turbidity, temperature and dissolved oxygen (DO) are detailed below. The calibration frequencies discussed below are the minimum. Field personnel can and should check calibration more frequently in adverse conditions, if anomalous readings are obtained, or subjective observations of instrument performance suggest the possibility of erroneous readings.

Field data for temperature, pH, conductivity, turbidity, temperature and DO will be collected using a Horiba U-10

Water Quality Checker, or equivalent instrument(s). Field equipment calibration records will be recorded in the daily field log book.

5.4.1 pH

Calibration of the pH meter will be checked twice daily (prior to initial use and midday), using two standards bracketing the range of interest (generally 4.0 and 7.0 unless field conditions suggest otherwise). The standards will be provided either by the vendor or the analytical laboratory. If the pH QC control sample (a pH buffer, which may be the same or different than those used to initially calibrate the instrument) exceeds $\pm$ 0.1 pH units from the true value, the source of the error will be determined and the instrument recalibrated. If a continuing calibration check with pH 7.0 buffer is off by $\pm$ 0.1 pH units, the instrument will be recalibrated. Expired buffer solutions will not be used. Field pH calibration records will be recorded in the daily field logbook.

5.4.2 Specific Conductivity

A vendor-provided conductivity standard will be used to check the calibration of the conductivity meter twice daily (prior to initial use and midday). Specific conductance QC samples will be on the order of 0.01 or 0.1 molar potassium chloride solutions provided by the vendor in accordance with manufacturer's recommendations. Field conductivity records calibration records will be recorded in the daily field log book.

5.4.3 Turbidity

The turbidity meter will be calibrated using a standard as close as possible to 50 NTUs (the critical value for determining effectiveness of well development and evacuation). The calibration of the turbidity meter will be checked twice daily with vendor-supplied standards. The turbidity QC sample will be a commercially prepared polymer standard (Advanced Polymer System, Inc., or similar). Field turbidity records calibration records will be recorded in the daily field log book.

5.4.3 Temperature

Temperature probes associated with an instrument are not subject to field calibration, but the calibration should be checked to monitor instrument performance. It is recommended that the instrument's temperature reading be checked against a NBS-traceable thermometer concurrently with checking the conductivity calibration. The instrument manual will be referenced for corrective actions if accurate readings cannot be obtained.

5.4.4 Dissolved Oxygen

The dissolved oxygen (DO) meter is calibrated twice per day in accordance with manufacturer's requirements. In general, the DO meter should be calibrated to ambient air based on probe temperature and true local atmospheric pressure conditions, or to feet above mean sea level based on National Geodetic Vertical Datum. Field DO meter calibration events will be recorded in the daily field logbook.

5.5 LABORATORY QUALITY ASSURANCE

5.5.1 Method Blanks

A method blank is laboratory water on which every step of the method is performed and analyzed along with the samples. They are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instruments as the sample is prepared and analyzed in the laboratory. Method blanks will be analyzed at a frequency of one for every 20 samples analyzed or as otherwise specified in the analytical protocol.

5.5.2 Laboratory Duplicates

Laboratory duplicates are sub-samples taken from a single aliquot of sample after the sample has been thoroughly mixed or homogenized (with the exception of VOCs), to assess the precision or reproducibility of the analytical method on a sample of a particular matrix. Laboratory duplicates will be performed on spiked samples as a Matrix Spike and a Matrix Spike Duplicate (MS/MSD) for volatile and semi-volatile organics, and as a matrix spike and matrix duplicate for inorganics.

5.5.3 Spiked Samples

Two types of spiked samples will be prepared and analyzed as quality controls: Matrix Spikes and Matrix Spike Duplicates (MS/MSD) are analyzed to evaluate instrument and method performance and performance on samples of similar matrix. MS/MSD will be analyzed at a frequency of one (pair) for every 20 samples. MS/MSD will be performed on additional samples as designated by LCS field staff. For inorganics, a matrix spike and matrix duplicate are analyzed for each set of 20 samples. In addition, matrix spike blanks (MSBs) will also be run by the lab as part of the NYSDEC ASP.

6.0 DATA DOCUMENTATION

6.1 FIELD NOTEBOOK

Dedicated field notebooks will be initiated at the start of on-site work. In addition to any forms that will be filled out summarizing field work (and become part of the project file), the field notebook will include the following daily information for all site activities:

- Date;
- Meteorological conditions (temperature, wind, precipitation);
- Site conditions (e.g., dry, damp, dusty, etc.);
- Identification of crew members (LCS staff and subcontractor present) and other personnel (e.g., agency or site owner) present;
- Description of field activities;
- Location(s) where work is performed;
- Problems encountered and corrective actions taken;
- Records of field measurements or descriptions recorded; and,
- Notice of modifications to the scope of work.

During drilling operations, the supervising field personnel will add the following information:

- Rig type;
- Documentation of materials used;
- Downtime;
- Time work is performed at an elevated or lowered level of respiratory protection; and,
- Diagram of well construction.

During sampling of wells, field samplers will add the following:

- sampling point locations and test results such as pH, specific conductance, etc.;
- information about sample collection;
- chain of custody information; and,
- field equipment calibration.

6.2 FIELD REPORTING FORMS

Field reporting forms (or their equivalent) to be utilized in this investigation are presented in Appendix B. These include:

- Geoprobe Boring Log
- Monitoring Well Field Measurements/Well Development Log;

- Monitoring Well Construction Detail;

These forms, when completed, will become part of the project file and final report, as appropriate.

7.0 EQUIPMENT CALIBRATION AND MAINTENANCE

7.1 STANDARD WATER AND AIR QUALITY FIELD EQUIPMENT

Field equipment used during the collection of environmental samples, includes a photoionization detector (PID), turbidity meter, pH meter, conductivity meter (specific conductance per EPA Method 120.1), thermometer, and photoionization detector.

Calibration and standardization for the field water quality tests will be in conformance with the manufacturer's recommendations.

Calibration of the pH meter will be checked (two points) at least two times daily and will also be checked with pH 7.0 buffer every five samples, two hours, or every time it has been turned off for more than two hours and then turned on, whichever occurs first.

The calibration of the specific conductance meter will be checked twice daily (at the beginning and in the middle of the workday).

Temperature will be measured with an NBS/NIST traceable thermometer, or with a platinum electrode, factory calibrated and coupled to the conductivity meter, or similar meter.

The Photovac PID (or equivalent organic vapor analyzer) used for soil screening and health and safety air monitoring will be calibrated following the manufacturer's instructions, at the beginning of the day, whenever the instrument is shut off for more than two hours, and at the field technician's discretion.

7.2 LABORATORY EQUIPMENT

Laboratory equipment will be calibrated by the laboratory according to the requirements of the 2005 Revised NYSDEC ASP, Superfund Contract Laboratory Program for each parameter or group of similar parameters, and maintained following professional judgment and the manufacturer's specifications.

8.0 CORRECTIVE ACTIONS

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken. These actions may include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work.

Subcontractors providing analytical services will perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

Situations related to this project requiring corrective action will be documented and made part of the project file. For each measurement system identified requiring corrective action, the responsible individual for initiating the corrective action and also the individual responsible for approving the corrective action, if necessary, will be identified.

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

The guidance followed to perform quality data validation, and the methods and procedures outlined herein, pertain to initiating and performing data validation, as well as reviewing data validation performed by others (if applicable). An outline of the data validation process is presented here, followed by a description of data validation review summaries.

9.1 LABORATORY DATA REPORTING AND REDUCTION

The laboratory will meet the applicable documentation, data reduction, and reporting protocols as specified in the 2000 revision of the NYSDEC ASP CLP. In addition, the laboratory will be accredited pursuant to the NYSDOH Environmental Laboratory Accreditation Program (ELAP) for the category of parameters analyzed. Laboratory data reports will conform to NYSDEC Category B deliverable requirements.

Copies of the laboratory's generic Quality Assurance Plan (QAP) are on file at LCS and with the NYSDEC. The laboratory's QAP will indicate the standard methods and practices for obtaining and assessing data, and how data are reduced from the analytical instruments to a finished report, indicating levels of review along the way.

In addition to the hard copy of the data report, the laboratory will be asked to provide the sample data in spreadsheet form on computer disk (CD). The CD will be generated to the extent possible directly from the laboratory's electronic files or information management system to minimize possible transcription errors resulting from the manual transcription of data.

9.2 DATA VALIDATION

Data will be validated by an independent third party. Data validation will be performed by following the guidelines established in Appendix 2B of *Final DER-10 Guidance for Site Investigation and Remediation*.

Validation reports will consist of text results of the review and marked up copies of Form I (results with qualifiers applied by the validator). Validation will consist of target and non-target compounds with corresponding method blank data, spike and surrogate recoveries, sample data, and a final note of validation decision or qualification, along with any pertinent footnote references. Qualifiers applied to the data will be documented in the report text.

9.3 DATA USABILITY

Data usability summary reports (DUSRs) will be prepared by an independent validator. The DUSRs, which will be provided as part of the Remedial Investigation Report, encompass both quantitative and qualitative aspects, although the qualitative element is the most significant.

The quantitative aspect is a summary of the data quality as expressed by qualifiers applied to the data; the percent rejected, qualified (i.e., estimated), missing, and fully acceptable data are reported. As appropriate, this quantitative summary is broken down by matrix, laboratory, or analytical fraction or method.

The qualitative element of the data usability summary is the translation and summary of the validation reports into a discussion useful to data users. The qualitative aspect will discuss the significance of the qualifications applied to the data, especially in terms of those most relevant to the intended use of the data. The usability report will also indicate whether there is a suspected bias (high or low) in qualified data, and will also provide a subjective overall assessment of the data quality. If similar analyses are performed by more than one method, a discussion of the extent of agreement among the various methods will be included, as well as discussion of any discrepancies among the data sets. The QAO will also indicate if there is a technical basis for selecting one data type over another for multiple measurements that are not in agreement.

9.4 FIELD DATA

Field chemistry data collected during air monitoring, soil screening (e.g., PID readings), and water monitoring (i.e., pH, turbidity, specific conductance, temperature and DO) will be presented in tabular form with any necessary supporting text. Unless activities resulted in significant unexpected results, field data comments can be added as footnotes to the tables.

10.0 PERFORMANCE AND SYSTEM AUDITS

The laboratory assigned to this project has been verified to be certified by the NYSDOH Environmental Laboratory Approval Program for the analytical protocols to be used. Therefore, no audit of the laboratory(s) during the Investigation will be performed unless warranted by a problem(s) that cannot be resolved by any other means, or at the discretion of LCS and the NYSDEC.

11.0 CITIZENS PARTICIPATION PLAN

A Citizen Participation (CP) Plan will be prepared for the Site in accordance with the requirements outlined in NYSDEC's *DER-23 Citizen Participation Handbook for Remedial Programs,* issued January 2010. The CP Plan provides for issuance of fact sheets and/or public meetings at various stages in the investigation/remedial process. One fact sheet will be mailed to announce the availability of the RI Work Plan for review, followed by a 30- to 45-day comment period. A public meeting will be held, if requested, during the public comment period. A copy of this Work Plan will be made available for public review at the NYSDEC Region 9 office and the Buffalo and Erie County Public Library – Kenmore Branch, and an announcement will be issued in the *Environmental Notice Bulletin.*

The major components of the CPP are as follows:

- names and addresses of the interested public as set forth on the Brownfield site contact list provided with the BCP application;
- identification of major issues of public concern related to the site;
- a description of citizens participation activities already performed;
- identification of document repositories for the project; and,
- a description and schedule of public participation activities that are either required by law or needed to address public concerns related to the Site.

12.0 REPORTING

Project status reporting to the NYSDEC, if requested, will include aspects of quality control that were pertinent during the investigation activities. Problems revealed during review of the investigation activities will be documented and addressed. These reports will include a description of completed and on-going activities and an indication how each task is progressing relative to the project schedule.

The project manager, through task managers, will be responsible for verifying that records and files related to this project are stored appropriately and are retrievable.

The laboratory will submit any memoranda or correspondence related to quality control of this project's samples as part of its deliverables package.

12.1 FINAL REMEDIAL INVESTIGATION/ALTERNATIVES ANALYSIS REPORT

Upon completion of the activities undertaken as described in this work plan, a final Remedial Investigation Report will be generated for the Site. The final report will include a summary of the investigation work completed, as well as all data generated relative to the Site and other information obtained as part of the implementation of the work plan (e.g., boring logs, well construction diagrams, well development data, detailed site plan documenting sampling locations, groundwater flow maps, analytical data, data usability reports, volumes and limits of contamination, etc.). A qualitative on- and off-site exposure assessment and receptor analysis will be included in the final investigation report, if necessary. Preparation of a Remedial Alternative Analysis Report shall be included in the event remediation is required. Such an evaluation will consider institutional and environmental controls to protect human health and the environment.

The final report will be certified by the person with primary responsibility for the activities undertaken as part of the investigation. The final report will be submitted to the NYSDEC for their review and comment.

TABLE 1 - ANTICIPATED REMEDIAL INVESTIGATION PROJECT SCHEDULE
945 KENMORE AVENUE
TONAWANDA, NEW YORK

ID	Task Name	September	October	November	December	January	February	March	April	May	June
1	Proposed Remedial Investigation Work Plan Submitted to the NYSDEC		★								
2	Public Comment Period for Proposed Remedial Investigation Work Plan		→	→							
3	Final (revised, if necessary) Remedial Investigation Work Plan Submitted to the NYSDEC				★						
4	Completion of Remedial Investigation, Site Survey, and Third Party Data Validation					→	→				
5	Preparation of Draft Remedial Investigation (RI) Report and Draft Alternatives Analysis (AA) Report					→	→				
6	Preparation of Draft Remedial Action Work Plan (RAWP) or Interim Remedial Measure (IRM) Work Plan					→	→				
7	Informal Review of Draft RI/AA Reports and Draft RAWP/IRM Work Plans by NYSDEC Project Manager							★			
8	Proposed Final RI/AA Reports and RAWP/IRM Work Plans Submitted to the NYSDEC								★		
9	Public Comment Period for Proposed Final RI/AA Reports and RAWP/IRM Work Plans								→	→	
10	Final (revised, if necessary) RI/AA Reports and RAWP/IRM Work Plans Submitted to the NYSDEC									★	
11	Remediation (if necessary) begins.										★
		2014				2015					

Table 2 - Analytical Summary
945 Kenmore Avenue
Tonawanda, New York

Matrix	Parameter	Sample Quantity	Equipment (Rinsate) Blank Quantity	Matrix Spike/ Matrix Spike Duplicate Quantity	Duplicate Quantity	Trip Blank Quantity
Soil						
	TCL and CP-51 list VOCs	12	1	1	1	0
	TCL SVOCs	12	0	1	1	0
	TAL Metals (w/cyanide)	12	0	1	1	0
	PCBs	12	0	1	1	0
Groundwater						
	TCL and CP-51 list VOCs	5	1	1	1	3
	TCL SVOCs	5	0	1	1	0
	TAL Metals (w/cyanide)	5	0	1	1	0
	PCBs	5	0	1	1	0

VOCs- volatile organic compounds
SVOCs- semi-volatile organic compounds
PCBs - Polychlorinated Biphenyls
TAL - Target Analyte List
TCL - Target Compound List
CP-51 - Final Commissioner Policy-51

Table 3 - Sample Volumes, Containers, Holding Times, and Preservatives
945 Kenmore Avenue
Tonawanda, New York

Parameter	No. of Containers/Sample Volume	Sample Container	Sample Holding Time	Sample Preservative
Soil				
TCL and CP-51 list VOCs	1- 4 oz.	glass w/ teflon-lined cap	7 days[1]	none
TCL and CP-51 list VOCs	3-40 mL	glass with teflon septum	7 days[1]	Sodium bisulfate and methanol
TCL SVOCs	1- 4 oz.	glass w/ teflon-lined cap	7 days	none
TAL Metals	1- 4 oz.	glass w/ teflon-lined cap	180 days[2]	none
Cyanide	1- 4 oz.	glass w/ teflon-lined cap	14 days	none
PCBs	1 - 4 oz.	glass w/ teflon-lined cap	7 days	none
Groundwater				
TCL and CP-51 list VOCs	3- 40 mL	glass with teflon septum	7 days	Hydrochloric acid
TCL SVOCs	2- 1 liter	amber glass w/ teflon cap	7 days	none
TAL Metals	1- 500 mL	polyethylene	180 days	Nitric acid
Cyanide	1- 250 mL	polyethylene	14 days	Sodium Hydroxide
PCBs	1- 1 liter	amber glass w/ teflon cap	7 days	none

[1] holding times are calculated from the time of arrival at the laboratory.
[2] except mercury (28 days).
TCL VOCs- Target Compound List volatile organic compounds
TCL SVOCs- Target Compound List semi-volatile organic compounds
TAL Metals - Target Analyte List metals
PCBs - Polychlorinated Biphenyls
CP-51- Final Commissioner Policy-51