REMEDIAL INVESTIGATION / REMEDIAL ALTERNATIVES REPORT

Portion of the Niagara Falls Municipal Complex
913 Cleveland Avenue
915 Cleveland Avenue
1921 Main Street
1925 Main Street
1929 Main Street
1931 Main Street
1935 Main Street
Niagara Falls, New York

July 2010 LCS#06B3027.26

Prepared for:

CLP3 LLC
c/o Salvatore LaGambina
Ciminelli Development
350 Essjay Road, Suite 101
Williamsville, New York 14221

Prepared by

Prepared by

Professional Engineer

Table of Contents

Table of Contents

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Table of Contents

APPENDICES

1.0 INTRODUCTION

This Remedial Investigation and Remedial Alternatives Report (RI/RAR) has been prepared on behalf of CLP3, LLC, for property on which a portion of the Niagara Falls Municipal Complex has been constructed (see Figure 1). Lender Consulting Services, Inc. (LCS) conducted RI activities on the subject property between October and December 2007. The RI activities were performed on behalf of CLP3, LLC under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP No. C932133). It was determined during the course of RI planning that remedial measures would be required to address impacted soil and groundwater at the Site prior to redevelopment with a portion of the Niagara Falls Municipal complex. Specifically, Soil remediation Interim Remedial Measure (IRM) was recommended during the RI process in lieu of delaying this measure until after completion of the RI/RAR. IRM activities began in December 2007; and were substantially completed in early 2008.

1.1 Purpose

The subject property is now developed with a portion of the Niagara Falls Municipal Complex. The primary objective of the RI was to assess the environmental quality of the soils and groundwater on the subject property, in accessible exterior locations of the Site. That information was used to design and implement IRM as a necessary predicate to the construction project.

The purpose of this RI/RAR report is to; (1) describe and present the findings of the RI; (2) document the IRM work; and (3) evaluate the IRM as the final remedial alternative for the Site.

1.2 Background

1.2.1 Site Description

The Site is a portion of the recently built Niagara Falls Municipal Complex and measures approximately 0.75 acres, and includes portions of Tax parcels 144.46-2-44 (915 Cleveland Avenue), 144.46-2-45.2 (913 Cleveland Avenue), 144.46-2-6 (1931 Main Street), 144.46-2-7 (1935 Main Street), 144.46-2-42 (1921 Main Street), 144.46-2-45.1 (1929 Main Street), and 144.46-2-46 (1925 Main Street). The boundaries of the subject property are depicted on Figure 2. For purposes of this report, the area within those boundaries is referred to as the Site. The Site is generally bounded by Cleveland Avenue to the north, Main Street to the west and portions of the recently built Niagara Falls Municipal Complex to the east and south. The Site is described as, prior to implementation of the IRM, being developed with various commercial structures, located in a predominantly commercial and residential area of Niagara Falls, New York. The Site and surrounding area was historically used for commercial and residential purposes.

At the time the RI was completed the Site was generally flat lying with limited distinguishable site features other than the on-Site structures, demolished prior to initiation of the IRM and subsequent redevelopment. Prior to redevelopment of the Site, the surface contained soil/fill with some patches of grass and brush. Precipitation (i.e., rain or melting snow) either infiltrated into the soil/fill or moved to the storm drains present in the roadways via overland flow. Surface and shallow groundwater flow were historically and are currently likely impacted by various cycles of development and filling, as well as utility lines and foundations.

1.2.1.1 Site Geology and Hydrogeology

The geographic mapping of the Site and surrounding area indicates the underlying bedrock as belonging to the Lockport Group, primarily the Guelph, Oak Orchard, Eramosa and Goat Island Dolostones; and local biotherms of Gasport Limestone (Ref. 1). Depth to bedrock ranges from approximately 2 to 25 feet in the Niagara Falls area. On the Site, bedrock lies approximately 15 feet below ground surface (ft. bgs). The bedrock surface has been significantly impacted by glacial activity. Prior to implementation of the IRM, the surficial geology of the Site consists of a primarily till. Till, deposited beneath glacier ice, is described as being poorly sorted and variably textured (clay, silt-clay, boulder-clay).

Surface soils at the Site are not characterized by the Soil Survey of Niagara County, but generally could be characterized as typical urban land with level to sloping land in which 80 percent or more of the soil surface is covered by asphalt, concrete, buildings, or other impervious structures typical of an urban environment. The presence of overburden fill material is widespread and common throughout the City of Niagara Falls. Prior to IRM activities, the Site contained fill to depths ranging between approximately 1 and 9 feet below ground surface (Ref. 1).

Groundwater exists immediately above bedrock [typically approximately 15 feet below the ground surface (ft. bgs)] (when groundwater was encountered) in a shallow overburden unconfined aquifer based on observations during well drilling. In addition, the Dolostone contains one single aquifer, mostly attributable to the fractures present in the Dolostone. Recharge of the aquifers comes predominantly from precipitation by direct infiltration of rain and snowmelt through the overburden. Regional groundwater flow is generally from the south to the north following the local topography.

1.2.1.2 Climate

Western New York has a cold continental climate, with moisture from Lake Erie, Lake Ontario, and the Niagara River causing increased precipitation. Average annual precipitation is reportedly 40.5 inches and snowfall is 93.6 inches (NOAA, 2000) to the northern part of the watershed with over 150 inches per year falling on the southern portion of the watershed. Average monthly temperatures range from 24.5 degrees Fahrenheit in January to 70.8 degrees Fahrenheit in July (NOAA, 2000). The ground and lakes typically remain frozen from December to March. Winds are generally from the west to southwest (180 to 240 degrees) with a mean velocity of 10 miles per hour (Buffalo Airport, 1999).

1.2.1.3 Population and Land Use

The City of Niagara Falls, encompassing 14 square miles, has a population of 53,989 persons (2000 U.S. Census Bureau), a decrease of 7,851 from the 1990 U.S. census. The population density in the City is 3,955.7 people per square mile. Niagara Falls is primarily zoned residential with commercial use mixed in along major roads. The Site, which was vacant prior to redevelopment with a portion of the recently built Niagara Falls Municipal Complex, is located in an area of the City zoned commercial/residential.

1.2.1.4 Utilities and Groundwater Use

The Site has access to major public and private utilities, including water (City of Niagara Falls Water Board); sanitary and storm sewers (Niagara Falls Engineering Department), electric (National Grid), and natural gas (National Fuel Gas).

Groundwater at the Site is classified as "GA" (potable use). Currently, there are no deed restrictions on the use of groundwater at the Site; groundwater supply wells are not present on the Site. Regionally, groundwater in the area has not been developed for agriculture, or public supply purposes. Municipal potable water service is provided on-Site and off-Site by the Niagara Falls Water Board.

1.2.1.5 Wetlands and Floodplains

New York State Freshwater Wetland Maps, and US Department of the Interior Wetland maps show that no State or Federal wetlands exist on the subject property; however, Federal wetlands are located approximately 0.2 miles west of the Site along the shore of the Niagara River in the Niagara Gorge, and 1.5 miles east in Hyde Park, City of Niagara Falls. Niagara County Internet Mapping Service also shows a 100-year floodplain located approximately 0.2 miles west of the Site along the shore of the Niagara River in the Niagara Gorge.

1.2.2 Site History

The Site and surrounding area was historically used for commercial and residential purposes. The Site was previously developed as summarized below:

913 Cleveland Avenue

913 Cleveland was developed with a single residential structure in at least 1892, through at least 1950, then with a small unidentified commercial structure thereafter.

915 Cleveland Ave

915 Cleveland Avenue was developed with an apparent automotive repair/service facility from at least 1939 through at least 1949, a drycleaner at least in 1950, a clothing store from at least 1959 to at least 1970, a drycleaner from at least 1979 through at least 1988 and a drycleaner in at least 1994.

1921 Main Street

1921 Main Street was developed with a Millinery from at least 1939 through at least 1949, a Beauty Shop from at least 1949 through at least 1959, and a retail store from at least 1979 through at least 1998.

1925 Main Street

1925 Main Street was developed with a single residential structure from at least 1939 through at least 1949, a retail clothing store from at least 1949 through at least 1959, a vacant structure from at least 1959 through at least 1979, Niagara Hair Styling from at least 1979 through at least 1998, and was vacant from at least 1998 to 2007. Undated municipal records also suggest that this property was occupied by a dry-cleaning establishment.

1929 Main Street

1929 Main Street was occupied by a vacant structure from at least 1939 through at least 1949, a liquor store and tailor shop from at least 1949 through at least 1959, an appliance store from at least 1959 through at least 1969, a jewelers from at least 1969 through at least 1988 and residence from at least 1998 to approximately 2006.

1931 Main Street

1931 Main Street was occupied by a jeweler from at least 1939 through at least 1979 and Ruben's (nature of business unknown) from at least 1998 to approximately 2006.

1935 Main Street

1935 Main Street was occupied by Livingston (nature of business unknown) from at least 1939 through at least 1949, a shoe store and dentist office from at least 1949 through at least 1959, a jeweler, dentist office, and lawyer's office from at least 1959 through at least 1969, a gift shop from at least 1969 through at least 1979, a garden gift shop from at least 1979 through at least 1988, and a beauty supplies shop from at least 1988 through at least 2007.

1.2.3 Previous Investigations

The following sections describe the results of pre-RI sampling programs to provide a historic-based description of the nature and distribution of chemical constituents at the Site. Appendix A presents the pre–RI investigation sample results. Sample locations are shown on Figure 3.

Pre-Design Investigation – July 2007

In July 2007, LCS completed a Magnetometer and Limited and Focused Soil and Groundwater Investigation at the Site (Ref. 2). The site investigation was completed to better assess the environmental quality of the on-Site soils and groundwater for the presence of volatile organic compound (VOC), semi-volatile organic compound (SVOC) and/or metal contamination. As part of that investigation, analytical soil data was collected from eight locations and analytical groundwater data was collected from four locations at the Site. The results of that investigation showed that while VOCs [benzene, toluene, xylenes, isopropylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, sec-butylbenzene, p-isopropyltoluene, n-butylbenzene, tentatively identified compounds (TICs) and tetrachloroethene], SVOCs (phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene and TICs) and metals (arsenic, barium, cadmium, chromium, lead and mercury) were detected, no VOCs or SVOCs were detected at concentrations above Part 375 Recommended Soil Cleanup Objectives (Unrestricted Use). Metals [arsenic (13.5 milligrams per kilogram, mg/kg), mercury (0.557 mg/kg-5.09 mg/kg) and lead (207 mg/kg-520 mg/kg] were detected at concentrations above Part 375 Recommended Soil Cleanup Objectives (Unrestricted Use) as well as above typical background concentrations. Overburden groundwater was found to contain VOCs (tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,1-dichloroethene, 1,1,1-trichloroethane, acetone, chloroform, benzene, toluene, ethylbenzene, and xylenes. Tetrachloroethene (299 micrograms/liter, ug/l) – 17,700 ug/l), trichloroethene, (12ug/l-61 ug/l), cis-1,2-dichloroethene (116 ug/l-20 ug/l), 1,1,1-trichloroethane (9 ug/l), benzene (1-2 ug/l), ethylbenzene (10 ug/l) and xylenes (9 ug/l) were detected above 6 NYCRR Part 703 (Class GA) groundwater criteria. Based on site characterization data obtained during LCS' July 2007 study, the extent of the solvent contamination was unknown, but the highest concentrations were noted on the north portion of the Site. The extent of the petroleum-related contamination appeared to be localized to the area of suspected underground storage tanks (USTs), located north of the structure addressed at the 915 Cleveland Avenue portion of the Site.

1.2.3.1 Supplemental Investigation – September 2007

In September 2007, LCS completed a Supplemental Soil and Groundwater Investigation at the Site (Ref. 3). The investigation was completed to better delineate the extent of the contamination within the groundwater above the bedrock, to better determine if groundwater within the bedrock had been impacted, to attempt to locate the source area of the solvent contamination, and to complete additional soil and/or groundwater analyses. All work was completed outside of the on-Site structures. Additional analytical testing for the presence of PCBs and cyanide was also completed in preparation of the Site entering the BCP. As part of that investigation, analytical soil data was collected from six additional locations and analytical groundwater data was collected from five locations (four overburden and one bedrock well) at the Site. The results of that investigation showed the presence of VOCs [methylene chloride, cis-1,2 dichloroethene, benzene, toluene, xylenes, isopropylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, sec-butylbenzene, p-isopropyltoluene, n-butylbenzene, tetrachloroethene, ethylbenzene, n-propylbenzene, methylcyclohexane, naphthalene, p-cymene and tentatively identified compounds (TICs)], and SVOCs (naphthalene, 2-methylnaphthalene, fluorene, bis (2 ethylhexyl) phthalate, di-n-octyl phthalate, Caprolactum, phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene and TICs) and metals (arsenic, barium, cadmium, chromium, lead and mercury). Only one VOC {1,2,4-trimethylbenzene (9,500 ug/kg)] and no SVOCs, metals, PCBs or cyanide were detected at concentrations above Part 375 Recommended Soil Cleanup Objectives (Unrestricted Use) or typical background concentrations. Overburden groundwater was found to contain VOCs consisting of vinyl chloride (87 ug/l), acetone (770 ug/l), methylene chloride (1,000 ug/l), trans-1,2-dichloroethene (260 ug/l), tetrachloroethene (11,000 ug/l-16,000 ug/l), trichloroethene, (13 ug/l-310 ug/l), cis-1,2-

dichloroethene (220 ug/l), and 1,2,4-trimethylbenzene (160 ug/l) above 6 NYCRR Part 703 (Class GA) groundwater criteria. Bedrock groundwater was found to contain VOCs consisting of methylene chloride (6 ug/l), cis-1,2-dichloroethene (6 ug/l), trichloroethene (15 ug/l), and tetrachloroethene 550 (ug/l), also above 6 NYCRR Part 703 (Class GA) groundwater criteria. Based on site characterization data obtained during LCS' September 2007 study, the extent of the contamination within the soil and overburden groundwater was unknown, but the highest concentrations were noted on the north portion of the Site and likely beneath one or more of the on-Site structures. Solvent impact to the bedrock was confirmed and the extent of bedrock groundwater contamination was unknown.

1.2.3.2 IRM Findings – December 2007/January 2008

During initiation of IRM activities, solvent, and to a lesser extent, petroleum impacted soils were discovered beneath each of the former on-Site structures. While analytical testing was not performed beneath the former on-Site structures, sampling of the excavated soils was performed after the soils were staged for subsequent waste characterization testing. That testing indicated up to 773 parts per million (ppm) total petroleum hydrocarbons (TPH) and 2,300 ppm of Tetrachloroethene, further supporting the need for implementation of the IRM.

1.3 Constituents of Primary Concern (COPCs)

Based on the historic investigations, the constituents of potential concern (COPCs) in soil/fill and/or groundwater were identified as petroleum-based and solvent-based volatile organic compounds (VOCs), and heavy metals. The RI approach, described in the RI Work Plan (Ref. 6), focused on these COPCs as well as PCBs and cyanide.

1.4 Report Organization

This report contains the following sections:

- Section 2.0 presents the approach for the soil and groundwater investigation.
- Section 3.0 describes the physical characteristics of the Site as they pertain to the investigation findings.
- Section 4.0 presents the investigation results by media.
- Section 5.0 describes the fate and transport of the COPCs.
- Section 6.0 presents the qualitative risk assessment.
- Section 7.0 presents the RI summary and conclusions.
- Section 8.0 summaries the Interim Remedial Measures.
- Section 9.0 evaluates the IRM as the final remedial alternative.
- Section 10.0 provides a list of references for this report.

2.0 INVESTIGATION APPROACH

The purpose of the field activities was to more fully characterize overburden soils and groundwater at the Site. On-Site field activities included: a magnetometer survey; direct-push (Geoprobe®) soil sampling; rotary auger borehole development; monitoring well installation; groundwater sampling of existing and newly installed monitoring wells; collection of hydraulic data; and completion of a Site survey. The location of the boreholes and monitoring wells were approved by the NYSDEC in a meeting on October 5, 2007. The NYSDEC also confirmed that analytical testing of the bedrock groundwater could be limited to VOCs.

2.1 Magnetometer Survey

LCS performed a Geonics EM-61 magnetometer survey on the northern portion of the subject property (between the structures and Cleveland Avenue). However, due to limited accessibility, conclusive data suggesting the presence or absence of UST(s) could not be obtained.

2.2 Supplemental Soil/Fill Investigation

2.2.1 Direct Push Test Borings

In accordance with the RI Work Plan, six test borings (i.e., BCP BH17 through BCP BH21) were completed by SJB Services, Inc. to top of bedrock (~13 to 20.5 ft. bgs) at the locations shown on Figure 3. The borings were completed by driving a 2-inch outside diameter (O.D.) by 24-inch long split spoon sampler along with a 4.25-inch hollow stem auger (HSA).

A representative portion of each 2-foot interval was containerized to minimize loss of potential VOC constituents present in the soil sample. The remainder of each sample interval was placed into sealable PVC bags and allowed to equilibrate to ambient temperature. Each container was slightly opened and the PID probe was placed within the headspace of the container to allow for a reading of the organic vapors. The PID readings were recorded on the Field Borehole Logs in Appendix B. Soil screening was performed by headspace screener using a PID. PID readings ranged from 0.1 to 13.9 ppm (BCP BH19, 8 -10 ft. bgs).

2.2.2 Soil/Fill Sampling

One surface soil samples and six subsurface soil samples were collected from the Site for comprehensive analysis including TCL VOCs. Two of those subsurface soil samples were collected for TCL SVOCs and TAL metals PCBs, cyanide using NYSDEC Analytical Services Protocol (ASP) 2000 methods and Category B deliverables. These samples (designated BCP BH17 through BCP BH21) were collected to better delineate the VOC impact and to document the condition of on-Site surface and subsurface soils for general Site characterization. Soil samples were collected from the interval of highest PID reading.

The test borings were sampled by opening the split spoon bisecting the core (if intact) and scooping sufficient sample from the long axis of the split core with a decontaminated stainless steel spoon or spatula. Samples for VOCs were collected and transferred to sample containers immediately after opening and bisecting the split spoon sample. If the core was not homogeneous, representative portions of each type of material within the spoon was collected. VOC samples were placed into the sample containers (2, 2-oz. wide mouth glass jar) in a manner limiting headspace by compacting the soil into the container. Soil samples collected for non-VOC analysis were homogenized. The homogenization was completed by removing the soil from the sampling equipment, transferring it to a clean surface (steel pan, bowl, etc.), and mixing to provide a more homogeneous sample. The soil was scraped from the sides, corners, and bottom of the clean surface; rolled to the middle; and thoroughly mixed until the material appeared homogenous. An aliquot of this mixture was then 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 on the threads of the container was wiped off with a clean paper towel or equivalent before placing the cap on the sample container.

2.3 Groundwater Investigation

In accordance with the RI Work Plan, two additional overburden groundwater monitoring wells and five bedrock monitoring wells were installed, and previously installed monitoring wells were inspected for integrity. New groundwater monitoring wells were sampled to document the condition of on-Site groundwater for general Site characterization.

2.3.1 Overburden Drilling

Two monitoring wells were installed on-Site to straddle the groundwater table (designated BCP OBMW1 and BCP OBMW2). The wells were constructed with a 10-foot screened interval to a depth of 15.5 ft. bgs (top of bedrock). Neither of the wells (or previously installed wells) produced sufficient groundwater for sampling.

Test borings were advanced into the overburden using a split spoon sampler with a hollow stem auger method. Samples were obtained by driving an approximate 2-inch outside diameter (O.D.) by 24-inch long steel sampling rod directly in the soil. The sampler was driven its entire length (unless refusal was encountered) with a 140lb. hammer falling 30-inches. Test borings BH18/BRMW3 and BH21/BRMW6 were completed using an approximate 2 inch diameter, 48 inch long macro-core sampler. Soil samples were collected within each borehole continuously from the ground surface until equipment refusal was encountered.

Soil samples were described on stratigraphic field borehole logs by a geologist from ground surface to refusal (approximately 13 to 20.5 ft. bgs). The overburden soil was described as mainly silt with various mixtures of gravel, clay, and sand. Each 2-foot sample was scanned for total volatile organic vapors with a photoionization detector (PID) equipped with a 10.6 eV lamp, and any visual and/or olfactory observations were noted. Soil descriptions, PID scan results, and visual/olfactory observations recorded during boring advancement are presented on the Field Borehole Logs in Appendix B.

The highest PID reading of 13.9 ppm was measured in the 8 to 10-foot interval of borehole BCP BH19; no petroleum- or solvent-type odors were detected.

2.3.2 Overburden and Bedrock Monitoring Well Installation

Overburden monitoring wells were constructed of 2-inch I.D. flush jointed Schedule 40 PVC riser and screen. The actual installation depth of the screen was selected to monitor the uppermost water bearing zone. The screen consists of a 10-foot long section of 0.010-inch factory slotted PVC.

Following determination of the monitoring zone and placement of the assembled screen and riser, the annular space of the borehole was backfilled. Generally, this included the placement of a sand filter pack consisting of Morie #00 sand around the well screen such that the sand extends a minimum of 1 foot above the top of the screen. A minimum 2-foot layer of bentonite pellets was placed above the sand filter, tap water was poured over the pellets and they were allowed time to hydrate. Concrete was installed above the bentonite seal to the surface and included completion of the protective casings. The monitoring wells were completed by placing a locking steel protective casing over the riser. Above-grade (stick-up) and at grade (manhole) protective casings were used. Monitoring well construction details are presented on the Field Borehole Logs in Appendix B.

Five additional bedrock groundwater monitoring well (BCP BRMW2-BCP BRMW6) were installed on Main Street, Cleveland Avenue, South Street, the parking lot, and in the former park (see Figure 3). The wells were positioned at locations on and off-of the Site to determine if the previously discovered contamination has migrated off-Site. The location of the boreholes and monitoring wells were approved by the NYSDEC in a meeting on October 5, 2007, and varied from the originally proposed locations. The NYSDEC also confirmed that analytical testing of the bedrock groundwater could be limited to VOCs.

The bedrock groundwater monitoring wells were installed using hollow stem auger (HSA) drilling techniques as described above until auger refusal was encountered.

In order to install bedrock monitoring wells, bedrock was cored once the formation became too hard to be sampled by soil-sampling methods (i.e., a 1 inch penetration or less for 50 blows with the slide hammer). The wells consisted of a permanent steel overburden casing. The steel casing was advanced a minimum of two feet into the bedrock.

A 3-inch nominal rock core was continued beyond the depth of the steel casing until a depth of which bedrock fractured zones were observed to encounter the upper-most water bearing zone. Coring of the bedrock was completed in general accordance with ASTM D

2113 (Diamond Core Drilling for Site investigation). During coring of the bedrock, drilling fluids (potable water) were used and re-circulated. Additional fluids were added as necessary.

Once the boring was deemed complete, the well was constructed using 2 inch-diameter Schedule 40 PVC screen and riser. The silica filter pack was placed several feet above of the top of the well screen and a bentonite/cement grout was installed above the filter pack. The bedrock monitoring wells were either completed with a flush mount protective casing set in a concrete pad or an above grade protective casing. Refer to the attached well construction diagram for specific well construction details.

2.3.3 Groundwater Sampling

Each newly installed and existing overburden monitoring well was developed/re-developed prior to sampling to remove residual sediments and ensure good hydraulic connection with the water-bearing zone. Newly installed monitoring wells were developed a minimum of two days after installation to allow grout used in well construction to set. A minimum of five well volumes and a maximum of eight volumes were removed from each well prior to sampling.

Dedicated, disposable PVC bailers equipped with a bottom check-valve were used for sample collection. Bailers were lowered gently with minimal water agitation into the well with dedicated polyethylene or polypropylene line.

Newly installed monitoring wells were sampled for TCL VOCs.

2.3.4 Hydraulic Assessment

Hydraulic assessment included completion of hydraulic conductivity tests and measurement of water levels in new monitoring wells. Hydraulic conductivity testing was completed using variable head methods on the bedrock monitoring wells. As the overburden wells were dry, they could not be included in the hydraulic assessment. Variable head tests were completed on two different occasions by removing water from the well with a bailer or displacing water with a slug. Due to the nearly instantaneous recharge of the bedrock wells, LCS utilized a submersible pump to evacuate the wells. The recovery of the initial water level was measured with respect to time. Data obtained using these test procedures was evaluated using procedures presented in "The Bouwer and Rice Slug Test -

An Update," Bouwer, H., Groundwater Journal, Vol. 27, No. 3, May-June 1989 (see Appendix C).

The calculations presented in Appendix C indicate that the hydraulic conductivity in the bedrock (where instantaneous recharge did not occur) was 0.11 ft./day.

All groundwater monitoring wells were surveyed on November 16, 2008. Water level measurements were recorded for the purpose of developing an overburden isopotential map (no overburden groundwater was present). Based on the survey data, groundwater was noted to be flowing to the Northwest.

.

3.0 SITE PHYSICAL CHARACTERISTICS

The physical characteristics of the Site observed during the RI are described in the following sections.

3.1 Surface Features

At the time of the RI, the Site generally sloped slightly to the northwest with limited distinguishable Site features are generally flat lying with limited distinguishable features other than the on-Site structures, demolished prior to initiation of the IRM. Subsequent to the IRM, the Site was redeveloped with a portion of the Niagara Falls Municipal Complex.

3.2 Geology

The Site geology generally encountered fill material in all borehole locations to a depth of between approximately 1 and 9 ft. bgs. That material consisted of clayey silt, gravelly silt, gravel, and silt. The fill material was generally underlain by native soils consisting of various combinations of gravel, sand, clay and silt. Suspected groundwater was generally encountered in most boreholes immediately above the bedrock. Equipment refusal (bedrock) was typically encountered between approximately 12.9 and 24.5 ft. bgs. Refer to Figures 4 and 5 for a cross-section of the geology at the Site.

3.3 Hydrogeology

Overburden groundwater was generally observed immediately above bedrock, however, the overburden wells installed, did not yield groundwater. Hydraulic conductivity testing performed during the RI and prior groundwater elevation data indicate a bedrock groundwater transport rate of 0.11 ft/day. Groundwater Flow was determined to be to the northwest. See Figure 6 for a groundwater contour map.

4.0 INVESTIGATION RESULTS BY MEDIA

The following sections discuss the analytical results of the Remedial Investigation. Tables 1 and 2 summarize the soil and groundwater analytical data, respectively. Analytical data is included in Appendix D. Figure 3 presents the soil sampling and groundwater monitoring well locations.

4.1 Soil

Table 1 presents a comparison of the detected soil parameters to a comparative criteria: Part 375 Recommended Soil Cleanup Objectives (unrestricted) (RSCO). Sample results are described below according to contaminant class.

4.1.1 Volatile Organic Compounds

As indicated in Table 1, VOCs were generally reported as non-detectable, at trace (estimated) concentrations below the sample quantitation limit, or at concentrations slightly above the sample quantitation limit. None of the samples exceed Part 375 SCOs.

As indicated on the Subsurface Logs in Appendix B, PID headspace readings from the subsurface soil samples ranged from 0.1 to 13.9 ppm. No petroleum- or solvent-type odors were detected in any of the test borings. During implementation of the IRM, large quantities of solvent and some petroleum-impacted soils were removed from the Site. During soil disposal characterization testing indicated up to 2,300 ppm of Tetrachloroethene, and up to 773 ppm TPH. Refer to Section 8.0 for additional details regarding the IRM activities.

4.1.2 Semi-Volatile Organic Compounds

The majority of the analyzed SVOCs were reported as non-detectable or at trace (estimated) concentrations below the sample quantitation limit. None of the samples exceeded Part 375 SCOs. All sample locations meet the Part 375 SCOs.

4.1.3 Metals

Metals were generally present within the range of Eastern US or Part 375 SCOs with the following exceptions: The sample from BCP BH21 (and the corresponding duplicate sample) exceeded the Part 375 (Unrestricted Use) SCOs for lead and zinc. Given the location and depth of the sample (immediately above bedrock), the elements appear to be naturally occurring and no further work is warranted. Those conclusions were discussed with NYSDEC personnel who agreed.

4.1.4 PCBs

All of the analyzed PCB Aroclors were reported as non-detectable.

4.1.5 Cyanide

None of the samples analyzed for cyanide exhibited any detectable concentrations.

4.1.6 Summary

Analytical data generated during the RI for the overburden soil show that VOCs, SVOCs, PCBs, and cyanide met Part 375 SCOs (unrestricted). Two metals (lead and zinc) were detected at concentrations within one test boring (BH21) above Part 375 SCOs (unrestricted). Given the location and depth of the sample (immediately above bedrock). The elements appear to be naturally occurring and no further work is warranted. NYSDEC personnel agreed with those conclusions.

During implementation of the IRM, large quantities of solvent and some petroleum-impacted soils were removed from the Site. During soil disposal characterization testing indicated up to 2,300 ppm of Tetrachloroethene, and up to 773 ppm TPH . Refer to Section 8.0 for additional details regarding the IRM activities.

4.2 Groundwater

Table 2 presents a comparison of the detected groundwater parameters to the Class GA Groundwater Quality Standards (GWQS) per NYSDEC TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (June 1988, Revised April 2000). The results of the sampling in the new monitoring wells are discussed in the following sections. The samples obtained from the bedrock wells were limited to VOC analysis.

4.2.1 Volatile Organic Compounds

As indicated in Table 2, some solvent based VOCs were reported at concentrations above Class GA GWQS in three of the five bedrock wells sampled. The majority of these wells are located along the north and west Site boundaries, except one in the former park located south of 1925 Main Street. In the bedrock monitoring wells BCP BRMW2, BCP BRMW3, and BCP BRMW4 trichloroethene and tetrachloroethene were detected above the GWQS. No petroleum-related VOCs were detected within bedrock groundwater.

4.2.2 Summary

As described above, solvent-based VOCs were detected within BCP BRMW2, BRMW3, and BCP BRMW4. The highest concentrations of solvent-based VOCs were detected in BCP BRMW2, located off-Site within Cleveland Avenue. The SVOCs detected were qualified as estimated or were also present in the method blank in soil samples submitted. See Table 2 for specific contaminant concentrations.

4.3 Data Usability Summary

In accordance with the Section 9.0 of the RI Work Plan (Ref. 6), the laboratory analytical data from this investigation was independently assessed and, as required, submitted for independent review. Waste Stream Technology Inc. located in Buffalo, New York performed the data usability summary assessment, which involved a review of the summary form information and sample raw data, and a limited review of associated QC raw data. Specifically, the following items were reviewed:

- Laboratory Narrative Discussion
- Custody Documentation
- Holding Times
- Surrogate and Internal Standard Recoveries
- Matrix Spike Recoveries/Duplicate Recoveries
- Field Duplicate Correlation
- Preparation/Calibration Blanks
- Control Spike/Laboratory Control Samples
- Instrumental IDLs
- Calibration/CRI/CRA Standards
- ICP Interference Check Standards
- ICP Serial Dilution Correlations
- Sample Results Verification

The Data Usability Summary Report (DUSR) was conducted using guidance from the USEPA Region 2 validation Standard Operating Procedures, the USEPA National Functional Guidelines for Data Review, as well as professional judgment. Appendix E includes the DUSR, which was prepared in accordance with Appendix 2B of NYSDEC's draft DER-10 guidance.

In general, sample processing was conducted in compliance with protocol requirements. Sample results are usable as reported; usable with minor edit or qualification; or reported as estimated values. None of the data was rejected. Internal laboratory quality control (QC) samples and Site-specific QC samples indicate satisfactory analytical accuracy, precision, and completeness. Sample shipping coolers were received in good condition and at an appropriate temperature. Data quality issues are further described in the DUSR (Appendix E).

5.0 FATE AND TRANSPORT OF COPCS

The soil sample analytical results were incorporated with the physical characterization of the Site to evaluate the fate and transport of COPCs in Site media. The mechanisms by which the COPCs can migrate to other areas or media are briefly outlined below.

5.1 Airborne Pathways

Volatilization of chemicals (i.e., chlorinated solvents and petroleum) present in soil and groundwater and generation of fugitive dust are potential migration pathways for airborne transport of COPCs. As the impacted soils have since been remediated and the Site redeveloped, fugitive dust does not pose a concern.

5.1.1 Fugitive Dust Generation

Non-volatile chemicals (i.e., metals) present in soil can be released to ambient air as a result of fugitive dust generation. Since the Site was primarily characterized as flat lying with limited distinguishable features other than the on-Site structures, demolished prior to initiation of the IRM, suspension due to wind erosion or physical disturbance of surface soil particles was unlikely. Since the IRM related work was performed in the winter time of year, suspension due to wind erosion or physical disturbance was deemed unlikely to occur. Subsequent remediation and redevelopment of the Site by a portion of the Niagara Falls Municipal Complex, including concrete sidewalks, with the remaining area covered by grass and/or ornamental landscaping has addressed this concern.

5.1.2 Volatilization

Chlorinated solvent and petroleum-related volatile chemicals present in soil and groundwater may be released to ambient or indoor air through volatilization either from or through the soil underlying building structures. Volatile chemicals typically have a low organic-carbon partition coefficient (Koc), low molecular weight, and a high Henry's Law constant. Several VOCs were detected in Site soil at concentrations above SCOs. Numerous VOCs were also detected in Site groundwater above Class GA GWQS at several locations. Therefore, the groundwater-to-air and soil-to-air pathways pose the greatest risk of those contaminants entering into commercial or residential indoor air. As such, this was the primary concern and has been addressed through implementation of the IRM.

5.2 Waterborne Pathways

Chlorinated solvent and petroleum-related chemicals in subsurface soils could be potentially transported via storm water runoff during excavation or construction activities, or leaching to groundwater. This pathway at the Site has been addressed through implementation if the IRM.

5.2.1 Surface Water Runoff

Erosion and transport of surface soils and associated sorbed chemicals in surface water runoff is a potential migration pathway. The potential for soil particle transport with surface water runoff was deemed low, as the Site is relatively flat lying with the former on-Site structures, grass and brush covered areas, is collected by surrounding combined sanitary/storm water sewer collection system (i.e., Niagara Falls Engineering Department collection and conveyance system). The Niagara Falls Engineering Department collection system provides a mechanism for controlled surface water transport but will ultimately result in sediment capture in the Niagara Falls Engineering Department grit chambers followed by disposal at a permitted sanitary landfill.

5.2.2 Leaching

Chlorinated solvents and petroleum-related chemicals present in soil may migrate downward to groundwater as a result of infiltration of precipitation. Some chemicals detected in soil are also present in bedrock groundwater underlying the Site. As groundwater has been impacted and there is evidence of migration beyond the boundaries of the Site, there is the potential for further off-Site impact. The extent of the impact is unknown. As the source of the solvents (i.e., impacted soils proximate to and underlying the Site) was addressed through implementation of the IRM, this pathway has been addressed.

5.3 Exposure Pathways

Based on the analysis of chemical fate and transport provided above, the pathways through which Site COPCs could reach receptors off-Site at significant exposure point concentrations are: groundwater-to-air volatilization; leaching; and, to a lesser extent, fugitive dust emissions via physical disturbance of subsurface soil particles and surface water migration. These exposure pathways may be reduced, but would not necessarily be fully addressed, under the future unremediated commercial land use scenario discussed in Section 6.0.

6.0 QUALITATIVE RISK ASSESSMENT

6.1 Potential Human Health Risks

The identification of potential human receptors is based on the characteristics of the Site, the surrounding land uses, and the probable future land uses. The Site has been developed with a portion of the Niagara Falls Municipal Complex Site. Under unremediated Site use conditions, human contact with Site soil may have occurred primarily by two types of receptors: trespassers who may have traversed or used the property; and construction workers that may have accessed the Site to service utilities. Trespassers may have been comprised of children, adolescents, and adults, whereas construction workers would be limited to adults. The Site is serviced by municipal (supplied) water. Therefore, groundwater exposure would be limited to direct contact by construction workers.

In terms of future use, the current Site owner (City of Niagara Falls) has redeveloped the Site with a portion of the new Municipal Complex. While such use could be compared to commercial use, it is LCS' understanding that unrestricted use was desired to minimize potential exposures to the building occupants and Site groundskeepers or construction workers.

The chemicals prevalent in the soil and/or groundwater prior to remediation consisted of elevated concentrations of petroleum and solvent-based VOCs as well as heavy metals. The contaminants could have been released to ambient air as a result of physical disturbance of subsurface soil particles, and in the case of the VOCs, volatilization either from or through the soil/fill and/or groundwater underlying future building structures. Off-Site transport of chemicals via storm water runoff and leaching was much more likely prior to implementation of the IRM. Under both the unremediated and future (unrestricted) use conditions, potential exposure routes were incidental ingestion, dermal contact, and inhalation of re-suspended particulates in air; inhalation of volatile compounds in ambient or indoor air; and dermal contact with compounds in surface water runoff or groundwater.

For the trespasser and construction worker scenarios, health-risk based lookup values specifically addressing these types of receptors are not widely published, as estimates of exposure frequency and duration tend to be site-specific in nature. However, the NYSDEC has published health risk-based lookup values for several chemicals under various exposure scenarios in the June 2006 document entitled "New York State Brownfield Cleanup Program

LCS INC.
Environmental and Real Estate Consultants

Development of Soil Cleanup Objectives Technical Support Document" (a.k.a., "Technical Support Document"). The Technical Support Document forms the basis for the health-based SCOs presented in 6NYCRR Part 375-6. Based on incorporation of these types of receptors and exposures, the unrestricted health-based SCOs presented in the Technical Support Document are considered protective of human health under both the current and future Site use condition.

In addition to the unrestricted health-based SCOs, Table 3 includes USEPA health-based recommended soil cleanup objectives as published in NYSDEC Part 375 SCOs. These values are considered protective of human health under an unrestricted use scenario, and are thus conservative comparative criteria for the reasonably anticipated municipal future use scenario.

As shown on Table 3, tetrachloroethene, 1,2,4-trimethylbenzene, arsenic, cadmium, mercury, lead and zinc were detected above unrestricted use comparative criteria. Accordingly, potential health risks did exist for a property with a desired status for unrestricted use. The health-based criteria described above are for individual constituents; cumulative or synergistic effects among chemicals may yield greater risks.

6.2 Potential Ecological Risks

The Site is a former commercial area in a developed, urban area in the City of Niagara Falls. Prior to implementation of the IRM, the Site was vacant with numerous structures, and the surface contained soil with grass and a couple of trees, providing little or no wildlife habitat or food value. No natural waterways are present on or adjacent to the Site. The reasonably current and planned use is commercial (or municipal); the majority of the Site has subsequently been redeveloped with a portion of the Niagara Falls Municipal Complex, landscaping and/or paved areas. As such, no unacceptable ecological risks are anticipated under the current or reasonably anticipated future use scenario.

7.0 SUMMARY AND CONCLUSIONS

Based on the information and analyses presented in the preceding sections, prior to implementation of the IRM, constituents of concern (COCs) at the Site included solvent-based VOCs and to a lesser extent, petroleum and heavy metals. These COCs were in subsurface soil and/or in Site groundwater and are also common at sites with similar historical usage. As a result of solvents-related VOCs, the groundwater concentrations were higher than would be deemed acceptable for current and reasonably anticipated future uses. Such risks, as well as any impact to the environment were addressed through implementation of the IRM. A discussion of the IRM implementation is presented in Section 8.0.

8.0 INTERIM REMEDIAL MEASURES

An IRM was implemented at the Site concurrent with RI activities. Details of the IRM approach are described in the August 2007 IRM Work Plan (Ref. 7). Based on the nature and extent of contamination as indicated by prior investigations and the planned redevelopment of the subject property, the IRM Work Plan called for source removal via excavation, with off-Site disposal of impacted soil. The IRM Work Plan was published with the Brownfield Cleanup Program Application for the Site in the September, 2007. The IRM Work Plan was approved in December, 2007.

The IRM work was overseen by LCS on behalf of the Site developer, CLP3. Excavation and backfill activities were contracted by LP Ciminelli to Mark Cerrone, Inc. Surveying activities were contracted by LP Ciminelli to D.A. Naybor, PLS, PC. Remediation was initiated on December 11, 2007 and was substantially completed by January 17, 2008. Some soil characterization and off-Site disposal was completed at a later date.

Impacted soil at the Site that exceeded NYSDEC Part 375 SCOs for petroleum and solvent-based volatile organic compounds (VOCs) as well as metals was removed by excavation and transported off-Site for disposal at either the Tonawanda Landfill (Solid Waste Facility No. 15S29), Tonawanda, New York, Modern Landfill (Subtitle D Landfill), Lewiston, New York, EQ Landfill (Treatment, Subtitle C Landfill), Bellville, Michigan, WTI, Inc. (Incineration), East Liverpool, Ohio or CWM Model City (Haz Sub C Landfill), New York, depending upon the characteristics of the waste soil. Specific elements of the IRM included:

- Excavation and on-Site staging of non-impacted surface soil. Approximately 4,400 tons of non-impacted soil was temporarily relocated to an on-Site spoils laydown area for reuse.
- Excavation of petroleum, solvent and metals impacted soil. Approximately 21,980 tons of impacted soils were removed for off-Site disposal.
- Permanent closure of four USTs discovered during the excavation work.
- Verification sampling of the sidewalls and bottom of the excavation. LCS personnel collected 7 bottom and 51 sidewall verification samples within the excavation limits. A Geotextile demarcation layer was placed where verification samples did not meet Part 375 criteria (i.e., partial north wall of excavation beyond property line).

- Off-Site transportation and disposal of impacted soil to either the either the Tonawanda Landfill (Solid Waste Facility No. 15S29), Tonawanda, New York, Modern Landfill (Subtitle D Landfill), Lewiston, New York, EQ Landfill (Treatment, Subtitle C Landfill), Bellville, Michigan, WTI, Inc. (Incineration), East Liverpool, Ohio or CWM Model City (Haz Sub C Landfill), New York, depending upon the characteristics of the waste soil. All trucks were lined with polyethylene liners to allow the soil be fully evacuated from the truck. Approximately 42,000 gallons of groundwater and snow melt water was collected in the excavation during excavation activities.

- The bottom excavation was scraped using a track-mounted bulldozer.

- Placement and compaction of non-impacted on-Site and "clean" (i.e., Part 375 (unrestricted Use compliant) soil from off-Site sources.

- Placement of a minimum 12-inch layer of No. 2 crusher run stone to the bottom of the excavation to provide a firm base for placement of the backfill soils. The crushed stone originated from the LaFarge Stone Quarry in the town of Niagara Falls, NY.

8.1 General

Impacted soil at the Site that exceeded Part 375 Recommended Soil Cleanup Objectives (unrestricted use) for solvent-related volatile organic compounds (VOCS) and heavy metals was removed by excavation and transported off-Site for disposal at either the Tonawanda Landfill (Solid Waste Facility No. 15S29), Tonawanda, New York, Modern Landfill (Subtitle D Landfill), Lewiston, New York, EQ Landfill (Treatment, Subtitle C Landfill), Bellville, Michigan, WTI, Inc. (Incineration), East Liverpool, Ohio or CWM Model City (Haz Sub C Landfill), New York, depending upon the characteristics of the waste soil. Excavation work initially involved removal and staging of non-impacted, overburden soil, followed by excavation of impacted soil. Excavation extended vertically until bedrock was encountered, generally to an average depth of approximately 16 feet below ground surface (bgs). The excavation did not extend past the property boundaries with the exception of a portion of the northern border, where excavation was extended as to facilitate the permanent closure (removal) of four petroleum bulk storage underground storage tanks (USTs) and accessible petroleum and solvent impacted soils surrounding the USTs.

After the lateral and vertical excavation limits were achieved or the feasible limits of excavation were encountered, verification sampling was performed on the sidewalls and bottom to verify that the excavation met the soil cleanup objectives. All verification samples collected were placed in laboratory-supplied bottles using dedicated sampling equipment and transferred under chain of custody to Test America Laboratories, Inc. for analysis of NYSDEC STARS plus TCL List VOCs in accordance with USEPA SW-846 methodology. A total of 58 verification samples were collected following the remedial work.

The impacted soil removal, verification sampling and backfill activities are presented in greater detail below.

8.2 Soil Excavation, Handling and Disposal

Excavation of impacted soils began on December 11, 2007, and was substantially completed on January 19, 2008. Prior to excavation of impacted soil, a temporary haul road was prepared using bricks from the demolition of the on-site structures and imported gravel fill. The purpose of the haul road was to prevent the dump-trucks from collecting potentially impacted soils on their tires and transporting it to other areas on or adjoining the Site.

A hydraulic excavator was used to excavate soil/fill and load dump trucks for staging on an adjoining property. Site soils were screened with a PID during excavation to provide guidance to the excavator operator. Soil/fill with chemical impact identified through previous testing or exhibiting visual or olfactory evidence of impact (i.e. staining, chemical odors, etc.) were also segregated from non-impacted soil/fill. Upon excavation, either impacted or non-impacted soils were placed directly into dump trucks. The driver was then informed if the load was of impacted or non-impacted soil and directed to dump the load in a predesignated "clean" soil stating area or an impacted soil staging area. Handheld radios were also used to communicate with personnel monitoring the dumping of the excavated soil/fill to ensure the truck driver dumped their load in the correct staging area. All excavated soils from the Site were stockpiled on an adjoining property also owned by the city of Niagara Falls. Soils were subsequently tested for re-use or disposal.

The first area of impacted soils to be remediated consisted of a portion of the site containing elevated concentrations of heavy metals (lead and mercury) located immediately south of the former structure located at 915 Cleveland Avenue. Following excavation the soil/fill was loaded onto tri-axle dump trucks, transported to the soil/fill staging area and placed on and covered with 6 mil thick plastic sheeting. Following receipt of the verification test results, it was determined that additional excavation was necessary. Additional excavation was completed and additional verification samples were collected confirming the successful removal of the metals impacted soil/fill. Once that excavation was deemed complete, excavation of the remainder of the Site was performed.

Excavation continued along the west portion of the Site in order to determine the extent of the impacted soil/fill to the south. Excavation was completed from the ground surface until the top of bedrock was encountered. Once the excavation was deemed complete to the south, the excavation proceeded north along Main Street until the intersection with Cleveland Avenue was reached. The excavation then proceeded to the east to a point approximately five feet west of South Avenue Place. Due to the discovery of four underground storage tanks (USTs) along the northeast property boundary of the Site and the presence of impacted soils extending off-Site, the excavation was continued to the north until there was concern that underground utilities and a nearby utility pole may have become damaged. The NYSDEC confirmed, further excavation of impacted soils beyond the Site boundary was not necessary. (See Figure 3.) Once excavation was deemed complete, a dozer was utilized to scrape the top of the bedrock to further remove the small amount of soils that could not be removed by the excavator alone. Approximately 21,340 tons of impacted soil/fill was removed for off-Site disposal at either the Tonawanda Landfill (Solid Waste Facility No. 15S29), Tonawanda, New York, Modern Landfill (Subtitle D Landfill), Lewiston, New York, EQ Landfill (Treatment, Subtitle C Landfill), Bellville, Michigan, WTI, Inc. (Incineration), East Liverpool, Ohio or CWM Model City (Haz Sub C Landfill), New York, depending upon the characteristics of the waste soil.

During excavation work, small pockets of perched water formed at the bottom of the excavation from various processes (i.e. snow melt, rain runoff, etc.). An on-Site treatment system encompassing a settling/feed (Baker) tank, perched water was pumped and approximately two Baker Tanks were filled.

8.2.1 Tank Removal

During excavation of the Site, four USTs were encountered along the northeast property boundary of the Site. Trec Environmental Inc. (Trec) of Spencerport, New York pumped approximately 750 gallons of a petroleum-like product from a UST with the capacity of 10,000 gallons. The product was pumped into drums which were staged on-Site for future disposal. Following the removal of the petroleum-like product, Trec tested the internal conditions of the UST using a Lower Explosive Limits (LEL) sensor. This test indicated that the internal environment of the tank was non-explosive. Upon completion of the LEL test, Trec with assistance from Mark Cerrone Inc, removed the 10,000-gallon UST. During removal of the 10,000 gallon UST, three 1,000 gallon USTs were also encountered. The three 1,000 gallon tanks were free of liquid contents. Following removal from the ground, all four of the tanks were staged on 20 mil HDPE sheeting for cleaning. All of the tanks were cut open and thoroughly cleaned prior to off-Site disposal at a steel recycling facility.

8.3 Verification Sampling

8.3.1 Bottom Verification Samples

LCS personnel collected 7 bottom verification samples within the metals impacted soil/fill excavation limits from December 13, 2007 for Total Lead and Mercury. The samples were collected at a minimum frequency of approximately one per every 900 square feet of excavation bottom (See Figure 7). In addition, one bottom verification sample was collected beyond the north boundary of the Site, following removal of the USTs and accessible impacted soil/fill. A summary of the verification samples results; with a comparison to Part 375 (Unrestricted) Recommended Soil Cleanup Objectives (RSCOs) is presented on Table 4.

Results of the bottom verification samples indicated a compliance with Part 375 (Unrestricted Use), with the exception of the sample collected beyond the north boundary of the Site, following removal of the USTs. In that sample, tetrachloroethene was detected at a concentration of 6.3 ppm. A copy of laboratory analytical data report is included in Appendix C.

8.3.2 Sidewall Verification Samples

LCS personnel collected a total of 71 sidewall verification samples within the excavation limits. Samples were collected between December 13, 2007 and January 17, 2008. Per the IRM Work Plan, the samples were collected at a frequency of approximately one per 30 linear feet of sidewall (See Figure 7). A summary of the verification sample results, with a comparison to Part 375 RSCOs, is presented on Table 4.

Results of some of the sidewall verification samples indicated elevated concentrations of Lead and Mercury above RSCOs in metals impacted soil/fill excavation East Wall and North Wall A samples. Those sidewall samples represent the northeast and east edge of the metals remedial excavation (located south of the former 915 Cleveland Avenue structure) and were collected following excavation as laid out in the IRM. Excavation of those areas was extended and additional sidewall samples were taken. The analytical results for the subsequent sidewall verification samples were analyzed and found to meet Part 375 RSCOs. As such, removal of the metals impacted soil/fill was deemed complete.

The remaining verification samples collected from the limits of the larger remedial excavation (i.e., limits of the Site) met RSCOs with the exception of the sample collected beyond the north boundary of the Site, following removal of the USTs. In that sample, tetrachloroethene was detected at a concentration of 4.2 ppm. The verification test results are summarized in Table 4. A copy of laboratory analytical data report is included in Appendix F.

8.4 Backfill

8.4.1 Backfill Soils

All areas excavated were restored with compacted backfill soils. Backfill soils were obtained from three sources: non-impacted site overburden, which was comprised of stockpiled soils within the spoils laydown area (described above), additional soil/fill generated immediately south of the Site from the excavation for the basement of the Niagara Falls Municipal Complex, with the balance being made up with imported stone from an off-Site gravel pit (Lafarge gravel pit) located on Hinman Street in Lockport, New York.

8.5 Waste Characterization

8.5.1 Excavated Soils

The soil/fill excavated from the Site was systematically removed and staged in approximate 1,000 ton quantities. Soil volumes were estimated based on the capacity of the dump-trucks and typical weights hauled. Following staging of each 1,000 ton+/- volume of soil, a composite soil sample was collected and subsequently analyzed by Test America Laboratories, Inc. Each sample was analyzed for TCLP VOCs, TCLP SVOCs, TCLP metals, PCBs, TPH, reactivity, corrosivity and ignitability in accordance with test methods 1311/8260, 1311/8270, 1311/6010 and 7471, 8082, 1664, Section 7.3, Section 7.3 and 1010, as required by the Tonawanda Landfill. As a result of the level of contamination encountered, soil/fill was handled and disposed of as non-hazardous contaminated waste and hazardous waste.

EnSol, Inc. (Ensol) was contracted by Cerrone to provide services that included transportation coordination, and disposal of impacted soil/fill. EnSol was retained by Cerrone to manage what was initially characterized as non-hazardous impacted soil. As noted above, soil was excavated from the site, monitored by LCS for evidence of chemical impact and segregated into one of two piles, "clean" soil/fill and impacted soil/fill. Waste characterization samples were required for soil/fill presumed to be impacted.

Most of the excavated soil/fill was characterized, transported, and disposed of at the Tonawanda Landfill. LCS collected the waste characterization samples, transported the samples under standard chain-of-custody procedures to Test America, Inc. for analysis, and forwarded the analytical results to Cerrone and EnSol for preparation of the characterization paperwork. Characterization paperwork included waste profiles, manifest documents, approvals from disposal facilities and the NYSDEC, and obtaining signatures from the city of Niagara Falls (as the generator of the wastes).

Of the approximately 20,000 tons of soils disposed of at landfills, approximately 1,000 tons (Referenced as Soil Mound #17) that was initially disposed of at the Tonawanda Landfill. Subsequently, the NYSDEC determined that that soil should not have been disposed of at the Tonawanda Landfill; at least not without further testing, under the presumption that the solvent impacted to the soil was the result of a discharge of solvents from the historic on-Site dry-cleaning operation(s).

Waste Technology Services, Inc. ("WTS"), was retained by LP Ciminelli to assist with the proper disposal of the remaining 2,000 tons+/- of waste stockpiled proximate to the Site and the 1,000 tons (Soil Mound #17) at the Tonawanda Landfill. Subsequently, the NYSDEC informed the parties that the soil/fill remaining proximate to the Site and the 1,000 tons (Soil Moud#17) located at the Tonawanda Landfill needed to be analyzed under a total analysis protocol.

The soil sampling and additional testing under total analysis was required by the NYSDEC to determine whether a contained-in determination or exemption could be obtained. The NYSDEC indicated to representatives of WTS and LCS that a contained-in determination would be granted if the total analysis demonstrated that the contaminant of concern (tetrachloroethene) was reported less than 12ppm.

In an effort to determine if the remaining stockpile soil/fill from the Site and the 1,000 tons of soil (Soil Mound #17) in question at the Tonawanda Landfill would be granted a contained-in determination was sought. That determination required a statistical analysis and subsequent extensive sampling of the stockpiled soils proximate to the Site and the 1,000 tons (Soil Mound #17) in question at the Tonawanda Landfill. (See Figure 8.)

Subsequent to the additional testing the NYSDEC granted a contained-in determination for the majority of the soils remaining at the site. Indicating that that nearly all the remaining soils staged on-Site (approximately 2,232 tons) could be disposed of in a non-hazardous landfill under that determination. All but approximately 100 tons of the soils previously transported to the Tonawanda Landfill (Soil Mound #17) were allowed remain at that landfill. However the approximately 100 tons was subsequently removed and disposed of at Modern Landfill under a contained-in determination. Approximately 557 tons of soil/fill required disposal as hazardous waste.

8.6 Vapor Intrusion Mitigation

Due to the presence of VOC impact identified during previous studies as well as the RI, the historical contamination in the soil and groundwater and the planned redevelopment of a portion of the Site with the Niagara Falls Municipal Complex, installation of a vapor barrier combined with a sub-slab depressurization system was completed. That system was designed and installed by ENSOL and consisted of a full-slab vapor barrier (i.e., Stego Wrap 3™) beneath the entire building footprint (including the portion outside of the Site) and that an active venting system, involving the use of negative pressure blowers to evacuate air from below and around the facility's basement floor slab. This approach provided maximum protection of human health for facility occupants.

9.0 REMEDIAL ALTERNATIVES EVALUATION

The final remedial measure for the Niagara Falls Municipal Complex Site must satisfy Remedial Action Objectives (RAOs). Remedial Action Objectives are site-specific statements that convey the goals for minimizing or eliminating substantial risks to public health and the environment. For the Niagara Falls Municipal Complex Site, appropriate RAOs are:

- Removal of soil COCs within the Site to levels protective of human health.
- Mitigate loadings to groundwater from impacted soil COCs of the Site at levels that could be expected to result in exceedances of groundwater quality standards.
- Mitigate the potential for vapor intrusion of VOCs from groundwater underlying the Site or remaining off-Site.

As discussed in Section 8.0, Part 375 SCOs were employed as soil cleanup goals to provide a measure of performance against these RAOs. The SCOs are soil concentration limits protective of human health and groundwater quality. Achievement of the SCOs was confirmed through verification sampling.

Because the IRM achieved removal of soil within the limits of the Site to below Part 375 SCOs and a vapor barrier and sub-slab depressurization system were installed beneath the entire new Niagara Falls Municipal Complex, the IRM successfully achieved the above-described remedial action objectives.

In addition to achieving RAOs, NYSDEC's Brownfield Cleanup Program calls for remedy evaluation in accordance with DER-10 Technical Guidance for Site Investigation and Remediation (December 2002). Specifically, the guidance states "When proposing an appropriate remedy, the person responsible for conducting the investigation and/or remediation should identify and develop a remedial action that is based on the following criteria..:"

- **Overall Protection of Public Health and the Environment**. This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced, or controlled through removal, treatment, engineering controls, or institutional controls.

- **Compliance with Standards, Criteria, and Guidance (SCGs)**. Compliance with SCGs addresses whether a remedy will meet applicable environmental laws, regulations, standards, and guidance.

- **Long-Term Effectiveness and Permanence**. This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-Site after the selected remedy has been implemented, the following items are evaluated: (i) the magnitude of the remaining risks (i.e., will there be any significant threats, exposure pathways, or risks to the community and environment from the remaining wastes or treated residuals), (ii) the adequacy of the engineering and institutional controls intended to limit the risk, (iii) the reliability of these controls, and (iv) the ability of the remedy to continue to meet RAOs in the future.

- **Reduction of Toxicity, Mobility or Volume with Treatment**. This criterion evaluates the remedy's ability to reduce the toxicity, mobility, or volume of Site contamination. Preference is given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the Site.

- **Short-Term Effectiveness**. Short-term effectiveness is an evaluation of the potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during construction and/or implementation. This includes a discussion of how the identified adverse impacts and health risks to the community or workers at the Site will be controlled, and the effectiveness of the controls. This criterion also includes a discussion of engineering controls that will be used to mitigate short term impacts (i.e., dust control measures), and an estimate of the length of time needed to achieve the remedial objectives.

- **Implementability**. The implementability criterion evaluates the technical and administrative feasibility of implementing the remedy. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

- **Cost**. Capital, operation, maintenance, and monitoring costs are estimated for the remedy and presented on a present worth basis.

- **Community Acceptance**. This criterion evaluates the public's comments, concerns, and overall perception of the remedy.

Evaluation of the IRM against these criteria is presented below.

Overall Protection of Public Health and the Environment – Since the IRM achieved removal of all impacted soil within the boundaries of the Site to SCOs and included installation of a vapor barrier and sub-slab depressurization system beneath the entire Niagara Falls Municipal Complex, the IRM is protective of human health and the environment and successfully achieved the RAOs for the Site.

Compliance with SCGs – The IRM was performed in accordance and otherwise achieved with applicable, relevant, and appropriate standards, guidance, and criteria.

Long-Term Effectiveness and Permanence – Since the IRM achieved removal of all impacted soil within the boundaries of the Site, no residual soil contamination remains on the Site. Consequently, the IRM provides long-term effectiveness and permanence.

Reduction of Toxicity, Mobility, or Volume with Treatment – Through removal of all impacted soil, the IRM permanently and significantly reduced the toxicity, mobility, and volume of Site contamination.

Short-Term Effectiveness – The short-term adverse impacts and risks to the community, workers, and environment during implementation of the IRM were effectively controlled. Temporary safety construction fencing was placed around the outer perimeter of the work area to distinguish the work zone and discourage trespassing. During soil excavation and loading activities, dust monitoring was performed to assure conformance with NYSDOH-approved community air monitoring action levels. Erosion and sedimentation control were accomplished through the construction of earthen berms and/or the use of straw bails. The potential for chemical exposures and physical injuries were reduced through safe work practices, proper personal protection, environmental monitoring, establishment of work zones and Site control, and appropriate decontamination procedures. The IRM achieved the RAOs for the Site in little more than 1 month.

Implementability – No technical or action-specific administrative implementability issues were associated with implementation of the IRM, with the exception of classification of the impacted soil/fill, as discussed above.

Cost – The capital cost of the IRM was approximately $2,535,925.00. Post-remedial bedrock groundwater monitoring will be undertaken if required by the NYSDEC. According to the NYSDEC, that agency will be performing at least one additional groundwater sampling event as requested by the NYSDOH. Accordingly, long-term O&M costs have not been separately allocated for this Site.

Community Acceptance – The IRM Work Plan was advertised and made available for comment with the BCP application. No comments opposing the work were received.

Based on the preceding evaluation, the IRM in conjunction with post-remedial groundwater monitoring (if required by the NYSDEC), satisfies the criteria necessary for these measures and is the final remedy for the Site.

10.0 REFERENCES

1. *Magnetometer and Limited and Focused Subsurface Soil & Groundwater Investigation, Portion of the Proposed Niagara Falls Municipal Complex, 915 Cleveland Avenue, Niagara Falls, New York*, dated July 11, 2007, prepared by LCS, Inc.

2. *Soil and Groundwater Investigation – Portion of the Proposed Niagara Falls Municipal Complex Report*, *915 Cleveland Avenue, Niagara Falls, New York*, prepared by LCS, Inc., dated September 20, 2007

3. *Remedial Investigation Work Plan for Niagara Falls Municipal Complex*, prepared by LCS, Inc., dated August 2007.

4. *Interim Remedial Measures Work Plan for Brownfield Cleanup Program – Niagara Falls Municipal Complex*, prepared by LCS, Inc., August 2007.

TABLES

Table 1

Summary of Soil/Fill Analytical Results

Main Street and Cleveland Avenue Site
Niagara Falls, New York

VOCs in Soil by USEPA SW-846 Method 8260 TCL

Sample ID	BCP BH17	BCP BH18	BCP BH19	BCP BH19	BCP BH20	BCP BH21	DUP1 (BCP BH21)	Part 375 (Unrestricted Use) Soil Cleanup Objectives
Date Sampled	10/16/07	10/30/07	10/18/07	10/18/07	10/18/07	10/17/07	10/17/07	
Sample Depth	14-16.4 ft. bgs	20-22 ft. bgs	16-17 ft. bgs	8-10 ft. bgs	12-12.8 ft. bgs	18-19 ft. bgs	18-19 ft. bgs	
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Methylene chloride	8	5	7	4 J	4 J	11	14	50
Cis-1,2- Dichloroethene	<5	<5	<5	<6	<5	<6	<7	250
Tetrachloroethene	4 J	37	2 J	3 J	2 J	1 J	2 J	1,300
Cyclohexane	<5	3 J	<5	<6	<5	<6	<7	NL
Ethylbenzene	<5	<5	<5	<6	<5	<6	<7	1,000
Total Xylenes	<15	<16	<16	<17	<15	<17	<21	260
N-Propylbenzene	<5	<5	<5	<5	<5	<6	<7	3,900
1,2,4- Trimethylbenzene	<5	<5	<5	<6	<5	<6	<7	3,600
1,3,5- Trimethylbenzene	<5	<5	<5	<6	<5	<6	<7	8,400
Isopropylbenzene	<5	<5	<5	<6	<5	<6	<7	NL
Methylcyclohexane	<5	4 J	<5	<6	<5	<6	<7	NL
n-butylbenzene	<5	<5	<5	<6	<5	<6	<7	12,000
Naphthalene	<5	<5	<5	<6	<5	<6	<7	12,000
Benzene	<5	<5	<5	<6	<5	<6	<7	60
Toluene	<5	2 J	<5	<6	<5	<6	<7	700
M,p-Xylene	NA	NA	NA	NA	NA	NA	NA	NL
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NL
p-isopropyltoluene	NA	NA	NA	NA	NA	NA	NA	NL
p-cymene	<5	<5	<5	<6	<5	<6	<7	NL

ug/kg = micrograms per kilogram
ft. bgs = feet below ground surface
NA= Not Analyzed
NL = Not Listed
J= Indicates an estimated value
BOLD = Analyte detected above Part 375 (Unrestricted Use) Soil Cleanup Objectives

Table 1

Summary of Soil/Fill Analytical Results

Main Street and Cleveland Avenue Site
Niagara Falls, New York

SVOCs in Soil by USEPA SW-846 Method 8270 TCL

Sample ID	**BH18**	**BCP BH21**	**DUP1 (BCP BH21)**	**Part 375 (Unrestricted Use) Soil Cleanup Objectives**
Date Sampled	**10/30/07**	**10/17/07**	**10/17/07**	
Sample Depth	**20-22ft. bgs**	**18-19ft. bgs**	**18-19 ft. bgs**	
Units	ug/kg	ug/kg	ug/kg	ug/kg
Naphthalene	44 J	<180	<180	12,000
2- Methylnaphthalene	32 J	<180	<180	NL
Fluorene	97 J	<180	<180	30,000
Phenanthrene	510	<180	<180	100,000
Acenaphthylene	14 J	<180	<180	100,000
Anthracene	150 J	<180	<180	100,000
Acenaphthene	87 J	<180	<180	20,000
Bis (2-ethylhexyl) phthalate	<200	<180	<180	NL
Di-n-octyl phthalate	130 B,J	<180	120 B,J	NL
Dibenzo(a,h)anthtacene	30 J	<180	<180	330
Caprolactum	<200	<180	<180	NL
Fluoranthene	440	<180	10J	100,000
Pyrene	330	13J	<180	100,000
Benzo(a)anthracene	220	<180	47 J	1,000
Chrysene	180 J	120J	36 J	1,000
Benzo(b)fluoranthene	220	<180	<180	1,000
Benzo(ghi)perylene	83 J	<180	<180	100,000
Benzo(k)fluoranthene	<200	<180	<180	800
Benzo(a)pyrene	160 J	<180	<180	1,000
Dibenzofuran	54 J	<180	<180	NL
Carbazole	69 J	<180	<180	NL
Indeno(1,2,3-cd)pyrene	84 J	<180	<180	500

ug/kg = micrograms per kilogram
NL = Not Listed
J= Indicates an estimated value
B = This analyte was also detected within the laboratory's method blank and may be the result of laboratory contamination.
BOLD = Analyte detected above Part 375 (Unrestricted Use) Soil Cleanup Objectives

Table 1

Summary of Soil/Fill Analytical Results

Main Street and Cleveland Avenue Site
Niagara Falls, New York

METALS in Soil by USEPA SW-846 METHODS 6010/7471A TAL

Sample ID	BH18	BCP BH21	DUP1 (BCP BH21)	Part 375 (Unrestricted Use) Soil Cleanup Objectives
Date Sampled	10/30/07	10/17/07	10/17/07	
Sample Depth	0-2 ft. bgs	18-19ft. bgs	18-19ft. bgs	
Units	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum- Total	8200	2300	2540	NL
Antimony- Total	0.78 B	<0.52	<0.55	NL
Arsenic- Total	4.9	2.2	2.4	13
Barium- Total	76.5	14.5	17.3	350
Beryllium- Total	0.5	0.33	0.33	7.2
Cadmium- Total	0.91	0.64	**5**	2.5
Calcium- Total	140,000	196,000	179,000	NL
Chromium- Total	23.7	4.1	5.6	30
Cobalt- Total	4.6	2.5	2.6	NL
Copper- Total	18.9	7.8	10.5	50
Iron- Total	9450	4300	4340	NL
Mercury- Total	**0.545**	0.028	0.027	0.18
Magnesium- Total	42,900	107,000	97,400	NL
Manganese- Total	579	567	548	1,600
Nickel- Total	14.2	6	6.2	30
Potassium- Total	1060	933	978	NL
Selenium- Total	0.73 B	<0.57	<0.6	3.9
Sodium- Total	512	288	358	NL
Vanadium- Total	22.2	8.5	8.5	NL
Lead- Total	**84.6**	**535**	**1190**	63
Zinc- Total	**276**	**333**	**2080**	109

mg/kg = micrograms per kilogram
NL = Not Listed
B = This analyte was also detected within the laboratory’s method blank and may be the result of laboratory contamination.
BOLD = Analyte detected above Part 375 (Unrestricted Use) Soil Cleanup Objectives

Table 1

Summary of Soil/Fill Analytical Results

Main Street and Cleveland Avenue Site
Niagara Falls, New York

PCBs in Soil by USEPA SW-846 METHOD 8082

No analytes were detected at or above the laboratory's method detection limits.

Table 2

Summary of Groundwater Analytical Results

Main Street and Cleveland Avenue Site
Niagara Falls, New York

VOCs in Groundwater by USEPA SW-846 METHOD 8260 TCL

Sample ID	BCP BRWM2	BCP BRMW2	DUP2 (BCP BRMW2)	DUP2 (BCP BRMW2)	BCP BRMW3	BCP BRMW4	BCP BRMW5	BCP BRMW6	NYSDEC Groundwater Criteria (Class GA)
Date Sampled	**10/31/07**	**10/31/07**	**10/31/07**	**10/31/07**	**10/31/07**	**1/14/08**	**10/31/07**	**10/31/07**	
Units	**ug/l**	**ug/l**	**Ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**
Vinyl chloride	<10	<50	<10	<50	<10	<10	<10	<10	2
Acetone	<10	<50	<10	<50	<10	<10	<10	<10	50
Methylene chloride	<10	4 D,J	<10	6 D,J	<10	<10	<10	<10	5
Trans-1,2- Dichloroethene	<10	<50	<10	<50	<10	<10	<10	<10	5
Cis-1,2- Dichloroethene	2 J	<50	2 J	<50	<10	2J	<10	<10	5
Trichloroethene	7 J	6 D,J	7 J	7 D,J	0.5	2J	<10	<10	5
Tetrachloroethene	360 E	320 D	360 E	320 D	13	45	<10	<10	5
1,2,4 Trimethylbenzene	<1	<5	<1	<5	<1	<1	<1	<1	5
1,1-Dichloroethene	<10	<50	<10	<50	<10	<10	<10	<10	5
Chloromethane	<10	<50	<10	<50	<10	<10	<10	<10	5
Chloroform	<10	<50	<10	<50	<10	<10	1 J	<10	7
1,1,1-Trichloroethane	<10	<50	<10	<50	<10	<10	<10	<10	5
Benzene	<10	<50	<10	<50	<10	<10	<10	<10	1
Toluene	<10	<50	<10	<50	<10	<10	<10	<10	5
Ethylbenzene	<10	<50	<10	<50	<10	<10	<10	<10	5
Total Xylenes	<10	<50	<10	<50	<10	<10	<10	<10	5

ug/l = micrograms per liter
NA= Not Analyzed
D or DL= Compounds identified at a secondary dilution
J= Indicates an estimated value
E= Identifies compounds whose concentrations exceed the calibration range of the instrument for that particular analysis.
[shaded] = Analyte detected above or 6 NYCRR Part 703 Groundwater (GA) Criteria

Table 3

Comparison of Source Area Concentrations to Health-Based Soil Cleanup Objectives

Main Street and Cleveland Avenue Site
Niagara Falls, New York

Parameter	Highest Exposure Point Concentration (ug/kg)	USEPA Health Based Recommended Soil Cleanup Objective (ug/kg)	Part 375 (Unrestricted) Recommended Soil Cleanup Objective (ug/kg)
Volitale Organic Compounds (VOCs) (ug/kg)			
Methylene chloride[1]	14	93,000	50
Cis-1,2- Dichloroethene[2]	2 J	7,700	250
Tetrachloroethene[3]	2,300,000	14,000	1,300
Cyclohexane[4]	3 J	NL	NL
Ethylbenzene[5]	310	NL	1,000
N-Propylbenzene[5]	1,100	NL	3,900
Sec-Butylbenzene[5]	1,000	NL	11,000
1,2,4-Trimethylbenzene[5]	9,500	NL	3,600
1,3,5-Trimethylbenzene[5]	2,800	NL	8,400
Isopropylbenzene[6]	651	NL	NL
Methylcyclohexane[5]	200	NL	NL
N-Butylbenzene[5]	2,200	NL	12,000
Naphthalene[5]	480	NL	12,000
Benzene[7]	18	24,000	60
Toluene[8]	24	NL	700
M,P-Xylene[8]	26	NL	NL
O-Xylene[9]	4	NL	NL
Total Xylenes[2]	220 J	NL	260
P-Isopropyltoluene[6]	839	NL	NL
P-Cymene[2]	1,100	NL	NL
TICS[2]	113,900	NL	NL
Semi-Volatile Organic Compounds (SVOCs) (ug/kg)			
Naphthalene[2]	130 J	NL	12,000
2-Methylnaphthalene[2]	98 J	NL	NL
Fluorene[4]	97 J	NL	30,000
Phenanthrene[4]	510	NL	100,000
Acenaphthylene[4]	14 J	NL	100,000
Anthracene[4]	150 J	NL	100,000
Acenaphthene[4]	87 J	NL	20,000
Bis (2-ethylhexyl) Phthalate[10]	80 J	50,000	NL
Di-n-octyl phthalate[10]	9 J	NL	NL
Dibenzo(a,h)anthracene[4]	**30 J**	14.3	330
Caprolactum[5]	380	NL	NL
Fluoranthene[7]	519	NL	100,000
Pyrene[7]	706	NL	100,000
Benzo(a)anthracene[7]	271	224	1,000
Chrysene[7]	286	NL	1,000
Benzo(b)fluoranthene[7]	514	NL	1,000
Benzo(g,h,i)perylene[4]	83 J	NL	100,000
Benzo(k)fluoranthene[7]	268	NL	800
Benzo(a)pyrene[7]	327	60.9	1,000
Dibenzofuran[4]	54 J	NL	NL
Carbazole[4]	69 J	NL	NL
Ideno(1,2,3-cd)pyrene[7]	102	NL	500

TICS[2]	52,700	NL	NL
Metals (ug/kg)			
Aluminum-Total[4]	8,200,000	NL	NL
Arsenic-Total[11]	13,500	390,000	13,000
Barium-Total[7]	215,000	NL	350,000
Beryllium-Total[4]	500	1,400,000	7,200
Cadmium-Total[1]	5,000	NL	2,500
Calcium-Total[1]	196,000,000	NL	NL
Chromium-Total[12]	29,000	2,800,000	30,000
Cobalt-Total[4]	4,600	3,700,000	NL
Copper-Total[4]	18,900	NL	50,000
Iron-Total[4]	9,450,000	NL	NL
Mercury-Total[11]	5,090	NL	180
Magnesium-Total[1]	107,000,000	NL	NL
Manganese-Total[4]	579,000	NL	1,600,000
Nickel-Total[4]	14,200	NL	30,000
Potassium-Total[4]	1,060,000	NL	NL
Sodium-Total[4]	512,000	3,800,000	NL
Vanadium-Total[4]	22,200	NL	NL
Lead-Total[1]	1,190,000	NL	63,000
Zinc-Total[1]	2,080,000	NL	109,000

ug/kg = micrograms per kilogram
NL = Not Listed
[1] = Concentration detected in BCP BH21 or DUP1
[2] = Concentration detected in BH11
[3] = Concentration detected in BH15
[4] = Concentration detected in BCP BH18
[5] = Concentration detected in BH11
[6] = Concentration detected in BH2
[7] = Concentration detected in BH4
[8] = Concentration detected in BH3
[9] = Concentration detected in BH7
[10] = Concentration detected in BH13
[11] = Concentration detected in BH6
[12] = Concentration detected in BH8
BOLD = Analyte detected above USEPA Health Based Recommended Soil Cleanup Objectice
(grey shading) = Analyte detected above Part 375 (Unrestricted) Soil Cleanup Objective

Table 4

Verification Sampling
Soil Analytical Data Summary

VOCs in Soil by USEPA SW-846 Method 8260

Sample ID	BCP EX 1 Bottom 1	BCP EX 1 Bottom 2	BCP EX 1 E Wall A	BCP EX 1 E Wall B	BCP EX 1 E Wall B DL	BCP EX 1 S Wall A	BCP EX 1 S Wall B	BCP EX 1 S Wall C	BCP EX 1 S Wall D	BCP EX 1 S Wall E	BCP EX 1 S Wall F	BCP EX 1 S Wall G	BCP EX 1 S Wall G Dupe	BCP EX 1 W Wall A	BCP EX 1 W Wall B	Part 375 (Unrestricted Use) Soil Cleanup Objectives
Figure 7 Reference Number	**1**	**2**	**3**	**4**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**11**	**12**	**13**	
Date Sampled	**1/2/08**	**1/2/08**	**12/26/07**	**1/8/08**	**1/8/08**	**12/19/07**	**12/19/07**	**12/26/07**	**12/26/07**	**12/31/07**	**12/31/07**	**12/31/07**	**12/31/07**	**12/12/07**	**12/31/07**	
Units	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
Methylene chloride	<6	<6	6	<6	<31	12	9	6	<6	15 B	5 J	6	6	3 J	5 J	50
Tetrachloroethene	<6	<6	3 J	520 E	1000 D	<6	<6	<6	<6	<6	<6	<6	<6	<5	<6	1,300
Ethylbenzene	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	1 J	<6	<6	<5	<6	1,000
Total Xylenes	<19	<19	<19	<18	<94	<19	<19	<19	<18	<19	8 J	4 J	<17	<16	<18	260
N-Propylbenzene	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	<6	<6	<6	<5	<6	3,900
Sec- Butylbenzene	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	2 J	<6	<6	1 J	<6	11,000
1,2,4- Trimethylbenzene	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	3 J	1 J	<6	<5	<6	3,600
1,3,5- Trimethylbenzene	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	<6	<6	<6	<5	<6	8,400
Isopropylbenzene	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	<6	<6	<6	<5	<6	NL
Methylcyclohexane	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	<6	<6	<6	<5	<6	NL
n-butylbenzene	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	<6	<6	<6	<5	<6	12,000
Naphthalene	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	2 J	<6	<6	<5	<6	12,000
Toluene	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	3 J	2 J	<6	<5	<6	700
Acetone	12 BJ	11 BJ	<31	7 Bj	<160	17 BJ	32 B	7 J	7 J	20 BJ	10 J	8 J	7 J	6 J	10 J	NL
p-cymene	<6	<6	<6	<6	<31	<6	<6	<6	<6	<6	<6	<6	<6	<5	<6	NL

ug/kg = micrograms per kilogram

(TAGM Part 375 = Recommended Soil Cleanup Objective

NL = Not Listed

J= Indicates an estimated value

D or DL = Compounds analyzed at secondary dilution factor.

E= Identifies compounds whose concentrations exceed the calibration range of the instrument for that particular analysis.

N= Indicates presumptive evidence of a compound. This flag is used only for Tentatively Identified Compounds, where the identification is based on the Mass Spectral library search. It is applied to all TIC results.

B= This analyte was also detected within the laboratory's method blank and may be the result of laboratory contamination.

Bold = Analyte detected above Part 375 (Unrestricted Use) Soil Cleanup Objectives.

Table 4 (continued)

Verification Sampling
Soil Analytical Data Summary

VOCs in Soil by USEPA SW-846 Method 8260

Sample ID	BCP EX 4 N Wall D	BCP EX 4 N Wall E	BCP EX 3 Floor	BCP EX 3 E Wall	BCP EX 3 S Wall	BCP EX 3 W Wall	BCP EX 4 E Wall A	BCP EX 4 E Wall A DL	BCP EX 4 E Wall B	BCP EX 4 E Wall C	BCP EX 4 E Wall D	BCP EX 4 S Wall A	BCP EX 4 S Wall B	BCP EX 4 W Wall A	BCP EX 4 W Wall B	Part 375 (Unrestricted Use) Soil Cleanup Objectives
Figure 7 Reference Number	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	
Date Sampled	**1/8/08**	**1/8/08**	**1/2/08**	**1/2/08**	**1/2/08**	**1/2/08**	**1/12/08**	**1/12/08**	**1/12/08**	**1/12/08**	**1/14/08**	**1/12/08**	**1/12/08**	**1/3/08**	**1/3/08**	
Units	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
Methylene chloride	<6	<6	3 BJ	3 BJ	<6	3 BJ	<6	<32	4 J	<6	<6	5 J	2 J	2 BJ	4 BJ	50
Tetrachloroethene	1 J	10	<6	<6	<6	<5	350 E	260 D	23	<6	<6	31	15	<6	<6	1,300
Ethylbenzene	<6	<6	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	<6	1,000
Total Xylenes	<18	<18	<18	<16	<19	<16	<17	<94	<18	<19	<17	<18	<16	<16	<17	260
N-Propylbenzene	<6	5 J	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	<6	3,900
Sec- Butylbenzene	<6	6	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	<6	11,000
1,2,4- Trimethylbenzene	6	87	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	<6	3,600
1,3,5- Trimethylbenzene	<6	16	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	<6	8,400
Isopropylbenzene	<6	2 J	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	<6	NL
Methylcyclohexane	<6	5 J	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	<6	NL
n-butylbenzene	2 J	17	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	<6	12,000
Naphthalene	5 J	39	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	2 J	12,000
Toluene	<6	<6	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	<6	700
Acetone	7 BJ	9 BJ	9 BJ	8 BJ	11 BJ	8 BJ	7 J	<160	<30	10 J	<28	12 J	7 J	13 BJ	12 BJ	NL
p-cymene	<6	7	<6	<6	<6	<5	<6	<32	<6	<6	<6	<6	<5	<6	<6	NL

ug/kg = micrograms per kilogram
(TAGM Part 375 = Recommended Soil Cleanup Objective
NL = Not Listed
J= Indicates an estimated value
D or DL = Compounds analyzed at secondary dilution factor.
E= Identifies compounds whose concentrations exceed the calibration range of the instrument for that particular analysis.
N= Indicates presumptive evidence of a compound. This flag is used only for Tentatively Identified Compounds, where the identification is based on the Mass Spectral library search. It is applied to all TIC results.
B= This analyte was also detected within the laboratory's method blank and may be the result of laboratory contamination.
Bold = Analyte detected above Part 375 (Unrestricted Use) Soil Cleanup Objectives.

Table 4 (continued)

Verification Sampling
Soil Analytical Data Summary

VOCs in Soil by USEPA SW-846 Method 8260

Sample ID	BCP EX 4 W Wall C	BCP EX 4 W Wall D	BCP EX 4 N Wall A	BCP EX 4 N Wall B	BCP EX 4 N Wall C	DUP 4 BCP EX 4 N Wall C	BCP EX 4 N Wall F	BCP EX 4 N Wall G	DUP 5 BCP EX 4 N Wall G	BCP Off-Site Floor CMP	BCP Off-Site Floor CMP DL	BCP Off-Site Wall CMP	BCP Off-Site Wall CMP DL	Part 375 (Unrestricted Use) Soil Cleanup Objectives
Figure 7 Reference Number	**28**	**29**	**30**	**31**	**32**	**32**	**33**	**34**	**34**	**35**	**35**	**36**	**36**	
Date Sampled	**1/3/08**	**1/3/08**	**1/7/08**	**1/7/08**	**1/7/08**	**1/7/08**	**1/17/08**	**1/17/08**	**1/17/08**	**1/18/08**	**1/18//08**	**1/18/08**	**1/18/08**	
Units	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
Methylene chloride	<6	<6	<6	<5	<6	<6	2 J	3 J	2 J	4 J	<140	3 J	<130	50
Tetrachloroethene	<6	<6	<6	<5	<6	<6	<6	4 J	4 J	**5,700 E**	**6,300 D**	**3,500 E**	**4,200 D**	1,300
Ethylbenzene	<6	<6	<6	<5	<6	<6	<6	<5	<6	<6	<140	<6	<130	1,000
Total Xylenes	<17	<18	<17	3 J	3 J	<18	3 BJ	<16	<17	<17	<410	<16	<390	260
N-Propylbenzene	<6	<6	<6	<5	<6	<6	<6	<5	<6	<6	<140	<6	<130	3,900
Sec- Butylbenzene	3 J	<6	<6	<5	<6	<6	<6	<5	<6	<6	<140	<6	<130	11,000
1,2,4- Trimethylbenzene	<6	<6	<6	1 J	<6	<6	<6	<5	<6	1 J	<140	<6	<130	3,600
1,3,5- Trimethylbenzene	<6	<6	<6	<5	<6	<6	<6	<5	<6	<6	<140	<6	<130	8,400
Isopropylbenzene	<6	<6	<6	<5	<6	<6	<6	<5	<6	<6	<140	<6	<130	NL
Methylcyclohexane	<6	<6	<6	<5	<6	<6	<6	<5	<6	<6	<140	<6	<130	NL
n-butylbenzene	<6	<6	<6	<5	<6	<6	<6	<5	<6	<6	<140	<6	<130	12,000
Naphthalene	5 J	<6	<6	<5	<6	<6	<6	<5	1 BJ	3 J	<140	2 J	28 DJ	12,000
Toluene	<6	<6	<6	3 J	2 J	2 J	2 BJ	2 BJ	<6	<6	<140	<6	<130	700
Acetone	15 BJ	7 BJ	8 BJ	6 BJ	7 BJ	17 BJ	<28	<26	6 J	22 J	<690	25 J	<650	NL
p-cymene	<6	<6	<6	<5	<6	<6	<6	<5	<6	<6	<140	<6	<130	NL

ug/kg = micrograms per kilogram
(TAGM Part 375 = Recommended Soil Cleanup Objective
NL = Not Listed
J= Indicates an estimated value
D or DL = Compounds analyzed at secondary dilution factor.
E= Identifies compounds whose concentrations exceed the calibration range of the instrument for that particular analysis.
N= Indicates presumptive evidence of a compound. This flag is used only for Tentatively Identified Compounds, where the identification is based on the Mass Spectral library search. It is applied to all TIC results.
B= This analyte was also detected within the laboratory's method blank and may be the result of laboratory contamination.
Bold = Analyte detected above Part 375 (Unrestricted Use) Soil Cleanup Objectives.

Table 4 (continued)

Verification Sampling
Soil Analytical Data Summary

METALS in Soil by USEPA SW-846 METHODS 6010/7471A

Sample ID	BCP EX 2 E Wall	BCP EX 2 E Wall 2	BCP EX 2 Floor	BCP EX 2 N Wall A	BCP EX 2 N Wall A2	BCP EX 2 N Wall B	BCP EX 2 S Wall A	BCP EX 2 S Wall B	Part 375 (Unrestricted Use) Soil Cleanup Objectives
Figure 7 Reference Number	37	38	39	40	41	42	43	44	
Date Sampled	12/13/07	12/18/07	12/13/07	12/13/07	12/18/07	12/13/07	12/13/07	12/13/08	
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Mercury- Total	**0.504** N	0.045	0.08 N	**0.464 N**	0.071	0.01 B,N	0.142 N	0.043	0.18
Lead- Total	**216 N**	11.7	14.8 N	**223 N**	24.3	5.7 N	36.7 N	17.9 N	63

mg/kg = milligrams per kilogram

(TAGM Part 375 = Recommended Soil Cleanup Objective

N= Indicates presumptive evidence of a compound. This flag is used only for Tentatively Identified Compounds, where the identification is based on the Mass Spectral library search. It is applied to all TIC results.

B= This analyte was also detected within the laboratory's method blank and may be the result of laboratory contamination.

Bold = Analyte detected above Part 375 (Unrestricted Use) Soil Cleanup Objectives.

FIGURES

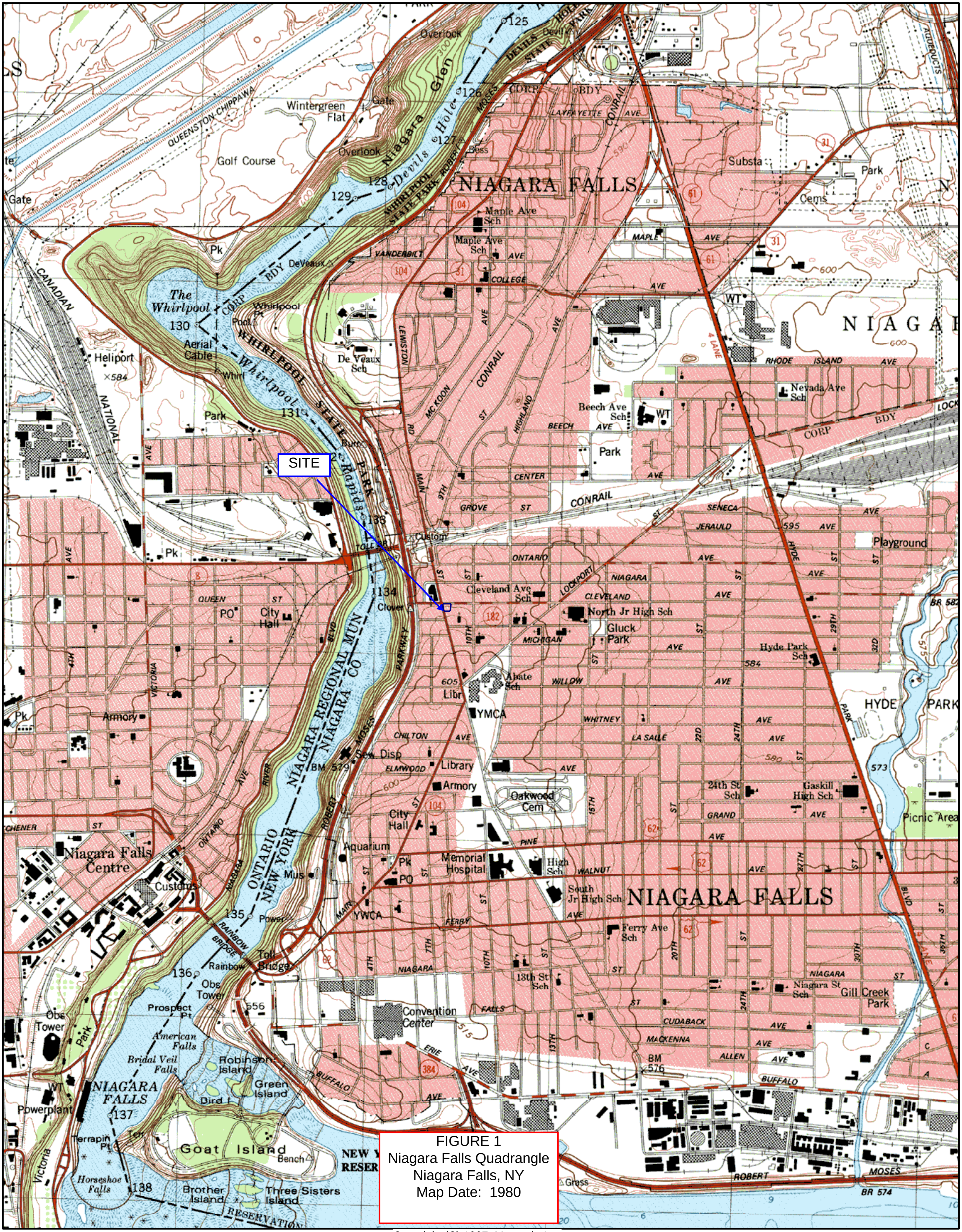
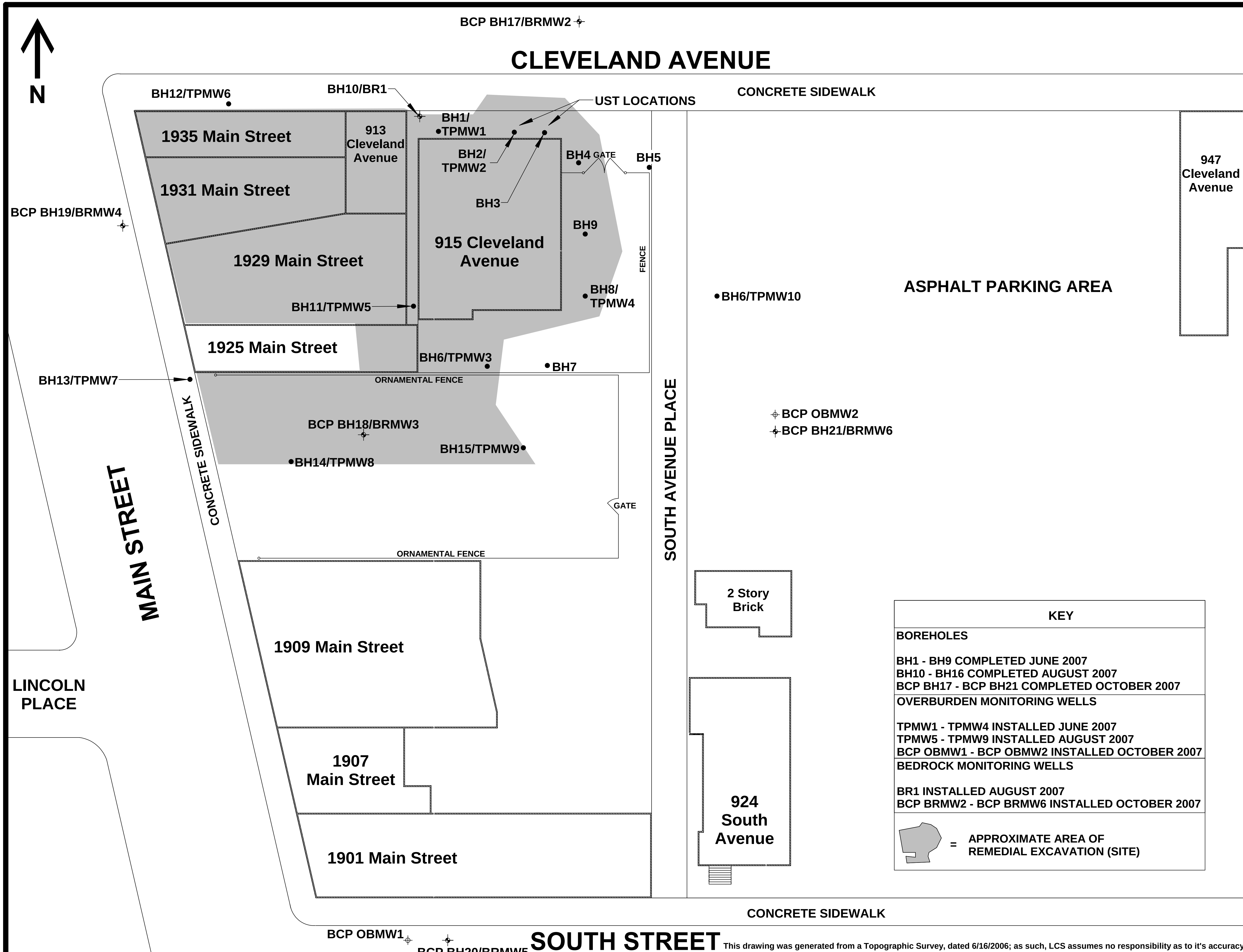


FIGURE 1
Niagara Falls Quadrangle
Niagara Falls, NY
Map Date: 1980


SITE
Lincoln Pl
Cleveland Ave
South Ave
104
182
10th St
ain St
© 2008 Tele Atlas
Google
Pointer 43°06'23.24" N 79°03'10.47" W
Streaming 44%
Eye alt 917 ft

FIGURE 2



Drawn by: DPS

Checked by: DBR

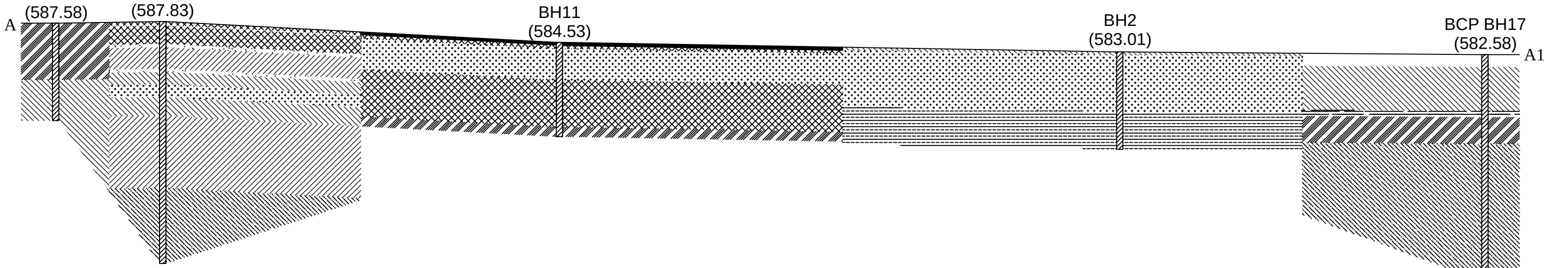
0 40 80
Approximate Scale in Feet

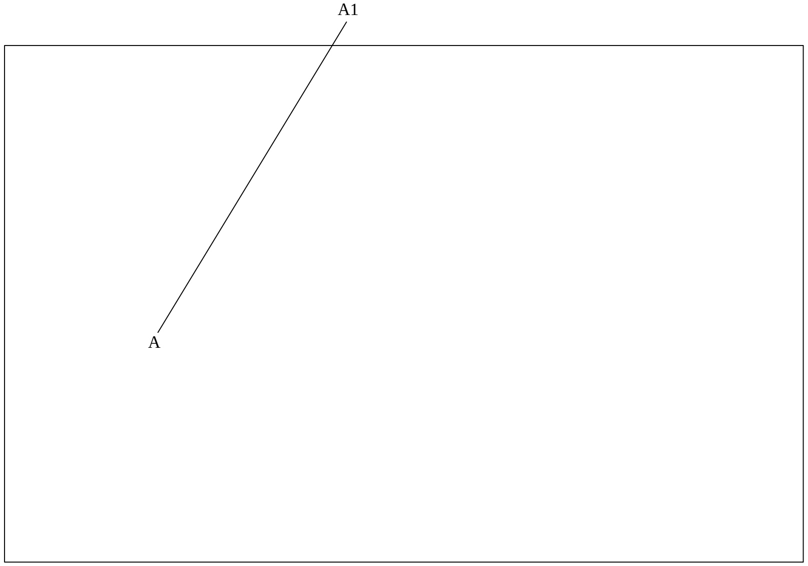
LCS Project # 06B3027.26

FIGURE 3

LCS INC.

□ = NO RECOVERY
▨ = SILT
▨ = CLAY
□ = GRAVEL
▨ = BEDROCK
▨ =GRAVELLY SILT
▨ = CLAYEY SILT
▨ = SANDY GRAVEL
▨ = SILTY CLAY
▨ = SILTY SANDY CLAY
▨ = GRAVELLY SANDY SILT
■ = CONCRETE
( ) = ELEVATION





THE ELEVATIONS REPORTED ARE BASED ON THE TOPOGRAPHICAL SURVEY COMPLETED BY DEBORAH A. NAYBOR PLS, P.C. DATED JUNE 16, 2006

Drawn by: AKZ

Checked by: DBR

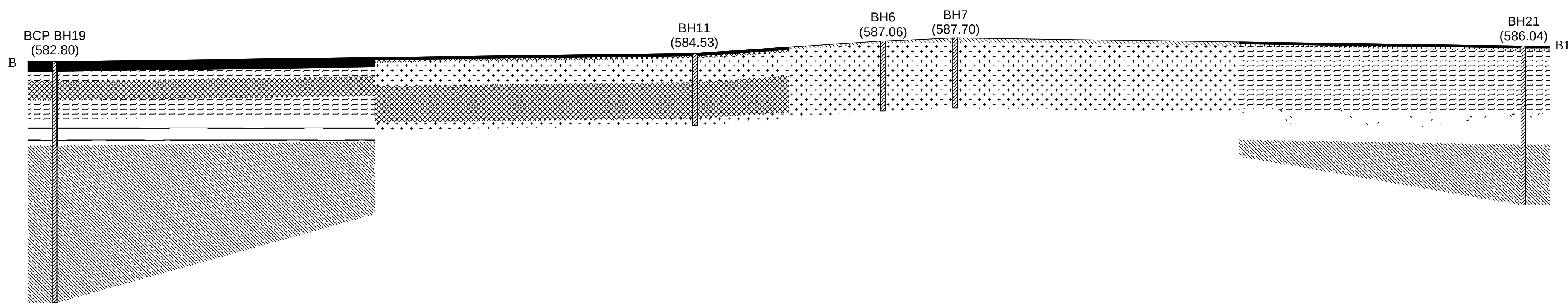
0 20 40
Approximate Scale in Feet

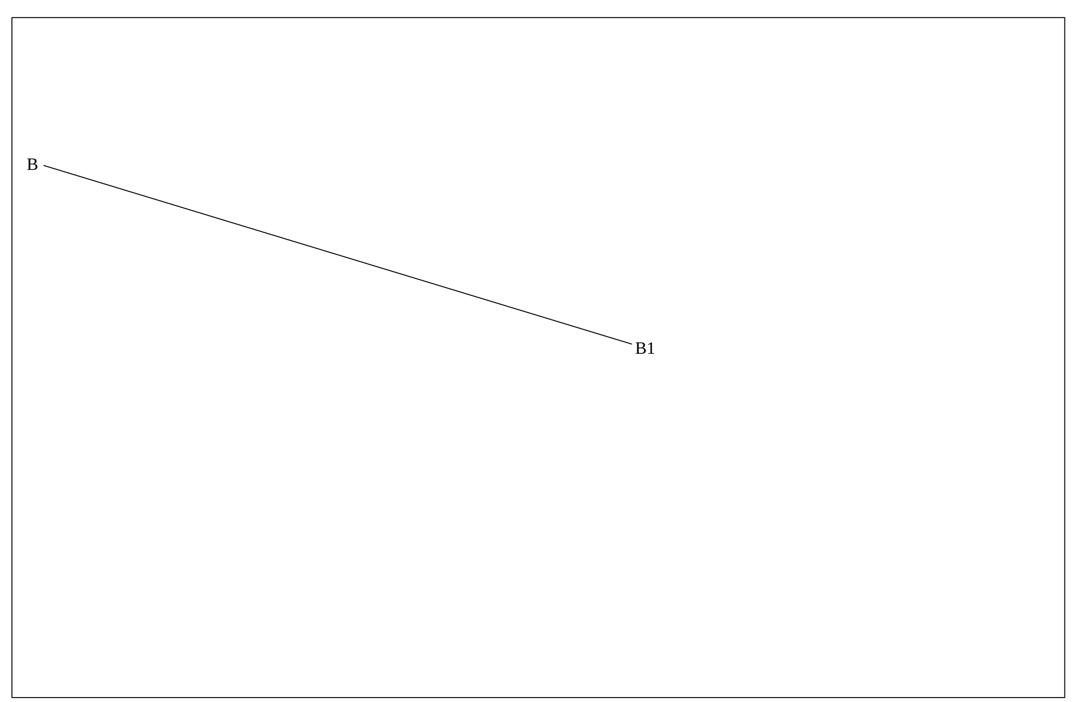
LCS Project # 06N3072.26

FIGURE 4

LCS INC.

▧ = SILT
□ = SANDY GRAVELLY SILT
▧ = BEDROCK
▦ = CLAYEY SILT
▭ = GRAVELLY SANDY CLAYEY SILT
( ) = ELEVATION
▦ = SILTY CLAY
▤ = GRAVELLY SANDY SILT
■ = ASPHALT/CONCRETE
▭ = SANDY SILT
▨ = SILTY GRAVEL





THE ELEVATIONS REPORTED ARE BASED ON THE TOPOGRAPHICAL SURVEY COMPLETED BY DEBORAH A. NAYBOR PLS, P.C. DATED JUNE 16, 2006

Drawn by: AKZ

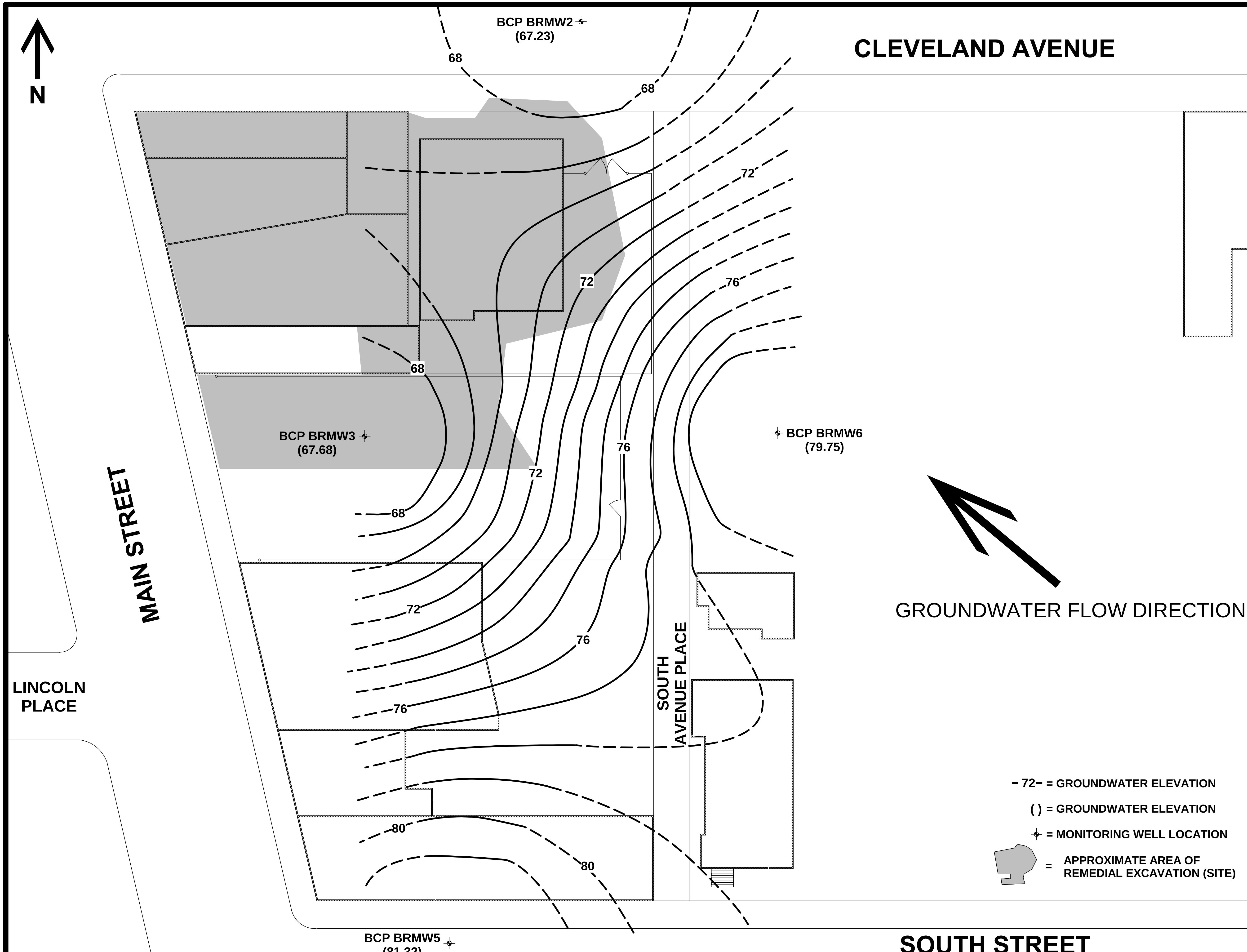
Checked by: DBR

0 30 60
Approximate Scale in Feet

LCS Project # 06B3027.26

FIGURE 5

LCS INC.



Drawn by: DPS

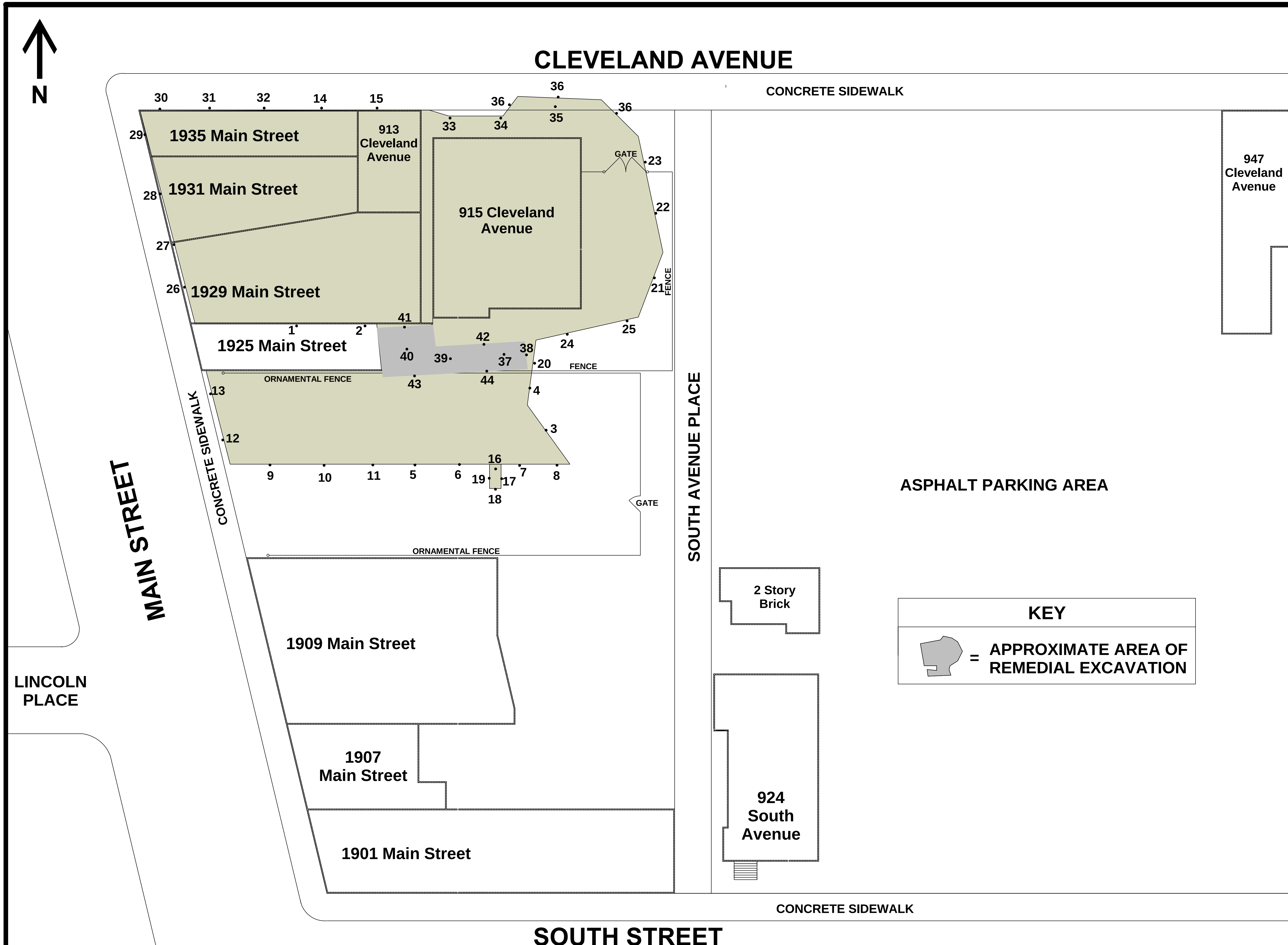
Checked by: DBR

0 40 80 *Approximate Scale in Feet*

LCS Project # 06B3027.26

FIGURE 6

LCS INC.



Drawn by: DPS

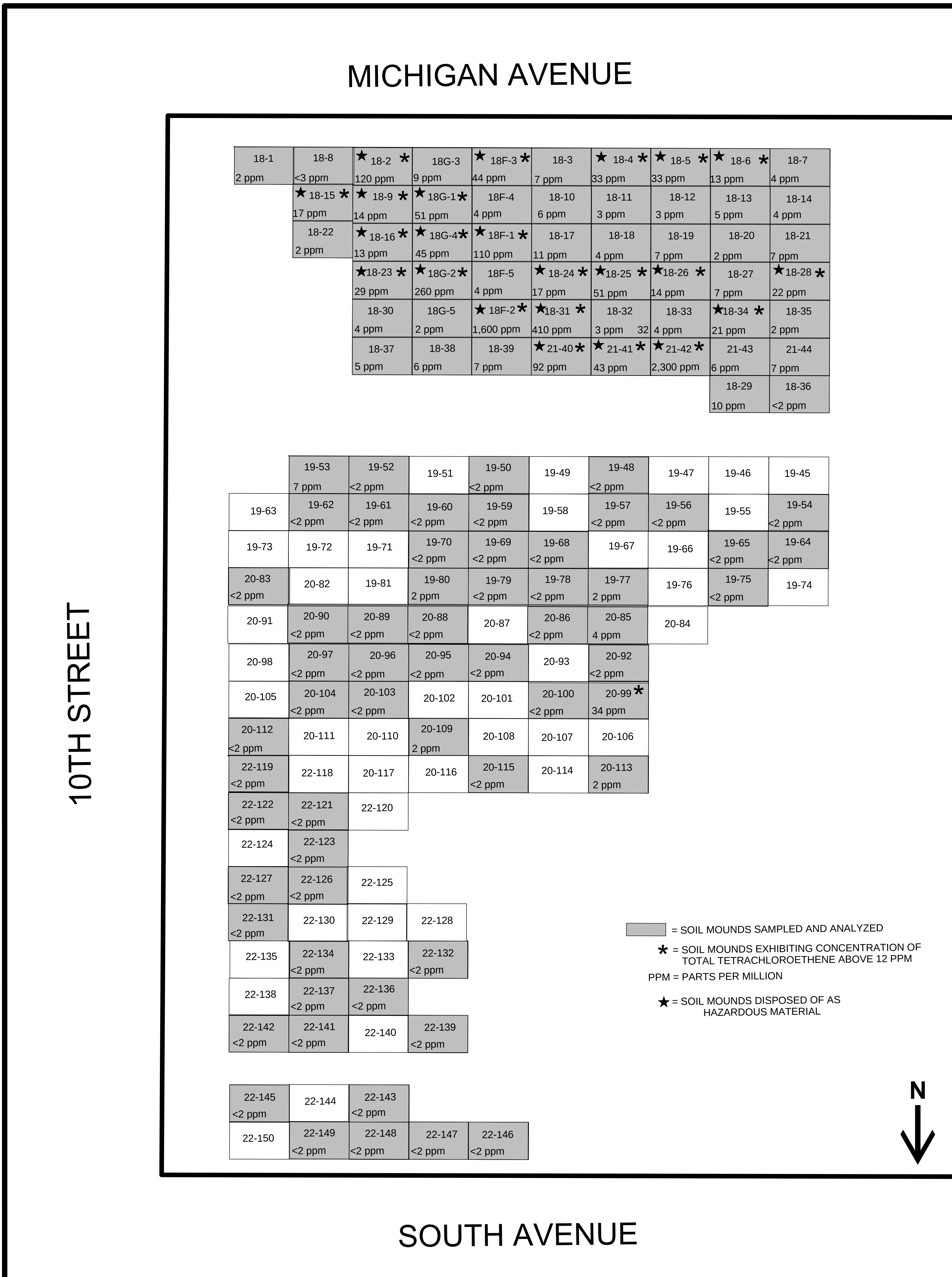
Checked by: DBR

0 40 80 *Approximate Scale in Feet*

LCS Project # 06B3027.26

FIGURE 7

LCS INC.



LCS INC.

FIGURE 8

Drawn by: SM

Checked by: DBR

LCS Project # 06B3027.26

NOT TO SCALE