62-64 Scio Street
Rochester, New York
MONROE COUNTY
ROCHESTER, NEW YORK

SOIL AND GROUNDWATER MANAGEMENT PLAN

Prepared for:

City of Rochester
City Hall, Room 300B
30 Church Street
Rochester, New York 14614

Prepared by:

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ENVIRONMENTAL • TRANSPORTATION • CIVIL

399 East Avenue, Suite 200
Rochester, New York 14604

December 2016

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1.0 Overview and Objectives

The Site is a vacant lot located at 62-64 Scio Street in Rochester, New York currently owned by The City of Rochester. The location of the Site is shown on Figure 1.

The objective of this Soil and Groundwater Management Plan (SGMP) is to consolidate all available data and information on the environmental status of the project Site. This plan also provides guidelines for management of soil and groundwater that could be impacted during future development. This SGMP addresses environmental concerns related to soil and groundwater management and has been reviewed and approved by the New York State Department of Environmental Conservation (NYSDEC).

This SGMP was prepared by Lu Engineers, on behalf of The City of Rochester, in accordance with guidelines provided by NYSDEC Region 8 Spills Unit.

2.0 Site Background

2.1 Site Location and Description

The Site is located at 62-64 Scio Street in The City of Rochester, Monroe County, New York. The Site is bounded by a dry-cleaning plant (Speedy's Cleaners) to the South and an imaging company (City Blue Imaging) to the North. Residential homes are located along the eastern boundary across Matthews Street and a parking garage is located to the west, across Scio Street. The surrounding land use is commercial and residential. There are currently no buildings on the property.

2.2 Site History

A 22,000 square foot, two-story, brick building constructed around 1920 occupied the Site until 2002. The building was primarily used as a warehouse from the date of construction, until approximately 1990. The City of Rochester took ownership of the property in 1996, at which time the building was used for storage until it was demolished in November 2002. The Site has remained vacant since demolition.

Several Environmental Studies have been completed on behalf of the City of Rochester at the Site including:

- Rizzo Associates Inc. Preliminary Site Assessment Update/Limited Subsurface Investigation Report, dated May 1993;
- Day Environmental Inc. (DAY) Phase I Environmental Site Assessment Report, dated May 1995;
- Day Environmental Inc. (DAY) Phase II Environmental Site Assessment Report, dated August 1995;
- Day Environmental Inc. (DAY) Underground Storage Tank Closure and Limited Subsurface Study Report, dated December 2006;
- Day Environmental Inc. (DAY) Data Package Limited Groundwater Study Report dated June 2007; and
- Lu Engineers Phase I Environmental Site Assessment Report, dated October 2009.

The results of the previous Environmental Studies revealed the following Recognized Environmental Concerns (RECs) associated with the Site and/or adjacent properties that may have impacted the Site prior to remedial activities. These include the following:

Underground Storage Tank(s)- Two (2) underground storage tanks (USTs) were formerly used on- Site for the storage of petroleum products including gasoline and diesel fuel/fuel oil. These tanks (5,000 gallon and 2,000 gallon) were removed in 2006 and 2003, respectively. Subsurface investigations that began in 2006 showed the presence of petroleum compounds in Site soils and groundwater.

Adjacent NYSDEC Active Spills- The NYSDEC's spills database was reviewed and identified eight (8) active spills within a 0.5 mile radius of the Site. The distance and location of these spills from the Site suggest no environmental impact on the assessed properties.

Adjacent NYSDEC Inactive Spills- An Underground Storage Tank (UST) containing gasoline was removed from the adjacent property to the east, at 68-72 Scio Street, in 1991. Soils surrounding the tank were found to be contaminated. A soil venting system and three (3), groundwater monitoring wells were installed on the property. The only monitoring well reportedly containing a detectable level of contamination was the well closest to 62-64 Scio Street. The spill was closed by the NYSDEC in 1995.

Groundwater Contamination at Adjacent Property Monitoring Wells- Petroleum contamination was identified at an adjacent property, located at 200 East Avenue, to the east of the Site, across Matthews Street. A north/northeastward groundwater flow direction has been documented for this location. Review of the NYSDEC Petroleum Bulk Storage (PBS) database identified six (6) former storage tanks at 200 East Avenue including:

- one (1) 4,000 gallon gasoline UST installed in 1986;
- three (3) 1,000 gallon USTs with unknown contents;
- one (1) 2,000 gallon gasoline UST installed in 1987, and;
- one (1) 1,000 gallon Aboveground Storage Tank (AST) with unknown contents.

These tanks were closed and removed in 1997. A well located east/southeast of the Site contained seven (7) volatile organic compounds (VOCs) ranging in concentrations from 1.1 µg/L to 4.3 µg/L or parts per billion (ppb).

2.3 Geologic Conditions

Native soils at the Site are comprised mainly of Urban Land. Urban land consists of areas that have been so altered or obscured by urban works and structures that identification of the soils is not feasible. Characteristics of Urban soil also include restricted aeration and water drainage due to modified soil structure leading to compaction.

The areas that contain Urban Land soil are located mainly in the closely built-up parts of the City of Rochester. The bedrock in this area consists of the Paleozoic Era, Upper Silurian Series. There are no wetlands or floodplains at or in the immediate vicinity of the Site.

3.0 Summary of Investigation and Remedial Actions

3.1 Investigation

On July 27, 2012 five (5) test pits were advanced to a depth of approximately twelve (12) feet below ground surface (bgs), in the areas of suspected highest contamination to obtain appropriate sample(s) for waste characterization analysis.

A MiniRAE 3000® Photoionization Detector (PID) was used to screen excavated soils. Based on the results of the soil screening and other observations at each location, soil samples were collected from test pits 1 and 2 and submitted to Paradigm Environmental Services, Inc. (Paradigm), a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified analytical laboratory. A total of two samples were analyzed for the following parameters:

- STARS Volatiles by United States Environmental Protection Agency (USEPA) Method 8260;
- Total Lead by USEPA Method 6010; and
- Flashpoint by USEPA Method 1010 or 1030.

The results of these samples can be found in Appendix 1.

3.2 Removal of Contaminated Materials from the Site

Approximately 700 tons of source area material consisting of soil, fill, and fractured rock was excavated and removed from the Site for off-site disposal. All material removed from the site was pre-profiled and taken to Waste Management Incorporated's, High Acres Landfill in Perinton, New York, as non-hazardous petroleum-contaminated soil, and used as landfill cover.

All excavated materials were field screened with a PID. Excavated soils were segregated based on PID readings during the excavation. Soils exhibiting PID readings between 0 and 25 parts per million (ppm) were staged for on-Site re-use. Soils exhibiting headspace readings between 25 and 100 ppm were staged separately, on 6 millimeter polyethylene (poly) sheeting, and sampled in accordance with NYSDEC CP-51 to determine suitability for on-Site re-use. Soils exhibiting headspace readings of greater than 100 ppm were excavated and "live-loaded" into appropriately permitted trucks for disposal at Waste Management, Inc. of New York. Excavation sidewall soils were continuously screened with a PID to determine the maximum extent of soil removal. Total depth of soil removal varied based on the extent of impact, the depth of bedrock and accessibility to bedrock.

The excavation process was completed in stages due to close proximity of the adjacent properties to the excavation area(s). The seasonally saturated soils above bedrock (lower five (5) feet) of each excavation were backfilled with 1-2 inch diameter crushed dolostone. Backfilling was completed in 2 foot lifts to facilitate compaction. The upper layers were backfilled with

uncontaminated Site soils. Compaction was verified to 95% in one-foot lifts in all backfilled areas. Figure 2 provides the layout of the Site while excavation work was in-progress.

Continuous perimeter and work zone air monitoring was conducted during all soil removal, soil staging, loading and/ or excavation using a MiniRAE 3000 PID, to ensure that workers and the public were not exposed to elevated concentrations of VOCs. In accordance with the New York State Department Of Health (NYSDOH)-required Community Air Monitoring Plan (CAMP), continuous particulate monitoring was conducted at upwind and downwind locations to ensure contaminants were not migrating off-site during excavation.

Groundwater was not encountered during the excavation process. Semi-saturated soils were observed on the bedrock surface at approximately 10-12 feet bgs.

After impacted "source area" soils were removed, confirmatory soil samples were collected from excavation sidewalls, in accordance with NYSDEC CP-51 Soil Cleanup Guidance and DER-10 Technical Guidance for Site Investigation and Remediation. No bottom samples were collected since excavation terminated on bedrock. Sidewall samples were collected approximately every 30 feet. A total of 11 confirmatory sidewall soil samples were collected. An additional three (3) QA/QC samples were obtained for VOCs (EPA Method 8260 STARS) and semi-volatile organic compounds (SVOCs) (EPA Method 8270 B/Ns Only). The confirmation soil samples were relinquished to Paradigm Environmental for analysis. Figure 3 includes the confirmatory sample locations. Analytical results are provided in Appendix 1.

3.3 Site-Related Treatment Systems

Post soil source removal groundwater treatment was necessary in order to reduce residual groundwater contaminant levels to below 6 New York Codes, Rules, and Regulations (6 NYCRR) Part 703.5 Ambient Water Quality Standards and Guidance Values. The selected remedial approach included the use of direct oxygen injection into the overburden and shallow bedrock saturated zone by means of network of injection points, installed in 2014. The layout of the oxygen injection system is indicated on Figure 4.

On-going groundwater monitoring was performed to verify groundwater remedial parameters and to confirm that remedial goals were being approached or attained. Monitoring took place in August 2012, August 2013, September and December 2014, March, June and September of 2015 and August 2016. The oxygen injection system was decommissioned in August 2016. Groundwater analytical results can be found in Appendix 1.

3.4 Remaining Contamination

In the event that residual contamination is encountered during future construction and development activities within the Site, the NYSDEC Spills Unit will be notified.

The City of Rochester will be responsible for remediation if additional contaminated soil is encountered. The material will be excavated and disposed of at the High Acres Landfill in Perinton, New York. Post excavation sampling for VOCs, SVOCs, PCBs, metals and flashpoint will

be obtained from sidewalls of the excavation, as necessary to comply with waste handling and disposal requirements.

Figure 5 indicates the most recent groundwater conditions observed relative to the Site. Contaminated groundwater remains beneath the southern edge of the property and beneath the parking lot to the south of the City's property boundary. The City is currently planning to implement a limited in-situ remedial program to address the low levels of remaining contamination. Proposed injection points are included in Figure 5.

4.0 Soil and Groundwater Management Plan

This SGMP provides procedures to identify residual subsurface petroleum contamination associated with NYSDEC Spill #0650898 that could be encountered during future subsurface activities conducted at the Site. In addition, this SGMP provides options for the management, disposal and/or re-use of subsurface material impacted with petroleum. The procedures presented herein are intended to reduce potential exposure to workers conducting subsurface activities at the Site should petroleum-impacted subsurface materials be encountered that require management.

4.1 Potentially Contaminated Material

This section provides information on the identification, handling, analytical laboratory testing, disposal, or re-use of potentially contaminated materials.

4.1.1 In-Field Identification

During past subsurface activities, petroleum impacted soil or groundwater has been encountered. Petroleum-impacted soil may be stained gray or black, contain a rainbow-type sheen, and emit petroleum-type odor. Petroleum-impacted groundwater may emit a petroleum-type odor, and could contain a floating sheen. Free petroleum product, if encountered, would exhibit an oily type texture, a strong petroleum-type odor, likely an amber to dark brown/black color, and would be floating on the groundwater surface. Elevated PID readings exceeding background measurements on ambient air above soil or groundwater is also indicative of the presence of VOCs associated with petroleum contamination.

4.1.2 Handling

Petroleum-impacted soil and groundwater that are encountered must be managed in accordance with applicable federal, state, and local regulations. During intrusive work, soil and liquids (e.g., water) being disturbed or removed must be assessed for field evidence of petroleum contamination (e.g., petroleum-type odors, staining, free product, sheen). In addition, the ambient air above removed or excavated media must be screened for total VOCs using a PID. The following is general guidance for the handling of materials that are potentially contaminated with residual petroleum that may be encountered during subsurface work at the Site:

Petroleum-Contaminated Soil

Soil should be considered to be petroleum-contaminated if: 1) PID readings on ambient air above a sample of the soil exceed 10 parts per million (ppm); or 2) the soil exhibits a petroleum nuisance odor, sheen or free product. Petroleum-contaminated soil that is excavated or disturbed should be segregated from non-impacted media, and handled in one or more of the following methods:

- Place on, and cover with, two layers of plastic sheeting that total at least 12 millimeters in thickness. Secure plastic sheeting with sand bags or other suitable inert weights, and replace as needed if damaged by wind, site activities or other factors.
- Place in New York State Department of Transportation (NYSDOT)-approved 55-gallon drums with secure lids. Label drums with date, contents, and generator.
- Place in one or more lined roll-off with secure cover.

Petroleum-Contaminated Liquids

Petroleum-impacted groundwater, petroleum-impacted standing water, and free petroleum product (if encountered) removed from the subsurface (e.g., excavations, etc.), must be containerized (i.e., placed in sealed NYSDOT-approved 55-gallon drums, holding tanks or frac tanks) prior to characterization and disposal. Any subsurface liquid or water (including groundwater, stormwater, and snow melt in excavations, trenches, boreholes, etc.) that is encountered at the Site must be considered petroleum-contaminated unless it can be proved otherwise via appropriate analytical laboratory testing and/or other method that is acceptable to the NYSDEC.

A suitable pump will need to be utilized to pump free petroleum product and/or petroleum-contaminated water from work areas (e.g., excavation) until such time that the work is completed. To the extent practicable, free petroleum product (if encountered) should be segregated/removed from petroleum-contaminated water, and stored/staged separately. In addition, petroleum-contaminated groundwater may require pre-treatment prior to waste characterization sampling and testing.

4.1.3 Characterization

Petroleum-contaminated soil and groundwater must be characterized in accordance with applicable federal, state, and local regulations and disposal facility requirements. The following is general guidance for characterizing these media.

Petroleum-Contaminated Soil

Representative samples of the stockpiled soil will be collected, and the samples will be submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified analytical laboratory for testing of appropriate waste characterization parameters. The proposed waste disposal company

will identify the number of samples and the test parameters required. However, based on the results of previous analytical laboratory testing conducted for this Site and disposal facility requirements in the Greater Rochester area, it is anticipated that the waste characterization sampling and analysis program required by the disposal facility may include, but not be limited to, one or more of the following:

- Collect one (1) sample for the first 500 tons of soil, and one sample for each 1,000 tons thereafter.
- Test each sample at a NYSDOH ELAP-certified analytical laboratory for:
    - USEPA target compound list (TCL) VOCs using USEPA Method 8260;
    - USEPA TCL SVOCs using USEPA Method 8270;
    - Total lead using USEPA Method 6010; and
    - Flashpoint using USEPA Method 1010 or 1030.

Petroleum-Contaminated Liquids

Representative samples of each type of liquid (e.g., water, free product) will be collected, and the samples will be submitted to a NYSDOH ELAP-certified analytical laboratory for testing of appropriate waste characterization parameters. The proposed waste disposal company or wastewater treatment facility will identify the number of samples and the test parameters required. However, based on the results of previous analytical laboratory testing conducted for this Site, it is anticipated that the waste characterization sampling and analysis program that is required for petroleum-contaminated water and free product (if encountered) may include, but not be limited to, one or more of the following:

- Collect one sample for each type of liquid media (e.g., water, free product if present).
- Test each sample at a NYSDOH ELAP-certified analytical laboratory for:
    - Purgeable Organic VOCs using USEPA Method 624;
    - SVOCs using USEPA Method 625;
    - Total lead using USEPA Method 200.7; and
    - Flashpoint using USEPA Method 1010 or 1030.

4.1.4 Disposal and Re-Use Options

This section addresses disposal and re-use options for petroleum-contaminated soil and liquids.

Petroleum-Contaminated Soil

If the petroleum-contaminated soil is to be disposed of, a waste profile will be prepared and submitted to the waste disposal company to obtain approval for disposal at an appropriate waste disposal facility (e.g., regulated landfill). Once approved, load the petroleum-contaminated soil and any plastic sheeting or drums onto NYSDEC Part 364 permitted trucks or trailers, and transport the material to the approved waste disposal facility for disposal.

As an option, waste characterization samples can be collected and analyzed, and waste profiling can be approved for a designated waste disposal facility (e.g., regulated landfill) prior to excavation so that the material can be direct loaded onto NYSDEC Part 364 permitted trucks and transported to the designated waste disposal facility for disposal.

The NYSDEC must be notified if displaced soil is being considered for on-site or off-site re-use. In this case, the NYSDEC may require additional sampling and analytical laboratory testing of the petroleum-contaminated soil, and the re-use options will depend on the test results. If soil is to be re-used, its geotechnical properties should also be considered. Potential outcomes include, but may not be limited to, the following:

- With approval from the NYSDEC, displaced soil that does not exceed 6 NYCRR Part 375 Unrestricted Use SCOs, or NYSDEC CP-51 SCLs may be re-used on-site, or re-used off-site.
- With approval from the NYSDEC, soil that exceeds 6 NYCRR Part 375 Unrestricted Use SCOs, or NYSDEC CP-51 SCLs may be allowed to be re-used on-site at depths greater than four feet bgs.

Petroleum-Contaminated Liquids

Options for addressing petroleum-contaminated liquids (e.g., groundwater, stormwater, and snowmelt) may include:

- Discharge to a Publicly Owned Treatment Works (POTW) sanitary or combined sewer system under a Monroe County, NY sewer use permit in accordance with applicable regulations. If the water contains free product, a petroleum sheen or exceeds Monroe County sewer use limits or other criteria, it will require pre-treatment and re-testing prior to discharge under a sewer use permit.
- Off-site transport, and treatment or disposal, in accordance with applicable regulations. Although not anticipated, options for addressing free product may include off-site transport, and recycling or disposal, in accordance with applicable regulations.

4.2 Health and Safety

The Site owner (currently the City) is responsible for making Site workers involved with intrusive activities (e.g., excavation, dewatering, etc.) aware of the potential harmful exposures that may be present in subsurface media at the Site. This SGMP should be provided to Site workers for their review. The Site owner will discuss with the Site workers the proper identification, handling, and disposal methods described herein, and will caution the Site workers to avoid or minimize disturbance of impacted material in order to reduce or eliminate exposure to contaminants. Areas that have been disturbed (e.g., excavated, etc.) that contain petroleum contaminated material should be restored (e.g., backfilled/covered with clean soil/fill cover, paved, etc.).

The entity conducting intrusive activities (e.g., excavation, dewatering, etc.) that have the potential to disturb petroleum-contaminated media must conduct its work in accordance with a NYSDEC-accepted Health and Safety Plan (HASP). A NYSDEC-accepted HASP that contains on-site air monitoring requirements and a CAMP is included as Appendix A. The entity can implement this HASP during its intrusive activities, or can prepare and implement its own HASP, which must first be accepted by the NYSDEC and the City.

5.0 Engineering Controls

Prior to the construction of any enclosed structures (e.g., buildings) on the Site, the potential for soil vapor intrusion (SVI) must be evaluated, and any potential SVI impacts that are identified must be mitigated. Mitigation measures may include, but are not limited to, the use of engineering controls such as a vapor barrier and sub-slab depressurization system. Measures to be employed to mitigate potential vapor intrusion will be evaluated, selected, designed, installed, and maintained based on the most recent NYSDOH "Guidance for Evaluating Vapor Intrusion in the State of New York" and construction details of any planned enclosed structures. The City and the NYSDEC must be notified and consulted to approve any SVI evaluation and mitigation measures associated with any planned enclosed structures.

6.0 Institutional Controls

As an institutional control, the Site is flagged in the City Building Information System (BIS), which requires the City's Division of Environmental Quality (DEQ) to be consulted prior to issuing permits for the Site. This institutional control ensures that the environmental conditions at the Site are evaluated prior to new construction. If a permit is approved that has the potential to result in encountering impacted material, City DEQ will provide a copy of this SGMP to the involved parties, notify the involved parties of the environmental conditions at the Site, and require the work to be completed in accordance with the SGMP.

Chapter 59 (Health and Sanitation), Article III (Nuisances and Sanitation) § 59-27 (Water Supply) of the current Charter and Code of the City of Rochester, New York states:

A. No person shall use for drinking purposes, or in the preparation of food intended for human consumption, any water except the potable water supply authorized for public use by the City of Rochester; and

B. Other water supplies, wells or springs used for cooling and washing purposes only, where food is prepared or sold for human consumption, shall be tested and approved by the Monroe County Health Director. All auxiliary water supplies used for commercial or industrial use shall have all hydrants and faucets conspicuously posted indicating that such water is not for drinking use, and such water supplies shall not be cross-connected or interconnected with the public water supply."

This City Code has been interpreted to represent an institutional control that prohibits groundwater within the City limits, including the Site, from being used as a source of potable water.

7.0 Health and Safety Plan

A Site Specific Health and Safety Plan (HASP) was developed for this project and is attached as Appendix 2.

FIGURES

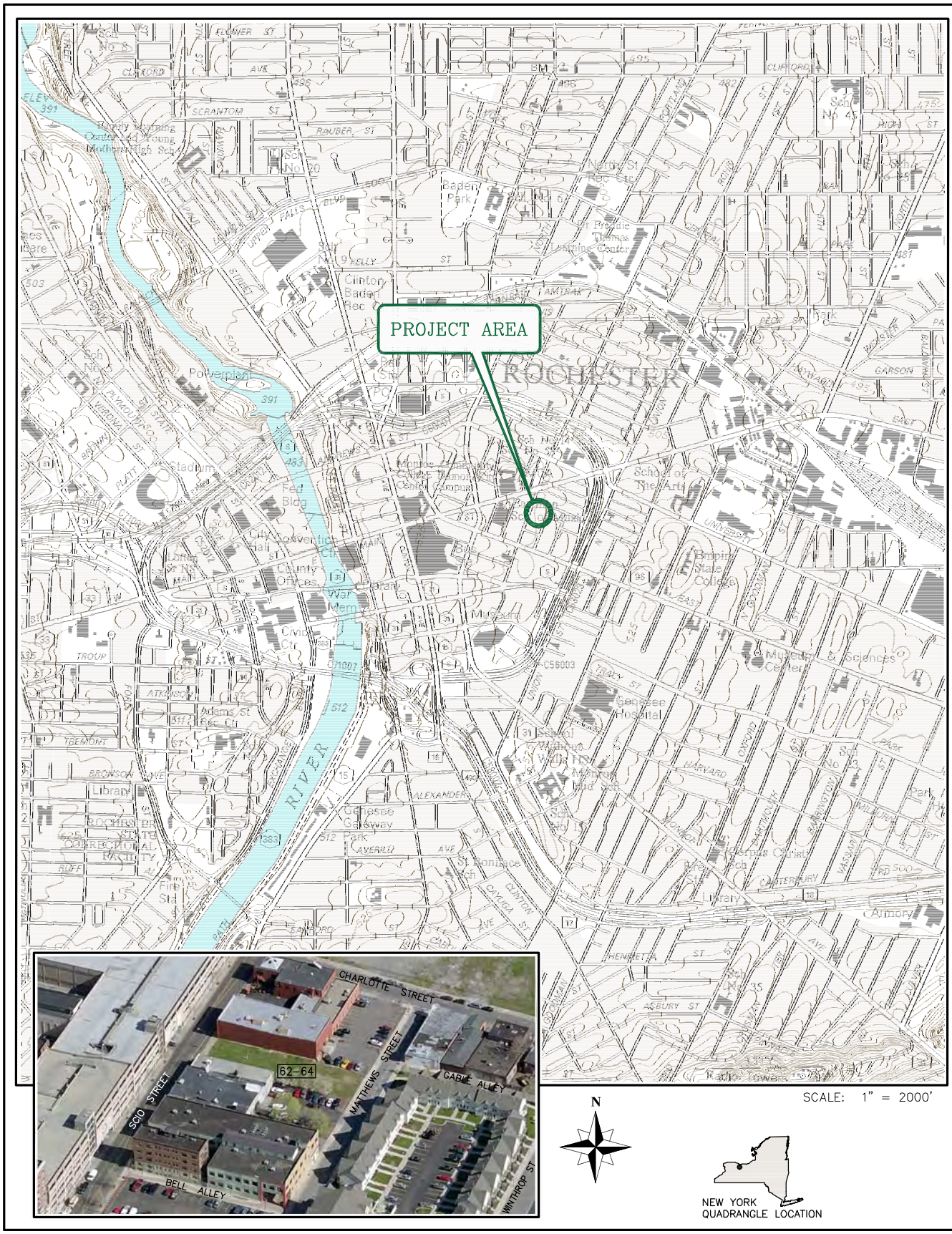

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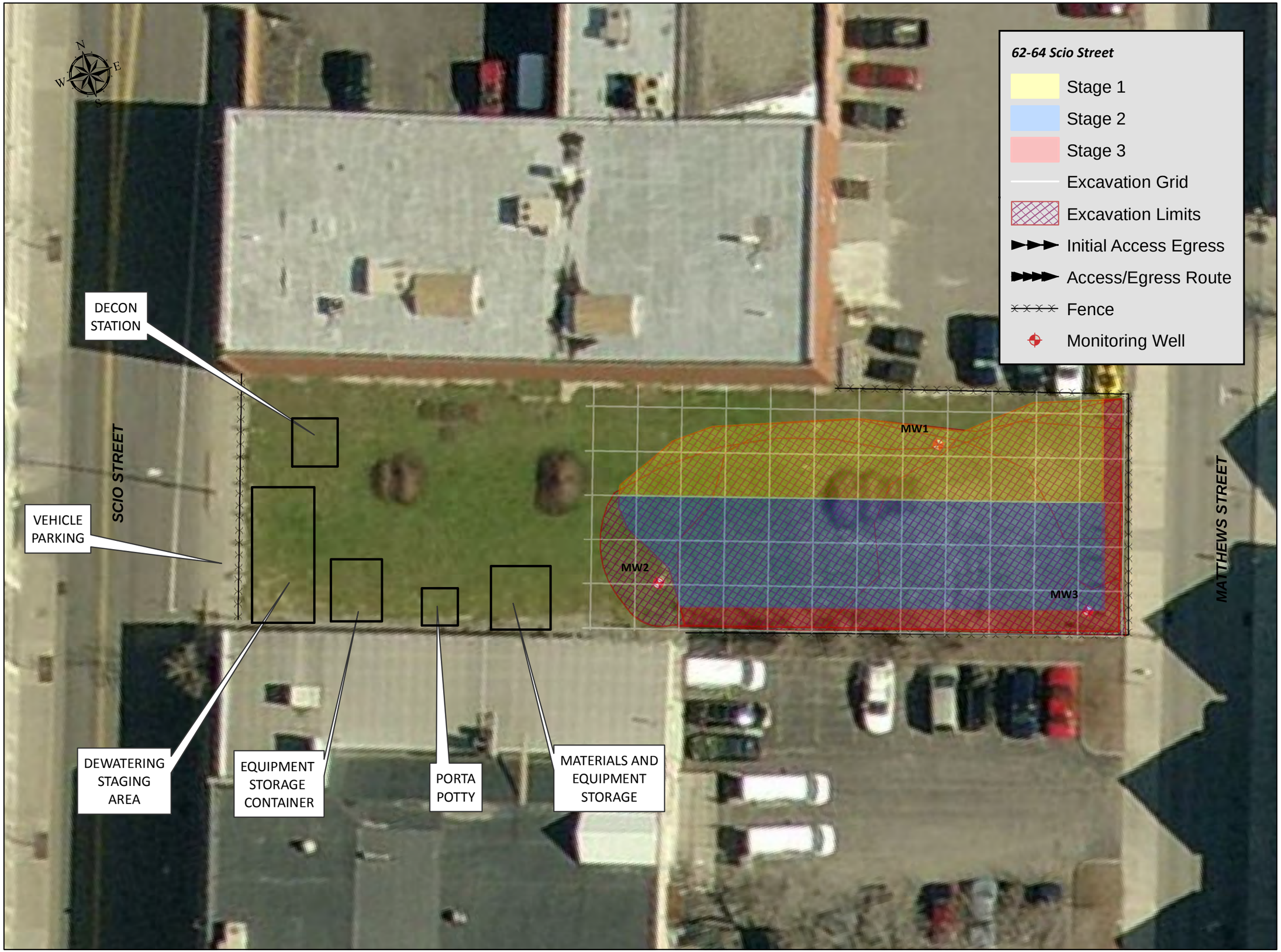
FIGURE 1. SITE LOCATION MAP

CITY OF ROCHESTER | BROWNFIELD SITE CLEAN-UP
62-64 SCIO STREET
ROCHESTER – MONROE COUNTY – NEW YORK

DATE:	JANUARY 2012
SCALE:	1:24,000
DRAWN BY:	DLS

MAP SOURCE: NYS DOT RASTER QUADRANGLES – ROCHESTER WEST & ROCHESTER EAST / NEW YORK, MONROE COUNTY DOT EDITION DATE: 1997 / USGS CONTOUR DATA: 1971. 2009 MICROSOFT CORPORATION, 2009 NAVTEQ AND 2009 PICTOMETRY INTERNATIONAL CORP.



DESIGNED BY	DATE
GLA	07-2012
DRAWN BY	DATE DRAWN
CAC	07-2012
SCALE	DATE ISSUED
1 inch = 20 feet	07-20-2012

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Pittsford, New York 14534

PROJECT TITLE

BROWNFIELD SITE CLEAN-UP
62-64 SCIO STREET
CITY OF ROCHESTER, MONROE COUNTY

FIGURE 2
IRM LAYOUT AND EXCAVATION SEQUENCING

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FIGURE 3
CONFIRMATORY SAMPLE LOCATION & CONTAMINANT LEVEL MAP

SCIO ST. BCP SITE
ROCHESTER, NY

DATE: JANUARY 2013
SCALE: 1:200
DRAWN/CHECKED: ED/SK
P.N. 4226

Scio St

Gable Al

Mathews St

Direct-Oxygen Injection System Trailer

Buried Electrical Service

Electrical Service H-Frame/Meter

MW-5
IP-2
IP-1
IP-3
MW-6
IP-8
IP-7
IP-6
IP-5
IP-4
IP-14
IP-12
MW-2
IP-16
IP-15
MW-7
IP-13
IP-11
IP-10
MW-4
IP-9
MW-8
MW-9

Legend

- 1" Diameter Injection Point
- Monitoring Well
- Fence
- Site Boundary
- Street Centerline

1 inch = 20 feet

0 5 10 20 30 40 Feet

DATE: JUNE 2014
SCALE: 1 Inch= 20 Feet
DRAWN/CHECKED: ED/GLA
DATA SOURCE: PICTOMETRY

CLD ¦w9 n hXYGEN INJECTION SY{TEM PLAN
6H-64 SCIO STREET BCP SITE
wOCHESTER, NY

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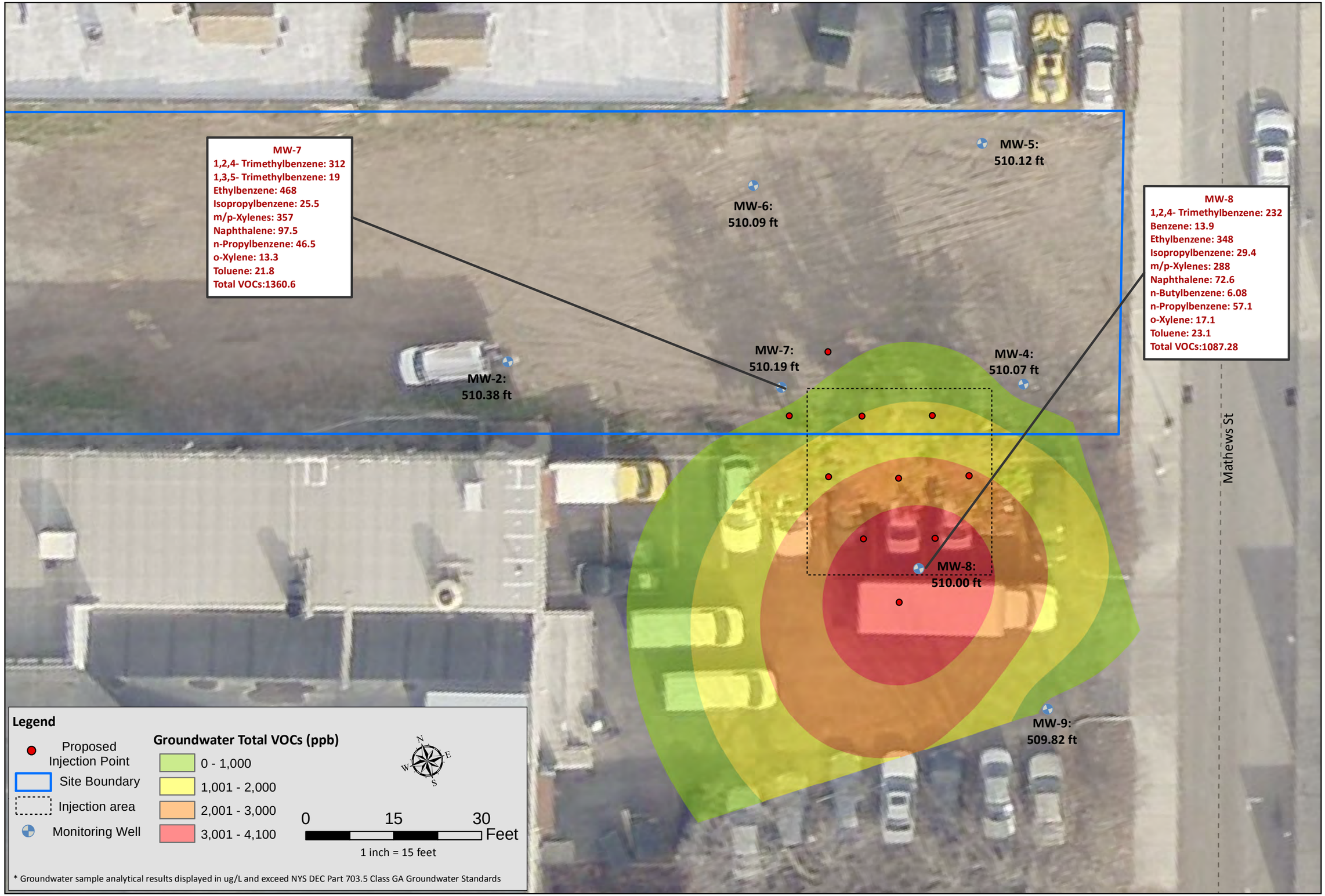

DATE: August 2016

SCALE: 1 Inch= 15 Feet

DRAWN/CHECKED: CSB/AC

DATA SOURCE: PICTOMETRY

Figure 5. CURRENT SITE CONDITION

August 2016

62-64 SCIO STREET BCP SITE

ROCHESTER, NY

APPENDIX 1
ANALYTICAL DATA

62-64 Scio Street BCP Site
City of Rochester
Quarterly Groundwater Sampling Results
June 2016

Groundwater Results - VOCs

Detected Parameters[1]	NYS GW Standard[2]	MW-02							MW-04							MW-05							MW-06						
		Aug-13	Sep-14	Dec-14	Mar-15	Jun-15	Sep-15	Jun-16	Aug-13	Sep-14	Dec-14	Mar-15	Jun-15	Sep-15	Jun-16	Aug-13	Sep-14	Dec-14	Mar-15	Jun-15	Sep-15	Jun-16	Aug-13	Sep-14	Dec-14	Mar-15	Jun-15	Sep-15	Jun-16
1,2,4-Trimethylbenzene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**5.71**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	**10.2**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
1,3,5-Trimethylbenzene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Benzene	1	< 0.700	< 0.700	< 0.700	< 0.700	< 0.700	< 1.00	< 1.00	**7.36**	0.409	< 0.700	0.846	< 0.700	< 1.00	**2.97**	< 0.700	< 0.700	NS	< 0.700	< 0.700	< 1.00	< 1.00	< 0.700	< 0.700	< 0.700	< 0.700	< 0.700	< 1.00	< 1.00
Ethylbenzene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**26**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	**5.42**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**3.28**
Isopropylbenzene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	4.78	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	1.93	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**2.23**
m/p-Xylenes	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	2.91	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Methyl-Tert-Butyl Ether	10	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Naphthalene	10	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	NS	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
n-Butylbenzene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	1.54	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	2.61	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
n-Propylbenzene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**6.02**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	1.13	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**2.92**
o-Xylene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
p-Isopropyltoluene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
sec-Butylbenzene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
tert-Butylbenzene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Toluene	5	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	2.07	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NS	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00

Detected Parameters[1]	NYS GW Standard[2]	MW-07							MW-08							MW-09						
		Aug-13	Sep-14	Dec-14	Mar-15	Jun-15	Sep-15	Jun-16	Aug-13	Sep-14	Dec-14	Mar-15	Jun-15	Sep-15	Jun-16	Aug-13	Sep-14	Dec-14	Mar-15	Jun-15	Sep-15	Jun-16
1,2,4-Trimethylbenzene	5	**163**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**312**	**97.5**	**41.8**	**118**	**549**	**400**	**848**	**232**	2.00	< 2.00	< 2.00	4.40	< 2.00	< 2.00	< 2.00
1,3,5-Trimethylbenzene	5	**29.1**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**19**	**21.8**	**3.15**	**13.6**	**116**	**64.4**	**115**	< 10.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Benzene	1	**9.41**	< 0.700	< 0.700	< 0.700	< 0.700	< 1.00	< 5.00	**60.4**	**8.74**	**25.4**	**47.0**	**35.7**	**39.1**	**13.9**	**4.11**	**1.53**	**1.75**	**1.80**	**1.68**	**1.20**	**0.998**
Ethylbenzene	5	**216**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**468**	**207**	**60.8**	**163**	**677**	**568**	**1,060**	**348**	**15.1**	**5.99**	**7.88**	**9.74**	< 2.00	< 2.00	**3.10**
Isopropylbenzene	5	**24.7**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**25.5**	**20.7**	**6.71**	**16.2**	**36.2**	**29.9**	**62.4**	**29.4**	2.83	**6.05**	4.52	2.24	< 2.00	< 2.00	< 2.00
m/p-Xylenes	5	**510**	< 2.00	**6.01**	< 2.00	**5.36**	< 2.00	**357**	**248**	**53.7**	**182**	**1420**	**952**	**1,400**	**288**	**11.4**	1.02	2.34	**10.7**	< 2.00	< 2.00	< 2.00
Methyl-Tert-Butyl Ether	10	< 20.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 10.00	< 20.0	< 2.00	<4.00	< 20.0	< 20.0	< 20.0	< 10.00	< 2.00	< 2.00	<2.00	< 2.00	< 2.00	< 2.00	< 2.00
Naphthalene	10	**142**	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	**97.5**	**60**	9.24	**38.1**	**182**	**139**	**266**	**72.6**	**11.7**	< 5.00	< 5.00	5.43	< 5.00	< 5.00	< 5.00
n-Butylbenzene	5	< 20.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 10.00	< 20.0	1.59	**5.89**	< 20.0	< 20.0	< 20.0	**6.08**	< 2.00	1.38	<2.00	< 2.00	< 2.00	< 2.00	< 2.00
n-Propylbenzene	5	**55**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**46.5**	**38.6**	**13.3**	**32.4**	**82.2**	**75.3**	**155**	**57.1**	4.93	**10.3**	**10.3**	2.94	2.04	< 2.00	< 2.00
o-Xylene	5	**74.5**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**13.3**	**16**	4.21	**16.8**	**78.2**	**46.2**	**52.2**	**17.1**	2.14	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
p-Isopropyltoluene	5	< 20.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 10.00	< 20.0	< 2.00	<4.00	< 20.0	< 20.0	< 20.0	< 10.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
sec-Butylbenzene	5	< 20.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 10.00	< 20.0	< 2.00	<4.00	< 20.0	< 20.0	< 20.0	< 10.00	< 2.00	1.51	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
tert-Butylbenzene	5	< 20.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 10.00	< 20.0	< 2.00	<4.00	< 20.0	< 20.0	< 20.0	< 10.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
Toluene	5	**36.2**	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	**21.8**	**23.9**	4.9	**17**	**94.0**	**70.1**	**95.6**	**23.1**	3.18	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00

BOLD ~ parameter detected above NYS Ambient Groundwater Standard or applicable NYSDEC Guidance Value

1 - Results presentend in ug/L or parts per billion (ppb)

NS = Not Sampled

Scio Steet BCP Project-Confirmatory Soil Sample Analytical Results

Detected Parameters	Unrestricted Use[3]	Residential Use[4]	Restricted-Residential Use[4]	Commercial Use[4]	Industrial Use[4]	CS-01(8)_08-14-12	CS-02(8.5)_08-15-12	CS-03(9)_08-16-12	CS-03(9)Dup_08-16-12	CS-04(10)_08-17-12	CS-05(10)_08-17-12	CS-06(10)_08-21-12	CS-07(11)_08-21-12	CS-08(13)_08-23-12	CS-09(11.5)_08-23-12	CS-10(13)_08-23-12
					Date Sampled:	8/14/12	8/15/12	8/16/12	8/16/12	8/17/12	8/17/12	8/21/12	8/21/12	8/23/12	8/23/12	8/23/12
Volatile Organics - NYSDEC STARS 8021[1]																
1,2,4-Trimethylbenzene	**3,600**	**47,000**	**52,000**	**190,000**	**380,000**	**5,440**	**5,330**	**50,200**	**64,000**	**55,800**	**97,000**	**14,600**	**21,800**	333	ND	ND
1,3,5-Trimethylbenzene	**8,400**	**47,000**	**52,000**	**190,000**	**380,000**	1,290	1,680	**14,600**	**20,600**	**18,100**	**26,200**	4,570	6,620	82	ND	ND
Acetone	**50**	**100,000**	**100,000**	**500,000**	**1,000,000**	ND	ND	ND	ND	ND	ND	**B 5,250**	**B 7,950**	**154**	**B 338**	**B 64.1**
Carbon disulfide	**NL**	**NL**	**NL**	**NL**	**NL**	ND	ND	ND	ND	ND	ND	ND	ND	J 2.83	ND	ND
Ethylbenzene	**1,000**	**30,000**	**41,000**	**390,000**	**780,000**	J 283	638	**5,900**	**17,600**	**10,300**	**18,500**	**3,150**	**2,120**	16.7	ND	ND
Isopropylbenzene	**NL**	**NL**	**NL**	**NL**	**NL**	J 230	J 192	J 2,280	3,150	2,830	3,950	677	842	23.2	ND	ND
2-Methylnapthalene	**NL**	**NL**	**NL**	**NL**	**NL**	642	1,770	5,040	ND	3,610	13,600	J 282	2,020	ND	ND	ND
Methylene Chloride	**50**	**51,000**	**100,000**	**500,000**	**1,000,000**	**877**	**J 537**	ND	ND	ND	ND	ND	B 2,240	ND	ND	ND
n-Butylbenzene	**12,000**	**100,000**	**100,000**	**500,000**	**1,000,000**	945	701	ND	ND	ND	ND	1,660	2,410	120	76.8	ND
n-Propylbenzene	**3,900**	**100,000**	**100,000**	**500,000**	**1,000,000**	986	671	**7,740**	**10,200**	**9,230**	**13,900**	2,210	2,990	92	73.6	ND
sec-Butylbenzene	**11,000**	**100,000**	**100,000**	**500,000**	**1,000,000**	J 235	ND	ND	ND	ND	J 1,990	J 286	J 384	34.9	101	ND
Toluene	**700**	**100,000**	**100,000**	**500,000**	**1,000,000**	ND	ND	ND	**7,890**	ND	**J 1,350**	J 221	ND	ND	ND	ND
p-Isopropyltoluene	**NL**	**NL**	**NL**	**NL**	**NL**	ND	ND	ND	ND	ND	J 1,880	J 293	J 395	ND	ND	ND
m,p-Xylene	**NL**	**NL**	**NL**	**NL**	**NL**	**668**	**2,190**	**21,300**	**70,000**	**46,500**	**72,900**	**17,200**	**9,430**	87.9	ND	ND
o-Xylene	**NL**	**NL**	**NL**	**NL**	**NL**	ND	**599**	**2,520**	**11,500**	**11,400**	**10,600**	**1,000**	**555**	17.7	ND	ND
Xylene (Total)	**260**	**100,000**	**100,000**	**500,000**	**1,000,000**	**668**	**2,858**	**23,820**	**81,500**	**57900**	**83,500**	**18200**	**9985**	105.6	ND	ND
Semi-Volatile Organics - NYSDEC STARS 8270 Base/Neutrals[1]																
Fluoranthene	**100,000**	**100,000**	**100,000**	**500,000**	**1,000,000**	ND	ND	ND	ND	J 185	ND	ND	ND	ND	ND	ND
2-Methylnapthalene	**NL**	**NL**	**NL**	**NL**	**NL**	642	1,770	5,040	5,550	3,610	13,600	J 282	2,020	ND	ND	ND
Naphthalene	**12,000**	**100,000**	**100,000**	**500,000**	**1,000,000**	ND	1,040	3,420	4,730	3,010	**13,000**	J 218	2,030	ND	ND	ND
Phenanthrene	**100,000**	**100,000**	**100,000**	**500,000**	**1,000,000**	ND	ND	ND	ND	J 188	ND	ND	ND	ND	ND	ND

1 - results presented in micrograms per kilogram (ug/Kg).

2 - results presented in milligrams per kilogram (mg/Kg).

3 - 6 NYCRR Part 375-6.8 - Table 375-6.8(a): Unrestricted Use Soil Cleanup Objectives

4 - 6 NYCRR Part 375-6.8 - Table 375-6.8(b): Restricted Use Soil Cleanup Objectives

ND- not detected above reporting limit

NL - Not listed as contaminant of concern in 6 NYCRR Part 375-6.8 - Tables 375-6.8(a)&(b)

Value Exceeds Unrestricted SCOs

Value Exceeds Residential Use SCOs

Value Exceeds Restricted-Residential SCOs

Value Exceeds Commercial Use SCOs

Value Exceeds Industrial Use SCOs

APPENDIX 2
HEALTH AND SAFETY PLAN

Brownfield Cleanup Program
USEPA Assistance ID No. BF97219700

62-64 Scio Street
Rochester, New York 14604

HEALTH AND SAFETY PLAN

Prepared For:

City of Rochester
Department of Environmental Services
Division of Environmental Quality
30 Church Street, Room 300B
Rochester, New York 14614

Prepared By:

Lu Engineers

2230 Penfield Road
Penfield, New York 14526

August 2012

Project No: 4226

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HEALTH AND SAFETY PLAN

A. GENERAL INFORMATION

Project Title: 62-64 Scio Street
Monroe County, New York
Corrective Action Plan
USEPA Assistance ID No. BF97219700

Project Manager: Jane MH Forbes (City) Project Manager: Greg Andrus (Lu Engineers)

Location: 62-64 Scio Street
City of Rochester, Monroe County, New York

Prepared by: City DEQ/ Lu Engineers Date Prepared: July 2012
Date Revised:
Approved by: Date Approved:

Site Safety Officer Review: Date Reviewed:

Introduction:
The Project is being performed as part of the City of Rochester's (City's) 2010 Brownfield Cleanup Grant from the United States Environmental Protection Agency (EPA). Lu Engineers and the City prepared this Health and Safety Plan (HASP) to outline the policies and procedures to protect workers and the public from potential environmental hazards during the Corrective Action described in the Corrective Action Plan (CAP). The Project will be conducted under a Stipulation Agreement between the City of Rochester (City) and the New York State Department of Environmental Conservation (NYSDEC). The Site is comprised of a 0.25 acre parcel addressed as 62-64 Scio Street, City of Rochester, County of Monroe, New York (Site). Figure 1 included in the work plan depicts the general Site location.

Scope/Objective of Work:

Soil removal and off-Site disposal combined with In-Situ Groundwater Treatment through Direct Oxygen Injection will be used to remediate the Site. These methods are proven remedial methods that will immediately and permanently remove significant petroleum-contaminated soils, followed by biodegradation of organic contaminants, such as petroleum hydrocarbons, via oxygen injection. The Oxygen Injection system is designed to remediate groundwater preset in the overburden and within the upper 5 feet of bedrock. The oxygen injection does not require groundwater extraction and/ or off-Site treatment, and disposal does not generate any vapors or odors.

Proposed Date of Field Activities: July 2012 through September 2013

Background Information: [X] Complete [ ] Preliminary (limited analytical data)

Overall Chemical Hazard:	[ ] Serious	[X] Moderate
	[ ] Low	[ ] Unknown
Overall Physical Hazard:	[ ] Serious	[X] Moderate
	[ ]Low	[ ] Unknown

B. SITE/WASTE CHARACTERISTICS

Waste Type(s):

[X] Liquid [X] Solid [X] Sludge [X] Gas/Vapor

Characteristic(s):

[ ] Flammable/Ignitable [X] Volatile [ ] Corrosive [ ] Acutely Toxic
[ ] Explosive (moderate) [ ] Reactive [X] Carcinogen [ ] Radioactive
Other: _____

Physical Hazards:

[X] Overhead [X] Confined Space [X] Below Grade [X] Trip/Fall
[X] Puncture [ ] Burn [X] Cut [ ] Splash
[X] Noise [X] Other: Heat Stress

Site History/Description and Unusual Features:

The Site is located in the City's desirable East End District. A 22,000 square-foot, two-story, brick building was constructed around 1920. The building was mainly used as a warehouse from the date of construction until approximately 1990. The City took ownership of the property in 1996, and the building was demolished in November 2002. The Site has remained vacant since demolition.

A Phase I Environmental Site Assessment (ESA) was completed in 1995 and identified recognized environmental conditions due to the presence of petroleum underground storage tanks (USTs). An abandoned UST was removed in 2002. An abandoned 5,000 gallon UST was removed in 2003, following building demolition. This tank contained a mixture of gasoline and oil. Petroleum contaminated soil was observed underneath the tank and a soil sample was obtained for testing. Spill file # 027052 was opened for this Site. In 2004, a groundwater monitoring well was installed adjacent to the former tank location and groundwater sampled showed gasoline related volatile organic compounds (VOCs) including benzene, ethylbenzene, toluene, and xylene exceeding NYSDEC groundwater quality standards. Another abandoned 2,000 gallon UST suspected of containing gasoline was removed. A total of 30.27 tons of grossly contaminated soil was removed during the tank excavation and disposed of off-Site at a permitted landfill. Upon observation of contaminated soil, NYSDEC Spill File # 0650898 was generated for the Site.

Following closure of the USTs, a subsurface investigation was completed to evaluate subsurface conditions at the Site. A total of 14 test borings were advanced using direct-push drilling in October 2006. The test borings were advanced to depths of 9-14 feet below ground surface when refusal, presumed to be top of bedrock, was encountered. Nine of the fourteen test borings had PID readings exceeding 1,000 ppm and petroleum related odors were observed in most wells.

In 2007, two additional bedrock interface groundwater wells were installed to further evaluate groundwater flow direction groundwater contamination. One well was installed in close proximity to a former UST, and contained groundwater exceeding applicable regulatory levels for VOCs. The other well was installed 95 feet west, and did not contain detectable levels of VOCs.

Locations of Chemicals/Wastes: Soil and groundwater.

Estimated Volume of Chemicals/Wastes: There is an estimated volume of 1,370 tons of petroleum impacted soil in an area encompassing approximately 5,000 square feet at depths ranging from 8-12 feet below ground surface. The average thickness of contaminated soil is around 2 feet.

Site Currently in Operation: [ ] Yes [X] No [ ] Not Applicable

C. HAZARD EVALUATION

HAZARD EVALUATION:	
HAZARD(S)	**HAZARD PREVENTION**
General physical hazards associated with soil removal operations including excavation equipment (excavator, dump trucks), excavation safety, sloping/sidewall stability, slip/trip/fall. Also well installation safety including drill rig and geoprobe operations (overhead equipment, spinning augers, noise, drill rig movement).	Hard hats, eye protection, and steel-toed boots required at all times. Keep safe distance from excavation sidewalls, heavy equipment, machines and all moving parts. Only operator and helper are to be in "work zone". Do not enter excavations to screen soil or obtain soil samples.
Contact with or inhalation of contaminants, potentially in high concentration, in subsurface media	Direct reading instruments and/or olfactory indications will be used to monitor airborne contaminants. Respiratory protection will be used as appropriate. Standard safety procedures such as restricting eating, drinking, and smoking to the support zone and utilizing proper personal decontamination procedures will minimize ingestion as a potential route of exposure. Vapor suppression techniques may be implemented, as necessary.
Utilities (above and underground)	Identify location(s) prior to start of work, maintain 25-foot minimum distance to overhead utilities.
Slip/ trip/ fall	Observe terrain and equipment while walking to minimize slips and falls. Steel-toed boots provide additional support and stability. Use adequate lighting. Wear hard hat. Inspect all lifting equipment prior to use. Be aware of open excavation areas.
Back strain and muscle fatigue, ergonomic stress due to lifting	Use proper lifting techniques and limit load to prevent back strain. Lift with legs when possible.
Noise	Engineering controls will be used to the extent possible. Hearing protection will be made available to all workers on Site. Exposure to time-weighted average levels in excess of 85 dBA is not anticipated.
Heat/Cold stress	Implement heat/cold stress management techniques such as shifting work hours, increasing fluid intake, and monitoring employees**. See Appendix A.**
Sunburn	Apply sunscreen, and wear appropriate clothing.
Weather Extremes	Establish Site-specific contingencies for severe weather situations. Discontinue work in severe weather, including lightening.
Native wildlife presents the possibility of insect bites and associated diseases	Avoid wildlife when possible. Use insect repellant.

Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	PID	
	OSHA PEL	NIOSH REL	IDLH					Relative Response	Ioniz. Poten. (eV)
Acetone	1000 ppm	250 ppm	500 ppm	Y	Inh, Ing, Con	Irritation to eyes, nose, or throat, skin, skin burns, loss of coordination and equilibrium	Sharp penetrating odor, mint like	1.1	9.69
Benzene*	1 ppm	0.1 ppm	500 ppm	Y	Inh, Abs, Ing, Con	Irritation to eyes, skin, nose, respiratory system; headache, nausea, dizziness, drowsiness, unconsciousness, harmful, fatal if aspirated into lungs	Colorless to light yellow liquid, sweet aromatic odor	---	9.24
Ethylbenzene	100 ppm	---	100 ppm	Y	Inh, Ing, Con	Irritation to eyes, skin, mucous membranes; dermatitis, narcosis, , trouble breathing, paralysis, headache, nausea, headache, dizziness, coma	Colorless liquid, aromatic odor	0.5	8.77
n-Propylbenzene (per mfg. Recommended exposure is 100 ppm)	N/A	N/A	N/A	Y	Inh, Ing, Con	Irritation to eyes, skin, respiratory tract, mucous membranes of nose & throat, depresses CNS, vertigo, fatigue, chest constriction, may invoke aspiration if swallowed	Clear colorless liquid, mild odor	---	---
Toluene	200 ppm	100 ppm	20 ppm	Y	Inh, Abs, Ing, Con	Irritation to eyes, skin, nose; upper respiratory tract, fatigue, weak, confusion, dizziness, headache, drowsiness, abdominal spasms, dilated pupils, euphoria	Colorless liquid, sweet pungent, benzene like odor	0.5	8.82

Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	PID	
	OSHA PEL	NIOSH REL	IDLH					Relative Response	Ioniz. Poten. (eV)
1,2,4-Trimethylbenzene	---	25ppm	Not Determined	Y	Inh, Ing, Con	Irritation to eyes, skin nose throat, respiratory system, hypochromic anemia, headache, drowsiness, fatigue, dizziness, nausea, in-coordination, vomiting confusion, aspiration.	Clear colorless liquid, distinctive aromatic odor		8.27
1,3,5-Trimethylbenzene	---	25ppm	Not Determined	Y	Inh, Ing, Con	Irritation to eyes, skin nose throat, respiratory system, hypochromic anemia, headache, drowsiness, fatigue, dizziness, nausea, in-coordination, vomiting confusion, aspiration.	Clear colorless liquid, distinctive aromatic odor		8.39
Xylene(mixed)	100 ppm	100 ppm	900 ppm	Y	Inh, Ing, Abs, Con	Irritation to eyes, nose, throat, skin; nausea, vomiting, headache, ringing in ears, severe breathing difficulties (that may be delayed in onset), substernal pain, coughing hoarseness, dizziness, excited, burning in mouth, stomach, dermatitis (removes oils from skin), corneal burns	Colorless liquid, aromatic odor (solid below 56 F	.5	8.44

Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	PID	
	OSHA PEL	NIOSH REL	IDLH					Relative Response	Ioniz. Poten. (eV)
Isopropylbenzene	50 ppm	50 ppm	50 ppm	Y	Inh, Inj, Con	Irritation, nausea, difficulty breathing, headache, drowsiness, dizziness, and loss of coordination. Skin and eye irritation. Vomiting, stomach pain, drowsiness, aspiration, and central nervous system depression.	1.2 ppm Colorless liquid, distinct odor, pungent odor	---	---
Benzo(a)anthracene	N/A	N/A	N/A	Y	Inh,Ing, Con, Abs	Irritation to eyes, skin, digestive tract, respiratory tract (prevent contact to skin and eyes)	Yellow to green	---	---
Benzo (a) pyrene*	0.2 mg/m^3	---	A2	Y	Ing, Inh, Abs, Con	Irritation to eyes, skin, lungs harmful if swallowed (all hazards and toxic properties not fully known)	Yellow green powder		
Benzo(b)fluoranthene*	0.2 mg/m^3	0.1 mg/m^3	A2	Y	Inh, Ing, Con	No signs or symptoms of acute exposure to benzo(b)fluoranthene have been reported in humans	Colorless		

Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	PID	
	OSHA PEL	NIOSH REL	IDLH					Relative Response	Ioniz. Poten. (eV)
Chrysene* (Polynuclear Aromatics)	0.2 mg/m^3	---	0.2 mg/m^3	Y	Inh, Ing, Con	Irritation to eyes, skin, GI with nausea; vomiting, diarrhea, respiratory irritation	Very light beige solid	---	---
Indeno (1,2,3-cd)pyrene	0.2 mg/m^3	0.1 mg/m^3	0.1 mg/m^3	Y	Inh, Ing,	N/A	Yellow Crystals	---	---
Naphthalene	10 ppm	10 ppm	10 ppm	Y	Inh, Ing, Abs, Con	Irritation to eyes; headache, confusion, excitement, nausea, vomiting, abdominal pain, irritation to bladder, profuse sweating, jaundice, corneal injury, blurred vision, renal shutdown	Colorless to brown solid/crystals, moth ball odor	0.4	8.12

Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	PID	
	OSHA PEL	NIOSH REL	IDLH					Relative Response	Ioniz. Poten. (eV)
Lead	0.05 mg/m^3	0.05 mg/m^3	0.05 mg/m^3	Y	Inh, Ing, Con	Poison, abdominal pain, spasms, nausea, vomiting, headache, irritation to eyes; skin, weakness, metallic taste, anorexia/loss of appetite, insomnia, facial pallor, colic, anemia, tremor, "lead line" in gums, constipation, abdominal pain, paralysis in wrists and ankles, encephalopathy (inflammation of brain)	Odorless	---	---

KEY:

PEL = Permissible Exposure Limit
REL = Recommended Exposure Limit
--- = Information not available
TLV = Threshold Limit Value(ACGIH)

Inh = Inhalation
Ing = Ingestion
mg/m^3 = Milligrams per cubic meter
* = Chemical is a known or suspected carcinogen

Abs = Skin Absorption
Con = Skin and/or eye Contact
ppm = Parts per million
sk = Skin notation

D. SITE SAFETY WORK PLAN

Site Control: Temporary chain-link construction fencing and lockable gates.

Perimeter Identified?	**[Y]**	**Site Secured?**	**[Y]**
Work Areas Designated?	**[Y]**	**Zone(s) of contamination identified?**	**[Y]**

Anticipated Level of Protection (cross-reference task numbers in Section C):

A	B	C	D
		Available	X

Site work will be performed in Level D safety equipment (steel-toed boots, work clothes, eye protection, gloves, hard hats, and hearing protection(as necessary)) unless monitoring indicates otherwise. Gloves will be worn if contact with Site soil, sediment or water is anticipated, due to concerns of contamination.

If conditions are encountered that require Level A or Level B Personal Protective Equipment (PPE), the work will immediately be stopped. The appropriate government agencies (i.e., City, NYSDEC, NYSDOH, MCDPH, etc.) will be notified and the proper health and safety measures will be implemented (e.g., develop and implement engineering controls, upgrade in PPE, etc.). If conditions are encountered (as indicated by PID and particulate readings) that require Level C PPE, the work will be temporarily suspended and the work Site will be evaluated to limit exposure prior to implementing Level C PPE. Engineering controls may be implemented, as necessary, in an effort to maintain Level D PPE required Site conditions.

Respiratory Protection

Any respirator used will meet the requirements of the OSHA 29 CFR 1910.134. Both the respirator and cartridges specified shall be fit-tested prior to use in accordance with OSHA regulations (29 CFR 1910). Air purifying respirators shall not be worn if contaminant levels exceed designated use concentrations. The workers will wear respirators with approval for: organic vapors <1,000 ppm; and dusts, fumes and mists with a TWA < 0.05 milligrams per cubic meter (mg/m^3).

No personnel who have facial hair, which interferes with respirator sealing surface, will be permitted to wear a respirator and will not be permitted to work in areas requiring respirator use.

Only workers who have been certified by a physician as being physically capable of respirator usage shall be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas that require respiratory protection.

Air Monitoring*:

Contaminant	Monitoring Device	Frequency
Organic Vapors	MiniRAE 3000 PID	Continuous
Ignition Sources	O2/Explosimeter	Continuous
Particulate	Dustrak	Continuous

*Continuous perimeter air monitoring for VOCs and particulates will be performed during ground intrusive activities and is described in the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP).

Lu will also conduct continuous air monitoring of worker breathing zone air during excavation activities. If action levels are exceeded during excavation, appropriate precautions will be taken, as described below.

VOCs

VOCs in worker's breathing zone air will be monitored with a PID during activities that have the potential to disturb contaminated material to aid in determining if respiratory protection and/or vapor suppression is necessary. This ensures that respiratory protection is adequate to protect personnel from the chemical vapors and particulates they may be exposed to. Readings will be recorded in the Site logbook or log sheets.

Action Levels:

PID readings of **25 ppm to 100 ppm** above background at breathing zone, sustained for greater than 5 minutes,
Action: Stop work and implement vapor suppression techniques, such as application of Biosolve. If vapors cannot be brought below 25 ppm, upgrade PPE to Level C.

PID readings of **>100 ppm** above background at breathing zone, sustained for greater than 5 minutes,
Action: Stop work, evaluate the use of engineering controls, upgrade PPE to Level B or Level A.

Depending on circumstances observed during excavation and related IRM activities, alternative action levels and corresponding PPE levels to those described above may be considered and implemented at the discretion of the field team leader and City project manager.

O_2

O_2 readings must remain between 19.5% and 22.0%. Explosivity must be above 10% lower explosive level (LEL). The area must be evacuated and ignition sources eliminated if levels are not within their standard. These atmosphere factors will be measured at a position that would give the earliest indication of a hazardous condition forming not at the breathing zone. Appropriate actions, initially evacuation of the immediate work area, will be taken if established action levels area exceeded.

Particulates

During activities where contaminated materials (i.e., soil, fill, etc.) may be disturbed, air monitoring will include real-time monitoring for particulates using a real-time aerosol monitor (RTAM) particulate meter at the perimeter of the work zone in accordance with the *Final DER-10 Technical Guidance for Site Investigation and Remediation* dated May 2010. DER-10 uses an action level of 100 g/m^3 (0.10 mg/m^3) over background conditions for an integrated period not to exceed 15 minutes. If the action level is exceeded, or if visible dust leaving the Site is observed, then work shall be discontinued until corrective actions are implemented. Corrective actions may include dust suppression, change in the way work is performed, and/or upgrade of personal protective equipment. If dust suppression is deemed necessary, clean water will be applied to excavation area.

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the work zone at temporary particulate monitoring stations. The particulate monitoring should be performed using RTAM capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during work activities.

Action Levels:

If particulate levels exceed a level of 2.5 times background (upwind levels subtracted from downwind concentration) or a level of 150 mcg/m^3, dust control measures will be initiated and the dust generating activity suspended until levels decrease below the action level. Perimeter monitoring will be conducted if the action level is obtained at the work area. All air monitoring results as well as wind direction and speed (estimates) will be documented in the Site-specific log book or log sheets.

Decontamination Solutions and Procedures for Equipment, Sampling Gear, etc: Specified in the Work Plan.

Personnel Decon Protocol: Soap, water, and paper towels or baby wipes will be available for all personnel and will be used before eating, drinking or leaving the Site. Personnel will shower upon return to home or hotel. Disposable PPE will be rendered unusable and disposed of as stated in work plan.

Decon Solution Monitoring Procedures, if Applicable: Contractor's controlled/ decon waste container.

Special Site Equipment, Facilities or Procedures (Sanitary Facilities and Lighting Must Meet 29CFR 1910.120):

A restroom and bottled water are available for use on Site.

Site Entry Procedures and Special Considerations: Entry to the Site should be limited through west entrance located at 62-64 Scio Street. The Buddy System should be employed at all times on Site. All personnel entering the Site shall have current 40-hr OSHA HAZWOPER training.

Personnel admitted into the work zone shall be properly trained in health and safety techniques and equipment usage. No personnel shall be admitted into the work zone without the property safety equipment.

Work Limitations (time of day, weather conditions, etc.) and Heat/Cold Stress Requirements: All work will be completed during daylights hours. Heavy equipment, including drill rigs, will not be used during electrical storms.

General Spill Control, if applicable: N/A

Investigation Derived Material (i.e., Expendables, Decon Waste, Cuttings) Disposal: Specified in the Work Plan.

Sample Handling Procedures Including Protective Wear: Sample handling will be performed while wearing chemically-resistant gloves. To minimize hazards to lab personnel, sample volumes will be no larger than necessary, and the outside of all sample containers will be wiped clean prior to shipment. Additional sampling protocols and procedures are outlined in the QAPP.

Accident and Injury Reporting: Any work-related incident, accident, injury, illness, exposure, or property loss must be immediately reported to the Lu Engineers project manager, and the City of Rochester project manager. This includes:

- Accident, injury, illness, or exposure of an employee;
- Injury of a subcontractor;
- Damage, loss, or theft of property, and/or
- Any motor vehicle accident regardless of fault, which involves a company vehicle, rental vehicle, or personal vehicle while employee is acting in the course of employment.

E. TRAINING REQUIREMENTS

Personnel conducting field activities on Site are required to have completed training sessions in accordance with Occupational Safety and Health Administration (OSHA) for Parts 1926 and 1910 (Title 29 Code of Federal Regulations [CFR] Part 1926.65 and Part 1910.120 - Hazardous Waste Operations and Emergency Response- 'HazWOPER'). This training shall consist of a minimum of 40 hours of instruction off-Site and three days of actual field experience under the direct supervision of a trained, experienced supervisor. Each employer will maintain documentation stating that its on-Site personnel have complied with this regulation.

In addition, all personnel will have reviewed this HASP and received a Site-specific health and safety briefing prior to participating in field work.

Visitors entering the work area must review the HASP and be equipped with the proper PPE. All Site personnel and visitors shall sign the last page of the HASP as an acknowledgement that they have read and understand the Site health and safety requirements.

Medical Surveillance Requirements: All Lu Engineers field staff who engage in on Site activities for 30 days or more per year participate in a medical monitoring program and have completed applicable training per 29CFR 1910.120. Lu's Respiratory Protection Program meets requirements of 29CFR 1910.134.

Key Personnel and Management
The Project Manager (PM) and Site Safety Officer (SSO) are responsible for formulating health and safety requirements, and implementing the HASP.

Project Manager
The PM has the overall responsibility for the project and will coordinate with the SSO to ensure that the goals of the project are attained in a manner consistent with the HASP requirements.

Site Safety Officer
The SSO has responsibility for administering the HASP relative to Site activities, and will be in the field while activities are in progress. The SSO's operational responsibilities will be monitoring, including personal and environmental monitoring, ensuring personal protective equipment (PPE) maintenance, and identification of protection levels. The air monitoring data obtained by the SSO will be available for review by the City, regulatory agencies, and other on-Site personnel.

Employee Safety Responsibility
Each employee is responsible for personal safety as well as the safety of others in the area. The employee will use the equipment provided in a safe and responsible manner as directed by the SSO.

Key Safety Personnel
The following individuals are anticipated to share responsibility for health and safety of Lu representatives at the Site.

Team Member*	Responsibility
Gregory Andrus	Project Manager
Eric Detweiler	Field Team Leader/ Site Safety Officer/Geologist
Sue Hilton	Quality Assurance Officer
Jon Becker	Team Member-Field Technician
Janet Bissi	Team Member- Field Technician

*Entries into the work zone require "Buddy System" use. Lu Engineers' field staff participated in a medical monitoring program and have completed applicable training per 29CFR 1910.120. Lu's Respiratory protection program meets requirements of 29CFR 1910.134.

The following individuals are anticipated to share responsibility for health and safety of Lu representatives at the Site.

Lu Project Manager Gregory Andrus

F. EMERGENCY INFORMATION

The following telephone numbers are listed in case there is an emergency at the Site:

Fire/Police Department:	911
Poison Control Center:	(800) 222-1222
NYSDEC	
Mike Zamiarski	(585) 226-5438
Spills Hotline	(585) 226-2466
NYSDOH	
Debby McNaughton	(585) 423-8069
MCDOH	
Jeffrey Kosmala, P.E.	(585) 753-5470

City of Rochester	
Jane Forbes	(585) 428-7892; (585) 314-1719 (cell)
Joseph Biondolillo	(585) 428-6649; (585) 314-1617 (cell)
Lu Engineers	
Gregory Andrus	(585) 385-7417 x215/ (585) 732-5786 (cell)
Eric Detweiler	(585) 385-7417 x227/ (585) 278-8202 (cell)
Nearest Hospital	Highland Hospital 1000 South Avenue, Rochester, NY 14620 (585) 473-2200 (Main) (585) 341-6880 (Emergency Department)

SITE RESOURCES

Site Emergency Evaluation Alarm Method:	Sound vehicle horn.
Water Supply Source:	Water will be available through a City issued Hydrant Permit.
Telephone Location, Number:	None available
Cellular Phone, if Available:	Greg Andrus (585) 732-5786
Radio:	TBD
Other:	TBD

EMERGENCY ROUTES

Note: Field team must know route(s) prior to start of work.

Directions from the Site to Highland Hospital:

Route is 2.4 miles, about 8 minutes. Turn left onto Scio St toward Bell Alley. Continue 0.2 miles and turn left onto East Ave. Continue 0.2 miles and turn right onto Pitkin St. Take the ramp on left onto the Inner Loop. Exit after 0.4 miles onto Clinton Ave S. Continue 0.2 miles and turn right onto Alexander St. Follow signs to Emergency Medical Services (Refer to the map shown below).

On-Site Assembly Area: At Site entry point.

Off-Site Assembly Area: 80 – 100 Charlotte Street (located 200 yards northeast of the Site).

Emergency egress routes to get off-Site: Follow Scio Street, north or south.

Personnel shall exit the Site and shall congregate in an area designated by the SSO. The SSO shall ensure that all personnel are accounted for. If someone is missing, the SSO will alert emergency personnel. The appropriate government agencies will be notified as soon as possible regarding the evacuation, and any necessary measures that may be required to mitigate the reason for the evacuation.

G. Additional Information

Contamination Emergency

It is unlikely that a contamination emergency will occur; however, if such an emergency does occur, the specific work area shall be shut down and immediately secured. If an emergency rescue is needed, notify Police, Fire Department and EMS units immediately. Advise them of the situation and request an expedient response. The appropriate government agencies shall be notified immediately. The area in which the contamination occurred shall not be entered until the arrival of trained personnel who are properly equipped with the appropriate PPE and monitoring instrumentation as outlined in Section D of this HASP.

Spill or Air Release

In the event of a spill or air release of hazardous materials on-Site, the specific area of the spill or release shall be shut down and immediately secured. The area in which the spill or release occurred shall not be entered until the cause can be determined and Site safety can be evaluated. Non-essential Site personnel shall be evacuated to a safe and secure area. The appropriate government agencies shall be notified as soon as possible. The spilled or released material shall be immediately identified and appropriate containment measures shall be implemented, if possible. Real-time air monitoring shall be implemented as outlined in Section 8.0 of this HASP. If the materials are unknown, Level B protection is mandatory. If warranted, samples of the materials shall be acquired to facilitate identification.

Locating Containerized Waste and/or Underground Storage Tanks

In the event that unanticipated containerized waste (e.g., drums) and/or USTs are located during remedial activities, the work will be stopped in the specific area until Site safety can be evaluated and addressed. Non-essential Site personnel shall not work in the immediate area until conditions including possible exposure hazards are addressed. The appropriate government agencies shall be notified as soon as possible. The SSO shall monitor the area as outlined in Section D of this HASP.

Prior to any handling, unanticipated containers will be visually assessed by the SSO to gain as much information as possible about their contents. As a precautionary measure, personnel shall assume that unlabelled containers and/or tanks contain hazardous materials until their contents are characterized. To the extent possible based upon the nature of the containers encountered, actions may be taken to stabilize the area and prevent migration (e.g., placement of berms, etc.). Subsequent to initial visual assessment and any required stabilization, properly trained personnel will sample, test, remove, and dispose of any containers and/or tanks, and their contents. After visual assessment and air monitoring, if the material remains unknown, Level B protection is mandatory.

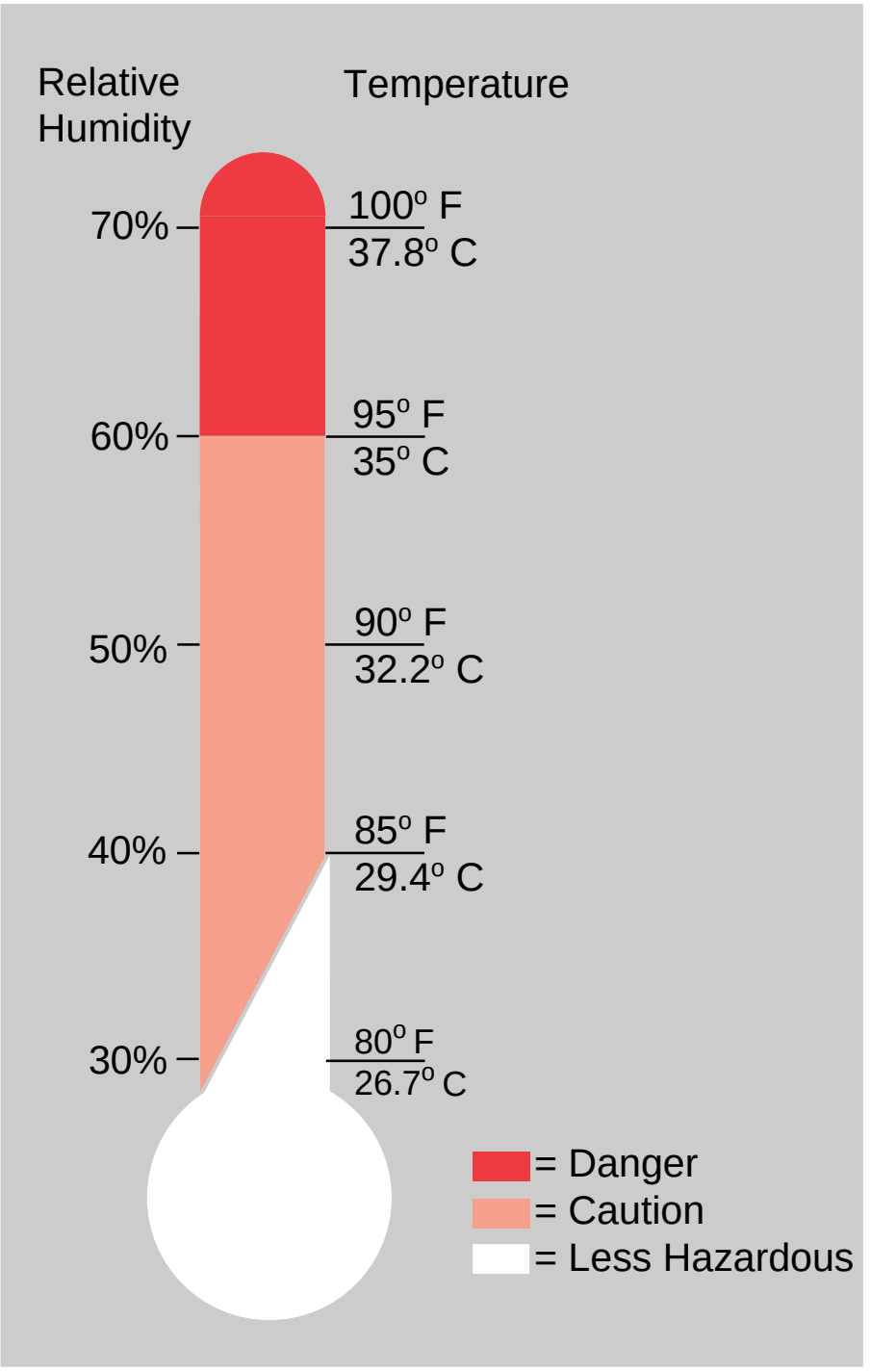
APPENDIX B-1

HEAT STRESS INFORMATION

THE HEAT EQUATION

HIGH TEMPERATURE + HIGH HUMIDITY + PHYSICAL WORK = HEAT ILLNESS

When the body is unable to cool itself through sweating, **serious** heat illnesses may occur. The most severe heat-induced illnesses are **heat exhaustion** and **heat stroke**. If actions are not taken to treat heat exhaustion, the illness could progress to heat stroke and possible **death**.



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Occupational Safety and Health Administration
OSHA 3154
1998

HEAT EXHAUSTION

What Happens to the Body:

HEADACHES, DIZZINESS/LIGHT HEADEDNESS, WEAKNESS, MOOD CHANGES (irritable, or confused/can't think straight), FEELING SICK TO YOUR STOMACH, VOMITING/THROWING UP, DECREASED and DARK COLORED URINE, FAINTING/PASSING OUT, and PALE CLAMMY SKIN.

What Should Be Done:

- Move the person to a cool shaded area to rest. Don't leave the person alone. If the person is dizzy or light headed, lay them on their back and raise their legs about 6-8 inches. If the person is sick to their stomach lay them on their side.
- Loosen and remove any heavy clothing.
- Have the person drink some cool water (a small cup every 15 minutes) if they are not feeling sick to their stomach.
- Try to cool the person by fanning them. Cool the skin with a cool spray mist of water or wet cloth.
- If the person does not feel better in a few minutes call for emergency help (Ambulance or Call 911).

(If heat exhaustion is not treated, the illness may advance to heat stroke.)

HEAT STROKE—A MEDICAL EMERGENCY

What Happens to the Body:

DRY PALE SKIN (no sweating), HOT RED SKIN (looks like a sunburn), MOOD CHANGES (irritable, confused/not making any sense), SEIZURES/FITS, and COLLAPSE/PASSED OUT (will not respond).

What Should Be Done:

- Call for emergency help (Ambulance or Call 911).
- Move the person to a cool shaded area. Don't leave the person alone. Lay them on their back and if the person is having seizures/fits remove any objects close to them so they won't strike against them. If the person is sick to their stomach lay them on their side.
- Remove any heavy and outer clothing.
- Have the person drink some cool water (a small cup every 15 minutes) if they are alert enough to drink anything and not feeling sick to their stomach.
- Try to cool the person by fanning them. Cool the skin with a cool spray mist of water, wet cloth, or wet sheet.
- If ice is available, place ice packs under the arm pits and groin area.

How to Protect Workers

- Learn the signs and symptoms of heat-induced illnesses and what to do to help the worker.
- Train the workforce about heat-induced illnesses.
- Perform the heaviest work in the coolest part of the day.
- Slowly build up tolerance to the heat and the work activity (usually takes up to 2 weeks).
- Use the buddy system (work in pairs).
- Drink plenty of cool water (one small cup every 15-20 minutes)
- Wear light, loose-fitting, breathable (like cotton) clothing.
- Take frequent short breaks in cool shaded areas (allow your body to cool down).
- Avoid eating large meals before working in hot environments.
- Avoid caffeine and alcoholic beverages (these beverages make the body lose water and increase the risk for heat illnesses).

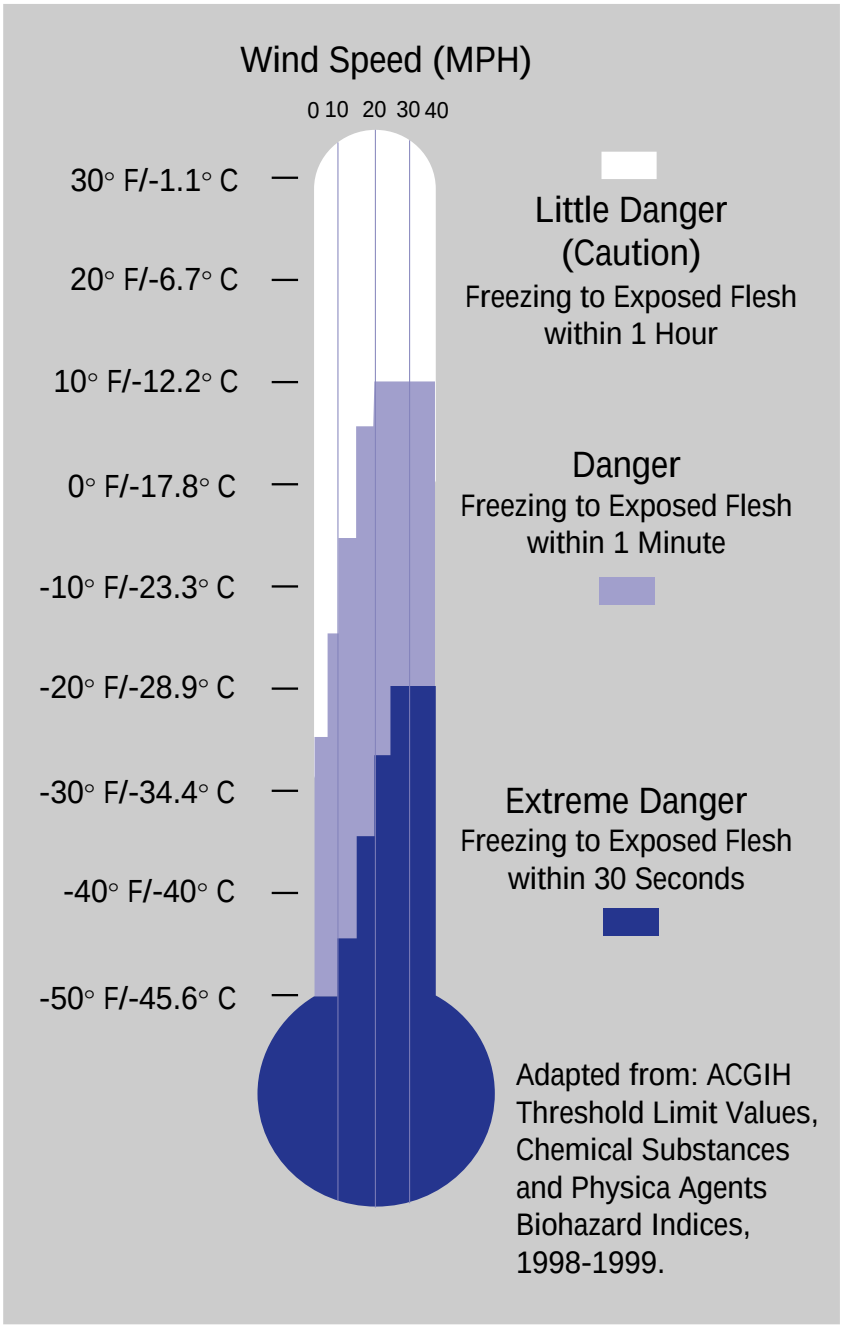
Workers Are at Increased Risk When

- They take certain medication (check with your doctor, nurse, or pharmacy and ask if any medicines you are taking affect you when working in hot environments).
- They have had a heat-induced illness in the past.
- They wear personal protective equipment (like respirators or suits).

THE COLD STRESS EQUATION

LOW TEMPERATURE + WIND SPEED + WETNESS = INJURIES & ILLNESS

When the body is unable to warm itself, serious cold-related illnesses and injuries may occur, and permanent tissue damage and death may result. **Hypothermia** can occur when *land temperatures* are **above** freezing or *water temperatures* are below 98.6°F/ 37°C. Cold-related illnesses can slowly overcome a person who has been chilled by low temperatures, brisk winds, or wet clothing.



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Occupational Safety and Health Administration

OSHA 3156
1998

FROST BITE

What Happens to the Body:

FREEZING IN DEEP LAYERS OF SKIN AND TISSUE; PALE, WAXY-WHITE SKIN COLOR; SKIN BECOMES HARD and NUMB; USUALLY AFFECTS THE FINGERS, HANDS, TOES, FEET, EARS, and NOSE.

What Should Be Done: (land temperatures)

- Move the person to a warm dry area. Don't leave the person alone.
- Remove any wet or tight clothing that may cut off blood flow to the affected area.
- **DO NOT** rub the affected area, because rubbing causes damage to the skin and tissue.
- **Gently** place the affected area in a warm (105°F) water bath and monitor the water temperature to **slowly** warm the tissue. Don't pour warm water directly on the affected area because it will warm the tissue too fast causing tissue damage. Warming takes about 25-40 minutes.
- After the affected area has been warmed, it may become puffy and blister. The affected area may have a burning feeling or numbness. When normal feeling, movement, and skin color have returned, the affected area should be dried and wrapped to keep it warm. **NOTE:** If there is a chance the affected area may get cold again, do not warm the skin. If the skin is warmed and then becomes cold again, it will cause severe tissue damage.
- Seek medical attention as soon as possible.

HYPOTHERMIA - (Medical Emergency)

What Happens to the Body:

NORMAL BODY TEMPERATURE (98.6° F/37°C) DROPS TO OR BELOW 95°F (35^0 C); FATIGUE OR DROWSINESS; UNCONTROLLED SHIVERING; COOL BLUISH SKIN; SLURRED SPEECH; CLUMSY MOVEMENTS; IRRITABLE, IRRATIONAL OR CONFUSED BEHAVIOR.

What Should Be Done: (land temperatures)

- Call for emergency help (i.e., Ambulance or Call 911).
- Move the person to a warm, dry area. Don't leave the person alone. Remove any wet clothing and replace with warm, dry clothing or wrap the person in blankets.
- Have the person drink warm, sweet drinks (sugar water or sports-type drinks) if they are alert. **Avoid drinks with caffeine** (coffee, tea, or hot chocolate) or alcohol.
- Have the person move their arms and legs to create muscle heat. If they are unable to do this, place warm bottles or hot packs in the arm pits, groin, neck, and head areas. **DO NOT** rub the person's body or place them in warm water bath. This may stop their heart.

What Should Be Done: (water temperatures)

- Call for emergency help (Ambulance or Call 911). Body heat is lost up to 25 times faster in water.
- **DO NOT** remove any clothing. Button, buckle, zip, and tighten any collars, cuffs, shoes, and hoods because the layer of trapped water closest to the body provides a layer of insulation that slows the loss of heat. Keep the head out of the water and put on a hat or hood.
- Get out of the water as quickly as possible or climb on anything floating. **DO NOT** attempt to swim unless a floating object or another person can be reached because swimming or other physical activity uses the body's heat and reduces survival time by about 50 percent.
- If getting out of the water is not possible, wait quietly and conserve body heat by folding arms across the chest, keeping thighs together, bending knees, and crossing ankles. If another person is in the water, huddle together with chests held closely.

How to Protect Workers

- Recognize the environmental and workplace conditions that lead to potential cold-induced illnesses and injuries.
- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to help the worker.
- Train the workforce about cold-induced illnesses and injuries.
- Select proper clothing for cold, wet, and windy conditions. Layer clothing to adjust to changing environmental temperatures. Wear a hat and gloves, in addition to underwear that will keep water away from the skin (polypropylene).
- Take frequent short breaks in warm dry shelters to allow the body to warm up.
- Perform work during the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system (work in pairs).
- Drink warm, sweet beverages (sugar water, sports-type drinks). Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol.
- Eat warm, high-calorie foods like hot pasta dishes.

Workers Are at Increased Risk When…

- They have predisposing health conditions such as cardiovascular disease, diabetes, and hypertension.
- They take certain medication (check with your doctor, nurse, or pharmacy and ask if any medicines you are taking affect you while working in cold environments).
- They are in poor physical condition, have a poor diet, or are older.