NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 8
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May 7, 2018

Mr. Thomas Masaschi
Canandaigua Crossroads, LLC
2604 Elmwood Avenue, #352
Rochester, NY 14618

Re: Former Labelon Corp. Facility BCP Site (#C835016)
10 Chapin St. Canandaigua, NY
Remedial Action Work Plan, March 21, 2018

Dear Mr. Masaschi;

The New York State Departments of Environmental Conservation (NYSDEC) and Health (NYSDOH; collectively referred to as the Departments) have completed their review of the document entitled *"Remedial Action Work Plan"* (the Work Plan) dated March 21, 2018 and prepared by Ravi Engineering and Land Surveying, P.C. for the Former Labelon Corp. Facility located in the City of Canandaigua, Ontario County. In accordance with 6 NYCRR Part 375-1.6, the Departments have determined that the Work Plan, with the following modifications, substantially addresses the requirements of the Brownfield Cleanup Program:

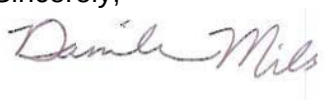
1. A water truck or hose will be on-site during field work at all times.
2. An underground utility clearance will be completed prior to field work at the site.
3. Please adhere to any noise ordinances required by the City of Canandaigua.
4. Section 9.3, #2, bullet point 1: Soil vapor will also be monitored to assess the performance and effectiveness of the remedy, as needed.
5. CAMP results will be submitted to the Departments weekly. In addition, the Departments will be notified if residents have any complaints.
6. Installation of the sub-slab depressurization system will be completed during the remedial phase.

With the understanding that the modified Work Plan is agreed to, the Remedial Action Work Plan is hereby approved. If you have questions or concerns, please contact me at (585) 226-5349 or danielle.miles@dec.ny.gov.

By **May 9, 2018** please attach a copy of this letter to the Work Plan and distribute the approved Work Plan as follows:

- Danielle Miles (1 hard copy with an original signature on the certification page);
- Julia Kenney (electronic copy on CD); and,
- Document Repository at Wood Library located at 134 North Main Street, Canandaigua, NY 14424 (1 hard copy).

Sincerely,



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Remedial Action Work Plan:

Excavation with Enhanced Bioremediation and Vapor Mitigation Remedy

Former Labelon Corporation Facility
10 Chapin Street
City of Canandaigua
Ontario County, New York

NYSDEC Site No. C835016

PREPARED FOR:

Canandaigua Crossroads, LLC
2604 Elmwood Avenue, #352
Rochester, NY 14618

PREPARED BY:

Ravi Engineering & Land Surveying, P.C.
2110 South Clinton Avenue
Suite 1
Rochester, New York 14618

December 22, 2017
Revised March 21, 2018

Project No. 45-17-008-0J

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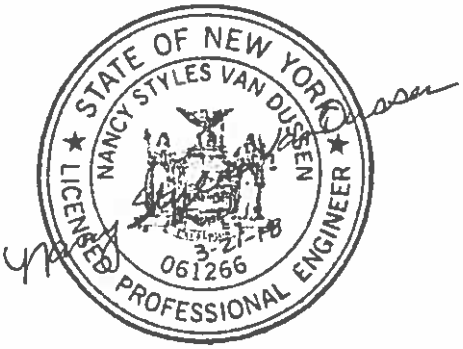
CERTIFICATION

I Nancy Styles VanDussen certify that I am currently a NYS-registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Department of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10)

Nancy Styles VanDussen
Signed:

3-21-18
Date:



1.0 INTRODUCTION

This Remedial Action Work Plan (RAWP) was prepared on behalf of Canandaigua Crossroads LLC and provides a detailed plan for implementation of the remedial actions to address the contamination at the Former Labelon Corporation Facility (Labelon) at 10 Chapin Street in the City of Canandaigua, Ontario County, New York (the "Site", Figure 1).

2.0 BACKGROUND

2.1 MacDonald Land Surveying and Engineering, DPC

As further discussed in Section 3.0, MacDonald Land Surveying and Engineering, DPC (MacDonald Engineering) prepared an Alternatives Analysis Report (AAR) for the Site. Ravi Engineering & Land Surveying, P.C. (RE&LS) has prepared this RAWP to conduct the New York State Department of Environmental Conservation (NYSDEC)-approved remediation as proposed in the AAR.

2.2 Site Description

The Site is an approximately 1.63-acre parcel that is improved with a 79,800 square foot (sq. ft.) four-story masonry/brick building, currently vacant. Labelon Corporation, which manufactured transparency films and adhesive labels, occupied the Site from circa 1960 to 2002. The building is surrounded by gravel and asphalt parking lots, driveways, and limited vegetative cover in isolated locations throughout the property. The Site is bound to the east and south by commercial properties; railroad tracks and Canandaigua City Hall are to the north, and residential property to the west of the Site.

The U.S. Geologic Survey 7.5-miniute Canandaigua Quadrangle indicates a general westward topographic gradient across the Site and surrounding area. Based on previous investigations and local topography, it is inferred that the surficial and groundwater flow directions are to the west-southwest. Previous investigations have indicated that overburden deposits in the area consist of glaciolacustrine silty sands overlying shale and limestone of the Devonian Hamilton Group. The depth to bedrock on the Site has not been determined.

2.3 Site History

MacDonald Engineering reported that the original building was constructed prior to 1924; it is the southernmost structure on the property. The Site building was built in stages that are connected with common walls.

The historic Site usage includes a coal yard from the 1880s to 1910s, a corset factory from the 1920s to 1940s, and a bicycle factory from the 1940s to 1950s. Labelon occupied the Site from circa 1960 to 2002.

3.0 PREVIOUS INVESTIGATIONS

3.1 Remedial Investigation Workplan, SAW Environmental Services, Inc. (SAW)

SAW prepared a Remedial Investigation (RI) Workplan for the Site dated November 2011. In the Workplan SAW reported the following previous environmental work at the Site:

UST Removal – 1990:

Fifteen (15) underground storage tanks (UST) were removed from the Site in September 1990.

Hydrogeologic Investigation – 1992:

In March 1992, Haley and Aldrich of New York (H&A) installed two groundwater monitoring wells in the vicinity of the former USTs at the northwest corner of the Site building; their groundwater samples indicated that 29.0 micrograms per liter (ug/L) of the chlorinated volatile organic compound (cVOC) trichloroethene (TCE) and 7ug/L of the TCE breakdown product 1,2-dichloroethene (DCE) were detected in the groundwater samples.

Environmental Investigation – 2001:

In August 2001, H&A conducted an investigation that included 11 soil borings and conversion of 8 borings into 1-inch groundwater monitoring wells. In addition, six soil vapor samples were collected from beneath the building concrete floor.

- The soil analyses indicated perchloroethylene (PCE) at a concentration of 23.7 micrograms per kilogram (ug/kg), 1,890 ug/kg of TCE, 503ug/kg of cis-DCE, and 23.4 ug/kg of trans-DCE were detected in the soil samples.
- TCE was detected in one groundwater sample at a concentration of 874 ug/L.

Phase I Environmental Site Assessment – 2009:

In June 2009, SAW conducted a Phase I ESA and identified the following recognized environmental conditions (RECs):

1. Observations of gasoline tanks on Sanborn® maps and lack of documentation relative to their removal.
2. Lack of documentation relative to the removal or potential presence of a 4,000-gallon fuel UST northeast of the Site building.
3. The presence and unknown extent of VOC impacts in Site soils.

4. The presence and unknown extent of TCE and DCE in Site groundwater.
5. The presence and unknown extent of silver and petroleum hydrocarbons in Site soils.
6. The potential for a vapor intrusion concern at the Site from sub-slab TCE vapors.
7. The unknown discharge location of sumps observed in the Site building.
8. The likely presence and unknown condition of a fuel oil UST at the Site.

Phase II Environmental Investigation – 2009:

SAW performed a Phase II ESA to address the RECs identified during the Phase I including sixteen (16) soil borings, four (4) groundwater monitoring wells, sampling of five (5) existing monitoring wells, and collection of soil samples and sub-slab vapor samples.

SAW reported TCE in four monitoring wells at concentrations up to 3,140 ug/L. Groundwater flow at the Site was calculated to be towards the adjacent residential properties and Chapin Street to the south-southwest.

Laboratory analysis of sub-slab vapor samples indicated that cVOCs and petroleum compounds were present in all 8 sample locations under the building slab. Concentrations of TCE detected in sub-slab vapor at the site exceed the NYS Department of Health (NYSDOH) Vapor Intrusion Guidance mitigation criteria with a maximum concentration of 3,790 ug/m^3.

3.2 Supplemental Remedial Investigation Report (RIR), MacDonald Engineering, October 2016 (Revised May 2017)

The RIR states that the contaminants detected in environmental media include cVOCs, petroleum constituents, and silver are attributed to activities that took place on the property during its past industrial use which includes solvent storage and mixing, silver use and mixing, as well as underground storage of petroleum and potentially other industrial liquids.

MacDonald Engineering concluded that the majority of the Site is free of soil and/or groundwater contamination requiring additional investigation or remedial efforts. The portion of the Site that contains elevated levels of cVOC contamination in soil and groundwater is located beneath the southern portion of the Site building and beneath the parking lot southwest of the building. Although soils in this area generally meet the NYSDEC requirements for Restricted-Residential for semivolatile organic compounds (SVOCs) and Protection of Groundwater Soil Cleanup Objectives (SCOs) for VOCs, they represent a continuing source for westward-flowing groundwater to be contaminated at levels exceeding applicable standards. MacDonald Engineering stated that remediation of soils and groundwater is necessary in this area of the Site in order to attain compliance

with applicable regulations and to mitigate the potential for downgradient contaminant migration toward neighboring properties to the west.

One UST with an approximate capacity of 200 gallons (RE&LS subsequently determined this to be a 500-gallon UST) was discovered that will require removal and closure to obtain compliance with applicable regulatory criteria. This UST contains a trace amount of gasoline and water. Contaminated soils surrounding this tank will also require remediation to attain compliance.

Drainage features within the building such as sumps and drainage piping contain contaminated sediment and water which will require removal and proper disposal to attain compliance with applicable regulations.

3.3 Alternatives Analysis Report (AAR) , MacDonald Engineering, June 2016 (Revised May 2017)

In the AAR, MacDonald Engineering selected their Remedial Alternative #2-Impacted Area Removal & In-Situ Groundwater Remediation with Institutional and Engineering Controls.

They stated that in-situ enhanced biodegradation will be employed to treat contaminants in groundwater in the "Area A" chlorinated-VOC source area under the building, the "Area B" chlorinated-VOC source area at the southwest corner of the building, on-site areas within the associated groundwater contaminant plumes, and at the downgradient site boundary. Liquid activated carbon will also be injected near the downgradient Site boundary to control contaminant migration. As a component of UST closure activities in Area B, impacted soils will be excavated and disposed of off-site. A vapor mitigation system will be installed in the Site building to mitigate potential impacts from TCE soil vapor, and a soil cover system will prevent potential exposure to, and migration of soil contaminants. Subsequent to the impacted soil removals and in-situ groundwater remediation, a groundwater monitoring program will be implemented to evaluate the effectiveness of the remedy, and an environmental easement will be established to limit the use and development of the Site to Commercial and Industrial use.

4.0 REMEDIATION GOALS

Impacted area remedial work will be completed at the Site by means of the procedures listed above and described herein.

Goals of this alternative include:

- Remediating the VOC and petroleum contamination in soil to achieve Restricted-Residential Use SCOs for SVOCs and Protection of Groundwater SCOs for VOCs;
- Remediating the residual VOC contamination in groundwater to achieve standards and guidance values as defined in NYSDEC TOGS 1.1.1 to the extent practicable;

- Controlling exposure to residual contaminants that may be present in historic fill material and soil at the Site; and
- Preventing off-Site migration in groundwater.

Based on studies performed to date by others, the contaminants of concern are:

- Trichlorothene (TCE), cis-1,2-dichlorothene, vinyl chloride in soil, soil vapor, and groundwater;
- Barium and chromium in soil
- Toluene, xylene (mixed) benzene, benzo (a) pyrene, benzo(a)anthracene, and benzo(b)fluoranthene in soil in proximity to the identified UST; and
- PAHs in surficial soils on the north end of the Site.

5.0 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are medium-specific objectives for the protection of human health and the environment. RAOs for this project are as follows:

5.1 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

5.2 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of groundwater or surface water contamination.

5.3 Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

5.4 Other Factors for Consideration

For this project, the following additional considerations were evaluated during the development of remedial alternatives:

- Eliminate or mitigate threats to public health and the environment.
- Address source areas of contamination using the following hierarchy in order of preference:
  - Removal and/or treatment;
  - Containment;
  - Elimination of exposure; and
  - Treatment of source at point of exposure.
- Give preference to permanent closure of abandoned USTs via removal over closure of tanks in-place. This preference is intended to maximize redevelopment options at the Site, and also result in a higher level of confidence that associated contamination or tank contents are properly addressed as part of the remedy.
- Protect groundwater considering the following:
  - Source removal, treatment or control;
  - Restoration of groundwater quality to meet applicable SCGs to the extent practicable; and
  - Plume containment/stabilization.
- Prevent soil vapor intrusion into structures:
  - Implement engineering controls to address soil vapor intrusion (e.g., sub-slab depressurization system, etc.).

6.0 REMEDIAL ACTION WORK PLAN

6.1 Standards, Criteria, and Guidance (SCG)

The remedy is selected pursuant to the remedy selection criteria set forth in DER-10, Technical Guidance for Site Investigation and Remediation and 6 NYCRR Part 375. The selected remedy is a Track 4 remedy: Restricted use with site-specific soil cleanup objectives. Remedial Cleanup SCGs include the following:

Soil SCGs

- Part 375-6.8: Restricted Residential Use Soil Cleanup Objectives (SCOs) for SVOCs and Protection of Groundwater SCOs for VOCs.

- Grossly-contaminated soil associated with the buried tank(s), as defined in 6 NYCRR Part 375-1.2(u) will be removed to the greatest extent feasible, as set forth in Part 375-1.8(c)(1).

- Soil brought to the site for use as a soil cover or backfill must be comprised of soil or other unregulated material as set forth in 6 NYCRR Part 360 and not exceed the protection of groundwater soil cleanup objectives.

Groundwater SCGs

- TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.

Soil Vapor

- 6 NYCRR Part 375-6.7(a): The remedy will be protective for on-site soil vapor and vapor intrusion and shall address through engineering controls the migration of contaminants in soil and groundwater at levels which could impact the indoor air quality within the buildings.

- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in NYS (October 2006) with all updates and revisions, including the May 2017 updated SVI decision matrices.

6.2 Field Activities Plan

The field activities to be completed as part of the Work Plan have been separated into the following tasks:

1. Area A: In-situ Treatment of Impacted Soil and Groundwater

2. Area B: Soil Excavation, UST Closure, and Off-Site Disposal, Placement of Hydrogen Release Compound (HRC®) in open excavation
3. In-Situ Barrier Installation
4. Installation of a soil cover system
5. Installation of Sub-Slab Depressurization System (SSDS)
6. Post-Injection Monitoring until Certificate of Closure is issued

During all ground intrusive work conducted at the Site, air monitoring will be conducted in accordance with the Community Air Monitoring Plan (CAMP).

6.2.1 In-situ Treatment of Impacted Soil and Groundwater

In-situ enhanced biodegradation will be employed to treat contaminants in groundwater in the chlorinated VOC source area located under the southern portion of the building (Area A), the Area B chlorinated VOC source area at the southwest corner of the building, on-site areas within the associated groundwater contaminant plume, and at the downgradient site boundary (see Fig. 2 – Remedial Plan).

The United States Environmental Protection Agency (EPA) will be notified at least 30 days prior to injections in accordance with the EPA Underground Injection Control (UIC) program. The NYSDEC will be copied in on correspondence with the EPA.

6.2.1.1 Area A: High Intensity Treatment Area

Area A is located beneath the southwestern portion of the subject building. Although soils in this area generally meet the NYSDEC Restricted-Residential for SVOCs and Protection of Groundwater SCOs for VOCs, they represent a continuing source of westward-flowing groundwater contaminants at levels exceeding applicable standards. TCE-contaminated soil and groundwater above the Site RAOs are not readily accessible for removal from Area A or the surrounding area. The proposed approach for addressing impacts within Area A and the surrounding lesser impacted areas is anaerobic bioremediation using Regenesis, Inc. Hydrogen Release Compound (HRC®) and Bio Dechlor Incoculum (BDI®) Plus. BDI® Plus is an enriched, natural microbial consortium containing species of Dehalococcoides sp. (DHC) which are capable of completely dechlorinating contaminants during in situ anaerobic bioremediation processes. HRC® enables enhanced anaerobic biodegradation by adding hydrogen (an electron donor) to groundwater and/or soil to increase the number and vitality of microorganisms able to perform the naturally occurring process of enhanced reductive dechlorination that effectively reduces contaminants to a less harmful substance, with the preferred and innocuous endpoints of ethene or ethane.

Using the mapped extent of soil exceeding 21 ppm of TCE as a guide, and based on the anticipated contaminated zone thickness of six (6) feet (to a total depth of approximately nine (9) feet below grade), MacDonald Engineering estimated that 82 cubic yards (140 tons) of TCE-contaminated soil will be treated.

Area A will be remediated using approximately eight (8) injection points installed on an approximate 15-foot grid spacing through the impacted zone (Figure 2). Table 1 indicates the proposed HRC® application in Area A:

Table 1: Area A High Intensity Area HRC® & BDI® Plus Details

HRC® Application Points	8
HRC® (lbs. per point)	40
HRC® Injection Volume (gals per point)	3.7
BDI® Plus (liters per point)	1.0

The Regenesis design calculations are included in Appendix A.

6.2.1.2 Low Intensity Treatment Area

The lower intensity injection zone extends generally to the west through the building and beneath the parking lot following the outline of the MacDonald Engineering's estimated 3,670 sq. ft. area of Protection of Groundwater VOC exceedances. Wider grid spacing will be used for installation of approximately seven (7) additional injection points in the "Low Intensity" zone to address the lower TCE levels identified in soil and groundwater within this area. Injection locations, depicted on Figure 2, will be spaced approximately 30 feet in between rows and 17 feet within rows.

Table 2: Low Intensity Area HRC® **& BDI® Plus Details**

HRC® Application Points	7
HRC® (lbs. per point)	129
HRC® Injection Volume (gals per point)	11.8
BDI® Plus (liters per point)	1.0

6.2.1.3 Injection Point Procedure

Site Preparation

Prior to injection, RE&LS will mark the approximate boundaries of Areas A and B with Spray paint on the concrete slab and asphalt parking lot, and the injection points will also be painted. An area of the Site building will be prepared for storage of the injection material. A secondary containment berm will be created, and pallets will be placed inside to store the material.

Several sumps identified in the site building during previous investigations were investigated by MacDonald Engineering and Land Surveying. Dye testing performed during the remedial investigation did not identify the discharge locations of the sumps, and sediment sampling did not identify source material. Future renovation plans of the site building include filling or closure of the sumps. We recommend that the sumps be filled prior to HRC® injection to prevent migration of the HRC® into the sumps.

The possible presence of off-site sumps in downgradient residences to the west is unknown. However, material that migrates into off-site sumps would be partially, if not completely consumed and diluted. It is not anticipated that contact with any HRC® that migrates into off-site sumps would be of significant concentrations that could cause exposure problems or corrosion of sumps and utility pipes.

Injection Strategy

The injection strategy for both areas will be to first inject on the outer (cleaner) portions of each area, and work our way into the more contaminated zones. This will prevent the injections from pushing the contaminants outwards.

HRC® becomes viscous when cold. Nature's Way will construct a hot water bath, if needed, utilizing a galvanized water-filled steel trough on a block frame; the trough and water will be heated with a propane gas system to keep the HRC® in a liquid, flowable state (Figure 3).

Injection of HRC® will be accomplished by direct push using a Simco Earthprobe 200 Geoprobe or the equivalent, driving 1.25-inch diameter probe rods equipped with a point holder and expendable stainless steel drive points. The rods will be driven to the bottom depth of the treatment interval and withdrawn while pumping in the product. Injection of the HRC® will be completed from a total depth of approximately 10 feet upward (from bottom to top as the tooling is withdrawn) to approximately four (4) feet below grade. This approach will facilitate contact with the majority of the impacted subsurface. The installation of the HRC® above the saturated zone, at approximately depths of six (6) to eight (8) feet below grade, will provide coverage of the impacted area by allowing downward percolation of HRC® to follow the likely pathway(s) of past TCE releases. Mixing the HRC® with clean water for subsurface injection will also enhance microbial accessibility to TCE in the unsaturated zone.

HRC® injection of the low-intensity treatment area will be performed before the high-intensity area. The injection methodology will be as follows:

- A Monyo (3LG) progressive cavity transfer pump with 0 to 300 pounds per square inch (PSI) capacity will be used to inject the HRC® into the subsurface.

- Blowback will be managed after injection by filling the holes with granular or chipped bentonite to prevent daylighting out of the injection points.
- Pressure gauges will be utilized to regulate the amount of pressure required to move the HRC® into the formation to ensure that the HRC® product is not surfacing or traveling along preferential migration paths. This will be indicated by a sudden drop in pressure; if this occurs, injection will be stopped and a new injection well will be installed as close as practical to the proposed well location.
- Injection documentation detailing the quantities of HRC® material pumped into the subsurface as well as pressure gauge readings will be recorded in the field and included in the Final Engineering Report (FER).

6.2.2 Area B: Soil Excavation, UST Closure, and Off-Site Disposal

6.2.2.1 Area B UST

A 500-gallon UST is located near the exterior southwest corner of the building at a depth of approximately 3 feet bgs (to top of tank). Initial efforts to address impacted soils in Area B will focus on the removal and proper closure of this abandoned UST, underground piping or other structures associated with the source of contamination. As this tank lies within Area B, the removal and disposal of soils excavated as part of that remedial effort will address some of the contamination surrounding the tank (Figure 4).

Using MacDonald Engineering's mapped extent of soil exceeding 21 ppm of TCE, it is estimated that approximately 38 cubic yards (60 tons) of impacted soil, soil with visual waste material or non-aqueous phase liquid, and soils which create a nuisance condition as defined in CP-51 Section G will be removed. Post-excavation confirmatory soil samples will be collected as described in Section 6.2.2.5 and submitted to the laboratory with an expedited turn-around-time. The excavation will remain open and fenced pending these results.

Saturated soils and groundwater will then be remediated in-situ by directly mixing HRC® into the open excavation.

Table 3: UST Excavation HRC® & BDI® Plus Details

HRC® Application Points	2
HRC® (lbs. per point)	75
HRC® Injection Volume (gals per point)	6.9
BDI® Plus (liters per point)	2.5

The excavation will be backfilled to pre-existing grade or proposed final grade upon completion. On-site soil which does not exceed the above excavation criteria or the protection of groundwater SCO for any constituent may be used anywhere beneath

the cover system, including below the water table, to backfill the excavation or re-grade the Site. Clean fill meeting the requirements of 6 NYCRR part 375-6.7(d) will be brought in to replace the excavated soil or complete the backfilling of the excavation and establish the designed grades at the Site. NYSDEC-approved fill materials consisting of stone, soil, or other materials will be used as backfill. Imported fill soils will be sampled in conformance with the Department of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10), as detailed in Section 6.2.2.7.

The extent of soils removed will be surveyed by a NYS-licensed land surveyor, and documented in the FER as a Professional Engineer (P.E.) - stamped As-Built drawing.

6.2.2.2 Suspect Interior Sub-slab UST

Based on the presence of vent and fill pipes protruding from the boiler room slab, a UST is suspected to be present. Test pitting was performed to a depth of 5 feet beneath the slab in the boiler room in the vicinity of two vent/fill pipes during the remedial investigation but no tank was found. Additional test pitting will be performed during remedial activities. If a UST is identified, a determination will be made whether the tank is to be abandoned in place or removed.

Removal of the tank and excavation of associated contamination is the preferred method. If feasible, the tank will be removed similarly to the exterior tank in accordance with DER-10 and 6 NYCRR 613.9. If it is determined that removal of the tank will cause structural damage to the building, consideration to abandon the tank in place will be done in consultation with the NYSDEC.

6.2.2.3 UST Removal Procedures

Prior to commencing work, the need for a geotechnical survey will be determined based on the proximity of the planned excavation to the building. NYSDEC and NYSDOH Project Managers will be notified at least 10 days before initiating UST closure in accordance with DER-10 Section 5.5.

<u>Procedures for Exterior UST Removal</u>

The following procedure will be used to remove the UST(s):

1. Remove all product to its lowest draw-off point; the existing tank was found to contain approximately 15 inches of liquid.
2. Drain and flush piping into the tank.
3. The liquid below the draw-off point is a “tank bottom”; it will be pumped out with a hand pump or a vacuum pump, if required.

4. Dig down to the top of the tank and expose the upper half of the tank.
5. Remove the fill tube and disconnect the fill, gauge, product, and vent lines. Cap or plug open ends of lines which are not to be used further.
6. If degassing the tank before removing from the excavation, the tank interior and the excavation will be checked for flammable vapors to ensure that such flammable vapors have been satisfactorily removed. The vent line will remain connected and open until the purging procedure is complete. The tank interior will be tested with an oxygen meter and will be considered safe when the meter reads 6-7% oxygen.
7. The tank will be rendered safe by ensuring that petroleum vapors have been satisfactorily purged from the tank with the addition of dry ice; approximately 7.5 pounds of dry ice will be introduced to the 500 gallon UST; it will be crushed and distributed evenly over the greatest possible area of the UST interior. The dry ice will vaporize, pushing flammable vapors out of the tank.
8. Complete the excavation, and remove the tank, placing it in a secure location. Tank will be blocked to prevent movement.
9. After the vapors are purged, the tank(s) will be cleaned by a high-pressure spray rinse. The water collected from this operation will be disposed of in the same manner as the tank bottoms.
10. Before the tank is moved from the Site, all holes will be plugged or capped. The tank will be secured to a truck for transportation to a disposal facility; it will be secured so that the vent hole is at the uppermost point of the tank. Once emptied and cleaned, it will be disposed of at a landfill permitted under Part 360 or at a scrap yard.

6.2.2.4 Soil Screening and Staging

Concurrent with the removal of the UST and accessible petroleum-impacted soils adjacent to Area B, soils above the saturated zone will be continuously screened for "nuisance factors" using a photoionization detector (PID) and olfactory senses, removed, and loaded directly onto trucks for disposal at Waste Management of New York's High Acres Landfill.

6.2.2.5 Soil Sampling

Post excavation field samples and quality assurance/quality control (QA/QC) samples will be collected and analyzed for VOCs using USEPA Method 8260, and SVOCs using USEPA Method 8270. The samples will be collected in accordance with CP-51 Soil Cleanup Guidance Document (October, 2010) criteria and NYSDEC Technical Guidance for Site Investigation and Remediation (May, 2010).

The final number of samples will be based on the actual size of the excavation; a minimum of 5 soil samples will be taken, consisting of 4 sidewall and 1 bottom

sample, for each 15 linear feet of the excavation wall (Figure 4). Samples will be biased based on field screening toward the suspected location of greatest contamination. Analytical results will be compared to Restricted-Residential for SVOCs and Protection of Groundwater SCOs for VOCs.

6.2.2.6 Monitoring Well Installation

One monitoring (MW-R1) well will be installed into the former UST pit as backfilling takes place. The well will be used to monitor the effectiveness of Alternative #2 relative to groundwater.

The exterior monitoring well will be installed with a rotary drill rig and 4 ¼ inch inner diameter hollow stem auger. The auger will be advanced through the overburden to bedrock refusal, anticipated at approximately 20 feet beneath ground surface (BGS). Air or drilling fluids will not be used. Soils will be sampled continuously in advance of the auger utilizing a standard split spoon sampler or Macro-Core® sampling equipment. A field geologist will observe and log each boring.

The exterior monitoring well will be constructed of a 2-inch Schedule 40 flush-joint PVC screen consisting of a 10-foot length of 0.010-inch slotted screen. The well will be connected to an appropriate length of Schedule 40 PVC well riser and backfill will be added around the screen. The well will be completed at the surface with a flush-mount protective casing set in a concrete collar and equipped with a locking J-plug and padlock.

In the event that a UST is identified inside the boiler room, a monitoring well (MW-R2) will be installed similar to the exterior well, but with a 1-inch schedule 40 PVC screen and riser.

6.2.2.7 Development of New Wells

The newly installed wells will be developed after a minimum period of 48 hours. Wells will be developed by surging and pumping to remove fine particles from the well and sand pack using dedicated bailers. Initially, each monitoring well will be developed by removing five (5) well volumes. Groundwater generated during well development activities will be containerized in 55-gallon drums, characterized, and disposed of off-site in accordance with applicable regulations.

6.2.2.8 Imported Materials Criteria

For each source of backfill that is imported to the Site, one of the following will be completed prior to importing the backfill:

1. Documentation will be provided to NYSDEC as to the source of the material and the consistency of the material in accordance with the exemption for no chemical testing listed in DER-10 Section 5.4(e)(5); or
2. Chemical testing will be completed in accordance with the following table:

Table 4: DER-10 Recommended Number of Soil Samples for Imported/Exported Soils

Table 5.4(e)10*			
Recommended Number of Soil Samples for Soil Imported to or Exported From a Site			
Contaminant	**VOCs**	**SVOCs, Inorganics & PCBs/Pesticides**	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	3-5 discrete samples from different location in the fill being provided will comprise a composite sample for analysis.
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
➢ 1000	Add an additional 2 VOC and 1 composite for each additional 1000 cubic yards or consult with DER		

***From DER-10/Technical Guidance for Site Investigation and Remediation**

The Request to Import/Reuse Fill or Soil Form is included in Appendix B.

6.2.2.9 Dewatering

The remedial investigation indicated the groundwater depth to be approximately 6-8 ft. BGS. It is assumed that dewatering will not be required to advance the excavation to the required depth. However, pumping and storage equipment will be available on site; if groundwater is encountered, it will be collected, sampled, and discharged and disposed of similarly to all water generated during remedial work.

6.2.3 In-Situ Barrier Installation

In order to directly address the general westward migration of the TCE plume, a barrier consisting of Regenesis PlumeStop® will be installed. The PlumeStop® product consists of colloidal activated carbon, which is designed to easily disperse in the saturated zone and facilitate the bioremediation process by providing a favorable environment for the formation

of microbial colonies. This material will be installed along an approximate 50-foot line oriented north/south (see Figure 2) to intersect westward-flowing groundwater and reduce down-gradient concentrations of TCE. It will be installed from the bottom up of seven (7) injection points, directly injected into the saturated zone between approximately ten (10) and six (6) feet BGS in a single injection event.

The PlumeStop® will be shipped to the Site in two 2,000-pound totes and one 55-gallon drum and stored inside the site building until ready for use. Prior to injection, PlumeStop® must be mixed with water. Water will be transported to the Site in a truck-mounted water tank or obtained from the municipal water supply via the nearest fire hydrant. The PlumeStop® will be mixed at a ratio of approximately 0.56 gallon of water for each pound of PlumeStop®. HRC® and BDI® -plus will also be added to the mixture. Regenesis recommends the following PlumeStop® specifications:

Table 5: In-Situ Barrier HRC® & BDI® Plus Details

Number of Points	7
PlumeStop® (lbs. per point)	629
PlumeStop® (gals per point)	75
HRC® (lbs. per point)_	60
HRC® Injection Volume (gals. per point)	5.5
BDI® Plus (liters per point)	0.6

Injection of HRC® and PlumeStop® will be accomplished with a Simco Earthprobe 200 or equivalent driving 1.25 inch diameter probe rods equipped with a point holder and expendable stainless steel drive points. The rods will be driven to bottom depth of treatment interval and withdrawn while pumping in a prescribed volume of product.

Injection locations and final injection quantities will be logged in the field and indicated on an injection location map in the FER.

6.2.4 Post-Injection Sampling plan

It is noted that HRC® works slowly, continuing to enhance microbial consumption of TCE and its daughter products for periods of up to two (2) years. Groundwater monitoring will be conducted on a quarterly basis for up to two years. The first two rounds of sampling will be required for Certificate of Completion issuance, as long as analytical results indicate that the remedy is working. Long term groundwater monitoring will be addressed in the Site Management Plan (SMP).

6.2.4.1 Groundwater Sampling

Six monitor wells were selected for sampling based on the elevated levels of cVOCs identified during the RI in these locations. These wells are all downgradient of

immediate HRC® injection treatment areas. Table 6 outlines the post-injection sampling plan.

Table 6: Post-Injection Groundwater Sampling Plan

Location ID*	Sampling Area		QC Samples per event
MW-R1	Exterior UST Pit Area	TCL & CP-51 VOCs	1 Trip Blank 1 MS/MSD 1 Duplicate
MW-200S	Parking Lot, West of Exterior UST Area		
MW-201S	Southwest Boundary		
MW-201D			
MW-202S	Parking Lot, West of Building		
MW-202D			
MW-204S			
MW-204D			

*See Fig. 2 – Remedial Plan for monitor well locations

Overburden groundwater samples will be collected using low-flow sampling techniques, in accordance with American Society of Testing and Materials (ASTM) Practice D6771-02. Low flow sampling of the monitoring wells will occur in order to minimize groundwater drawdown and to obtain a representative sample of groundwater conditions.

The following low flow equipment (or equivalent) will be utilized to conduct low flow groundwater sampling. This equipment includes;

- Peristaltic Pump
- Oil/Water Interface Meter
- Horiba U-22 Water Quality Monitoring System
- ¼" Polyethylene Tubing

Prior to well purging, groundwater elevations and the potential presence of NAPL will be measured and recorded. Each well will also be checked with an oil/water interface probe to evaluate for potential NAPL. After the elevation level has been measured and recorded, the interface probe will be slowly lowered into the water column and observed for variations in the audible tone, which indicates the presence of NAPL. Initially, LNAPL will be evaluated for, then DNAPL. Care will be taken to minimize disturbance of the water column and the equipment will be decontaminated (alconox wash with potable water rinse) between each well.

Low flow purging of the monitoring wells will include collection of water quality indicator parameters. Water quality indicator parameters will be recorded on low-

flow sampling logs at five (5)-minute intervals during the purging of the well. Groundwater sampling will commence once the groundwater quality indicator parameters have stabilized for at least three (3) consecutive readings for the following parameters;

- Water Level Drawdown <0.3'
- Temperature - +/- 3%
- pH - +/- 0.1unit
- Dissolved Oxygen - +/-10%
- Specific Conductance - +/-3%
- Oxidation Reduction Potential - +/-10 millivolts
- Turbidity - +/-10% for values greater than 1 NTU

Samples will be submitted for analytical laboratory testing for TCL and CP-51 VOCs using USEPA Method 8260. Monitoring will continue in the vicinity of the UST excavation after UST closure is achieved, specifically, until results indicate that the remedy has been achieved and approval has been provided by the NYSDEC.

6.2.4.2 Soil Sampling

The number and location of post-remedial soil samples, as well as a schedule for collecting the samples will be addressed in the SMP.

6.2.5 Sub-Slab Depressurization System (SSDS) Installation

The existing on-site building will require a sub-slab depressurization system (SSDS) to mitigate the migration of vapors into the building. In addition to mitigating potential TCE vapor exposure to future occupants, the SSDS will ventilate the sub-slab environment and will provide the long-term benefit of contaminant reduction in the unsaturated zone beneath the building.

The design of the system is dependent on the results of the pilot study, which is performed to investigate and evaluate the development of a negative pressure field, via the induced movement of soil gases. The pilot study will be conducted to evaluate the sub-slab air flow characteristics needed to determine the specifications of the SSDS design.

Pilot Study

The pilot study will be conducted by first core drilling a 6-inch diameter extraction hole and installing a 4-inch PVC pipe. Observation holes will then be drilled through the building slab. A vacuum will then be applied to the extraction hole to gauge the radius of influence of the extraction point. This information will be used to determine whether a low pressure/high flow or a high pressure/low flow system is needed, as well as to determine the number and location of system extraction points.

Based on the size of the building, three or four extraction points are anticipated; observation points will initially be installed at 20 foot intervals. A 2-horsepower regenerative blower unit will be used to extract soil gas from the extraction hole, and the drop in pressure at the observation points will be measured with a vacuum gauge. The results will be documented on field forms.

Depending on the amount of pressure differential measured between the extraction point and observation point, additional observation points will be installed at closer or further intervals until the radius of influence is determined.

SSDS Design

The radius of influence will determine the number of extraction points, and the type of fan or blower necessary for the final design of the SSD system. The system will be designed and certified by a NYS-Licensed Professional Engineer, and an SSDS work plan will be prepared and approved by the NYSDEC prior to installation of the system. The SSDS will be designed and installed prior to issuance of the Certificate of Completion.

6.2.6 Cover System Installation

A Site cover will be required to allow for restricted residential use of the site in areas where the upper two feet of exposed surface soil will exceed the applicable SCOs. Installation of a minimum of (2) feet of clean cover material will be necessary in the area of SS-03 (see Figure 2), where elevated concentrations of SVOCs were identified exceeding Restricted Residential Criteria. Elsewhere on the Site, Restricted Residential exceedances of barium and chromium exist in isolated areas. However, the presence of the parking lot and the building itself prevents direct contact with these contaminants at depth; therefore, no mitigation or removal of these exceedances is proposed. In areas where building foundations or building slabs preclude contact with the soil, the requirements for a site cover will be deferred until such time that they are removed.

Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d). A Request to Import form will be submitted to the NYSDE C for approval of soils imported for the cover system.

The soil cover will consist of a minimum of two feet of soil placed over a demarcation layer consisting of orange safety fence or geotextile fabric to delineate clean soils from contaminated soils, and will cover all exposed soil areas up to pavement and/or the Site building. The upper six inches of soil will be of sufficient quality to maintain a vegetative layer. The cover material is estimated to require a total of 122 cubic yards of clean fill material covering an area of approximately 1,650 square feet. Prior to installation of the cover system, the existing elevation will be surveyed by a NYS-licensed land surveyor. The perimeter of the area to be covered will then be excavated down two feet to ensure a 2-foot cover is achieved to the lower elevations of the slope, the property boundary line, and areas

that abut pavement or the site building (Figure 5). Upon completion, final elevations will again be surveyed and documented on an As-Built figure to be included with the FER.

6.3 Permits, Authorizations, Modifications

If modifications to the RAWP are necessary, they will be done in consultation with the NYSDEC project manager. Requests will be done in writing prior to approval and documented in the FER. Any request for modifications to the approved RAWP will be identified in the progress report, along with the status of the requested modifications.

7.0 COMMUNITY & ENVIRONMENTAL REPSONSE PLAN (CERP)

The Site is located in a mixed-use neighborhood. Due to the close proximity of numerous residential and commercial properties, this CERP outlines the measures that will be taken to safeguard the health and safety of site workers and the general public during the remedial action, and was prepared in accordance with DER-10 section 5.1(f)(4).

7.1 Community Air Monitoring Plan (CAMP)

Remedial action work will be conducted in conformance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP), and with Fugitive Dust and Particulate Monitoring requirements outlined in Appendix 1A and 1B of DER-10, as well as with Site-specific requirements. The CAMP and fugitive dust monitoring will be implemented as follows:

- Continuous monitoring will be performed for ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, injection of bioremedial material, and the installation of soil borings or monitoring wells.
- Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

The NYSDOH project manager will be notified at a minimum of 10 days in advance of field work that is to include soil/UST excavation. CAMP monitoring results will be summarized in the monthly progress report and are to include the duration of, and actions taken in response to any such exceedance.

7.1.1 CAMP Enclosure Placement

Due to the close proximity of the adjacent residence to the southwest (26 Chapin Street) additional provisions will be necessary to ensure that contaminated soil and vapor do not migrate beyond the work area. VOC and particulate monitoring will be performed. "Upwind" concentrations will be measured to establish background concentrations. "Downwind" concentrations will be monitored halfway between the exclusion zone and the immediate work area. Air monitoring will focus on downwind areas, and will be adjusted as wind directions vary. A minimum of two CAMP enclosures will be utilized during ground disturbances; however, a third CAMP enclosure should be added if field conditions warrant it.

7.2 Dust and Odor Controls

Dust suppression techniques will be employed as necessary to limit fugitive dust generated in disturbed areas during remediation and redevelopment activities. Such techniques may be employed even if the community air monitoring results indicate that particulates levels are below action levels. No visible emissions will be permitted to leave the work area. Techniques may include, but are not limited to:

- Applying water on haul roads
- Wetting equipment and excavation surfaces with a water truck or hose
- Hauling materials in properly tarped or watertight containers
- Limiting vehicle speed on the Site
- Limiting the size of excavations
- Covering excavated areas and materials following excavation.

Odor suppression will be utilized if odors can be detected at the perimeter of the property or if ambient VOC air concentrations at the downwind perimeter of the work area persist at levels in excess of 5 parts per million above background levels for the15-minute average. If odors exceed the action criteria, a solution of BioSolve Pink Water will be sprayed directly onto newly exposed soil surfaces or stockpiles of contaminated material where volatilization is taking place. Biosolve creates a barrier that keeps vapors in the soil. For indoor work, VOCs will be monitored at the perimeter of the building

7.2.1 Action Levels and Responses

<u>VOC Monitoring, Response Levels, & Actions</u>

VOCs must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment

appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If total organic vapor levels exceed 5 parts per million (ppm) above background at the perimeter, work activities will be temporarily halted and monitoring continued. If levels decrease below 5 ppm above background, work activities will resume with continued monitoring.
2. If total organic vapor levels at the downwind perimeter persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level at half the distance to the nearest potential receptor or residential/commercial structure is below 5 ppm.
3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.
4. All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will be performed using real-time monitoring equipment 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 will 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.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m_3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.
2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m_3 of the upwind level and in preventing visible dust migration.

3. All readings will be recorded and be available for State (DEC and DOH) personnel to review.

7.3 Site Access

Access to all remedial work areas will be restricted. Temporary construction fencing will be erected around the southeast portion of the parking lot and potential staging areas to prevent unauthorized personnel from entering these areas (Figure 2).

7.4 Management of Derived Waste

Drill cuttings will be drummed and characterized for off-site disposal.

Development, purge, and decontamination water will be containerized in either 55-gallon drums secured within the site building or a portable storage tank pending waste characterization and disposal.

Table 7: Waste Removal and Imported Soil Quantities

Work Area	Quantity Removed/Imported	Number of trucks required for import/export per event
Area A	None	None
Area B	38 cy	2
Suspect Interior UST	tbd	tbd

7.5 Traffic Controls

Access gates will be placed at Chapin Street and West Avenue entrances; however ingress will preferentially occur from West Avenue, as the area of the Chapin Street/Area B portion of the parking lot will not accommodate the excavator, CAMP equipment, and an ingress/egress lane to support disposal trucks.

7.5.1 Off-Site Disposal

All transporters of contaminated soils from the Site must be properly permitted and registered to transport solid or hazardous waste. The following waste stream documentation will be kept for inclusion in the FER:

- Correspondence from the facility accepting the waste stream
- Waste profiles
- Waste characterization sampling and results
- Manifests
- Bills of Lading

- Weight tickets

7.6 Equipment Decontamination

To prevent cross-contamination to surrounding areas, vehicles (excavators, drill rigs, etc.) and equipment that contact contaminated material will be decontaminated prior to leaving the Site. A truck decontamination (decon) will be created onsite and the size will be large enough to accommodate the placement of equipment requiring decontamination.

Water utilized for decontamination will be containerized and handled in the same manner as construction water.

The tracking of Site soil/fill onto public streets will not be permitted, and provisions will be made to ensure that any material tracked offsite will be promptly cleaned up using street sweeping methods or other means.

7.7 Off-Site Trucking Routes & Emergency Procedures

Sub-contractors will enter and exit the Site from West Avenue.

Heavy truck traffic is not anticipated due to the small quantity of RA derived waste and materials to be imported to the Site for backfilling the UST excavation. No more than two disposal trucks will be required on any given day, therefore eliminating the need for truck staging and traffic controls.

It should be noted that the overhead clearance of the railroad bridge to the east of the West Avenue Site entrance is 10’6”. Waste disposal vehicles exceeding the height limit will have to alternatively approach the Site entrance from the west.

Emergency routes and procedures details are outlined in the Site specific Health & Safety Plan (HASP) provided in Appendix C.

8.0 QUALITY ASSURANCE PROJECT PLAN

The Site-specific Quality Assurance Project Plan (QAPP) outlines the procedures to be implemented during this RA, and is included in Appendix D. The key elements of the QAPP are summarized below.

8.1 Project Scope and Goals

The Quality Assurance Project Plan (QAPP) applies to the aspects of the project associated with the collection of field data, laboratory testing of field samples and QA/QC samples, and evaluation of the quality of data that is generated to determine that the RA objectives have been met.

8.2 Project Organization

Project Manager
Peter S. Morton, P.G., C.P.G.

Technical Staff
The technical staff (team members) for this project will be selected from a qualified pool of resources. The technical team staff will be utilized to gather and analyze data and to prepare various task reports and support materials. All of the designated technical team members are experienced professionals who possess the degree of specialization, training, and technical competence required to effectively and efficiently perform the required work.

8.3 Sampling Procedures

The samples will be collected by gloved hand and placed into laboratory supplied glass jars that meet Analytical Services Protocol (ASP) criteria. The jars will be labeled, recorded on a chain of custody form, placed into a sample cooler, and held on ice for transport to the laboratory. Samples will be received by the laboratory within 48 hours of sampling. The samples will be delivered under Chain of Custody procedures to a NYSDOH ELAP-certified laboratory.

Tables 8 and 9 outlines the Site-specific sampling plan:

Table 8: Sampling Plan-UST Pit Confirmatory Soil Sampling

Sample Location	Matrix	Proposed Number of Samples		Field Analysis	Sample Depth
		TCL & CP-51 VOCs	TCL & CP-51 SVOCs		
Area B Confirmatory Samples					
Excavation Walls[1]	Soil	4	4	PID/Visual	Based on Field Observations
Excavation Bottom[1]	Soil	1	1	PID/Visual	
Duplicate[2]	Soil	1	1	PID/Visual	
Matrix Spike[2]	Soil	1	1	N/A	
Matrix Spike Duplicate[2]	Soil	1	1	N/A	

[1]The proposed number of samples shown is the minimum number per 15 linear feet of the excavation wall.
[2]A duplicate, matrix spike, and matrix spike duplicate will be taken for every 20 samples

Table 9: Sampling Plan-UST Pit Groundwater Sampling

Sample Location	Matrix	Proposed Number of Samples		Field Analysis	Sample Depth
		TCL & CP-51 VOCs	TCL & CP-51 SVOCs		
Monitoring Wells (1st round to be completed 3 months after completion of UST removal)					
MW-R1	Groundwater	1	1	Temperature, Oxidation Reduction Potential (Orp) Dissolved Oxygen (DO), Specific Conductance, pH, turbidity	Middle of Screened Interval
MW-R2 (if installed)		1	1		
Duplicate		1	1		
Matrix Spike		1	1		
Matrix Spike Duplicate		1	1		
Trip Blank		1	1		
Monitoring Wells (2nd round to be completed 6 months after completion of UST removal)					
MW-R1	Groundwater	1	1	Temperature, Orp, DO, Specific Conductance, pH, turbidity	Middle of Screened Interval
MW-R2 (if installed)		1	1		
Duplicates		1	1		
Matrix Spikes		1	1		
Matrix Spike Duplicates		1	1		
Trip Blanks		1	1		

Notes:
1. VOCs to be analyzed by Method 8260
2. SVOCs to be analyzed by Method 8270
3. Reporting level: Category B

8.4 Reporting Requirements

8.4.1 Analytical Laboratory

Paradigm Environmental Services, Inc., a NYSDOH ELAP certified laboratory, will conduct all analytical laboratory testing.

8.4.2 Analytical Services Protocol

The laboratory will provide a NYSDEC ASP Category B Deliverables data package for all samples except the TO-15 samples (indoor air, outdoor air, sub-slab soil vapor). For the TO-15 samples, the laboratory will provide a data package using the ASP Category B format.

8.4.3 Data Usability Summary Reports

KR Applin Associates will prepare Data Usability Summary Reports (DUSRs) in accordance with the NYSDEC DER-10 Section 2.0. The findings of the DUSR(s) will be incorporated in analytical laboratory tables provided in the FER.

A DUSR will be completed for all ASP-B and ASP-B format laboratory data packages per DER-10. The DUSRs will include the laboratory data summary pages showing corrections made by the data validator. The laboratory data summary pages will be included even if no changes were made.

8.4.4 Electronic Data Deliverables

All data generated will be submitted in an electronic data deliverable (EDD) that complies with the DEC's Electronic Data Warehouse Standards (EDWS) or as otherwise directed by the NYSDEC Department of Environmental Remediation (DER) in accordance with DER-10 section 1.15.

9.0 SITE MANAGEMENT PLAN, INSTITUTIONAL, AND ENGINEERING CONTROLS

9.1 Institutional Control

Imposition of an institutional control in the form of an environmental easement will be prepared for the controlled property which will:

- Require the remedial party or site owner to complete and submit to the NYSDEC a periodic certification of institutional and engineering controls in accordance with Part 375-1.8(h)(3);
- Allow the use and development of the controlled property for restricted residential use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- Require compliance with the Department-approved Site Management Plan.

The environmental easement will be executed prior to DER approval of the FER.

9.2 Engineering Controls

The engineering controls to be installed at the Site are listed below and are discussed in more detail in Section 6.2 of this report.

- A sub-slab depressurization system
- A cover system

9.3 Site Management Plan

A SMP will be developed for the Site, and will begin with the issuance of the Certificate of Completion. The purpose of the SMP is to ensure the safe reuse of the Site where contamination will remain in place by managing residual soil impacts remaining at the Site, mitigating and monitoring soil vapor and indoor air contaminants, and to monitor groundwater impacts and restrict groundwater usage at the Site. This document will be developed and submitted for regulatory approval with the FER.

The SMP will include the following:

1. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

    - An Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination which exceeds Site SGCs
    - A provision for removal or treatment of the source area located under the existing on-site building if and when the building is demolished
    - Imposition of an Institutional Control in the form of an environmental easement for the controlled property which will require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3); Allow the use and development of the controlled property for restricted residential use, or commercial use or industrial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws; Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and require compliance with the Department approved Site Management Plan
    - A provision that should a building foundation or building slab be removed in the future, a cover system consistent with that described in Section 6.2.6 of this report will be placed in areas where the upper two feet of exposed surface soil exceed the applicable SCOs.
    - A provision for evaluation of the potential for soil vapor intrusion for any new buildings developed on the site including provision for implementing actions recommended to address exposures related to soil vapor intrusion
    - Provisions for the management and inspection of the identified engineering controls
    - Provisions for maintaining site access controls and Department notification, and
    - The steps necessary for the periodic reviews and certification of the institutional and/or engineering controls

2. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

   - Monitoring of soil, groundwater, sub-slab, and indoor air to assess the performance and effectiveness of the remedy
   - A schedule of monitoring and frequency of submittals to the Department
   - Monitoring for vapor intrusion for occupied existing or future buildings on the site, as may be required by the Institutional and Engineering Control Plan discussed above

3. An Operation and Maintenance (O&M) Plan to address continued operation, maintenance, inspection, and reporting of mechanical or physical components of the active vapor mitigation systems. The plan includes, but is not limited to:

   - Procedures for operating and maintaining the systems; and
   - Compliance inspection of the systems to ensure proper O&M, as well as providing the data for any necessary reporting.

10.0 SCHEDULE AND REPORTING

10.1 Schedule

Implementation of the RAWP is scheduled to begin within 30 days of NYSDEC approval of this RAWP.

The approved remedial action schedule can only be modified by approval from the NYSDEC.

10.2 Periodic Reporting

Monthly progress reports will be submitted in accordance with the BCP agreement until the Certificate of Completion is issued.

10.3 Site Management Plan/Institutional Controls

To allow for the time needed to receive validated data, the Draft SMP and FER will be completed and submitted to the NYSDEC within 60 days of completion of remedial activities. The Environmental Easement documentation will be submitted to the Clerk prior to submittal of the FER.

10.4 Final Engineering Report

The information and laboratory analytical data obtained during the remedy will be included in the FER. The FER will be completed in accordance with the DER-10.

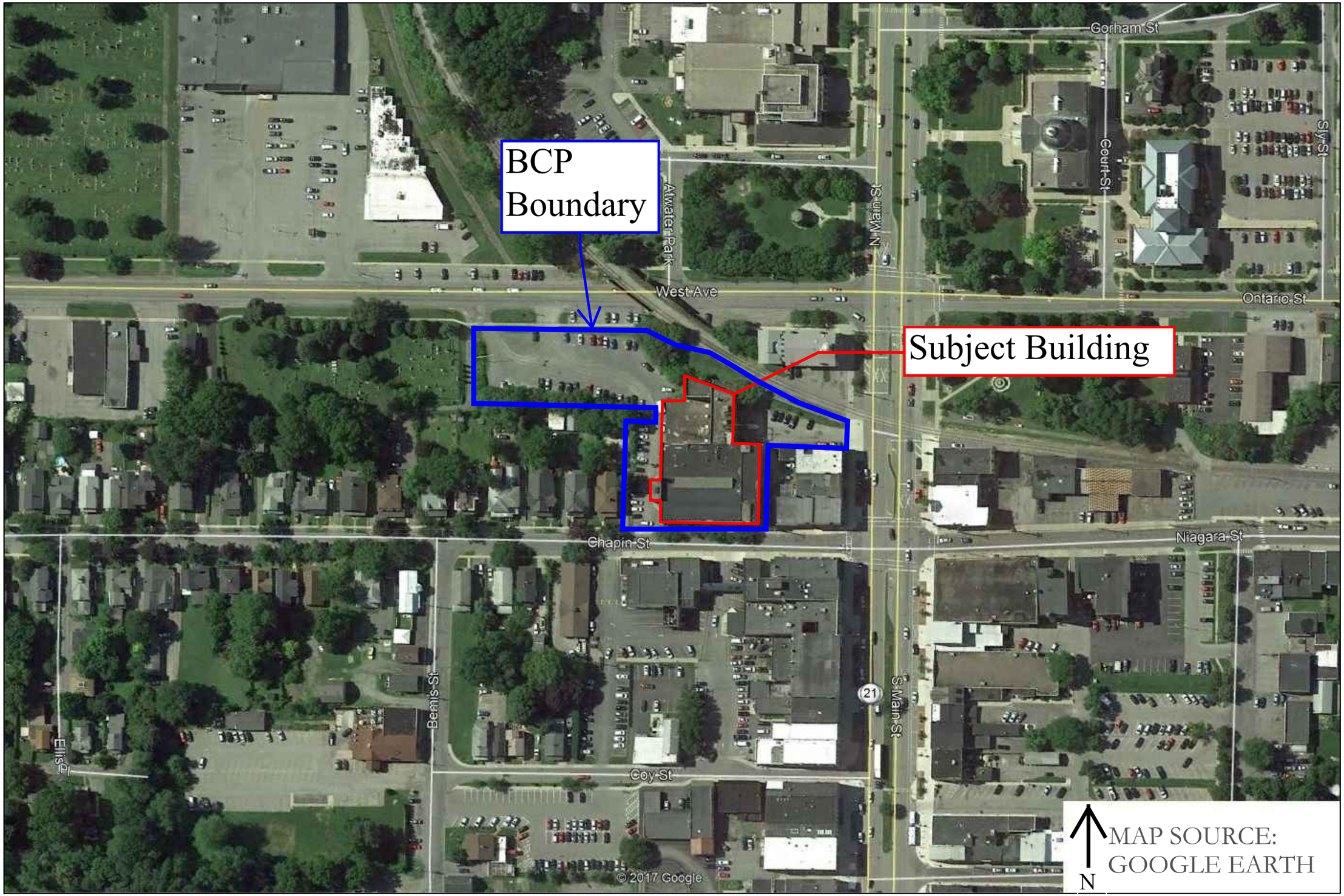


FIGURE 1: SITE MAP

REMEDIAL ACTION WORK PLAN: FORMER LABELON CORPORATION
10 CHAPIN STREET, CITY OF CANANDAIGUA, NEW YORK

DATE: DECEMBER 2017
DRAWN/CHECKED BY: CS/PM
SCALE: NOT TO SCALE
SOURCE: RAVI ENGINEERING & LAND SURVEYING, P.C.

RAVI ENGINEERING & LAND SURVEYING, P.C.

WEST AVENUE

WEST AVENUE
GATE ENTRANCE

RAILROAD BRIDGE HEIGHT CLEARANCE: 10'6"

SS03

TRUCK
DECON

TRUCK
TRAFFIC
PATTERN

PIPESTUB

APPROXIMATE AREA OF
PROPOSED SOIL COVER
INSTALLATION
1,650 SQ. FT.
122 CY

GRAVEL
PARKING

SCALE

PATCHED DRAINAGE
FEATURES

SUMPS
16"
24"
16"

MW-204S
MW-204D
SB-06R
MW-203S

DRAINAGE INLET

GP-43

COVERED
SUMP

PATCHED DRAINAGE
TRENCHES

SUSPECTED
UST

MW-202S
MW-202D

IN-SITU BARRIER
INSTALLATION

BR-01

STORAGE
ROOM

FORMER MACHINE
LOCATION PATCHES

AREA B
0.004 ACRES
173 SQ. FT.
38 CY (+/-)

STAIRWELL

MW-R1

AREA A
0.008 ACRES
370 SQ. FT.
82 CY (+/-)

MW-201D2

MW-201S
MW-201D

OVERHEAD
DOOR

STRUCTURAL
COLUMN (TYP)

MW-200S

0.085 ACRES
3,670 SQ. FT.
816 CY (+/-)

COVERED
SUMP

OUTLINE OF
CONCRETE PATCH

BURIED
PIPE

UST LOCATION

CHAPIN STREET
GATE ENTRANCE

CHAPIN STREET

LEGEND

- MONITORING WELL
- PROPOSED MONITORING WELL
- INJECTION POINT
- SURFICIAL SOIL SAMPLE
- SUPPORT COLUMN
- HIGH INTENSITY INJECTION
- LOW INTENSITY INJECTION
- TEST PIT
- UST LOCATION
- SOIL COVER
- >0.470 PPM (EXCEEDS PROTECTION OF GROUNDWATER - DASHED WHERE INFERRED)
- >21.0 PPM (EXCEEDS RESTRICTED RESIDENTIAL - DASHED WHERE INFERRED)
- TRENCH OR PATCHED FEATURE
- TRUCK TRAFFIC PATTERN
- TEMPORARY CONSTRUCTION FENCE

Date: Dec 2017. Revised 3-21-18

DRAWN/CHECKED BY: CS/PM

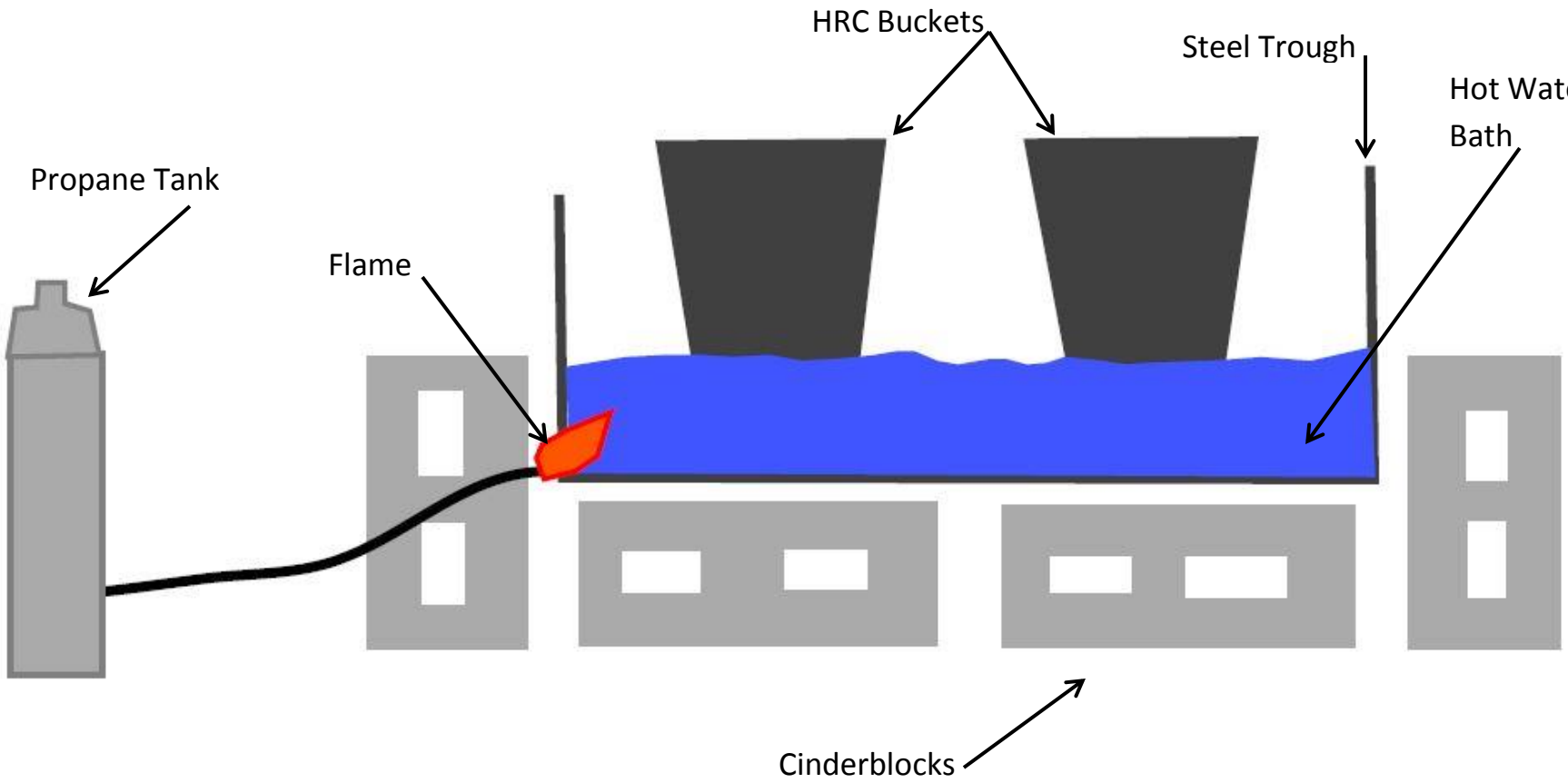
SCALE: NOT TO SCALE

SOURCE: MACDONALD LAND SURVEYING & ENGINEERING, D.P.C., A.A.R.; FIG. 9A

FIGURE 2: REMEDIAL PLAN

REMEDIAL ACTION WORK PLAN: FORMER LABELON CORPORATION
10 CHAPIN STREET, CITY OF CANANDAIGUA, ONTARIO COUNTY, NEW YORK

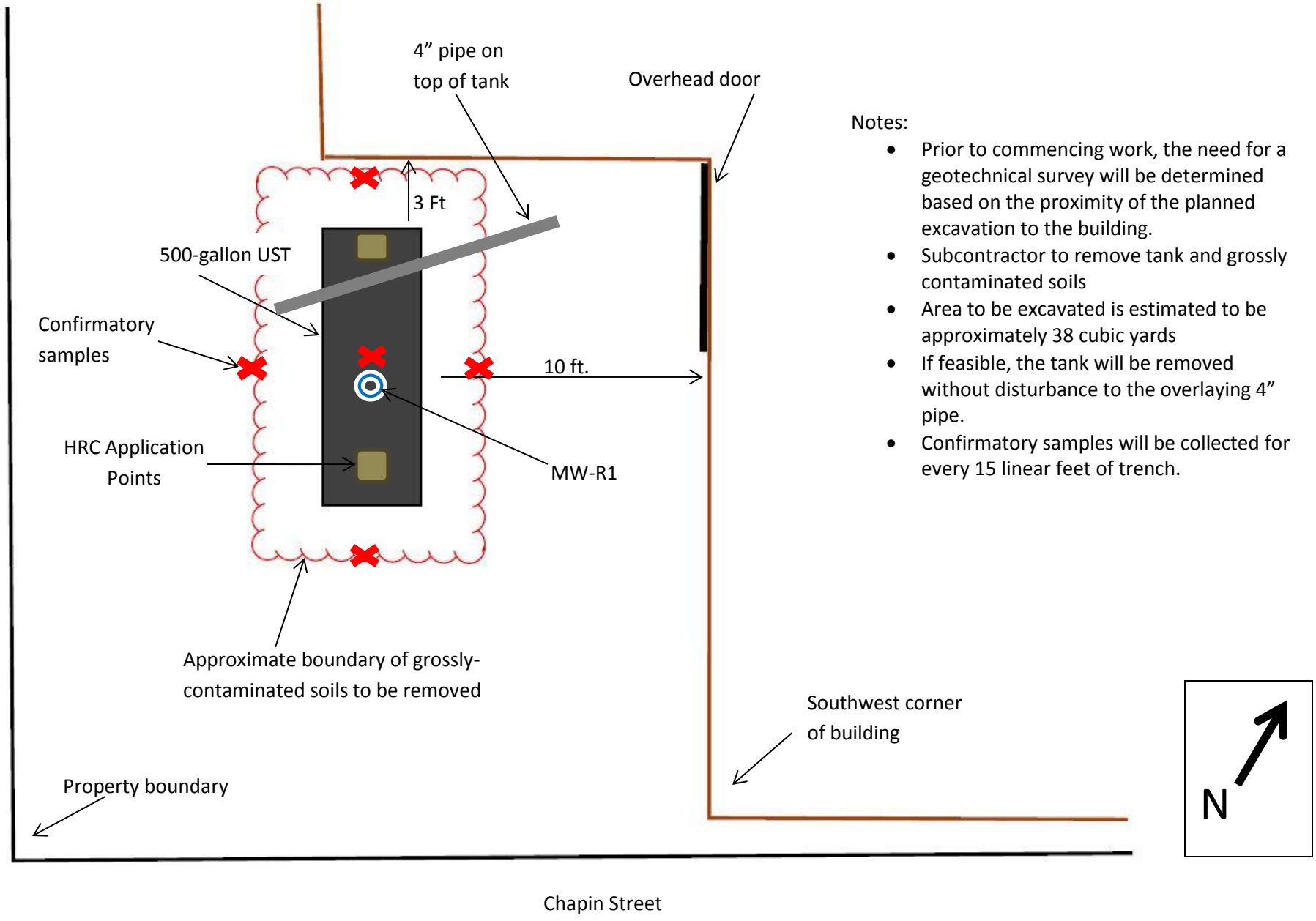
RAVI ENGINEERING & LAND SURVEYING, P.C.



RAVI ENGINEERING & LAND SURVEYING, P.C.
2110 S. CLINTON AVENUE, SUITE 1
ROCHESTER, NEW YORK 14618
TL: (585) 223-3660 FX (585) 697-1764

Figure 3: HRC Hot Water Bath Schematic
Remedial Action Work Plan
Former Labelon Corporation
NYSDEC BCP #C835016

PROJECT NO. 4517008 J	DATE: DEC 2017
SCALE: NTS	FIGURE NO. 3



Notes:

- Prior to commencing work, the need for a geotechnical survey will be determined based on the proximity of the planned excavation to the building.
- Subcontractor to remove tank and grossly contaminated soils
- Area to be excavated is estimated to be approximately 38 cubic yards
- If feasible, the tank will be removed without disturbance to the overlaying 4" pipe.
- Confirmatory samples will be collected for every 15 linear feet of trench.

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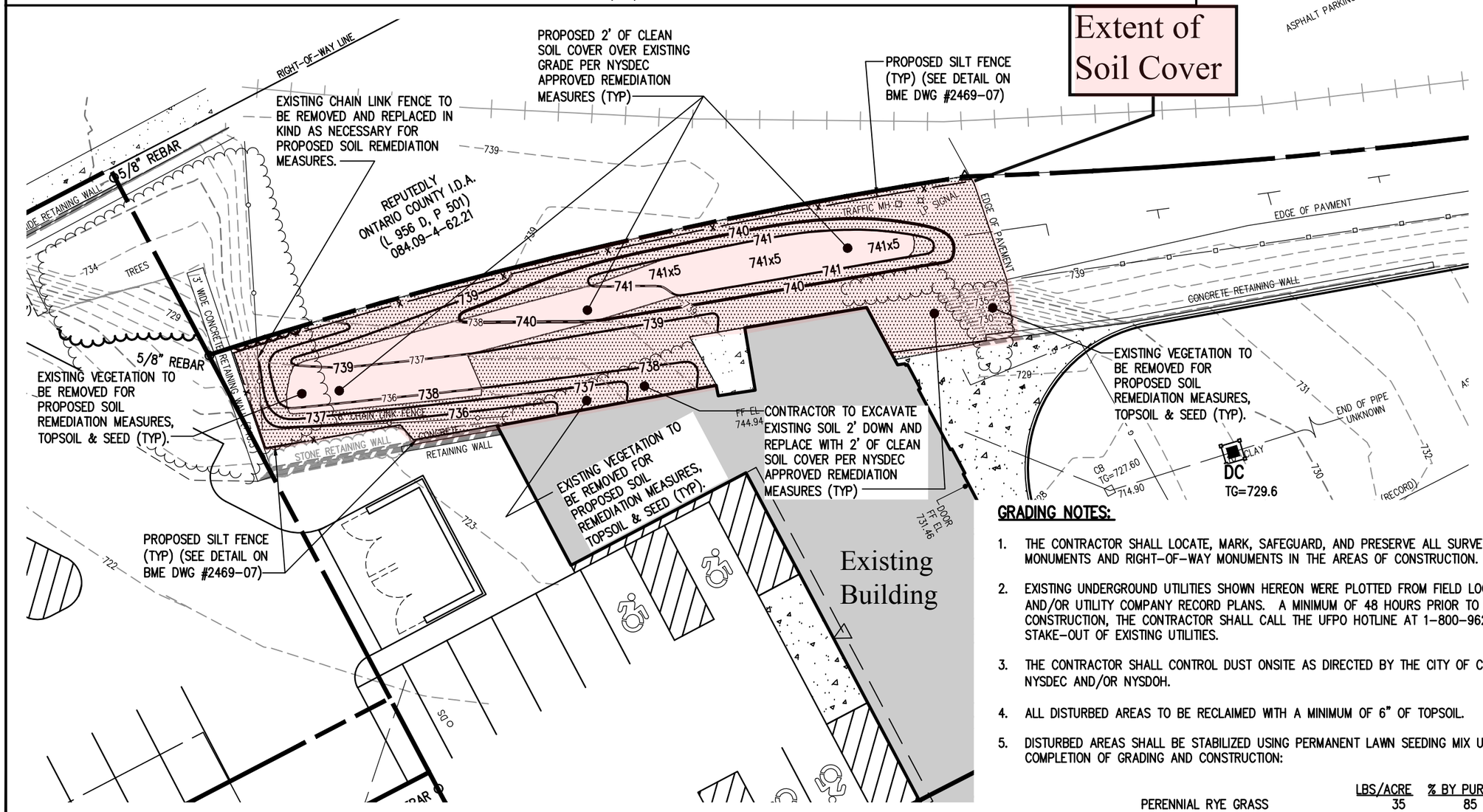
Figure 4 UST Excavation Plan
Remedial Action Work Plan
Former Labelon Corporation
NYSDEC BCP #C835016

PROJECT NO. 4517008 J	DATE: Dec 2017 Revised Mar 2018
Scale: NTS	Figure No: 4

Figure 5

LEGEND

- PROPERTY LINE
- PROPERTY MARKER FOUND
- EXISTING CONTOUR (336)
- PROPOSED CONTOUR (336)
- PROPOSED SPOT ELEVATION (336x5)
- CONTRACTOR TO EXCAVATE EXISTING SOIL 2' DOWN AND REPLACE WITH 2' OF CLEAN SOIL COVER PER NYSDEC APPROVED REMEDIATION MEASURES (TYP)
- PROPOSED SILT FENCT
- EXISTING BRUSH/TREE LINE
- PROPOSED BRUSH/TREE LINE
- EXISTING CHAIN LINK FENCE



SEE BME DWG #'s 2469-02 TO 2469-07 FOR APPROVED 10 CHAPIN STREET SITE PLANS, NOTES AND DETAILS

GRAPHIC SCALE

20 0 10 20 40

(IN FEET)

1 inch = 20 ft.

GRADING NOTES:

1. THE CONTRACTOR SHALL LOCATE, MARK, SAFEGUARD, AND PRESERVE ALL SURVEY CONTROL MONUMENTS AND RIGHT-OF-WAY MONUMENTS IN THE AREAS OF CONSTRUCTION.
2. EXISTING UNDERGROUND UTILITIES SHOWN HEREON WERE PLOTTED FROM FIELD LOCATIONS AND/OR UTILITY COMPANY RECORD PLANS. A MINIMUM OF 48 HOURS PRIOR TO ANY CONSTRUCTION, THE CONTRACTOR SHALL CALL THE UFPO HOTLINE AT 1-800-962-7962 FOR STAKE-OUT OF EXISTING UTILITIES.
3. THE CONTRACTOR SHALL CONTROL DUST ONSITE AS DIRECTED BY THE CITY OF CANANDAIGUA, NYSDEC AND/OR NYSDOH.
4. ALL DISTURBED AREAS TO BE RECLAIMED WITH A MINIMUM OF 6" OF TOPSOIL.
5. DISTURBED AREAS SHALL BE STABILIZED USING PERMANENT LAWN SEEDING MIX UPON COMPLETION OF GRADING AND CONSTRUCTION:

	LBS/ACRE	% BY PURITY	% GERM
PERENNIAL RYE GRASS	35	85	85
RED FESCUE	35	97	80
KENTUCKY BLUEGRASS	30	85	80

SEEDING RATE: 6.0 LBS PER 1,000 SQ FT.
MULCH: STRAW OR WOOD FIBER MULCH USED WITH HYDROSEEDING METHOD, AT TWO TONS PER ACRE WITH TACKIFIER
STARTING FERTILIZER: 5-10-10 AT 20 LBS PER SQ. FT

6. AN ORANGE SNOW FENCE (OR APPROVED EQUAL) DEMARCATION LAYER SHALL BE INSTALLED BENEATH THE PROPOSED SOIL COVER

SCALE: 1"=20'
DWG NO: 2469-12
DRAWN BY: RTD
LAST REVISED: 03-01-18 Revised 3-21-18 RE&LS

PROJECT: 10 CHAPIN STREET
LOCATION: CITY OF CANANDAIGUA, ONTARIO COUNTY, NEW YORK STATE
CLIENT: CANANDAIGUA CROSSROADS, LLC. 6225 CARMEL ROAD CHARLOTTE, N.C. 28226
DRAWING TITLE: SOIL COVER PLAN

BME ASSOCIATES
ENGINEERS • SURVEYORS • LANDSCAPE ARCHITECTS
10 LIFT BRIDGE LANE EAST
FAIRPORT, NEW YORK 14450
PHONE 585-377-7360
FAX 585-377-7309

RAVI ENGINEERING & LAND SURVEYING, P.C.

APPENDIX A

Regenesis Injection Calculations and Safety Data Sheets

REGENESIS

Project Info		
Labelon		
Canindagua, NY		
barrier 201		
Prepared For:		
Ravi Pete Morton		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Barrier Length	ft	50
Top Treat Depth	ft	5.0
Bot Treat Depth	ft	14.0
Vertical Treatment Interval	ft	9.0
Treatment Zone Volume	ft^3	6,750
Treatment Zone Volume	cy	250
Soil Type	---	silty sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	16,663
Treatment Zone Effective Pore Volume	gals	10,099
Fraction Organic Carbon (foc)	g/g	0.003
Soil Density	g/cm^3	1.6
Soil Density	lb/ft^3	100
Soil Weight	lbs	6.7E+05
Hydraulic Conductivity	ft/day	5.0
Hydraulic Conductivity	cm/sec	1.76E-03
Hydraulic Gradient	ft/ft	0.005
GW Velocity	ft/day	0.13
GW Velocity	ft/yr	46
Sources of Hydrogen Demand	**Unit**	**Value**
Dissolved Phase Contaminant Mass	lbs	1
Sorbed Phase Contaminant Mass	lbs	1
Competing Electron Acceptor Mass	lbs	13
Total Mass Contributing to H_2 Demand	**lbs**	**14**
Stoichiometric Demand	**Unit**	**Value**
Stoichiometric H_2 Demand	lbs	1
Stoichiometric HRC Demand	**lbs**	**40**
Engineering/Safety Factor	**--**	**2**
Application Dosing	**Unit**	**Value**
Plume Stop to be Applied	**lbs**	**4,400**
HRC to be Applied	**lbs**	**420**
BDI Plus to be Applied	**Liters**	**10**

PlumeStop® Application Design Summary

barrier 201	
Barrier Length (ft)	**50**
Spacing Within Barrier (ft)	7
Number of Lines	1
Application Points	**7**
Application Method	**Direct Push**
Top Application Depth (ft bgs)	5
Bottom Application Depth (ft bgs)	14
PlumeStop to be Applied (lbs)	**4,400**
PlumeStop per point (lbs)	629
PlumeStop per point (gals)	75
Mixing Water (gal)	**2,487**
Mixing Water (per pt)	355
Total Application Volume (gals)	**3,014**
Injection Volume per Point (gals)	431
Anaerobic Bioremediation - HRC	
HRC Application Points	**7**
HRC to be Applied (lbs)	**420**
HRC per point (lbs)	60
Total Application Volume (gals)	**39**
Injection Volume per Point (gals)	5.5
Bioagumentation - BDI Plus	
BDI Plus Application Points	**7**
BDI Plus to be Applied (Liters)	**4**
BDI Plus per point (Liters)	0.6

Field App Instructions

Technical Notes/Discussion

Prepared By: ***Name***

Date: ***12/22/2017***

Assumptions/Qualifications

In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.

REGENESIS

Project Info

Labelon
Canindagua, NY
Area A
Prepared For:
Ravi Pete Morton

Target Treatment Zone (TTZ) Info	Unit	Value
Treatment Area	ft^2	375
Top Treat Depth	ft	6.0
Bot Treat Depth	ft	12.0
Vertical Treatment Interval	ft	6.0
Treatment Zone Volume	ft^3	2,250
Treatment Zone Volume	cy	83
Soil Type	---	silty sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	5,554
Treatment Zone Effective Pore Volume	gals	3,366
Fraction Organic Carbon (foc)	g/g	0.003
Soil Density	g/cm^3	1.6
Soil Density	lb/ft^3	100
Soil Weight	lbs	2.2E+05
Hydraulic Conductivity	ft/day	10.0
Hydraulic Conductivity	cm/sec	3.53E-03
Hydraulic Gradient	ft/ft	0.005
GW Velocity	ft/day	0.25
GW Velocity	ft/yr	91

Sources of Hydrogen Demand	Unit	Value
Dissolved Phase Contaminant Mass	lbs	1
Sorbed Phase Contaminant Mass	lbs	2
Competing Electron Acceptor Mass	lbs	4
Total Mass Contributing to H_2 Demand	**lbs**	**8**

Stoichiometric Demand	Unit	Value
Stoichiometric H_2 Demand	lbs	0
Stoichiometric HRC Demand	**lbs**	**19**
Engineering/Safety Factor	--	**2**

Application Dosing	Unit	Value
Plume Stop to be Applied	**lbs**	**0**
HRC to be Applied	**lbs**	**320**
BDI Plus to be Applied	**Liters**	**8**

PlumeStop® Application Design Summary

Area A High Intensity Area	
Application Method	**Direct Push**
Spacing Within Rows (ft)	7
Spacing Between Rows (ft)	7
Application Points	**8**
Areal Extent (square ft)	375
Top Application Depth (ft bgs)	6
Bottom Application Depth (ft bgs)	12
PlumeStop to be Applied (lbs)	**0**
PlumeStop per point (lbs)	0
PlumeStop per point (gals)	0
Mixing Water (gal)	**0**
Mixing Water (per pt)	0
Total Application Volume (gals)	**0**
Injection Volume per Point (gals)	0
Anaerobic Bioremediation - HRC	
HRC Application Points	**8**
HRC to be Applied (lbs)	**320**
HRC per point (lbs)	40
Total Application Volume (gals)	**29**
Injection Volume per Point (gals)	3.7
Bioaugmentation - BDI Plus	
BDI Plus Application Points	**8**
BDI Plus to be Applied (Liters)	**8**
BDI Plus per point (Liters)	1.0

Field App Instructions

Technical Notes/Discussion

Prepared By: ***Name***
Date: ***12/22/2017***

Assumptions/Qualifications

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REGENESIS

Project Info

Labelon
Canindagua, NY
Area B
Prepared For:
Ravi Pete Morton

Target Treatment Zone (TTZ) Info	Unit	Value
Treatment Area	ft^2	3,600
Top Treat Depth	ft	6.0
Bot Treat Depth	ft	12.0
Vertical Treatment Interval	ft	6.0
Treatment Zone Volume	ft^3	21,600
Treatment Zone Volume	cy	800
Soil Type	---	silty sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	53,321
Treatment Zone Effective Pore Volume	gals	32,316
Fraction Organic Carbon (foc)	g/g	0.003
Soil Density	g/cm^3	1.6
Soil Density	lb/ft^3	100
Soil Weight	lbs	2.2E+06
Hydraulic Conductivity	ft/day	10.0
Hydraulic Conductivity	cm/sec	3.53E-03
Hydraulic Gradient	ft/ft	0.005
GW Velocity	ft/day	0.25
GW Velocity	ft/yr	91

Sources of Hydrogen Demand	Unit	Value
Dissolved Phase Contaminant Mass	lbs	2
Sorbed Phase Contaminant Mass	lbs	4
Competing Electron Acceptor Mass	lbs	40
Total Mass Contributing to H_2 Demand	**lbs**	**46**

Stoichiometric Demand	Unit	Value
Stoichiometric H_2 Demand	lbs	3
Stoichiometric HRC Demand	**lbs**	**128**
Engineering/Safety Factor	--	**2**

Application Dosing	Unit	Value
Plume Stop to be Applied	**lbs**	**0**
HRC to be Applied	**lbs**	**900**
BDI Plus to be Applied	**Liters**	**7**

PlumeStop® Application Design Summary

Area A: Low Intensity Area

Application Method	**Direct Push**
Spacing Within Rows (ft)	17
Spacing Between Rows (ft)	30
Application Points	**7**
Areal Extent (square ft)	3,600
Top Application Depth (ft bgs)	6
Bottom Application Depth (ft bgs)	12
PlumeStop to be Applied (lbs)	**0**
PlumeStop per point (lbs)	0
PlumeStop per point (gals)	0
Mixing Water (gal)	**0**
Mixing Water (per pt)	0
Total Application Volume (gals)	**0**
Injection Volume per Point (gals)	0
Anaerobic Bioremediation - HRC	
HRC Application Points	**7**
HRC to be Applied (lbs)	**900**
HRC per point (lbs)	129
Total Application Volume (gals)	**83**
Injection Volume per Point (gals)	11.8
Bioaugmentation - BDI Plus	
BDI Plus Application Points	**7**
BDI Plus to be Applied (Liters)	**7**
BDI Plus per point (Liters)	1.0

Field App Instructions

Technical Notes/Discussion

Prepared By: ***Name***
Date: ***12/22/2017***

Assumptions/Qualifications

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REGENESIS

Project Info

Labelon
Canindagua, NY
excavation
Prepared For:
Ravi Pete Morton

Target Treatment Zone (TTZ) Info	Unit	Value
Treatment Area	ft^2	240
Top Treat Depth	ft	6.0
Bot Treat Depth	ft	12.0
Vertical Treatment Interval	ft	6.0
Treatment Zone Volume	ft^3	1,440
Treatment Zone Volume	cy	53
Soil Type	---	silty sand
Porosity	cm^3/cm^3	0.33
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	3,555
Treatment Zone Effective Pore Volume	gals	2,154
Fraction Organic Carbon (foc)	g/g	0.003
Soil Density	g/cm^3	1.6
Soil Density	lb/ft^3	100
Soil Weight	lbs	1.4E+05
Hydraulic Conductivity	ft/day	10.0
Hydraulic Conductivity	cm/sec	3.53E-03
Hydraulic Gradient	ft/ft	0.005
GW Velocity	ft/day	0.25
GW Velocity	ft/yr	91

Sources of Hydrogen Demand	Unit	Value
Dissolved Phase Contaminant Mass	lbs	0
Sorbed Phase Contaminant Mass	lbs	0
Competing Electron Acceptor Mass	lbs	3
Total Mass Contributing to H_2 Demand	**lbs**	**3**

Stoichiometric Demand	Unit	Value
Stoichiometric H_2 Demand	lbs	0
Stoichiometric HRC Demand	**lbs**	**9**
Engineering/Safety Factor	--	**2**

Application Dosing	Unit	Value
Plume Stop to be Applied	**lbs**	**0**
HRC to be Applied	**lbs**	**150**
BDI Plus to be Applied	**Liters**	**5**

PlumeStop® Application Design Summary

Area B Excavation	
Application Method	**excavation**
Spacing Within Rows (ft)	16
Spacing Between Rows (ft)	15
Application Points	**1**
Areal Extent (square ft)	240
Top Application Depth (ft bgs)	6
Bottom Application Depth (ft bgs)	12
PlumeStop to be Applied (lbs)	**0**
PlumeStop per point (lbs)	0
PlumeStop per point (gals)	0
Mixing Water (gal)	**0**
Mixing Water (per pt)	0
Total Application Volume (gals)	**0**
Injection Volume per Point (gals)	0
Anaerobic Bioremediation - HRC	
HRC Application Points	**1**
HRC to be Applied (lbs)	**150**
HRC per point (lbs)	150
Total Application Volume (gals)	**14**
Injection Volume per Point (gals)	13.8
Bioaugmentation - BDI Plus	
BDI Plus Application Points	**1**
BDI Plus to be Applied (Liters)	**5**
BDI Plus per point (Liters)	5.0

Field App Instructions

Technical Notes/Discussion

Apply HRC and BDI to bottom of excavation

Prepared By: ***Name***
Date: ***12/22/2017***

Assumptions/Qualifications

In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.

HYDROGEN RELEASE COMPOUND

HRC® Technical Description

HRC® is an engineered, hydrogen release compound designed specifically for enhanced, *in situ* anaerobic bioremediation of chlorinated compounds in groundwater or highly saturated soils. Upon contact with groundwater, this viscous, polylactate ester material becomes hydrated and subject to microbial breakdown producing a controlled-release of hydrogen for periods of up to 18-24 months on a single application.

Example of HRC

HRC enables enhanced anaerobic biodegradation by adding hydrogen (an electron donor) to groundwater and/or soil to increase the number and vitality of indigenous microorganisms able to perform the naturally occurring process of enhanced reductive dechlorination. During this process, certain naturally occurring microorganisms replace chlorine atoms on chlorinated contaminants with the newly available hydrogen effectively reducing the contaminant to a less harmful substance with the preferred and innocuous endpoints of ethene or ethane.

For a list of treatable contaminants with the use of HRC, view the Range of Treatable Contaminants Guide.

Chemical Composition

- Glycerol Tripolylactate- CAS #201167-72-8
- Glycerin- CAS #56-81-5
- Lactic acid- CAS #50-21-5

Properties

- pH - 3 (10% solution/water)
- Appearance – Viscous gel/liquid. Amber color
- Odor – Odorless

Storage and Handling Guidelines

Storage
Store away from incompatible materials
Store in original tightly closed container
Store in a cool, dry, well-ventilated place

Handling
Wash thoroughly after handling
Wear appropriate personal protective equipment
Wear eye/face protection
Provide adequate ventilation
Observe good industrial hygiene practices

HYDROGEN RELEASE COMPOUND

HRC® Technical Description

Applications

- Permanent injection wells
- Direct-push injection (barriers and grids)
- Recirculating wells
- Soil borings
- Excavation applications into soil or on top of bedrock
- Gravity feed into bedrock wells

Application instructions for this product are contained in the HRC Application Instructions.

Health and Safety

Avoid contact with eyes, skin, and clothing. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.

Please review the HRC Safety Data Sheet for additional storage, usage, and handling requirements.

REGENESIS®

Corporate Headquarters
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

European Headquarters
The Tramshed, Beehive Yard
Walcot St, Bath BA1 5BB, United Kingdom

BDI PLUS® Technical Description

Bio-Dechlor INOCULUM Plus (BDI PLUS®) is an enriched natural consortium containing species of Dehalococcoides sp. (DHC). BDI PLUS has been shown to simulate the rapid and complete dechlorination of chlorinated solvents such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE) and vinyl chloride (VC) to non-toxic end products, ethene, carbon dioxide and water.

The culture also contains microbes capable of dehalogenating halomethanes (e.g., carbon tetrachloride and chloroform) and haloethanes (e.g., 1,1,1-TCA and 1,1-DCA) as well as mixtures of these contaminants.

Species of Dehalococcoides sp. (DHC)

For a list of treatable contaminants with the use of BDI PLUS, view the Range of Treatable Contaminants Guide

Chemical Composition

- Non-hazardous, naturally-occurring, non-altered anaerobic microbes and enzymes in a water-based medium.

Properties

- Appearance – Murky, yellow to grey water
- Odor – Musty
- pH 6.0 to 8.0
- Density – Approximately 1.0 grams per cubic centimeter (0.9 to 1.1 g/cc)
- Solubility – Soluble in Water
- Vapor Pressure – None
- Non-hazardous

Storage and Handling Guidelines

Storage
Store in original tightly closed container
Store away from incompatible materials
Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass
Store in a cool, dry area at 4-5°C (39 - 41°F)
Material may be stored for up to 3 weeks at 2-4°C without aeration

Handling
Avoid prolonged exposure
Observe good industrial hygiene practices
Wear appropriate personal protective equipment

BIO-DECHLOR INOCULUM

BDI PLUS® Technical Description

Applications

- BDI PLUS is delivered to the site in liquid form and is designed to be injected directly into the saturated zone requiring treatment.
- Most often diluted with de-oxygenated water prior to injection into either hydraulic push injection points or properly constructed injection wells.
- The typical dilution rate of the injected culture is 10 gallons of deoxygenated water to 1 liter of standard BDI PLUS culture.

Application instructions for this product are contained here BDI PLUS Application Instructions.

Health and Safety

Material is non-hazardous and relatively safe to handle; however avoid contact with eyes and prolonged contact with skin. OSHA Level D personal protection equipment including: vinyl or rubber gloves and safety goggles or a splash shield are recommended when handling this product. An eyewash station is recommended. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: BDI PLUS SDS.

REGENESIS

www.regenesis.com
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

PlumeStop® Liquid Activated Carbon™ Technical Description

PlumeStop Liquid Activated Carbon is an innovative groundwater remediation technology designed to rapidly remove and permanently degrade groundwater contaminants. PlumeStop is composed of very fine particles of activated carbon (1-2µm) suspended in water through the use of unique organic polymer dispersion chemistry. Once in the subsurface, the material behaves as a colloidal biomatrix, binding to the aquifer matrix, rapidly removing contaminants from groundwater, and expediting permanent contaminant biodegradation.

This unique remediation technology accomplishes treatment with the use of highly dispersible, fast-acting, sorption-based technology, capturing and concentrating dissolved-phase contaminants within its matrix-like structure. Once contaminants are sorbed onto the regenerative matrix, biodegradation processes achieve complete remediation at an accelerated rate.

Distribution of PlumeStop in water

To see a list of treatable contaminants with the use of PlumeStop, view the Range of Treatable Contaminants Guide.

Chemical Composition

- Water - CAS# 7732-18-5
- Colloidal Activated Carbon ≤2.5 - CAS# µm 7440-44-0
- Proprietary Additives

Properties

- Physical state: Liquid
- Form: Aqueous suspension
- Color: Black
- Odor: Odorless
- pH: 8 - 10

Storage and Handling Guidelines

Storage
Store in original tightly closed container
Store away from incompatible materials
Protect from freezing

Handling
Avoid contact with skin and eyes
Avoid prolonged exposure
Observe good industrial hygiene practices
Wash thoroughly after handling
Wear appropriate personal protective equipment

PlumeStop® Liquid Activated Carbon™ Technical Description

Applications

PlumeStop is easily applied into the subsurface through gravity-feed or low-pressure injection.

Health and Safety

Wash hands after handling. Dispose of waste and residues in accordance with local authority requirements. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: PlumeStop SDS.

REGENESIS

www.regenesis.com
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

APPENDIX B

NYSDEC Request to Import/Reuse Fill Form (From DER-10)

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e). Use of this form is not a substitute for reading the applicable Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that would pass a size 80 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

Revised August 2014

RAVI ENGINEERING & LAND SURVEYING, P.C.

APPENDIX C

Health and Safety Plan

Site Health and Safety Plan

Location:

Former Labelon Corporation Facility
10 Chapin Street
City of Canandaigua
Ontario County, New York
NYSDEC Site #C835016

Prepared by:

Ravi Engineering & Land Surveying, P.C.
2110 South Clinton Avenue Suite 1
Rochester New York 14618

December 2017
Revised March 21, 2018

Table of Contents

PROJECT REFERENCE SHEET

Project Title:	Former Labelon Corporation Facility
Project Number:	45-17-008 J
Project Location (Site):	10 Chapin Street, Canandaigua, New York
Project Manager:	Peter S. Morton, P.G., C.P.G.
Field Geologist:	Lynn Zicari
Field Geologist:	Jeremy Kilbury
Site Safety Supervisor:	Geoffrey Bijak, M.S.
Site Contact:	Kevin Kane
Safety Director:	Geoffrey Bijak, M.S.
Proposed Date(s) of Field Work	April 2018 thru September 2018

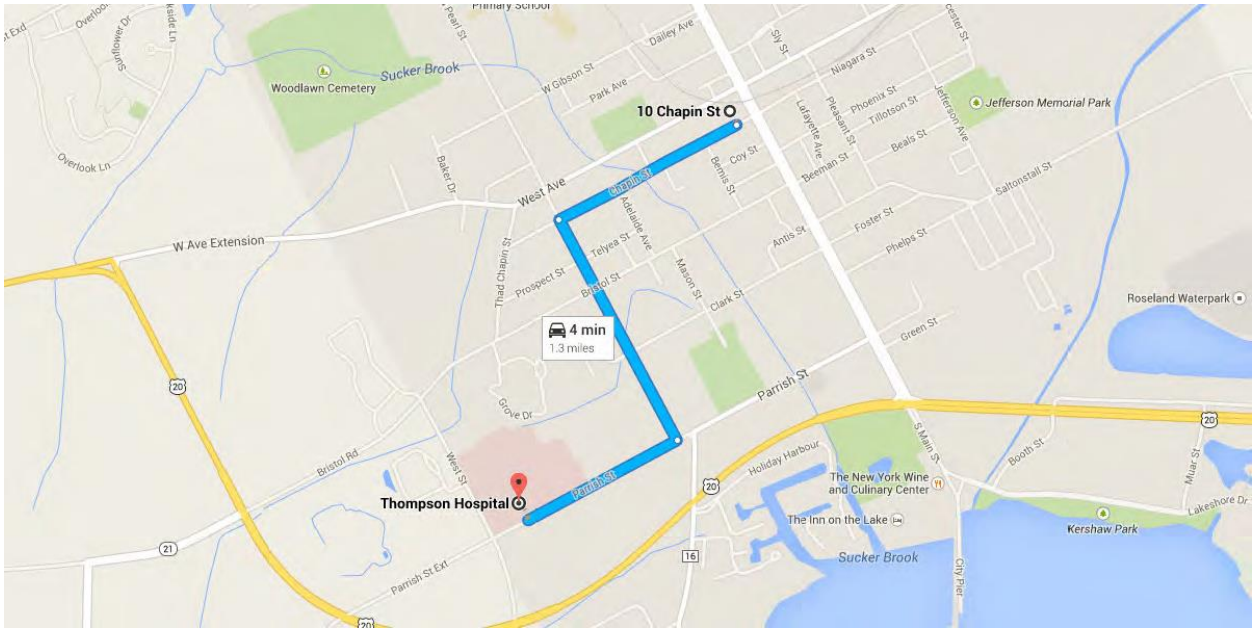
EMERGENCY CONTACTS

Name		Phone Number
Ambulance:	As Per Emergency Service	911
Hospital Emergency:	Thompson Hospital	911
Poison Control		911
Police (local, state):		911
Fire Department:		911
Agency Contact:	NYSDEC – Danielle Miles	585-226-5349
Project Manager:	Peter S. Morton, P.G., C.P.G.	585-697-2806
Site Safety Supervisor:	Geoffrey Bijak, M.S.	585-690-6485
10 Chapin Street Contact:	Kevin Kane	315-263-3687

MAP AND DIRECTIONS TO UR THOMPSON HOSPITAL 350 PARRISH STREET, CANANDAIGUA, NEW YORK

10 Chapin St, Canandaigua, NY 14424

1. Head southwest on Chapin St. toward Bemis Street. 0.4 mi.
2. Turn left onto South Pearl Street. 0.5 mi.
3. Turn right onto Parrish Street 0.4 mi.
4. Destination will be on the right.



Estimated Time:4 minutes / Estimated Distance: 1.3 miles

1.0 INTRODUCTION

The purpose of this Health and Safety Plan (HASP) is to provide guidelines for responding to potential health and safety issues that may be encountered during the subsurface investigation activities at the Former Labelon Corporation Facility located at 10 Chapin Street (see Figure 1).

This HASP may need to be modified to reflect the policies of the actual firm and personnel retained to implement the subsurface investigation if health and safety concerns are identified that are not included in this investigation. The requirements of this HASP are applicable to all approved personnel and their authorized visitors at the work site. In addition, the personnel that may occupy the buildings in the vicinity of the work area should also be aware of potential concerns relating to the remedial investigation. The provisions of the HASP do not replace or supersede any regulatory requirements of the USEPA, NYSDEC, OSHA or and other regulatory body.

This HASP only applies to work activities at 10 Chapin Street, Canandaigua New York.

1.2 Site Location and Conditions

The Former Labelon Corporation Facility is located at 10 Chapin Street, in the City of Canandaigua, Ontario County, New York and encompasses 1.63 acres. The Site contains an 80,000 square foot, 4-story vacant manufacturing building. The Site is bordered to the east and south by commercial properties and by residential neighborhoods to the north and west. Historic usage of the Site includes a coal yard, a corset factory, and a bicycle factory. Most recently Labelon Corporation occupied the Site from approximately 1960 to 2002 and manufactured transparency films and pressure sensitive labels. A full description of the Site history is detailed in the RI Work Plan.

2.0 RESPONSIBILITIES

This HASP presents guidelines to minimize the risk of injury, to project personnel, and to provide rapid response in the event of injury. The HASP is applicable only to activities of approved personnel and their authorized visitors. The Project Manager shall implement the provisions of this HASP for the duration of the project. It is the responsibility of employees to follow the requirements of this HASP, and all applicable company safety procedures. Ravi Engineering & Land Survey, P.C. (RE&LS) staff is required to review the HASP prior to conducting work at the project site. Listed below are RE&LS project personnel and their responsibilities with regard to the project:

Peter S. Morton, P.G., C.P.G. – Project Manager
Direct: 585-697-2806 Cell: 585-645-8295

Geoffrey Bijak, M.S., - RE&LS Health and Safety Supervisor
Direct: 585-697-2805 Cell: 585-690-6485

Lynn Zicari, Site Safety Supervisor
Direct: 585-697-2071 Cell: 585-506-6975

Mr. Morton is responsible for direct oversight and implementation of the project and HASP. Mr. Morton will be interacting directly with field personnel.

Mr. Bijak is responsible for implementation of the HASP. Any changes to this HASP must be approved of by Mr. Bijak.

Ms. Zicari is responsible for implementation of the HASP during remedial activities. Ms. Zicari will notify the Project Manager regarding all HASP issues during the project.

3.0 ACTIVITIES COVERED

The activities covered under this HASP include the following:

1. Management of subsurface/UST investigation activities;
2. Environmental Monitoring;
3. Collection of samples; and
4. Management of derived wastes.

4.0 WORK AREA ACCESS AND SITE CONTROL

RE&LS is working at the site on behalf of Canandaigua Crossroads, LLC which is the owner of the Site. RE&LS is not responsible for individuals not employed by RE&LS accessing the site, but will make a reasonable effort to maintain a 20 foot buffer around the work area where remedial activities are taking place. RE&LS will work with the caretaker of the property in an effort to prevent individuals not involved in the project from entering the work area. A daily sign in/sign out sheet will be required to be completed for RE&LS employees and its contractors working at the Site. A copy of the sign in/sign out is included in Appendix G. Also included in Appendix G is a compliance sheet that each RE&LS personnel is required to sign indicating they were informed of health and safety issues at the work site.

5.0 POTENTIAL HEALTH AND SAFETY HAZARDS

This section lists some potential health and safety hazards that project personnel may encounter at the project site and some actions to be implemented by approved personnel to control and reduce the associated risk to health and safety. This is not intended to be a complete listing of any and all potential health and safety hazards. New or different hazards may be encountered as site environmental and site work conditions change.

5.1 Chemical Hazards

Chemical hazards or potential chemicals of concern (COC) are associated with the historical use of the site. The potential COCs include, petroleum related compounds, solvents, metals, polychlorinated biphenyls (PCBs) asbestos and lead paint.

These potential COCs relate to inhalation, ingestion, and dermal exposure to workers at the site. Although it is anticipated that exposure to unprotected works is low, monitoring equipment and handling procedures shall be used during intrusive activities conducted at the site. It is understood that RE&LS will maintain equipment at the site to monitor for volatile organic compounds (VOCs) at the site during work activities. RE&LS will make an effort to communicate to notify workers at the site if monitoring equipment indicates exposures to chemical hazards. Where necessary, personal protective equipment will be specified for that job task.

5.2 Physical and Environmental Hazards

Physical hazards at the site are primarily associated with drilling and associated equipment, moving of vehicles, and site conditions. These conditions present slip and fall hazards, crushing hazards, cuts on debris, slippery and irregular unsafe surfaces, and getting struck by heavy machinery. Personnel should inspect working surfaces prior to moving equipment throughout the site. Unsafe surface shall be marked with highly visible material.

Weather related hazards include sunburns, heat and cold stress, lighting, rain, snow, ice, etc. Personnel should be aware of the weather forecast each day and maintain the appropriate apparel and protective equipment for the weather.

5.3 Hazard Control

Environmental, health and safety hazards shall be addressed using engineering controls first. Where engineering controls cannot be used to eliminate the hazards, personal protective equipment will be specified based on PID readings. It is anticipated that Level D personnel protective equipment (PPE) will be worn and provide enough protection for each task during the project. Sample collection and handling will be performed using nitrile 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.

6.0 PERSONNEL TRAINING AND PROTECTION

6.1 Personnel Training Requirements

RE&LS personnel performing subsurface investigation activities at the site must have completed the 40-hour requirements of 29 CFR 1910.120 hazardous waste operations and emergency response and completed an 8-hour refresher course within one year of the work completed at the site.

RE&LS personnel are required to review this HASP prior to completing work at the site. The RE&LS Project Manager or another RE&LS personnel identified by the Project Manager shall review the HASP with each RE&LS employee working at the site.

6.2 Personnel Protection

Level D PPE will be used during field activities associated with completing the subsurface investigation at the site. Level D protection at the site includes the use of:

1. Hard hats;
2. Safety glasses;
3. Steel toe boots with metal shank;
4. Hearing protection when noises hinder hearing above speaking level; and
5. Nitrile chemical resistant gloves are required for sampling, and resistant Kevlar gloves may be necessary if handling fill materials that contain sharp edges (e.g. glass).

PPE may be upgraded based on observations by RE&LS field personnel, the Project Manager, or the RE&LS Health and Safety Supervisor. If respirators are used at the site, personnel are required to be properly trained, fit tested, medically approved, and use National Institute of Occupational Safety and Health (NIOSH) approved equipment.

If personnel are aware of a potential failure to PPE, personnel are required to stop and leave the work area immediately. If necessary the Project Manager or RE&LS Health and Safety Supervisor will be notified regarding the failure and make a decision whether the failure has affected the health and safety of workers where action should be taken. The Project Manager or RE&LS Health and Safety Supervisor will make the determination whether work shall continue when the PPE failure has been identified and repaired.

6.3 Medical Surveillance

RE&LS implements a Medical Surveillance Program (MSP) in accordance with 29 CFR 1910.120. The purpose of the MSP is to provide for the protection of RE&LS personnel, and to fulfill OSHA regulatory compliance requirements. OSHA mandates protection for employees with possibly hazardous exposures under the "general duty clause" and specific substance standards. The content and services of the MSP are consistent with applicable federal and state regulations, OSHA regulations, and NIOSH recommendations.

7.0 AIR MONITORING

According to 29 CFR 1910.120(h), air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection required for personnel working onsite. Air monitoring instruments will be calibrated and maintained in accordance with the manufacturer's specifications.

RE&LS personnel will utilize a RAE Systems MiniRae Meter, or equivalent, that is capable to screen the ambient air in the work areas for total VOCs.

7.1 Personal Air Monitoring

Personal air monitoring will consist of continuous monitoring of VOCs, with Rae Systems MiniRae Meter. The air monitoring equipment will be programmed to identify personnel of action levels are exceeded. The following readings will be utilized for action levels at the site:

- PID readings of >5 ppm to 10 ppm above background in the breathing zone, sustained for >1 minute.

  Action: Halt work activities and move away from the vapor source. Consider vapor suppression actions. If PID readings drop to within 5 ppm above background, work may resume with continuous air monitoring.

- PID readings of 10 ppm to <25 ppm above background at breathing zone, sustained for > 1 minute.

  Action: Stop work and upgrade to Level C protection (use of respirators).

- PID readings of >25 ppm above background at breathing zone, sustained for >1 minute.

  Action: Stop work.

Air monitoring results as well as wind direction and speed (estimates) will be documented in the Site-specific log book.

If any of the above readings are exceeded in the breathing zone, personnel are to leave the work area until satisfactory readings are obtained. Approved personnel may re-enter the work areas wearing an appropriate type of NIOSH approved respirator. Personnel are required to notify the Project Manager.

7.2 Site Perimeter Monitoring

Site perimeter monitoring will be conducted during ground intrusive activities at the Site. Monitoring will be completed for particulates and VOCs. The following sustained readings will be utilized for action levels at the site:

- Total Volatile Organics – measured with a MiniRae PID: 5.0 part per million (ppm) per 15-minute running average.

- Dust – measured with a Dust Track: 0.1 mg/m^3 above background (upwind) conditions per 15-minute running average.

If site perimeter or downwind measurements above background reach or exceed the action level, work should be immediately stopped and measures taken to reduce the airborne concentrations of contaminants and/or dust (e.g., watering the work area). In addition, if the downwind readings above action levels persist consistently for a 15 minute period, persons downwind of the Site should be evacuated via routes perpendicular to the wind direction and emergency response crews should be contacted.

8.0 PERSONNEL DECONTAMINATION PROCEDURES

Upon leaving the work area, approved personnel shall decontaminate footwear as needed. Under normal work conditions, detailed personal decontamination procedures will not be necessary. Work clothing may become contaminated in the event of an unexpected splash or spill or contact with contaminated substances. Minor splashes on clothing and footwear can be cleaned with soap and water. Heavily contaminated clothing should be removed and disposed of if it cannot be cleaned with soap and water. Personnel assigned to this project should be prepared with a change of clothing whenever on site.

9.0 EMERGENCY ACTION PLAN

In the event of an emergency, employees are to turn off and shut down all powered equipment and leave the work areas immediately. Employees are to walk or drive out of the Site as quickly as possible and wait at the assigned safe area.

The assigned safe area will be the Chapin Street entrance.

Employees are not authorized or trained to provide rescue and medical efforts. Rescue and medical efforts will be provided by local authorities.

A cell phone will be used to notify off-site personnel of emergencies. If personnel are to be transported to a hospital, a map and directions to Thomson Hospital are included in the beginning of this HASP along with emergency contact phone numbers.

9.1 Responsibilities

The Site Safety Supervisor has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measure to ensure the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the site area, and evacuation of adjacent residents. He/she is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. The RE&LS Health and Safety officer may be called upon to act on the behalf of the Site Safety Supervisor, and will direct responses to any medical emergency. The individual contractor organizations are responsible for assisting the project manager in his/her mission within the parameters of their scope of work.

9.2 Evacuation Routes/Procedures

In the event of an emergency which necessitates an evacuation of the site evacuation alarm notification should be made verbally, using hand signals, and/or by the Site Supervisor supplemented by sounding three long blasts from a vehicle horn. All personnel should evacuate upwind of any activities. The safe area is at the Chapin Street entrance to the site in case of an emergency so that all personnel can be accounted for.

Personnel will be expected to proceed to the closest exit with your buddy, and mobilize to the safe distance area associated with the evacuation route. Personnel will remain at that area until the re-entry is authorized by the Project Manager.

9.3 Accidents and Injuries

Any accidents and injuries to a worker are to be immediately reported to the Site Safety Supervisor. He/she will assist those who have been injured by notifying the personnel trained to respond to accidents and injuries.

Any accident and injury shall be reported to the Project Manager who will then track the injury in accordance with OSHA's Injury and Illness Recordkeeping and Recording Requirements.

9.4 Emergency Equipment

The following equipment, based on the potential site hazard will be maintained in the Site Safety Supervisor's vehicle:

- First aid kit

9.5 Site Communications Plan

Successful communications between field teams and contact with personnel in the work area is essential. The following communications systems will be used during activities at the Site.

Hands clutching throat - Out of air/cannot breath
Hands on top of head - Need assistance
Thumbs up- I am all right/I understand
Thumbs down - No/negative
Arms waving upright - Send backup support
Grip partners wrist - Exit area immediately

10.0 JOB SAFETY ANALYSIS

The suggested actions to be taken under this plan are not to be substituted for good judgment on the part of project personnel. At all times, the Site Safety Officer has responsibility for site safety and his or her instructions must be followed. The following list is intended to identify hazards at the site. Additional hazards may be identified that are not included below, and should be added to the HASP.

<u>Hazards Due to Heavy Machinery</u>

Potential Hazard:
Heavy machinery including trucks, drill rigs, excavators, backhoes, etc. will be in operation at the site. The presence of such equipment presents the danger of being struck or crushed. Use caution when working near heavy machinery.

Protective Action:
Make sure that operators are aware of your activities, and heed operator's instructions and warnings. Wear bright colored clothing and walk safe distances from heavy equipment. Operators should be made aware of where each contractor is working during that shift.

Cuts, Punctures and Other Injuries

Potential Hazard:
There is the potential for the presence of sharp or jagged edges on rock, metal materials, and other sharp objects. Serious cuts and punctures can result in loss of blood and infection.

Protective Action:
Steel-toe boots with steel shanks and long pants should be work when conducting work at the site. Kevlar or cut resistant gloves should be used when handling sharp objects.

The Project Manager is responsible for making First Aid supplies available at the work site to treat minor injuries. The Site Safety Officer is responsible for arranging the transportation of authorized on-site personnel to medical facilities when First Aid treatment in not sufficient. Do not move seriously injured workers. All injuries requiring treatment are to be reported to the Project Manager. Serious injuries are to be reported immediately to the Site Safety Officer.

Injury Due to Exposure of Chemical Hazards

Potential Hazards:
Potential exposure to contaminants of concern (COCs) (e.g. VOC vapors) may be encountered during work at the site. Inhalation of high concentrations of organic vapors can cause headache, stupor, drowsiness, confusion and other health effects. Skin contact can cause irritation, chemical burn, or dermatitis.

Dust particulates could also present an inhalation hazard. Inhalation of high concentrations of dust can cause irritation of the eyes and skin; coughing; chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis.

Protective Action:
The presence of potential COC may be detected by their odor and by monitoring instrumentation. Dust particulates may be detected by monitoring instrumentation. Approved employees will not work in environments where hazardous concentrations of potential COC are present.

Continuous air monitoring (refer to Section 7.0) of the work area will be performed within the work area. Personnel are to leave the work area whenever PID measurements of ambient air exceed 5 ppm consistently for a 5 minute period for total VOCs.

Injuries Due to Extreme Hot or Cold Weather Conditions

Potential Hazards:
Extreme hot weather conditions can cause heat exhaustion, heat stress and heat stroke. Extreme cold weather conditions can cause hypothermia.

Protective Action:
Precaution measures should be taken such as dress appropriately for cold weather conditions. If necessary work shall not be conducted or take necessary measures to heat up the body.

To protect from heat stress, drink plenty of fluid before and during work. Take adequate number of breaks to prevent fatigue.

Subsurface Soil and Groundwater Sampling

Potential Hazards: Contact with contaminants, back strain and muscle fatigue due to lifting, shoveling and augering techniques, contact with or sharp objects.

Protective Actions:
Nitrile gloves over Kevlar or cut resistant gloves to minimize exposure to chemical contaminants, a thorough review of suspected contaminants should be completed and implementation of an adequate protection program. Proper lifting (pre-lift weight assessment, use of legs, multiple personnel) techniques will prevent back strain. Use slow easy motions when shoveling, augering, and digging to decrease muscle strain. Use of PPE

Soil Borings/Drilling

Potential Hazards:
Noise levels exceeding the OSHA PEL of 90 dBA are both a hazard and a hindrance to communication. Fumes (carbon monoxide) from the drill rig. Overhead utility wires, i.e., electrical and telephone, can be hazardous when the drill rig boom is in the upright position. Underground pipelines and utility lines can be ruptured or damaged during active drilling operations. Moving parts, i.e. augers, on the drill rig may catch clothing. Free or falling parts may cause head injury. Moving the drill rig over uneven terrain may cause the vehicle to roll over or get stuck in a rut or mud. Be aware of hazards associated with moving heavy machinery and other associated injury.

Protective Actions:
Ear muffs and ear plugs effectively reduce noise levels. Hard hats should be worn at all times when working around a drill rig. Secure loose clothing. Check boom prior to approaching drill rig. To avoid contact with any overhead lines, the drill rig boom should be lowered prior to moving the rig. Overhead utilities should be considered "live" until determined otherwise. The rig mast should not be erected within 10 feet of an overhead electrical line until the line is de-energized, grounded, or shielded and an electrician has certified that arcing cannot occur. Inspect terrain prior to moving drilling rig. Maintain a distance of 20 feet away from the drill rig when possible.

11.0 SUBCONTRACTOR RESPONSIBILITIES

RE&LS is the prime contractor for the activities associated with this project and, therefore, is responsible for subcontractor health and safety while under contract with Canandaigua Crossroads, LLC and engaged in work at the work site. RE&LS will inform subcontractors of the site emergency response procedures, and any potential fire, explosion, health, safety, or other hazard by making this HASP available on-site. All RE&LS subcontractors are responsible for:

- Attending the general health and safety briefing given by RE&LS covering the requirements of this HASP. Each new employee must be briefed on site-specific safety procedures.
- Providing their own company-provided PPE.
- Providing documentation that their employees have been trained in health and safety in accordance with applicable federal, state, and local laws and regulations.
- Providing evidence of medical surveillance and medical approvals for their employees.
- Designating their own Site Safety Officer (SSO) responsible for ensuring that their employees comply with their own HASP and taking any other additional measures required by their site activities.

RAVI ENGINEERING & LAND SURVEYING, P.C.

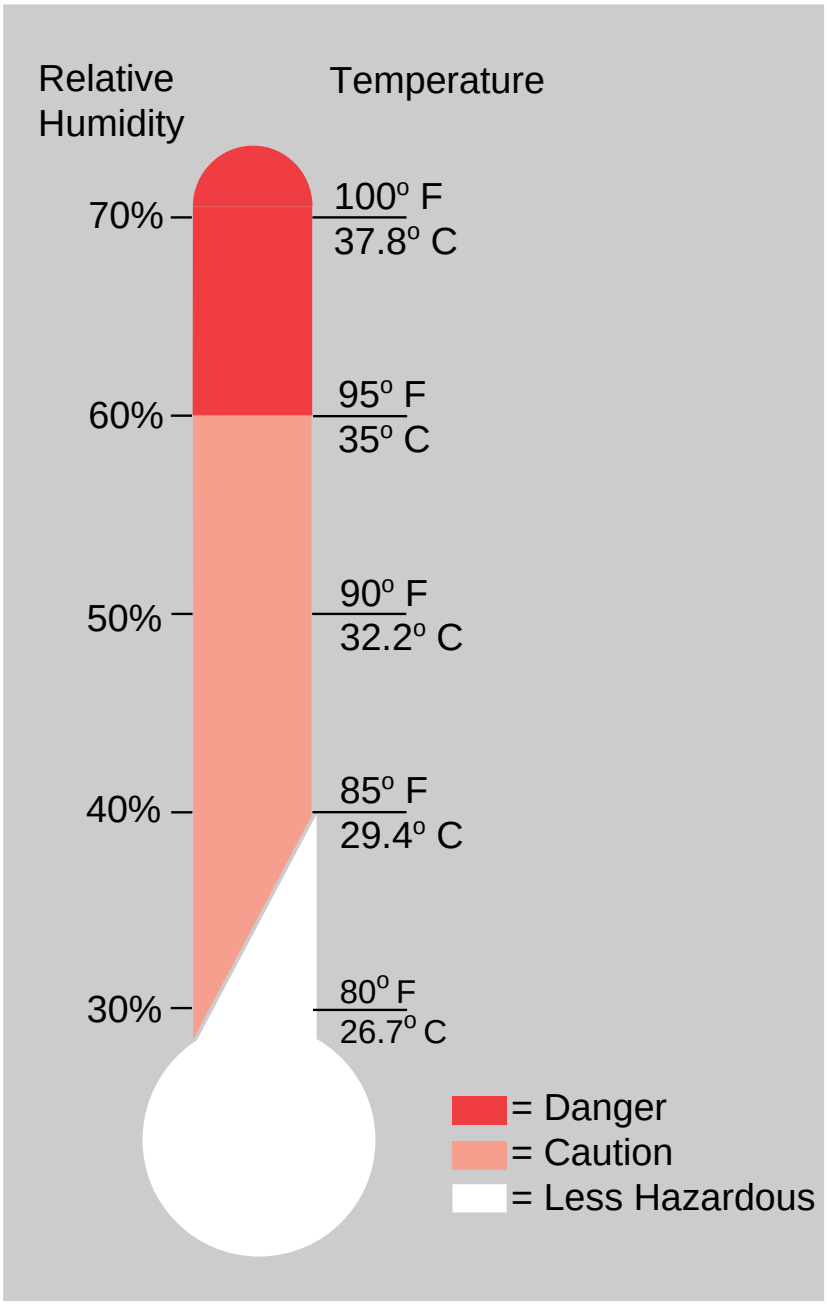
HASP APPENDIX A

Heat and Cold Exposure Sheets

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**.



U.S. Department of Labor
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).

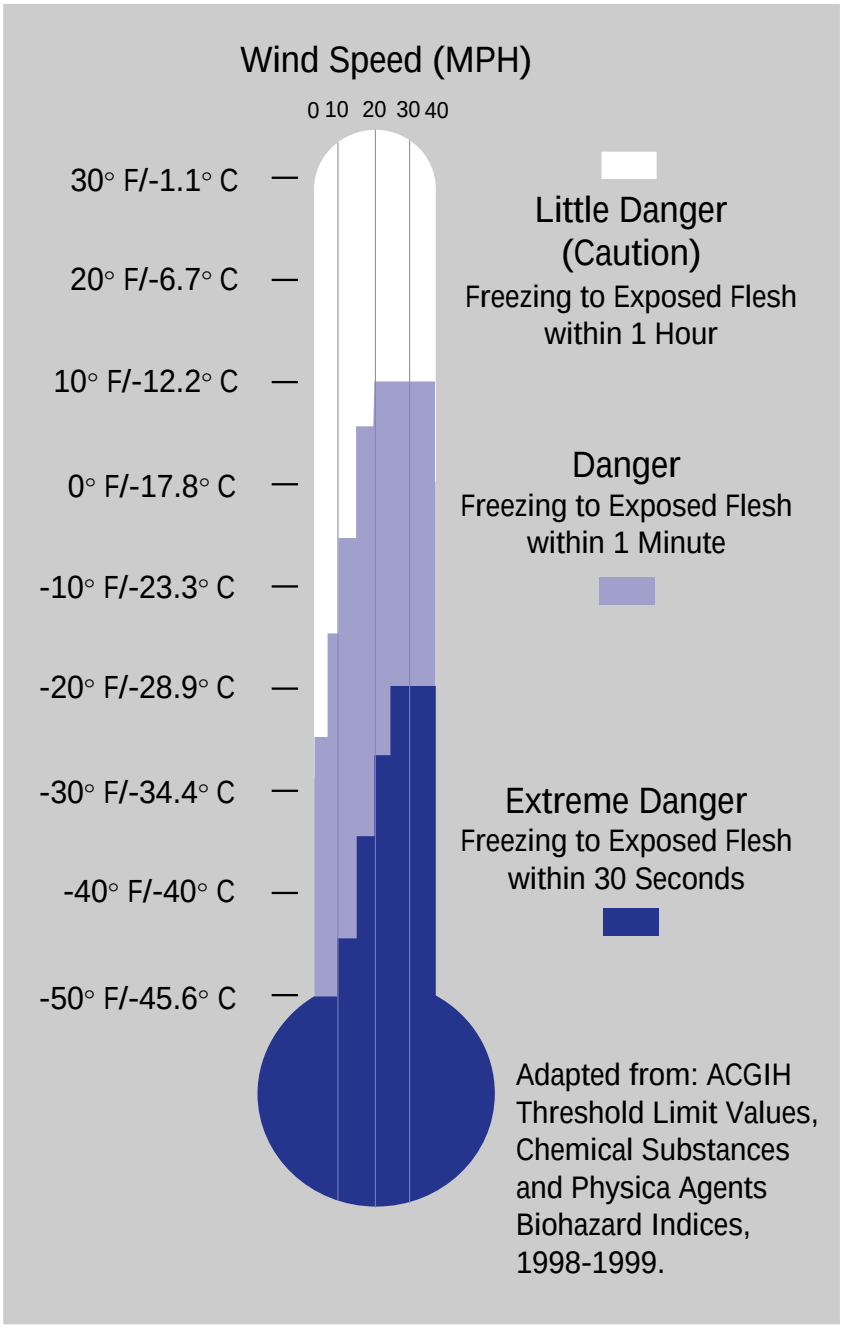
Workers Are at Increased Risk When

- 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.



U.S. Department of Labor
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.

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HASP APPENDIX B

Potential Physical and Chemical Hazard Evaluation

ADDITIONAL POTENTIAL PHYSICAL AND CHEMICAL HAZARDS	
POTENTIAL PHYSICAL HAZARDS	**CONTROL METHODS**
Overhead Hazards/Falling Objects	Overhead hazards will be identified prior to each task (i.e., inspecting drill rig mast, building structure). Hardhats will be required for each task that poses an overhead hazard.
Contact with Utilities	Prior to initiating Site activities, all utilities will be located by the appropriate utility company and will be marked and/or barricaded to minimize the potential of accidental contact. A minimum distance of 25 feet between the derrick and overhead power lines must be maintained at all times.
Noise Exposure	Areas of potentially high sound pressure levels (>85 dBA) will be restricted to authorized personnel only. 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.
POTENTIAL CHEMICAL HAZARDS	**GENERAL CONTROL METHODS**
Contaminant Inhalation	Direct reading instruments and/or olfactory indications will be used to monitor airborne contaminants. Established action levels will limit exposure to safe levels. Respiratory protection will be used as appropriate.
Contaminant Ingestion	Standard safety procedures such as restricting eating, drinking, chewing gum and tobacco, and smoking to the support zone and utilizing proper personal decontamination procedures will minimize ingestion as a potential route of exposure.
Dermal Contaminant Contact	The proper selection and use of personal protective clothing and decontamination procedures will minimize dermal contaminant contact.
Potential contact with lower concentration waste and naturally occurring contaminants (i.e., methane)	Dermal contact with contaminants will be minimized by proper use of the following PPE: • Neoprene gloves

CHEMICAL HAZARD EVALUATION									
	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
Compound	PEL	REL	TLV					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
Aroclor 1260 (PCB)*	0.5 ^{sk} mg/m^3	---	0.5 ^{sk} mg/m^3	Y	Abs, Inh, Ing	Irritation to eyes and skin; dermatitis, liver damage	---	---	---
Arsenic*	0.010 mg/m^3	---	0.01 mg/m^3	Y	Inh, Ing, Abs, Con	Coughing, irritation to eyes, nose, throat, respiratory tract, inflammation of mucous membranes, dyspnea (labored breathing), cyanosis, and rales (rattle breathing), vomiting, bloody diarrhea, cold clammy skin, low blood pressure, weakness, headache cramps, convulsions, coma, redness, burns to skin	Odorless/silver gray or tin white brittle (metal, inorganic), also can be in solution (clear & odorless)	---	---
Barium	0.5 mg/m^3	---	0.5 mg/m^3	N	Inh, Ing, Con	Irritation to eyes, nose, throat, or skin; stomach pains, slow pulse, irregular heart beat	Odorless	---	---

CHEMICAL HAZARD EVALUATION									
	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
Compound	PEL	REL	TLV					Relative Response	Ioniz. Poten. (eV)
Benzene*	1 ppm	---	10 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	0.5	9.25
Cadmium*	0.005 mg/m^3	LFC	0.01 mg/m^3	N	Inh, Ing, Con	Irritation to eyes, nose, throat, cough, tight chest/pain, dyspnea, pulmonary edema, sweating, chills, slow pulse, muscle aches, weakness, death	Silvery/white (blue tinged) lustrous solid, odorless	---	N/A
Chromium (metal)	1.0 mg/m^3	0.5 mg/m^3	0.5 mg/m^3	N	Inh, Ing, Con	Irritation to eyes, skin and respiratory tract (lungs), ulceration of skin and mucous membranes, rash, electrolyte disturbances	Blue-white to steel gray lustrous brittle hard, odorless solid	---	N/A
CIS-1,2-Dichloroethene CIS-DCE	200 ppm	200 ppm	200 ppm	Y	Inh, Ing, Abs, Con	Irritant to skin, eyes, respiratory tract, mucous membranes, liver damage, narcotic effect at high concentrations	Mild odor	0.8	9.66
1,1-Dichloroethene	1 ppm	---	5 ppm	N	Inh, Ing, Abs, Con	Irritation, sensitation to eyes, nose, throat, dizziness	Mild, sweet chloroform-like odor	0.9	9.79

CHEMICAL HAZARD EVALUATION

Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
	PEL	REL	TLV					Relative Response	Ioniz. Poten. (eV)
1,2-Dichloroethene 1,2-Dichloroethylene Trans-DCE	200 ppm	200 ppm	10 ppm	Y	Inh, Ing, Abs, Con	Irritation to eyes, respiratory system; central nervous system depression	Colorless liquid, slightly acrid, chloroform-like odor	---	---
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
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	---	---

CHEMICAL HAZARD EVALUATION

Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
	PEL	REL	TLV					Relative Response	Ioniz. Poten. (eV)
Magnesium	N/A	---	N/A	Y	Inh	Irritation to eyes, nose, throat, skin (can burn), corneal abrasions, muscular pain, chills, nausea, vomiting, diarrhea, metal fume fever.	Silver white, metallic powder, odorless	---	---
Mercury	0.1 [sk] mg/m^3 ceiling	0.1 mg/m^3 ceiling 0.05 mg/m^3 ceiling	0.025 [sk] mg/m^3	Y	Inh, Abs, Ing, Con	Severe respiratory tract damage, sore throat, coughing, pain, tightness in chest, breathing difficulties, headache, muscle weakness, anorexia, GI disturbances, ringing in ear, liver changes fever, bronchitis, pneumonitis, burning in mouth, abdominal pain, vomiting, corrosive ulceration, bloody diarrhea, weak & rapid pulse, paleness, exhaustion, tremors, collapse, thirst, burns and irritates skin, eyes, blurred vision, pain in eyes	Silver-white, heavy, odorless liquid metal	---	N/A

CHEMICAL HAZARD EVALUATION

Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
	PEL	REL	TLV					Relative Response	Ioniz. Poten. (eV)
Methyl Ethyl Ketone (2-Butanone, MEK)	200 ppm	200 ppm	200 ppm	Y	Inh, Ing, Con	Irritation to eyes, nose; skin, dizziness, nausea, drowsiness, CNS depression, unconsciousness	Mint or acetone-like	0.9	9.51
Silver	0.01 mg/m^3	---	0.1 mg/m^3	Y	Inh, Ing, Con	Blue gray eyes, irritation to nasal septum, throat, skin, ulcerations to skin, GI disturbances	White to gray lustrous/ metallic solid, odorless	---	---
Sodium	None	---	None	Y	Ing, Con	Can react with moisture to create sodium hydroxide and burn tissue	White to gray metallic, odorless solid	---	---
1,1,1-Trichloroethane	350 ppm	---	350 ppm	Y	Inh, Con	Vomiting, nausea, drowsiness, unconsciousness	Slight fruity odor	NR	11
Tetrachloroethylene (PCE)	100 ppm	---	25 ppm	Y	Inh, Abs, Ing, Con	Irritation to eyes, nose, upper respiratory tract, throat; skin, flush face dizziness, giddiness, headache, intoxication, nausea, vomiting, abdominal pain, diarrhea, systemic effects	Colorless liquid, mild chloroform-like odor	---	9.32

CHEMICAL HAZARD EVALUATION									
	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
Compound	PEL	REL	TLV					Relative Response	Ioniz. Poten. (eV)
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
Trichloroethene* (TCE)	100 ppm (per 6/97 NIOSH Pocket Guide)	25 ppm (per 2005 NIOSH Pocket Guide)	10 ppm	Y	Inh, Abs, Ing, Con	Irritation to eyes, skin, mucous membranes and GI, headache, vertigo, fatigue, giddiness, tremors, vomiting, nausea, may burn skin, visual disturbance, paresthesia, cardiac arrhythmias	Colorless liquid, sometimes dyed blue, chloroform odor	---	9.45
Vinyl Chloride*	1 ppm	---	1 ppm	Y	Inh, Con	Dulled auditory and visual response, headache, weakness, frostbite, GI bleeding, pallor or cyanosis of extremities, abdominal pain, bleeding	Colorless liquefied gas, pleasant odor at high concentrations (3000 ppm)	2.0	9.99

CHEMICAL HAZARD EVALUATION									
	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
Compound	PEL	REL	TLV					Relative Response	Ioniz. Poten. (eV)
Xylenes	100 ppm	100 ppm	100 ppm	Y	Inh, Abs, Ing, 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

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

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HASP APPENDIX C

Safety Data Sheets

1 Identification

Product identifier

Product name: Trichloroethylene

Stock number: L14474
CAS Number:
79-01-6
EC number:
201-167-4
Index number:
602-027-00-9
Relevant identified uses of the substance or mixture and uses advised against.
Identified use:
SU3 Industrial uses: Uses of substances as such or in preparations at industrial sites
SU24 Scientific research and development

Details of the supplier of the safety data sheet
Manufacturer/Supplier:
Alfa Aesar
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com
Information Department: Health, Safety and Environmental Department
Emergency telephone number:
During normal business hours (Monday-Friday, 8am-7pm EST), call (800) 343-0660. After normal business hours, call Carechem 24 at (866) 928-0789.

2 Hazard(s) identification

Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)


GHS08 Health hazard

Muta. 2 H341 Suspected of causing genetic defects.
Carc. 1B H350 May cause cancer.


GHS07

Skin Irrit. 2 H315 Causes skin irritation.
Eye Irrit. 2 H319 Causes serious eye irritation.
STOT SE 3 H336 May cause drowsiness or dizziness.
Hazards not otherwise classified No information known.

Label elements
GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms


GHS07 GHS08

Signal word Danger
Hazard statements
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H336 May cause drowsiness or dizziness.
Precautionary statements
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P281 Use personal protective equipment as required.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
WHMIS classification
D1B - Toxic material causing immediate and serious toxic effects
D2A - Very toxic material causing other toxic effects

Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)


Health (acute effects) = 2
Flammability = 0
Physical Hazard = 1

Other hazards
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

(Contd. on page 2)

Product name: Trichloroethylene

(Contd. of page 1)

3 Composition/information on ingredients

Chemical characterization: Substances
CAS# Description:
79-01-6 Trichloroethylene
Identification number(s):
EC number: 201-167-4
Index number: 602-027-00-9

4 First-aid measures

Description of first aid measures
After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact Rinse opened eye for several minutes under running water. Then consult a doctor.
After swallowing Seek medical treatment.
Information for doctor
Most important symptoms and effects, both acute and delayed
Causes skin irritation.
Causes serious eye irritation.
May cause respiratory irritation.
May cause cancer.
May cause drowsiness or dizziness.
Indication of any immediate medical attention and special treatment needed No further relevant information available.

5 Fire-fighting measures

Extinguishing media
Suitable extinguishing agents Use carbon dioxide, extinguishing powder or foam. Water may be ineffective but may be used for cooling exposed containers.
Special hazards arising from the substance or mixture
If this product is involved in a fire, the following can be released:
Carbon monoxide and carbon dioxide
Hydrogen chloride (HCl)
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Environmental precautions: Do not allow product to reach sewage system or any water course.
Methods and material for containment and cleaning up:
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose of contaminated material as waste according to section 13.
Prevention of secondary hazards: No special measures required.
Reference to other sections
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

Handling
Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Open and handle container with care.
Information about protection against explosions and fires: No information known.

Conditions for safe storage, including any incompatibilities
Storage
Requirements to be met by storerooms and receptacles: No special requirements.
Information about storage in one common storage facility:
Store away from strong bases.
Store away from oxidizing agents.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.
Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters

Components with limit values that require monitoring at the workplace:	
79-01-6 Trichloroethylene (100.0%)	
PEL (USA)	Long-term value: 100 ppm Ceiling limit value: 200; 300* ppm *5-min peak in any 2 hrs
REL (USA)	See Pocket Guide Apps. A and C
TLV (USA)	Short-term value: 135 mg/m³, 25 ppm Long-term value: 54 mg/m³, 10 ppm BEI

(Contd. on page 3)

Product name: Trichloroethylene

(Contd. of page 2)

EL (Canada)	Short-term value: 25 ppm Long-term value: 10 ppm ACGIH A2, IARC 2A
EV (Canada)	Short-term value: 25 ppm Long-term value: 10 ppm

Ingredients with biological limit values:

79-01-6 Trichloroethylene (100.0%)

BEI (USA)	15 mg/L Medium: urine Time: end of shift at end of workweek Parameter: Trichloroacetic acid (nonspecific) 0.5 mg/L Medium: blood Time: end of shift at end of workweek Parameter: Trichloroethanol without hydrolysis (nonspecific) - Medium: blood Time: end of shift at end of workweek Parameter: Trichloroethylene (semi-quantitative) - Medium: end-exhaled air Time: end of shift at end of workweek Parameter: Trichloroethylene (semi-quantitative)

Additional information: No data

Exposure controls
Personal protective equipment
General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.
Maintain an ergonomically appropriate working environment.
Breathing equipment: Use suitable respirator when high concentrations are present.
Recommended filter device for short term use:
Use a respirator with organic vapor/acid gas cartridges as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards such as NIOSH (USA) or CEN (EU).
Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.
The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.
Material of gloves Fluorocarbon rubber (Viton)
Penetration time of glove material (in minutes) 480
Glove thickness 0.7 mm
Eye protection: Safety glasses
Body protection: Protective work clothing.

9 Physical and chemical properties

Information on basic physical and chemical properties
General Information

Appearance:	
Form:	Liquid
Color:	Colorless
Odor:	Chloroform-like
Odor threshold:	Not determined.
pH-value:	Not determined.
Change in condition	
Melting point/Melting range:	-85 °C (-121 °F)
Boiling point/Boiling range:	87 °C (189 °F)
Sublimation temperature / start:	Not determined
Flammability (solid, gaseous)	Not determined.
Ignition temperature:	410 °C (770 °F)
Decomposition temperature:	Not determined
Auto igniting:	Not determined.
Danger of explosion:	Not determined.
Explosion limits:	
Lower:	8 Vol %
Upper:	12.5 Vol %
Vapor pressure at 20 °C (68 °F):	77 hPa (58 mm Hg)
Density at 20 °C (68 °F):	1.46 g/cm³ (12.184 lbs/gal)
Relative density	Not determined.
Vapor density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with	
Water at 20 °C (68 °F):	1 g/l
Partition coefficient (n-octanol/water):	Not determined.
Viscosity:	
dynamic:	Not determined.
kinematic:	Not determined.
Other information	No further relevant information available.

10 Stability and reactivity

Reactivity No information known.
Chemical stability Stable under recommended storage conditions.

(Contd. on page 4)

(Contd. of page 3)

Thermal decomposition / conditions to be avoided: Decomposition will not occur if used and stored according to specifications.
Possibility of hazardous reactions Reacts with strong oxidizing agents
Conditions to avoid No further relevant information available.
Incompatible materials:
Bases
Oxidizing agents
Hazardous decomposition products:
Carbon monoxide and carbon dioxide
Hydrogen chloride (HCl)

11 Toxicological information

Information on toxicological effects
Acute toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for this substance.

LD/LC50 values that are relevant for classification:

Oral	LD50	2402 mg/kg (mouse)
Dermal	LD50	>20000 mg/kg (rabbit)
Inhalative	LC50/4H	8450 ppm/4H (mouse)

Skin irritation or corrosion: Causes skin irritation.
Eye irritation or corrosion: Causes serious eye irritation.
Sensitization: No sensitizing effects known.
Germ cell mutagenicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains mutation data for this substance.
Carcinogenicity:
May cause cancer.
IARC-1: Carcinogenic to humans: sufficient evidence of carcinogenicity.
NTP-R: Reasonably anticipated to be a carcinogen: limited evidence from studies in humans or sufficient evidence from studies in experimental animals.
EPA-CaH: Carcinogenic to humans.
ACGIH A2: Suspected human carcinogen: Agent is carcinogenic in experimental animals at dose levels, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) considered relevant to worker exposure. Available epidemiologic studies are conflicting or insufficient to confirm an increased risk of cancer in exposed humans.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for this substance.
Reproductive toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains reproductive data for this substance.
Specific target organ system toxicity - repeated exposure: No effects known.
Specific target organ system toxicity - single exposure:
May cause respiratory irritation.
May cause drowsiness or dizziness.
Aspiration hazard: No effects known.
Subacute to chronic toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for this substance.
Additional toxicological information: To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

Carcinogenic categories
OSHA-Ca (Occupational Safety & Health Administration) Substance is not listed.

12 Ecological information

Toxicity
Aquatic toxicity: No further relevant information available.
Persistence and degradability No further relevant information available.
Bioaccumulative potential No further relevant information available.
Mobility in soil No further relevant information available.
Ecotoxical effects:
Remark: Harmful to aquatic organisms
Additional ecological information:
General notes:
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
May cause long lasting harmful effects to aquatic life.
Avoid transfer into the environment.
Harmful to aquatic organisms
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.
Other adverse effects No further relevant information available.

13 Disposal considerations

Waste treatment methods
Recommendation Consult state, local or national regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.

14 Transport information

UN-Number **DOT, IMDG, IATA**	UN1710
UN proper shipping name **DOT** **IMDG, IATA**	RQ Trichloroethylene TRICHLOROETHYLENE
Transport hazard class(es)	
DOT	
Class **Label** **Class**	6.1 Toxic substances. 6.1 6.1 (T1) Toxic substances

(Contd. on page 5)
USA

Product name: Trichloroethylene

(Contd. of page 4)

Label **IMDG, IATA**	6.1
Class **Label**	6.1 Toxic substances. 6.1
Packing group **DOT, IMDG, IATA**	III
Environmental hazards:	Not applicable.
Special precautions for user **EMS Number:** **Segregation groups**	Warning: Toxic substances F-A,S-A Liquid halogenated hydrocarbons
Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.
Transport/Additional information:	
DOT **Hazardous substance:** **Marine Pollutant (DOT):**	 100 lbs, 45.4 kg No
UN "Model Regulation":	UN1710, Trichloroethylene, 6.1, III

15 Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture
GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms

GHS07 GHS08

Signal word Danger
Hazard statements
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H336 May cause drowsiness or dizziness.
Precautionary statements
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P281 Use personal protective equipment as required.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
All components of this product are listed on the Canadian Domestic Substances List (DSL).

SARA Section 313 (specific toxic chemical listings)
79-01-6 Trichloroethylene

California Proposition 65

Prop 65 - Chemicals known to cause cancer
79-01-6 Trichloroethylene

Prop 65 - Developmental toxicity
79-01-6 Trichloroethylene

Prop 65 - Developmental toxicity, female Substance is not listed.

Prop 65 - Developmental toxicity, male
79-01-6 Trichloroethylene

Information about limitation of use:
Workers are not allowed to be exposed to this hazardous material. Exceptions can be made by the authorities in certain cases.
For use only by technically qualified individuals.
This product is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.
Other regulations, limitations and prohibitive regulations
Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.
This substance is included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH).
The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
Substance is not listed.
Annex XIV of the REACH Regulations (requiring Authorisation for use) Substance is listed.
Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing SDS: Global Marketing Department
Date of preparation / last revision 03/24/2016 / -
Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
vPvB: very Persistent and very Bioaccumulative

(Contd. on page 6)

Product name: Trichloroethylene

(Contd. of page 5)

ACGIH: American Conference of Governmental Industrial Hygienists (USA)
OSHA: Occupational Safety and Health Administration (USA)
NTP: National Toxicology Program (USA)
IARC: International Agency for Research on Cancer
EPA: Environmental Protection Agency (USA)
Skin Irrit. 2: Skin corrosion/irritation, Hazard Category 2
Eye Irrit. 2: Serious eye damage/eye irritation, Hazard Category 2
Muta. 2: Germ cell mutagenicity, Hazard Category 2
Carc. 1B: Carcinogenicity, Hazard Category 1B
STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3

Safety Data Sheet

Revision Date: 10/28/16
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**30279 / cis-1,2-Dichloroethene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	8
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:

GHS Classification:	Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 1 Flammable Liquid Category 2 Acute Toxicity - Inhalation Dust / Mist Category 3 Acute Toxicity - Dermal Category 3 Acute Toxicity - Oral Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Toxic if swallowed, in contact with skin or if inhaled. Causes damage to organs.
GHS Precautions:	
Safety Precautions:	Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilation and lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe dust/fume/gas/mist/vapours/spray. Wash hands and skin thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF SWALLOWED: Immediately call a POISON CENTER/doctor/.... IF ON SKIN: Wash with plenty of soap and water. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF exposed: Call a POISON CENTER or doctor/physician. Call a POISON CENTER or doctor/physician. Call a POISON CENTER or doctor/physician if you feel unwell. Specific treatment see section 4. Rinse mouth. Take off immediately all contaminated clothing and wash it before reuse. In case of fire: Use extinguishing media in section 5 for extinction.

Storage: Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: No data available.

Repeated Exposure Target Organs: No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
methanol	67-56-1	200-659-6	99.800000
cis-1,2-dichloroethylene	156-59-2	205-859-7	0.200000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water may be ineffective but water spray can be used extinguish a fire if swept across the base of the flames. Water can absorb heat and keep exposed material from being damaged by fire.

Fire and/or Explosion Hazards: Vapors may be ignited by sparks, flames or other sources of ignition if material is above the flash point giving rise to a fire (Class B). Vapors are heavier than air and may travel to a source of ignition and flash back.

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions:	Toxic or severely irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment
Storage Technical Measures and Conditions:	Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
methanol	67-56-1	6000 ppm IDLH	250 ppm STEL	200 ppm TWA	200 ppm TWA; 260 mg/m3 TWA
cis-1,2-dichloroethylene	156-59-2	ND		200 ppm TWA	No data available.

Personal Protection:

Engineering Measures:	Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.
Respiratory Protection:	Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.If an exposure limit is exceeded or if an operator is experiencing symptoms of inhalation overexposure as explained in Section 3, provide respiratory protection.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.
Skin Protection:	Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	No data available.
Odor:	Mild
Physical State:	Liquid
pH:	No data available.
Vapor Pressure:	No data available.
Vapor Density:	1.1 (air = 1)
Boiling Point:	No data available.
Melting Point:	-98 °C
Flash Point:	52
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	36
Lower Flammable/Explosive Limit, % in air:	6
Autoignition Temperature:	464 deg C
Decomposition Temperature:	No data available.
Specific Gravity:	0.791 - 0.792 g/cm3 at 20 °C
Evaporation Rate:	No data available.
Odor Threshold:	No data available.
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available.
VOC % by weight:	99.8
Molecular Weight:	32.04

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	No data available.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure:	Eyes, Central nervous system stimulation, Skin, GI

Tract, Respiratory Tract

Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation: Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.

Inhalation Toxicity: Harmful! Can cause systemic damage (see "Target Organs)Methanol can cause central nervous system depression and overexposure can cause damage to the optic nerve resulting in visual impairment or blindness.

Skin Contact: Can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.

Eye Contact: Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.

Ingestion Irritation: Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.Highly toxic and may be fatal if swallowed.

Ingestion Toxicity: Toxic if swallowed. May cause target organ failure and/or death.May be fatal if swallowed.

Long-Term (Chronic) Health Effects:

Carcinogenicity: No data.

Reproductive and Developmental Toxicity: Contains a known human reproductive and/or developmental hazard.

Inhalation: Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic damage upon prolonged and/or repeated exposure (see "Target Organs)

Skin Contact: Upon prolonged or repeated contact, can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.

Ingestion: Toxic if swallowed. May cause target organ failure and/or death.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methanol	67-56-1	Inhalation LC50 Rat 22500 ppm 8 h

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.
No data available.	

ACGIH:

Chemical Name	CAS No.
No data available.	

NIOSH:

Chemical Name	CAS No.
No data available.	

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
No data.		Group 2A
No data.		Group 2B

12. ECOLOGICAL INFORMATION

Overview: Moderate ecological hazard. This product may be dangerous to plants and/or wildlife.

Mobility: No data

Persistence: No data

Bioaccumulation: No data

Degradability: Biodegrades slowly.
Ecological Toxicity Data: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.
Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3(6.1)
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
methanol	67-56-1	X	X	-	X
cis-1,2-dichloroethylene	156-59-2	X	-	-	X

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Methanol	67-56-1	Prop 65 Devolop Tox

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
methanol	67-56-1	X	X	X	X
cis-1,2-dichloroethylene	156-59-2	-	X	X	-

16. OTHER INFORMATION

Prior Version Date: 07/22/14
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

SAFETY DATA SHEET

Creation Date 16-Sep-2014 **Revision Date** 30-May-2017 **Revision Number** 2

1. Identification

Product Name **trans-1,2-Dichloroethylene, stabilized**

Cat No. : **AC406840000; AC406840250; AC406842500**

Synonyms trans-Acetylene dichloride

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 2
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Harmful if swallowed
Harmful if inhaled

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Wear protective gloves/protective clothing/eye protection/face protection
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Ingestion
Rinse mouth
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Explosion risk in case of fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store in a well-ventilated place. Keep cool
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Harmful to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
trans-1,2-Dichloroethylene	156-60-5	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects Breathing difficulties. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Chemical foam. Use water spray to cool unopened containers.

Unsuitable Extinguishing Media No information available

Flash Point 6 °C / 42.8 °F

Method - No information available

Autoignition Temperature 440 °C / 824 °F

Explosion Limits

Upper 12.80%
Lower 9.70%
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Flammable. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Vapors may form explosive mixtures with air. Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Hydrogen chloride gas Carbon monoxide (CO) Carbon dioxide (CO_2) Phosgene
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	3	0	N/A

6. Accidental release measures

Personal Precautions Remove all sources of ignition. Take precautionary measures against static discharges. Use personal protective equipment. Ensure adequate ventilation.

Environmental Precautions Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Avoid dust formation.

7. Handling and storage

Handling Wear personal protective equipment. Ensure adequate ventilation. Avoid contact with skin and eyes. Do not breathe dust. Use only in area provided with appropriate exhaust ventilation. Use explosion-proof equipment. Use only non-sparking tools. Keep away from open flames, hot surfaces and sources of ignition. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. Take precautionary measures against static discharges.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
trans-1,2-Dichloroethylene	TWA: 200 ppm			

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

Engineering Measures Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	6.5-7.2
Melting Point/Range	-50 °C / -58 °F
Boiling Point/Range	48 °C / 118.4 °F @ 760 mmHg
Flash Point	6 °C / 42.8 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	12.80%
Lower	9.70%
Vapor Pressure	331 mmHg @ 25 °C
Vapor Density	3.34 (Air = 1.0)
Specific Gravity	1.260
Solubility	Immiscible with water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	440 °C / 824 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C2 H2 Cl2
Molecular Weight	96.94

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Exposure to air. Exposure to light. Incompatible products. Exposure to moist air or water.

Incompatible Materials Bases, Strong acids, Strong oxidizing agents

Hazardous Decomposition Products Hydrogen chloride gas, Carbon monoxide (CO), Carbon dioxide (CO_2), Phosgene

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
trans-1,2-Dichloroethylene	LD50 = 1235 mg/kg (Rat)	>5 g/kg (Rabbit)	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
trans-1,2-Dichloroethylene	156-60-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
trans-1,2-Dichloroethylene	Not listed	LC50: = 135 mg/L, 96h static (Lepomis macrochirus)	Not listed	Not listed

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow

trans-1,2-Dichloroethylene	1.48

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
trans-1,2-Dichloroethylene - 156-60-5	U079	-

14. Transport information

DOT

UN-No UN1150
Proper Shipping Name 1,2-DICHLOROETHYLENE
Hazard Class 3
Packing Group II

TDG

UN-No UN1150
Proper Shipping Name 1,2-DICHLOROETHYLENE
Hazard Class 3
Packing Group II

IATA

UN-No UN1150
Proper Shipping Name 1,2-DICHLOROETHYLENE
Hazard Class 3
Packing Group II

IMDG/IMO

UN-No UN1150
Proper Shipping Name 1,2-DICHLOROETHYLENE
Hazard Class 3
Packing Group II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
trans-1,2-Dichloroethylene	X	X	-	205-860-2	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313 Not applicable

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
trans-1,2-Dichloroethylene	-	-	-	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
trans-1,2-Dichloroethylene	1000 lb 1 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
trans-1,2-Dichloroethylene	X	-	X	-	-

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date	16-Sep-2014
Revision Date	30-May-2017
Print Date	30-May-2017
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other

materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 3.11
Revision Date 12/01/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Vinyl chloride

Product Number : 387622
Brand : Aldrich
Index-No. : 602-023-00-7

CAS-No. : 75-01-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable gases (Category 1), H220
Gases under pressure (Liquefied gas), H280
Carcinogenicity (Category 1A), H350

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H220 Extremely flammable gas.
H280 Contains gas under pressure; may explode if heated.
H350 May cause cancer.

Precautionary statement(s)
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P281 Use personal protective equipment as required.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.
P405	Store locked up.
P410 + P403	Protect from sunlight. Store in a well-ventilated place.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS
May form explosive peroxides.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Chloroethylene
Formula	:	C_2H_3Cl
Molecular weight	:	62.50 g/mol
CAS-No.	:	75-01-4
EC-No.	:	200-831-0
Index-No.	:	602-023-00-7

Hazardous components

Component	Classification	Concentration
Vinyl chloride		
	Flam. Gas 1; Press. Gas Liquefied gas; Carc. 1A; SA ; H220, H280, H350,	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Clean up promptly by sweeping or vacuum.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid inhalation of vapour or mist.
Use explosion-proof equipment.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Contents under pressure. Light sensitive.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Vinyl chloride	75-01-4	TWA	1 ppm	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Lung cancer Confirmed human carcinogen		
		STEL	5 ppm	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	1 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		STEL	5 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		See 1910.1017		
		Potential Occupational Carcinogen See Appendix A		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 120 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Liquefied gas
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -153.8 °C (-244.8 °F) - lit.
f)	Initial boiling point and boiling range	-13.4 °C (7.9 °F) - lit.
g)	Flash point	-61.0 °C (-77.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or	Upper explosion limit: 33 %(V) Lower explosion limit: 3.6 %(V)

	explosive limits	
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	0.911 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Contains the following stabiliser(s):
Hydroquinone (>=0 - <=0.0001 %)
Phenol (>=0 - <=0.01 %)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Chemically active metals, Copper

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

LC50 Inhalation - Rat - 0.3 h - 180000 ppm
Remarks: Behavioral:Tremor. Behavioral:Convulsions or effect on seizure threshold. Respiratory disorder

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Human carcinogen.

IARC: 1 - Group 1: Carcinogenic to humans (Vinyl chloride)

NTP: Known to be human carcinogen (Vinyl chloride)

OSHA: OSHA specifically regulated carcinogen (Vinyl chloride)

Reproductive toxicity
No data available

Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: KU9625000

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -
Stomach - Irregularities - Based on Human Evidence (Phenol)
Liver - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1086 Class: 2.1
Proper shipping name: Vinyl chloride, stabilized
Reportable Quantity (RQ): 1 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1086 Class: 2.1 EMS-No: F-D, S-U
Proper shipping name: VINYL CHLORIDE, STABILIZED

IATA
UN number: 1086 Class: 2.1
Proper shipping name: Vinyl chloride, stabilized
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Phenol	108-95-2	2007-07-01
Hydroquinone	123-31-9	2007-07-01

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01
Phenol	108-95-2	2007-07-01
Hydroquinone	123-31-9	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01
Phenol	108-95-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-07-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Vinyl chloride	75-01-4	2007-09-28

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

	May displace oxygen and cause rapid suffocation.
Carc.	Carcinogenicity
Flam. Gas	Flammable gases
H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H350	May cause cancer.
Press. Gas	Gases under pressure
SA	Simple Asphyxiant

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	4
Physical Hazard	3

NFPA Rating

Health hazard:	2
Fire Hazard:	4
Reactivity Hazard:	0

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 3.11 Revision Date: 12/01/2015 Print Date: 05/01/2016

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WATER-BASED HYDROCARBON MITIGATION AGENTS ™

THE TRUSTED SOLUTION FOR HYDROCARBON CLEANUP for over 30 years

» Reduces Volatility
» Increases Solubility
» Accelerates Biodegradation

The leading specialty surfactant formulation used by professionals to mitigate contamination from oil, fuel and other hydrocarbons

Used Worldwide by Environmental & Industrial Contractors, Utilities & Municipalities

BioSolve.com

Tank Cleaning & Degassing

BioSolve PINKWATER, brand leader and industry workhorse for over 30 years. Formulated with our signature magenta dye for traceability. Sold only as a concentrate.

BioSolve CLEAR, same concentration and performance as Pinkwater, without traceable magenta dye.

NEW BioSolve Activator, formulated as a high performance emulsification surfactant for improved soil remediation. Meets EPA's Safer Choice Standard as well as OECD standard for Ready Biodegradability.

BioSolve FOGwash, same concentration and performance as Pinkwater, with no fragrance and less color. FOGwash is formulated for professional use in both commercial & industrial kitchens. (Sold only in cases/gallons.)

BioSolve products sold in:

Units	US Gallons	Liters	Pallet
Tote	275	1,041	1 unit
Drum	55	208	4 units
Pail	5	19	24 units
Case	4 x 1G	4 x 3.8L	27 units

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THE BioSolve™ COMPANY

The BioSolve Company
Lexington, MA 02420 USA
781 482-7900
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APPLICATIONS

Vapor Suppression & Odor Control >> PINKWATER • ACTIVATOR
Diluted in large mixing tanks, Pinkwater and Activator are used at major remediation and construction work-sites where excavation of contaminated soils may release noxious organic odors or hazardous VOCs. The dilute solution is sprayed directly onto newly exposed soil surfaces or stockpiles of contaminated material where volatilization is taking place. Used as an alternative to foam, our products create a barrier that keeps vapors in the soil, allowing work to continue safely without disruption to workers or neighbors.

Soil Remediation >> ACTIVATOR • PINKWATER
In-situ, a dilute solution is injected into contaminated subsurface zones to mobilize and solubilize NAPL trapped in the soil. The effluent is then extracted under careful hydraulic control and treated prior to discharge. For ex-situ remediation or soil washing, Pinkwater and Activator are used as washing agents to remove hydrocarbons. Following the wash, soil is rinsed, dried and returned to grade. On bioremediation or land farming projects, the ability to micro-emulsify hydrocarbons results in enhanced bioavailability for naturally occurring hydrocarbon degrader bacteria. This dramatically accelerates the biodegradation process.

Tank Cleaning & Degassing >> PINKWATER
Pinkwater is a standard component in cleaning/degassing protocols for oil and fuel tanks of all sizes. High pressure spray application of Pinkwater solution to tank walls and internal structures rapidly reduces LEL (Lower Explosive Limits) readings, improves worker safety and sharply reduces project turnaround time. Pinkwater solution is also sprayed/mixed into sludge to knock down vapor levels and convert sludge into a pumpable aqueous solution.

Emergency Spill Response >> PINKWATER
BioSolve Pinkwater eliminates fire and explosion hazard when sprayed directly onto a fuel/oil spill. Aggressive agitation reduces volatilization and causes LEL readings to immediately decline, possibly registering "0." Application of Pinkwater also facilitates roadway cleanup and elimination of hazardous oil sheen.

Equipment Decontamination >> PINKWATER • CLEAR
Used for cleaning/decontaminating tools and equipment at remediation sites, in refineries, on drilling rigs, following spill cleanup, and in industrial maintenance operations. Generally applied with standard pressure washing equipment, most oil and tar build-up can be washed away on contact. For more severe contamination, a hot water spray system may be required.

HOW DO BIOSOLVE PRODUCTS WORK?

BioSolve products are water-based surfactant formulations engineered to aggressively "grab" hydrocarbon molecules and hold them in an aqueous solution, called an emulsion. When applied as a dilute solution and agitated, the formulation first mobilizes hydrocarbons, pulling them away from hard surfaces (e.g., metal, concrete, asphalt) or releasing them from soil, and then solubilizes hydrocarbons in an emulsion that can be removed with water. The emulsion is non-volatile and readily degraded.

This functionality enables BioSolve products to be effective across a wide range of applications where increased solubility, reduced volatility and/or accelerated biodegradation is required for removing or remediating oil and fuel contamination. Pinkwater, Activator and Clear are typically applied as a 1% to 8% solution. Agitation may be provided by a pressure washer, pump, brush, water hose, jet sprayer or mixer.

"Shell is purchasing BioSolve Pinkwater for only one reason, because it works"
Pat Agbo
Head of Oil Spill Response
Shell Oil Upstream International
Port Harcourt, Nigeria

"Your product performed exactly as advertised"
David Turner
Colonial Pipeline
Alpharetta, Georgia

"The loading dock was caked with hydraulic oil and had a grotesque odor. The Pinkwater worked brilliantly. When those guys were finished, it literally smelled clean."
Mike Dimino
The Seneca Companies
Denver Colorado

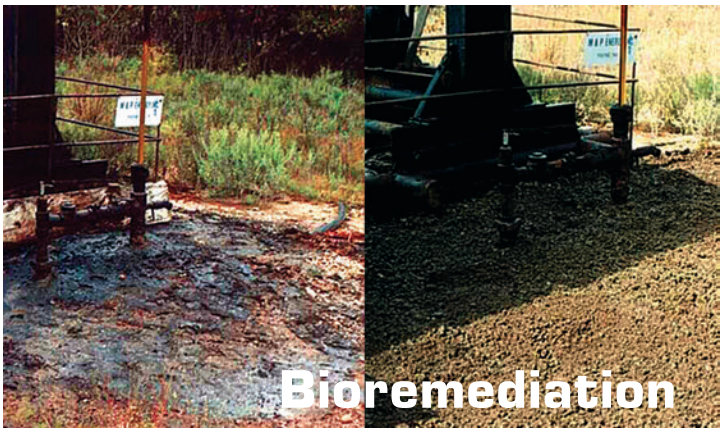
"BioSolve Pinkwater helped mitigate a big VOC emission issue, assisting in eliminating citizen complaints and keeping the project on schedule."
Shouvik Gangopadhyay
ECC Senior Project Manager
Nordlys Environmental, LP
Sydney Tar Ponds Project

» PROVEN EFFECTIVE » EASY TO USE » SAFE FOR WORKERS & ENVIRONMENT

Water-based Biodegradable

COMMON USES

Suppression of Volatile Organic Vapors
In-Situ/Ex-Situ Remediation of Contaminated Soil
Bioremediation of Contaminated Soil
Hazardous Spill Containment & Cleanup
Solubilization of Sludge & Grease
Oil/Fuel Storage Tank Cleaning & Degassing
Equipment & Hard Surface Decontamination
Paraffin Control in Oil Wells



BioSolve products contain no caustic, d-limonene or hydrocarbon solvents. Products do not contain any hazardous ingredients as defined by CERCLA, OSHA (29 CFR 1910.1200), Massachusetts Right to Know Law, and California Proposition 65. Products are rated by DOT as Class 55, non-hazardous.

BioSolve Pinkwater is on the U.S. Environmental Protection Agency's NCP Product Schedule. This listing does NOT mean that EPA approves, recommends, licenses, certifies, or authorizes the use of BioSolve Pinkwater on an oil discharge. This listing means only that data have been submitted to EPA as required by Subpart J of the National Contingency Plan, 40 CFR Section 300.915.

Pinkwater and Activator are not listed as bioremediation agents on the EPA National Contingency Plan and therefore are not to be used for bioremediation purposes on or near the shorelines of navigable waters within the US.

This material is made available for use by professionals or persons having the proper technical skills. The statements made herein are guidelines only and may require modification to accommodate site specific conditions. Nothing contained herein is a warranty or is to be taken as a license to use without proper instruction and supervision. BioSolve products should always be used in accordance with applicable federal, state and local rules and regulations

Case Studies, Information Sheets, Application Protocols & SDS are available on request

"I am very impressed with your product's ability to clean everything from invert and gel drilling mud to hydraulic oil."

Colby Simpson
Hot Flash Oil Field Services
Alberta Canada

"BioSolve clearly outperformed everything else we have tried. I'm a real believer in the product."

Lane Altenbaumer
Specialized Maintenance Services,
Carylon Corporation
Pasadena, TX

Used by 'Fire Department of New York' Hazmat Units (for emergency response) and 'New York City Transit' (for parts cleaning) for over ten years.

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IMO INTERNATIONAL MARITIME ORGANIZATION

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RAVI ENGINEERING & LAND SURVEYING, P.C.

HASP APPENDIX D

Sign In/Sign Out Log & Compliance Form

Sign In Sign Out Sheet

Former Labelon Corporation Facility
10 Chapin Street
City of Canandaigua
Ontario County, New York

Name	Company	Reason for site visit	Time-in	Time-out

APPENDIX D

Quality Assurance Project Plan

Quality Assurance Project Plan

Former Labelon Corporation Facility
10 Chapin Street
City of Canandaigua
Ontario County, New York
NYSDEC Site No. C835016

Prepared for:

DHD Ventures
Canandaigua Crossroads, LLC
2604 Elmwood Avenue, #352
Rochester, NY 14618

Prepared By:

Ravi Engineering & Land Surveying, P.C.
2110 S. Clinton Avenue
Rochester New York
14618

October 5, 2017
Revised March 21, 2018

TableofContents

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) was prepared in general accordance with the United States Environmental Protection Agency (USEPA) Region 2 "Guidance for the Development of Quality Assurance Project Plans for Environmental Monitoring Projects" (April 2004) and is subject to the review and approval by the New York State Department of Environmental Conservation (NYSDEC) for the Former Labelon Corporation (Labelon), City of Canandaigua, Ontario County, New York. This QAPP provides quality assurance/quality control (QA/QC) protocols and guidance that are to be followed when implementing the Remedial Investigation (RI) Work Plan for the Site to ensure that data of a known and acceptable precision and accuracy are generated.

The QAPP also provides a summary of the project, identifies personnel responsibilities, and provides procedures to be used during sampling of environmental media, other field activities, and the analytical laboratory testing of samples.

1.1 Project Scope and Objective

The QAPP applies to the aspects of the project associated with the collection of field data, laboratory testing of field samples and QA/QC samples, and evaluation of the quality of data that is generated. The scope of work is described in further detail in the RI Work Plan. In general, the project objective is to obtain sufficient information to further characterize the nature and extent of contamination on the Site to assist in the development of a technical remedial action plan.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Project organization and tentative personnel to implement the work are outlined in this section of the QAPP.

2.1 Ravi Engineering & Land Surveying, P.C.

Ravi Engineering & Land Surveying, P.C. (RE&LS) will provide environmental consulting and engineering for the project. Additional information regarding key personnel is provided as follows, and resumes of key personnel are included in the Remedial Action Work Plan (RAWP).

Project Director and Manager
The project director and manager for this project will be Peter S. Morton, P.G., C.P.G. As project director, Mr. Morton will have overall responsibility for ensuring that the project meets client objectives and quality standards. In addition, the project director will be responsible for technical quality control and project oversight and will provide the project manager with access to upper management.

As project manager, Mr. Morton will be responsible for implementing the project and will have the authority to commit the resources necessary to meet project objectives and requirements. The project manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved. The project manager will provide the major point of contact and control for matters concerning the project.

QualityAssurance Officer(QAO)
The QA officer responsible for QA/QC on this project is Lynn Zicari. The QAO may conduct audits of the operations at the Site to ensure that work is being performed in accordance with the QAPP.

Technical Staff
The technical staff (team members) for this project will be drawn from a qualified pool of resources. The technical team staff will be utilized to gather and analyze data and to prepare various task reports and support materials. All of the designated technical team members are experienced professionals who possess the degree of specialization, training, and technical competence required to effectively and efficiently perform the required work.

2.2 Analytical Laboratories

Paradigm Environmental Services Inc. of Rochester, New York will provide partial analytical services for the project. Paradigm is a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) Contract Laboratory Protocol (CLP)-certified laboratory (ELAP ID 10958). A copy of Paradigm's Statement of Qualifications is available upon request.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

As part of this QAPP, QA/QC protocol and procedures have been developed and are described below. The objective of the QA/QC protocol and procedures is to ensure that the information, data, and decisions associated with this project are technically sound and properly documented. These QA/QC protocol and procedures will be modified in supplemental work plans when deemed appropriate.

3.1 Operation and Calibration of On-Site Monitoring Equipment

The on-Site monitoring equipment includes volatile organic compound (VOC) monitors, particulate monitors, electronic water level indicators, and water quality meters. Operation and calibration of monitoring equipment anticipated for use during the project are discussed below.

3.1.1 VOC Monitoring Equipment

Real-time monitoring for VOCs will be conducted to evaluate the nature and extent of petroleum discharges at the Site and to monitor breathing zone air for workers and nearby residences as noted in the Health and Safety Plan (HASP). The primary field instrument for monitoring VOCs will be a photoionization detector (PID). It is anticipated that a MiniRAE 3000 PID equipped with a 10.6 eV lamp will be used during this project. An accredited firm/testing laboratory will calibrate the equipment on a yearly basis. During fieldwork, the PID will be calibrated on a daily basis in accordance with the manufacturer's specifications. Isobutylene gas will be used to calibrate the PID prior to use and as necessary during fieldwork. Daily PID calibrations will be recorded in the field logbook.

3.1.2 Miscellaneous Field Monitoring Equipment

Several other types of field monitoring equipment will be used during the project, including:

- An electronic static water level indicator; A YSI Professional Plus water quality meter that measures pH, specific conductivity, temperature, dissolved oxygen, and oxygen-reduction potential; and
- A LaMotte 2020e turbidity meter.
- Dustrak II Particulate Monitor
- MiniRae Photoionizing Detector

These meters will be calibrated, operated, and maintained in accordance with the manufacturer's recommendations.

3.2 Surface Soil, Sediment and Water Sampling

Area B excavation samples will be collected from the excavation walls and bottom. Samples will be collected from the excavator bucket with gloved hand transferred to the appropriate clean glass containers. Sufficient sample volume (as specified by the laboratory) will be collected to fill the sample bottles. Any observable physical characteristics of the soil, (i.e., color, odor, physical state) will be recorded on appropriate sampling logs.

3.3 General Soil Screening and Logging

During subsurface investigation, a field team member will document visual observations, screen the soils with a PID, collect selected samples for laboratory analysis, photograph the field work, and prepare the appropriate field logs to document pertinent information. Pertinent information will be recorded on boring/well logs, and will include:

- Date, location identification, and project identification;
- Name of individual completing the log;
- Name of contractor;
- Equipment make and model, and auger size;
- Drilling methods used;
- Depths recorded in feet and fractions thereof referenced to ground surface;
- Standard penetration test (American Standards Testing Materials (ASTM) D-1586) blow counts;
- Sample depth interval and % recovered;
- Description of soil type using the Unified Soil Classification System or New York State Department of Transportation (NYSDOT) Soil Control Procedure STP-2 "An Engineering Description of Soils, Visual-Manual Procedure";
- Depth of water encountered;
- Well specifications (materials, screened interval, etc.); and
- PID screening results of soil samples.

3.4 Well Development

After completion of the wells, but not sooner than 48-hours after grouting is completed, development will be accomplished using disposable polyethylene bailers. Dispersing agents, acids, disinfectants, or other additives will not be used during development, nor will they be introduced into the well at any other time.

Well development will consist of gentle surging followed by bailing the well to remove sediments from the well screen and surrounding formation. In a case where considerable drill water is lost to the formation during drilling, an attempt to remove a volume of water greater than the volume lost will be made. If this is not feasible, a greater amount of time between development and groundwater sampling will be allotted.

The development process will continue until clarity (goal of <50 NTUs) of the discharge is achieved, the well is purged dry repeatedly, or for a maximum of two hours. Pertinent information from development activities will be recorded on Well Development Field Forms.

3.5 Low-Flow Groundwater Purging and Sampling

Prior to purging and sampling, static water level measurements will be taken from each well using a Solinst water level meter, or similar instrument. The presence and thickness of any light non-aqueous phase liquids (LNAPL) will be noted in the field logbook.

A portable peristaltic pump (i.e., Geopump) connected to new disposable polyethylene tubing will be used for collection of groundwater samples. The tubing will be lowered into the well and positioned at or slightly above the mid-point of the well screen. Care will be taken to install and lower the tubing slowly in order to minimize disturbance of the water column.

A pumping rate of less than 500 ml/min will be selected. The water level in the well will be measured and the pump rate will be adjusted until the drawdown is stabilized. The water level in the well will be measured periodically using an electronic water level meter to ensure optimum flow rate for purging and sampling.

When the water level in the well has stabilized (i.e., goal of <0.3 feet of drawdown once stabilized), water quality parameters will be monitored at a frequency of 5 minutes with a YSI Professional Plus (or equivalent) water quality meter using an in-line flow-through cell.

Turbidity will be measured with a LaMotte 2020e (or equivalent) turbidity meter. Water quality indicator parameters will be considered stabilized after three consecutive readings of each of the following parameters are achieved:

- pH ($\pm$ 0.1)
- specific conductance ($\pm$ 3%)
- dissolved oxygen ($\pm$ 10%)
- oxidation-reduction potential ($\pm$ 10 mV)
- temperature ($\pm$ 10%)
- turbidity ($\pm$ 10%, when turbidity is greater than 10 NTUs)

Following stabilization of water quality parameters, the flow-through cell will be disconnected and a groundwater sample will be collected from the tubing. The pumping rate during sampling will remain at the established purge rate or it may be adjusted downward to minimize aeration. A pumping rate below 250 ml/min will be used when collecting VOC samples. Once collected, the samples will be placed in a pre-chilled cooler and transported to Paradigm in accordance with applicable protocols.

Field observations, water quality parameters, and other pertinent information obtained during sampling will be recorded on Low-Flow Groundwater Sampling Field Records.

3.6 Passive Diffusion Bag Groundwater Sampling

If utilized, prior to deploying passive diffusion bags (PDBs) for sampling, static water level measurements will be taken from each well using a Solinst water level meter, or similar instrument. The presence and thickness of any light non-aqueous phase liquids (LNAPL) will be noted in the field logbook.

PDBs will be deployed into the wells and positioned at or slightly above the mid-point of the well screen or at discreet depths determined to contain the contaminant concentration gradient. The PDBs will be left in-Situ for a minimum of two weeks.

Once the wait period has passed and the PDBs have reached equilibrium with the surrounding groundwater, the sampling event can commence. PDBs will be carefully removed from each well

and water contained within the bags will be poured into VOA vials at the well head, maintaining a reverse meniscus. The samples will subsequently be placed in a pre-chilled cooler and transported the lab in accordance with applicable protocols.

3.7 Field QC Samples

Various types of field QC samples are used to check the cleanliness and effectiveness of field handling methods. They are analyzed in the laboratory as samples, and their purpose is to assess the sampling and transport procedures as possible sources of sample contamination and document overall sampling and analytical precision.

- Trip Blanks are similar to field blanks with the exception that they are not exposed to field conditions. Their analytical results give the overall level of contamination from everything except ambient field conditions. Trip blanks are prepared at the lab prior to the sampling event and shipped with the sample bottles.

  Trip blanks are prepared by adding organic-free water to a 40-ml volatile organic analysis (VOA) vial. One trip blank will be used with every batch of water samples shipped for volatile organic analysis. Each trip blank will be transported to the sampling location, handled like a sample, and returned to the laboratory for analysis without being opened in the field.

- Field Equipment/Rinseate Blanks are blank samples designed to demonstrate that sampling equipment has been properly prepared and cleaned before field use and that cleaning procedures between samples are sufficient to minimize cross-contamination. Rinseate blanks are prepared by passing analyte-free water over sampling equipment and analyzing the samples for all applicable parameters. If a sampling team is familiar with a particular Site, its members may be able to predict which areas or samples are likely to have the highest concentration of contaminants. Unless other constraints apply, these samples should be taken last to avoid excessive contamination of sampling equipment. Rinseate blanks are not required if dedicated sampling equipment is used for sample collection.

- Field Duplicates consist of a set of two samples collected independently at a sampling location during a single sampling event. Field duplicates can be sent to the laboratory so that they are indistinguishable from other analytical samples and personnel performing the analysis are not able to determine which of the samples field duplicates are. Field duplicates are designed to assess the consistency of the overall sampling and analytical system.

  Field QC samples and the frequency of analysis for this project are summarized in Table 1.

4.0 EQUIPMENT DECONTAMINATION PROCEDURES

All decontamination will be performed in accordance with NYSDEC-approved decontamination procedures. Sampling methods and equipment have been chosen to minimize decontamination requirements and prevent the possibility of cross-contamination.

Split-spoons, other non-disposable sampling equipment, and stainless steel spoons will be decontaminated using the following procedure:

- Alconox/tap water wash
- Tap water rinse
- Deionized/distilled water rinse
- Air dry

One field rinseate blank will be collected for each type of equipment used each day a decontamination event is carried out.

If necessary, a temporary decontamination pad will be established in a secure area on-Site using 6-mil polyethylene sheeting. The equipment and associated tooling will be decontaminated using steam-cleaning methods at the designated location. Fluids generated during decontamination will be collected in the plastic-lined decontamination pad. All decontamination wastes will be transferred into drums or an on-Site holding tank for appropriate staging and disposal. The contractor/representative will be responsible for proper staging and disposal of all investigation-derived wastes. Final disposal of soils and water will be dependent on the results of the soil and groundwater analyses to be conducted during this investigation.

5.0 SAMPLING HANDLING AND CUSTODY REQUIREMENTS

This section describes procedures for sample handling and chain-of-custody (COC) to be followed by sampling personnel and the analytical laboratory. The purpose of these procedures is to ensure that the integrity of the samples is maintained during their collection, transportation, storage, and analysis. All COC requirements comply with Standard Operating Procedures (SOPs) indicated in EPA sample-handling protocols, described in the EPA QAPP guidance and Contract Laboratory Protocols.

Sample identification documents will be carefully prepared so that sample identification and COCs can be maintained and sample disposition controlled. Sample identification documents include field notebooks, sample labels, custody seals, COC records, and laboratory sample log-in and tracking forms.

The primary objective of the COC procedures is to provide an accurate written record that can be used to trace the possession and handling of a sample from the moment of its collection through it analyses. A sample is in custody if it is:

- In someone's physical possession;
- In someone's view;
- Locked up; or
- Kept in a secured area that is restricted to authorized personnel.

5.1 Sample Containers and Preservation

New laboratory-grade sample containers obtained from a reliable supplier will be provided by the analytical laboratory. All containers provided by the laboratory are pre-cleaned (Level 1), with Certificates of Analysis available for each bottle type. Certifications of Analysis provided by the vendor are kept on file by the laboratory.

All samples will be stored on ice pending delivery to the laboratory. A list of preservatives and holding times for each type of analysis is included in the following table.

Table 5.1 Sample Preservation and Holding Times

Sample Matrix	Analysis	Container Type and Size	Preservation	Holding Time
Soil and Sediment	VOC	2 oz. wide mouth glass jar with Teflon-lined cap	Cool to 4^{o}C; minimize headspace	14 days
	SVOC	4 oz wide mouth glass jar with Teflon-lined cap	Cool to 4^{o}C	14 days
	Metals	8 oz. glass	Cool to 4^{o}C	6 months
	PCBs	8 oz. glass	Cool to 4^{o}C	14 days
	Pesticides	8 oz. glass	Cool to 4^{o}C	14 days
	Total Petroleum Hydrocarbon	4 oz. wide mouth glass jar with Teflon-lined cap	None	14 days
PCB samples	PCB	Concrete chip, wipe, or bulk sample	Cool to 4^{o}C	40 Days
Groundwater and water	VOC	2 - 40-ml.glass vial with Teflon-lined cap	Cool to 4^{o}C; minimize headspace	14 days
	Metals Mercury	40-ml. polyethylene or glass	HNO_3 to a pH <2	6 months 28 Days
	PCBs	2 - ½ L Amber Glass Jars	Cool to 4^{o}C	7 days
Waste water samples	TCLP-metals Mercury Cyanide	1 L polyethylene or glass jar	Cool to 4^{o}C; HNO_3 to pH<2	6 months 28 Days 14 Days
	TCLP- VOC	2 - 40-ml.glass vial with Teflon-lined cap	Cool to 4^{o}C	14 days
	TCLP-SVOC	2 - ½ L Amber Glass Jars with Teflon-lined cap	Cool to 4^{o}C	14 days

* Holding times are based on verified time of sample receipt

Sample preservation will be verified at the lab just prior to extraction, digestion, and/or analysis and the pH will be recorded in the extraction/digestion logbook. The pH may be checked upon arrival, if desired. If the samples are improperly preserved, a QA/QC discrepancy form will be submitted to the lab manager and QA coordinator for appropriate follow-up action (i.e., evaluation of the data during the data validation process and, if necessary, additional instruction

of personnel regarding proper procedures).

5.2 Sample Identification

All containers of samples collected by field personnel from the project will be identified using a format identified in the field on a label affixed to the sample container. Generally, the format will include the following.

- One, two or three letters identifying the type of sample:
  - BH- Geoprobe soil boring sample
  - TP- test pit soil sample
  - MW- groundwater sample
  - WB- well boring soil sample
  - SV- soil vapor sample
  - SS- surface soil sample
  - S-soil
  - W-water
  - PCB- PCB sample
  - D – Field Duplicate
  - MS – Matrix Spike
  - MD- Matrix Spike Duplicate
- Current date of sample collection

Example: MW201S-011015 is a groundwater sample collected from monitoring well MW201S on January 10, 2015. GP02-011015 is the second Geoprobe soil sample collected on January 10, 2015. GP02-011015-MS is the matrix spike soil sample collected from the second Geoprobe sample on January 10, 2015.

Each sample will be sealed and labeled immediately after collection. To minimize handling of sample containers, labels may be filled out prior to sample collection. The sample label will be filled out using waterproof ink and will be firmly affixed to the sample containers. The sample label will give the sample number, the date of the collection, analysis required, and pH and preservation, if appropriate.

5.3 Field Custody Procedures

- Sample bottles must be obtained pre-cleaned from the laboratory or directly from an approved retail source. Coolers or boxes containing cleaned bottles should be sealed with a custody tape seal during transport to the field or while in storage prior to use.
- All containers will have assigned lot numbers to ensure traceability through the supplier.
- As few persons as possible should handle samples.
- The sample collector is personally responsible for the care and custody of samples collected until the samples are relinquished to another person or dispatched properly under COC rules.

- The sample collector will record sample data in the field notebook.

- The project manager will determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required.

5.3.1 Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if the seals are disturbed. A custody seal is placed over the cap of individual sample bottles by the sampling technician. Sample shipping containers (coolers, cardboard boxed, etc., as appropriate) are sealed in as many places as necessary to ensure security. Seals must be signed and dated before use. Packing tape should be wrapped around the lid to ensure that seals are not accidentally broken during shipment and in a manner that allows easy removal by laboratory personnel. Immediately upon receipt at the laboratory, the custodian must check (and certify, by completing logbook entries) that seals on boxes and bottles are intact.

5.3.2 Chain-of-Custody Record

The COC record must be fully completed in duplicate by the field technician who has been designated by the project manager as responsible for sample shipment to the appropriate laboratory for analysis. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations, etc.), the person completing the COC record should note these constraints in the "Remarks" section of the custody record.

5.4 Sample Handling, Packaging and Shipping

The transportation and handling of samples must be accomplished in a manner that not only protects the integrity of the sample but also prevents any detrimental effects due to the possible hazardous nature of samples. Regulations for packaging, marking, labeling, and shipping hazardous materials are promulgated by the United States Department of Transportation (DOT) in the Code of Federal Regulations, 49 CFR 171 through 177.

5.4.1 Sample Packaging

Samples must be packaged carefully to avoid breakage or cross-contamination and must be shipped to the laboratory at proper temperatures. The following sample packaging requirements will be followed:

- Sample bottle lids must never be mixed. All sample lids must stay with the original containers.
- The sample bottle should never be completely filled except for VOA bottles. At a minimum, a 10% void space should be left in the bottle to allow for expansion.
- All sample bottles must be sealed around the neck or the jar lid with clear tape.
- Any custody seals should be affixed prior to sealing the bottle.
- All sample bottles shall be placed in plastic Zip-lock bags to minimize contact with inert packing material, unless foam inserts are used.

- Foam inserts should be used as inert packing material when shipping low hazard water samples via a common carrier to the laboratory.
- Low-hazard environmental samples are to be cooled. "Blue ice" or some other artificial icing material, or ice placed in plastic bags, may be used. Ice will not be used as a substitute for packing material.
- A duplicate custody record must be placed in a plastic bag and taped to the inside of the cooler lid. Custody seals are affixed to the sample cooler.

5.4.2 Shipping Containers

Environmental samples will be properly packaged and labeled for transport and dispatched for analysis to the appropriate subcontracted laboratory. A separate COC record must be prepared for each container. The following requirements for marking and labeling of shipping containers will be observed:

- Use abbreviations only where specified;

- The words "This End Up" or "This Side Up" must be clearly printed on the top of the outer package. Upward-pointing arrows should be placed on the sides of the package. The words "Laboratory Samples" should also be printed on the top of the package; and

- After a container has been closed, two custody seals are placed on the container— one on the front and one on the back. The seals are protected from accidental damage by placing strapping tape over them.

- Field personnel will make timely arrangements for transportation of samples to the laboratory. When custody is relinquished to a shipper, field personnel will telephone the laboratory custodian to inform him of the expected time of arrival of the sample shipment and to advise him of any time constraints on sample analysis.

5.4.3 Shipping Procedures

- The coolers in which the samples are packed must be accompanied by a COC record. When transferring samples, the individuals relinquishing and receiving them must sign, date, and note the time on the record. This record documents sample custody transfer.
- Samples must be dispatched to the laboratory for analysis with a separate COC record accompanying each shipment. Shipping containers must be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information are entered in the "Remarks" section of the COC record.
- All shipments must be accompanied by the COC record identifying their contents.
- The original record accompanies the shipment, and the yellow copy is retained by the Site team leader.
- If sent by mail, the package is registered with return receipt requested. If sent by common carrier, a bill of lading is used. Freight bills, Postal Service receipts, and bills of lading are retained as part of the permanent documentation.
- Samples must be shipped to the analytical laboratory within 24 to 48 hours from the time of collection.

5.5 Laboratory Custody Procedures

The designated sample custodian at the laboratory will be responsible for maintaining the COC for samples received at the lab. Among other things, the custodian must adhere to the following basic requirements:

- When the sample arrives at the lab, the custodian will complete a Cooler Receipt & Preservation Form for each cooler/package container.
- Upon receipt, the coolers are examined for the presence and condition of custody seals, locks, shipping papers, etc. Shipping labels are removed and placed on scrap paper and added to the receiving paper work. The custodian then completes the COC record by signing and recording the date and time the package is opened.
- Acceptance criteria for cooler temperature is 0-6^{O}C. If a cooler exhibits a temperature outside this range, the anomalies are noted on the Cooler Receipt & Preservation Form.
- The custodian will then unload the samples from the cooler(s)/container(s), assign an identification number to each sample container, and affix a barcode label to each sample container for logging in and out of the LIMS system.

Adherence to this procedure will ensure that all samples can be referenced in the computer tracking system. All sample control and COC procedures applicable to the analytical laboratory are presented in laboratory SOPs available for review.

6.0 ANALYTICAL QUALITY ASSURANCE/QUALITY CONTROL

All laboratory analyses will be performed by Paradigm Environmental Services INC., an accredited and appropriately certified (NYSDEC ELAP CLP) analytical laboratory.

Method detection limits are determined according to procedures outlined in 40 CFR Part 136, Appendix B or EPA CLP. General analytical detection limits are usually determined by the lowest point on the curve. Detection limits are determined at least annually for all appropriate analytical methods. A listing of the laboratory's method detection limits is available upon request.

6.1 Quality Control Samples

Laboratory QC consists of analysis of laboratory blanks, duplicates, spikes, standards, and QC check samples as appropriate to the methodology. These laboratory QC samples are described below.

6.1.1 Laboratory Blanks

Three types of laboratory blanks, one or more of which will be utilized depending on the analysis are described below:

- Method blanks consist of analyte-free water and are subjected to every step of the analytical procedure to determine possible contamination.

- Reagent blanks are similar to method blanks but incorporate only one of the preparation reagents in the analysis. When a method blank indicates significant contamination, one or more reagent blanks are analyzed to determine the source.

- Calibration blanks consist of pure reagent matrix and are used to zero an instrument's response, thus establishing the baseline.

6.1.2 Calibration Standards

A calibration standard may be prepared in the laboratory by dissolving a known amount of a pure compound in an appropriate matrix. The final concentration calculated from the known quantities is the true value of the standard. The results obtained from these standards are used to generate a standard curve and thereby quantitate the compound in the environmental sample. A minimum of three calibration standards will be used to generate a standard curve for all analyses.

6.1.3 Reference Standard

A reference standard is prepared in the same manner as a calibration standard but from a different source. Reference standards may be obtained from the EPA.

The final concentration calculated from the known quantities is the "true" value of the standard. The important difference in a reference standard is that it is not carried through the same process used for the environmental samples, but is analyzed without digestion or extraction. A reference standard result is used to validate an existing concentration calibration standard file or calibration

curve.

6.1.4 Spike Sample

A spike sample is prepared by adding to an environmental sample (before extraction or digestion) a known amount of pure compound of the same type that is to be assayed for in the environmental sample. Spikes are added at one to 10 times the expected sample concentration or approximately 10 times the method detection limit. These spikes simulate the background and interferences found in the actual samples, and the calculated percent recovery of the spike is taken as a measure of the accuracy of the total analytical method.

A blank spike is the same as a spike sample except the spike is added to analyte-free water. The blank spike is used to determine whether the sample preparation and analysis are under control.

6.1.5 Surrogate Standard

A surrogate is prepared by adding a known amount of pure compound to the environmental sample; the compound selected is not one expected to be found in the sample, but is similar in nature to the compound of interest. Surrogate compounds are added to the sample prior to extraction or digestion. Surrogate spike concentrations indicate the percent recovery of the analytes and, therefore, the efficiency of the methodology.

6.1.6 Internal Standard

Internal standards are similar to surrogate standards in chemical composition but are used to quantify the concentration of analytes sampled based on the relative response factor. Internal standards are added to the environmental sample just prior to instrumental analysis.

6.1.7 Laboratory Duplicate or Matrix Spike Duplicate

Laboratory duplicates are aliquots of the same sample that are split prior to analysis and treated exactly the same throughout the analytical method. Spikes and duplicates for the batch are normally aliquots of the same sample.

For organics, spikes are added at approximately 10 times the method detection limit. The RPD between the values of the matrix spike and matrix spike duplicate for organics or between the original and the duplicate for inorganics is taken as a measure of the precision of the analytical method.

In general, the tolerance limit for RPDs between laboratory duplicates should not exceed 20% for validation in homogeneous samples.

6.1.8 Check Standard/Samples

Inorganic and organic check standards or samples are prepared with reference standards or are available from the EPA. They are used as a means of evaluating analytical techniques of the analyst. Check standards or samples are subjected to the entire sample procedure, including extraction, digestion, etc., as appropriate for the analytical method utilized. The check standard or sample can provide information on the accuracy of the analytical method independent of various

sample matrices.

6.2 Laboratory Instrumentation

Laboratory capabilities will be demonstrated initially for instrument and reagent/standards performance as well as accuracy and precision of analytical methodology. A discussion of reagent/standard procedures and brief descriptions of calibration procedures for major instrument types follow.

All standards are obtained directly from EPA or through a reliable commercial supplier with a proven record for quality standards. All commercially supplied standards will be traceable to EPA or NIST reference standards and appropriate documentation will be obtained from the supplier. In cases where documentation is not available, the laboratory will analyze the standard and compare the results to a known EPA-supplied or previous NIST-traceable standard.

All sections of the laboratory will have SOP for standard and reagent procedures to document specific standard receipt, documentation, and preparation activities. In general, the individual SOPs incorporate the following items:

- Documentation and labeling of date received, lot number, date opened, and expiration date;
- Documentation of traceability;
- Preparation, storage, and labeling of stock and working solutions; and
- Establishing and documenting expiration dates and disposal of unusable standards.

Each laboratory instrument will be labeled clearly with a unique identifier that relates to all laboratory calibration documentation. Laboratory SOPs and calibration procedures are detailed in the laboratory's Quality Assurance Manual, available upon request.

7.0 DATA REPORTING AND USABILITY

Laboratory test results will be reported in NYSDEC Analytical Services Protocol (ASP) Category B deliverable reports. In addition, analytical results will be provided using an electronic database deliverable (EDD) and EQuIS format.

7.1 Category B Data Package

All analytical data will be reported by the laboratory with NYSDEC ASP Category B deliverables. The Category B data package includes:

- A detailed summary of the report contents and any quality control outliers or corrective actions taken.
- Chain of Custody documentation
- Sample Information including: date collected, date extracted, date analyzed, and analytical methods.
- Data (including raw data) for:
  - samples
  - laboratory duplicates
  - method blanks
  - spikes and spike duplicates
  - surrogate recoveries
  - internal standard recoveries
  - calibrations
  - any other applicable QC data
- Method detection limits and/or instrument detection limits
- Run logs, standard preparation logs, and sample preparation logs
- Percent solids (where applicable).

7.2 Quality Assurance Reports

For the laboratory, a general QA report summarizing problems encountered throughout the laboratory effort, including sample custody, analyses, and reporting, is provided to project QA management by the QA coordinator. This report identifies areas of concern and possible resolutions in an effort to ensure data quality.

Upon completion of a project sampling effort, analytical and QC data will be included in a comprehensive report that summarizes the work and provides a data evaluation. A discussion of the validity of the results in the context of QA/QC procedures will be made, as well as a summation of all QA/QC activity.

Serious analytical or sampling problems will be reported to NYSDEC. Time and type of corrective action, if needed, will depend on the severity of the problem and relative overall project importance. Corrective actions may include altering procedures in the field, conducting an audit, or modifying laboratory protocol. All corrective actions will be implemented after notification and approval of NYSDEC.

In addition to the laboratory report narrative, QA data validation reports that include any contractual requirements will also be provided to NYSDEC. These QA reports will be submitted with the analytical data, on a monthly basis, or at the conclusion of the project.

7.3 Data Usability

Prior to the submission of the report to NYSDEC, all data will be evaluated for precision, accuracy, and completeness.

QA/QC requirements from both methodology and company protocols will be strictly adhered to during sampling and analytical work. All data generated will be reviewed by comparing and interpreting results from instrumental responses, retention time, determination of percent recovery of spiked samples or blanks, and reproducibility of duplicate sample results. All calculations and data manipulations are included in the appropriate methodology references. Control charts and calibration curves will be used to review the data and identify outlying results.

Sampling locations will be obtained from the sampling records, such as the COC forms. This information is necessary for preparation of the data summary, evaluation of adherence to sample holding times, discussion of matrix problems, and discussion of contaminants detected in the samples.

A Data Usability Summary Report (DUSR) will be provided after review and evaluation of the analytical data package. The DUSR will contain required elements listed in Appendix 2B of DER-10 Technical Guidance for Site Investigation and Remediation.

The DUSR will include a description of the samples and analytical procedures used. Any data deficiencies, protocol deviations, or quality control problems will be discussed as to their effect on data results. The report will also include any suggestions for resampling or reanalysis.

Copies of all data usability reports, as well as all data summary packages, will be provided to the NYSDEC project manager. In addition, copies of all analytical raw data will be provided to NYSDEC upon request.

TABLE
1:
SAMPLING AND ANALYSIS
SUMMARY

Sample Location	Matrix	Proposed Number of Samples		Field Analysis	Sample Depth
		CP-51	CP-51 SVOC		
Area B Confirmatory Samples					
Excavation Walls[1] Excavation Bottom[1]	Soil	4 1		PID/Visual	Based on Field Observations
Duplicate[2]	Soil	1		NA	
Matrix Spike[2]	Soil	1			
Matrix Spike Duplicate[2]	Soil	1			
Trip Blank	Soil	1			

Notes:
[1]The proposed number of samples shown is the minimum number per 15 linear feet of trench.
[2]A duplicate, matrix spike, and matrix spike duplicate will be taken for every 20 samples.
VOCs to be analyzed by Method SW8260B
SVOCs to be analyzed by Method SW8270C
Reporting level: Category B (Level IV)

APPENDIX E

Qualifications of Environmental Professionals

Nancy S. Van Dussen, P.E.
Environmental Department Manager

RAVI ENGINEERING & LAND SURVEYING, P.C.

EDUCATION
B.C.E., Civil Engineering, University of Detroit, Magna Cum Laude

PROFESSIONAL REGISTRATION
Professional Engineer: New York, 1984 No. 61266
NYS Department of Labor Asbestos Project Designer
OSHA 40-hour Hazardous Waste Site Training

PROFESSIONAL EXPERIENCE
Nancy S. Van Dussen, P.E. has more than 25 years of professional engineering experience. She has served as project manager for transportation, environmental, and planning projects with construction values up to $45 million, performed dozens of Hazardous Materials Assessments to ensure staff health and safety. Ms. Van Dussen is experienced with the SEQRA and NEPA processes and has been responsible for preparation of numerous Environmental Impact Statements and Environmental Assessments. Her projects include:

Niagara Falls State Park – Police Station, Niagara Falls, NY - Project manager for a Phase I Environmental Site Assessment at the proposed New Police Station site along the Gorge Rim south of the existing Discovery Center. Findings from the Phase I ESA led to a Phase II test pit investigation, sampling, & radiological survey. During the radiological survey, the on-site slag fill was determined to be a technically-enhanced naturally occurring radioactive material requiring special handling. Soil samples were collected and characterized for TCLP, VOCs and SVOCs, Metals, PCBs, Ignitability and pH levels. A soils management plan was developed to handle soils during construction. The NYSOPRHP ultimately decided on another site for the police station.

Farmington Hotels, Phase I Environmental Site Assessment -
Project Manager - prepared a Phase I Environmental Site Assessment Report, per ASTM E 1527-05 Standards for this site located behind 6037 State Route 96 in Farmington, New York. It consists of a 2.00 acre developed parcel containing a hotel. Adjacent properties include a hotel, commercial lands and undeveloped lands. The Site is bounded on the east by a motel; on the west by a gas station and convenient food mart; on the north by Route 96 and a restaurant; and on the south by a vacant, former restaurant.

Elm Street Penn Yan Phase I Environmental Site Assessment -
Project Manager - was responsible for the preparation of a Phase I Environmental Site Assessment for a commercial property transaction.

Phase I Environmental Site Assessment, Victor, Ontario County, NY –
Project Manager - prepared a Phase I Environmental Site Assessment Report per ASTM E 1527-05 Standards. The Site is located behind 7449 State Route 96 in Victor, New York. The site consisted of a 2.7 acre parcel. Adjacent properties include commercial lands and undeveloped lands. Information relative to the Site's historical usage was provided by the current and past owners and available historical records.

Brooks Landing – Phase II Improvements, Rochester, NY - Environmental Project Manager responsible for the environmental evaluations associated with Genesee River Waterfront Area Improvement projects. Tasks included addressing requirements of all applicable state and federal environmental laws and regulations, compliance with 6NYCRR Part 502 "Floodplain Management Criteria", preparation of a Section 4(f) statement for Genesee Valley. Preparation of permit applications will be completed by Ravi Engineering & L.S., P.C.

111 Buffalo Road, Rochester, NY - Ravi Engineering & Land Surveying, P.C. (RE&LS) conducted a Phase I Environmental Site Assessment (ESA) of the property at 111 Buffalo Road of Rochester, New York. The results warranted conducting a Limited Phase II ESA to investigate impacts from a historic gas station that occupied the site from the 1940s until 1983. The scope of work for the Phase II ESA included removing and disposing of the asphalt and concrete over the impacted area, excavating and disposing of 1000 tons of impacted soil, screening the excavated soils with a photoionization detector, collecting confirmatory pit sidewall samples and submitting for volatile organic compound (VOC) analysis, removing contaminated soils from the pit and trench, and treating the contamination with bioremedial accelerants. A passive vent system was installed to mitigate concerns relative to vapor intrusion into the building. Nancy was the Environmental Department manager on this project.

Rochester City School District, 30 Hart Street, Phase I Environmental Site Assessment -
Project Manager - prepared a Phase I Environmental Site Assessment Report, per ASTM E 1527-05 Standards for this site prior to the Rochester City School District renewing the lease of a portion of the building at 30 Hart Street.

Peter S. Morton, P.G., C.P.G.
Project Manager

RAVI ENGINEERING & LAND SURVEYING, P.C.

EDUCATION
M.S. Geology, University of Massachusetts, Amherst, MA
B.A. Geology, Amherst College, Amherst, Massachusetts

PROFESSIONAL REGISTRATION
NYS Licensed Professional Geologist / American Institute of Professional Geologists Certificate #7932 / NYS Licensed Asbestos Inspector / USEPA Certified Lead Inspector / RCRA-OSHA 40 hour Hazardous Waste Training / NYS Licensed Mold Assessor

PROFESSIONAL EXPERIENCE
Peter has over 25 years of environmental services experience. He is a NYS and AIPG Certified Professional Geologist, a NYS Licensed Asbestos Inspector, a USEPA Certified Lead Inspector, and a NYS Certified Mold Assessor. His experience includes Phase I Environmental Site Assessments, Phase II investigations and remedial plans, soil gas surveys, underground storage tank closures; feasibility studies/remedial investigations (FS/RI), Brownfield Cleanup (BCP) Investigations and design of bioremedial and soil vapor extraction systems. Peter was also a member of the Region 2 USEPA Superfund Field Investigation Team.

Site Assessment - Peter has greater than 25 years of experience conducting Phase I Environmental Site Assessments (ESAs), supervising Phase II work and BCP remedial investigations. Examples of Phase II work include underground storage tank removal, tank testing, drywell closure, and vapor mitigation.

Cell Towers - Peter has performed more than **1,000 environmental due diligence inspections** for a national cellular telecommunications provider.

Notable projects that Peter has managed include:

Housing Visions Walnut Avenue Homes Project, Niagara Falls, New York – RE&LS identified radioactive slag on the property. The slag required transportation and disposal outside of New York State.

5 & 15 Flint Street, Rochester, NY - RE&LS compiled the Remedial Investigation (RI) for the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) for the 5 & 15 Flint Street properties in Rochester, New York. This site is part of the City of Rochester Vacuum Oil BCP.

BCP at 1440 Empire Blvd, Town of Penfield - The site is an approximately 4.5-acre parcel on Empire Boulevard in the Town of Penfield; it was historically a landfill that was contaminated with polychlorinated biphenyls (PCBs). After achieving the certificate of completion (COC), the site had been developed as the Southpoint Cove apartment complex.

BCP at 690 Portland Ave., City of Rochester - RE&LS conducted a Remedial Investigation (RI) at the Former JML Optical site at 678-690 Portland Avenue in the City of Rochester, New York. The scope of work included soil boring installation, subsurface soil sampling, monitoring well installation, water level measurements, supplemental groundwater sampling, and a soil vapor investigation. A groundwater plume of trichloroethylene (TCE) was identified; sub-slab vapor samples indicate that soil vapors are contaminated with several chlorinated compounds. Vapor mitigation systems were installed in the subject building and several adjacent houses to mitigate the vapor intrusion issue.

BCP at 245 Andrews Street, City of Rochester - RE&L was responsible for conducting a limited Phase II Environmental Site Assessment at 245 Andrews Street in the City of Rochester, New York as part of Rochester's Federal Brownfield Grant. The site had previously been used as a gas station and as a dry cleaner. We identified a historic petroleum spill where a gas station was reported in the parking lot adjacent to the dry cleaner, and identified a perchloroethylene (PCE) plume in groundwater relative to the dry cleaning operation. The New York State Department of Environmental Conservation (NYSDEC) subsrquently added the site to the list of NYS Superfund Sites.

VCA at former Fischbach & Moore Electric, 235 Metro Park, Town of Brighton

BCP at former Speedy's Cleaners on Monroe Avenue, Town of Pittsford

BCP at Comfort Inn on Buell Road, Town of Gates

Blue Cross/Blue Shield Remedial Site Plan - Peter was the Project Manager for the environmental cleanup in March 1997 of urban lands developed as the new Blue Cross/Blue Shield building in Rochester, NY.

Geoffrey Robert Bijak, M.S.
Environmental Project Manager

RAVI ENGINEERING & LAND SURVEYING, P.C.

EDUCATION
M.S. Environmental Management, Health and Safety, Rochester Institute of Technology
B.A., Environmental Studies, SUNY Buffalo

CERTIFICATIONS
USEPA Certified Lead Risk Assessor/Inspector / NYS Mold Assessor
NYS Department of Labor Asbestos Project Designer/ Inspector / Project Monitor / Air Technician

PROFESSIONAL AFFILIATIONS
American Conference of Industrial Hygienists
Construction Specifier Institute

PROFESSIONAL EXPERIENCE
Geoffrey R. Bijak has been performing various forms of environmental consulting in the Western New York area for over thirteen years. He earned a Bachelor of Arts degree in Environmental Studies from The University of Buffalo in 2005 and received a Master of Science Degree in Environmental Management, Health and Safety in December of 2012 from the Rochester Institute of Technology. Mr. Bijak specializes in Asbestos Inspections, Lead Inspections, Mold Site Assessments, Indoor Air Quality Testing, and Industrial Hygiene Services. He currently holds valid certifications for asbestos and lead work. Mr. Bijak is a current member of the Construction Specifier Institute, and past member of the American Conference of Governmental Industrial Hygienists.

Monroe Community College, Rochester, NY - Carbon Monoxide Detection and Site Lighting Project
Buildings 3, 5, 7, 9, 10, 11, 21, 22, and 23, Rochester, New York As Project Manager, an Asbestos Pre-Renovation Survey/Inspection was conducted at the Monroe Community College (MCC) Buildings 3, 5, 7, 9, 10, 11, 21, 22, and 23 located in Rochester, New York. The Survey/Inspection included a visual inspection and collection of suspect asbestos containing building materials for analysis. RE&LS assessed interior spaces of the buildings impacted by the Carbon Monoxide Detection project only as proposed by MCC and coordinated to determine the presence, location, quantity and condition of asbestos containing materials (ACMs). Numerous areas were found to have homogeneous areas (HAs), based on color and texture, and were identified. (2016)

Monroe Community College Building 4 Theater MCC upgraded outdated equipment and acoustics in the theater. MCC intends to perform the renovation during the summer of 2016 so the building can be ready for student and faculty occupancy prior to the Fall Semester. As Project Manager, (RE&LS) performed a Limited Pre-Renovation Survey/Inspection and abatement design was conducted. Asbestos abatement will be performed in 3 separate work areas throughout the theater. (2016)

SUNY Cobleskill, Champlin Hall RE&LS conducted an Asbestos Pre-Renovation Survey/Inspection for Champlin Hall to gather samples and test for the presence of asbestos, lead and PCBs. Asbestos was detected on the first, second floor and in the basement as well. Mr. Bijak was the Project Manager for asbestos abatement design, specifications, opinion of probable cost and assistance with bidding for construction for this project. (2016)

SUNY Brockport, Stair replacement, for Hartwell Hall, Rakov Center, and the Tower Fine Arts Center A Pre-Renovation Asbestos Survey/Inspection, PCB Caulk Survey, and Lead Paint Survey have been completed for Hartwell Hall, Rakov Center, and the Tower Fine Arts Center at the State University of New York (SUNY) College at Brockport. Mr. Bijak was the project manager and provided quality assurance/quality control of the final inspection report. (2016)

SUNY Plaza Building, Center Tower, Albany, NY, Floors Six through Eleven
The SUNY System Administration Building, formerly the Delaware & Hudson Railroad Building, is a public office building located at the intersection of Broadway and State Street in downtown Albany, New York. Locally the building and land it sits on is referred to as State University Plaza, It was listed on the National Register of Historic Places in 1972 as Delaware and Hudson Railroad Company Building. The central tower is thirteen stories high and is capped by an 8-foot-tall (2.4 m) working weathervane that is a replica of Henry Hudson's Half Moon. A Pre-Renovation Asbestos Inspection, Lead-based Paint Survey, PCB Caulk Survey, and Abatement Design were conducted. Mr. Bijak was the project manager and provided quality assurance/quality control of the final inspection report. (2016)

New York State College of Agricultural and Life Sciences, Food Research Facility, Geneva, New York
Mr. Bijak conducted a site assessment and subsequent asbestos abatement design for the removal and disposal of a two-ton cooling tower that contained asbestos caulk and internal paper. The project involved the submission of a site specific asbestos variance which detailed the scope of work for the abatement contractor. Mr. Bijak worked directly with Cornell Asbestos Manager Dale Housknecht to coordinate efforts needed to execute this work.

RCSD #58- WOI School, Rochester, NY
The school is a multi-level two/three-story building with a basement, and about 106,500 square feet of building area, constructed in 1915. RE&LS performed a Pre-Renovation Asbestos Inspection and PCB Caulk Survey for the proposed masonry rehabilitation, coping replacement, and roof replacement at School #58. Mr. Bijak was the project manager and provided quality assurance/quality control of the final inspection report. (2016)

Abelard Reynolds School No. 42, RCSD, Rochester, NY
Originally built in 1928, addition in 1958 this 3-story brick buildings environmental inspection is to assess and sample suspect asbestos containing materials (ACMs) and test caulks/sealants for PCB content that will be impacted by the proposed roof renovation at School #42. As Project Manager, the scope of work to included assessment and bulk sampling in the following areas: - North end roof field, flashings, cement and caulks - North, east and west parapet wall cement and caulks - Stack, interior and exterior construction materials and Terrazzo floor testing . (2016)

Rochester City School District AHERA Three-Year Reinspection Ravi Engineering & Land Surveying is conducting the 2016 three year reinspection of approximately 60 buildings comprised of approximately 5.5 million square feet of total area for the Rochester City School District. RE&LS will conduct a reinspection of all friable and non-friable known and assumed asbestos containing building materials (ACBMs) in each District building. The inspection will be conducted in order to determine if there has been any change in the condition of the ACBM, under the Asbestos Hazard Emergency Response Act (AHERA) (2016)

West Genesee Central School District - District Wide Reconstruction Project Phase III: Onondaga, East Hill, West Genesee & Split Rock, Camillus, NY The West Genesee Central School District performed renovations at four of their schools as part of 2014 Capital Improvement project. Mr. Bijak was the Project Manager for the hazardous materials sampling and results review, along with quantifying potential asbestos containing materials throughout renovation areas. Mr. Bijak coordinated work with the district and Architect and provided asbestos abatement design and project specifications.

Asbestos and Hazardous Materials Pre-Renovation Survey, Rockton Plaza Accessibility Project, Little Falls, NY The City of Little Falls was awarded a NYS Community Development Block Grant funds to assist the Little Falls Housing Authority with the construction of an elevator shaft and all required controls and mechanisms at the existing Rockton Plaza senior housing complex. The Rockton Plaza, built in the early 1970s, is a 64-unit senior housing high rise within the downtown business district. The renovations included building a new elevator at the front of the building maintaining the existing elevator as backup, and a re-designed main entrance. Ravi Engineering & Land Surveying conducted an asbestos and hazardous materials survey, asbestos abatement design and construction administration services on this project.

NYS Office of Parks, Recreation and Historic Preservation, Administration Building/Visitor Center Roof, Niagara Falls State Park, NY As part of renovations to this facility, asbestos containing materials, lead-based paint, and mold contaminated building materials were specified for removal. Mr. Bijak oversaw RE&LS personnel in performing asbestos Project Monitoring activities. Mr. Bijak was responsible for conducting final visual inspections for asbestos, mold and lead remediation. Clearance lead dust wipes and mold air samples were collected by Mr. Bijak. Mr. Bijak was instrumental in hazardous material coordination between the owner and construction manager. A mold/moisture assessment report and a remediation specification were provided at the owner's request.

Rochester Genesee Regional Transportation Authority, Campus Improvement Project , Rochester, NY
RGRTA is implementing a Campus Improvement Project that would improve operations on RGRTA's existing Regional Transit Service (RTS) campus located on approximately 16.5 acres in the City of Rochester. A limited room-by-room site investigation of the Operations Building on the Rochester Genesee Regional Transportation Authority (RGRTA) campus was completed. In addition, the inspectors took additional asbestos bulk samples for asbestos analysis; sampled floor coating material for PCB's and inventoried all lights and fixtures contained within the Operations Building. Mr. Bijak was the project manager and performed asbestos survey and design services on this project.

Asbestos and Hazardous Materials Pre-Renovation Inspection, Central New York Psychiatric Center
The Marcy Psychiatric Facility is a seven story brick and masonry façade correctional facility located in Marcy, New York. DASNY/OMH intended to renovate the existing windows throughout the building which will impact asbestos containing building materials. The planned renovation included removal of building windows, window trim interior and exterior, removal of caulk and glazing compounds, and interior wall and ceiling systems impacted by the window replacement. Ravi Engineering & Land Surveying, P.C. provided professional engineering services including an asbestos pre-renovation survey, PCB caulk survey and sampling, design development, bid submission and bid phase assistance and construction administration services. Mr. Bijak performed asbestos survey and design services on this project.

Rochester Housing Authority - University Tower/Kennedy Tower Asbestos Pre-Renovation Survey Exterior Waterproofing/Repointing
The University and Kennedy Towers are multi-story apartment complexes in the City of Rochester. Due to years of weathering, exterior building materials were losing the ability to repel water. All exterior sealants were scheduled for removal and bricks required repointing. Mr. Bijak completely executed this hazardous material project from cost proposal to report preparation.

James MacKecknie
Environmental Engineer

RAVI ENGINEERING & LAND SURVEYING, P.C.

EDUCATION
M.S., Geology, 1991, Vanderbilt University, Nashville, TN
B.A., Geology, 1987, Alfred University, Alfred, NY

CERTIFICATIONS
- OSHA 40-hour Health and Safety Training for Hazardous Waste Site Operations
- NSPE Level III
- EPA Sampling for Hazardous Materials Training
- OSHA Confined Space Entry Training
- NYSDOL Asbestos Inspector
- Corps Wetland Delineation Manual Training
- ISO 14001:2004 Internal Auditor Course in August 2006

PROFESSIONAL AFFILIATIONS
New York State Council of Professional Geologists
Geological Society of America
New York State Wetland Forum

PROFESSIONAL EXPERIENCE
Mr. MacKecknie has over 21 years' experience in a wide range of environmental engineering and geological areas. He has conducted Phase I and Phase II environmental assessments, designed and installed groundwater monitoring wells and remediation systems, assisted clients with regulatory compliance, and conducted wetland delineations.

ENVIRONMENTAL ASSESSMENTS
Phase I and II Environmental Site Assessments - Conducted initial Phase I investigation following ASTM and NYSDOT guidelines. Expanded assessments to include soil vapor, geophysical, and well installation design and supervision; soil, waste, surface water and groundwater sampling; and analysis interpretation. From the information obtained, assisted in the design, designed and installed various remediation systems. Presented all information to the client in a report format.

NYS Thruway Authority
- Erie Canal/Barge Canal Trail – Palmyra to Newark
- Barge Canal Trail - Greece to Pittsford
- NYS Thruway Interchange 48, Batavia
- Phase I Investigation, Staff Geologist - Canal facilities, including locks, moveable dams, and guard gates
- Rest Areas - Conducted soil vapor survey and remedial design at rest areas

City of Rochester - Phase I and II Investigations
- 200 Lake Avenue, Rochester, NY – Phase II investigation, soil vapor intrusion, subsurface sampling.
- Buffalo Road/West Avenue - Phase II, soil-vapor and soil-sampling investigations.
- Frontier Stadium - As Project Geologist, conducted a Phase II, soil-vapor and geophysical investigation. Screening of archeological investigation with a photoionization detector (PID).

Monroe County - Phase I and Phase II Investigations
- Paul Road, Chili, NY – Phase I Environmental Site Assessment.
- Garnsey Road – Phase 1 only.
- VanLare Waste Water Treatment Plant - Conducted soil investigation at a former PBS facility.
- Kreag Road, Perinton, NY - Conducted Phase I investigation of project corridor.
- Regional Traffic Operation Center (RTOC), Rochester, NY - As Project Geologist conducted site inspections, a subsurface investigation and geophysical investigations at three properties associated with the proposed RTOC facility.

Wetland Delineation
Conducted wetland delineations in accordance with the 1987 Federal Wetlands Delineation Manual and the January 2012 Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Northcentral and Northeast Region.
- Black Street Road Bridge over Mud Creek, Genesee County, New York
- Genesee Regional Market, Scottsville Road, Chili, New York
- Haskell Road, Cattaraugus County, New York
- Paul Road, Chili, NY
- Black Creek Park, Monroe County New York. Mitigation Monitoring
- Midland Asphalt Materials Inc. Lyons, NY

- DPSG, Williamson, NY
- Route 17 Conversion to I-86 – Sullivan County Line to Liberty, NY
- Route 17 Conversion to I-86 – Hancock to Sullivan County Line, NY
- Route 17 Conversion to I-86 – Windsor to Hale Eddy, NY
- Lehigh Valley Linear Trail, Monroe and Livingston Counties, NY
- Erie County/Barge Canal Trail – Palmyra to Newark, NY
- Hillary Heights, Chili, NY – Storm Water/Flood Mitigation Project
- LeBrun Toyota, Canandaigua, NY
- Interchange 56, Blasdell, NYS Thruway
- Route 252 (Jefferson Road), Henrietta, NY
- Centerpointe Office Park, Canandaigua, NY
- Interchange 48, Batavia, NYS Thruway
- Hinsdale Bridge over Gull Brook, Cattaraugus County, NY
- Hamlin Beach State Park, Hamlin, NY - 100+ acres
- Ava Research Facility, Ava, NY - 300+ acres on U.S. Air Force property
- Verona Research Facility, Verona, NY - 500+ acres on U.S. Air Force property

Identification & Analysis of Riparian Corridor in the Black & Oatka Creek Watersheds, Genesee County, NY - The scope of work on this project included review of existing plans and stream channel condition assessments in the Black and Oatka Creek Watersheds. From the existing stream inventory data, forty potential restoration sites were identified based on the erosion potential ranking and the overall stream assessment score. Factors such as site accessibility, owner cooperation and land use constraints were considered during the selection process. Where possible, each project site was classified using Rosgen stream classification methods based on substrate material, width to depth ratio, sinuosity, entrenchment ratio, and other factors. Bankfull width and depth were also determined for each problem site wherever possible. Mitigation plans were preared for 10 sites along Oatka and Black Creeks. Mr. Mackecknie provided field and report preparation assistance on this project.

Joint Flood Mitigation Plan for Tonawanda & Oatka Creek Watershed, Genesee and Wyoming Counties, NY - The goals of this project was to develop a watershed-wide and municipal approach for mitigating and reducing flood hazards along the Oatka and Tonawanda Creeks in Genesee and Wyoming Counties. This project involved the preparation of 26 Flood Mitigation Plans for 24 participating municipalities and two counties in the project area. A flood hazard and risk assessment was completed for each community. General hazards identified in the communities along the Tonawanda and Oatka Creeks included structural damage, floodplain development and impervious surfaces, in-stream debris, stream-bank erosion and associated siltation, culvert maintenance/sizing, and issues associated with existing dams. Mr. Mackecknie provided field and report preparation assistance on this project.

New York Route 17 Windsor to Deposit, Broome County, NY - Mr. MacKecknie developed the preliminary storm water treatment design for ten sites along Route 17 for a proposed disturbance of over 40 acres. The sites were located in area with steep terrain with minimal right-of-way available for storm water treatment. The proposed storm water treatment included a combination of wet swales, dry swales, wet ponds, micro-pool extended detention ponds and pocket ponds. Discharge from nine of the sites was directed to important trout fishing streams, therefore the design required accommodated temperature constraints. Mr. Mackecknie provided field and report preparation assistance on this project.

Lehigh Valley Linear Trail, Monroe and Livingston Counties, NY - Assisted in the completion of "Chapter 4 - Environmental" for Lehigh Valley Linear Trail in Towns of Caledonia, Rush and Mendon, in Monroe and Livingston Counties. This involved wetland delineation; field investigation of hazardous waste, asbestos, cross culverts and condition of side roads; sample paint, potential ACM, soil, water and sediment; prepare asbestos and hazardous reports with cost estimates for recommendations; develop Work Plan and Health and Safety Plan; conduct endangered species survey; and research status of NYSDEC, Army Corp., and Coast Guard permits and prepare permit applications. Services also included creating displays and handouts for public information meetings and attendance at NYSDEC, Monroe County and public meetings.

Lynn Zicari
Environmental Scientist

RAVI ENGINEERING & LAND SURVEYING, P.C.

EDUCATION

B.S., Environmental Science, SUNY Brockport, May 2012, Magna Cum Laude; Presidents List

CERTIFICATIONS & ASSOCIATIONS

NYSDOL Certified Asbestos Inspector
NYSDOL Certified Air Project Monitor
40 Hour HAZWOPER
10 Hour Construction Safety Course
NYSDEC Erosion and Sediment Control Qualified Inspector

PROFESSIONAL EXPERIENCE

Dedicated Environmental professional proficient in environmental chemistry analytical techniques and Geographical Information Systems.

Phase I & Ii Environmental Site Assessments

Woodlyn Subdivision Phase I ESA, Webster, NY
A Site inspection was conducted by RE&LS on this site consisting of five housing lots located north of Route 104, in the Town of Webster, NY. Lynn performed the investigation and prepared the Phase I ESA report in accordance with ASTM 1527-13.

Richland Estates Phase I ESA, Greece, NY
RE&LS conducted a Site inspection for this residential development of eight lots in the Town of Greece, New York. Lynn performed the investigation and prepared the Phase I ESA report in accordance with ASTM 1527-13.

New Police Station – Niagara Falls State Park, Niagara Falls, NY
Ravi Engineering & Land Surveying, P.C. is providing on-going Environmental and Permitting services for this term contract for the Rehabilitation and Improvement of various facilities at the Niagara Falls State Park. As part of this contract, RE&LS provided a Phase I Environmental Site Assessment (ESA) at the proposed New Police Station site along the Gorge Rim south of the existing Discovery Center. Findings from the Phase I ESA led to a Phase II test pit investigation, sampling, & radiological survey. Lynn was responsible for the Phase II radiological survey, soil sampling and vapor screening.

LEDCO Inc. Phase II Environmental Site Assessment, Livonia, NY
Ravi Engineering & Land Surveying, P.C. conducted a Limited Phase II ESA at 4265 Main Street in the Town of Livonia, New York. Lynn collected 2 soil and 2 groundwater samples for laboratory characterization for VOCs by USEPA Method 8260 to investigate the conditions in the location of the historic septic system.

291 Buell Road Phase II Environmental Site Assessment, Gates, NY
The site was once utilized by several fuel oil companies. Ravi Engineering & Land Surveying, P.C. performed a Limited Phase II ESA at 291 Buell Road in the Town of Gates, New York. Lynn was responsible for collecting both soil and groundwater samples and submitting for laboratory analysis for VOCs.

Horseheads North Cell Phase II Environmental Site Assessment, Horseheads, NY
Ravi Engineering & Land Surveying, P.C. performed a Limited Phase II ESA at 61Old Ithaca Road & 130 North Main Street in the Village of Horseheads, New York. Lynn collected soil and groundwater samples for laboratory analysis for VOCs by Method 8260.

149 Ridge Road East Phase II Environmental Site Assessment, Rochester, NY
Ravi Engineering & Land Surveying, P.C. performed a Limited Phase II ESA at 149 Ridge Road East in the city of Rochester, New York. RE&LS drilled and sampled 3 soil borings, and collected and screened soil samples for the presence of VOCs.

Clayton Village Phase II Environmental Site Assessment, Clayton, NY
RE&LS performed a Limited Phase II ESA at St. Mary's Church at 521 James Street in the Village of Clayton, New York. RE&LS conducted a subsurface investigation with a track-mounted Geoprobe unit, and collected ten soil samples for laboratory analysis for SVOCs by USEPA Method 8270 in conformance with NYSDEC Commissioner's regulations along with, one soil sample for landfill characterization analysis and developed recommendations.

149 Ridge Road East Phase II Environmental Site Assessment, Rochester, NY
Ravi Engineering & Land Surveying, P.C. performed a Limited Phase II ESA at 149 Ridge Road East in the city of Rochester, New York. RE&LS drilled and sampled 3 soil borings, and collected and screened soil samples for the presence of VOCs. Lynn was responsible for soil vapor screening and soil sampling.

291 Buell Road Phase I & II Environmental Site Assessment, Gates, NY
The site was once utilized by several fuel oil companies. Ravi Engineering & Land Surveying, P.C. performed a Limited Phase I and Phase II ESA at 291 Buell Road in the Town of Gates, New York. Lynn was responsible for collecting both soil and groundwater samples and submitting for laboratory analysis for VOCs.

RHA Term Contract Glenwood Gardens Environmental Screening of Soil, Rochester, NY
RE&LS was hired to perform environmental screening of soil samples as a supplement to the geotechnical drilling that was performed at Glenwood Gardens Apartments. Lynn was the lead field technician onsite during the investigation. She was involved with the screening of soils for VOCs, collecting soil samples, and preparing the letter report. Lynn prepared the soils management plan for the project.

111 Buffalo Road, Rochester, NY
Lynn assisted with a Phase II Environmental Site Assessment and identified petroleum contamination in soil and groundwater beneath this NYSDEC spill site, a historic pump island north of the BRG building. The NYSDEC-approved Remedial Action Plan included excavation of contaminated soils for off-site disposal, removing a "slug" of contaminated groundwater, and treatment of residual soil and groundwater contamination with bioremedial measures.

Buffalo Road Soils Management Plan, Rochester, NY
Lynn assisted with a Phase II Environmental Site Assessment and identified petroleum contamination in soil and groundwater beneath a historic pump island north of the BRG building. The NYSDEC-approved Remedial Action Plan included excavation of contaminated soils for off-site disposal, removing a "slug" of contaminated groundwater, and treatment of residual soil and groundwater contamination with bioremedial measures.

BROWNFIELD REMEDIATION PROGRAM
Empire Boulevard Brownfield Remediation, Rochester, NY
The Site is an approximately 4.5-acre parcel on Empire Boulevard and will be used for a 358-unit apartment complex. Lynn was the lead on-site consultant during remedial activities to ensure that all work within the limits of the BCP was performed in accordance with the Remedial Action Work Plan (RAWP). She sampled imported soils to ensure that soils met the NYSDEC criteria for soils used in the soil cover system, performed CAMP air monitoring (Community Air Monitoring Program) to ensures that contaminated soils are not becoming airborne and migrating off-site. Lynn prepared the Final Engineering Report (FER) and the Electronic Data Deliverable (EDD). RE&LS is still performing CAMP monitoring whenever the cap is breeched. Additional soil sampling of imported soils also recently done under the SMP.

Portland Avenue Brownfield Remediation, Rochester, NY – Lynn performed soil and groundwater sampling. She is currently investigating alternatives for groundwater and soil cleanup methods, preparing the RIR (remedial investigation report) and the EDD.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)
OH - Rochester Restaurant Depot, Ridgeland Road, Henrietta, NY
Lynn performed weekly SWPPP site visits looking to see that site stabilization methods were in place and functioning properly to ensure that sediment-laden runoff was not migrating off the site onto adjacent properties, surface water, or stormwater sewers. She prepared and delivered weekly inspection reports.

Braddock Bay Storm Water Pollution and Prevention (SWPPP), Rochester, NY
The New York State Department of Environmental Conservation (NYSDEC) and the Town of Greece were working to restore and enhance the wetland habitat at Buck Pond with the Braddock Bay Fish and Wildlife Management Area. Ravi Engineering & Land Surveying, P.C. (RE&LS) provided weekly SWPPP inspections of the site after temporary stabilization measures were installed. Lynn assisted with weekly inspections continued until final stabilization occurred and prepared inspection reports, upon completion of each SWPPP Inspection.