NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 8
6274 East Avon-Lima Road, Avon, NY 14414-9516
P: (585) 226-5353 I F: (585) 226-8139
www.dec.ny.gov

September 19, 2018

Mr. Joseph Lobozzo II
Ridgecrest Associates, L.P.
135 Orchard Park Blvd
Rochester, NY 14609

Subject: 820 Linden Ave Site (#C828200)
820 Linden Ave, Pittsford, NY 14625
IRM Work Plan, July 2018

Dear Mr. Lobozzo II:

The New York State Departments of Environmental Conservation (NYSDEC) and Health (NYSDOH; collectively referred to as the "Departments") have completed the review of the document entitled *"IRM Work Plan"* dated July 2018 and prepared by Stantec for the 820 Linden Ave Brownfield Cleanup Program (BCP) site. 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. Based on the sub-slab vapor detection of trichloroethene at SS-4 in the northern tenant space at a concentration of 140 micrograms per cubic meter ($\mu g/m^3$), additional investigation of the northern tenant space is warranted. Specifically, additional soil vapor intrusion sampling in the northern tenant space (especially the western half), including both sub-slab and indoor air, will be completed during the heating season and following the installation of the proposed sub-slab depressurization system in the southern tenant space. If the sample results detect compounds at concentrations that still require mitigation, additional measures will be warranted.

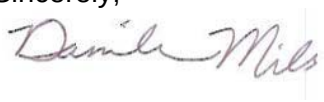
2. The reported detection limit for several volatile organic compounds in the sub-slab, indoor air, and ambient air samples was above guidance values. All future air samples will be collected following a protocol that ensures proper detection limits can be achieved during analysis.

With the understanding that the modified Work Plan is agreed to, the IRM Work Plan is hereby approved. By **October 4, 2018** and before field work begins, please stamp and date the certification page and distribute final copies as follows:

- Danielle Miles (NYSDEC – Avon, electronic file and 1 bound hard copy);
- The document repository at the Pittsford Community Library located at 24 State St. Pittsford, NY 14534 (1 bound hard copy); and,
- Kristin Kulow (NYSDOH – Oneonta, electronic file/CD).

If you have questions or concerns, please contact me at (585) 226-5349 or danielle.miles@dec.ny.gov.

Sincerely,



Danielle Miles, EIT
Environmental Engineer

ec: Mike Storonsky, Stantec
Stephanie Reynolds Smith, Stantec
Dwight Harrienger, Stantec
Linda Shaw, Knauf Shaw LLP
Frank Sowers, NYSDEC
Bernette Schilling, NYSDEC
Justin Deming, NYSDOH
Kristin Kulow, NYSDOH
Dusty Tinsley NYSDEC

IRM Work Plan

820 Linden Ave Site
Pittsford, New York
Site # C828200

July 2018

Prepared for:

New York State Department of
Environmental Conservation
6274 East Avon-Lima Road
Avon, New York 14414

Prepared on Behalf of:

Ridgecrest Associates, L.P.
125 Orchard Park Boulevard
Rochester, NY 14609

Prepared by:

Stantec Consulting Services Inc.
61 Commercial Street Suite 100
Rochester NY 14614-1009

Revision	Description	Author		Quality Check		Independent Review	

Certification

I, Dwight A. Harrienger, certify that I am currently a NYS registered professional engineer and that this IRM Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Table of Contents

LIST OF FIGURES

LIST OF APPENDICES

Abbreviations

BCP	Brownfield Cleanup Program
CAMP	Community Air Monitoring Plan
CCR	Construction Completion Report
CU	Commercial Use
DER-10	Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation, May 2010
ELAP	Environmental Laboratory Approval Program
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
IU	Industrial Use
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCE	Tetrachloroethene
PID	Photoionization Detector
POGW	Protection of Groundwater
PVC	Polyvinyl Chloride
REC	Recognized Environmental Condition
RI	Remedial Investigation
SCOs	Soil Cleanup Objectives
SGVs	Standards and Guidance Values
SSDS	Sub-Slab Depressurization System
SVI	Soil Vapor Intrusion

TCE	Trichloroethene
TOGS	Technical and Operational Guidance Series
TO-15	USEPA Air Method, Toxic Organics – 15
USEPA	United States Environmental Protection Agency
UU	Unrestricted Use
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This document presents a Work Plan for an Interim Remedial Measure (IRM) that will be implemented at the existing structure located at 820 Linden Avenue, Pittsford, New York (refer to Figure 1), in the majority of the southern tenant space. Stantec Consulting Services, Inc. (Stantec) has prepared this IRM Work Plan at the request of Ridgecrest Associates, L.P and the New York State Department of Environmental Conservation (NYSDEC).

1.1 SITE DESCRIPTION

The Site consists of an approximately 7.6-acre property improved with an approximately 108,400 square foot slab-on-grade building (Figure 1). The southern tenant space in this building is approximately 70,200 square feet and is currently occupied by JML Optical (JML). The northern tenant space is approximately 38,200 square feet and is currently occupied by Newport Corporation (Newport). Both current tenants are optics manufacturing facilities. Based on building permit records, the building was reportedly constructed in six phases. The first building permit was issued in 1954, with subsequent additions permitted for the rear and west sides of the building in 1956, 1958, and 1959. A large addition immediately north of the original building was permitted in 1966. Each of the first five construction phases now comprise the current southern tenant space. The final construction phase, which now comprises the northern tenant space, was permitted in 1967. Construction phases are delineated on design drawings provided in Appendix A.

1.2 SITE HISTORY, PREVIOUS INVESTIGATIONS, AND ENVIRONMENTAL CONDITIONS

1.2.1 Site History

Historical records indicate that the Site's building has been occupied for optical industry use since the construction of the southern building in 1954. A detailed list of the former owners and operators appears in the BCP Application.

1.2.2 Previous Investigations and Environmental Conditions

1.2.2.1 1995 Site Assessment and Operations Audit

A Phase I ESA and Operations Audit was completed by GZA GeoEnvironmental, Inc. (GZA) for Life Sciences International, PLC c/o Sheehan, Phinney, Bass and Green, in 1995 (GZA, 1995). The following is a summary of findings and recommendations from the 1995 Phase I ESA:

> The report identified Recognized Environmental Conditions (RECs) related to onsite usage of hazardous materials with waste discharge to onsite septic systems, a former outdoor storage drum area, potential fill in the raised elevation area on the northeast portion of the property, and a database listing for a potentially upgradient leaking underground storage tank (LUST) site.
>
> The GZA report included documentation of 1972 correspondence from Bausch and Lomb to E. J. Delmonte Corp. that stated the southeast septic system was used for sanitary purposes, no chemicals were discharged through the system. The system to the southwest collected sanitary and process discharge. Chemicals

including acids, bases, poisons (arsenic, antimony, mercury, etc.), DiPhospyridine, sodium pyruvate, and biological organics were discharged to the system either directly or through neutralization tanks. A third septic system located at the northwest corner collected cooling water, sanitary, and process water from the cafeteria, washrooms, and the chemistry laboratory. Discharge chemicals included organic solvents, acids, alkalis, ammonia residue, fixers and developers. In the conclusion of their report, GZA referred to the discharged materials as hazardous materials and waste. Records of removal or final pumping of the septic systems were not found.

The operations audit portion of this investigation focused on the facility's regulatory compliance with environmental, health, and safety laws and regulations pertaining to Site operations.

1.2.2.2 2004 Phase II ESA

A Phase II ESA was completed by Environmental Resources Management for Thermo Electron Corporation in 2004 (ERM, 2004). The following is a summary of findings and recommendations from the 2004 Phase II ESA:

This investigation included a passive soil gas (PSG) survey with 60 sampling locations across the northern portion of the Site, installation and sampling of a soil boring and monitoring well in a former drum storage area, a floor drain investigation, and lead wipe testing in several indoor areas where lead dust cleaning had been previously performed.

The 2004 PSG survey showed that chlorinated volatile organic compounds (CVOCs) such as tetrachloroethene (PCE), trichloroethene (TCE), and 1,1,1-trichloroethane (1,1,1-TCA) were present in soil vapor beneath the building footprint and toluene (a petroleum-related VOC) was present in exterior soil vapor across the northern portion of the Site. The highest concentration of toluene was observed in the parking lot area to the south of the eastern half of the northern tenant space, and to the east of the northeast corner of the southern tenant space.

VOCs were not detected in the soil samples collected from the test borings. VOCs were detected in the groundwater, but only at concentrations below NYSDEC standards, and were reportedly generally 50% lower than levels reported in an unnamed previous investigation (a report documenting this prior investigation was not provided to Stantec and is reportedly not in the possession of Ridgecrest Associates). The groundwater table was reported to occur at a depth of approximately 65 feet below ground surface (ft bgs). Soils encountered consisted of fine-grained sands and silty fine-grained sands.

The floor drain investigation determined that a floor drain in the flammable materials storage area discharged to the sanitary sewer near Linden Avenue.

Concentrations of lead reported in the lead wipe testing program after an intensive cleaning program ranged from 6.2 to 345 micrograms per square foot ($\mu g/ft^2$).

1.2.2.3 2005 Phase II ESA

A Phase II ESA was completed by Labella Associates, P.C. for JML Optical in 2005 (Labella, 2005). The following is a summary of findings and recommendations from the 2005 Phase II ESA:

This investigation included a Passive Soil Gas (PSG) survey with 31 sampling locations, mostly across the southern portion of the Site, with four locations duplicating those sampled in the previous PSG survey (ERM, 2004). The constituent detected at the highest concentration was PCE, with lesser amounts of TCE, 1,1,1-TCA, and 2- butanone reported. The highest CVOC concentrations were detected under the central portion of the building near a former hazardous waste storage area. Toluene was also detected in about two-thirds of the locations.

1.2.2.4 2011 Phase I ESA

A Phase I ESA was completed by O'Brien and Gere for BB&T Capital Partners II, LLC in 2011 (OBG, 2011). The following is a summary of findings and recommendations from the 2011 Phase I ESA:

The 2011 Phase I ESA was limited to the southern portion of the building (JML tenant space). The report identified RECs related to septic and sanitary systems, historical use of the property for optical manufacturing, and findings of historical environmental reports (ERM, 2004; Labella, 2005) with findings indicating the presence of primarily CVOCs and toluene in soil vapor and/or groundwater.

1.2.2.5 2016-2017 Limited Phase II ESA

Stantec conducted a Limited Phase II ESA in April 2016 through January 2017 for Ridgecrest Associates to further evaluate impacts to the Site (Stantec, 2017a). Since the results of the prior PSG survey results were 11 years old, in April 2016 Stantec began its investigation of the Site by conducting an updated soil vapor intrusion (SVI) investigation in accordance with the NYSDOH's *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006). In addition, the Limited Phase II ESA work was performed to attempt to identify if there is a source on-Site for the SVI results through a soil and groundwater investigation.

The Limited Phase II ESA work scope included two SVI Investigation events. The first event was conducted in April 2016 and included twelve sampling locations in both tenant spaces. The second event was conducted in January 2017 and included three sampling locations in the northern tenant space. The limited Phase II ESA work scope also included an interior and exterior soil and groundwater investigation. Components included the drilling of 14 test borings, collection of subsurface soil samples, and installation and sampling of four permanent and three temporary groundwater monitoring wells.

Based on water level gauging results from September 2016, the data indicate that groundwater in the northern portion of the site flows toward the north; it is anticipated that the flow direction is also generally northward across the remainder of the site.

A synopsis of the analytical findings of the Limited Phase II ESA is presented below.

SVI Results: The indoor air and sub-slab vapor data were evaluated against the NYSDOH Guidance Matrices (NYSDOH, 2006; most recently amended NYSDOH, 2017) to assign a recommended action for the indoor air and subslab sample pairs. Additionally, indoor air data were compared to the NYSDOH Air Guideline Values (NYSDOH, 2006) for the three compounds with guideline values (methylene chloride, TCE, and PCE).

Based on the NYSDOH guidance, the results would suggest the need for mitigation based on methylene chloride results in five locations in the southern tenant space and one location in the northern tenant space. However, at the

time of the SVI sampling, methylene chloride was utilized or stored in each tenant space. The indoor air concentrations are well below the 25 parts per million (ppm) Permissible Exposure Limit (PEL) set by the Occupational Safety and Health Administration (OSHA). Therefore, OSHA PELs and not NYSDOH guidance values are applicable for methylene chloride.

Based on the NYSDOH guidance for chlorinated volatile organic compounds (CVOCs), within the southern tenant space, results from four of the six locations indicated the need for mitigation of potential SVI impacts based on the 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), trichloroethene (TCE) or tetrachloroethene (PCE) results. Within the northern tenant space, one location suggested the need for monitoring during one sampling round and for mitigation during another sampling round based on TCE results. This location is adjacent to the southern tenant space. None of these CVOCs are reported to be used or stored by the current tenants.

The concentration of TCE in indoor air within the northern tenant space at one location (2.1 micrograms per cubic meter [µg/m^3]) slightly exceeded the indoor air guideline of 2 µg/m^3 during the first SVI sampling event, although it was not reported above the detection limit in the corresponding sub-slab vapor sample during either SVI sampling event. In addition, TCE was not detected above reporting limits in the indoor air samples collected during the second SVI sampling event. Given these results, it would not appear that installation of a SSDS in the northern tenant space is warranted.

Soil Results: The exceedances of NYSDEC Part 375 (NYSDEC, 2006) and Commissioner Policy (CP)-51 (NYSDEC, 2010b) Soil Cleanup Objectives (SCOs) for Unrestricted Use (UU) and the Protection of Groundwater SCOs (POGW) in Site soil samples included common, naturally-occurring metals (aluminum, calcium, iron, and magnesium) and acetone. Acetone is considered a common laboratory contaminant. However, acetone was not detected in the corresponding Quality Assurance/Quality Control (QA/QC) samples, and, is therefore considered to be related to Site conditions, particularly given: (1) the concentrations reported ranging from 53 micrograms per kilogram [µg/kg] to 120 µg/kg, which exceeds the UU and POGW SCOs but not the Commercial (CU) or Industrial use (IU) SCOs; (2) historical use of acetone at the facility; and (3) its reported presence in groundwater as described below.

Groundwater Results: The exceedances of NYSDEC's Technical and Operational Guidance Series (TOGS) 1.1.1 [Class GA] Standards and Guidance Values (SGVs; NYSDEC, 1998) for groundwater samples included commonly-occurring metals (iron, magnesium, manganese, and sodium) and acetone. Acetone was detected at concentrations ranging from 100 micrograms per liter [µg/L] to 1,100 µg/L. While acetone is a common laboratory contaminant, and laboratory contamination can often be responsible for low-level concentrations of acetone detected in water, the relatively high concentrations detected in these Site samples are considered indicative of a Site-related issue, given its absence in the QA/QC samples, its use at the facility, and its elevated presence in the soil samples.

Recommendations: The source(s) of the CVOC contamination in sub-slab vapor has not been identified. The absence of detections in soil and groundwater near (and downgradient from) the highest sub-slab vapor concentrations appear to indicate the absence of a major CVOC issue in Site soil and groundwater. Nonetheless, the SVI CVOC results indicate the need for monitoring and/or mitigation for both tenant spaces. Installation of a sub-slab depressurization system (SSDS) to address the potential for CVOC SVI to occur onsite is recommended.

To address the acetone in soil and groundwater and CVOCs detected during the SVI investigation, it was recommended that the Site owners apply for entry into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP).

1.2.2.6 2017 Phase I ESA

As a requirement of the BCP, an updated Phase I ESA was performed. Stantec conducted the Phase I ESA in accordance with the requirements of American Society for Testing and Materials (ASTM) *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM, 2013) for the entire property located at 820 Linden Avenue. Two other Phase I reports were previously performed for the Site, one of which was limited to the southern tenant space, currently occupied by JML (OBG, 2011; GZA, 1995).

The following is a list of the RECs identified during Stantec's Phase I ESA for the Site:

- According to a 1995 Phase I performed by GZA, which was disclosed to Stantec by an on-Site tenant in August 2017, documented discharge of hazardous materials and waste into multiple septic systems contained on the Site occurred between 1968 and1975. Since discharges from the septic systems may have impacted the Property, this historical activity associated with the use of the building is considered to be a REC.

- A grassed area elevated above the adjacent parking lot was observed to the east of the northern tenant space. Although the elevated area appears likely to be the pad for a building addition that was never constructed, no information was available regarding its origin or composition. Therefore, the potential for the presence of fill of unknown origin and composition is considered to be an REC.

- The results from three Phase II ESAs revealed evidence of VOC impacts to soil vapor, soil, and/or groundwater on the Site. There is enough evidence of soil, soil vapor, and groundwater contamination on the Property that this contamination is considered to be a REC.

- The facility age and reports of the condition of the sewer pipes from northern tenant indicate the possibility that leaks may have occurred under the building footprint or elsewhere on the Property. Potential process sewer line leaks are considered to be a REC for the Property.

- The parcel adjacent to the east of the Property, 860 Linden Avenue, is the former location of Jarl Extrusions, a New York State Superfund site (Code: 828005). Given the potential presence of groundwater contamination in close proximity to the Site, the remedial measures performed on the adjacent parcel, and the continued engineering and institutional controls of the adjacent parcel and discharge lagoon, 860 Linden Avenue is considered to be a controlled REC for the Property.

Though not RECs, some items that may or may not indicate the need for further investigation include:

- A pile of broken asphalt and concrete pieces was observed in the northeast corner of the parking lot. The pile is approximately 3.5' tall, 6' wide, and 4' deep.

- It was reported by Brian Grove from Newport Corporation that a lead soldering operation was conducted in what is now the southern tenant space prior to the sale to the current owner in 2005. Based on the ERM

(2004) report, an intensive cleaning program was conducted and then sampling completed prior to the sale to the current owner. Lead levels in post-cleaning wipe samples ranged from 6.2 to 345 µg/ft^2.

1.2.2.7 Sub-slab Communication Testing

As indicated in Section 1.2.2.5, SVI sampling indicated a need for mitigation in certain areas of the existing building based upon the 2017 NYSDOH matrices. In preparation for a potential design of a SSDS, sub slab communication testing was performed on August 18, 2017, August 21, 2017, and September 11, 2017 with the intent of understanding the ability of the substrate in each of the six building footprints to propagate vacuum. Appendix B contains the communication testing results, which display the presumed building construction outlines, the locations of the suction and test holes, and the testing results.

In each of the building footprints, a 4-inch diameter temporary suction hole was drilled through the floor slab. During the testing, suction was applied at the suction hole using a residential grade Radonaway GP-501 fan. Smaller diameter 1-inch temporary testing holes were installed through the slab at various distances from the suction hole and vacuum was monitored at these holes with a digital manometer before and during the application of suction. In some cases, higher pressure fans were used if no communication was observed at a given test hole using a GP-501 model fan.

In the northern tenant space (constructed in 1967), testing indicated that sub-slab conditions were not conducive to achieving a large radius of vacuum influence, which is apparently due to the lack of a sufficient sub-slab gravel layer. In the southern tenant space (constructed over five phases ranging from 1954 to 1966), sub-slab communication testing indicated that there was communication observed under the slab.

1.3 NATURE AND EXTENT OF CONTAMINATION

The known aspects of the nature and extent of contamination are outlined in Section 1.2. As per the Remedial Investigation Work Plan approved by NYSDEC on May 21, 2018, Stantec will be conducting a Remedial Investigation (RI) as part of the New York State Brownfield Cleanup Program (BCP) in 2018. One of the main objectives of the RI is to gain a more thorough characterization of the nature and extent of contamination of soil and groundwater at the Site.

1.4 SUMMARY OF IRM

The IRM will consist of the installation and operation of a SSDS in the majority of the southern tenant space. Sub-slab depressurization is designed to mitigate the migration of subsurface vapors into the interior of the structure. After installation and start-up of the system, demonstration of sub-slab depressurization will be confirmed, and thereafter periodic maintenance and monitoring of the continuing system function will be performed.

2.0 GOALS AND OBJECTIVES

The IRM is being implemented to address the recommendation in Stantec's 2017 Limited Phase II ESA to monitor and/or mitigate CVOC (1,1-DCE, cis-1,2- DCE, TCE, and PCE) impacts noted in sub-slab SVI sampling. The objective of this IRM is to mitigate the potential migration of soil vapor impacted by CVOCs (excluding methylene chloride) from beneath certain portions of the building footprint into the interior, occupied space where SVI sampling indicated a consistent need for mitigation based upon comparison to the May 2017 NYSDOH matrices. To achieve the objective, the goal of the IRM will be to achieve and maintain a minimum pressure differential vacuum of 0.002-inches of water column between the applicable sub-slab areas and the building interior space in portions of the building's footprint using an SSDS. However, there are some factors that may prevent the goal from being attained under some portions of the slab (see Section 3.1).

Areas of the building where Stantec's 2017 Limited Phase II ESA identified inconsistent recommendations per the May 2017 NYSDOH matrices or recommendations of "Monitor" or "Identify Source(s) and Resample or Mitigate" are proposed to have an additional round of SVI monitoring following the installation of the SSDS, as detailed in Section 3.6.

2.1 STANDARDS, CRITERIA AND GUIDANCE

This IRM Work Plan was developed in general accordance with the applicable standards, criteria and guidance (SCGs) contained or referenced in NYSDOH's "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006, with matrices updated May 2017, and the IRM Work Plan requirements of the Department's "DER-10 Technical Guidance for Site Investigation and Remediation" dated May 2010.

SVI investigation analytical results were compared to the May 2017 New York State Department of Health (NYSDOH) soil vapor/indoor air decision matrices (Matrices A through C), which address the following volatile chemicals: carbon tetrachloride, 1,1-dichloroethene, *cis*-1,2-dichloroethene, trichloroethene, methylene chloride, tetrachloroethene, 1,1,1-trichloroethane, and vinyl chloride.

3.0 IRM WORK PLAN

3.1 TECHNICAL APPROACH AND PROJECT PLAN

The SSDS will be designed in accordance with the performance guidelines specified in the NYSDOH SVI guidance document referenced above.

Due to constraints related to the manufacturing operations, some portions of the tenant space are inaccessible due to the presence of highly sensitive equipment and therefore cannot have suction points installed in them. According to tenant representatives, some work areas have positive pressure and/or include manufacturing processes which are sensitive to vibration and dust. In most cases, these areas coincide with areas that have prohibited construction access. The SSDS will be designed to provide as much pressure field extension into inaccessible areas within the applicable portion of the southern tenant space as reasonably practical based on the observed limits of air flow conductivity beneath the slab. Other NYSDOH recommended methods of mitigation such as sealing cracks in the concrete slab as needed, sealing existing electrical conduits as needed, and maintaining a positive pressure relative to the sub-slab pressure in locations where the tenants already maintain positive pressure relative to the sub-slab pressure will also be utilized as needed to minimize current or potential exposures associated with SVI.

Based upon the radii of influence observed in each building footprint in the southern tenant space during preliminary sub-slab air flow communication testing, described in Section 1.2.2.7, 19 extraction points and 7 fans are proposed to comprise the SSDS. Fan sizing may be adjusted following installation depending on the radius of influence for each suction point determined by post-mitigation pressure field extension testing. Proposed suction point locations are shown in Appendix A. Actual locations may need to be adjusted in the field during installation to accommodate existing equipment and operations.

The SSDS suction points will be installed using the following methods. A hole will be cut through the concrete floor to allow a suction cavity of approximately 1 cubic foot to be excavated. Clean, washed #2 gravel will be placed in the suction cavity. Alternatively, a 4-inch diameter perforated polyvinyl chloride (PVC) pipe will be installed to a depth of approximately 12 inches below the bottom of the floor slab and encased with clean, washed #2 gravel.

A network of vapor collection and discharge pipes/vent fans will be installed to convey the vapor to above the building roof line. Specifications for the discharge system are shown on the attached design drawings provided in Appendix A. Labels on the depressurization piping will clearly identify the purpose of the system. Discharge pipes will penetrate walls and be ultimately routed to the roof where each fan will be mounted to a vertical discharge point. Building managers for the two (2) tenants provided information on the location of air intakes on the building's roof. Discharge locations for the SSDS will be located a minimum of 25 horizontal feet away from air intakes. Vertical discharge piping will terminate 10 feet above the highest roof line.

One differential pressure gage per system fan will be permanently installed on the suction side of each fan to allow for monitoring and confirmation of effective operation. The gages will be combined as practical into centralized monitoring panels. Each gage will have a warning light that will be actuated if a fan is not creating suction.

After the installation of the SSDS, temporary sub-slab pressure monitoring points will be drilled into the slab in applicable areas of the southern tenant space. Sub-slab pressure will be measured using a digital manometer to

verify that the system lowers sub-slab pressure below the building ambient interior pressure. Permanent sub-slab monitoring points will be installed at various locations based on the pressure readings of the temporary sub-slab pressure monitoring points to allow for the confirmation of a minimum of 0.002-inches water pressure differential between the sub-slab and the indoor air in the future. The location of these monitoring points will be determined in coordination with the NYSDEC, the Owner and the Tenant. Temporary monitoring points that will not be utilized as permanent sub-slab pressure monitoring points will be sealed after acceptable system performance has been established.

Immediately following installation, adequate operation of the warning system (a pressure indicator) will be confirmed, and the building occupants will be made aware of this warning device and how it functions. In addition, "smoke tubes" will be used to check for leaks through cracks or floor joints near the suction point. Observable leaks will be sealed with polyurethane caulk.

3.2 DESIGN AND SPECIFICATIONS

Components of the system will be designed and installed in accordance with the NYSDOH SVI guidance document referenced above and in compliance with the applicable building codes. System components and piping will be PVC, and exterior piping and fans will be installed to minimize condensation on the exterior of the piping and permit condensation on the inside of the piping to drain back into the subsurface. The electrical components of the system will be low-power equipment compatible with the normal electrical loads and systems of the facility.

Specifications for the SSDS piping, fans and equipment are presented on the Design Drawings attached to this Work Plan.

3.3 POST-MITIGATION PRESSURE FIELD EXTENSION TESTING

As discussed in Section 3.1, temporary sub-slab pressure monitoring points will be drilled into the slab in the applicable areas of the southern tenant space. Sub-slab pressure will be measured using a digital manometer to verify that the system lowers sub-slab pressure below the building ambient interior pressure. Permanent sub-slab monitoring points will be installed at various locations based on the pressure readings of the temporary sub-slab pressure monitoring points to allow for the confirmation of a minimum of 0.002-inches water pressure differential between the sub-slab and the indoor air in the future. The location of these monitoring points will be determined in coordination with the NYSDEC, the Owner and the Tenant. Temporary monitoring points that will not be utilized as permanent sub-slab pressure monitoring points will be sealed after acceptable system performance has been established.

3.4 IRM CONSTRUCTION COMPLETION REPORT

SSDS installation and post-installation communication test results will be documented in an IRM Construction Completion Report (IRM CCR). The report will include detailed descriptions and record drawings of the system locations and components.

An Operations, Maintenance, and Monitoring (OM&M) Plan will be submitted with the IRM CCR. The OM&M Plan will be provided to the site owner and designated representatives for both tenants to facilitate their understanding of the system's operation, maintenance and monitoring. The OM&M Plan will include the following:

- a description of the mitigation system installed and its basic operating principles;
- how the owner or tenant can check that the system is operating properly;
- how the system will be maintained and monitored and by whom;
- a list of appropriate actions for the Owner or Tenant to take if a system warning device (differential pressure gage) indicates system degradation or failure;
- a description of the proper operating procedures for the system, including manufacturer's operation and maintenance instructions and warrantees; and
- contact information if the Owner or Tenant have questions, comments, or concerns.

3.5 MAINTENANCE AND MONITORING

Future monitoring will be performed on an annual basis to monitor system communication via differential pressure measurements. This routine monitoring will include:

- visual inspection of the equipment and piping;
- inspection of exhaust points to verify that no new air intakes have been located nearby;
- identification and subsequent repair of leaks;
- measurement of differential pressure on all differential pressure gages located on the suction side of exhaust fans; and
- measurement of differential pressure at all permanent monitoring locations to ensure a sufficiently lower pressure is being maintained in the sub-slab relative to indoor ambient.

In addition, non-routine maintenance may be conducted should it appear that the mitigation system has reduced its effectiveness due to malfunction, renovation, or other unplanned circumstance. Examples of such circumstances include the following:

- the building's Owner or Tenant report that a warning device indicates that the mitigation system is not operating properly;
- the system is accidentally damaged; or
- the building has undergone renovations that may reduce the effectiveness of the mitigation system.

The sub-slab depressurization system will be operated until such time as permission in writing is received from NYSDEC and/or NYSDOH to terminate operation of the system.

3.6 POST-SSDS INSTALLATION INDOOR AIR/SUB-SLAB VAPOR MONITORING

One additional SVI monitoring event is proposed to occur a minimum of 30 days following the completion of SSDS construction and SSDS startup activities at up to five prior sampling locations and one new sampling location. Those six proposed potential sampling locations are described below.

Prior to the additional SVI monitoring, sub-slab pressure relative to the pressure of the interior, occupied space will be measured using a digital manometer at each of the six proposed sampling locations. If the IRM's pressure differential vacuum goal of 0.002 inches of water column or greater is observed, that proposed sampling location will be considered mitigated to reduce the potential migration of soil vapor impacted by CVOCs into the interior, occupied space. In the event this pressure differential vacuum goal is met, that proposed sampling location will not undergo additional SVI monitoring.

Should the differential pressure vacuum be less than 0.002 inches of water column, one additional round of monitoring is proposed as follows. Targeted SVI monitoring is the proposed action based upon "Monitor" or "Identify Source(s) and Resample or Mitigate" matrix outcomes, or in building construction areas not previously tested. In the southern tenant space, proposed SVI monitoring will include:

- Two existing monitoring locations IA/SS-7 and IA/SS-9 (as shown in Appendix D).
- An additional SVI monitoring location will be established in the 1959 portion (depicted in Appendix A) of the southern tenant space.

In the northern tenant space, the following monitoring is proposed:

- Three existing locations (IA/SS-2, IA/SS-4 and IA/SS-5, as shown in Appendix D).

SVI samples will be analyzed using USEPA method TO-15 at a NYSDOH-certified ELAP laboratory. Summa canisters will be batch-certified clean, and regulators will be set for a sampling period of 8 hours. Post-installation SVI monitoring results will be submitted to NYSDOH and NYSDEC.

3.7 SCHEDULE

Construction of the SSDS is planned to begin after approvals of this IRM Work Plan by the NYSDOH and NYSDEC.

Work will generally be performed after approximately 3:00 pm to avoid conflicts with both tenants daily operating schedules. Additionally, construction will need to be coordinated with each tenant's manufacturing timelines due to equipment sensitivities. NYSDEC and NYSDOH will be notified in advance of the installation activities.

The IRM CCR and the OM&M will be submitted to NYSDOH and NYSDEC within three (3) months following the completion of post-installation pressure field extension testing.

3.8 PERMITTING

The SSDS installation contractor(s) will be responsible for obtaining the necessary permits for construction and electrical work.

3.9 WASTE MANAGEMENT

It is anticipated that the soil and concrete generated during the installation of the sub-slab depressurization system will be placed directly in covered DOT-approved 55-gallon steel drums. Each drum will be labeled as to contents, and representative samples from the drums will be collected for waste characterization purposes. Pending analytical results and arrangements for transport and disposal, the drums will be staged on site in one of the designated IRM staging areas. Drums will be disposed of in accordance with applicable regulations. Documentation of waste characterization results and disposal will be included in the IRM CCR.

3.10 HEALTH & SAFETY PLAN

Stantec has prepared a Health and Safety Plan (HASP) for Stantec personnel who will be involved with the IRM implementation at this site. This plan is attached as Appendix C to this Work Plan. Contractors working on the site will be required to prepare and follow their own HASPs for the site.

3.11 COMMUNITY AIR MONITORING PROGRAM

The Community Air Monitoring Plan (CAMP) will be implemented using periodic VOC monitoring during the extraction point construction activities. It is anticipated that the upwind and downwind VOC monitoring requirements of the generic NYSDOH CAMP will be applied as feasible and appropriate for work on an indoor construction project.

VOC monitoring will be performed periodically using a 10.6 eV lamp PID. Exhaust fans will be used to remove air from the work area of each penetration of the concrete slab. The fan exhaust will be piped to the outside of the building except in cases where the distance to an exterior door makes it impractical to run exhaust piping. In these cases, the exhaust fan will be piped to carbon filtration units prior to interior discharge.

An effort will be made to maximize dust containment during work. For example, particulates created from penetrating the slab will be contained using a shop vacuum with a high efficiency particulate air (HEPA) cartridge filter. Particulate monitoring will be performed by visual inspection. Real time measuring of the particulates is not anticipated.

3.12 QUALITY ASSURANCE AND QUALITY CONTROL

Field monitoring instrument calibration will be performed in accordance with DER-10 guidance.

A NYSDOH ELAP certified analytical laboratory will be used for the analytical services of the project. With the exception of waste disposal samples, laboratory deliverables will be prepared in general accordance with NYSDOH ASP Category B guidelines and will be evaluated in a data usability summary report.

4.0 REFERENCES

ASTM, 2013 E1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.

ERM, 2004 Results of Phase II Site Assessment Activities, Spectronic Facility, 820 Linden Avenue, Pittsford, New York. January 13, 2004.

GZA, 1995 Site Assessment and Operations Audit, Milton Roy Analytical Products Division, 820 Linden Avenue, Rochester, New York. June 1995.

Labella, 2005 Phase II Environmental Site Assessment: Supplemental Passive Soil Gas Survey. June 2005.

NYSDEC, 1998 Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 and June 2004 addenda).

NYSDEC, 2006 6NYCRR Part 375 Environmental Remediation Programs. December 14, 2006.

NYSDEC, 2010a NYSDEC's DER-10, Technical Guidance for Site Investigation and Remediation. May 3, 2010.

NYSDEC, 2010b NYSDEC's Commissioner Policy CP-51 Soil Cleanup Guidance. October 21, 2010.

NYSDOH, 2006 Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York. October 2006.

NYSDOH, 2017 Soil Vapor Intrusion Updates, May 2017: Updates to Soil Vapor/Indoor Air Decision Matrices. Website: https://health.ny.gov/environmental/indoors/vapor_intrusion/update.htm, accessed 7/26/2017.

Stantec, 2017a Limited Phase II Environmental Site Assessment for 820 Linden Avenue, Pittsford, New York. August 2017.

Stantec, 2017b Phase I Environmental Site Assessment, 820 Linden Avenue, Town of Pittsford, Monroe County, New York. August 2017.

OBG, 2011 Environmental Site Assessment, 820 Linden Avenue, Rochester, NY. April 2011

FIGURE 1 – 820 LINDEN AVENUE SITE LAYOUT

Stantec

Legend

- Site Property Outline
- Nearby Parcel Boundaries
- Building Tenant Spaces
- JML Optical
- Newport

0 100 200 Feet

1:1,200 (At Original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 StatePlane New York West FIPS 3103 Feet
2. Orthoimagery (2015) downloaded from gis.ny.gov.
3. Site building is occupied by two tenants: JML Optical in the southern building section and Newport in the northern building section.

Project Location:
820 Linden Avenue
Pittsford, Monroe Co., NY

Prepared by MB on 2018-07-06
Technical Review by SRS on 2018-07-06
Independent Review by MPS on 2018-07-06

190500898

Client/Project
820 Linden Avenue Site
Interim Remedial Measure Work Plan
Brownfield Cleanup Program Site #C828200

Figure No.
1

Title

820 Linden Avenue Site Layout

Appendix A DESIGN DRAWINGS

A.1 ENV-100 – SUB-SLAB DEPRESSURIZATION SYSTEM COVERAGE PLAN (SOUTHERN TENANT SPACE)

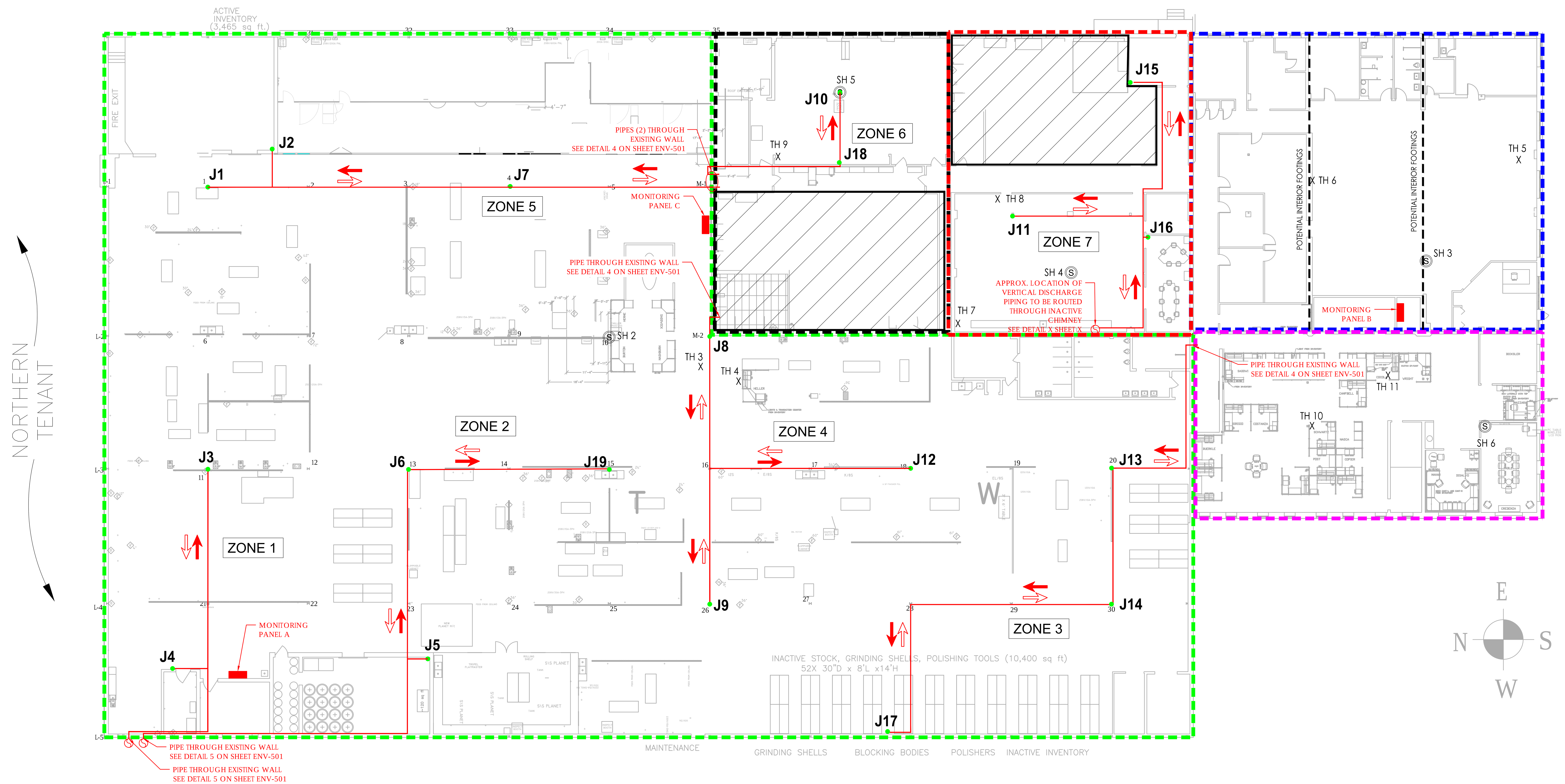
A.2 ENV-101– SUB-SLAB DEPRESSURIZATION SYSTEM DISCHARGE AND EXHAUST LOCATIONS (SOUTHERN TENANT SPACE)

A.3 ENV-300 – TYPICAL SUB-SLAB DEPRESSURIZATION SYSTEM SECTION

A.4 ENV-500 – INTERIOR DETAILS

A.5 ENV-501 – EXTERIOR DETAILS

A.6 ENV-502 – SUB-SLAB DEPRESSURIZATION SYSTEM PROCESS & INSTRUMENTATION DIAGRAM (SOUTHERN TENANT SPACE)



1954*

1956*

1958*

1959*

1966*

*SEE LEGEND

NOTE:

1. NYSDOL ASBESTOS INSPECTOR TO OBSERVE AND SAMPLE BUILDING MATERIALS AS NEEDED.
2. ALL PENETRATIONS THROUGH FIRE RATED WALLS MUST USE FIRESTOP MATERIAL AROUND PENETRATION. REDUCE 6-INCH DIA. PIPING TO 4-INCH DIA. PIPING WHEN PENETRATING FIRE RATED WALLS.
3. CONTRACTOR TO USE LEAD SAFE WORK PRACTICES.

Suction Point	Column Number/Description	Side of Column Suction Pipe will be Installed On*	Notes
J1	1	WEST	
J2	CORNER OF ROOM	NA	
J3	11	EAST	
J4	OUTSIDE ROOM	NA	
J5	CORNER OF ROOM	NA	
J6	13	WEST	
J7	4	SOUTH	
J8	M-2	NORTH	
J9	26	WEST	
J10	OTHER SIDE OF COLUMN	EAST	Install suction pipe where communication testing suction hole is located.
J11	POST IN CAFETERIA	WEST	Contractor to box in pipe with wood finishing that matches existing.
J12	18	WEST	
J13	20	EAST	
J14	30	WEST	
J15	CORNER OF FOYER	NA	
J16	CORNER OF CONF. ROOM	NA	
J17	EXTERIOR WALL BY SHELVING UNITS	NA	
J18	WALL IN ASSEMBLY	NA	Contractor to box in pipe with drywall finishing that matches existing.
J19	15	WEST	

* Note: Compass directional locations are only provided for column installations. All other installed suction piping was denoted by "NA", or "Not applicable".

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Legend

- (S) APPROXIMATE LOCATION OF TEST SUCTION HOLES
- X TH 3 APPROXIMATE LOCATION OF TEST EXTENSION HOLES
- 12 EXISTING BUILDING COLUMN AND COLUMN NUMBER
- 1954 APPROXIMATE SLAB FOOTPRINTS AND YEAR OF BUILDING PERMIT
- NO ENTRY DUE TO TENANT MANUFACTURING PROCESS
- J1 PROPOSED SUCTION HOLE LOCATION
- VERTICAL DISCHARGE PIPING
- PROPOSED SUCTION PIPE ALIGNMENT (PVC)
- DIFFERENTIAL PRESSURE GAUGES AND WARNING LIGHTS
- CONDENSATE FLOW DIRECTION / PIPE SLOPE
- VACUUM FLOW DIRECTION

Notes

1. FIGURE DEVELOPED USING BASE BUILDING PLAN PROVIDED BY SOUTHERN TENANT.
2. SSDS TESTING WAS PERFORMED BY STANTEC AND MITIGATION TECHNOLOGIES ON 8-18-2017, 8-21-2017, AND 9-11-2017.
3. PROPOSED SUCTION HOLE LOCATION ON COLUMNS TO BE VERIFIED IN FIELD WITH OWNER'S REPRESENTATIVE.

Issued | By | Appd. | YY.MM.DD

ENV-100 - SUB-SLAB DEPRESSURIZATION SYSTEM COVERAGE PLAN- SOUTHERN TENANT SPACE.DWG

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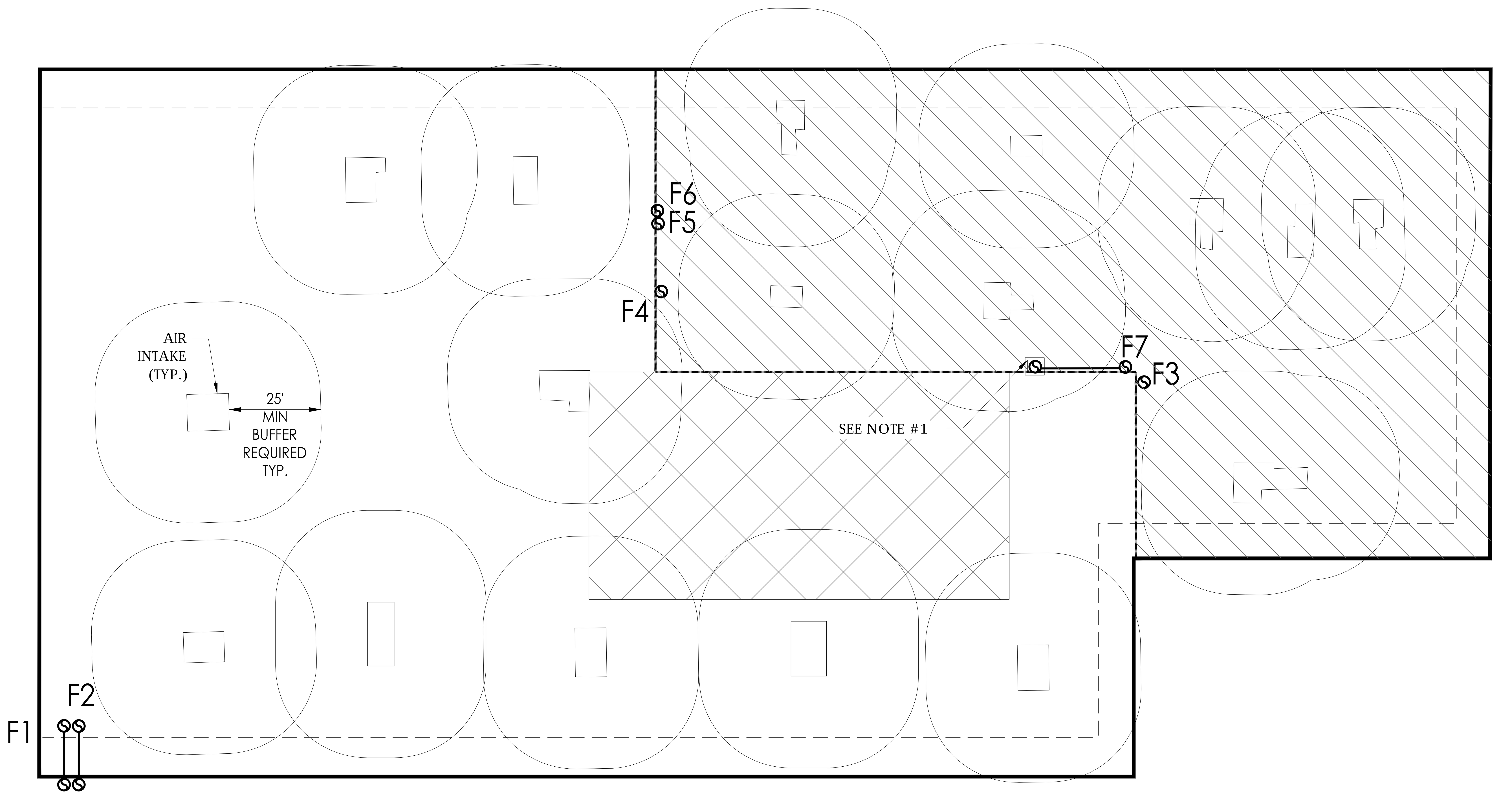
Client/Project
INTERIM REMEDIAL MEASURE WORK PLAN
820 LINDEN AVE SITE

BROWNFIELD CLEANUP PROGRAM
SITE # C828200
820 LINDEN AVE., PITTSFORD, NY

Title
SUB-SLAB DEPRESSURIZATION SYSTEM COVERAGE PLAN (SOUTHERN TENANT SPACE)

Project No. 190500898 | Scale 1/16"=1'-0"

Drawing No. ENV-100 | Sheet of | Revision



NOTE:

1.) SIZE OF CHIMNEYS TO BE CONFIRMED IN THE "FIELD" WITH CONTRACTOR AND OWNER'S REPRESENTATIVE

BUILDING ROOF PLAN - SOUTHERN TENANT SPACE

Scale : 1/16" = 1'-0"

0 8' 16' 32'

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Consultants

Legend

- AIR INTAKE STRUCTURE
- LOWER ELEVATION ROOF
- ROOF MOUNTED SOLAR PANELS
- AIR INTAKE BUFFER (AREA WITHIN 25 FEET OF OF AIR INTAKE EQUIPMENT)
- PROPOSED ROOF TOP SUCTION PIPING (PVC) LOCATION
- OSHA FALL PROTECTION BOUNDARY (10 FOOT OFFSET FROM BUILDING EDGE)
- F1 PROPOSED EXHAUST FAN AND DISCHARGE LOCATION
- PROPOSED EXHAUST FAN PIPING LOCATED INSIDE EXISTING CHIMNEYS

Notes

1. FIGURE DEVELOPED USING BASE BUILDING PLAN PROVIDED BY JML OPTICAL.
2. SSDS TESTING WAS PERFORMED BY STANTEC AND MITIGATION TECHNOLOGIES ON 8-18-2017, 8-21-2017, AND 9-11-2017.

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

ENV-101– Sub-Slab Depressurization System Discharge and Exhaust Locations - Southern Tenant Space.dwg

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820 LINDEN AVE SITE

BROWNFIELD CLEANUP PROGRAM
SITE # C828200
820 LINDEN AVE., PITTSFORD, NY

Title
SUB-SLAB DEPRESSURIZATION SYSTEM DISCHARGE AND EXHAUST LOCATIONS (SOUTHERN TENANT SPACE)

Project No.	Scale	
190500898	1/16" = 1'-0"	
Drawing No.	Sheet	Revision
ENV-101	of	

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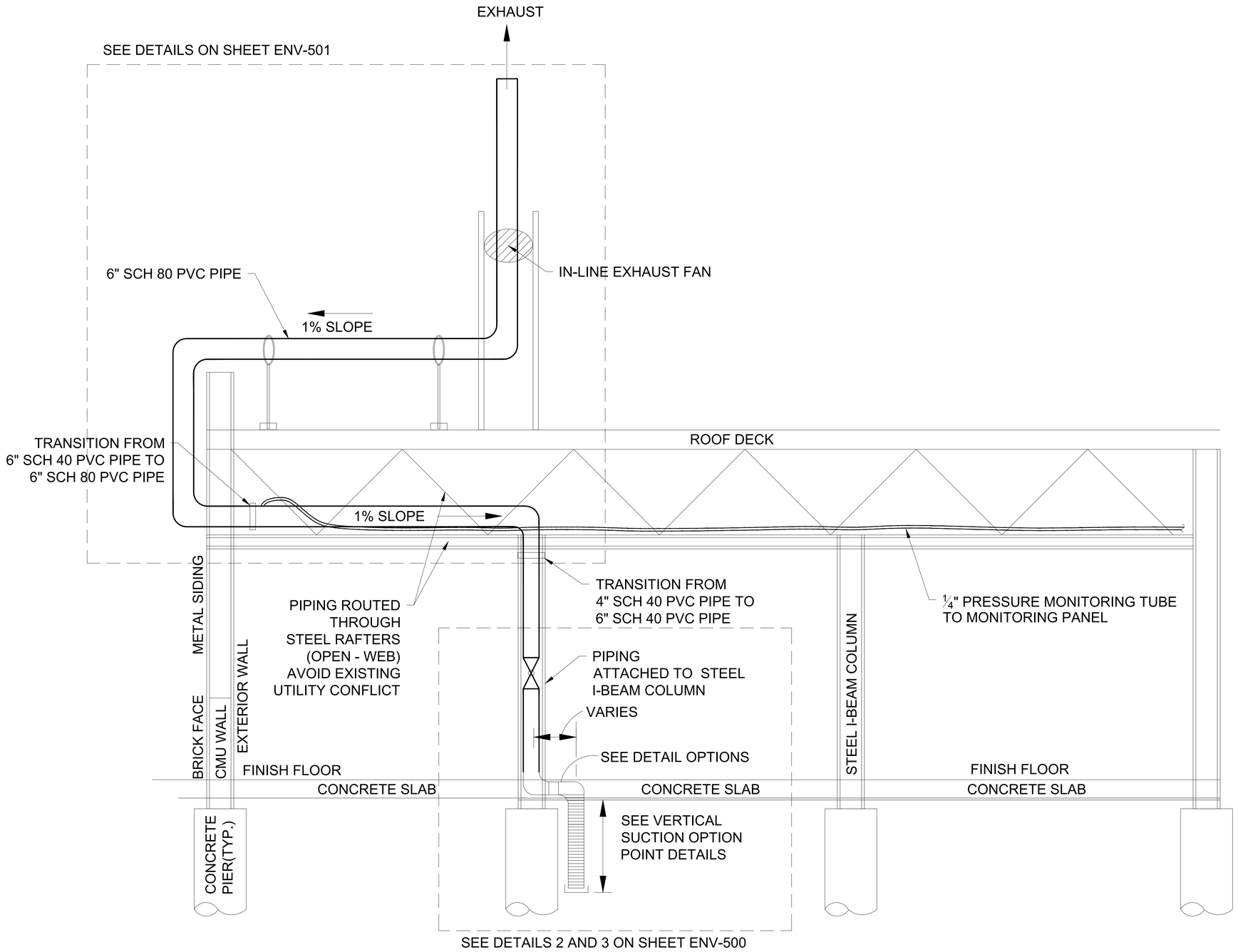

1 ENV-300 TYPICAL INSTALLATION SECTION VIEW

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Legend

Notes

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ENV-300 – Typical Sub-Slab Depressurization System Section.dwg

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Client/Project
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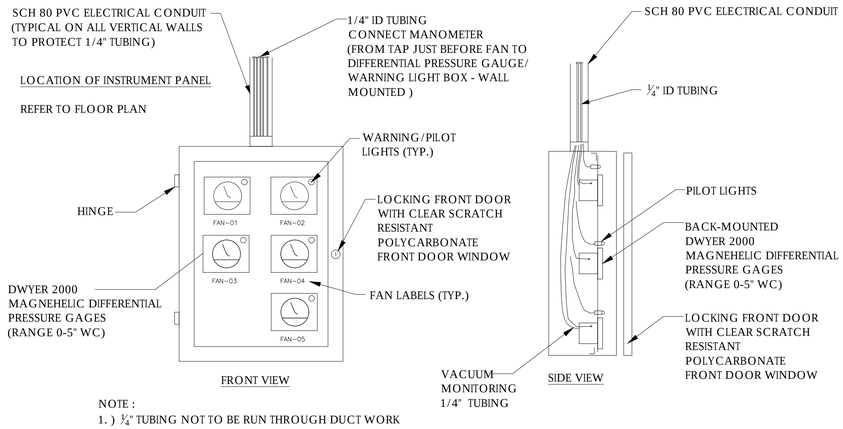
820 LINDEN AVE SITE

BROWNFIELD CLEANUP PROGRAM
SITE # C828200
820 LINDEN AVE., PITTSFORD, NY

Title
SUB-SLAB DEPRESSURIZATION SYSTEM SECTION
(SOUTHERN TENANT SPACE)

Project No.	Scale	
190500898	NOT TO SCALE	
Drawing No.	Sheet	Revision
ENV-300	of	

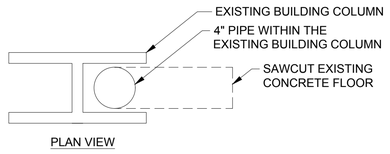


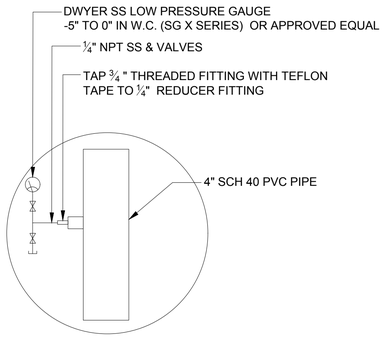
NOTE :
1.) ¼" TUBING NOT TO BE RUN THROUGH DUCT WORK

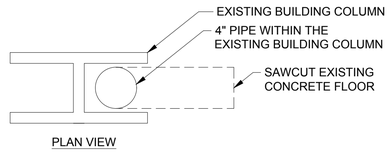
2.) ¼" TUBING SHALL BE POLYETHYLENE (PE) OR APPROVED EQUAL

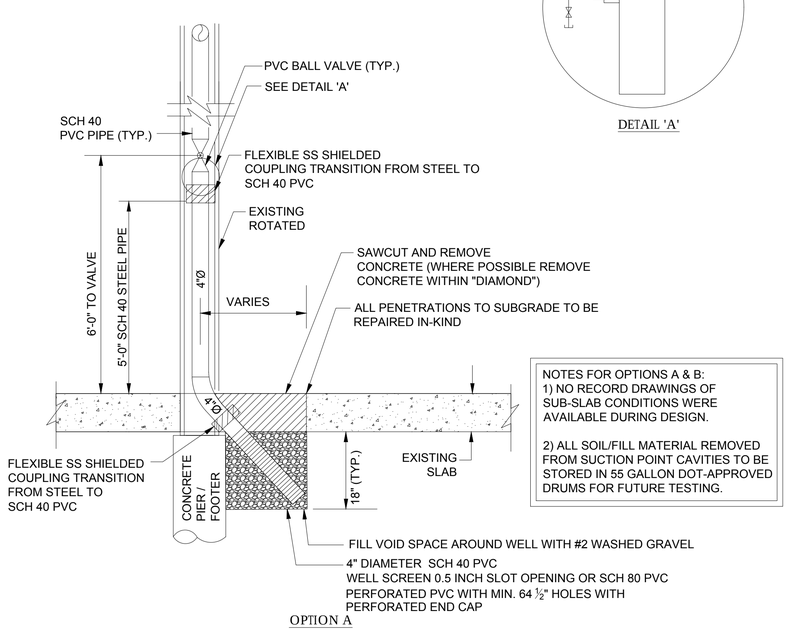
1 TYPICAL WALL-MOUNTED INSTRUMENT PANEL INSTALLATION DETAIL

NO SCALE







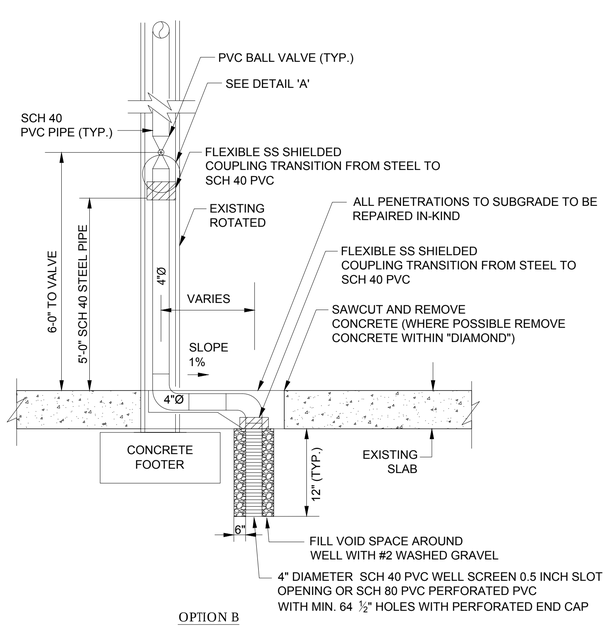


NOTES FOR OPTIONS A & B:
1) NO RECORD DRAWINGS OF SUB-SLAB CONDITIONS WERE AVAILABLE DURING DESIGN.

2) ALL SOIL/FILL MATERIAL REMOVED FROM SUCTION POINT CAVITIES TO BE STORED IN 55 GALLON DOT-APPROVED DRUMS FOR FUTURE TESTING.

2 TYPICAL VERTICAL SUCTION POINT INSTALLATION SECTION

NOT TO SCALE



3 TYPICAL VERTICAL SUCTION POINT INSTALLATION SECTION

NOT TO SCALE

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ENV-500 – Interior Details.dwg	APL	DH	MB	18.07.31

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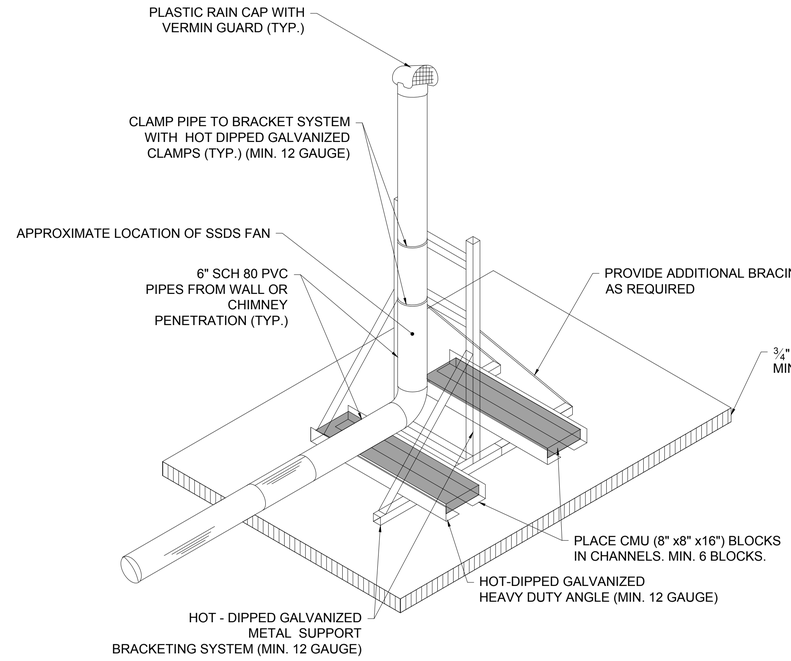
Client/Project
INTERIM REMEDIAL MEASURE WORK PLAN
820 LINDEN AVE SITE

BROWNFIELD CLEANUP PROGRAM
SITE # C828200

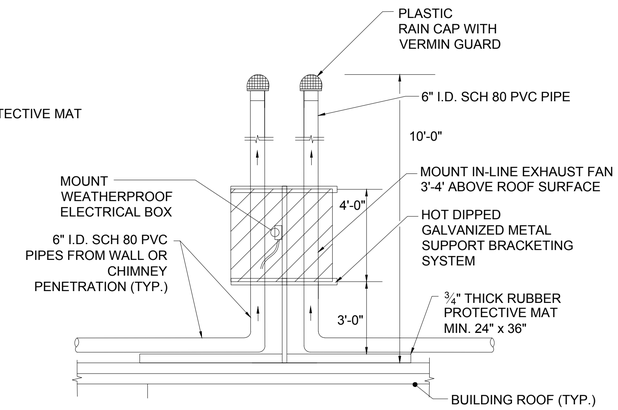
820 LINDEN AVE., PITTSFORD, NY

Title
SUB-SLAB DEPRESSURIZATION SYSTEM
INTERIOR DETAILS

Project No.	Scale	
190500898	NOT TO SCALE	
Drawing No.	Sheet	Revision
ENV-500	of	



1 SSDS ROOF EXHAUST STACK SUPPORT SYSTEM (TYP.)
NO SCALE

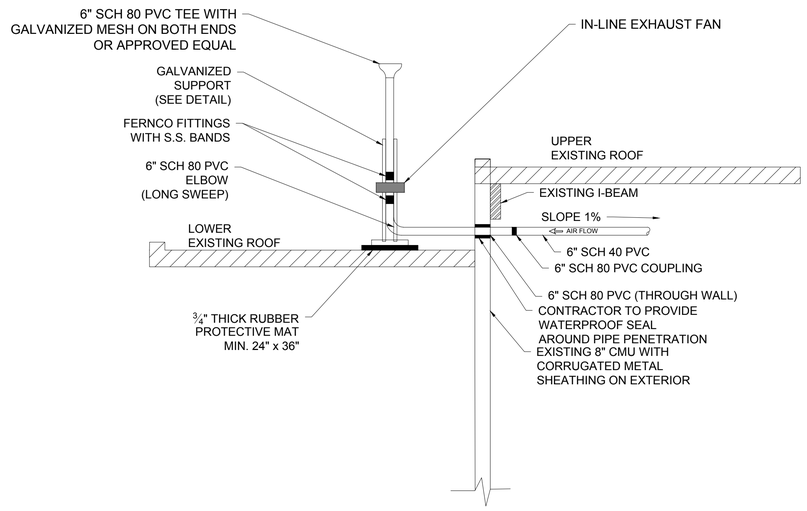


NOTE:

1. SOME EXHAUST STACKS MAY HAVE ONE(1) OR TWO (2) FANS

SECTION

2 TYPICAL SSDS ROOF EXHAUST STACK
NO SCALE

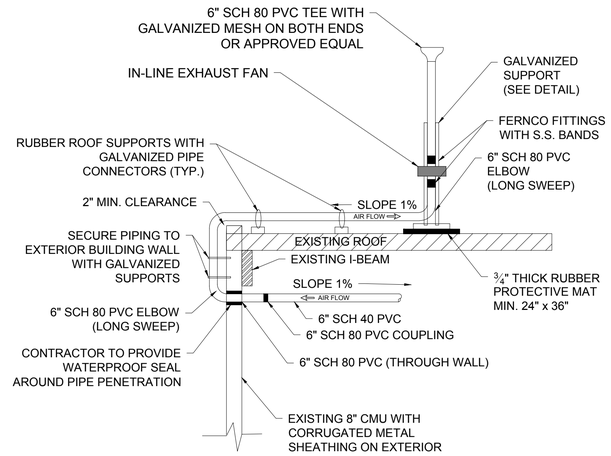


DETAIL BEING FINALIZED

NOTES:
1. NYSDOL LICENSED ASBESTOS INSPECTOR TO OBSERVE / SAMPLE BUILDING MATERIALS AS NEEDED.
2. CONTRACTOR TO USE LEAD SAFE WORK PRACTICES.
3. EXISTING ROOF MEMBRANE SHALL NOT BE DAMAGED.
4. ALL GALVANIZED METAL SHALL BE HOT-DIPPED.
5. ALL IN-LINE EXHAUST FANS TO BE INSTALLED WITH CONDENSATE BYPASS PER MANUFACTURER.

3 TYPICAL CHIMNEY PENETRATION DETAIL
NO SCALE

4 TYPICAL PENETRATION TO LOWER ROOF DETAIL
NO SCALE



NOTES:
1. NYSDOL LICENSED ASBESTOS INSPECTOR TO OBSERVE / SAMPLE BUILDING MATERIALS AS NEEDED.
2. CONTRACTOR TO USE LEAD SAFE WORK PRACTICES.
3. EXISTING ROOF MEMBRANE SHALL NOT BE DAMAGED.
4. ALL GALVANIZED METAL SHALL BE HOT-DIPPED.
5. ALL IN-LINE EXHAUST FANS TO BE INSTALLED WITH CONDENSATE BYPASS PER MANUFACTURER.

5 TYPICAL WALL PENETRATION DETAIL
NO SCALE

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ENV-501 – Exterior Details.dwg			
File Name:	APL Dwn.	DH Chkd.	MB Dsgn.	18.07.31 YY.MM.DD

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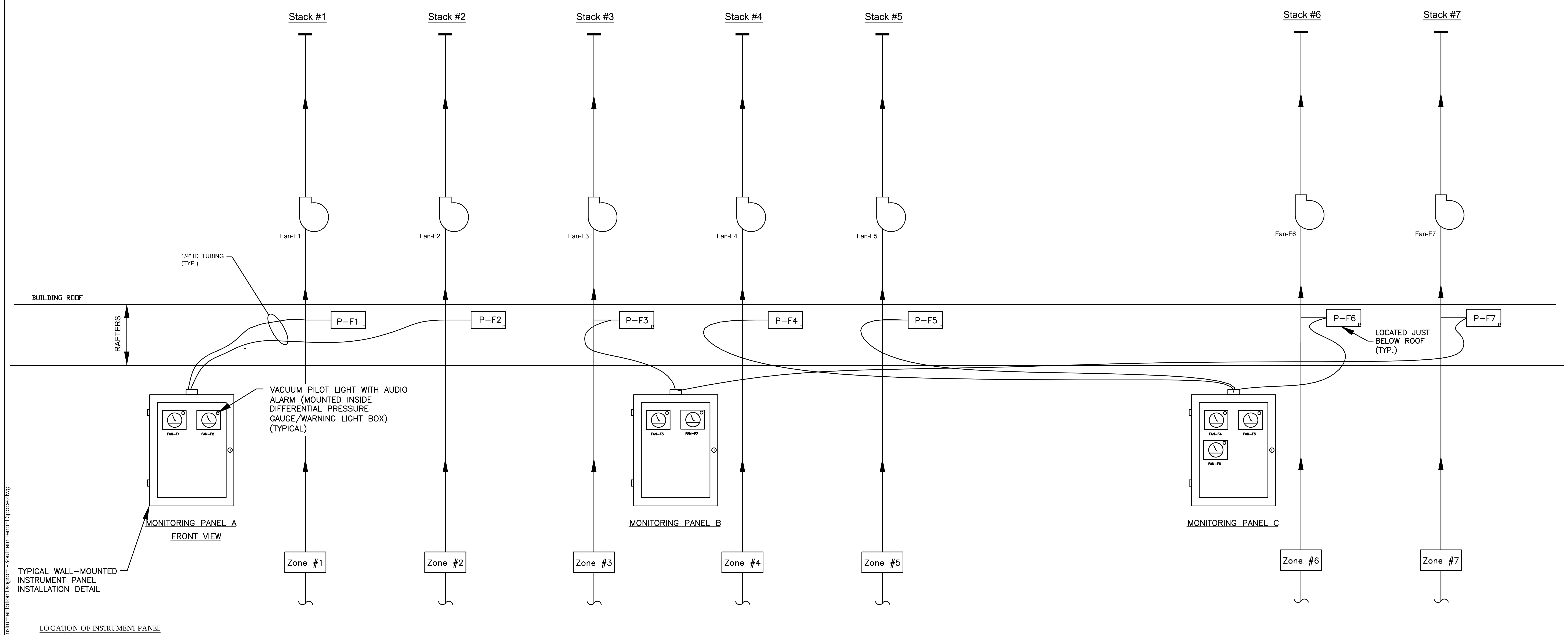
Client/Project
INTERIM REMEDIAL MEASURE WORK PLAN
820 LINDEN AVE SITE

BROWNFIELD CLEANUP PROGRAM
SITE # C828200
820 LINDEN AVE., PITTSFORD, NY

Title
SUB-SLAB DEPRESSURIZATION SYSTEM
EXTERIOR DETAILS

Project No.	Scale	
190500898	NOT TO SCALE	
Drawing No.	Sheet	Revision
ENV-501	of	



PROCESS & INSTRUMENTATION DIAGRAM (P&ID)

NO SCALE

Zone	In-line Exhaust Fan	Suction Points in Zone	Monitoring Panel
1	F1	J3, J4	A
2	F2	J5, J6, J19	A
3	F3	J13, J14, J17	B
4	F4	J8, J9, J12	C
5	F5	J1, J2, J7	C
6	F6	J10, J18	C
7	F7	J11, J15, J16	B

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IN-LINE EXHAUST FAN

P-F1 — POINT OF MEASUREMENT FOR THE MAGNEHELIC MODEL 2000 DIFFERENTIAL PRESSURE GAUGE (MOUNTED INSIDE DIFFERENTIAL PRESSURE GAUGE/WARNING LIGHT BOX)

AIR FLOW

Notes

1.) ¼" TUBING SHALL NOT BE RUN THROUGH DUCT WORK.
2.) REFER TO DRAWINGS FOR CONNECTION OF ¼" TUBING TO DIFFERENTIAL PRESSURE GAUGE.
3.) ¼" TUBING TO BE POLYETHYLENE (PE) EATON SYNFLEX 1219FR OR APPROVED EQUAL.
4.) ¼" TUBING TO BE RUN THROUGH ROOF JOIST WEBBING IN A WIRE LOOM (PROTECTIVE SLEEVE). PROVIDE SCH 80 PVC ELECTRICAL CONDUIT ON VERTICAL WALLS TO RUN TUBING IN TO CONNECT TO PANEL BOX.
5.) ALL PRESSURE MONITORING POINTS TO BE AT THE SUCTION SIDE OF THE IN-LINE EXHAUST FAN, MOUNTED INSIDE, JUST BELOW THE ROOF.

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

ENV-502 - Sub-Slab Depressurization System Process & Instrumentation Diagram - Southern Tenant Space.dwg

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NOT TO BE USED FOR CONSTRUCTION

Client/Project

INTERIM REMEDIAL MEASURE WORK PLAN
820 LINDEN AVE SITE

BROWNFIELD CLEANUP PROGRAM
SITE # C828200

820 LINDEN AVE., PITTSFORD, NY

Title

SUB-SLAB DEPRESSURIZATION SYSTEM
PIPING AND INSTRUMENTATION DIAGRAM
(SOUTHERN TENANT SPACE)

Project No. 190500898
Scale NOT TO SCALE

Drawing No. ENV-502
Sheet of
Revision

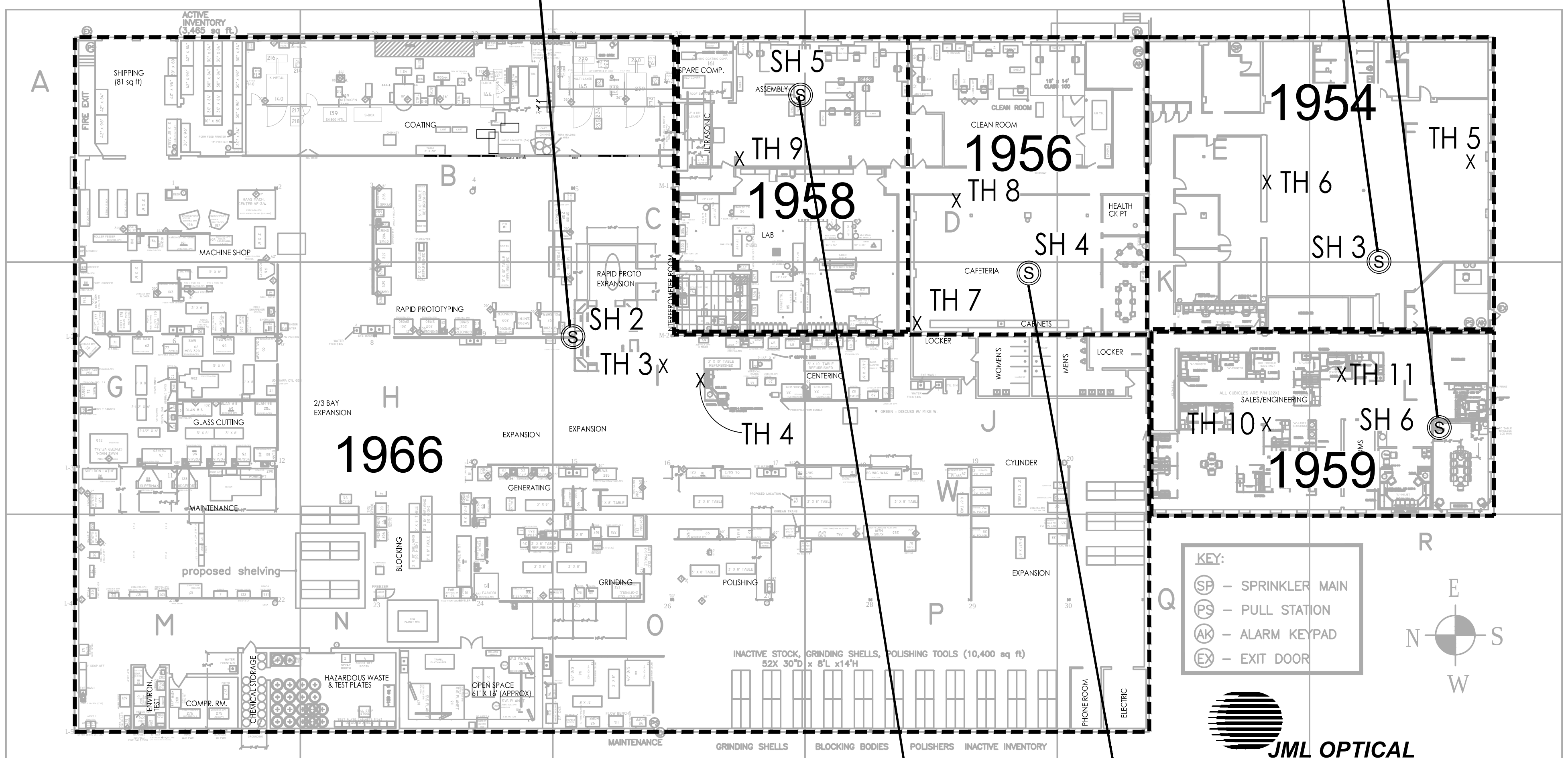
ORIGINAL SHEET - ANSI D

Appendix B COMMUNICATION TESTING RESULTS

Suction Hole (SH)	Test Hole (TH)	Approx. Distance, SH to TH (ft)	Vacuum (inches Water Column) measured at TH with suction applied at SH using RadonAway[TH] fan model HS-5000	Notes
SH6	TH10*	48	0.000	Notes: The slab in this area was well sealed. Taping of cracks was determined not to be necessary. *: The pressure differential observed at TH10 indicated a slight increase in pressure (0.003 inches Water Column) when the fan was turned on. The result is shown as 0.000 inches water column for the purposes of this study since no observed vacuum occurred.
	TH11	31	0.081	

Suction Hole (SH)	Test Hole (TH)	Approx. Distance, SH to TH (ft)	Vacuum (inches Water Column) measured at TH with suction applied at SH using RadonAway[TH] fan model GP-501	Notes
SH2	TH3	25	0.045	Notes: The substrate beneath this slab was crushed stone. The slab was well sealed. Taping of cracks was determined not to be necessary.
	TH4	35	0.011	

Suction Hole (SH)	Test Hole (TH)	Approx. Distance, SH to TH (ft)	Vacuum (inches Water Column) measured at TH with suction applied at SH using RadonAway[TH] fan model GP-501	Notes
SH3	TH5	40	0.002	Notes: Fine sand was observed as the concrete slab's substrate. Additionally a cinder block structure that was likely the footer of the exterior of a building was observed. SH3 was opened in a manner to be able to draw vacuum on both sides of the cinder block footer. The slab in this area was well sealed. Taping of cracks was determined not to be necessary. *: Due to poor initial results, the same test was repeated using two (2) GP-501 fans in series.
	TH5*	40	0.003	
	TH6	38	0.003	



Suction Hole (SH)	Test Hole (TH)	Approx. Distance, SH to TH (ft)	Vacuum (inches Water Column) measured at TH with suction applied at SH using RadonAway[TH] fan model HS-5000	Notes
SH4	TH7	35	0.000	Notes: The validity of TH7 was questioned in the field. TH7 was observed to be close to the division of two building footprints and could have been influenced by extraneous factors. The slab in this area was well sealed. Taping of cracks was determined not to be necessary.
	TH8	28	0.148	

Suction Hole (SH)	Test Hole (TH)	Approx. Distance, SH to TH (ft)	Vacuum (inches Water Column) measured at TH with suction applied at SH using RadonAway[TH] fan model HS-5000	Notes
SH5	TH9	38	0.071	Notes: The slab in this area was well sealed. Taping of cracks was determined not to be necessary.

Stantec
61 Commercial Street, Suite 100
Rochester, New York USA 14614
585.475.1440
www.stantec.com

Legend

- (S) APPROXIMATE LOCATION OF SUCTION HOLES
- X TH 3 APPROXIMATE LOCATION OF TEST HOLES
- 1954 APPROXIMATE SLAB FOOTPRINTS AND YEAR OF BUILDING PERMIT

Notes

1. FIGURE DEVELOPED USING BASE BUILDING PLAN PROVIDED BY JML OPTICAL.
2. SSDS TESTING WAS PERFORMED BY STANTEC AND MITIGATION TECHNOLOGIES ON 8-18-2017, 8-21-2017, AND 9-11-2017.

Issued — By — Appd. — YY.MM.DD

	Dwn.	Chkd.	Dsgn.	YY.MM.DD
File Name:	APL	TW	APL	16.07.18

Permit-Seal

Client/Project

820 LINDEN AVE., PITTSFORD, NY

Title

SUB-SLAB COMMUNICATION TESTING LOCATION MAP (JML OPTICAL TENANT SPACE)

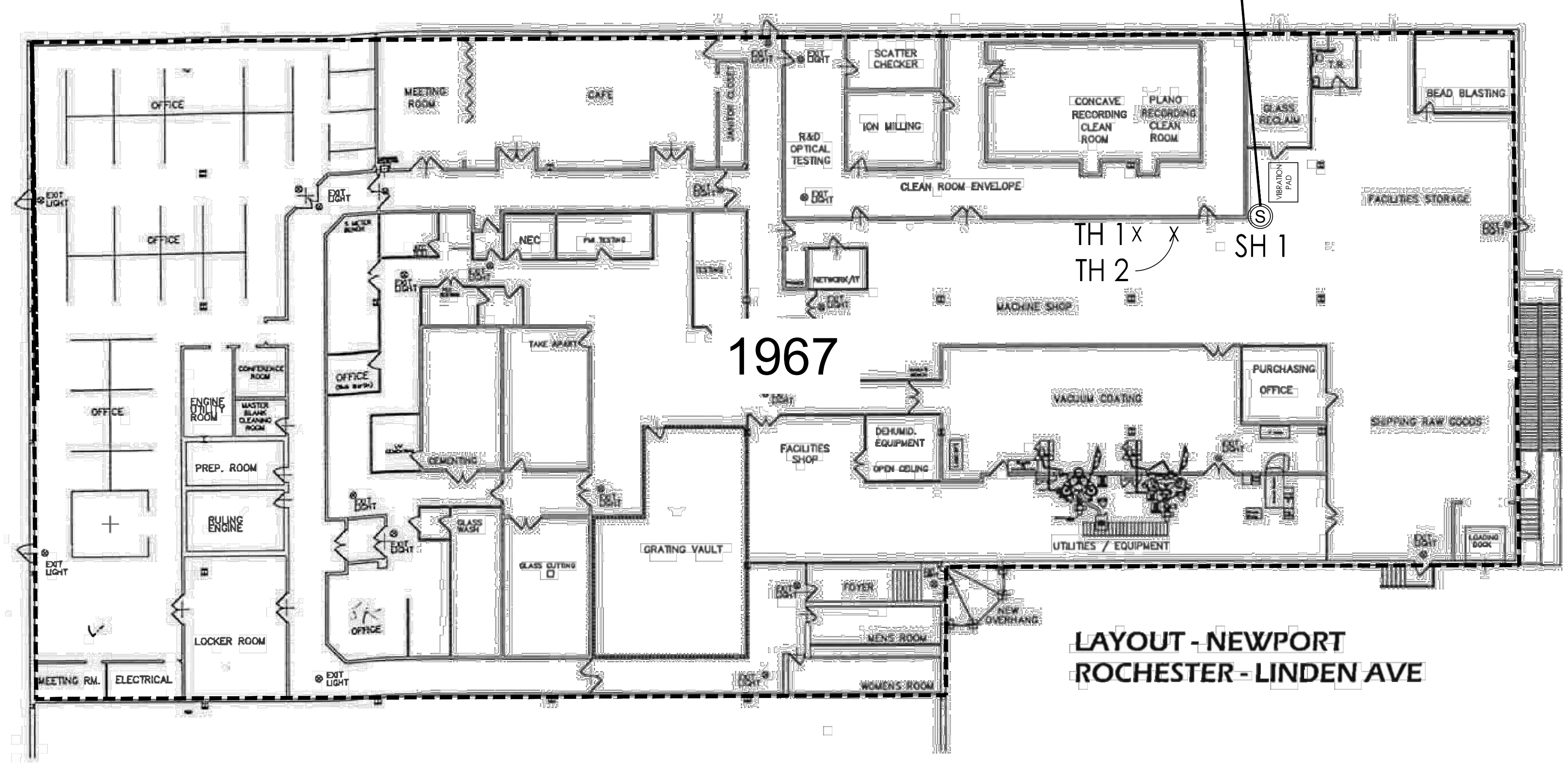
Project No. 190500898 — Scale NOT TO SCALE

Drawing No. — Sheet — Revision

Figure B.1 — 1 of 1

ORIGINAL SHEET - ANSI D

Suction Hole (SH)	Test Hole (TH)	Approx. Distance, SH to TH (ft)	Vacuum (inches Water Column) measured at TH with suction applied at SH using RadonAway[TH] fan model GP-501	Notes: The substrate beneath the concrete slab was observed to be largely compacted soil. The slab did have a vapor barrier layer. Joints in the concrete slab near SH1 were sealed with masking tape. *: Due to poor initial results, the same test was repeated using a shop vacuum in series with the GP-501.
SH1	TH1	30	0.000	
	TH1*	30	0.003	
	TH2	20	0.035	



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Rochester, New York USA 14614
585.475.1440
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Legend

Ⓢ APPROXIMATE LOCATION OF SUCTION HOLES

X TH 3 APPROXIMATE LOCATION OF TEST HOLES

1954 APPROXIMATE SLAB FOOTPRINTS AND YEAR OF BUILDING PERMIT

Notes

1. FIGURE DEVELOPED USING BASE BUILDING PLAN PROVIDED BY NEWPORT.
2. SSDS TESTING WAS PERFORMED BY STANTEC AND MITIGATION TECHNOLOGIES ON 8–18–2017.

Issued By Appd. YY.MM.DD

File Name: FIGURE 2 - SSDS LOCATION MAP- NEWPORT - ACTUAL SSDS.DWG 16.05.13
Dwn. Chkd. Dsgn. YY.MM.DD

Permit-Seal

Client/Project

820 LINDEN AVE., PITTSFORD, NY

Title

SUB-SLAB COMMUNICATION TESTING LOCATION MAP (NEWPORT TENANT SPACE)

Project No. 190500898

Scale NOT TO SCALE

Drawing No. Sheet Revision

Figure B.2 of

ORIGINAL SHEET - ANSI D

Appendix C HEALTH AND SAFETY PLAN

Appendix C

Health and Safety Plan
Interim Remedial Measure
820 Linden Avenue Site
Brownfield Cleanup Program Site
#C828200
820 Linden Avenue
Pittsford, Monroe County, New York

Prepared for:
New York State Department of
Environmental Conservation
6274 Avon-Lima Road
Avon, New York 14414

Prepared on behalf of:
Ridgecrest Associates
135 Orchard Park BV
Rochester, New York 14609

Prepared by:
Stantec Consulting Services Inc.
61 Commercial Street, Suite 100
Rochester, New York 14614

July 2018

APPENDIX C

HEALTH AND SAFETY PLAN
INTERIM REMEDIAL MEASURE
820 LINDEN AVENUE SITE
BROWNFIELD CLEANUP PROGRAM SITE #C828200
820 LINDEN AVENUE
PITTSFORD, MONROE COUNTY, NEW YORK

Table of Contents

APPENDIX C

HEALTH AND SAFETY PLAN
INTERIM REMEDIAL MEASURE
820 LINDEN AVENUE SITE
BROWNFIELD CLEANUP PROGRAM SITE #C828200
820 LINDEN AVENUE
PITTSFORD, MONROE COUNTY, NEW YORK

List of Figures

List of Tables

List of Appendices

APPENDIX C

HEALTH AND SAFETY PLAN
INTERIM REMEDIAL MEASURE
820 LINDEN AVENUE SITE
BROWNFIELD CLEANUP PROGRAM SITE #C828200
820 LINDEN AVENUE
PITTSFORD, MONROE COUNTY, NEW YORK

Abbreviations

1,1-DCE	1,1-dichloroethene
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulations
cis-1,2-DCE	cis-1,2-dichloroethene
COC	Contaminant of Concern
CVOC	chlorinated volatile organic compound
dB	decibel
DER	[NYSDEC] Division of Environmental Remediation
FTL	Field Team Leader
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
JML	JML Optical
NEC	National Electrical Code
Newport	Newport Corporation
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration
PCE	tetrachloroethene
PEL	Permissible Exposure Limit
PID	photoionization detector
ppm	parts per million
PPE	Personal Protective Equipment
RI	Remedial Investigation
SSO	Site Safety Officer
SWP	Safe Work Practice
TCE	trichloroethene
TSP	trisodium phosphate
TWA	Time Weighted Average
VOC	volatile organic compound

APPENDIX C

HEALTH AND SAFETY PLAN
INTERIM REMEDIAL MEASURE
820 LINDEN AVENUE SITE
BROWNFIELD CLEANUP PROGRAM SITE #C828200
820 LINDEN AVENUE
PITTSFORD, MONROE COUNTY, NEW YORK

1.0 INTRODUCTION

The following Health and Safety Plan (HASP) describes personal safety protection standards and procedures to be followed by Stantec staff during planned Interim Remedial Measure (IRM) activities for the 820 Linden Avenue Site, Brownfield Cleanup Program Site #828200, located at 820 Linden Avenue in Pittsford, New York (Figure 1).

This HASP establishes mandatory safety procedures and personal protection standards pursuant to the Occupational Safety and Health Administration (OSHA) regulations 29 Code of Federal Regulations (CFR) 1910.120. The HASP applies to all Stantec personnel conducting any Site work, as defined in 29 CFR 1910.120(a). All personnel involved in the mentioned activities must familiarize themselves with this HASP, comply with its requirements and have completed the required health and safety training and medical surveillance program participation pursuant to 29 CFR 1910.120 prior to beginning any work onsite.

THIS HASP IS FOR THE EXPRESS USE OF STANTEC EMPLOYEES. ALL OTHER CONTRACTORS TO BE WORKING IN THE EXCLUSION AREAS ARE REQUIRED BY LAW TO DEVELOP THEIR OWN HASP, AS WELL TO MEET ALL PERTINENT ASPECTS OF OSHA REGULATIONS. STANTEC RESERVES THE RIGHT TO STOP ANY SITE WORK WHICH IS DEEMED TO POSE A HEALTH AND SAFETY THREAT TO ITS STAFF OR OTHERS.

1.1 BACKGROUND

This IRM Work Plan (Work Plan) is being is being submitted to the New York State Department of Environmental Conservation (NYSDEC) for the 820 Linden Avenue Site located at 820 Linden Avenue in the Town of Pittsford, Monroe County, New York. The objective of this IRM is to mitigate the potential migration of soil vapor impacted by volatile chemicals beneath the building footprint into the interior, occupied space. To achieve the objective, the goal of the IRM will be to achieve and maintain a minimum pressure differential vacuum of 0.002-inches of water column between the sub-slab and the building interior space in the building's footprint using an SSDS.

The Site consists of an approximately 7.6-acre parcel located in the Town of Pittsford, Monroe County, New York. The Site is improved with an approximately 108,400 square foot slab-on-grade building. The southern tenant space in this building is approximately 70,200 square feet and is currently occupied by JML Optical (JML). The northern tenant space is approximately 38,200 square feet and is currently occupied by Newport Corporation (Newport). Both current

tenants are optics facilities. The SSDS is proposed to be constructed in the majority of the southern tenant space.

1.2 HAZARD RECOGNITION

Several health and safety hazards associated with this Site and the anticipated job tasks to be performed as part of the IRM have been identified and are listed below.

While in the field, new hazards may be identified as part of the field level risk assessment. This HASP should be updated to reflect new hazards as they are identified during the various investigation stages.

1.2.1 Health Hazards

The following is a list of the potential health hazards identified for the Site.

Chemical hazards include:

- Halogenated organic compounds;
- Paints;
- Petroleum hydrocarbons; and
- Solvents/flammables.

Physical hazards include:

- Cold stress/frostbite;
- Heat stress/sunburn;
- Driver fatigue;
- Dust/dusty environment;
- Flora or fauna (ticks known to be present);
- Noise; and
- Rough terrain/heavy brush.

1.2.2 Safety Hazards

The following is a list of the potential safety hazards identified for the Site.

Machine-related hazards include:

- Heavy equipment;
- Moving parts;
- Excavations (test pits)
- Pinch points; and
- Rotating parts.

Material handling hazards include:

- Load < 50 lbs; and
- Sharp/rough surface (drums).

1.3 HAZARD ASSESSMENT

At the minimum, Stantec personnel will review the following Stantec Safe Work Practices (SWPs) identified as being relevant to the Site and project tasks prior to implementation of the IRM.

- SWP 104 – Hazard Communication
- SWP 105 – Personal Protective Equipment (PPE)
- SWP 107 – First Aid
- SWP 111 – Medical Surveillance
- SWP 113 – Heat Stress
- SWP 114 – Working in Cold Environments
- SWP 115 – Material Handling and Safe Lifting
- SWP 124 – Safe Driving
- SWP 201 – Fall Protection/Working from Heights
- SWP 213 – Utility Clearance
- SWP 214 – Entering Excavation and Trenches
- SWP 216 – Working Near Mobile Equipment
- SWP 314 – Working Around Hazardous Waste and Wastewater
- SWP 407 – Traffic Control and Protection Planning
- SWP 409 – Respiratory Protection
- SWP 416 – Supervision of Contracted Drilling Activities
- SWP-E&R Operational Draft – Ticks and Lyme Disease

If new hazards are identified throughout the investigation, additional SWPs should be reviewed, if available. This process should occur prior to the commencement of field work and throughout the stages of the IRM.

1.4 SITE-SPECIFIC CHEMICALS OF CONCERN

Passive Soil Gas (PSG) survey results from 2004 indicated that chlorinated volatile organic compounds (CVOCs) such as tetrachloroethene (PCE), trichloroethene (TCE), and 1,1,1-trichloroethane (1,1,1-TCA) were present in soil vapor beneath the building footprint and toluene (a petroleum-related VOC) was present in soil vapor across the northern portion of the Site. The highest concentration of toluene was observed in the parking lot area to the south of the eastern half of the Newport tenant space, and to the east of the northeast corner of the JML tenant space. The 2004 investigation also included a lead wipe test program within the building interior. Lead concentrations from wipe samples ranged from 6.2 - 345 µg/ft^2. Results from a subsequent PSG survey performed in 2005 confirmed the presence of PCE, TCE, and 1,1,1-TCA onsite. The highest concentrations of the CVOCs were detected under the central portion of the building near a former hazardous waste storage area. Toluene was also detected in about two-thirds of the locations.

Although the Limited Phase II Environmental Site Assessment (ESA) investigations performed by Stantec in 2016 and 2017 did not identify the source of CVOCs or toluene in soil or groundwater, both are considered Site Contaminants of Concern (COCs) because they are known to occur in the soil gas media. Additionally, acetone was identified in both soil and groundwater at levels greater than regulatory standards. Although acetone is considered a common laboratory contaminant, the concentrations reported in soil and groundwater indicate it is a Site-related issue.

Two soil vapor intrusion (SVI) investigation events were conducted as part of Stantec's Limited Phase II ESA program, the first in April 2016 (12 sampling locations covering both tenant spaces), and the second in January 2017 (limited to three sampling locations in the Newport tenant space). Background outdoor air sampling accompanied both events. The concentration of TCE in indoor air within the Newport tenant space at one location (2.1 micrograms per cubic meter [µg/m^3]) slightly exceeded the indoor air guideline of 2 µg/m^3 during the first SVI sampling event, although it was not reported above the detection limit in the corresponding sub-slab vapor sample during either SVI sampling event. In addition, TCE was not detected above reporting limits in the indoor air samples collected during the second SVI sampling event.

Results indicated the need for mitigation based on methylene chloride results in five locations in the JML tenant space and one location in the Newport tenant space. At the time of the SVI sampling, this compound was utilized in each tenant space. Additionally, within the JML tenant space, results from four locations indicated the need for mitigation of potential SVI impacts based on the 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), TCE, or PCE

results. Within the Newport tenant space, one location indicated the need for monitoring or mitigation for TCE.

As more analytical data is generated during and/or following the IRM activities, the HASP should be updated to reflect any new information regarding Site COCs.

Volatile Organic Compounds (VOCs)

Based on the above summary of investigation results, the following is a list of the primary VOCs of potential concern: PCE, TCE, 1,1,1-TCA, toluene, acetone, methylene chloride, 1,1-DCE, and cis-1,2-DCE.

These VOCs are documented onsite and/or presumed to be potentially encountered in the soil vapor, soil and/or groundwater at the Site. Table 1 summarizes health and safety data for the volatile compounds of primary concern. Safety Data Sheets (SDSs) for these compounds are presented in HASP Appendix A. The air monitoring action levels will be based on the OSHA Short-Term Exposure Limit (STEL) for benzene (5 ppm) with a margin of safety built into the action levels to account for the non-specificity of the field monitoring instruments. Exposure limits for less hazardous compounds will be satisfied by meeting the more stringent exposure limits for benzene. Although benzene is not a Site COC, this is a conservative approach to protecting personnel health when utilizing a total VOC monitor that does not distinguish between compounds. Action levels are discussed in Section 6.2.

Metals

Given the previous investigation findings of lead in building materials, and the potential for lead contamination in surface soil particularly proximate to the building footprint, lead is considered a potential Site COC.

Table 1 summarizes health and safety data for lead, and the SDS for lead is included in HASP Appendix A.

2.0 STANTEC PERSONNEL ORGANIZATION

Below is a list of **Project Contact** information:

Title	Name	Company	Phone Number
Stantec Office	Rochester, NY	Stantec	(585) 475-1440
Project Manager	Stephanie Reynolds-Smith	Stantec	(585) 413-5272 c. (585)298-2382
Site Safety Officer/Field Team Leader	Mark Bailey	Stantec	(585) 413-5204 c. (585) 489-4031
After-Hours Project Contact	Stephanie Reynolds-Smith	Stantec	c. (585) 298-2382
After-Hours Project Contact [alternate]	Mike Storonsky	Stantec	c. (585) 298-2386
Client (Ridgecrest Associates)	Joe Lobozzo	Ridgecrest Associates	c. (585) 766-3949
Primary Facility Contact - JML	Steve Burton	JML	c. (585) 218-2906
Facility Contact - JML (Until 4:00 pm)	Mark Zaso	JML	c. (315) 289-3038
Facility Contact - JML (4:00 pm – 2:00 am)	Corbin Beck	JML	c. (585) 314-2663
Primary Facility Contact -Newport	Brian Grove	Newport	c. (585) 739-6046
Office Safety Environment Coordinator	Sarah Carroll	Stantec	(585) 413-5206
Local HR Representative	Keith Kiss	Stantec	(585) 413-5228 c. (585) 287-4502
Stantec Corporate HSE Representative (US Northeast)	Fred Miller	Stantec	(610) 235-7315
Stantec Public Relations/Media Contact (US Midwest/Mid-Atlantic and Northeast)	Marti Mueller	Stantec	(585) 319-3052

The following describes the Stantec personnel involved in health and safety operations at the 820 Linden Avenue Site located at 820 Linden Avenue in Pittsford, NY.

2.1 PROJECT MANAGER

The Project Manager is responsible for ensuring that all Stantec procedures and methods are carried out, and that all Stantec personnel abide by the provisions of this HASP.

2.2 SITE SAFETY OFFICER/FIELD TEAM LEADER

The Site Safety Officer (SSO) and Field team leader (FTL) will report directly to the Project Manager and will be responsible for the implementation of this HASP as well as daily calibration of Stantec's safety monitoring instruments. The FTL/SSO will keep a log book of all calibration data and instrument readings for the Site that will be utilized by the field team onsite during the various IRM activities.

2.3 DAILY MEETINGS

All Stantec personnel and contractors working within the exclusion zone will be required to sign off on the daily safety meeting form presented in HASP Appendix B.

3.0 MEDICAL SURVEILLANCE REQUIREMENTS

3.1 INTRODUCTION

Hazardous waste site workers can often experience high levels of physical and chemical stress. Their daily tasks may expose them to toxic chemicals, physical hazards, biologic hazards, or radiation. They may develop heat stress while wearing protective equipment or working under temperature extremes, or face life-threatening emergencies such as explosions and fires. Therefore, a medical program is essential to: assess and monitor worker's health and fitness both prior to employment and during the course of the work; provide emergency and other treatment as needed; and keep accurate records for future reference. In addition, OSHA requires a medical evaluation for employees that may be required to work on hazardous waste sites and/or wear a respirator (29 CFR Part 1910.120 and 1910.134), and certain OSHA standards include specific medical surveillance requirements (e.g., 29 CFR Part 1926.62, Part 1910.95 and Parts 1910.1001 through 1910.1045).

3.2 MEDICAL EXAMINATIONS

All Stantec personnel working in areas of the Site where Site-related contaminants may be present shall have been examined by a licensed physician as prescribed in 29 CFR Part 1910.120, and determined to be medically fit to perform their duties for work conditions which require respirators. Employees will be provided with medical examinations as outlined below:

- Pre-job physical examination

- Annually thereafter if contract duration exceeds 1 year;
- Termination of employment;
- Upon reassignment in accordance with CFR 29 Part 1910.120(e)(3)(i)(C);
- If the employee develops signs or symptoms of illness related to workplace exposures;
- If the physician determines examinations need to be conducted more often than once a year; and
- When an employee develops a lost time injury or illness during the contract period.

Examinations will be performed by, or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and will be provided without cost to the employee, without loss of pay and at a reasonable time and place. Medical surveillance protocols and examination and test results shall be reviewed by an Occupational Physician.

4.0 ONSITE HAZARDS

4.1 CHEMICAL HAZARDS

The primary chemical hazard onsite is expected to be potential exposure to the VOCs (and metal) detailed in Table 1. SDSs for the anticipated compounds presenting potential chemical exposure hazards are provided in Appendix A.

Any activity at the Site which causes physical disturbance of the soil can potentially allow the release of contaminants into the air. For volatiles, this can include release of organic vapors into the air. Such an occurrence may be recognized by noticeable chemical odors. Field personnel should be aware of the odor threshold for these chemicals and their relation to the action levels and PELs (see Table 1).

Symptoms of overexposure to primary compounds of concern are detailed in Table 1. To prevent exposure to these chemicals, dermal contact will be minimized by using disposable surgical gloves with work gloves (as appropriate) when handling soil, groundwater equipment or samples. Real time, breathing zone levels of total VOCs will be monitored using a portable photoionization detector (PID). If ambient levels exceed action levels, all Site activities will be performed using Level C PPE until ambient concentrations dissipate. Where levels exceed 50 parts per million (ppm), work will cease and the project manager will be notified immediately. Intrusive work may also be halted where visible dust is observed leaving the work area.

Depending on seasonal conditions, disturbance of the Site soils may cause the particulate contaminants to become airborne as dust. Therefore, particulates will be monitored as discussed in Section 6.1 and dust-suppression methods used where appropriate as discussed in Section 6.2, or in the CAMP.

Table 2 summarizes first aid instructions for exposure pathways for the Site COCs.

4.2 PHYSICAL HAZARDS

The following sub-sections describe the physical hazards anticipated to be encountered at this Site. Field team members will wear the basic safety apparel such as steel-toed shoes, hard hat, safety vest, and safety glasses during all appropriate activities. See Section 7 Personal Protective Equipment for additional information.

4.2.1 Roadway Hazards

Field activities may take place near active roadways and/or parking lots with vehicle traffic. Where such work zones are established, personnel shall assure that protective measures including signage, cones, and shielding through use of vehicles parked at workmen perimeter, are in place. All contractors shall be responsible for meeting signage requirements of DOT. Fluorescent safety vests shall be worn by all personnel during activities in or adjacent to roadways and driveways.

4.2.2 Noise

Operation of heavy machinery and equipment may result in noise exposures, which require hearing protection. Exposure to noise can result in temporary hearing losses, interference with speech communication, interference with complicated tasks, or permanent hearing loss due to repeated exposure to noise.

During the investigative activities, all Stantec field team members will use hearing protection when sound levels are in excess of 90 decibels (dB) time weighted average (TWA). In the absence of noise dosimetry data, field personnel will wear hearing protection during the test boring and monitoring well installation program, and where mandatory per JML/Newport standards when working indoors. Other instances requiring hearing protection may include use of hand power tools.

4.2.3 Heat and Cold Stress Exposure

Heat is a potential threat to the health and safety of Site personnel. The SSO under the direction of the Project Manager will determine the schedule of work and rest. These schedules will be employed as necessary so that personnel do not suffer adverse effects from heat. Table 3 summarizes exposure symptoms and first aid instructions for heat stress. Non-caffeinated, thirst replenishment liquids will be available onsite.

Cold stress is also a potential threat to the health and safety of Site personnel. Symptoms of cold stress include, shivering, blanching of the extremities, numbness or burning sensations, blue, purple or gray discoloration of hands and feet, frostbite, hypothermia, and loss of consciousness. Cold stress can be prevented by acclimatizing one's self to the cold, increasing fluid intake, avoiding caffeine and alcohol, maintaining proper salt and electrolyte intake, eating a well-balanced diet, wearing proper clothing, building heated enclosures to work in, and taking regular breaks to warm up. If any of the above symptoms are encountered the person should be removed from the cold area. Depending on the severity of the cold stress, 911 should be contacted and first aid administered. No fluids should be given to an unconscious person.

4.2.4 Weather-Related Hazards

Weather-related hazards include the potential for heat or cold stress (described in Section 4.2.4), electrical storms, treacherous weather-related working and/or driving conditions, or limited visibility. These hazards correlate with the season in which Site activities occur. Outside work will be suspended during electrical storms. Site work will not be resumed until 30 minutes have passed without thunder and lightning. In the event of other adverse weather conditions, the SSO, in consultation with the project manager, if needed, will determine if work can continue without endangering the health and safety of Site personnel.

4.2.5 Ladders

Over one-third of worker deaths in construction result from falls (https://www.osha.gov/oshstats/commonstats.html). Many falls occur because ladders are not placed or used safely. Ladder use will comply with OSHA 1926.1053 through 1926.1060, including the following safety requirements.

STEP	PROPER LADDER USE PROCEDURE
1	Choose the right ladder for the task including the proper type and size, with a sufficient rating for the task.

STEP	PROPER LADDER USE PROCEDURE
2	Check the condition of the ladder before climbing. • Do not use a ladder with broken, loose, or cracked rails or rungs. • Do not use a ladder with oil, grease, or dirt on its rungs. • The ladder should have safety feet.
3	Place the ladder on firm footing, with a four-to-one pitch.
4	Support the ladder by: • Tying it off; • Using ladder outrigger stabilizers; or • Have another worker hold the ladder at the bottom. If another worker holds the ladder, they must: • Wear a hard hat; • Hold the ladder with both hands; • Brace the ladder with their feet; and • Not look up.
5	Keep the areas around the top and bottom of the ladder clear.
6	Extend the top of the ladder at least 36 inches (3 feet) above the landing.
7	Climb the ladder carefully - facing it - and use both hands. • Use a tool belt and hand-line to carry material to the top or bottom of the ladder. • Wear shoes in good repair with clean soles.
8	Inspect the ladder every day, prior to use, for the following problems: • Rail or rung damage • Broken feet • Rope or pulley damage • Rung lock defects or damage • Excessive dirt, oil, or grease If the ladder fails inspection, it must be removed from service and tagged with a "Do Not Use" sign.

4.2.6 Hand and Power Tools

All hand and power tools will be maintained in a safe condition and in good repair. Hand and power tools will be used in accordance with 29 CFR 1926, Subpart I (1926.300 through 1926.307). Neither Stantec nor its subcontractors will issue unsafe tools, and workers are not permitted to bring unsafe tools onsite. All tools will be used, inspected, and maintained in accordance with the manufacturer's instructions. Throwing tools or dropping tools to lower levels is prohibited. Hand and power tools will be inspected, tested, and determined to be in safe operating condition prior to each use. Periodic safety inspections of all tools will be conducted to assure

that the tools are in good condition, all guards are in place, and the tools are being properly maintained. Any tool that fails an inspection will be immediately removed from service and tagged with a "Do Not Use" sign.

Workers using hand and power tools, who are exposed to falling, flying, abrasive, or splashing hazards will be required to wear personal protective equipment (PPE). Eye protection must always be worn when working onsite. Additional eye and face protection, such as safety goggles or face shields, may also be required when working with specific hand and power tools. Workers, when onsite, will wear hard hats. Additional hearing protection may be required when working with certain power tools. Workers using tools, which may subject their hands to an injury, such as cuts, abrasions, punctures, or burns, will wear protective gloves. Loose or frayed clothing, dangling jewelry, or loose long hair will not be worn when working with power tools, or near others operating machinery or equipment with moving or rotating parts.

Electric power-operated tools will be double insulated or grounded, and equipped with an on/off switch. Guards must be provided to protect the operator and other nearby workers from hazards such as in-going nip points, rotating parts, flying chips, and sparks. All reciprocating, rotating and moving parts of tools will be guarded if contact is possible. Removing machine guards is prohibited.

Abrasive wheels will only be used on equipment provided with safety guards. Safety guards must be strong enough to withstand the effect of a bursting wheel. Abrasive wheels will not be operated in excess of their rated speed. Work or tool rests will not be adjusted while the wheel is in motion. All abrasive wheels will be closely inspected and ring tested before each use, and any cracked or damaged wheels will be removed immediately and destroyed.

Circular saws must be equipped with guards that completely enclose the cutting edges and have anti-kickback devices. All planer and joiner blades must be fully guarded. The use of cracked, bent, or otherwise defective parts is prohibited. Chain saws must have an automatic chain brake or kickback device. The worker operating the chain saw will hold it with both hands during cutting operations. A chain saw must never be used to cut above the operator's shoulder height. Chain saws will not be re-fueled while running or hot. Power saws will not be left unattended.

Only qualified workers will operate pneumatic tools, powder-actuated tools, and abrasive blasting tools.

4.2.7 Manual Lifting

Back injuries are among the leading occupational injuries reported by industrial workers. Back injuries such as pulls and disc impairments can be reduced by using proper manual lifting techniques. Leg muscles are stronger than back muscles, so workers should lift with their legs and not with their back. Proper manual lifting techniques include the following steps:

STEP	PROPER MANUAL LIFTING PROCEDURE
1	Plan the lift before lifting the load. Take into consideration the weight, size, and shape of the load.
2	Preview the intended path of travel and the destination to ensure there are no tripping hazards along the path.
3	Wear heavy-duty work gloves to protect hands and fingers from rough edges, sharp corners, and metal straps. Also, keep hands away from potential pinch points between the load and other objects.
4	Get the load close to your ankles, and spread your feet apart. Keep your back straight and do not bend your back too far; instead bend at your knees.
5	Feel the weight; test it.
6	Lift the load smoothly, and let your legs do the lifting. If you must pivot, do not swing just the load; instead, move your feet and body with the load.

If the load is too heavy, then do not lift it alone. Lifting is always easier when performed with another person. Assistance should always be used when it is available, particularly when walking on uneven terrain, up/down stairs and near moving vehicles (or in other situations where sightlines are necessary).

4.2.8 Lock-Out/Tag-Out

Before a worker sets up, services, or repairs a system where unexpected energizing (or release of stored energy) could occur and cause injury or electrocution, the circuits energizing the parts must be locked-out and tagged. Only authorized personnel will perform lock-out/tag-out procedures. All workers affected by the lock-out/tag-out will be notified prior to, and upon completion of, the lock-out/tag-out procedure.

APPENDIX C

HEALTH AND SAFETY PLAN
INTERIM REMEDIAL MEASURE
820 LINDEN AVENUE SITE
BROWNFIELD CLEANUP PROGRAM SITE #C828200
820 LINDEN AVENUE
PITTSFORD, MONROE COUNTY, NEW YORK

Onsite Hazards

Lock-out/tag-out devices must be capable of withstanding the environment to which they are exposed. Locks will be attached in such a way as to prevent other personnel from operating the equipment, circuit, or control, or from removing the lock unless they resort to excessive force. Tags will identify the worker who attached the device, and contain information, which warns against the hazardous condition that will result from the system's unauthorized start-up. Tags must be legible and understood by all affected workers and incidental personnel. The procedures for attaching and removing lock-out/tag-out devices include the steps outlined in the following table.

If maintenance work is required, the electrical supply to the equipment must be disconnected. Turning off the MAIN breaker using the disconnect switch will disconnect all power to the system. Once the disconnect switch has been turned off, the switch will be locked-out using the steps outlined below.

STEP	LOCK-OUT/TAG-OUT PROCEDURES
1	Disconnect the circuits and/or equipment to be worked on from all electrical energy sources.
2	Ensure that the system is completely isolated so that it cannot be operated at that shut-off point or at any other location.
3	Release stored electrical energy.
4	Block or relieve stored non-electrical energy.
5	Place a lock on each shut-off or disconnect point necessary to isolate all potential energy sources. Place the lock in such a manner that it will maintain the shut-off/disconnect in the off position.
6	Place a tag on each shut-off or disconnect point. The tag must contain a statement prohibiting the unauthorized re-start or re-connect of the energy source and the removal of the tag, and the identity of the individual performing the tag and lock-out.
7	Workers who will be working on the system must place their own lock and tag on each lock-out point.
8	A qualified person must verify the system cannot be re-started or re-connected, and de-energization of the system has been accomplished.
Once the service or repairs have been made on the system:	
9	A qualified person will conduct an inspection of the work area, to verify that all tools, jumpers, shorts, grounds, etc., have been removed so that the system can then be safely re-energized.
10	All workers stand clear of the system.

STEP	LOCK-OUT/TAG-OUT PROCEDURES
11	Each lock and tag will be removed by the worker who attached it. If the worker has left the Site, then the lock and tag may be removed by a qualified person under the following circumstances:
	a. The qualified person ensures the worker who placed the lock and tag has left the Site; and
	b. The qualified person ensures the worker is aware the lock and tag has been removed before the worker resumes work on-site.

No Stantec personnel are permitted to perform lock-out/tag-out work without prior approval of the Project Manager and completion of required specialized training.

4.2.9 Electrical Work

Site work involving electrical installation or energized equipment must be performed by a qualified electrician. All electrical work will be performed in accordance with the OSHA electrical safety requirements found in 29 CFR 1926.400 through 1926.449. Workers are not permitted to work near electrical power circuits unless the worker is protected against electric shock by de-energizing and grounding the circuit or by guarding or barricading the circuit and providing proper PPE. All electrical installations must comply with National Electric Code (NEC) regulations. All electrical wiring and equipment used must be listed by a nationally recognized testing laboratory.

All electrical circuits and equipment must be grounded in accordance with the NEC regulations. The path to ground from circuits, equipment, and enclosures will be permanent and continuous. Ground Fault Circuit Interrupters (GFCIs) are required on all 120-volt, single phase, 15- and 20-amp outlets in work areas that are not part of the permanent wiring of the building or structure. A GFCI is required when using an extension cord. GFCIs must be tested regularly with a GFCI tester.

Heavy-duty extension cords will be used; flat-type extension cords are not allowed. All extension cords must be the three-wire type, and designed for hard/extra hard usage. Electrical wire or cords passing through work areas must be protected from water and damage. Worn, frayed, or damaged cords and cables will not be used. Walkways and work spaces will be kept clear of cords and cables to prevent a tripping hazard. Extension cords and cables may not be secured with staples, hung from nails, or otherwise temporarily secured. Cords or cables passing through holes in covers, outlet boxes, etc., will be protected by bushings or fittings.

All lamps used in temporary lighting will be protected from accidental contact and breakage. Metal shell and paper-lined lamp holders are not permitted. Fixtures, lamp holders, lamps, receptacles, etc. are not permitted to have live parts. Workers must not have wet hands while plugging/unplugging energized equipment. Plugs and receptacles will be kept out of water (unless they are approved for submersion).

5.0 SITE WORK ZONES

The following work zones will be delineated by Stantec during the investigation activities.

5.1 CONTROL ZONES

Control boundaries will be established within the areas of Site activities. Examples of boundary zones include the exclusion and decontamination zone. All boundaries will be dynamic, and will be determined by the planned activities for the day. The FTL will record the names of any visitors to the Site.

5.2 EXCLUSION ZONE

The controlled portion of the Site will be delineated to identify the exclusion zone, wherein a higher level of PPE may be required for entry during intrusive activities. The limits of the exclusion zone will be designated at each work location appropriately. A decontamination zone will be located immediately outside the entrance to the exclusion zone. All personnel leaving the exclusion zone will be required to adhere to proper decontamination procedures.

5.3 DECONTAMINATION ZONE

The decontamination zone will be located immediately outside the entrance to the exclusion zone on its apparent upwind side, if feasible, and will be delineated with caution tape and traffic cones as needed. This zone will contain the necessary decontamination materials for personnel decontamination. Decontamination procedures are outlined in Section 8.0 of this plan.

6.0 SITE MONITORING AND ACTION LEVELS

6.1 SITE MONITORING

Field activities associated with drilling suction holes may create potentially hazardous conditions due to the migration of contaminants into the breathing zone. These substances may be in the form of mists, vapors, dusts, or fumes that can enter the body through ingestion, inhalation, absorption, and direct dermal contact. Monitoring for VOCs will be performed as needed to ensure appropriate personal protective measures are employed during Site activities.

VOC monitoring will be performed periodically using a 10.6 eV lamp PID. Exhaust fans will be used to remove air from the work area of each penetration of the concrete slab. The fan exhaust will be piped to the outside of the building except in cases where the distance to an exterior door makes it impractical to run exhaust piping to. In these cases, the exhaust fan will be piped to carbon filtration units prior to discharge. The instrument will be calibrated daily or as per the manufacturer's recommendations. PID readings will be used as the criteria for upgrading or downgrading protective equipment and for implementing additional precautions or procedures.

Any particulates created from penetrating the slab will be contained using a shop vacuum with a high efficiency particulate air (HEPA) cartridge filter. Particulate monitoring will be performed by visual inspection.

6.2 ACTION LEVELS

During the course of any activity, as long as sustained PID readings in the breathing zone are less than 5 ppm above background, Level D protection will be considered adequate. Level C protection will be required when VOC concentrations in ambient air in the work zone are sustained at levels exceeding 5 ppm total VOCs above background but remain below 50 ppm total VOCs. Onsite use of VOCs (including acetone, toluene, and methylene chloride) within one or both tenant spaces may contribute to background VOCs, particularly given assumed operation of ventilation/exhaust systems.

If concentrations in the work zone exceed 50 ppm for a period of 5 minutes or longer, work will immediately be terminated by the SSO. Options to allow continued drilling would then be discussed amongst all parties. Supplied-air respiratory protection is generally required for drilling to resume under these conditions. If Level B protection is not used, work may resume in Level C

once monitoring concentrations have decreased below 50 ppm and conditions outlined in the CAMP are met.

If visible particulate matter within the work area is present, then the SSDS Contractor will be directed to implement fugitive dust control measures which may include use of engineering controls such as water spray at the excavation or a wet towel on the exhaust of the shop vacuum.

7.0 PERSONAL PROTECTIVE EQUIPMENT

Based on an evaluation of the hazards at the Site, PPE will be required for all personnel and visitors entering the drilling exclusion zone(s). It is anticipated that all Stantec oversight work will be performed in Level D. All contractors will be responsible for selection and implementation of PPE for their personnel.

7.1 PROTECTIVE CLOTHING/RESPIRATORY PROTECTION

Protective equipment for each level of protection is as follows:

If PID readings are above 50 ppm, requiring an upgrade to Level B, Site work will be halted pending review of conditions and options by Stantec and other involved parties.

When PID readings range between 5 and 50 ppm, upgrade to Level C:

Level C

- Full face, air purifying respirator with organic/HEPA cartridge;
- Disposable chemical resistant one-piece suit (Tyvek or Saranex, as appropriate);
- Inner and outer chemical resistant gloves;
- Hard hat;
- Steel-toed boots; and
- Disposable booties.

When PID readings range between background and 5 ppm use Level D:

Level D

- Safety glasses;

- Steel-toed boots;
- Protective cotton, latex or leather gloves depending on Site duties;
- Hard hat; and
- Tyvek coverall (optional).

Stantec employees are expected to wear long sleeves when doing so would not pose an additional hazard (i.e. heat stress). Steel-toed boots should be approximately 6" to provide sufficient ankle protection. Safety vests should be worn for visibility; alternatively, bright colored shirts (safety yellow, for example) can be utilized when reflective properties of the safety vests are not necessary.

8.0 DECONTAMINATION

8.1 PERSONAL DECONTAMINATION

For complete decontamination, all personnel will observe the following procedures upon leaving the exclusion zone:

1. If worn, remove disposable outer boots and outer gloves and place in disposal drum.
2. If using a respirator, remove respirator, dispose of cartridges if necessary, and set aside for later cleaning.
3. If worn, remove disposable chemical resistant suits and dispose of articles in drum.
4. Remove and dispose of inner gloves.

Decontamination solutions shall be supplied at the decontamination zone. The wash solution will consist of water and detergent such as Alconox or trisodium phosphate (TSP), and the rinse solution will consist of clean water.

Contaminated wash solutions shall be collected in drums for disposal. All other disposable health and safety equipment will be decontaminated and disposed of as non-hazardous waste.

8.2 EQUIPMENT DECONTAMINATION

If equipment is used during field activities, it will be properly washed or steam-cleaned prior to exiting the decontamination zone. Any needed pre- or post-use rinsing using solvents will be done wearing appropriate PPE.

When feasible, monitoring instruments will be either wrapped in plastic or carried by personnel not involved in handling contaminated materials, to reduce the need for decontamination. All instruments will be wet-wiped prior to removal from the work zone.

9.0 EMERGENCY PROCEDURES

The SSO will coordinate emergency procedures and will be responsible for initiating emergency response activities. Emergency communications at the Site will be conducted verbally and by means of an air or vehicle horn. All personnel will be informed of the location of the cellular telephone and horn. Three blasts on the air or vehicle horn will be used to signal distress.

9.1 LIST OF EMERGENCY CONTACTS

Ambulance: 911

Hospital: Highland Hospital: (585) 473-2200

Fire Department: 911

Police: 911

Poison Control Center: 1-800-222-1222

Utility Emergency: 911

9.2 DIRECTIONS TO HOSPITAL

Maps presenting directions to the nearest hospital (Highland Hospital) and urgent care centers (UR Medicine Urgent Care centers on Monroe Avenue and Penfield Road) are provided in Figure 2. The routes shall be reviewed at the initial Site safety meeting onsite and as needed for Site orientation if new personnel are added to the field team.

9.3 ACCIDENT INVESTIGATION AND REPORTING

The incident reporting form and protocol is included in Appendix C.

APPENDIX C

HEALTH AND SAFETY PLAN
INTERIM REMEDIAL MEASURE
820 LINDEN AVENUE SITE
BROWNFIELD CLEANUP PROGRAM SITE #C828200
820 LINDEN AVENUE
PITTSFORD, MONROE COUNTY, NEW YORK

Emergency Procedures

In the event that an accident or some other incident such as an explosion or exposure to toxic chemicals occurs during the course of the project, the Project Manager will be telephoned as soon as possible and receive a written notification within 24 hours (see Appendix C).

Where reportable injuries, hospitalizations or fatalities occur amongst Stantec personnel, the necessary document required by OSHA will be submitted within timeframes allowed by law.

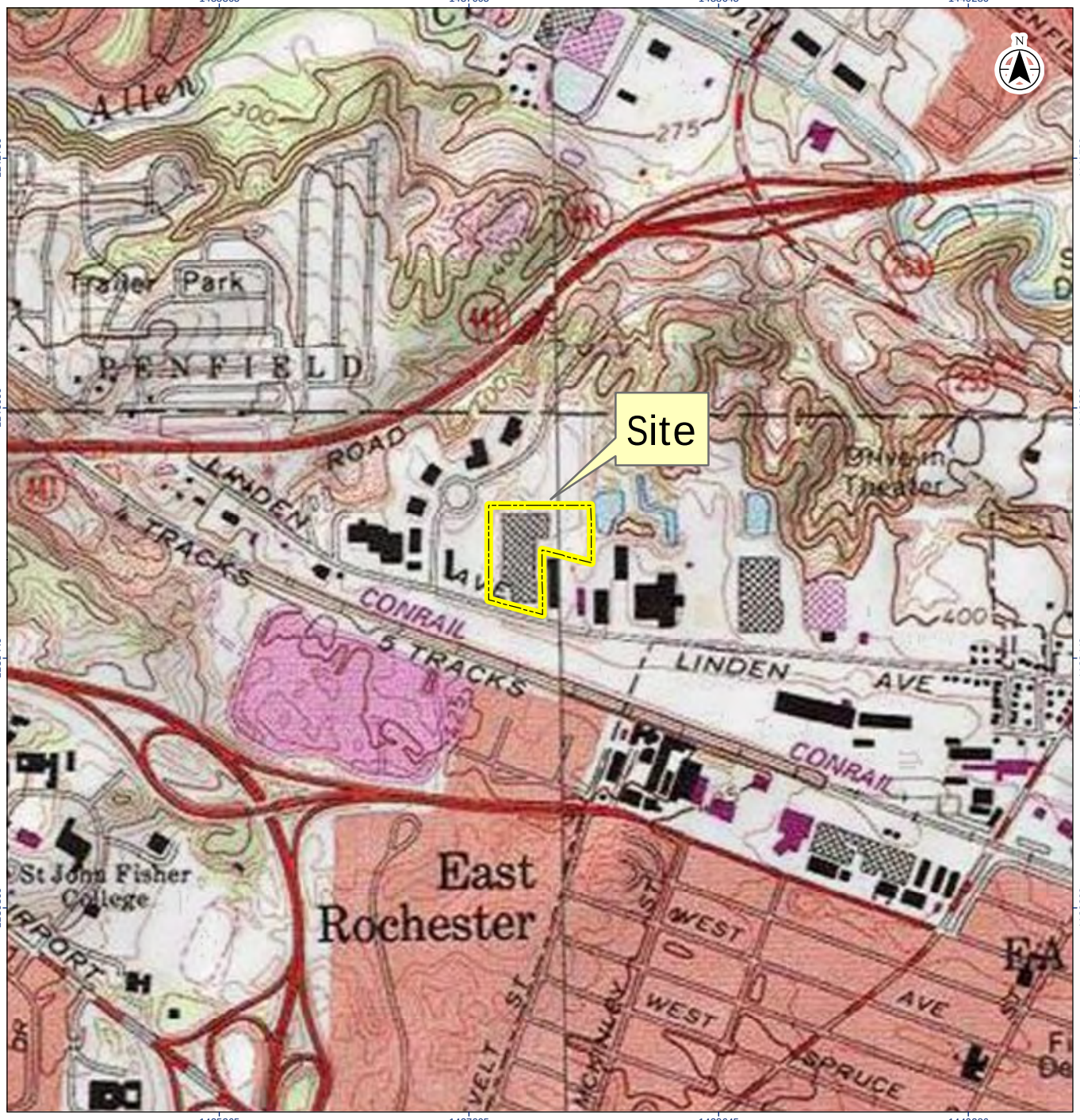
APPENDIX C

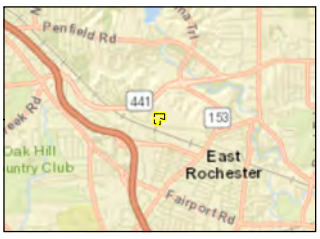
HEALTH AND SAFETY PLAN
INTERIM REMEDIAL MEASURE
820 LINDEN AVENUE SITE
BROWNFIELD CLEANUP PROGRAM SITE #C828200
820 LINDEN AVENUE
PITTSFORD, MONROE COUNTY, NEW YORK

FIGURES

Stantec

U:\190500898\05_report_deliv\dwgs_design\GIS_figures\mxd\18_HASP\Fig1_site_location_map_IRM.mxd Revised: 2018-07-11 By: mpbailey





Legend

Property Outline

0 400 800 1,200 Feet

1:12,000 (at original document size of 8.5x11)

Notes
1. Coordinate System: NAD 1983 StatePlane New York West FIPS 3103 Feet
2. ArcGIS Basemaps: USA Topo Maps (main frame) and World Street Map (key map).

Stantec

Project Location
820 Linden Avenue
Pittsford, Monroe Co., NY

190500898
Prepared by MB on 2018-07-11
Technical Review by SRS on 2018-07-20
Independent Review by DH on 2018-07-20

Client/Project
820 Linden Avenue (BCP Site #C828200)
Interim Remedial Measure Work Plan
Health and Safety Plan

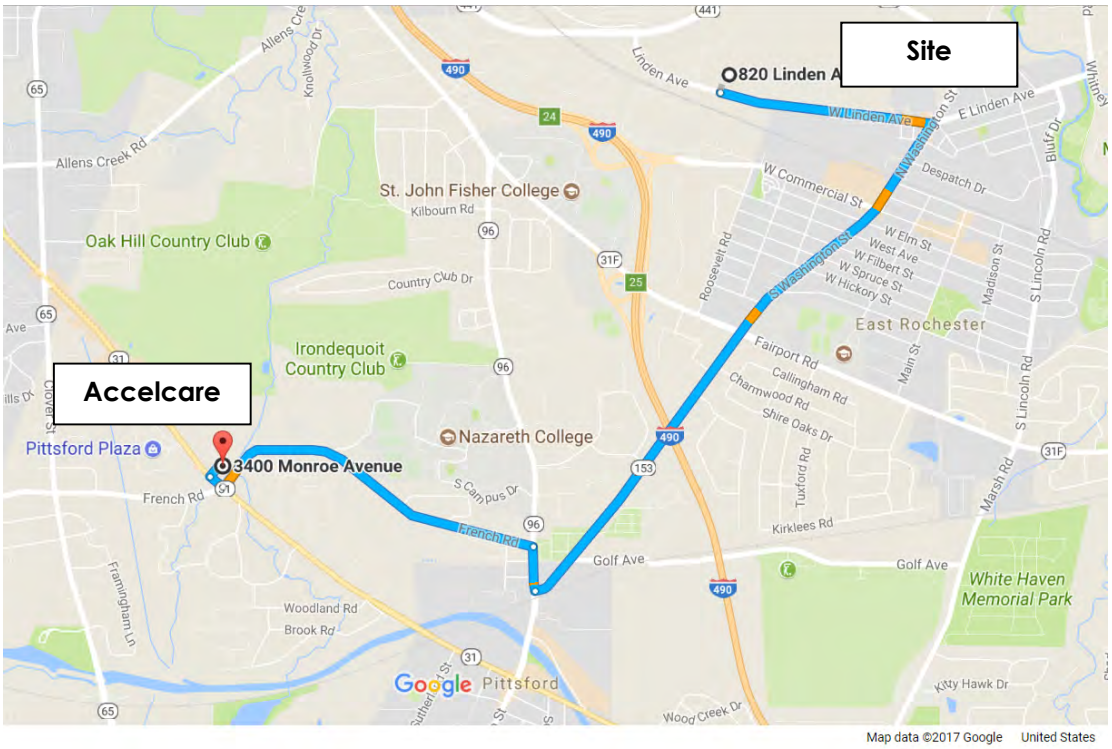
Figure No.
1

Title
Site Location Map

Figure 2
Map and Driving Directions to Medical Facilities

Urgent Care Option 1:
UR Medicine Urgent Care

Pittsford Colony Plaza
3400 Monroe Ave
Rochester, NY, 14618
Phone: (585) 203-1055



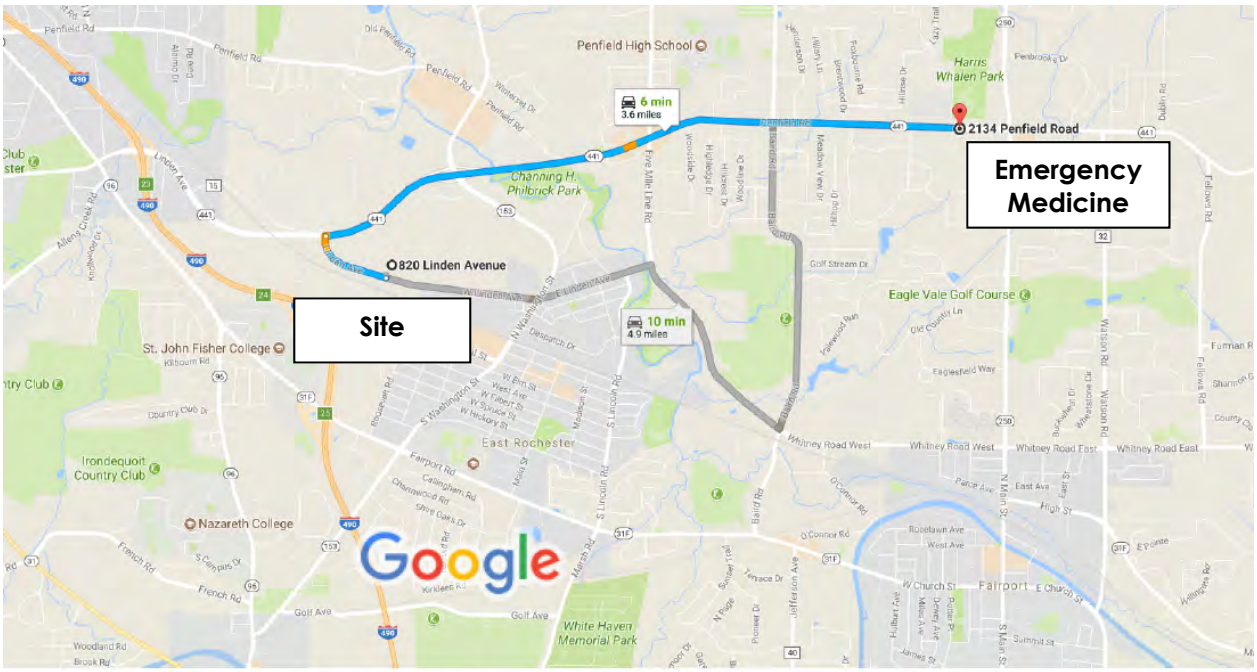
820 Linden Ave

1. Head east on Linden Ave toward Apple St
2. Turn right onto NY-153 S/N Washington St
3. Turn right onto NY-96 N/N Main St
   Continue to follow NY-96 N
4. Turn left onto French Rd
5. Turn right onto NY-31 W
6. Turn right
   Destination will be on the right

3400 Monroe Ave

Figure 2
Map and Driving Directions to Medical Facilities

Urgent Care Option 2:
UR Medicine Urgent Care
2134 Penfield Rd
Penfield, NY 14526
Phone: (585) 276-8280



Map data ©2017 Google United States 2000 ft

820 Linden Ave
Rochester, NY 14625

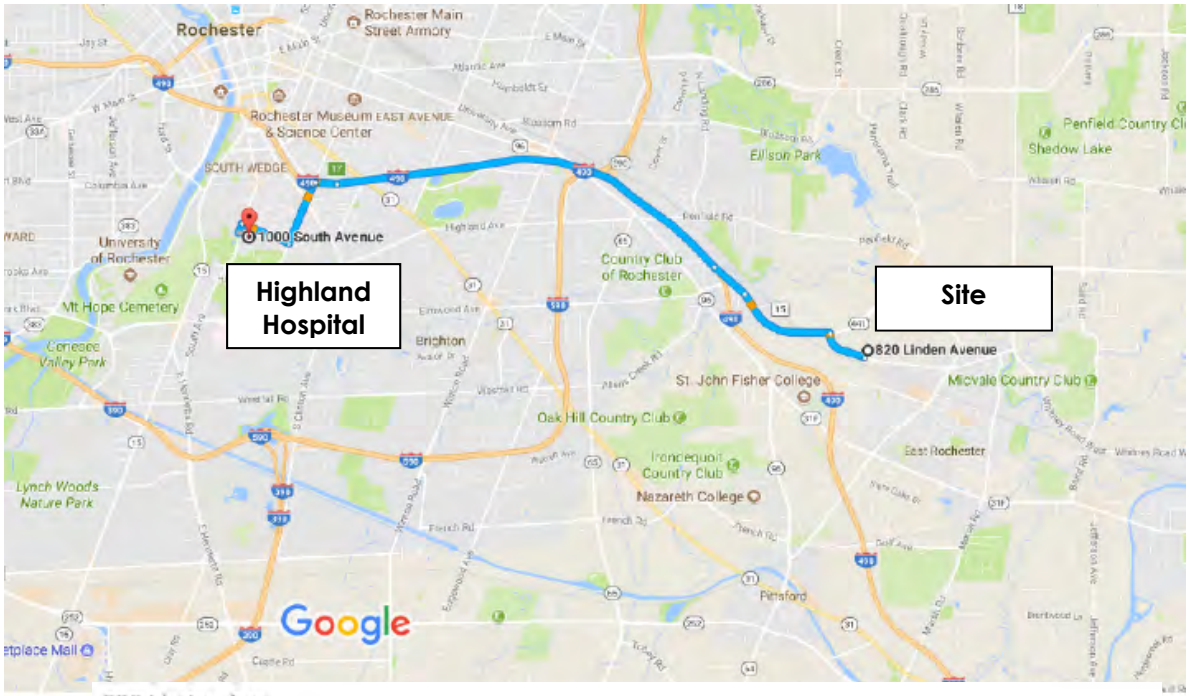
1. Head west on Linden Ave toward Linden Park — 0.4 mi
2. Turn right onto NY-441 E — 3.2 mi

2134 Penfield Rd
Penfield, NY 14526

Figure 2
Map and Driving Directions to Medical Facilities

Hospital:

Highland Hospital
1000 South Ave
Rochester, NY 14620
Phone: (585) 473-2200



820 Linden Ave
Rochester, NY 14625

Get on I-490 W in Brighton — 3 min (1.6 mi)

1. Head west on Linden Ave toward Linden Park — 0.4 mi
2. Use any lane to turn left onto NY-441 W — 0.9 mi
3. Use the right lane to take the Interstate 490 W ramp — 0.4 mi

Follow I-490 W to S Goodman St in Rochester. Take exit 17 from I-490 W — 4 min (3.7 mi)

4. Merge onto I-490 W — 3.5 mi
5. Take exit 17 for Goodman St — 0.2 mi

Follow S Goodman St and Rockingham St to South Ave — 5 min (1.1 mi)

6. Turn left onto S Goodman St — 0.6 mi
7. Turn right onto Rockingham St — 0.4 mi
8. Turn left onto South Ave — 446 ft

1000 South Ave
Rochester, NY 14620

APPENDIX C

HEALTH AND SAFETY PLAN
INTERIM REMEDIAL MEASURE
820 LINDEN AVENUE SITE
BROWNFIELD CLEANUP PROGRAM SITE #C828200
820 LINDEN AVENUE
PITTSFORD, MONROE COUNTY, NEW YORK

TABLES

Stantec

Table 1
Health and Safety Data for COCs
Interim Remedial Measure
Health and Safety Plan
820 Linden Avenue Site (BCP #C828200)
820 Linden Avenue, Pittsford, NY

Compound	OSHA PEL[1]	NIOSH REL[2]	ACGIH TLV[3]	Physical Description	Odor Threshold in Air	Route of Exposure	Symptoms	Target Organs
Acetone	1000 ppm	250 ppm	250 ppm 500 ppm STEL	Colorless liquid with a fragrant, mint-like odor	20 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eyes, skin, respiratory system, central nervous system
1,1-dichloroethene (1,1-DCE)	NE	NE	5 ppm	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor	190 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys
cis-1,2- dichloroethene (cis-1,2-DCE)	200 ppm	200 ppm	200 ppm	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor	17 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; central nervous system depression	Eyes, respiratory system, central nervous system
Lead	0.05 mg/m^3 0.03 mg/m^3 AL	0.05 mg/m^3	0.05 mg/m^3	A heavy, ductile, soft, gray solid	NE	inhalation, ingestion, skin and/or eye contact	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue
Methylene chloride	25 ppm 125 ppm STEL 12.5 ppm AL	NE	50 ppm	Colorless liquid with a chloroform-like odor	250 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; lassitude, drowsiness, dizziness; numb, tingle limbs; nausea	Eyes, skin, cardiovascular system, central nervous system
Tetrachloroethene (aka Perchloroethene [PCE])	100 ppm 200 ppm C	NE	25 ppm 100 ppm STEL	Colorless liquid with a mild chloroform-like odor	1 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, liver, kidneys, central nervous system
Toluene	200 ppm TWA 300 ppm C	100 ppm TWA 150 ppm STEL	20 ppm	Colorless liquid with a sweet, pungent, benzene-like odor	2.9 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys
1,1,1-Trichloroethane (1,1,1-TCA)	350 ppm	350 ppm	350 ppm 450 ppm STEL	Colorless liquid with a mild, chloroform-like odor	120 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage	Eyes, skin, central nervous system, cardiovascular system, liver
Trichloroethene (TCE)	100 ppm 200 ppm C	25 ppm	10 ppm 25 ppm STEL	Colorless liquid with a chloroform-like odor	28 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system

Abbreviations:

AL	Action Level
C	Ceiling limits are not to be exceeded during any part of the workday
mg/m3	milligrams per cubic meter
NE	Not established
ppm	parts per million
STEL	Short-Term Exposure Limit is a 15-min TWA
TWA	Time-weighted average

Notes:
1. Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) for general industry. The OSHA PELs are 8-hour TWAs, unless otherwise noted.
2. National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL) are based on 10-hour workdays during a 40-hour workweek.
3. American Conference for Governmental Industrial Hygenists (ACGIH) Threshold Limit Value (TLV). The ACGIH TLVs are 8-hr TWAs, unless otherwise noted.

Table 2
Exposure Pathways and First Aid Response for COCs
Interim Remedial Measure
Health and Safety Plan
820 Linden Avenue Site (BCP #828200)
820 Linden Avenue, Pittsford, NY

Substance	Exposure Pathways	First Aid Instructions
VOCs listed in Table 1	Eye	Irrigate immediately
	Dermal	Soap wash promptly; or Soap wash immediately (acetone); or Soap flush immediately (1,1-DCE)
	Inhalation	Respiratory support
	Ingestion	Medical attention immediately
Metals listed in Table 1	Eye	Irrigate immediately
	Dermal	Soap wash promptly
	Inhalation	Respiratory support
	Ingestion	Medical attention immediately

Table 3
Exposure Symptoms and First Aid for Heat Exposure
Interim Remedial Measure
Health and Safety Plan
820 Linden Avenue Site (BCP #C828200)
820 Linden Avenue, Pittsford, NY

Heat Disorder	Symptoms	First Aid Instructions
Heat Rash	Red skin	Remove victim from sun; allow skin to dry; washing skin may further cool the victim.
Heat Cramps	Muscle cramps	Move victim to cooler environment and lay down if possible; remove or lighten tight clothing; cool victim by sponging and fanning (do not cool worker too much); administer fluids (juice, non-caffeinated soft drinks or sports drinks are preferable) if victim is alert and not nauseated.
Heat Exhaustion	Heavy sweating; weakness; cool to cold skin; pale and clammy; thready pulse; possible confusion; fainting; vomiting.	Stop work immediately; remove victim from sun to cooler environment; lie down and loosen clothing; apply cool, wet cloths; fan or move to location with AC; sips of water; if nausea occurs, discontinue fluids; if vomiting continues, seek immediate medical attention.
Heat Stroke	High body temperature; hot, dry skin (red mottled or bluish); rapid and strong pulse; confusion/disorientation; dizziness; possible loss of consciousness.	Stop work immediately; call 911; move victim to cooler place and remove heavy clothing; cool the victim by available means (ice packs, wet towels) with extreme caution; do not administer fluids or medication.

APPENDIX C

HEALTH AND SAFETY PLAN
INTERIM REMEDIAL MEASURE
820 LINDEN AVENUE SITE
BROWNFIELD CLEANUP PROGRAM SITE #C828200
820 LINDEN AVENUE
PITTSFORD, MONROE COUNTY, NEW YORK

APPENDIX

Stantec

Appendix A

Safety Data Sheets

SAFETY DATA SHEET

Version 4.12
Revision Date 03/23/2017
Print Date 05/16/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 1,1-Dichloroethene

Product Number : 48526
Brand : Supelco
Index-No. : 602-025-00-8

CAS-No. : 75-35-4

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 # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 1), H224
Acute toxicity, Oral (Category 3), H301
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351

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)

H224	Extremely flammable liquid and vapour.
H301	Toxic if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H351	Suspected of causing 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.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
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	:	1,1-Dichloroethylene Vinylidene chloride
Formula	:	$C_2H_2Cl_2$
Molecular weight	:	96.94 g/mol
CAS-No.	:	75-35-4
EC-No.	:	200-864-0
Index-No.	:	602-025-00-8

Hazardous components

Component	Classification	Concentration
Vinylidene chloride		
	Flam. Liq. 1; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; H224, H301, H315, H319, H351	90 - 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. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

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
Dry powder Dry sand

Unsuitable extinguishing media
Do NOT use water jet.

5.2 Special hazards arising from the substance or mixture
No data available

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
Wear respiratory protection. 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
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. 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. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Air and moisture sensitive. Store under inert gas.

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
Vinylidene chloride	75-35-4	TWA	5.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Liver damage Kidney damage Not classifiable as a human carcinogen		
		Potential Occupational Carcinogen See Appendix A		
		PEL	1 ppm 4 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

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.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 30 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, 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: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -122 °C (-188 °F) - lit.
f)	Initial boiling point and boiling range	30 - 32 °C (86 - 90 °F) - lit.
g)	Flash point	-19 °C (-2 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 15.5 %(V) Lower explosion limit: 6.5 %(V)
k)	Vapour pressure	658.6 hPa (494.0 mmHg) 667.3 hPa (500.5 mmHg) at 20.0 °C (68.0 °F) 2,137.4 hPa (1,603.2 mmHg) at 55.0 °C (131.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.213 g/cm3 at 20 °C (68 °F)
n)	Water solubility	0.2 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	520.0 °C (968.0 °F) 580.0 °C (1,076.0 °F)
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.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents, Copper, Aluminum, and its alloys, Peroxides, Strong bases, Oxygen

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
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
LD50 Oral - Rat - 200.0 mg/kg

Inhalation: Lung irritation

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
Laboratory experiments have shown mutagenic effects.

Carcinogenicity

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

Limited evidence of carcinogenicity in animal studies

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

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: KV9275000

Nausea, Headache, Vomiting, Dizziness, Drowsiness, Confusion., Incoordination., Central nervous system depression, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Daphnia magna (Water flea) - 11.60 - 11.79 mg/l
	LC50 - Pimephales promelas (fathead minnow) - 108.00 - 169.00 mg/l
	LC50 - Lepomis macrochirus (Bluegill) - 74.00 - 220.00 mg/l
	LC50 - Cyprinodon variegatus (sheepshead minnow) - 249.00 mg/l
	LC50 - other fish - 250.00 mg/l
	LC50 - other fish - 224.00 mg/l
	LC50 - Pimephales promelas (fathead minnow) - 108 mg/l - 96 h
	NOEC - Cyprinodon variegatus (sheepshead minnow) - 80 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 11.6 mg/l - 48 h

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
Offer surplus and non-recyclable solutions to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. 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: 1303 Class: 3 Packing group: I
Proper shipping name: Vinylidene chloride, stabilized
Reportable Quantity (RQ): 100 lbsReportable Quantity (RQ): 100 lbsMarine pollutant:yes
Poison Inhalation Hazard: No

IMDG
UN number: 1303 Class: 3 Packing group: I EMS-No: F-E, S-D
Proper shipping name: VINYLIDENE CHLORIDE, STABILIZED
Marine pollutant:yes Marine pollutant: yes

IATA
UN number: 1303 Class: 3 Packing group: I
Proper shipping name: Vinylidene chloride, stabilized

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

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

	CAS-No.	Revision Date
Vinylidene chloride	75-35-4	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Reportable Quantity : D029 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Vinylidene chloride	75-35-4	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Vinylidene chloride	75-35-4	2007-07-01

	CAS-No.	Revision Date
Vinylidene chloride	75-35-4	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Vinylidene chloride	75-35-4	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H224	Extremely flammable liquid and vapour.
H301	Toxic if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H351	Suspected of causing cancer.
Skin Irrit.	Skin irritation

HMIS Rating

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

NFPA Rating

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

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: 4.12 Revision Date: 03/23/2017 Print Date: 05/16/2017

SAFETY DATA SHEET

Version 4.10
Revision Date 09/23/2016
Print Date 07/13/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : 1,1,1-Trichloroethane

Product Number : 402877
Brand : Sigma-Aldrich
Index-No. : 602-013-00-2

CAS-No. : 71-55-6

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 # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315

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 Warning

Hazard statement(s)
H315 Causes skin irritation.
H332 Harmful if inhaled.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves.
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312 Call a POISON CENTER/doctor if you feel unwell.

P321	Specific treatment (see supplemental first aid instructions on this label).
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	'Chlorothene' Methylchloroform
Formula	:	$C_2H_3Cl_3$
Molecular weight	:	133.40 g/mol
CAS-No.	:	71-55-6
EC-No.	:	200-756-3
Index-No.	:	602-013-00-2

Hazardous components

Component	Classification	Concentration
1,1,1-Trichloroethane		
	Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; Ozone 1; H315, H319, H332	<= 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
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
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
No data available

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

5.4 Further information
No data available

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.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
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. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

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
1,1,1-Trichloroethane	71-55-6	TWA	350.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Liver damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		STEL	450.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Liver damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		C	350.000000 ppm 1,900.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		See Appendix C 15 minute ceiling value		
		TWA	350.000000 ppm 1,900.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value in mg/m3 is approximate.		

		PEL	350 ppm 1,900 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	450 ppm 2,450 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	800 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
1,1,1-Trichloroethane	71-55-6	Methyl chloroform	40ppm	In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to last shift of workweek			
		Trichloroacetic acid	10.0000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of the workweek (After four or five consecutive working days with exposure)			
		Total trichloroethanol	30.0000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			
		Total trichloroethanol	1.0000 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

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.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 60 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, 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, 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 ABEK (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
Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-35.0 °C (-31.0 °F)
f)	Initial boiling point and boiling range	72.0 - 75.0 °C (161.6 - 167.0 °F)
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 15 %(V) Lower explosion limit: 7.5 %(V)
k)	Vapour pressure	133.3 hPa (100.0 mmHg) at 20.0 °C (68.0 °F)
l)	Vapour density	No data available
m)	Relative density	1.34 g/cm3
n)	Water solubility	1.25 g/l at 23 °C (73 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 2.49
p)	Auto-ignition temperature	537.0 °C (998.6 °F)
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):
Low alkyl epoxide (<=0.05 %)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Potassium, Magnesium, Sodium/sodium oxides, Zinc, Strong bases

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
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
LD50 Oral - Rat - 9,600 mg/kg
Remarks: Cardiac:Pulse rate. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

LD50 Oral - Mouse - 6,000 mg/kg
Remarks: Cardiac:Pulse rate. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

LC50 Inhalation - Mouse - 2 h - 3911 ppm
Remarks: Behavioral:Excitement.

Dermal: No data available

LD50 Intraperitoneal - Rat - 3,593 mg/kg

LD50 Intraperitoneal - Mouse - 2,568 mg/kg

LD50 Subcutaneous - Mouse - 16.0 mg/kg
Remarks: Drowsiness Behavioral:Ataxia.

LD50 Intraperitoneal - Dog - 3,100 mg/kg
Remarks: Liver:Liver function tests impaired.

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 24 h

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (1,1,1-Trichloroethane)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

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: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Exposure to and/or consumption of alcohol may increase toxic effects., prolonged or repeated exposure can cause:, narcosis, Liver injury may occur., Kidney injury may occur.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 42.3 mg/l - 96 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 28 d - 0.0734 mg/l
	Bioconcentration factor (BCF): 9

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
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: 2831 Class: 6.1 Packing group: III
Proper shipping name: 1,1,1-Trichloroethane
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG

UN number: 2831 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: 1,1,1-TRICHLOROETHANE

IATA
UN number: 2831 Class: 6.1 Packing group: III
Proper shipping name: 1,1,1-Trichloroethane

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

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

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Eye Irrit.	Eye irritation
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
Ozone	Hazardous to the ozone layer
Skin Irrit.	Skin irritation

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
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: 4.10 Revision Date: 09/23/2016 Print Date: 07/13/2017

SAFETY DATA SHEET

Creation Date 28-Apr-2009 **Revision Date** 24-May-2017 **Revision Number** 3

1. Identification

Product Name **Acetone**

Cat No. : **AC177170000; AC177170010; AC177170025; AC177170050; AC177170100; AC177170250**

Synonyms 2-Propanone

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
Serious Eye Damage/Eye Irritation	Category 2
Specific target organ toxicity (single exposure) Target Organs - Central nervous system (CNS).	Category 3
Specific target organ toxicity - (repeated exposure) Target Organs - Kidney, Liver, spleen, Blood.	Category 2

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Causes serious eye irritation
May cause drowsiness or dizziness
May cause damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not breathe 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
Keep cool
Response
Get medical attention/advice if you feel unwell
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
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store in a well-ventilated place. Keep container tightly closed
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Repeated exposure may cause skin dryness or cracking

3. Composition / information on ingredients

Component	CAS-No	Weight %
Acetone	67-64-1	>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 Move to fresh air. If breathing is difficult, give oxygen. Get medical attention immediately if symptoms occur.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: May cause pulmonary edema

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media CO_2, dry chemical, dry sand, alcohol-resistant foam. Water spray. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media Water may be ineffective

Flash Point -20 °C / -4 °F

Method - Closed cup

Autoignition Temperature 465 °C / 869 °F

Explosion Limits
Upper 12.8 vol %
Lower 2.5 vol %

Oxidizing Properties Not oxidising

Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Flammable. Risk of ignition. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2) Formaldehyde Methanol

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. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
1	3	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges. Keep people away from and upwind of spill/leak. Avoid contact with skin, eyes and inhalation of vapors.

Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Remove all sources of ignition. Take precautionary measures against static discharges. Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Wear personal protective equipment. Ensure adequate ventilation. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges. Use only non-sparking tools. Use explosion-proof equipment. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.

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

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Acetone	TWA: 250 ppm STEL: 500 ppm	(Vacated) TWA: 750 ppm (Vacated) TWA: 1800 mg/m^3 (Vacated) STEL: 2400 mg/m^3 (Vacated) STEL: 1000 ppm TWA: 1000 ppm TWA: 2400 mg/m^3	IDLH: 2500 ppm TWA: 250 ppm TWA: 590 mg/m^3	TWA: 1000 ppm TWA: 2400 mg/m^3 STEL: 1260 ppm STEL: 3000 mg/m^3

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. 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	sweet
Odor Threshold	19.8 ppm
pH	7
Melting Point/Range	-95 °C / -139 °F
Boiling Point/Range	56 °C / 132.8 °F
Flash Point	-20 °C / -4 °F
Method -	Closed cup
Evaporation Rate	5.6 (Butyl Acetate = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	12.8 vol %
Lower	2.5 vol %
Vapor Pressure	247 mbar @ 20 °C
Vapor Density	2.0
Specific Gravity	0.790
Solubility	Soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	465 °C / 869 °F
Decomposition Temperature	> 4°C
Viscosity	0.32 mPa.s @ 20 °C

Molecular Formula	C3 H6 O
Molecular Weight	58.08
Refractive index	1.358 - 1.359

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Heat, flames and sparks. Incompatible products. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong oxidizing agents, Strong reducing agents, Strong bases, Peroxides, Halogenated compounds, Alkali metals, Amines

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Formaldehyde, Methanol

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
Acetone	5800 mg/kg (Rat)	> 15800 mg/kg (rabbit) > 7400 mg/kg (rat)	76 mg/l, 4 h, (rat)

Toxicologically Synergistic Products Carbon tetrachloride; Chloroform; Trichloroethylene; Bromodichloromethane; Dibromochloromethane; N-nitrosodimethylamine; 1,1,2-Trichloroethane; Styrene; Acetonitrile, 2,5-Hexanedione; Ethanol; 1,2-Dichlorobenzene

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

Irritation Irritating to eyes and skin

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
Acetone	67-64-1	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 Central nervous system (CNS)

STOT - repeated exposure Kidney Liver spleen Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: May cause pulmonary edema

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

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Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Acetone	NOEC = 430 mg/l (algae; 96 h)	Oncorhynchus mykiss: LC50 = 5540 mg/l 96h Alburnus alburnus: LC50 = 11000 mg/l 96h Leuciscus idus: LC50 = 11300 mg/L/48h Salmo gairdneri: LC50 = 6100 mg/L/24h	EC50 = 14500 mg/L/15 min	EC50 = 8800 mg/L/48h EC50 = 12700 mg/L/48h EC50 = 12600 mg/L/48h

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
Acetone	-0.24

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
Acetone - 67-64-1	U002	-

14. Transport information

DOT

UN-No UN1090
Proper Shipping Name ACETONE
Hazard Class 3
Packing Group II

TDG

UN-No UN1090
Proper Shipping Name ACETONE
Hazard Class 3
Packing Group II

IATA

UN-No UN1090
Proper Shipping Name ACETONE
Hazard Class 3
Packing Group II

IMDG/IMO

UN-No UN1090
Proper Shipping Name ACETONE
Hazard Class 3
Packing Group II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL

Acetone	X	X	-	200-662-2	-		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	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

CWA (Clean Water Act) Not applicable

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
Acetone	5000 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
Acetone	X	X	X	-	X

U.S. Department of Transportation

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

U.S. Department of Homeland Security
This product contains the following DHS chemicals:

Component	DHS Chemical Facility Anti-Terrorism Standard
Acetone	2000 lb STQ

Other International Regulations

Mexico - Grade	Serious risk, Grade 3

16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	28-Apr-2009
Revision Date	24-May-2017
Print Date	24-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 4.4
Revision Date 12/01/2015
Print Date 07/13/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : cis-Dichloroethylene

Product Number : 48597
Brand : Supelco
Index-No. : 602-026-00-3

CAS-No. : 156-59-2

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 # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Acute toxicity, Inhalation (Category 4), H332
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

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)
H225 Highly flammable liquid and vapour.
H332 Harmful if inhaled.
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.

P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER or doctor/ physician if you feel unwell.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	C2H2Cl2
Molecular weight	:	96.94 g/mol
CAS-No.	:	156-59-2
EC-No.	:	205-859-7
Index-No.	:	602-026-00-3

Hazardous components

Component	Classification	Concentration
cis-Dichloroethylene		
	Flam. Liq. 2; Acute Tox. 4; Aquatic Acute 3; Aquatic Chronic 3; H225, H332, H412	<= 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. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. 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. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature 2 - 8 °C

Handle and store under inert gas. Air and moisture sensitive. 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
cis-Dichloroethylene	156-59-2	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Eye irritation		

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.

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. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: light yellow
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-80.0 °C (-112.0 °F)
f)	Initial boiling point and boiling range	60.0 - 61.0 °C (140.0 - 141.8 °F)
g)	Flash point	6.0 °C (42.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.28 g/cm3
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.

10.3 Possibility of hazardous reactions
Vapours may form explosive mixture with air.

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

10.5 Incompatible materials
Oxidizing agents

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
LC50 Inhalation - Rat - 13700 ppm
Remarks: Behavioral:Somnolence (general depressed activity). Liver:Fatty liver degeneration.

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

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

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: KV9420000

narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

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: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

Poison Inhalation Hazard: No

IMDG
UN number: 1150 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROETHYLENE

IATA
UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
cis-Dichloroethylene	156-59-2	1993-04-24

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

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

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H332	Harmful if inhaled.
H402	Harmful to aquatic life.

HMIS Rating

Health hazard:	1
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	1

NFPA Rating

Health hazard:	2
Fire Hazard:	3
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: 4.4 Revision Date: 12/01/2015 Print Date: 07/13/2017

LEAD METAL
SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identity: Lead Metal

Trade Names and Synonyms: Lead; Pb; Plumbum; Metallic Lead; Inorganic Lead; ASTM B29; TADANAC Lead, Low-Alpha Lead.

Manufacturer:
Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:
In U.S.:
Teck American Metal Sales Incorporated
501 North Riverpoint Blvd, Suite 300
Spokane, WA
USA, 99202

Other than U.S.:
Teck Metals Ltd.
#1700 – 11 King Street West
Toronto, Ontario
M5H 4C7

Preparer:
Teck Metals Ltd.
Suite 3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of Last Review: June 29, 2015.

Date of Last Edit: June 29, 2015.

Product Use: Used as a construction material for tank linings, piping, and equipment used in the manufacture of sulphuric acid and the refining and processing of petroleum; used in x-ray and atomic radiation shielding; used in the manufacture of paint pigments, organic and inorganic lead compounds, lead shot, lead wire for bullets, ballast, and lead solders; used as a bearing metal or alloy; used in the manufacture of storage batteries, ceramics, plastics, and electronic devices; used in the metallurgy of steel and other metals; and used in the form of lead oxide for batteries.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

Health		Physical	Environmental
Acute Toxicity (Oral, Inhalation)	– Does not meet criteria	Does not meet criteria for any Physical Hazard	**Aquatic Toxicity – Short Term (Acute) Category 3**
Skin Corrosion/Irritation	– Does not meet criteria		
Eye Damage/Eye Irritation	– Does not meet criteria		
Respiratory or Skin Sensitization	– Does not meet criteria		
Mutagenicity	– Does not meet criteria		
Carcinogenicity	**– Category 2**		
Reproductive Toxicity	**– Category 1A**		
Specific Target Organ Toxicity Chronic Exposure	**– Category 1**		

LABEL:

Symbols:

Signal Word:

DANGER

Hazard Statements	**Precautionary Statements:**
DANGER! Causes damage to kidneys, blood-forming systems, central nervous system and digestive tract through prolonged or repeated exposure. May damage the unborn child. May cause harm to breast-fed children. Suspected of damaging fertility. Suspected of causing cancer. Harmful to aquatic life.	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection. Do not breathe dust or fumes. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. If exposed or concerned or you feel unwell: Get medical advice/attention. Avoid release to the environment.

Emergency Overview: A bluish-white to silvery-grey, heavy, soft metal that does not burn in bulk. Finely-divided lead dust clouds are a moderate fire and explosion hazard, however. When heated strongly in air, highly toxic lead oxide fumes can be generated. Inhalation or ingestion of lead may produce both acute and chronic health effects. Possible cancer and reproductive hazard. SCBA and full protective clothing are required for fire emergency response personnel.

Potential Health Effects: Inhalation or ingestion of lead may result in headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm, and joint pain. Prolonged exposure may also cause central nervous system damage, hypertension, gastrointestinal disturbances, anemia, kidney dysfunction and possible reproductive effects. Pregnant women should be protected from excessive exposure in order to prevent lead crossing the placental barrier and causing infant neurological disorders. Lead and inorganic lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP lists lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU does not currently list lead as a human carcinogen (see Toxicological Information, Section 11).

Potential Environmental Effects: Lead metal has relatively low bioavailability; however, compounds which it forms with other elements can be toxic to both aquatic and terrestrial organisms at low concentrations. These compounds can be particularly toxic in the aquatic environment. Lead bioaccumulates in plants and animals in both aquatic and terrestrial environments (see Ecological Information, Section 12).

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENT	CAS Registry No.	CONCENTRATION (% wgt/wgt)
Lead	7439-92-1	99+%

Note: See Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Eye irritation, redness. Gently brush product off face if necessary. Do not rub eye(s). Let the eye(s) water naturally for a few minutes. Look right and left, then up and down. If particle/dust does not dislodge, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, get medical advice/attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: *Symptoms:* Skin soiling, mild irritation. Gently brush away excess dust. Wash gently and thoroughly with lukewarm, gently flowing water and non-abrasive soap for 5 minutes, or until product is removed. If skin irritation occurs or you feel unwell, get medical advice/attention. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: *Symptoms:* Respiratory irritation. Remove source of exposure or move person to fresh air and keep comfortable for breathing. Seek medical attention if you feel unwell.

Ingestion: *Symptoms:* Stomach upset. If you feel unwell or are concerned, get medical advice/attention.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not flammable or combustible. Finely-divided lead dust or powder is a moderate fire hazard and moderate explosion hazard when dispersed in the air at high concentrations and exposed to heat, flame, or other ignition sources. Explosions may also occur upon contact with certain incompatible materials (see Stability and Reactivity, Section 10).

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam.

Fire Fighting: Do not use direct water streams on fires where molten metal is present, due to the risk of a steam explosion that could potentially eject molten metal uncontrollably. Use a fine water mist on the front-running edge of the spill and on the top of the molten metal to cool and solidify it. If possible, move solid material from fire area or cool material exposed to flame to prevent melting of the metal ingots. Highly toxic lead oxide fumes may evolve in fires. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Restrict access to the area until completion of clean-up. Clean up spilled material immediately, observing precautions outlined below. Molten metal should be allowed to solidify before cleanup. If solid metal, wear gloves, pick up and return to process. If dust, wear recommended personal protective equipment (see below) and use methods which will minimize dust generation (e.g., vacuum solids). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labelled containers for later recovery or disposal. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

Personal Precautions: Persons responding to an accidental release should wear protective clothing, gloves and a respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust and fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash as well as a respirator to protect against inhalation of lead fume. Workers should wash and change clothing following cleanup of a lead spill to prevent personal contamination with lead dust.

Environmental Precautions: Lead metal has low bioavailability; however, compounds which it forms with other elements can be toxic to aquatic and terrestrial organisms. Releases of the product to water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store in a DRY, covered area, separate from strong acids, other incompatible materials, active metals and food or feedstuffs. Solid metal suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Otherwise, entrained moisture could expand explosively and spatter molten metal out of the bath. No special packaging materials are required. Lead metal, in contact with wood or other surfaces, may leave traces of lead particulate that can accumulate over time. Cleaning or disposal of these surfaces requires review to ensure that any effluent or solid waste disposal meets the requirements of regulations in the applicable jurisdiction.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines:

Component	ACGIH TLV	OSHA PEL	NIOSH REL
Lead	0.05 mg/m^3	0.05 mg/m^3	0.05 mg/m^3

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction.
ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentration of lead fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Local exhaust is recommended for melting, casting, welding, grinding, flame cutting or burning, and use of lead powders.

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when lead is processed. Appropriate eye protection should be worn where fume or dust is generated. Where hot or molten metal is handled, heat resistant gloves, goggles or face shield, and clothing to protect from radiant heat and hot metal splash should be worn. Safety type boots are recommended.

Respirators: Where lead dust or fumes are generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge). When exposure levels are obviously high but the actual concentration is unknown, a self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask should be worn.

General Hygiene Considerations: Do not eat, drink or smoke in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate, designated areas as well as at the end of the workday. A double locker-shower system with separate clean and dirty sides is usually required for lead handling operations to avoid cross-contamination of street clothes. Contaminated clothing should be changed frequently and laundered before each reuse. Inform laundry personnel of contaminants' hazards. Workers should not take dirty work clothes home and launder them with other personal clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Malleable, bluish-white to silvery-grey solid metal	**Odour:** None	**Odour Threshold:** Not Applicable	**pH:** Not Applicable
Vapour Pressure: (negligible @ 20°C)	**Vapour Density:** Not Applicable	**Melting Point/Range:** 328°C	**Boiling Point/Range:** 1,740°C
Relative Density (Water = 1)**:** 11.34	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Not Applicable	**Solubility:** Insoluble in water
Flash Point: None	**Flammable Limits (LEL/UEL):** Not Flammable	**Auto-ignition Temperature:** None	**Decomposition Temperature:** None

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur. Freshly cut or cast lead surfaces tarnish rapidly due to the formation of an insoluble protective layer of basic lead carbonate.

Incompatibilities: Lead reacts vigorously with strong acids (e.g., hot concentrated nitric acid, boiling concentrated hydrochloric acid, etc.), strong oxidizers such as peroxides, chlorates, nitrates and halogen or interhalogen compounds such as chlorine trifluoride. Powdered lead metal in contact with disodium acetylide, chlorine trifluoride, sodium carbide or fused ammonium nitrate poses a risk of explosion. Solutions of sodium azide in contact with lead metal can form lead azide, which is a detonating compound. Vigorous reactions can also occur between molten lead and active metals, such as sodium, potassium, lithium and calcium. A lead-zirconium alloy (10-70% Zr) will ignite when struck with a hammer.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting or burning, electric arc welding or overheating a molten bath will generate highly toxic lead oxide fume. Lead oxide is highly soluble in body fluids and the particle size of the metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Lead accumulates in bone and body organs once it enters the body. Elimination from the body is slow. Initial and periodic medical examinations are advised for persons repeatedly exposed to levels at or above the exposure limits of lead dust or fumes. Once lead enters the body, it can affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal system. The primary routes of exposure to lead are inhalation or ingestion of dust and fumes.

Acute:
Skin/Eye: Contact with dust or fume may cause local irritation but would not cause tissue damage.

Inhalation: Exposure to lead dust or fume may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An intense, short-term exposure to lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are unlikely in industry today. Kidney damage, as well as anemia, can occur from acute exposure.

Ingestion: Symptoms due to ingestion of lead dust or fume would be similar to those from inhalation. Other health effects such as metallic taste in the mouth and constipation or bloody diarrhea might also occur.

Chronic:
Prolonged exposure to lead dust and fume may produce many of the symptoms of short-term exposure and may also cause central nervous system damage, gastrointestinal disturbances, anemia, and, rarely, wrist drop. Reduced hemoglobin production has been associated with low lead exposures. Symptoms of central nervous system damage due to moderate lead exposure include fatigue, headaches, tremors and hypertension. Very high lead exposure can result in lead encephalopathy with symptoms of hallucinations, convulsions, and delirium. Kidney dysfunction and possible injury has also been associated with chronic lead poisoning. Chronic over-exposure to lead has been implicated as a causative agent for the impairment of male and female reproductive capacity. Pregnant women should be protected from excessive exposure as lead can cross the placental barrier and unborn children may suffer neurological damage or developmental problems due to excessive lead exposure. Teratogenic and mutagenic effects from exposure to lead have been reported in some studies but not in others. The literature is inconsistent and no firm conclusions can be drawn at this time. Lead and lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP lists lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen.

Animal Toxicity:

Hazardous Ingredient:	Acute Oral Toxicity:	Acute Dermal Toxicity:	Acute Inhalation Toxicity:
Lead	No Data	No Data	No Data

SECTION 12. ECOLOGICAL INFORMATION

While lead metal is relatively insoluble, its processing or extended exposure in aquatic and terrestrial environments may lead to the release of lead compounds in more bioavailable forms. While lead compounds are not particularly mobile in the aquatic environment, they can be toxic to aquatic organisms, especially fish, at low concentrations. Water hardness, pH and dissolved organic carbon content are three major factors which regulate the degree of lead toxicity. Lead in soil is generally neither very mobile nor bioavailable, as it can become strongly sorbed onto soil particles, increasingly so over time, to a degree related to physical properties of the soil. Lead bioaccumulates in plants and animals in both aquatic and terrestrial environments.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME ..... Not a regulated product in ingot form.
TRANSPORT CANADA AND U.S. DOT CLASSIFICATION ..... Not Applicable

TRANSPORT CANADA AND U.S. DOT PIN ..... Not Applicable
MARINE POLLUTANT..... No
IMO CLASSIFICATION ..... Not Regulated

SECTION 15. REGULATORY INFORMATION

U.S.
Ingredient Listed on TSCA Inventory..... Yes

Hazardous Under Hazard Communication Standard ..... Yes

CERCLA Section 103 Hazardous Substances..... ..... Lead ..... RQ: 10 lbs. (4.54 kg.)*
*reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA Section 302 Extremely Hazardous Substance..... No

EPCRA Section 311/312 Hazard Categories ..... Delayed (chronic) health hazard - Carcinogen
Delayed (chronic) health hazard – Reproductive toxin

EPCRA Section 313 Toxic Release Inventory..... Lead CAS No. 7439-92-1
Percent by Weight - At least 99%

SECTION 16. OTHER INFORMATION

Date of Original Issue: July 23, 1997 **Version:** 01 *(First edition)*

Date of Latest Revision: June 29, 2015 **Version:** 13

The information in this Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2015, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, Guide to Occupational Exposure Values – 2015.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urben, Ed), 1995.
- Canadian Centre for Occupational Health and Safety, Hamilton, ON, CHEMINFO Record No. 608 - Lead (Rev. 2009-05).
- European Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH).
- Health Canada, SOR/2015-17, Hazardous Products Regulations, 30 January 2015.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – present, (multi-volume work), World Health Organization, Geneva.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0052 - Lead.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank (online version).
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham, B. Cohrssen & C.H. Powell, Ed.
- U.S. Dept. of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 13th Report on Carcinogens, October 2014.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards, on-line edition.
- U.S. Dept. of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Lead, September 2005.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader
Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck American Metal Sales Incorporated and Teck Metals Ltd. extend no warranty and assume no responsibility for the accuracy of the content and expressly disclaim all liability for reliance thereon. This safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

SAFETY DATA SHEET

Creation Date 27-Jan-2010 **Revision Date** 24-May-2017 **Revision Number** 5

1. Identification

Product Name **Methylene chloride**

Cat No. : **D37-1; D37-4; D37-20; D37-200; D37-200LC; D37-500; D37FB-19; D37FB-50; D37FB-115; D37FB-200; D37POP-19; D37POPB-50; D37POPB-200; D37RB-19; D37RB-50; D37RB-115; D37RB-200; D37RS-19; D37RS-28; D37RS-50; D37RS-115; D37RS-200; D37SK-4; D37SK-4LC; D37SS-28; D37SS-50; D37SS-115; D37SS-200; D37SS-1350**

Synonyms Dichloromethane; DCM

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

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 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)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause drowsiness or dizziness
May cause cancer

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)

WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Methylene chloride	75-09-2	>99.5

4. First-aid measures

General Advice If symptoms persist, call a physician.

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 Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

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

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature 556 °C / 1032.8 °F

Explosion Limits
Upper 23 vol %
Lower 13 vol %
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
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
Carbon monoxide (CO) Carbon dioxide (CO_2) Hydrogen chloride gas 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	1	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing. Keep people away from and upwind of spill/leak.

Environmental Precautions Should not be released into the environment. See Section 12 for additional ecological information.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Use only under a chemical fume hood.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Methylene chloride	TWA: 50 ppm	(Vacated) TWA: 500 ppm (Vacated) STEL: 2000 ppm (Vacated) Ceiling: 1000 ppm TWA: 25 ppm STEL: 125 ppm	IDLH: 2300 ppm	TWA: 100 ppm TWA: 330 mg/m^3 STEL: 500 ppm STEL: 1740 mg/m^3

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

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	sweet
Odor Threshold	No information available
pH	Not applicable
Melting Point/Range	-97 °C / -142.6 °F
Boiling Point/Range	39 °C / 102.2 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	23 vol %
Lower	13 vol %
Vapor Pressure	350 mbar @ 20°C
Vapor Density	2.93 (Air = 1.0)
Specific Gravity	1.33
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	556 °C / 1032.8 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C H2 Cl2
Molecular Weight	84.93

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat.

Incompatible Materials Strong oxidizing agents, Strong acids, Amines

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Hydrogen chloride gas, 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
Methylene chloride	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rat)	53 mg/L (Rat) 6 h 76000 mg/m³ (Rat) 4 h

Toxicologically Synergistic Products No information available

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

Irritation Irritating to eyes and skin

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
Methylene chloride	75-09-2	Group 2A	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects Mutagenic effects have occured in microorganisms.

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects Developmental effects have occurred in experimental animals.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)

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 Tumorigenic effects have been reported in experimental animals. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

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Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Methylene chloride	EC50:>660 mg/L/96h	Pimephales promelas: LC50:193 mg/L/96h	EC50: 1 mg/L/24 h EC50: 2.88 mg/L/15 min	EC50: 140 mg/L/48h

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
Methylene chloride	1.25

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
Methylene chloride - 75-09-2	U080	-

14. Transport information

DOT

UN-No UN1593
Proper Shipping Name DICHLOROMETHANE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1593
Proper Shipping Name DICHLOROMETHANE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1593
Proper Shipping Name Dichloromethane
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No UN1593
Proper Shipping Name Dichloromethane
Hazard Class 6.1
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Methylene chloride	X	X	-	200-838-9	-		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)

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Methylene chloride	75-09-2	>99.5	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
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
Methylene chloride	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methylene chloride	X		-

OSHA Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Methylene chloride	125 ppm STEL 12.5 ppm Action Level 25 ppm TWA	-

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
Methylene chloride	1000 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Methylene chloride	75-09-2	Carcinogen	200 µg/day 50 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methylene chloride	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
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	27-Jan-2010
Revision Date	24-May-2017
Print Date	24-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

Creation Date 10-Dec-2009 **Revision Date** 26-May-2017 **Revision Number** 4

1. Identification

Product Name **Tetrachloroethylene**

Cat No. : **AC445690000; ACR445690010; AC445690025; AC445691000**

Synonyms Perchloroethylene

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)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Tetrachloroethylene	127-18-4	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

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. If skin irritation persists, call a physician.

Inhalation Move to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water.

Most important symptoms/effects None reasonably foreseeable. May cause allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available

Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated.

Hazardous Combustion Products
Chlorine Hydrogen chloride gas 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	0	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation.
Environmental Precautions Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Ensure adequate ventilation. Avoid ingestion and inhalation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from sunlight.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Tetrachloroethylene	TWA: 25 ppm STEL: 100 ppm	(Vacated) TWA: 25 ppm (Vacated) TWA: 170 mg/m^3 Ceiling: 200 ppm TWA: 100 ppm	IDLH: 150 ppm	TWA: 100 ppm TWA: 670 mg/m^3 TWA: 200 ppm TWA: 1250 mg/m^3 STEL: 200 ppm STEL: 1340 mg/m^3

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

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 Long sleeved clothing.

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	Characteristic, sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-22 °C / -7.6 °F
Boiling Point/Range	120 - 122 °C / 248 - 251.6 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	6.0 (Ether = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	18 mbar @ 20 °C
Vapor Density	No information available
Density	1.619
Specific Gravity	1.625
Solubility	0.15 g/L water (20°C)
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 150°C
Viscosity	0.89 mPa s at 20 °C
Molecular Formula	C2 Cl4
Molecular Weight	165.83

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Exposure to moist air or water.

Incompatible Materials Strong acids, Strong oxidizing agents, Strong bases, Metals, Zinc, Amines, Aluminium

Hazardous Decomposition Products Chlorine, Hydrogen chloride gas, 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
Tetrachloroethylene	LD50 = 2629 mg/kg (Rat)	LD50 > 10000 mg/kg (Rat)	LC50 = 27.8 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

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

Irritation Irritating to eyes and skin

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
Tetrachloroethylene	127-18-4	Group 2A	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Kidney Liver Blood

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: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest

pain, muscle pain or flushing

Endocrine Disruptor Information

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Tetrachloroethylene	Group II Chemical	Not applicable	Not applicable

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

12. Ecological information

Ecotoxicity

Toxic 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
Tetrachloroethylene	EC50: > 500 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 4.73 - 5.27 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: 11.0 - 15.0 mg/L, 96h static (Lepomis macrochirus) LC50: 8.6 - 13.5 mg/L, 96h static (Pimephales promelas) LC50: 12.4 - 14.4 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 100 mg/L 24 h EC50 = 112 mg/L 24 h EC50 = 120.0 mg/L 30 min	EC50: 6.1 - 9.0 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Insoluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its volatility.

Component	log Pow
Tetrachloroethylene	2.88

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
Tetrachloroethylene - 127-18-4	U210	-

14. Transport information

DOT

- **UN-No** UN1897
- **Proper Shipping Name** TETRACHLOROETHYLENE
- **Hazard Class** 6.1
- **Packing Group** III

TDG

- **UN-No** UN1897
- **Proper Shipping Name** TETRACHLOROETHYLENE
- **Hazard Class** 6.1
- **Packing Group** III

IATA

- **UN-No** UN1897
- **Proper Shipping Name** TETRACHLOROETHYLENE
- **Hazard Class** 6.1

Packing Group III

IMDG/IMO

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Subsidiary Hazard Class P
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Tetrachloroethylene	X	X	-	204-825-9	-		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

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Tetrachloroethylene	127-18-4	>95	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard Yes
Chronic Health Hazard Yes
Fire Hazard No
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
Tetrachloroethylene	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Tetrachloroethylene	X		-

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
Tetrachloroethylene	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Tetrachloroethylene	127-18-4	Carcinogen	14 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Tetrachloroethylene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant Y
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 10-Dec-2009
Revision Date 26-May-2017
Print Date 26-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

Creation Date 03-Feb-2010 **Revision Date** 14-Jul-2016 **Revision Number** 2

1. Identification

Product Name **Trichloroethylene**

Cat No. : **T340-4; T341-4; T341-20; T341-500; T403-4**

Synonyms Trichloroethene (Stabilized/Technical/Electronic/Certified ACS)

Recommended Use Laboratory chemicals.
Uses advised against

Details of the supplier of the safety data sheet

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

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 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)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1A
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Heart, spleen, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness
Suspected of causing genetic defects
May cause cancer
May cause damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Harmful to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer, birth defects or other reproductive harm.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Trichloroethylene	79-01-6	100

4. First-aid measures

General Advice
Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

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

Inhalation
Move to fresh air. If not breathing, give artificial respiration. 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. Immediate medical attention is required.
Ingestion	Do not induce vomiting. Call a physician or Poison Control Center immediately.
Most important symptoms/effects	None reasonably foreseeable. May cause allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	410 °C / 770 °F
Explosion Limits	
Upper	10.5 vol %
Lower	8 vol %
Oxidizing Properties	Not oxidising
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Hydrogen chloride gas Chlorine Phosgene Carbon monoxide (CO) Carbon dioxide (CO_2)

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. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling	Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe vapors or spray mist. Do not ingest.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from light. Do not store in aluminum containers.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Trichloroethylene	TWA: 10 ppm STEL: 25 ppm	(Vacated) TWA: 50 ppm (Vacated) TWA: 270 mg/m³ Ceiling: 200 ppm (Vacated) STEL: 200 ppm (Vacated) STEL: 1080 mg/m³ TWA: 100 ppm	IDLH: 1000 ppm	TWA: 100 ppm TWA: 535 mg/m³ STEL: 200 ppm STEL: 1080 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

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 Long sleeved clothing.

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	Characteristic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-85 °C / -121 °F
Boiling Point/Range	87 °C / 188.6 °F
Flash Point	No information available
Evaporation Rate	0.69 (Carbon Tetrachloride = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	10.5 vol %
Lower	8 vol %
Vapor Pressure	77.3 mbar @ 20 °C
Vapor Density	4.5 (Air = 1.0)
Specific Gravity	1.460
Solubility	Slightly soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	410 °C / 770 °F
Decomposition Temperature	> 120°C
Viscosity	0.55 mPa.s (25°C)

Molecular Formula C2 H Cl3
Molecular Weight 131.39

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Light sensitive.

Conditions to Avoid Incompatible products. Excess heat. Exposure to light. Exposure to moist air or water.

Incompatible Materials Strong oxidizing agents, Strong bases, Amines, Alkali metals, Metals,

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

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
Trichloroethylene	LD50 = 4290 mg/kg (Rat) LD50 = 4920 mg/kg (Rat)	LD50 > 20 g/kg (Rabbit) LD50 = 29000 mg/kg (Rabbit)	LC50 = 26 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

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

Irritation Irritating to eyes and skin

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
Trichloroethylene	79-01-6	Group 1	Reasonably Anticipated	A2	X	Not listed

IARC: (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

ACGIH: (American Conference of Governmental Industrial Hygienists)

IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans
NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen
A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mutagenic Effects Mutagenic effects have occurred in humans.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Kidney Liver Heart spleen Blood

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: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Do not empty into drains. The product contains following substances which are hazardous for the environment. Contains a substance which is:. Harmful to aquatic organisms. Toxic to aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Trichloroethylene	EC50: = 175 mg/L, 96h (Pseudokirchneriella subcapitata) EC50: = 450 mg/L, 96h (Desmodesmus subspicatus)	LC50: 39 - 54 mg/L, 96h static (Lepomis macrochirus) LC50: 31.4 - 71.8 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 0.81 mg/L 24 h EC50 = 115 mg/L 10 min EC50 = 190 mg/L 15 min EC50 = 235 mg/L 24 h EC50 = 410 mg/L 24 h EC50 = 975 mg/L 5 min	EC50: = 2.2 mg/L, 48h (Daphnia magna)

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
Trichloroethylene	2.4

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
Trichloroethylene - 79-01-6	U228	-

14. Transport information

DOT

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE

Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Trichloroethylene	X	X	-	201-167-4	-		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

Component	TSCA 12(b)
Trichloroethylene	Section 5

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Trichloroethylene	79-01-6	100	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard Yes
Chronic Health Hazard Yes
Fire Hazard No
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
Trichloroethylene	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Trichloroethylene	X		-

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
Trichloroethylene	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Trichloroethylene	79-01-6	Carcinogen Developmental Male Reproductive	14 µg/day 50 µg/day	Developmental Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Trichloroethylene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
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 03-Feb-2010
Revision Date 14-Jul-2016
Print Date 14-Jul-2016
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

Creation Date 11-Jun-2009 **Revision Date** 24-May-2017 **Revision Number** 3

1. Identification

Product Name **Toluene**

Cat No. : **T326F-1GAL; T326P-4; T326S-20; T326S-20LC**

Synonyms Tol; Methylbenzene

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

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 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
Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Reproductive Toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system, Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, spleen, Blood.	
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
May be fatal if swallowed and enters airways
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation
May cause drowsiness or dizziness
Suspected of damaging the unborn child
Causes damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Do not eat, drink or smoke when using this product
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
Keep cool
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Do NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)

WARNING! This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Toluene	108-88-3	>95

4. First-aid measures

General Advice	If symptoms persist, call a physician.
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. If skin irritation persists, call a physician.
Inhalation	Move to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur. Risk of serious damage to the lungs.
Ingestion	Clean mouth with water and drink afterwards plenty of water. Do not induce vomiting. Call a physician or Poison Control Center immediately. If vomiting occurs naturally, have victim lean forward.
Most important symptoms/effects	Breathing difficulties. Causes central nervous system depression: 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	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.
Unsuitable Extinguishing Media	No information available
Flash Point	4 °C / 39.2 °F
Method -	No information available
Autoignition Temperature	535 °C / 995 °F
Explosion Limits	
Upper	7.1 vol %
Lower	1.1 vol %
Oxidizing Properties	Not oxidising
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2)
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
3	3	0	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Ensure adequate ventilation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. 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 containers tightly closed in a dry, cool and well-ventilated place. Flammables area. Keep away from heat and sources of ignition.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Toluene	TWA: 20 ppm	(Vacated) TWA: 100 ppm (Vacated) TWA: 375 mg/m³ Ceiling: 300 ppm (Vacated) STEL: 150 ppm (Vacated) STEL: 560 mg/m³ TWA: 200 ppm	IDLH: 500 ppm TWA: 100 ppm TWA: 375 mg/m³ STEL: 150 ppm STEL: 560 mg/m³	TWA: 50 ppm TWA: 188 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure adequate ventilation, especially in confined areas.

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 Long sleeved clothing.

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	1.74 ppm
pH	Not applicable
Melting Point/Range	-95 °C / -139 °F
Boiling Point/Range	111 °C / 231.8 °F @ 760 mmHg
Flash Point	4 °C / 39.2 °F

Evaporation Rate	2.4 (Butyl acetate = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	7.1 vol %
Lower	1.1 vol %
Vapor Pressure	29 mbar @ 20 °C
Vapor Density	3.1
Specific Gravity	0.866
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	535 °C / 995 °F
Decomposition Temperature	No information available
Viscosity	0.6 mPa.s @ 20 °C
Molecular Formula	C7 H8
Molecular Weight	92.14

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong oxidizing agents, Strong acids, Strong bases, Halogenated compounds

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

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
Toluene	> 5000 mg/kg (Rat)	LD50 = 12000 mg/kg (Rabbit)	26700 ppm (Rat) 1 h

Toxicologically Synergistic Products No information available

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

Irritation Irritating to eyes, respiratory system and skin

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
Toluene	108-88-3	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Not mutagenic in AMES Test

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects Developmental effects have occurred in experimental animals.

Teratogenicity Possible risk of harm to the unborn child.

STOT - single exposure Respiratory system Central nervous system (CNS)
STOT - repeated exposure Kidney Liver spleen Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Causes central nervous system depression: 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.

12. Ecological information

Ecotoxicity

Contains a substance which is:. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Toluene	EC50: = 12.5 mg/L, 72h static (Pseudokirchneriella subcapitata) EC50: > 433 mg/L, 96h (Pseudokirchneriella subcapitata)	50-70 mg/L LC50 96 h 5-7 mg/L LC50 96 h 15-19 mg/L LC50 96 h 28 mg/L LC50 96 h 12 mg/L LC50 96 h	EC50 = 19.7 mg/L 30 min	EC50: = 11.5 mg/L, 48h (Daphnia magna) EC50: 5.46 - 9.83 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

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

Component	log Pow
Toluene	2.7

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
Toluene - 108-88-3	U220	-

14. Transport information

DOT

UN-No UN1294
Proper Shipping Name TOLUENE
Hazard Class 3
Packing Group II

TDG

UN-No UN1294
Proper Shipping Name TOLUENE
Hazard Class 3
Packing Group II

IATA

UN-No UN1294
Proper Shipping Name TOLUENE
Hazard Class 3
Packing Group II

IMDG/IMO

UN-No	UN1294
Proper Shipping Name	TOLUENE
Hazard Class	3
Packing Group	II

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Toluene	X	X	-	203-625-9	-		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

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Toluene	108-88-3	>95	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
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
Toluene	X	1000 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Toluene	X		-

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

Toluene	1000 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Toluene	108-88-3	Developmental	-	Developmental

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Toluene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
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 Serious risk, Grade 3

16. Other information

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

Creation Date 11-Jun-2009
Revision Date 24-May-2017
Print Date 24-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

Appendix B

Onsite Safety Meeting Forms

Stantec

FIELD LEVEL RISK ASSESSMENT (FIT FOR DUTY), 5 DAY – RMS 2

Project:	820 Linden Avenue (BCP Site #C828200) IRM	Project No:	190500898
Client:	Ridgecrest Associates		
Location:	820 Linden Avenue, Pittsford, New York		
Start Date:			

Documentation and Procedure Review

1. Risk Management Strategy (RMS1) form and/or Site Specific Health and Safety Plan signed and reviewed? ☐ Yes ☐ **No***
2. Emergency Response Plan reviewed? ☐ Yes ☐ **No*** ☐ N/A
3. Tested two-way communications (cell phone, satellite phone) and security measures? ☐ Yes ☐ **No***
4. Attended Client Site Health and Safety meeting? ☐ Yes ☐ **No*** ☐ N/A
5. Conducted Stantec site safety meeting with all workforces? ☐ Yes ☐ **No*** ☐ N/A
6. Are there any new or unexpected hazards not identified in the RMS1/HASP? ☐ Yes ☐ No
   If yes, include in the Job Safety Analysis (JSA).
7. Working alone or remote work? ☐ Yes ☐ No
   If yes, complete call in/out process – Safe Work form must be completed.

Notifications and Permits

8. Are work permits required for this site? ☐ Yes ☐ No
   If yes, have they been completed and submitted as required? ☐ Yes ☐ **No***
9. Are utility locates required for this site? ☐ Yes ☐ No
   If yes, have they been completed and reviewed? ☐ Yes ☐ **No***
10. Does the Client require any notification prior to starting the work? ☐ Yes ☐ No
    If yes, has the notification been provided? ☐ Yes ☐ **No***

***Contact your Project Manager immediately.**

Work Description

Provide a general description of the work to be conducted.

Personal Protective Equipment

List specific PPE as needed. Verify type and inspect condition.

☐ Head Protection Type:	☐ Hearing Protection:	☐ Gloves Type:
☐ Foot Protection Type:	☐ Respiratory Protection:	☐ Water Safety Gear:
☐ Eye Protection Type:	☐ Fire Retardant Coveralls:	☐
☐ High Visibility Vest:	☐ Fall Protection:	☐

Tools and Equipment

List specific equipment to be used. Verify type and inspect condition.

☐	☐	☐
☐	☐	☐

Daily Tailgate Discussions/Subcontractor Input

Date:	**Time:**	**Weather:**
Start		
Mid-Day		
Post-Day		
Date:	**Time:**	**Weather:**
Start		
Mid-Day		
Post-Day		
Date:	**Time:**	**Weather:**
Start		
Mid-Day		
Post-Day		
Date:	**Time:**	**Weather:**
Start		
Mid-Day		
Post-Day		
Date:	**Time:**	**Weather:**
Start		
Mid-Day		
Post-Day		

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FIELD LEVEL RISK ASSESSMENT (FIT FOR DUTY), 5 DAY – RMS 2

I know the hazards:

By signing here, you are stating the following:

1. I have been involved in the Job Safety Analysis (JSA) and understand the hazards and risk control actions associated with each task I am about to perform.
2. I understand the permit to work requirements applicable to the work I am about to perform (if it includes permitted activities).
3. I am aware that work that has not been risk–assessed must not be performed.
4. I am aware of my ability and obligation to **Stop Work** (*See below).*

I arrived and departed fit for duty (see Fit for Duty card for further information):

5. I am physically and mentally fit for duty.
6. I am not under the influence of any type of medication, drugs or alcohol that could affect my ability to work safely.
7. I am aware of my responsibility to bring any illness, injury (regardless of where or when it occurred), symptoms of soreness or discomfort, or fatigue issue I may have to the attention of the Crew Lead or Supervisor.
8. I sign out uninjured unless I have otherwise informed the Crew Lead or Supervisor.

Insert fitness level under corresponding time column: Fit for Duty = F Alternate Plan = AP
Team Lead to contact Project Manager for any personnel identified as AP

Individual Name/Company Name/Signature	Date:			Date:			Date:			Date:			Date:		
	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:	Time:

I will STOP WORK any time anyone is concerned or uncertain about safety. **I will STOP WORK** if anyone identifies a hazard or additional mitigation not recorded. **I will** be alert to any changes in personnel or their fitness level (AP), conditions at the work site or hazards. If it is necessary to **STOP WORK**, I will reassess the task, hazards and mitigations; and then proceed only when safe to do so.

Conclusion of day: I certify that the planned work activities are completed for the day and all injuries and first aids have been reported via RMS3.

Signature of Crew Lead: _____ **Date:** _____

Signature of Crew Lead: _____ **Date:** _____

Signature of Crew Lead: _____ **Date:** _____

Signature of Crew Lead: _____ **Date:** _____

Signature of Crew Lead: _____ **Date:** _____

Remember to
1. Stop and think
2. Look around
3. Assess risk
4. Control risks
5. Begin/resume work

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FIELD LEVEL RISK ASSESSMENT (FIT FOR DUTY), 5 DAY – RMS 2

Job Safety Analysis (JSA) **Must be completed for all field activities.**

Basic Job Steps	Potential Hazards	Controls to Reduce or Eliminate Hazard	Person Responsible

Review the hazard categories below and check the mitigation measures applicable to the identified scope of work.

Environmental Hazards

1. Work area clean ☐
2. Material storage identified ☐
3. Dust/Mist/Fume ☐
4. Noise in area ☐
5. Extreme temperatures ☐
6. Spill potential ☐
7. Waste containers needed ☐
8. Waste properly disposed ☐
9. Waste plan identified ☐
10. Excavation permit required ☐
11. Other workers in area ☐
12. Weather conditions ☐
13. MSDS reviewed ☐

Ergonomic Hazards

14. Awkward body position ☐
15. Over extension ☐
16. Prolonged twisting/bending motion ☐
17. Working in a tight area ☐
18. Lift too heavy/awkward to lift ☐
19. Parts of body in line of fire ☐
20. Repetitive motion ☐
21. Hands not in line of sight ☐
22. Working above your head ☐

Access/Egress Hazards

23. Aerial life/Man basket (inspected & tagged) ☐
24. Scaffold (inspected & tagged) ☐
25. Ladders (tied off) ☐
26. Slips & trips ☐
27. Hoisting (tools, equipment) ☐
28. Evacuation (alarms, routes, ph. #) ☐
29. Confined space entry permit required ☐

Overhead Hazards

30. Barricades & signs in place ☐
31. Hole coverings identified ☐
32. Harness/lanyard inspected ☐
33. 100% Tie-off with harness ☐
34. Tie off points identified ☐
35. Falling items ☐
36. Foreign bodies in eyes ☐
37. Hoisting or moving loads overhead ☐

Rigging & Hoisting Hazards

38. Lift study required ☐
39. Proper tools used ☐
40. Tools inspected ☐
41. Equipment inspected ☐
42. Slings inspected ☐
43. Others working overhead/below ☐
44. Critical lift permit ☐

Electrical Hazards

45. GFI test ☐
46. Lighting levels too low ☐
47. Working on/near energized equipment ☐
48. Electrical cords condition ☐
49. Electrical tools condition ☐
50. Fire extinguisher ☐
51. Hot work or electrical permit required ☐

Personal Limitations/Hazards

52. Procedure not available for task ☐
53. Confusing instructions ☐
54. No training for task or tools to be used ☐
55. First time performing the task ☐
56. Micro break (stretching/flexing) ☐
57. Report **all injuries** to your supervisor ☐

It is important that all relevant hazards have plans in place to reduce risk.
Be sure that all associated permits are closed off at the end of the job.

Remember: Stop and Think

Reviewed by Name and Signature: _____

Appendix C

Incident Reporting

Incident Reporting Protocol - US

ACTIONS

1. Keeping safety in mind, care for injured people (if applicable) and stabilize the scene.
2. For life threatening injuries, **immediately contact 911.** Accompany the injured employee to the medical facility whenever possible.
3. Call **AllOne Health (24-hour service): 1-800-350-4511** for work-related symptoms or injuries, and speak to a medical professional for guidance and treatment options.
4. Make voice contact with your supervisor within 1 hour or less of the incident occurring. Leaving a voicemail does not count. If you cannot contact your supervisor, contact the HSSE Manager or HSSE Advisor for your region.
5. Supervisors must immediately contact their HSSE representative to develop a plan for assessment and care.
6. When an employee is guided by AllOne Health to obtain medical assistance, or the employee requests medical attention for a non-life threatening injury, and after alerting the supervisor; the employee must **immediately call Melissa Helton, Stantec's US WC Claims Coordinator at 513-720-3706** for assistance.
7. In most cases AOH will provide guidance about which clinic is available and provide directions. Some job sites already have prescribed clinics such as US Healthworks. Here is a link accessing additional clinic locations: Clinic Search link .
8. Additional notifications may be required based on the client requirements.

Contacts		Landline	Cell
HSSE Manager – US Central	Tami Renkoski	303-533-1964	720-530-7274
HSSE Manager – US South	Keith Kuhlmann	740-816-6170	740-816-6170
HSSE Manager – US Northeast	Fred Miller	610-235-7315	610-235-7315
HSSE Manager – US West	Tony Wong	805-250-2860	805-234-6227
HSSE Manager - International	Kev Metcalfe	780-917-7023	780-231-2185
Director HSSE Operations	Jim Elkins	613-738-6097	613-404-8508
HSSE Senior Vice President	Jon Lessard	713-548-5700	281-513-5538
Your OSEC or HSSE Advisor	Master HSSE Representative Listing		

Region	WC Claims Coordinator	Landline	Cell
US (All Regions)	Melissa Helton	513-720-3706	513-720-3706

REPORTING

- **Within 24 hours of the incident, an RMS3 – Incident Report must be completed with as much information as possible and emailed to hsse@stantec.com.**
- Do not delay submitting the report to wait for signatures. Follow-up with signatures when possible.
- Complete the balance of the RMS3 within 5 business days, including signatures. Include information and corrective actions determined during the investigation/ Incident Causation Analysis (ICA), as coordinated by HSSE Advisor and/or HSSE Manager.
- Other protocols dictated by a client or project agreement, or internal practice may also need to be completed.

INCIDENT REPORT – RMS 3

Incidents involving injury, potential injury, or report of pain, soreness, or discomfort must be reported immediately (within one hour) to a supervisor. Supervisors will then immediately contact ***their HSE representative to develop a plan for assessment and care***. This form must be completed and **submitted within 24 hours** of any incident. Do not delay submission waiting for signatures. **Email to hsse@stantec.com or fax unsigned report to (780) 969-2030** and file locally in compliance with the corporate records retention policy and practices once all signatures have been obtained.

This document contains privileged and confidential information prepared at the request of Stantec's Legal Counsel. The contents of this report are restricted to HR personnel, Risk Management Representatives, Project Manager and BC Leader, and Stantec's Insurer, Adjuster and Legal Counsel. Information collected will be used solely for the purpose of meeting the requirements of Stantec's HSE and insurance programs, complying with applicable legislation, and will be used in accordance with any governing privacy legislation. The information collected will be maintained electronically and may be included in required reports.

SECTION 1: GENERAL INFORMATION			
Office location:		BC number:	
Location of incident:			
Incident date and Time:		Date Reported:	
Project name:		Project number:	
Client Name:			
Person in charge:		Person in Charge Phone:	

SECTION 2: STANTEC EMPLOYEE INFORMATION (if more than one identify extras in incident details below)			
Name:		Phone:	
Job position:		Group name:	
Time employee began work:		Job Experience (in years)	
Type of employment:	Full Time ☐ ; Visitor ☐ ; Contract ☐ ; Volunteer ☐ ; Seasonal ☐		
Supervisor:		Supervisor Phone:	

SECTION 3: INCIDENT DETAILS

Type of Incident: *incident types marked with an asterisk, please complete sections 1, 2 and 3 and signature page only

See StanNet for a list of Incident Type Definitions

☐ **Report Only*	☐ First Aid	☐ Motor Vehicle Incident	☐ 3rd Party Incident (i.e., Public)
☐ **Hazard Identification*	☐ Medical Aid – No Lost Time	☐ Property Damage - Vehicle	☐ Spill or Release
☐ **Near Miss*	☐ Restricted Work	☐ Property Damage - Other	☐ Utility Strike
☐ **Safety Opportunity*	☐ Lost Time	☐ Theft	☐ Fire/Explosion/Flood
	☐ Fatality	☐ Contractor Recordable Incident	☐ Stop Work Authority
	☐ Violence or Harassment	☐ Non-compliance	☐ Work Refusal

Describe incident in detail: (include any issues related to people, equipment, materials, environment, and processes)

Immediate corrective actions taken:

Canada East (Atlantic) – Kyle Ferguson (902-240-3847); Canada East (ON) – Jared Memory (647-969-3709);
Canada East (Quebec) – Claudine Tremblay (514-668-4820); Canada Mountain – Nigel Dunning (306-203-4428);
Canada Prairies – Yvonne Beattie (780-616-8909); International – Kev Metcalfe (780-231-2185); US Northeast – Fred Miller (610-235-7315);
US Central – Tami Renkoski (720-530-7274); US South - Keith Kuhlmann (740-816-6170); US West – Tony Wong (805-234-6227)

SECTION 4: MEDICAL INFORMATION	
Name of first aid attendant:	Injury recorded in first aid log? Yes ☐ No ☐ N/A ☐
Description of first aid or medical treatment administered:	
Clinic/hospital sent to:	
Attending physician/paramedic (if known):	

Area of Injury – Please check all that apply:

☐ Head	☐ Teeth	☐ Upper back		Left	Right		Left	Right		Left	Right		Left	Right					
☐ Face	☐ Neck	☐ Lower back		☐	☐	Shoulder	☐	☐	Wrist	☐	☐	Hip	☐	☐	Ankle	☐	☐		
☐ Eye(s)	☐ Chest	☐ Abdomen		☐	☐	Arm	☐	☐	Hand	☐	☐	Thigh	☐	☐	Foot	☐	☐		
☐ Ear(s)		☐ Pelvis		☐	☐	Elbow	☐	☐	Finger(s)	☐	☐	Knee	☐	☐	Toe(s)	☐	☐		
☐ Other	Specify			☐	☐	Forearm	☐	☐			☐	Lower Leg	☐						

Has the injured employee had a previous similar injury or disability?	Yes ☐	No ☐

SECTION 5: PROPERTY OR VEHICLE DAMAGE: STANTEC			
Ownership Details (choose one):	☐ Rented (attach rental agreement)	☐ Stantec Owned	☐ Personal (employee vehicle)
Year, Make, and Model of Vehicle:		Vehicle ID # (VIN)	
Nature of damage:		Estimated cost of damage:	$
Description of damaged property:			
Attending police officer (if known):		Badge #:	
Copy of police report received	Yes ☐ No ☐ If yes, file number:	(attach copy of police report)	

PROPERTY OR VEHICLE DAMAGE: 3RD PARTY			
Name of owner and contact number:			
Year, Make, and Model of Vehicle:		License Plate Number:	
Insurer and Policy Number:			
Injured parties? Yes ☐ No ☐	If yes, describe Injuries:		
Diagram or photographs attached?	Yes ☐ No ☐		

WITNESS INFORMATION - #1			
Name:		Phone Number:	
Witness statement provided?	Yes (attached) ☐	No ☐	

WITNESS INFORMATION - #2			
Name:		Phone Number:	
Witness statement provided?	Yes (attached) ☐	No ☐	

SECTION 6: SPILL OR RELEASE			
Substance:			
Quantity:		Employee(s) exposed via:	☐ Inhalation ☐ Contact ☐ Ingestion ☐ n/a
Off-site impacts observed or anticipated?		Yes ☐ No ☐ If yes, describe:	
Name of regulatory agencies contacted:			
Contact name, number, date and time of call:			

Canada East (Atlantic) – Kyle Ferguson (902-240-3847); Canada East (ON) – Jared Memory (647-969-3709);
Canada East (Quebec) – Claudine Tremblay (514-668-4820); Canada Mountain – Nigel Dunning (306-203-4428);
Canada Prairies – Yvonne Beattie (780-616-8909); International – Kev Metcalfe (780-231-2185); US Northeast – Fred Miller (610-235-7315);
US Central – Tami Renkoski (720-530-7274); US South - Keith Kuhlmann (740-816-6170); US West – Tony Wong (805-234-6227)

SECTION 7: ANALYSIS

IMMEDIATE/DIRECT CAUSES

A. **UNSAFE ACTIONS** (check off as many as necessary)

- ☐ Operating equipment without authority
- ☐ Failure to warn
- ☐ Failure to secure
- ☐ Operating at improper speed
- ☐ Making safety devices inoperative
- ☐ Removing safety devices
- ☐ Using defective/improper equipment
- ☐ Using equipment improperly
- ☐ Failing to use personal protective equipment properly
- ☐ Improper loading
- ☐ Improper placement
- ☐ Improper lifting or handling
- ☐ Improper position for a task
- ☐ Servicing equipment in operation
- ☐ Horseplay
- ☐ Failure to follow procedure, policy or practice
- ☐ Failure to identify hazard or risk
- ☐ Inattention
- ☐ Failure to communicate
- ☐ Other: Specify

B. **UNSAFE CONDITIONS** (check off as many as necessary)

- ☐ Inadequate guards/barriers
- ☐ Improper/inadequate PPE
- ☐ Defective tools or equipment
- ☐ Congested work area
- ☐ Inadequate warning system
- ☐ Fire and explosion hazards
- ☐ Poor housekeeping; disorder
- ☐ Noise exposure
- ☐ Radiation exposure
- ☐ High or low temperature exposures
- ☐ Inadequate or excess illumination
- ☐ Inadequate ventilation
- ☐ Presence of harmful materials
- ☐ Inadequate instructions/procedures
- ☐ Hazardous environmental conditions; gases, dusts, smokes, fumes, vapours
- ☐ Inadequate information/data
- ☐ Inadequate preparation/planning
- ☐ Inadequate support/assistance
- ☐ Road conditions
- ☐ Weather conditions
- ☐ Other: Specify

BASIC/ROOT CAUSES

C. PERSONAL FACTORS (check off as many as necessary)

- ☐ Inadequate physical capability
- ☐ Physical stress
- ☐ Mental stress
- ☐ Lack of skill
- ☐ Lack of knowledge
- ☐ Other: Specify

D. JOB FACTORS (check off as many as necessary)

- ☐ Inadequate leadership or supervision
- ☐ Inadequate engineering
- ☐ Inadequate purchasing
- ☐ Abuse or misuse
- ☐ Inadequate maintenance (scheduled or preventative)
- ☐ Inadequate tools or equipment
- ☐ Inadequate work standards
- ☐ Other: Specify
- ☐ Excessive wear and tear
- ☐ Inadequate communications
- ☐ Improper motivation

SECTION 8: FOLLOW-UP

Short-term:	**Corrective Action**	**Assigned To**	**Target Date**	**Completion Date**

Long-term:	**Corrective Action**	**Assigned To**	**Target Date**	**Completion Date**

Canada East (Atlantic) – Kyle Ferguson (902-240-3847); Canada East (ON) – Jared Memory (647-969-3709);
Canada East (Quebec) – Claudine Tremblay (514-668-4820); Canada Mountain – Nigel Dunning (306-203-4428);
Canada Prairies – Yvonne Beattie (780-616-8909); International – Kev Metcalfe (780-231-2185); US Northeast – Fred Miller (610-235-7315);
US Central – Tami Renkoski (720-530-7274); US South - Keith Kuhlmann (740-816-6170); US West – Tony Wong (805-234-6227)

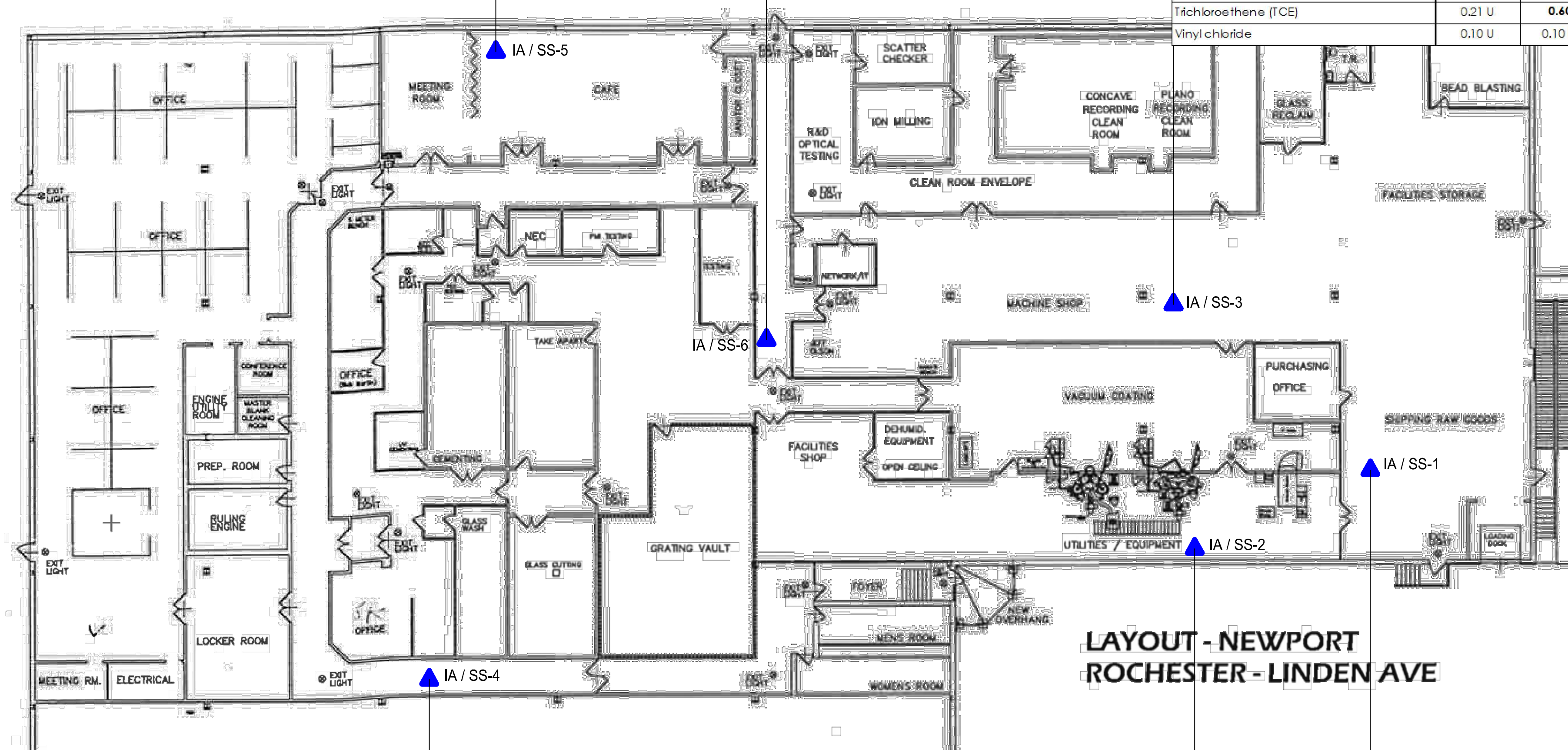
REVIEW COMMENTS		
Involved Employee Comments:		
Signature: Job Title:	Print Name:	Date:
Lead Investigator Comments:		
Signature: Job Title:	Print Name:	Date:
Supervisor/Project Manager:		
Signature: Job Title:	Print Name:	Date:
HSE Representative (OSEC/JH&S Committee/RSEC/HSE Manager):		
Signature: Job Title:	Print Name:	Date:
Management Review:		
Signature: Job Title:	Print Name:	Date:
Client Review (if required):		
Signature: Job Title:	Print Name:	Date:
Additional Comments:		

Appendix D SOIL VAPOR INTRUSION RESULTS FROM 2016-2017 STANTEC LIMITED PHASE II ESA

Sample Location	IA-5	SS-5	Matrix Output	IA-5	SS-5	Matrix Output
Sample Date	April 14, 2016			January 18, 2017		
Carbon Tetrachloride (Tetrachloromethane)	0.44	0.30	No further action	0.37	0.30	No further action
Dichloroethene, 1,1-	0.79 U	0.79 U	No further action	0.79 U	0.79 U	No further action
Dichloroethene, cis-1,2-	0.32 J	0.79 U	No further action	0.79 U	0.79 U	No further action
Methylene Chloride (Dichloromethane)	1.0 J	0.70 J	No further action	6.4	0.83 J	No further action
Tetrachloroethene (PCE)	1.4 U	2.5	No further action	0.19 J	2.5	No further action
Trichloroethane, 1,1,1-	1.1 U	1.3	No further action	1.1 U	2.0	No further action
Trichloroethene (TCE)	2.1	0.21 U	R&P action	0.21 U	0.21 U	No further action
Vinyl chloride	0.25	0.10 U	R&P action	0.099 J	0.10 U	No further action

Sample Location	IA-6	SS-6	Matrix Output	IA-6	SS-6	Matrix Output
Sample Date	April 14, 2016			January 18, 2017		
Carbon Tetrachloride (Tetrachloromethane)	0.25	0.39	No further action	0.25 U	0.39	No further action
Dichloroethene, 1,1-	0.79 U	0.79 U	No further action	0.79 U	0.79 U	No further action
Dichloroethene, cis-1,2-	0.16 J	0.79 U	No further action	0.79 U	0.79 U	No further action
Methylene Chloride (Dichloromethane)	0.89 J	2.3	No further action	2.6	18	No further action
Tetrachloroethene (PCE)	1.4 U	0.56 J	No further action	1.4 U	4.0	No further action
Trichloroethane, 1,1,1-	1.1 U	0.61 J	No further action	1.1 U	8.1	No further action
Trichloroethene (TCE)	0.21	0.51	No further action	0.21 U	4.1	No further action
Vinyl chloride	0.10 U	0.10 U	No further action	0.10 U	0.10 U	No further action

Sample Location	IA-3	SS-3	Matrix Output
Sample Date	April 14, 2016		
Carbon Tetrachloride (Tetrachloromethane)	0.53	0.48	No further action
Dichloroethene, 1,1-	0.79 U	0.32 J	No further action
Dichloroethene, cis-1,2-	0.79 U	0.79 U	No further action
Methylene Chloride (Dichloromethane)	1.2 J	1.7 U	No further action
Tetrachloroethene (PCE)	1.4 U	1.9	No further action
Trichloroethane, 1,1,1-	1.1 U	1.6	No further action
Trichloroethene (TCE)	0.21 U	0.60	No further action
Vinyl chloride	0.10 U	0.10 U	No further action



LAYOUT - NEWPORT
ROCHESTER - LINDEN AVE

Sample Location	IA-2	SS-2	Matrix Output
Sample Date	April 14, 2016		
Carbon Tetrachloride (Tetrachloromethane)	0.50 U	0.26	No further action
Dichloroethene, 1,1-	1.6 U	0.79 U	R&P action
Dichloroethene, cis-1,2-	1.6 U	0.79 U	R&P action
Methylene Chloride (Dichloromethane)	1.3 J	0.62 J	No further action
Tetrachloroethene (PCE)	2.7 U	0.25 J	No further action
Trichloroethane, 1,1,1-	2.2 U	0.75 J	No further action
Trichloroethene (TCE)	0.43 U	0.21 U	R&P action
Vinyl chloride	0.20 U	0.10 U	No further action

Sample Location	IA-4	SS-4	Matrix Output	IA-4	SS-4	Matrix Output
Sample Date	April 14, 2016			January 18, 2017		
Carbon Tetrachloride (Tetrachloromethane)	0.56	0.34	No further action	0.39 J	0.36	No further action
Dichloroethene, 1,1-	0.79 U	0.79 U	No further action	1.3 U	0.79 U	R&P action
Dichloroethene, cis-1,2-	0.79 U	0.79 U	No further action	1.3 U	0.79 U	R&P action
Methylene Chloride (Dichloromethane)	1.6 J	14	No further action	46	570 D	Mitigate
Tetrachloroethene (PCE)	1.4 U	2.0	No further action	0.29 J	25	No further action
Trichloroethane, 1,1,1-	1.1 U	1.1	No further action	1.8 U	14	No further action
Trichloroethene (TCE)	0.21 U	12	Monitor	0.36 U	140	Mitigate
Vinyl chloride	0.10 U	0.13	No further action	0.13 J	0.10 U	No further action

Sample Location	IA-1	SS-1	Matrix Output
Sample Date	April 14, 2016		
Carbon Tetrachloride (Tetrachloromethane)	0.44	0.46	No further action
Dichloroethene, 1,1-	0.79 U	0.79 U	No further action
Dichloroethene, cis-1,2-	0.79 U	0.79 U	No further action
Methylene Chloride (Dichloromethane)	2.6	2.4	No further action
Tetrachloroethene (PCE)	1.4 U	1.8	No further action
Trichloroethane, 1,1,1-	1.1 U	1.5	No further action
Trichloroethene (TCE)	0.21 U	0.21 U	No further action
Vinyl chloride	0.10 U	0.10 U	No further action

ORIGINAL SHEET - ANSI D

Stantec

61 Commercial Street, Suite 100
Rochester, New York USA 14614
585.475.1440
www.stantec.com

Legend

IA / SS-7
APPROXIMATE SAMPLE LOCATION

No further action	No further action is recommended.
R&P action	Take reasonable and practical actions to identify source(s) and resample or mitigate.
Monitor	Motoring is recommended.
Mitigate	Mitigation is recommended.

Notes

1. FIGURE DEVELOPED USING BASE BUILDING PLAN PROVIDED BY NEWPORT.
2. SEE TABLE 7c FOR DESCRIPTION OF NYSDOH MATRIX RECOMMENDATIONS.
3. ABBREVIATIONS:

IA – INDOOR AIR
SS – SOIL SAMPLE
U – ANALYTE WAS NOT DETECTED AT A CONCENTRATION GREATER THAN THE LABORATORY REPORTING LIMIT
J – THE REPORTED RESULT IS AN ESTIMATED VALUE

Issued | By | Appd. | YY.MM.DD

Dwn. | Chkd. | Dsgn. | YY.MM.DD

Permit-Seal

Client/Project

LIMITED PHASE II ESA

820 LINDEN AVE., PITTSFORD, NY

Title
NEWPORT TENANT SPACE
SUB-SLAB & INDOOR AIR SAMPLING RESULTS
AND NYSDOH MATRIX OUTPUT (NEWPORT)

Project No. 190500898 | Scale NOT TO SCALE

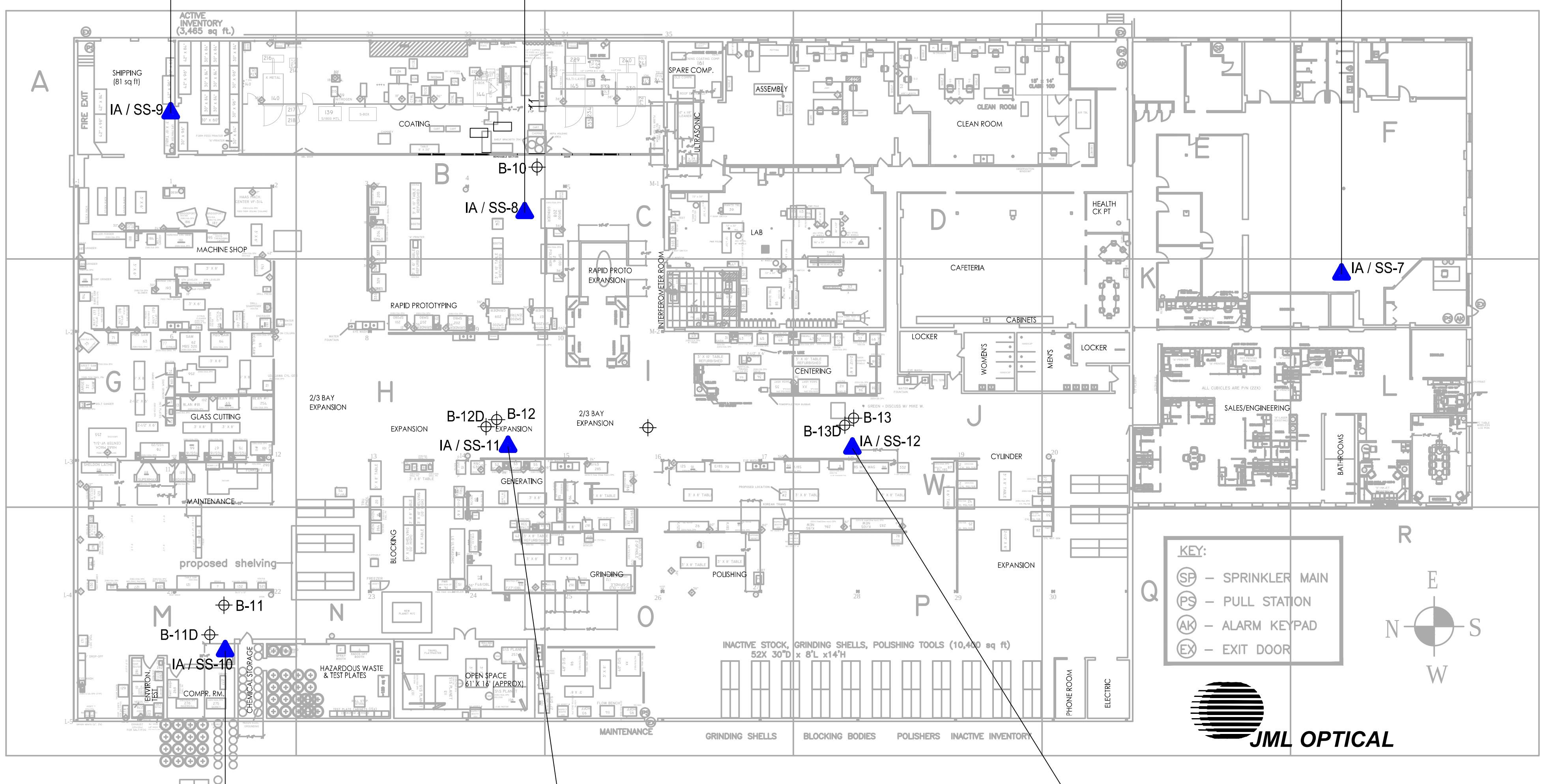
Drawing No. | Sheet | Revision

Figure D.1 | 1 of 1

Sample Location	IA-9	SS-9	Matrix Output
Sample Date	April 14, 2016		
Carbon Tetrachloride (Tetrachloromethane)	1.5 U	**0.38**	R&P action**
Dichloroethene, 1,1-	4.8 U	0.79 U	R&P action
Dichloroethene, cis-1,2-	4.8 U	0.79 U	R&P action
Methylene Chloride (Dichloromethane)	**530**	**120**	Mitigate
Tetrachloroethene (PCE)	8.2 U	**16**	No further action
Trichloroethane, 1,1,1-	6.6 U	**5.7**	No further action
Trichloroethene (TCE)	1.3 U	**3.1**	R&P action
Vinyl chloride	0.62 U	0.10 U	R&P action

Sample Location	IA-8	SS-8	Matrix Output
Sample Date	April 14, 2016		
Carbon Tetrachloride (Tetrachloromethane)	3.0 U	2.5 U	R&P action**
Dichloroethene, 1,1-	9.6 U	7.9 U	Mitigate
Dichloroethene, cis-1,2-	9.6 U	7.9 U	Mitigate
Methylene Chloride (Dichloromethane)	**500**	**380**	Mitigate
Tetrachloroethene (PCE)	16 U	**71**	R&P action
Trichloroethane, 1,1,1-	13 U	**4.4 J**	R&P action
Trichloroethene (TCE)	2.6 U	**59**	Mitigate
Vinyl chloride	1.2 U	1.0 U	R&P action

Sample Location	IA-7	SS-7	Matrix Output	IA-7 (Duplicate)	SS-7 (Duplicate)	Matrix Output
Sample Date	April 14, 2016			April 14, 2016		
Carbon Tetrachloride (Tetrachloromethane)	0.50 U	**0.40**	No further action	**0.47 J**	**0.40**	No further action
Dichloroethene, 1,1-	1.6 U	0.79 U	R&P action	1.6 U	0.79 U	R&P action
Dichloroethene, cis-1,2-	1.6 U	0.79 U	R&P action	1.6 U	0.79 U	R&P action
Methylene Chloride (Dichloromethane)	**76**	**12**	R&P Action	**99**	**12**	R&P Action
Tetrachloroethene (PCE)	2.7 U	**1.9**	No further action	2.7 U	**1.8**	No further action
Trichloroethane, 1,1,1-	2.2 U	**0.91 J**	No further action	2.2 U	**0.91 J**	No further action
Trichloroethene (TCE)	0.43 U	0.21 U	No further action	0.43 U	0.21 U	No further action
Vinyl chloride	0.20 U	0.10 U	R&P action	0.20 U	0.10 U	R&P action



Sample Location	IA-10	SS-10	Matrix Output
Sample Date	April 14, 2016		
Carbon Tetrachloride (Tetrachloromethane)	2.8 U	**0.41 J**	R&P action**
Dichloroethene, 1,1-	8.9 U	1.6 U	R&P action
Dichloroethene, cis-1,2-	8.9 U	1.6 U	R&P action
Methylene Chloride (Dichloromethane)	**890**	**220**	Mitigate
Tetrachloroethene (PCE)	15 U	**64**	R&P action
Trichloroethane, 1,1,1-	12 U	**9.3**	R&P action
Trichloroethene (TCE)	2.4 U	**71**	Mitigate
Vinyl chloride	1.1 U	0.20 U	R&P action

Sample Location	IA-11	SS-11	Matrix Output
Sample Date	April 14, 2016		
Carbon Tetrachloride (Tetrachloromethane)	2.5 U	1.5 U	R&P action**
Dichloroethene, 1,1-	7.9 U	4.8 U	R&P action
Dichloroethene, cis-1,2-	7.9 U	4.8 U	R&P action
Methylene Chloride (Dichloromethane)	**710**	**720**	Mitigate
Tetrachloroethene (PCE)	14 U	**89**	R&P action
Trichloroethane, 1,1,1-	11 U	**5.9 J**	R&P action
Trichloroethene (TCE)	2.1 U	**79**	Mitigate
Vinyl chloride	1.0 U	0.62 U	R&P action

Sample Location	IA-12	SS-12	Matrix Output
Sample Date	April 14, 2016		
Carbon Tetrachloride (Tetrachloromethane)	2.5 U	**0.66 J**	R&P action**
Dichloroethene, 1,1-	7.9 U	2.4 U	R&P action
Dichloroethene, cis-1,2-	7.9 U	2.4 U	R&P action
Methylene Chloride (Dichloromethane)	**530**	**320**	Mitigate
Tetrachloroethene (PCE)	14 U	**100**	Mitigate
Trichloroethane, 1,1,1-	11 U	3.3 U	R&P action
Trichloroethene (TCE)	2.1 U	**160**	Mitigate
Vinyl chloride	1.0 U	0.31 U	R&P action

Stantec

61 Commercial Street, Suite 100
Rochester, New York USA 14614
585.475.1440
www.stantec.com

Legend

IA / SS-7 — APPROXIMATE INDOOR AIR AND SUB–SLAB VAPOR SAMPLE LOCATION

B-13 — APPROXIMATE TEST BORING/SOIL SAMPLE LOCATION

No further action	No further action is recommended.
R&P action**	Take reasonable and practical action to identify source(s) and resample or mitigate; however, Carbon Tetrachloride was reported to be present in Outdoor Air and is regularly observed at similar concentrations across Monroe County.
R&P action	Take reasonable and practical actions to identify source(s) and resample or mitigate.
Mitigate	Mitigation is recommended.

Notes

1. FIGURE DEVELOPED USING BASE BUILDING PLAN PROVIDED BY JML OPTICAL.
2. SEE TABLE 8c FOR DESCRIPTION OF NYSDOH MATRIX RECOMMENDATIONS.
3. ABBREVIATIONS:

IA – INDOOR AIR
SS – SOIL SAMPLE
U – ANALYTE WAS NOT DETECTED AT A CONCENTRATION GREATER THAN THE LABORATORY REPORTING LIMIT
J – THE REPORTED RESULT IS AN ESTIMATED VALUE

Issued	By	Appd.	YY.MM.DD

File Name: FIGURE 8 - SAMPLE LOCATION MAP - JML OPTICALAREA_7-14-2017 - PHASE II.DWG	APL	TW	CY	16.07.18
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

LIMITED PHASE II ESA

820 LINDEN AVE., PITTSFORD, NY

Title

JML OPTICAL TENANT SPACE
SUB-SLAB & INDOOR AIR SAMPLING RESULTS
AND NYSDOH MATRIX OUTPUT (JML)

Project No. 190500898

Scale NOT TO SCALE

Drawing No. Figure D.2

Sheet 1 of 1

Revision

Matrix A Analytes Assigned:
Trichloroethene (TCE),
cis- 1,2-Dichloroethene (*c* 12-DCE),
1,1-Dichloroethene (11-DCE),
Carbon Tetrachloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND ($\mu g/m^3$)	INDOOR AIR CONCENTRATION of COMPOUND ($\mu g/m^3$)		
	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

Matrix B Analytes Assigned:
Tetrachloroethene (PCE),
1,1,1-Trichloroethane (111-TCA),
Methylene Chloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND ($\mu g/m^3$)	INDOOR AIR CONCENTRATION of COMPOUND ($\mu g/m^3$)		
	< 3	3 to < 10	10 and above
< 100	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
100 to < 1,000	4. No further action	5. MONITOR	6. MITIGATE
1,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

Matrix C Analytes Assigned:
Vinyl Chloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND ($\mu g/m^3$)	INDOOR AIR CONCENTRATION of COMPOUND ($\mu g/m^3$)	
	< 0.2	0.2 and above
< 6	1. No further action	2. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	3. MONITOR	4. MITIGATE
60 and above	5. MITIGATE	6. MITIGATE

Stantec

61 Commercial Street, Suite 100
Rochester, New York USA 14614
585.475.1440
www.stantec.com

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Notes

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File Name: FIGURE 9 - MATRIX TABLES.DWG | APL | MPS | SRS | 16.05.13
Dwn. | Chkd. | Dsgn. | YY.MM.DD

Permit-Seal

Client/Project

LIMITED PHASE II ESA

820 LINDEN AVE., PITTSFORD, NY

Title
Soil Vapor / Indoor Air Matrices
(NYSDOH Guidance for Evaluating Soil Vapor Intrusion in New York State, October 2006 , rev. May 2017)

Project No. 190500898 | Scale NOT TO SCALE

Drawing No. | Sheet | Revision

Figure D.3 of