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Phillip Eng
President

Lori Ebbighausen, PH.D.
Vice President – Corporate Safety

MTA Long Island Rail Road

February 26, 2021

VIA ELECTRONIC MAIL

Mr. Nigel Crawford
Environmental Engineer
New York State Department of Environmental Conservation
Division of Environmental Remediation
One Hunters Point Plaza 1st Floor
47-40 21st Street
Long Island City, NY 11101-5401

Re: **Supplemental Remedial Investigation Work Plan**
NYSDEC Site No. 241222
Arch Street Yard
Long Island City, New York

Dear Mr. Crawford:

MTA Long Island Rail Road ("LIRR") has prepared this Supplemental Remedial Investigation Work Plan (SRIWP) in connection with the Arch Street Yard (Yard), located south of Jackson Avenue, under the 21st Street Bridge at 49th Avenue, in Long Island City, Queens, New York. A site location map is provided as **Figure 1**. The Yard is currently owned by LIRR and is approximately eight acres in size. The area of the Yard that is currently subject to an Order on Consent and Administrative Settlement is an approximately 2.7-acre portion of the Yard designated as New York Department of Environmental Conservation (NYSDEC) Site No. 241222 (herein referred to as "the Site"). LIRR has proposed redefining the site boundary to include a smaller, approximately 0.3-acre, portion of the Yard where chlorinated volatile organic compound (VOC) impacts to soil and groundwater have been identified. The current and proposed revised boundaries of the Site are shown on **Figure 2**. A detailed summary of previous Site investigations is included in a 2016 Remedial Investigation Report (RIR) prepared by D&B Engineers and Architects, P.C. (D&B). This SRIWP is intended to present a description of proposed work activities associated with Supplemental Remedial Investigation (SRI) of surface soils within the proposed revised Site boundaries. The objective of this SRI is to characterize surface soil conditions and document the depth of bluestone ballast cover within the proposed revised Site boundaries.

Site Description

The Site is located in Long Island City, Queens, New York and is identified as Block 61, Lot 5 and 6, and Block 72, portion of Lot 1, on the New York City Tax Map. A United States Geological Survey (USGS) topographical quadrangle map (**Figure 1**) shows the Site location. The Site (NYSDEC Site No. 241222) is situated within the LIRR's Arch Street Yard (the Yard) and is an approximately 2.7-acre area bounded by Jackson Avenue to the north, 49th Avenue to the south, the Yard maintenance facility to the east, and 11th Street to the west. LIRR has proposed to revise the Site boundary to be limited to an approximately 0.3-acre area located in the southwest portion of the Yard (see **Figure 2**).

Site Geology and Hydrogeology

As is typical for most highly industrialized areas such as Queens, New York, the Yard property was likely filled and reworked to allow for development. Based on boring logs and consistent with previous investigations, a layer of urban fill material was observed immediately below the ground surface with a minimum thickness of 5 feet. The fill material is generally described as a dark brown to gray and black, sand and gravel mix with some silt. Varying amounts of anthropogenic material were observed in the fill, such as bluestone, concrete and brick, as well as coal, slag, ash, and cinders. The groundwater surface was observed within this fill material at a depth of approximately 3 to 5 feet below ground surface (bgs).

Based on the absence of anthropogenic materials, native glacial deposits may be present beneath the fill material in some locations that is similar to texture but generally finer and lighter in color. However, at all locations the top of a native clay-rich unit was observed at depths ranging from 10 to 15 feet bgs. The clay-rich unit consists of gray, plastic clay, with some zones of silt or silty sand, and often mixed with significant amounts of organic peat material. It is possible that this clay-rich unit marks the location of a historic wetland area which may have existed prior to filling activities. The clay-rich unit continues to approximately 20 feet bgs, with a thickness ranging from 5 to 10 feet.

The clay-rich unit transitions into a coarser sandy material at depths greater than 20 feet bgs, with refusal generally being encountered at a depth between 25 and 30 feet bgs during the installation of several soil borings during the RI. Based on USGS data for this area of Queens, it is suspected that the refusal is due to encountering the top of bedrock. Bedrock in this area of Queens likely consists of gneiss of the Ravenswood Formation or schist of the Hartland Formation. Material consistent with weathered bedrock was encountered before refusal, including rock fragments.

Background

In December 2003, a LIRR contractor discovered contaminated soil while excavating a utility trench under the 21st Street Bridge at the Yard. The NYSDEC was notified and NYSDEC Spill No. 0310802 was opened. In April 2004, the LIRR's East Side Access Department (ESA) performed an environmental investigation of the impacted area in an attempt to delineate the extent of contamination. Based on the results of this investigation, it was determined that the majority of the impacted surface/shallow subsurface soil had been excavated and removed during the utility trenching. Note there are no records available concerning the details of the utility trenching such as the quantities of soil excavated or the limits of excavation. However, additional follow-up investigations were completed in the vicinity of the excavation.

In 2005, ESA installed four groundwater monitoring wells, which were sampled three to four times per year during the time period from 2005 through 2009. In 2009, ESA advanced seven groundwater probes throughout the impacted area, in order to further define the extent of the contamination. Based on the investigation findings, it was determined that further horizontal and vertical delineation of groundwater contamination was required. In September 2011, the LIRR requested to add the 2.7-acre parcel of the Yard (i.e., the Site) to an existing Voluntary Cleanup Agreement (VCA) with the LIRR. The NYSDEC approved the addition of the Site to the existing VCA Index Nos. W1-0993-04-04 and W2-0994-04-04. Under this VCA, the Site as shown on **Figure 2**, was designated as NYSDEC Site No. V00733. As a result of the termination of the Voluntary Cleanup Program, NYSDEC entered into an Order on Consent and Administrative Settlement with LIRR to address the remaining remedial actions for the Site and NYSDEC Site No. 241222 was assigned. A summary of the previously completed investigations is presented in Section 2.2.2 of a draft Remedial Action Work Plan (RAWP), dated October 2019, prepared by TRC Engineers, Inc.

The most recent and notable investigation with respect to the current conditions of the Site was a Remedial Investigation (RI) completed by D&B Engineers and Architects, P.C. (D&B) between October 2015 and August 2016. D&B completed the RI field activities in four phases, in accordance with the July 2015 NYSDEC-approved Remedial Investigation Work Plan (RIWP) and subsequent work plan modifications and NYSDEC directives.

As discussed in the final NYSDEC-approved RI Report written by D&B, a localized source area or "hot-spot" of chlorinated VOC contamination is present in a discrete area south of the tracks within the Site, at a depth of approximately 8 to 16 feet below ground surface (bgs) immediately above and within the uppermost portion of the clay-rich unit. Based on the results of the RI and previous investigations, this "hot spot" encompasses approximately 680 square feet and is not migrating. Chlorinated VOCs at concentrations exceeding the NYSDEC Technical and Operational Guidance Series (TOGS) (1.1.1) Class GA Ambient Water Quality Standards and Guidance Values (herein referred to as Class GA Standards) in groundwater are consistent with the discrete residual source area or "hot-spot".

Due to its discrete location under the bridge and the fact that there is no evidence that the LIRR has utilized, disposed or accidentally spilled chlorinated VOCs at the Yard, the chlorinated VOCs may have been dumped onto the Site by an outside party during a "onetime event" or over a limited period of time. In addition, the results of the RI showing the presence of fill material and limited shallow impacts by chlorinated VOCs are consistent with previous reports indicating that the majority of impacted surface/shallow subsurface soil was excavated and removed during utility trenching conducted in 2003.

It should be noted that an investigation conducted in 2000 identified elevated levels of polychlorinated biphenyls (PCBs) at the Site; however, the RI results did not confirm the presence of PCB contamination within surface and shallow subsurface soil in the track area to the northwest of the chlorinated VOC contamination area. Given that the tracks and the approximately one to two feet of bluestone now present in the area were installed following the initial discovery of the elevated PCB concentrations in 2000, it is presumed that the majority of the PCB contaminated soil was removed previously.

The RAWP selected a remedy primarily consisting of in-situ chemical reduction (ISCR) and enhanced in-situ bioremediation (EISB) of soil and groundwater. However, it was determined that additional evaluation of Site surface soil was necessary to determine if a soil cover or cap would be required as part of the remedy. The SRI Scope of Work described below has been prepared to address this data gap.

Supplemental Remedial Investigation Scope of Work

TRC will perform the following tasks in accordance with the Site-specific Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP), presented in Appendix A, and the Quality Assurance Project Plan (QAPP) presented in Appendix B.

Utility Survey

Prior to initiating soil sampling activities, LIRR will perform a utility survey to confirm proposed soil boring locations, shown on **Figure 2**, are clear of underground utilities. LIRR will locate and identify all underground utilities.

Soil Sampling
Hand auguring equipment will be used to advance soil borings and collect soil samples to evaluate surface soil conditions at the Site. Soil sampling will include the following:

- TRC will advance fifteen borings (TRC-SB-01 through TRC-SB-15) via hand augur to assess Site surface soil.

- A portable vacuum box will be used to clear each soil boring location of bluestone ballast. Ballast thickness will be documented.

- Soil borings will be advanced to a depth of 2 feet below bottom of encountered ballast.

- Soil samples collected from each boring will be screened with a photoionization detector (PID) and inspected for indications of contamination (e.g., staining, odors, etc.). Geologic descriptions of the soil and field screening results will be recorded in field logs.

- One soil sample collected from each soil boring will be submitted for laboratory analysis for Target Compound List (TCL) VOCs and semi-volatile organic compounds (SVOCs).

- Soil samples will be containerized in laboratory prepared jars, labeled, sealed, and placed in a chilled cooler for transport to the laboratory via courier. Soil samples will be analyzed by Eurofins TestAmerica, Inc., an ELAP-certified laboratory approved by the New York State Department of Health (NYSDOH). Soil samples will be analyzed on a 10-day TAT.

Investigative Derived Waste
Boreholes will be backfilled with soil cuttings and removed ballast. Decontamination rinsate will be discharged to ground surface.

Land Surveying
The horizontal coordinates and ground surface elevation of each soil boring location will be surveyed by a New York State-licensed Land Surveyor. Horizontal coordinates will be measured in the North American Datum 1983 State Plane coordinate system and elevations will be measured relative to the North American Vertical Datum 1988.

Report Preparation
Results of analysis will be performed in accordance with NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation, Appendix 2B "Guidance for Data Deliverables and the Development of DUSRs. The October 2019 RAWP will be revised after laboratory results are received and validated. The revised RAWP will include updated figures showing the revised Site boundary, a discussion of the scope of the SRI, a figure showing surface soil boring locations and exceedances of regulatory criteria, tabulated analytical results, soil boring logs, and a description of a site cover/cap to be included as part of the selected remedy, if appropriate.

Schedule

Upon receipt of approval of this Work Plan from NYSDEC, TRC will arrange for the soil sampling to begin. Laboratory data is expected to be received 10 business days after the date of delivery of samples to the laboratory. The revised RAWP will be prepared and submitted within 50 business days following receipt of the final analytical package.

Certification

LIRR has retained TRC Engineers, Inc. to review and provide the certification below in accordance with DER-10.

I, Kirsten Myers, P.E., certify that I am currently a New York State registered professional engineer and that this Remedial Investigation 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)

Signature
NYS Professional Engineer No. 089236-1

2/26/2021
Date

Please do not hesitate to contact me at (347) 494-6034 if you have any questions.

Sincerely,

Kathleen Green
Director – Environmental Planning & Compliance
Corporate Safety Department

cc: D. Warren, TRC
K. Myers, TRC

Enclosures:

Figure 1 – Site Location Map
Figure 2 – Proposed Soil Sampling Locations

Appendix A – Health and Safety Plan
Appendix B – Quality Assurance Project Plan

FIGURES

SCALE: 1:2400

1 0.5 0 KILOMETERS 1 2

1000 500 0 METERS 1000 2000

1 0.5 0 1

MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

FEET

QUADRANGLE LOCATION

MAP INCLUDES INFORMATION FROM THE FOLLOWING MAP SHEET(S):
TP, BROOKLYN, NY, 7.5 MINUTE DATED 2016,
N, CENTRAL PARK, NY, 7.5 MINUTE DATED 2016.

MAP OBTAINED THROUGH USE OF TOPOVIEW WITH THE INTERFACE CREATED BY THE NATIONAL GEOLOGIC MAP DATABASE PROJECT (NGMDB), IN SUPPORT OF THE TOPOGRAPHIC MAPPING PROGRAM, MANAGED BY THE USGS NATIONAL GEOSPATIAL PROGRAM (NGP).

TRC
1430 Broadway, 10th Floor
New York, NY 10018
Phone: 212.221.7822
www.TRCcompanies.com

PROJECT:
METROPOLITAN TRANSPORTATION AUTHORITY LONG ISLAND RAIL ROAD
SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN
ARCH STREET YARD
LONG ISLAND CITY, NEW YORK

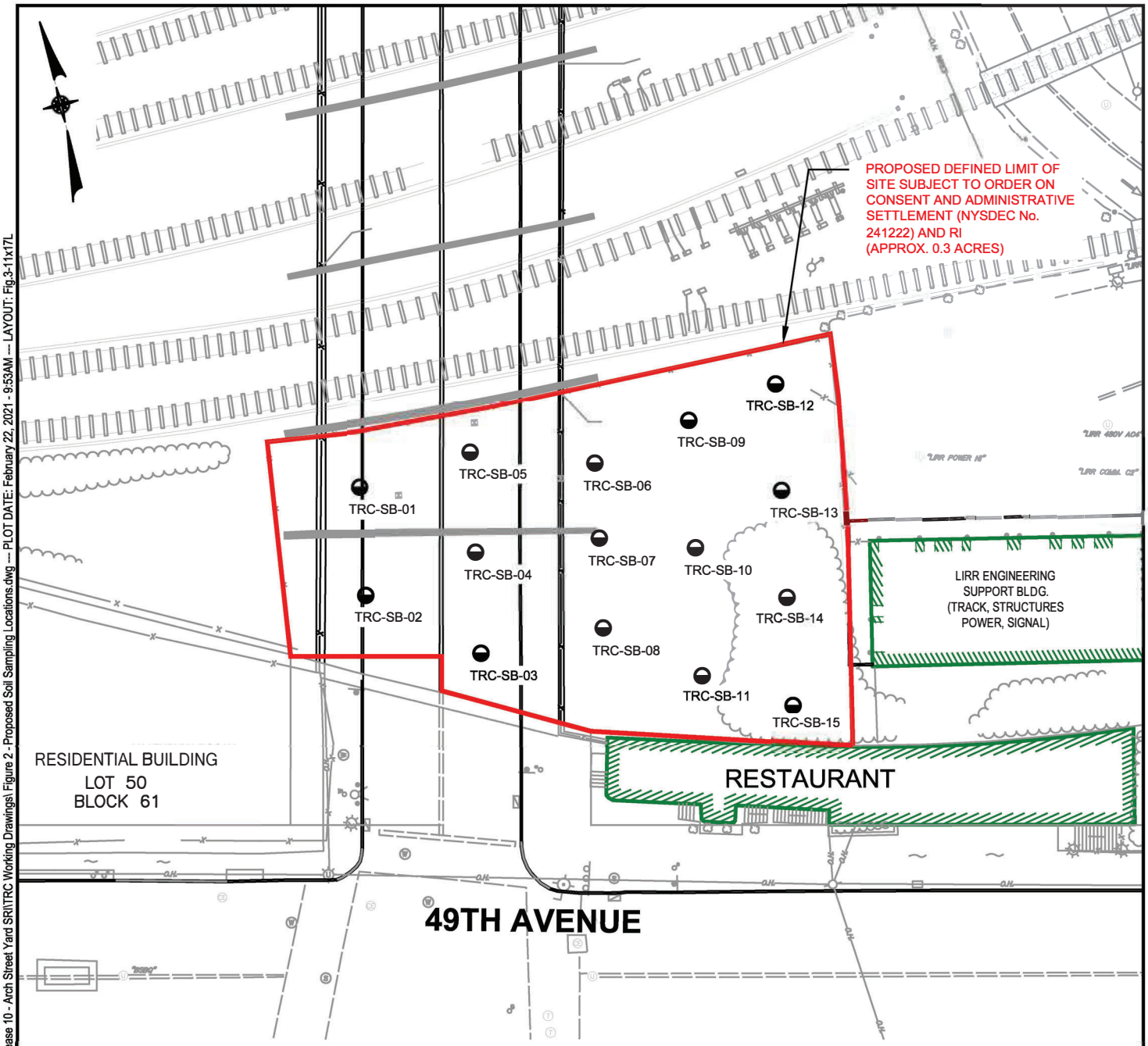
TITLE:

SITE LOCATION MAP

DRAWN BY:	H. DELGADO
CHECKED BY:	D. WARREN
APPROVED BY:	K. MYERS
DATE:	FEBRUARY 2021
PROJ. NO.:	414444
FILE:	Figure 1 - Site Location (Arch St.).dwg

FIGURE 1

8.5x11 --- ATTACHED IMAGES: NY_Brooklyn_20160824_TM; NY_Central_Park_20160824_TM;
DRAWING NAME: \\nyc-fp1\Shared\Projects\LIRR On-Call Environmental Services\414444.0000.0000 - Release 10 - Arch Street Yard SRI\TRC Working Drawings\ Figure 1 - Site Location (Arch St).dwg --- PLOT DATE: February 08, 2021 - 12:42PM --- LAYOUT: 8.5x11



LEGEND

PROPOSED DEFINED LIMIT OF SITE

OUTLINE OF ENCLOSED BUILDINGS

PROPOSED SOIL SAMPLING LOCATION (SB-)

NOTE:

1. DRAWING SOURCE FROM INTERIM REMEDIAL MEASURES WORK PLAN REPORT FIGURE A-2 "SITE PLAN SHOWING DEFINED BOUNDARIES OF PROJECT SITE" PROVIDED BY D & B ENGINEERS AND ARCHITECTS, P.C. DATED DECEMBER 2018.

0 40' 80'

SCALE: 1" = 40'
SHEET SIZE: 8.5" BY 11"

TRC
1430 Broadway, 10th Floor
New York, NY 10018
Phone: 212.221.7822
www.TRCcompanies.com

PROJECT:
METROPOLITAN TRANSPORTATION AUTHORITY LONG ISLAND RAIL ROAD
SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN
ARCH STREET YARD
LONG ISLAND CITY, NEW YORK

TITLE:

PROPOSED SOIL SAMPLING LOCATIONS

DRAWN BY:	A. REXROAT
CHECKED BY:	D. WARREN
APPROVED BY:	K. MYERS
DATE:	FEBRUARY 2021
PROJ.NO.:	41444
FILE:	Figure 2 - Proposed Soil Sampling Locations.dwg

FIGURE 2

8.5x11 --- ATTACHED XREFS: 3455-EXHIBIT-B --- ATTACHED IMAGES:
DRAWING NAME: \\nyc-fp1\Projects\LIRR On-Call Environmental Services\414444.0000.0000 - Release 10 - Arch Street Yard SRI\TRC Working Drawings\ Figure 2 - Proposed Soil Sampling Locations.dwg --- PLOT DATE: February 22, 2021 - 9:53AM --- LAYOUT: Fig.3-11x17L

APPENDIX A
HEALTH AND SAFETY PLAN

SITE-SPECIFIC HEALTH AND SAFETY PLAN

Arch Street Yard
Arch Street
Long Island, NY
LIRR Contract No. 6168A-09-32-B
NYSDEC Site No. 241222

Prepared for:
MTA Long Island Rail Road
146-01 Archer Avenue
MC 1428
Jamaica, NY 11435

Prepared by:
TRC Engineers, Inc.
1430 Broadway
10th Floor
New York, NY 10018

TRC Project Number: 414444.0000.0000

JANUARY 2021

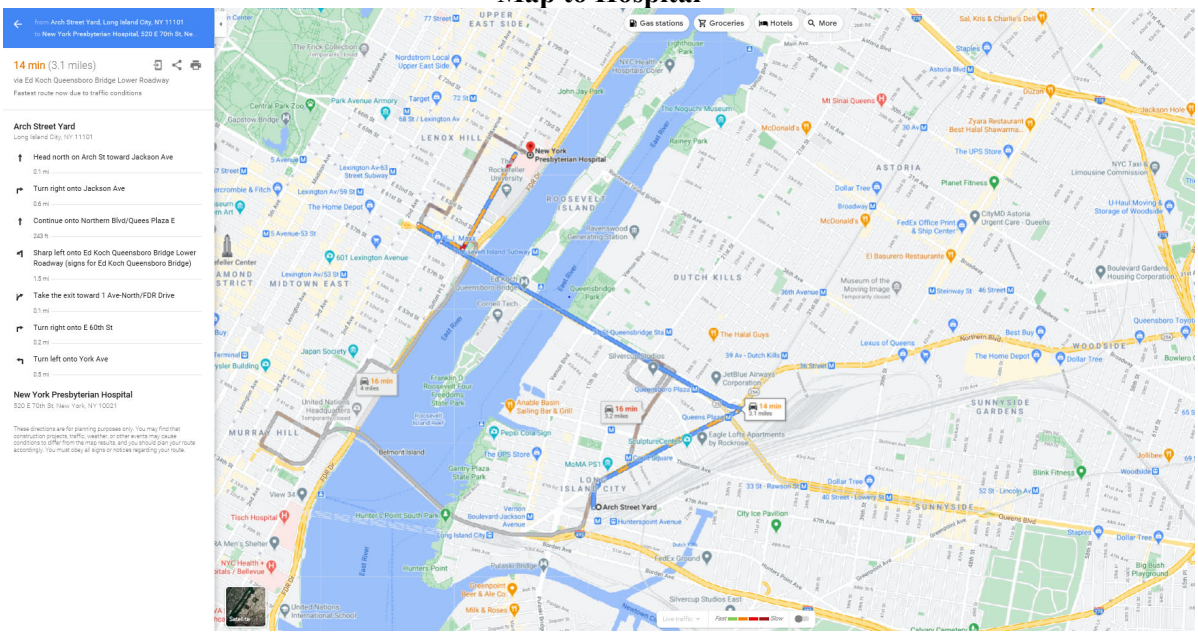
Nearest Hospital: New York Presbyterian Hospital, 520 E 70th Street, New York, New York 10021 (See below)

Directions to Hospital:

Site Address

1. Head north on Arch Street toward Jackson Avenue
2. Turn right onto Jackson Avenue
3. Continue onto Northern Boulevard/ Queens Plaza East
4. Sharp left onto Ed Koch Queensboro Bridge Lower Roadway
5. Take the exit toward 1 Avenue-North/ FDR Drive
6. Turn right onto East 60th Street
7. Turn left onto York Avenue

Map to Hospital



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Appendices

1. Client/Personnel Contact Information

Table 1.1 Site and Contact Information		
Site Name: Arch Street Yard **TRC Project Number: 414444** **Site Address: Arch Street, Long Island City, New York**		
Client Contact/Title	**Office Phone Number**	**Cellular Phone Number**
Kathleen Green, LIRR Director of Environmental Planning and Compliance	347-494-6034	631-921-1597
TRC Personnel and Role		
Name / Project Role	**Office Phone Number**	**Cellular Phone Number**
Karyn Treinen / TRC Field Lead, OHSO	908-451-0203	347-618-6526
Dan Warren / TRC Project Manager	401-285-8503	917-232-9837
Jennifer Miranda / TRC Principal	917-794-3248	646-285-8990
Emily Ebert / Office Health & Safety Coordinator	347-618-6526	908-451-0203
Scott Buchanan / ECR Safety Manager	978-970-5600	978-758-2808
Mike Glenn / Health & Safety Director	949-727-7347	949-697-7418

On-Site Health & Safety Officer (OHSO): On-Site Health and Safety Officer (OHSO), Karyn Treinen, is 40-hour OSHA certified and is current on refresher training, has OSHA 8-hour Supervisor training, and has first aid and CPR training.

2. Site Information

The Arch Street Yard is located under the 21st Street Bridge at 49th Avenue in Long Island City, Queens, New York. Historically, the yard operated as a maintenance area for the LIRR until 2009. Currently, the Site is occupied by the LIRR for storage and operation of an electric substation. A map showing the site location is included as Figure 1-1 (as provided in the RIR prepared by D&B Engineers and revised in May 2017).

The site is an active rail yard and all work around active rail lines must be performed in accordance with the LIRR Contractor Safety Training. All site workers will be required to be thoroughly familiar with this HASP and the LIRR Worker Protection Manual (latest edition). Any and all needs for flagging personnel while working on site will be provided by LIRR.

3. Work Scope Summary

TRC;s scope of work includes Supplemental Remedial Investigation (SRI) activities and services in connection with re-defining site boundaries at the Site.

TRC will attend one Site visit with LIRR to assess the existing conditions prior to the beginning of the SRI Work Plan Preparation. TRC's representative will inspect the proposed areas of the work as needed to complete the subsequent tasks and identify arrangements required for coordinating field investigation work with existing operations.

SRI activities includes completion of a utility survey, advancement of soil borings via hand auger to approximately 2 feet below ballast, collection of and analysis of soil samples, and completion of a land survey.

Prior to initiating hand auguring activities, LIRR will perform a utility survey to confirm proposed soil boring locations are clear of underground utilities.

TRC's subcontractor, Land, Air, Water Environmental Services [LAWES, an Empire State Development Corporation (ESDC)-certified Woman-Owned Business Enterprise (WBE)], will clear each soil boring location of ballast using a portable vacuum box. Up to 15 soil borings (based on a maximum area of the Site of 12,750 square feet) will be cleared of ballast and then advanced via hand augur 2 additional feet. One soil sample will be collected continuously from 0 to 2 feet below the bottom of ballast, screened with a photoionization detector (PID), and inspected for indications of contamination (e.g., staining, odors) by a TRC project scientist, and selected for laboratory analysis of Target Compound List (TCL) volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Boreholes will be backfilled with soil cuttings and removed ballast. Decontamination rinsate will be containerized in a 55-gallon drum and discharged to ground surface.

Following completion of sampling activities, TRC's subcontractor, Munoz Engineering & Land Surveying, DPC [an ESDC-certified Minority-owned Business Enterprise (MBE)], will survey the horizontal coordinates and ground surface elevation of each soil boring location. Horizontal coordinates will be measured in the North American Datum 1983 State Plane coordinate system and elevations will be measured relative to the North American Vertical Datum 1988.

TRC will then revise the draft Remedial Action Work Plan (RAWP) for LIRR's review and comment.

4. Hazard Assessment

This HASP assumes that an ongoing hazard assessment process with the field team, Project Management and TRC Office Safety Coordinators (OSCs) will take place regularly (via meetings/teleconferences), supplemented by ad hoc communication on project safety needs, to ensure the project work is conducted at a high level of technical excellence both safely and efficiently. Certain tasks are **not** covered by this HASP, including specialty inspections or other hazards as determined by the Project Manager and OSC. Where the hazard assessment indicates the presence of these tasks and potential impact on the work involved, supplemental planning will be conducted and documented in a revised or higher-level HASP document.

4.1 Chemical Hazards

Based on the NYSDEC-approved Remedial Investigation Report (RIR) prepared by D&B Engineers in May 2017, a localized "hot-spot" of chlorinated volatile organic compounds (CVOCs) was identified in the subsurface soil and groundwater. The "hot spot" covers an area of approximately 680 square feet (sf), located approximately 8 to 16 feet below grade surface (bgs). Since the areas of concern have been identified as at least 8 feet bgs, it is not anticipated that TRC staff will be exposed to CVOCs in soil.

Sample bottles containing hazardous preservatives will be handled with care. Sample bottles will be checked for leaks and lids tightened. Nitrile chemical resistant gloves and safety glasses will be worn at all times when handling sample bottles.

Isobutylene gas will be used during a short time period at the beginning of each work day to calibrate the photoionization detector (PID). 100 parts per million (ppm) isobutylene will be primarily contained in a tedlar bag. Any gas that is released to the air will quickly disperse and will not pose a threat to on-Site

workers. No monitoring is required for isobutylene.

If additional chemical hazards are identified the Project Manager and/or OSC shall be contacted to determine if additional safety measures should be incorporated at the Site

The Safety Data Sheets (SDS) for the compounds of concerns are provided in Appendix A.

4.2 Physical and Health Hazards

Physical and health hazards anticipated to be at the Site are listed here and described below. Other hazards are possible and should be evaluated using hazards identification. When hazards are identified that are not in the HASP (or not sufficiently covered by the HASP), the Project Manager and/or OSC shall be contacted to determine if additional safety measures should be incorporated at the Site.

- Edges/Material Handling
- Electrical
- Weather
- Manual lifting
- Mechanical
- Slips/Trips and Falls
- Traffic Hazards
- Work in an Active Rail ROW
- Noise

Edges/Material Handling – Kevlar gloves are required to be worn at all times while performing tasks that have the potential for hand injuries. A glove selection guideline is presented in Appendix B.

TRC has a policy of using guarded blades for cutting tasks, fixed blade open knives are not to be used for work under this scope of work unless a variance is approved by the ECR Safety Manager.

Electrical – Electricity is all around and needs to be treated with caution. When working with electrical equipment it should always be grounded and wires should be covered by insulation. If the electrical cording is damaged the equipment should be marked and marked for repair or disposal. Extra caution must be used when using electricity around water and if at all possible electrical equipment should not be used in wet conditions, but if required only equipment rated for outdoor and waterproof shall be used.

Manual Lifting – Improper lifting can lead to a variety of injuries including back strains, muscle pulls and joint damage. It is important for all personnel to understand proper lifting techniques and to utilize safe lifting procedures when handling materials. Generally, no one should lift more than 50 lbs. without assistance and mechanical means should be used whenever possible.

Mechanical – The mechanical hazards are anticipated to be associated with drilling operations. Drilling operations involve boring, augering or directionally pushing into soil or other surfaces. Various types of mechanical equipment may be used to provide the force of drilling.

Depending on the particular drill rig employed, drilling operations can present exposure to the following:

- Flying objects (chipped asphalt or concrete, soil) and dust. Measures used to control such exposures will include use of water misting apparatus to keep dust down, or use of a guard installed around the drill to protect against flying objects and dust.

- Underground utilities present fire, electrocution, burn and explosion hazards. If possible, all lines in the area of drilling will be de-energized, locked-out, and tested before work begins.

- Assembling and disassembling rigs.

- Perimeter protection in the form of barricades is necessary for the protection of employees and subcontractor personnel and the public. Such protection will meet requirements set forth in 29 CFR 1926, as well as in the New York City Building Code, Article 19.

- All subsurface utility lines in the area of drilling will be identified jointly with the TRC utility mark-out subcontractor and NYC One-Call Center.

A Job-Safety Analysis for direct push drilling operations is provided in **Attachment E.**

Noise – Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps, and generators and when working within operating power stations. Excessive noise can impair the ability to hear, and also put stress on other parts of the body. There is no cure for the effects of noise, so prevention of excessive noise exposure is the only way to avoid health damage. Approved hearing protection will be required at all times allowable noise limits, 85 dba, are exceeded. In general, ear protection will be worn during all activities when workers are unable to hear each other speak. Studies have indicated that high levels of noise will increase the release of adrenaline, resulting in increased heart rate, and blood pressure and respiration levels. Muscles are also found to tense in response to noise. High levels of noise may also interfere with job performance and also have been blamed for excessive fatigue at the end of the workday. Accident rates are higher in workplaces that have higher noise levels.

Slips/Trips and Falls – Be aware of uneven ground, and buried debris (metal, plastic, etc.), to avoid potential slip/trip/fall hazards, and use caution near open excavations. Maintain good housekeeping practices to minimize physical hazards.

Traffic Hazards – Driving to and from the Site each day is considered a physical hazard. Directions and travel time to the Site should be determined in advance (a.k.a., Journey Management Planning) and adequate time should be allocated to drive safely. The use of cellular phones is prohibited, and distracted driving should be avoided. Seatbelts should be worn at all times while the vehicle is moving. Use caution around traffic flow. Ensure proper traffic control (e.g., signs, traffic cones, jersey barriers, etc., or where jurisdictionally required, police details) are in place prior to and throughout the work day where work takes place in or near traffic. Work personnel must wear ANSI-rated class 3 reflective break-away traffic vests at all times.

Weather – Heat and cold stress are a potential concern for on-site workers. As needed, breaks will be permitted to cool down, replenish fluids and/or warm up. Please refer to Appendix C for the signs, symptoms and precautions for cold and heat stress. Work will also occur during a time of year when thunderstorms are possible/likely. If thunder or lightning is noted by onsite personnel, work will cease until the storm passes (thunder and/or lightning ceases and is not observed over at least a 30-minute period). Personnel will seek shelter in buildings or vehicles.

Work in an Active Rail ROW – Moving trains and highly energized electrical transmission lines are present in and around rail right-of-way (ROW). There is a risk of high voltage grounding, arc flash and arc burst. Note that LIRR flagmen will be addressing the hazards and mitigation measures associated with the actual construction work; TRC field personnel are not qualified workers to perform those activities. Construction contractors will be informed of LIRR requirements and the information provided in this HASP. The following measures will be used to mitigate the safety risks for TRC field workers.

- All work will comply with the appropriate requirements of LIRR.
- All TRC personnel shall attend the LIRR rail road worker protection training and have their current blue card on them while on LIRR property.
- Participate in an ROW job briefing before commencing work and/or when work conditions or on-

track safety protection changes.

- The work scope will determine the need for specific LIRR Employee Responsible for On Track Protection (ERTOP) safety protection personnel prior to accessing the site each day.
- Where necessary, the equipment will be grounded by LIRR and the work crew prior to use at locations within the rail ROW.
- The work offset should be a minimum of 15' from the any track unless we are under the active supervision LIRR ERTOP. Workers shall maintain the maximum distance practical from equipment while in operation.
- Work cannot be conducted within 15' of the centerline of any tracks (safety envelope) unless appropriate LIRR ERTOP personnel are present.
- If the ERTOP is not present at the site when work is scheduled to begin, no work can commence that may potentially foul the tracks.
- Expect a train or equipment at any time in any direction on any track.
- Unsecured equipment should must not be stored at distances less than 25' from the tracks

4.3 Biological Hazards

COVID-19 - The 2019 novel coronavirus, or COVID-19, is a new respiratory virus first identified in Wuhan, Hubei Province, China. It's called a "novel" — or new — coronavirus, because it is a coronavirus that has not been previously identified. Use the following precautions to avoid contracting COVID-19:

- Social distancing (at least 6 feet away from other individuals),
- When social distancing (at least 6 feet away from other individuals) is not possible, face coverings/masks shall be worn.
- When using a portable restroom at the Site, personnel shall wear a face covering/mask and wipe down door handles and other touched surfaces.
- Hand hygiene,
- Cover mouth and nose when coughing or sneezing,
- Avoid touching eyes, nose, or mouth,
- Frequently disinfect areas that are likely to have frequent hand contact using a List N: Disinfectant for use against SARS-CoV-2 (COVID-19). https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2-covid-19

Prior to the start of work each day at the Site, as part of the daily safety tool-box talk, the COVID-19 Questionnaire for Onsite Workers must be completed. See Appendix D for TRC Document No. CP052 Rev 9, COVID-19 Guidelines for Field Activities. **TRC COVID-19 Questionnaire included in Appendix E will be completed daily by all on-site personnel.**

Blood-Borne Pathogens - Injuries received in the field may require assistance from a field team member with appropriate first aid/first responder training to perform first aid. Contact with blood and certain body fluids can contain pathogens that may be transmitted by contact with an open wound by the caregiver. The following precautions should be used when giving first aid:

- Use nitrile gloves to avoid contact with blood/fluids. Spent bandages and gloves used to perform first aid should be placed in a plastic bag and properly disposed.
- Blood/fluid should be cleaned from surfaces that may be contacted by other individuals.
- Use an appropriate barrier if required to perform rescue breathing.

Ticks - Ticks generally favor areas of high grass and dense vegetation so to the extent possible, these areas should be avoided. It is advisable when entering these areas to tuck pants into socks and to wear a light colored long sleeve shirt to help spot ticks before they bite. DEET-based insect repellents may be worn to

repel ticks but hands should be washed thoroughly after use and DEET should not be sprayed on ones face. Self-checks should be made frequently and at least at the end of the field day for ticks when working in or near vegetated areas.

If discovered, the tick should be removed with a pair of tweezers and saved in a zip loc bag. Sometimes, tick bites occur but the tick may not stay attached. Sometimes within a few days, a rash will develop in the area of the bite**. If bitten by a tick or a bulls-eye like rash develops, it is advisable to consult WorkCare**.

Spiders – Spiders typically seek cover in dark protected areas. Common areas where spiders may be encountered are heavy vegetation and trees. Spiders also are found in basements and enclosed spaces where sampling drinking water supplies may be performed. Spider bites may cause swelling, pain and respiratory problems. Avoid dense vegetation and use caution when sampling water supplies from taps in dark poorly illuminated locations. If bitten, wash the area and use ice on the bite area to reduce swelling. If respiratory stress, significant pain or swelling is noted, or discoloration around the bite area occurs, seek immediate medical attention.

Stinging Insects – Like spiders, wasps and yellow jackets often nest in dense vegetation and in the ground, or in long-standing protective casings on monitoring wells and shielded gate locks. A sting from these insects can cause pain, swelling, and respiratory problems that may be life-threatening to certain individuals. If stung, remove stinger if present using tweezers or similar, and wash the area and use ice on the sting area to reduce swelling. If respiratory stress, significant pain or swelling is noted, or discoloration around the sting area occurs, seek immediate medical attention.

4.4 Radiological Hazards
None anticipated.

5. Personal Protection Monitoring
None anticipated.

6. Air Monitoring Requirements
An organic vapor photoionization detector (PID) will be used to evaluate airborne levels of VOCs during the completion of soil borings and the collection of soil samples. If ionizable total organic vapors are detected at 5.0 ppm or higher above ambient background levels in the breathing zone, the work will cease until the levels drop or work practices are modified to reduce the levels. If the vapor levels continue to be elevated, other air monitoring devices may be utilized to measure airborne concentrations of specific suspected contaminants of concern (see below) and to assess the need to upgrade the respiratory PPE.

OSHA Permissible Exposure Limit (PEL)
The OSHA PEL, for benzene, which will be used to determine the appropriate respiratory protection, is 1 part per million (ppm) over an 8-hour time-weighted average or 5 ppm over 15 minutes. This value is based upon the OSHA PEL for benzene, which, of the VOC constituents of petroleum compounds, has the lowest PEL.

Respiratory Protection
Respiratory protection in the form of a face covering (N95, half face, or other cloth covering) will be required during implementation of the work plan in response to COVID-19.

If air monitoring measurements indicate that levels of organic vapors have reached 5 ppm, workers will cease work in the area until levels of organic vapors have decreased. If necessary, modifications to work practices will be implemented to reduce or avoid generating elevated levels of organic vapors.

7. Personal Protective Equipment

TRC personnel will use Level D PPE as noted/modified below:

Table 6.1 Level D Personal Protective Equipment

Item	Rationale/Notes
Hardhat	ANSI/ISEA Z89.1-2009 rated hard hats will be worn by personnel for protection against overhead hazards, including electrical.
Hearing protection	Hearing protection will be worn by all personnel exposed to at least 85 dB of sound during the workday. A good rule of thumb to use in determining whether background noise is 85 dB or higher is if you must shout to be understood by somebody about one arm-length away, that background noise is hazardous. Hearing protection shall not be used on the ROW without an LIRR tap man.
Safety boots (steel or composite toe and shank)	ASTM F2413-05 and EH rated safety-toe safety boots will be worn by all personnel during project work described in this HASP and at all times on site.
Eye protection (safety glasses)	ANSI rated eye protection (Z87 or Z87+) will be worn when personnel are exposed to flying debris, chemical vapors or particulates. Chemical splash goggles will be worn for protection against chemical gases, vapors or particulates. Safety glasses will be worn for protection against flying objects.
Safety vest	ANSI Class 3 break-away vests will be worn at all times while on-site.
Chemical Protective Clothing (CPC) and Gloves	CPC and gloves will be inspected according to TRC's Personal Protective Equipment Program. CPC will be chosen with assistance from the OSC according to the chemical hazards present. Gloves are to be changed between samples to avoid cross-contamination.
Kevlar work gloves	As indicated herein, use Cut and Abrasion Resistance Level 2 to Level 4 gloves when necessary for hand protection during field tasks. See Appendix B for a Glove Selection Guide. ***Leather work gloves are expressly prohibited.***
Face Covering	As required in response to COVID-19 TRC employees will wear a face covering (N95, half face, or other cloth covering) until it is no longer required.

A basic first aid kit will be readily available on-site in the event of an emergency.

8. Site Control/Work Zones

The contractor and/or LIRR will be responsible for site control and performing tailgate safety meetings (see Section 11 Tailgate Safety Meetings).

9. Required Personnel Training

TRC field personnel will have the training outlined below before on-site work activities:

Table 8.1 Project Training Requirements.

(* required for all sites; but minimum recommended)

Check "A" if training required for everyone, and check "T" if training required for specific task or per notations.

A	T	SUBJECT	REFERENCE	
			29 CFR 1910	29 CFR 1926 or Other
☒	☐	HAZWOPER 40 hour*	1910.120	1926.65
☒	☐	3-Day HAZWOPER Supervised On-site*	1910.120	1926.65
☒	☐	8-Hour HAZWOPER Refresher*	1910.120	1926.65
☐	☒	8-Hour Supervisor HAZWOPER*	1910.120	1926.65
☐	☒	First Aid, CPR*,[1]	1910.151	1926.23,.50
☒	☐	Hazard Communication (HAZCOM)	1910.1200	1926.59
☐	☐	DOT / IATA Shipping Training	1910.1201	49 CFR 172.704
☒	☐	MTA LIRR Contractor Safety Training		
☒	☐	TRC Hand Protection Policy	1910.138	TRC Policy[2]
☒	☐	Defensive Driving	N/A	White Paper[3] TRC Manual[4]
Client-specific training:_____ ☐ Not Applicable ☐ Specify				
Client-specific training:_____ ☐ Not Applicable ☐ Specify				
Client-specific training:_____ ☐ Not Applicable ☐ Specify				

Note:
1 Per the TRC Health and Safety Policy and Procedure Manual, each TRC project will have at least one certified CPR/first aid trained person on site at all times. All Project Managers and anyone acting as the on-site Health and Safety Officer must be current in First Aid/CPR.
2 TRC RMD Hand Protection Policy, August 2012
3 Guidelines for Employers to Reduce Motor Vehicle Crashes (joint white paper by NETS, NHTSA and OSHA)
4 TRC Driver and Vehicle Management Policy and Procedure Manual, Rev 1 (May 2019)

Project training requirements beyond those provided in the above table will require a HASP revision/upgrade or concurrence of the TRC Safety Director or ECR Safety Manager.

10. Medical Monitoring

Medical monitoring will apply routinely to all employees who are or may be exposed to hazardous substances or health hazards at or above the established permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year (40 CFR 1910.120[f][2][i]). Said TRC field personnel will have the medical surveillance outlined in the table below prior to commencing on-site work activities.

Table 9.1 Medical Surveillance Required

*Baseline is minimum recommended.

	29 CFR 1910	29 CFR 1926 or Other	Notes
☒ HAZWOPER Physical - Baseline*	1910.120	1926.65	
☒ HAZWOPER Physical – Annual	1910.120	1926.65	
☐ HAZWOPER Physical - Biennial*	1910.120	1926.65	
Client-specific drug testing[1]	☐ Not Applicable ☐ Specify		
Client-specific medical monitoring[1]	☐ Not Applicable ☐ Specify		
Site-specific medical monitoring:	☐ Not Applicable ☐ Specify		

Note:
[1] Client required drug testing or medical monitoring should be coordinated through the Project Manager.

TRC has a Drug and Alcohol-Free Workplace Policy (TRC Academy Course #900013753). TRC may require employees or subcontractors to be tested upon reasonable suspicion, following accidents or incidents during work activities, or during travel to or from a project site. Client policies may be stricter in regard to procedures following an accident. Project Managers must be aware of these and inform employees and subcontractors of any additional requirements.

11. General Safety Requirements

The general safety rules listed below apply to all TRC personnel present at the site.

- A tailgate health and safety meeting will be held with all field team members each day prior to the start of work.
- Adhere to all requirements of this health and safety plan (HASP).
- Wear protective clothing appropriate for the designated level of protection and decontaminate before entering clean areas when applicable.
- Immediately report unsafe acts or conditions to the Project Manager and OSC.
- Eating, drinking, and smoking are prohibited on site, except in designated areas.

12. Tailgate Safety Meetings

- A tailgate safety meeting will be conducted by the contractor and/or LIRR daily prior to commencement of the workday. The TRC OHSO will complete the checklist provided in Appendix E.
- Topics covered by the tailgate safety meeting will include, but not be limited to, potential hazards, weather forecast, PPE, emergency procedures and the route to the medical facility.
- Safety meetings must also be held to address modifications to this HASP and any addenda prepared to supplement the HASP.
- Subcontractors and personnel present at the tailgate safety meeting shall be required to sign an acknowledgement form after each meeting.

13. Emergency/Contingency Plan

Before commencing any on-site operations, the TRC OHSO will advise all personnel of potential emergencies. Personnel will be advised on their roles in the event of an emergency, and the steps to take for a timely and controlled response.

Communication networks/chain of command - All on-site personnel will communicate any accident, injury or near miss to the TRC OHSO who will provide instruction on how to proceed further.

Evacuation Plans and Refuge Area - All personnel should safely remove themselves from danger in the event of an emergency and safely access the refuge area. The refuge area should be in an upwind location a safe distance from the work zone. The refuge area will be determined during the daily safety briefing.

Notifications of Fire, Police and Emergency Facilities - In the event of an emergency that cannot be controlled by on-site personnel, the appropriate emergency contact shall be notified. All personnel shall remove themselves from the area of danger and wait for the arrival of help in the predetermined refuge area.

Non-Emergency Medical Assistance: If an injury does occur and it is not life threatening, then the

employee or employee's supervisor/project manager should contact WorkCare as soon as possible, but within the first hour after an injury. WorkCare information is proved in Appendix F. This information will help assist the injured employee by connecting them with instant access to a medically qualified professional in order to provide guidance on appropriate first aid measures and medications.

Table 12.1 Non-Emergency Telephone Number

Service	Telephone Numbers	Notes
TRC Work Care Service	888-449-7787	See Appendix F

Table 12.2 Emergency Telephone Number

Service	Emergency Telephone Numbers	Direct Telephone Numbers
Police: New York City 108th Precinct	**Emergency:** 911	911 or 718-784-5411
Fire: Fire Department of New York Engine 258		911 or 718-999-2000
Ambulance: New York Presbyterian Hospital		911 or 212-746-5454
Poison Control:		(800) 222-1222

14. Stop Work

TRC personnel are all empowered, responsible, authorized and obliged to stop work at any time we feel that our safety or the safety of others is, or could be, compromised. When a stop work occurs the PM and/or OSC should be contacted to discuss the reason for the stop work and the corrective action(s) needed to move resume work safely. Work on an activity shall not continue until the unsafe condition has been corrected.

15. Safe Catches

A "Safe Catch" is a potential hazard or incident that has not resulted in any personal injury. Unsafe working conditions, unsafe employee behaviors, improper use of equipment or use of malfunctioning equipment have the potential to cause work related injuries. It is everyone's responsibility to report and/or correct these potential incidents immediately. Document an incident using the Safe Catch Report in the Intelex application or the paper form included in Appendix G.

16. Observations

Note that the Project Manager and/or OSC may notify field staff that their site activities may be the subject of Safety Observation, an integral part of the continuous improvement safety culture promoted at TRC. If subject to an observation, please note the following:

- The Observation will tend to focus on the highest risk activity (as a general example, drilling in a public right-of-way).
- Follow-up observations may need to occur on previous observes, depending on prior data collected.
- The observer's preparation before visiting the site will be a review of the HASP, JSAs, client-specific requirements, etc., and a review of the work scope with the Project Manager to ensure the context of the work is well understood in advance.
- Review items may include PPE, body use and positioning, work environment, operating procedures, and tools and equipment.

- The observation should last between 30 and 60 minutes.

Both positive and negative observations are candidates for documentation and later discussion. The overarching goals are to identify and correct questionable practices, and to identify and promote good, safe and efficient practices. It is a data gathering process that will allow TRC safety specialists to identify root causes for safety issues in both categories to better inform policy decisions.

17. Incident Reporting

In case of an accident, TRC personnel must report the incident immediately to their project manager/supervisor and/or OSC, and client's representative, and follow the TRC Incident Response and Reporting Process (see Appendix H In Case of Emergency). Required forms must be completed using the Intelex application or hard copy forms included in Appendix H within 24 hours following the incident. If neither is available, the incident shall be reported to the TRC Safety Director (Mike Glenn). Incident/injury/exposure information must be recorded per TRC policy and will be the basis of any incident investigations.

18. Acknowledgement

All TRC personnel operating under this HASP must read the HASP and sign the acknowledgment page in Appendix I.

Figure 1
Site Location Plan

MAP INCLUDES INFORMATION FROM THE FOLLOWING MAP SHEET(S):
TP, BROOKLYN, NY, 7.5 MINUTE DATED 2016,
N, CENTRAL PARK, NY, 7.5 MINUTE DATED 2016.

MAP OBTAINED THROUGH USE OF TOPOVIEW WITH THE INTERFACE CREATED BY THE NATIONAL GEOLOGIC MAP DATABASE PROJECT (NGMDB), IN SUPPORT OF THE TOPOGRAPHIC MAPPING PROGRAM, MANAGED BY THE USGS NATIONAL GEOSPATIAL PROGRAM (NGP).

TRC
1430 Broadway, 10th Floor
New York, NY 10018
Phone: 212.221.7822
www.TRCcompanies.com

PROJECT:
METROPOLITAN TRANSPORTATION AUTHORITY LONG ISLAND RAIL ROAD
SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN
ARCH STREET YARD
LONG ISLAND CITY, NEW YORK

TITLE:

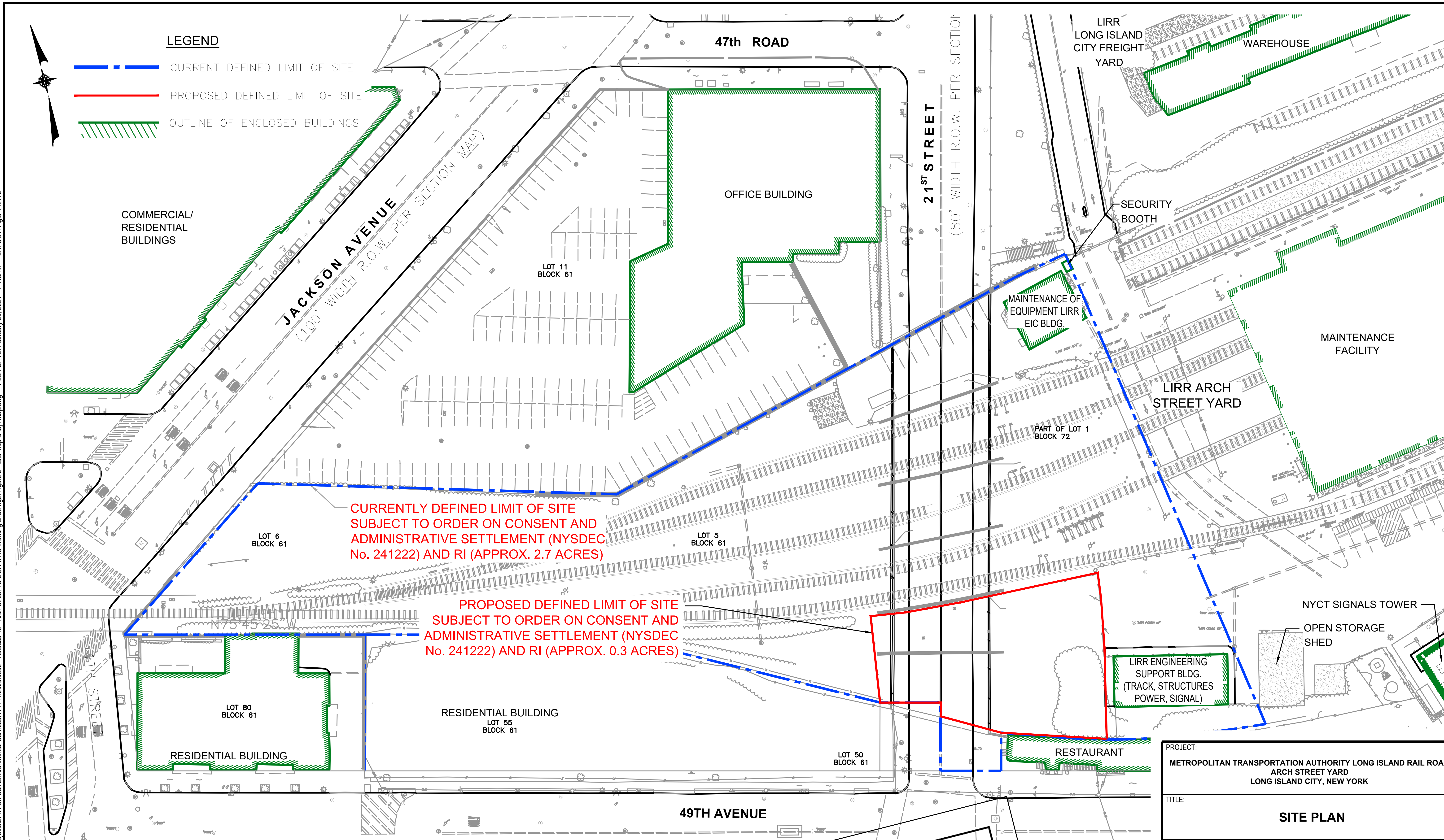
SITE LOCATION PLAN

DRAWN BY:	H. DELGADO
CHECKED BY:	D. WARREN
APPROVED BY:	K. MYERS
DATE:	FEBRUARY 2021
PROJ. NO.:	414444
FILE:	Figure 1 - Site Location (Arch St.).dwg

FIGURE 1

8.5x11 --- ATTACHED IMAGES: --- NY_Brooklyn_20160824_TM; NY_Central_Park_20160824_TM;
DRAWING NAME: \\nyc-fp1\Shared\Projects\LIRR On-Call Environmental Services\414444.0000.0000 - Release 10 - Arch Street Yard SRI\TRC Working Drawings\ Figure 1 - Site Location (Arch St.).dwg --- PLOT DATE: February 08, 2021 - 12:42PM --- LAYOUT: 8.5x11

Figure 2
Site Plan



NOTE:

1. DRAWING SOURCE FROM INTERIM REMEDIAL MEASURES WORK PLAN REPORT FIGURE A-2 "SITE PLAN SHOWING DEFINED BOUNDARIES OF PROJECT SITE" PROVIDED BY D & B ENGINEERS AND ARCHITECTS, P.C. DATED DECEMBER 2018.

0 60' 120'

SCALE: 1" = 60'
SHEET SIZE: 11" BY 17"

PROJECT:
METROPOLITAN TRANSPORTATION AUTHORITY LONG ISLAND RAIL ROAD
ARCH STREET YARD
LONG ISLAND CITY, NEW YORK

TITLE:
SITE PLAN

DRAWN BY:	H. DELGADO	PROJ NO.:	414444
CHECKED BY:	D. WARREN		**FIGURE 2**
APPROVED BY:	K. MYERS		
DATE:	FEBRUARY 2021		

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New York, NY 10018
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FILE NO.: Figure 2 - Site Map Bndy. Map.dwg

DRAWING NAME: \\nyc-fp1\Shared\Projects\LIRR On-Call Environmental Services\414444.0000.0000 - Release 10 - Arch Street Yard SRI\TRC Working Drawings\ Figure 2 - Site Map Bndy. Map.dwg --- PLOT DATE: February 26, 2021 - 11:45AM --- LAYOUT: Fig.3-11x17L

Version: 2017-10-21

Appendix A
Safety Data Sheets

SAFETY DATA SHEET

Creation Date 22-Sep-2009 **Revision Date** 25-Apr-2019 **Revision Number** 6

1. Identification

Product Name **Vinylidene chloride, stabilized**

Cat No. : **AC172290000; AC172290010; AC172290025; AC172290250**

CAS-No 75-35-4
Synonyms 1,1-Dichloroethylene

Recommended Use Laboratory chemicals.
Uses advised against 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 1
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 2
Specific target organ toxicity - (repeated exposure)	Category 2

Label Elements

Signal Word
Danger

Hazard Statements
Extremely flammable liquid and vapor
Harmful if swallowed
Causes serious eye irritation
Harmful if inhaled

Suspected of causing 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
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
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
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 (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
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep cool
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Vinylidene chloride	75-35-4	>95
4-Methoxyphenol	150-76-5	0.02

4. First-aid measures

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get 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. Obtain medical attention.
Most important symptoms and effects	Breathing difficulties. . Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray. Carbon dioxide (CO_2). Dry chemical. Use water spray to cool unopened containers. Chemical foam. Cool closed containers exposed to fire with water spray.
Unsuitable Extinguishing Media	No information available
Flash Point	-25 °C / -13 °F
Method -	No information available
Autoignition Temperature	520 °C / 968 °F

Explosion Limits

Upper	16.5%
Lower	8.4%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

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

Hazardous Combustion Products
Hydrogen chloride gas Carbon monoxide (CO) Carbon dioxide (CO_2) Formaldehyde peroxides
Protective Equipment and Precautions for Firefighters
Vapors are heavier than air and may spread along floors. 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	4	1	N/A

6. Accidental release measures

Personal Precautions	Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions	Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.
Methods for Containment and Clean Up	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Do not let this chemical enter the environment.

7. Handling and storage

Handling	Ensure adequate ventilation. Wear personal protective equipment. Avoid contact with skin and eyes. Take precautionary measures against static discharges. Do not ingest. Use only

in area provided with appropriate exhaust ventilation. Use explosion-proof equipment. Use only non-sparking tools. Avoid shock and friction. Avoid breathing dust/fume/gas/mist/vapors/spray. Keep away from open flames, hot surfaces and sources of ignition. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.

Storage

Refrigerator/flammables. Keep away from heat and sources of ignition. Protect from light. May form explosive peroxides on prolonged storage. Keep under nitrogen. 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)
Vinylidene chloride	TWA: 5 ppm	(Vacated) TWA: 1 ppm (Vacated) TWA: 4 mg/m^3		TWA: 5 ppm
4-Methoxyphenol	TWA: 5 mg/m^3	(Vacated) TWA: 5 mg/m^3	TWA: 5 mg/m^3	TWA: 5 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 explosion-proof electrical/ventilating/lighting/equipment. 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

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

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

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	7 2.5 g/l aq.sol
Melting Point/Range	-122 °C / -187.6 °F
Boiling Point/Range	31.2 - 32 °C / 88.2 - 89.6 °F @ 760 mmHg
Flash Point	-25 °C / -13 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	16.5%
Lower	8.4%
Vapor Pressure	665 mbar @ 20 °C
Vapor Density	3.4 (Air = 1.0)

Specific Gravity	1.218
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	520 °C / 968 °F
Decomposition Temperature	No information available
Viscosity	.377 mPa.s at 15 °C
Molecular Formula	C2 H2 Cl2
Molecular Weight	96.94

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability May form explosive peroxides. Hazardous polymerization may occur upon depletion of inhibitor. Moisture sensitive. Air sensitive. Light sensitive.

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

Incompatible Materials Strong oxidizing agents, Strong bases, Powdered metal salts, oxygen, Peroxides, Metals, copper, Powdered metals, Acids

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

Hazardous Polymerization Hazardous polymerization may occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Oral LD50 Category 4. ATE = 300 - 2000 mg/kg.

Vapor LC50 Category 4. ATE = 10 - 20 mg/l.

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Vinylidene chloride	LD50 = 1500 mg/kg (Rat) LD50 = 200 mg/kg (Rat)	Not listed	LC50 = 1.66 mg/L (Rat) 4 h LC50 = 6350 ppm (Rat) 4 h
4-Methoxyphenol	1600 mg/kg (Rat)	LD50 > 2000 mg/kg (Rabbit)	Not listed

Toxicologically Synergistic Products No information available

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

Irritation May cause eye, skin, and respiratory tract irritation

Sensitization No information available

Carcinogenicity Limited evidence of a carcinogenic effect. The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Vinylidene chloride	75-35-4	Group 2B	Not listed	Not listed	X	Not listed
4-Methoxyphenol	150-76-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Ames test: positive.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

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

Endocrine Disruptor Information No information available

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

12. Ecological information

Ecotoxicity

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

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Vinylidene chloride	Not listed	LC50: 85 - 117 mg/L, 96h flow-through (Pimephales promelas) LC50: 161 - 179 mg/L, 96h static (Pimephales promelas) LC50: 57 - 91 mg/L, 96h static (Lepomis macrochirus)	EC50 > 2000 mg/L 17 h	LC50: 62 - 110 mg/L, 48h Static (Daphnia magna) LC50: 9.0 - 14.0 mg/L, 48h Static (Daphnia magna)
4-Methoxyphenol	Not listed	LC50: = 84.3 mg/L, 96h flow-through (Pimephales promelas) LC50: = 28.5 mg/L, 96h flow-through (Oncorhynchus mykiss)	EC50 = 3.66 mg/L 5 min EC50 = 4.30 mg/L 15 min EC50 = 4.61 mg/L 30 min	Not listed

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

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

Component	log Pow
Vinylidene chloride	2.02
4-Methoxyphenol	1.3

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
Vinylidene chloride - 75-35-4	U078	-

14. Transport information

DOT

UN-No UN1303

Proper Shipping Name VINYLIDENE CHLORIDE, STABILIZED
Hazard Class 3
Packing Group I

TDG
UN-No UN1303
Proper Shipping Name VINYLIDENE CHLORIDE, STABILIZED
Hazard Class 3
Packing Group I

IATA
UN-No UN1303
Proper Shipping Name VINYLIDENE CHLORIDE, STABILIZED
Hazard Class 3
Packing Group I

IMDG/IMO
UN-No UN1303
Proper Shipping Name VINYLIDENE CHLORIDE, STABILIZED
Hazard Class 3
Subsidiary Hazard Class P
Packing Group I

15. Regulatory information

United States of America Inventory

Component	CAS-No	TSCA	TSCA Inventory notification - Active/Inactive	TSCA - EPA Regulatory Flags
Vinylidene chloride	75-35-4	X	ACTIVE	-
4-Methoxyphenol	150-76-5	X	ACTIVE	-

Legend:
TSCA - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Australia (AICS), China (IECSC), Korea (ECL).

Component	CAS-No	DSL	NDSL	EINECS	PICCS	ENCS	AICS	IECSC	KECL
Vinylidene chloride	75-35-4	X	-	200-864-0	X	X	X	X	KE-10122
4-Methoxyphenol	150-76-5	X	-	205-769-8	X	X	X	X	KE-23353

U.S. Federal Regulations

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Vinylidene chloride	75-35-4	>95	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Vinylidene chloride	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Vinylidene chloride	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
Vinylidene chloride	100 lb 1 lb	-

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

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Vinylidene chloride	75-35-4	Carcinogen	0.88 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Vinylidene chloride	X	X	X	X	X
4-Methoxyphenol	X	X	X	-	X

U.S. Department of Transportation

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

U.S. Department of Homeland Security: This product contains the following DHS chemicals:
Legend - STQs = Screening Threshold Quantities, APA = A placarded amount

Component	DHS Chemical Facility Anti-Terrorism Standard
Vinylidene chloride	Release STQs - 10000lb

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 22-Sep-2009
Revision Date 25-Apr-2019
Print Date 25-Apr-2019
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

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End of SDS

SAFETY DATA SHEET

Creation Date 04-Feb-2010 **Revision Date** 18-Jan-2018 **Revision Number** 6

1. Identification

Product Name 1,2-Dichloroethane

Cat No. : E175-4; E175-20; E175-500; E175RS-19; E175RS-50; E190-4

CAS-No 107-06-2
Synonyms Ethylene dichloride; Ethylene chloride (Certified ACS/Spectranalyzed)

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
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 3
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 - Respiratory system, Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Heart, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Harmful if swallowed
Causes skin irritation
Causes serious eye irritation

Toxic if inhaled
May cause respiratory irritation
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
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
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
Call a POISON CENTER or doctor/physician
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: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
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. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Ethylene dichloride	107-06-2	>95

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. Immediate medical attention is required.

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 breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

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

Most important symptoms and effects Breathing difficulties. May cause cardiac arrhythmia. May cause central nervous system depression: Symptoms may include tightness in the chest, flushing, headache, nausea, vomiting, respiratory depression, weakness, irregular heartbeat, abdominal pain, convulsions, and shock

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 Water may be ineffective

Flash Point 13 °C / 55.4 °F

Method - No information available

Autoignition Temperature 440 °C / 824 °F

Explosion Limits

Upper 15.9 vol %

Lower 6.2 vol %

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. Keep product and empty container away from heat and sources of ignition. Thermal decomposition can lead to release of irritating gases and vapors.

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

NFPA

Health	Flammability	Instability	Physical hazards
3	3	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

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. 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. Do not ingest. Use only under a chemical fume hood. Do not breathe vapors or spray mist. 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. 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)
Ethylene dichloride	TWA: 10 ppm	(Vacated) TWA: 1 ppm (Vacated) TWA: 4 mg/m^3 Ceiling: 100 ppm (Vacated) STEL: 2 ppm (Vacated) STEL: 8 mg/m^3 TWA: 50 ppm	IDLH: 50 ppm TWA: 1 ppm TWA: 4 mg/m^3 STEL: 2 ppm STEL: 8 mg/m^3	TWA: 10 ppm TWA: 40 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. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location. 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. Tightly fitting safety goggles. Face-shield.

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	400 ppm
pH	No information available
Melting Point/Range	-35 °C / -31 °F
Boiling Point/Range	81 - 85 °C / 177.8 - 185 °F
Flash Point	13 °C / 55.4 °F
Evaporation Rate	6.5 (Butyl Acetate = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	15.9 vol %
Lower	6.2 vol %
Vapor Pressure	65 mmHg @ 29 °C
Vapor Density	3.4
Specific Gravity	1.250
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	440 °C / 824 °F
Decomposition Temperature	No information available
Viscosity	0.8 mPa s at 20 °C
Molecular Formula	C2 H4 Cl2
Molecular Weight	98.96

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, Bases, Alkali metals

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
Ethylene dichloride	625 mg/kg (Rat) 413 mg/kg (Mouse)	2800 mg/kg (Rabbit)	28.79 mg/L (Rat) 1h 7.8 mg/l (Rat) 4h

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
Ethylene dichloride	107-06-2	Group 2B	Reasonably Anticipated	Not listed	X	Not listed

IARC: (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

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

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

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

Aspiration hazard No information available

Symptoms / effects,both acute and delayed May cause central nervous system depression: Symptoms may include tightness in the chest, flushing, headache, nausea, vomiting, respiratory depression, weakness, irregular heartbeat, abdominal pain, convulsions, and shock

Endocrine Disruptor Information No information available

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

12. Ecological information

Ecotoxicity
Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Ethylene dichloride	EC50: = 166 mg/L, 96h static (Desmodesmus subspicatus) EC50: > 433 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 110 - 123 mg/L, 96h flow-through (Pimephales promelas) LC50: 230 - 710 mg/L, 96h flow-through (Lepomis macrochirus) LC50: = 225 mg/L, 96h static (Oncorhynchus mykiss)	Not listed	EC50: 140 - 190 mg/L, 48h Static (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
Ethylene dichloride	1.45

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
Ethylene dichloride - 107-06-2	U077	-

14. Transport information

DOT

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

TDG

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

IATA

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II

IMDG/IMO

UN-No	UN1184
Proper Shipping Name	ETHYLENE DICHLORIDE
Hazard Class	3
Subsidiary Hazard Class	6.1
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
Ethylene dichloride	X	X	-	203-458-1	-		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)

Component	TSCA 12(b)
Ethylene dichloride	Section 4

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Ethylene dichloride	107-06-2	>95	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Ethylene dichloride	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Ethylene dichloride	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
Ethylene dichloride	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
Ethylene dichloride	107-06-2	Carcinogen	10 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Ethylene dichloride	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 04-Feb-2010
Revision Date 18-Jan-2018
Print Date 18-Jan-2018
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).

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End of SDS

SAFETY DATA SHEET

Creation Date 24-Nov-2010 **Revision Date** 18-Jan-2018 **Revision Number** 3

1. Identification

Product Name **Carbon tetrachloride**

Cat No. : **AC148170000; AC148170010; AC148170025**

Synonyms Tetrachloromethane

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)

Acute oral toxicity	Category 3
Acute dermal toxicity	Category 3
Acute Inhalation Toxicity - Dusts and Mists	Category 3
Carcinogenicity	Category 2
Specific target organ toxicity - (repeated exposure)	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Toxic if swallowed
Toxic in contact with skin
Toxic if inhaled
May cause cancer
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
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
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
Call a POISON CENTER or doctor/physician
Skin
IF ON SKIN: Wash with plenty of soap and water
Call a POISON CENTER or doctor/physician if you feel unwell
Remove/Take off immediately all contaminated clothing
Wash contaminated clothing before reuse
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
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
Harms public health and the environment by destroying ozone in the upper atmosphere
WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Carbon tetrachloride	56-23-5	>95

4. First-aid measures

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

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

Inhalation Move to fresh air. 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. If not breathing, give artificial respiration.

Ingestion	Do not induce vomiting. Call a physician or Poison Control Center immediately.
Most important symptoms and effects	Drowsiness. Dizziness. 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	Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.
Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	982 °C / 1799.6 °F
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. Keep product and empty container away from heat and sources of ignition.

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

NFPA

Health	Flammability	Instability	Physical hazards
3	0	0	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment. Ensure adequate ventilation. Avoid contact with the skin and the eyes. Keep people away from and upwind of spill/leak.
Environmental Precautions	Do not flush into surface water or sanitary sewer system.
Methods for Containment and Clean Up	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Do not let this chemical enter the environment.

7. Handling and storage

Handling	Ensure adequate ventilation. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation.
Storage	Keep in a dry, cool and well-ventilated place. Keep container tightly closed.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Carbon tetrachloride	TWA: 5 ppm STEL: 10 ppm Skin	(Vacated) TWA: 2 ppm (Vacated) TWA: 12.6 mg/m^3 Ceiling: 25 ppm TWA: 10 ppm	IDLH: 200 ppm STEL: 2 ppm STEL: 12.6 mg/m^3	TWA: 5 ppm TWA: 30 mg/m^3 STEL: 20 ppm STEL: 126 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.

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	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-23 °C / -9.4 °F
Boiling Point/Range	76 °C / 168.8 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	121 mbar @ 20 °C
Vapor Density	No information available
Specific Gravity	1.594
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	982 °C / 1799.6 °F
Decomposition Temperature	> 100°C
Viscosity	0.97 mPa.s at 20 °C
Molecular Formula	C Cl4
Molecular Weight	153.82

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents, Fluorine, Metals

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

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Carbon tetrachloride	LD50 = 2350 mg/kg (Rat)	LD50 = 5070 mg/kg (Rat)	LC50 = 8000 ppm (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 No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen. Limited evidence of a carcinogenic effect.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Carbon tetrachloride	56-23-5	Group 2B	Reasonably Anticipated	A2	X	A2

Mutagenic Effects Not mutagenic in AMES Test

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

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

Endocrine Disruptor Information No information available

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

12. Ecological information

Ecotoxicity

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

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Carbon tetrachloride	EC50: = 830 mg/L, 24h	LC50: 9.68 - 11.3 mg/L, 96h	EC50 = 34 mg/L 10 min	EC50: = 28 mg/L, 24h

	(Tetrahymena pyriformis)	static (Pimephales promelas) LC50: 23 - 33 mg/L, 96h static (Lepomis macrochirus) LC50: 36.3 - 47.3 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 5.6 mg/L 5 min	(Daphnia magna) EC50: = 29 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
Carbon tetrachloride	2.75

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
Carbon tetrachloride - 56-23-5	U211	-

14. Transport information

DOT
- **UN-No** 1846
- **Proper Shipping Name** CARBON TETRACHLORIDE
- **Hazard Class** 6.1
- **Packing Group** II

TDG
- **UN-No** 1846
- **Proper Shipping Name** CARBON TETRACHLORIDE
- **Hazard Class** 6.1
- **Packing Group** II

IATA
- **UN-No** UN1846
- **Proper Shipping Name** CARBON TETRACHLORIDE
- **Hazard Class** 6.1
- **Packing Group** II

IMDG/IMO
- **UN-No** UN1846
- **Proper Shipping Name** CARBON TETRACHLORIDE
- **Hazard Class** 6.1
- **Packing Group** II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Carbon tetrachloride	X	X	-	200-262-8	-		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 %
Carbon tetrachloride	56-23-5	>95	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Carbon tetrachloride	X	10 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Carbon tetrachloride	X	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
Carbon tetrachloride	10 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Carbon tetrachloride	56-23-5	Carcinogen	5 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Carbon tetrachloride	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	24-Nov-2010
Revision Date	18-Jan-2018
Print Date	18-Jan-2018
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 28-May-2009 **Revision Date** 17-Jan-2018 **Revision Number** 3

1. Identification

Product Name **tert-Butyl methyl ether**

Cat No. : **E127-4; XXE127RS200; NC1240503; XXE127U200LI; NC1568440; E127RS1350ASME; NC1561779**

CAS-No 1634-04-4
Synonyms 2-Methyl-2-methoxy propane; MTBE; Methyl tert-butyl ether

Recommended Use Laboratory chemicals.
Uses advised against 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
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Lungs.	

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
Causes skin irritation
May cause respiratory irritation

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
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
Avoid breathing dust/fume/gas/mist/vapors/spray
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 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
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)

Other hazards
Aspiration hazard if swallowed - can enter lungs and cause damage.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Methyl tert-butyl ether	1634-04-4	>95

4. First-aid measures

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

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

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

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms and 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. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media No information available

Flash Point -28 °C / -18.4 °F

Method - No information available

Autoignition Temperature 224 °C / 435.2 °F

Explosion Limits

Upper 15.1 vol %

Lower 1.6 vol %

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

NFPA

Health	Flammability	Instability	Physical hazards
2	3	0	N/A

6. Accidental release measures

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

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. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment. Take precautionary measures against static discharges.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use explosion-proof equipment. Take precautionary measures against static discharges. Use only under a chemical fume hood. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded.

Storage Flammables area. Keep away from heat and sources of ignition. Keep container tightly

closed in a dry and well-ventilated place. May form explosive peroxides on prolonged storage.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Methyl tert-butyl ether	TWA: 50 ppm			

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

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

Personal Protective Equipment

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

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

Respiratory Protection No protective equipment is needed under normal use conditions.

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

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Petroleum distillates
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-110 °C / -166 °F
Boiling Point/Range	54 - 56 °C / 129.2 - 132.8 °F
Flash Point	-28 °C / -18.4 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	15.1 vol %
Lower	1.6 vol %
Vapor Pressure	268 mbar @ 20 °C
Vapor Density	0.2
Specific Gravity	0.740
Solubility	Slightly soluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	224 °C / 435.2 °F
Decomposition Temperature	No information available
Viscosity	0.36 mPa.s at 20 °C
Molecular Formula	C5 H12 O
Molecular Weight	88.15

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

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
Methyl tert-butyl ether	LD50 = 2963 mg/kg (Rat)	LD50 = 10000 mg/kg (Rabbit)	LC50 = 85 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. Limited evidence of a carcinogenic effect.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Methyl tert-butyl ether	1634-04-4	Not listed	Not listed	A3	Not listed	Not listed

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)

Mutagenic Effects Mutagenic effects have occurred in experimental animals.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Lungs

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

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Methyl tert-butyl ether	Group III Chemical	Not applicable	Not applicable

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

12. Ecological information

Ecotoxicity

Do not empty into drains. .

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Methyl tert-butyl ether	800 mg/L EC50 > 72 h 184 mg/L EC50 = 96 h	887 mg/L LC50 96 h 100 mg/L LC50 96 h 929 mg/L LC50 96 h 672 mg/L LC50 96 h	EC50 = 11.4 mg/L 30 min EC50 = 8.23 mg/L 5 min EC50 = 9.67 mg/L 15 min	EC50: = 542 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
Methyl tert-butyl ether	1.06

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.

14. Transport information

DOT

UN-No UN2398
Proper Shipping Name METHYL tert-BUTYL ETHER
Hazard Class 3
Packing Group II

TDG

UN-No UN2398
Proper Shipping Name METHYL tert-BUTYL ETHER
Hazard Class 3
Packing Group II

IATA

UN-No UN2398
Proper Shipping Name METHYL tert-BUTYL ETHER
Hazard Class 3
Packing Group II

IMDG/IMO

UN-No UN2398
Proper Shipping Name METHYL tert-BUTYL ETHER
Hazard Class 3
Packing Group II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Methyl tert-butyl ether	X	X	-	216-653-1	-		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 %
Methyl tert-butyl ether	1634-04-4	>95	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methyl tert-butyl ether	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
Methyl tert-butyl ether	1000 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
Methyl tert-butyl ether	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 28-May-2009
Revision Date 17-Jan-2018

Print Date	17-Jan-2018
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** 23-Jan-2018 **Revision Number** 5

1. Identification

Product Name **Tetrachloroethylene**

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

CAS-No 127-18-4
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. Cancer - https://www.p65warnings.ca.gov/.

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. Get 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 and 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)

NTP: (National Toxicity Program)

ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

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
ACGIH: (American Conference of Governmental Industrial Hygienists)
A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
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	2.53 - 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 See section 2 for more information

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 23-Jan-2018
Print Date 23-Jan-2018
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)

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)

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
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End of SDS

SAFETY DATA SHEET

M9192 - ANSI - EN

Oxy Vinyls, LP
A subsidiary of Occidental Petroleum Corporation

VINYL CHLORIDE (MONOMER)

SDS No.: M9192 **SDS Revision Date:** 06-Apr-2015

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Company Identification:	Oxy Vinyls, LP 5005 LBJ Freeway Suite 2200 Dallas, Texas 75244-6119
24 Hour Emergency Telephone Number:	1-800-733-3665 or 1-972-404-3228 (USA); CHEMTREC (within USA and Canada): 1-800-424-9300; CHEMTREC (outside USA and Canada): +1 703-527-3887; CHEMTREC Contract No: CCN16186
To Request an SDS:	MSDS@oxy.com or 1-972-404-3245
Customer Service:	1-800-752-5151 or 1-972-404-3700
Product Identifier:	**VINYL CHLORIDE (MONOMER)**
Synonyms:	VCM, Monochloroethylene, Chloroethene, Ethylene, chloro-, Vinyl chloride monomer
Product Use:	PVC Manufacturing
Uses Advised Against:	Aerosol propellant.

2. HAZARDS IDENTIFICATION

OSHA REGULATORY STATUS: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

VINYL CHLORIDE (MONOMER)

SDS No.: M9192 **SDS Revision Date:** 06-Apr-2015

****

EMERGENCY OVERVIEW:

Color: Colorless
Physical state Compressed, liquefied gas
Odor: Sweet

Signal Word: **DANGER**

MAJOR HEALTH HAZARDS: CONTAINS VINYL CHLORIDE, A KNOWN HUMAN CANCER AGENT. MAY CAUSE CANCER. CONTACT WITH LIQUID MAY CAUSE FROSTBITE TO EXPOSED TISSUE. MAY PRODUCE SYMPTOMS OF CENTRAL NERVOUS SYSTEM DEPRESSION INCLUDING HEADACHE, DIZZINESS, NAUSEA, LOSS OF BALANCE AND DROWSINESS. CAUSES SKIN IRRITATION. CAUSES EYE IRRITATION. MAY CAUSE RESPIRATORY IRRITATION. CAUSES DAMAGE TO LIVER, BLOOD, NERVOUS SYSTEM, LYMPHATIC SYSTEM, AND MUSCULOSKELETAL SYSTEM THROUGH PROLONGED OR REPEATED EXPOSURE. CAUSES DAMAGE TO LUNGS THROUGH PROLONGED OR REPEATED EXPOSURE BY INHALATION. SUSPECTED OF CAUSING GENETIC DEFECTS. SUSPECTED REPRODUCTIVE HAZARD.

PHYSICAL HAZARDS: Extremely flammable gas under pressure.

PRECAUTIONARY STATEMENTS: Keep away from heat, sparks and flame. Wash thoroughly after handling. Avoid contact with eyes, skin and clothing. Do not breathe vapors or spray mist. Do not eat, drink or smoke in areas where this material is used. Use only outdoors or in a well-ventilated area. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Store in well-ventilated place. Keep container tightly closed.

****

GHS CLASSIFICATION:

GHS: PHYSICAL HAZARDS:	Flammable Gas - Cat. 1 Extremely Flammable Gas Under Pressure - Liquefied
GHS: CONTACT HAZARD - SKIN:	Category 2 - Causes skin irritation.
GHS: CONTACT HAZARD - EYE:	Category 2B - Causes eye irritation
GHS: TARGET ORGAN TOXICITY (SINGLE EXPOSURE):	Category 3 - May cause respiratory tract irritation Category 3 - May cause drowsiness or dizziness
GHS: TARGET ORGAN TOXICITY (REPEATED EXPOSURE):	Category 1 - Causes damage to liver, blood, nervous system, lymphatic system, musculoskeletal system, respiratory system through prolonged or repeated exposure
GHS: CARCINOGENICITY:	Category 1A - May cause cancer.
GHS: GERM CELL MUTAGENICITY:	Category 2 - Suspected of causing genetic defects
GHS: REPRODUCTION TOXIN:	Category 2 - Suspected of damaging fertility or the unborn child
GHS - OSHA Hazard(s)	Simple Asphyxiant: May displace oxygen and cause rapid suffocation

Unknown Acute Dermal Toxicity:
100% of this product consists of ingredient(s) of unknown acute dermal toxicity.

Unknown Acute Inhalation Toxicity:
100% of this product consists of ingredient(s) of unknown acute inhalation toxicity.

GHS SYMBOL:
Flame, Gas cylinder, Exclamation mark, Health hazards

GHS SIGNAL WORD: **DANGER**

GHS HAZARD STATEMENTS:

GHS - Physical Hazard Statement(s)
Extremely flammable gas
Contains gas under pressure; may explode if heated
May displace oxygen and cause rapid suffocation

GHS - Health Hazard Statement(s)
Causes eye irritation
Causes skin irritation
May cause drowsiness or dizziness
May cause respiratory irritation
Causes damage to organs through prolonged or repeated exposure: (liver, blood, nervous system, lymphatic system, musculoskeletal system, respiratory system)
May cause cancer
Suspected of causing genetic defects
Suspected of damaging fertility or the unborn child

GHS - OSHA Hazard(s)
Simple Asphyxiant: May displace oxygen and cause rapid suffocation

GHS - Precautionary Statement(s) - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Keep away from heat/sparks/open flames/hot surfaces. — No smoking
Do not breathe dust/fume/gas/mist/vapors/spray
Use personal protective equipment as required
Wear protective gloves/protective clothing/eye protection/face protection
Wash thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area

GHS - Precautionary Statement(s) - Response
Leaking gas fire: Do not extinguish, unless leak can be stopped safely
Eliminate all ignition sources if safe to do so
IF INHALED: Remove person to fresh air and keep comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
IF ON SKIN: Wash with plenty of water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash it before reuse
Specific treatment (see First Aid information on product label and/or Section 4 of the SDS)
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
Specific treatment (see Section 4 of the safety data sheet and/or the First Aid information on the product label)
Get medical advice/attention if you feel unwell
IF exposed or concerned: call a POISON CENTER or doctor/physician

GHS - Precautionary Statement(s) - Storage
Store in a well-ventilated place. Keep container tightly closed
Protect from sunlight
Store locked up

GHS - Precautionary Statement(s) - Disposal
Dispose of contents and container in accordance with applicable local, regional, national, and/or international regulations.

Hazards Not Otherwise Classified (HNOC)
Direct contact with liquid may cause frostbite to exposed tissue (eyes, skin, etc.)
Polymerization can occur

See Section 11: TOXICOLOGICAL INFORMATION

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: VCM, Monochloroethylene, Chloroethene, Ethylene, chloro-, Vinyl chloride monomer

Component	Percent [%]	CAS Number
Vinyl chloride	99 - 100	75-01-4

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer basic life support (Cardio-Pulmonary Resuscitation and/or Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY.

SKIN CONTACT: If frostbite or freezing occur, immediately flush with plenty of lukewarm water (100-105 °F, 38-41 °C). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT: Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION: Not a likely route of exposure in occupational environment.

Most Important Symptoms/Effects (Acute and Delayed) :.

Acute Symptoms/Effects: Listed below. Prolonged, high concentration exposures may cause unconsciousness or death.
Inhalation (Breathing): Respiratory Tract Irritation: rhinitis, scratchy throat, cough, sore throat, runny nose, wheezing, difficulty breathing (dyspnea). Inhalation of this material may cause central nervous system depression (narcotic effects).
Skin: Skin Irritation. If spilled on skin, rapid evaporation can cause local frostbite with redness, blistering, and scaling.
Eye: Eye Irritation. Rapid evaporation can cause local frostbite with corneal and conjunctival irritation or burns. High concentrations of vapor can cause eye irritation.
Ingestion (Swallowing): Ingestion is not a likely route of exposure.
Other Health Effects: Narcotic Effects (Central Nervous System Depression): Ataxia or dizziness, drowsiness or fatigue, loss of consciousness, headache, euphoria and irritability, visual or hearing disturbances, nausea, memory loss.

Delayed Symptoms/Effects:
- Carcinogen: Long term significant occupational overexposure to VCM has been associated with a specific cancer (angiosarcoma of the liver) and is associated with hepatocellular cancer
- Suspected mutagen and suspected of causing reproductive damage
- Repeated exposure can damage the skin (scleroderma), bones (acro-osteolysis) and blood vessels in the hand (Raynaud's Syndrome)
- Scleroderma is characterized by a hardening and tightening of patches of skin
- Raynaud's syndrome is characterized by an exaggerated response to cold temperatures or emotional distress, which can cause numbness, pain or color changes in the fingers or toes

Interaction with Other Chemicals Which Enhance Toxicity: Alcohol may enhance toxic effects.

Medical Conditions Aggravated by Exposure: Alcoholic Liver Disease. Infectious Hepatitis. Cirrhosis.

Protection of First-Aiders: Protect yourself by avoiding contact with this material. Direct contact with liquid may cause frostbite to exposed tissue (eyes, skin, etc.). Use personal protective equipment. Refer to Section 8 for specific personal protective equipment recommendations. At minimum, treating personnel should utilize PPE sufficient for prevention of bloodborne pathogen transmission.

Notes to Physician: There is no specific antidote. Treat symptoms with supportive care. Cardiac stimulants such as epinephrine should be avoided in persons overexposed to chlorinated hydrocarbons.

5. FIRE-FIGHTING MEASURES

Fire Hazard: Severe fire hazard. Vapor/air mixtures are explosive. Vapors or gases may ignite at distant sources and flash back. Containers may rupture or explode if exposed to heat.

Extinguishing Media: Stop flow of gas before extinguishing fire. Use carbon dioxide, regular dry chemical, foam or water. Use water spray to keep containers cool.

Fire Fighting: Move container from fire area if it can be done without risk. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this can't be done, then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately. Wear NIOSH approved positive-pressure self-contained breathing apparatus operated in pressure demand mode.

Hazardous Combustion Products:	Oxides of carbon, Hydrogen chloride, Phosgene
Sensitivity to Mechanical Impact:	Not sensitive.
Sensitivity to Static Discharge:	Electrostatic charges may build up during handling and may form ignitable vapor-air mixtures in storage containers. Ground equipment in accordance with industry standards and best practices such as NFPA 77 [Recommended Practices on Static Electricity (2007)] and American Petroleum Institute (API) RP Recommended Practice 2003 [Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents (2008)].
Lower Flammability Level (air):	3.6%
Upper Flammability Level (air):	33.0%
Flash point:	-108 °F (-78 °C)
Auto-ignition Temperature:	882 °F (472 °C)

GHS: PHYSICAL HAZARDS:
- Flammable Gas - Cat. 1 Extremely Flammable
- Gas Under Pressure - Liquefied

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:
Isolate hazard area and deny entry. Keep unnecessary and unprotected persons away. Eliminate all sources of heat and ignition. Ventilate closed spaces before entering. Wear appropriate personal protective equipment recommended in Section 8, Exposure Controls / Personal Protection, of the SDS. Refer to Section 7, Handling and Storage, for additional precautionary measures.

Methods and Materials for Containment and Cleaning Up:
Remove sources of ignition. Ventilate closed spaces before entering. Stop leak if possible without personal risk. Vapors or gases may ignite at distant ignition sources and flash back. See Section 13, Disposal considerations, for additional information.

Environmental Precautions:
Keep out of water supplies and sewers. Releases should be reported, if required, to appropriate agencies.

7. HANDLING AND STORAGE

Precautions for Safe Handling:
Avoid breathing vapor or mist. Avoid contact with skin, eyes and clothing. Keep away from heat, sparks and flame. Ground any equipment used in handling. Use non-sparking tools and equipment. All energized electrical equipment must be designed in accordance with the electrical classification of the area.

Safe Storage Conditions:
Store and handle in accordance with all current regulations and standards. Keep container tightly closed and properly labeled. Store in a cool, dry area. Store in a well-ventilated area. Do not enter confined spaces unless adequately ventilated. Avoid heat, flames, sparks and other sources of ignition. May be subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Keep separated from incompatible substances (see below or Section 10 of the Safety Data Sheet).

Incompatibilities/ Materials to Avoid:
oxidizing agents, oxides of nitrogen, metals, aluminum, aluminum alloys, copper, metal alkyl complexes and alkali metals such as sodium, potassium and their alloys

GHS: PHYSICAL HAZARDS:
- Flammable Gas - Cat. 1 Extremely Flammable
- Gas Under Pressure - Liquefied

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Regulatory Exposure Limit(s): As listed below.

Component	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PELCeiling
Vinyl chloride 75-01-4	1 ppm	5 ppm	-----

OEL: Occupational Exposure Limit; OSHA: United States Occupational Safety and Health Administration; PEL: Permissible Exposure Limit; TWA: Time Weighted Average; STEL: Short Term Exposure Limit

NON-REGULATORY EXPOSURE LIMIT(S): As listed below.

Component	CAS Number	ACGIH TWA	ACGIH STEL	ACGIH Ceiling	OSHA TWA (Vacated)	OSHA STEL (Vacated)	OSHA Ceiling (Vacated)

Vinyl chloride	75-01-4	1 ppm	-----	-----	-----	-----	-----

- The Non-Regulatory United States Occupational Safety and Health Administration (OSHA) limits, if shown, are the Vacated 1989 PEL's (vacated by 58 FR 35338, June 30, 1993).

- The American Conference of Governmental Industrial Hygienists (ACGIH) is a voluntary organization of professional industrial hygiene personnel in government or educational institutions in the United States. The ACGIH develops and publishes recommended occupational exposure limits each year called Threshold Limit Values (TLVs) for hundreds of chemicals, physical agents, and biological exposure indices.

ENGINEERING CONTROLS: Use closed systems when possible. Provide local exhaust ventilation where vapor may be generated. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Wear safety glasses with side-shields. If eye contact is likely, wear chemical resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin and Body Protection: Wear appropriate chemical resistant clothing.

Hand Protection: Wear appropriate chemical resistant gloves. Consult a glove supplier for assistance in selecting an appropriate chemical resistant glove.

Protective Material Types: Butyl rubber, Nitrile, Silver Shield®, Viton®

Respiratory Protection: Refer to 29 CFR 1910.1017 for selection of respirators for vinyl chloride. A respiratory protection program that meets applicable regulatory requirements must be followed whenever workplace conditions warrant use of a respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	Compressed, liquefied gas
Color:	Colorless
Odor:	Sweet
Odor Threshold [ppm]:	Not reliable to prevent excessive exposure.
Molecular Weight:	62.5
Molecular Formula:	C2ClH3
Decomposition Temperature:	Not applicable
Boiling Point/Range:	7 °F (-14 °C)
Freezing Point/Range:	No data available.
Melting Point/Range:	Not applicable
Vapor Pressure:	2660 mmHg @ 25 °C
Vapor Density (air=1):	2.15
Relative Density/Specific Gravity (water=1):	0.91 @ 25/25 °C
Water Solubility:	2.7 g/L

pH:	Not applicable
VOC Content (%):	100%
Volatility:	100%
Evaporation Rate (ether=1):	>15
Partition Coefficient (n-octanol/water):	Log Kow = 1.36
Flash point:	-108 °F (-78 °C)
Flammability (solid, gas):	No data available
Lower Flammability Level (air):	3.6%
Upper Flammability Level (air):	33.0%
Auto-ignition Temperature:	882 °F (472 °C)
Viscosity:	Not applicable

10. STABILITY AND REACTIVITY

Reactivity: Not reactive under normal temperatures and pressures.

Chemical Stability: Stable at normal temperatures and pressures.

Possibility of Hazardous Reactions:
Avoid air and sunlight. Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

Conditions to Avoid:
(e.g., static discharge, shock, or vibration) -. Electrostatic charges may build up during handling and may form ignitable vapor-air mixtures in storage containers. Ground equipment in accordance with industry standards and best practices such as NFPA 77 [Recommended Practices on Static Electricity (2007)] and American Petroleum Institute (API) RP Recommended Practice 2003 [Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents (2008)].

Incompatibilities/ Materials to Avoid:
oxidizing agents. oxides of nitrogen. metals. aluminum. aluminum alloys. copper. metal alkyl complexes and alkali metals such as sodium, potassium and their alloys.

Hazardous Decomposition Products: oxides of carbon, chlorine, hydrogen chloride, phosgene

Hazardous Polymerization: Polymerization can occur. Avoid elevated temperatures, oxidizing agents, oxides of nitrogen, oxygen, peroxides, other polymerization catalysts/initiators, air and sunlight.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:

PRODUCT TOXICITY DATA: VINYL CHLORIDE (MONOMER)

VINYL CHLORIDE (MONOMER)

LD50 Oral:	LD50 Dermal:	LC50 Inhalation:
> 4,000 mg/kg oral-rat LD50	-----	-----

COMPONENT TOXICITY DATA:

Note: The component toxicity data is populated by the LOLI database and may differ from the product toxicity data given.

Component	LD50 Oral:	LD50 Dermal:	LC50 Inhalation:
Vinyl chloride 75-01-4	-----	-----	18 pph (15 minr-Rat)

****

POTENTIAL HEALTH EFFECTS:

Eye contact: Causes eye irritation. Rapid evaporation of the material may cause frostbite.

Skin contact: Causes skin irritation. Rapid evaporation of the material may cause frostbite.

Inhalation: May cause respiratory tract irritation. Several minutes of exposure to high, but attainable concentrations (over 1000 ppm) may cause difficulty breathing, central nervous system depression and symptoms such as: ataxia or dizziness, drowsiness or fatigue, loss of consciousness, headache, euphoria and irritability, visual and or hearing disturbances, nausea, memory loss. Prolonged, high concentration exposures may cause unconsciousness or death. Cardiac: Acute intoxication may cause irregular heartbeats.

Ingestion: Not a likely route of exposure in occupational settings.

Chronic Effects: Chronic exposure to vinyl chloride monomer (VCM) may cause damage to the nervous system, respiratory system, musculoskeletal system, and lymphatic system. Occupational overexposure has produced a specific cancer (angiosarcoma of the liver) and is associated with hepatocellular cancer. Repeated prolonged exposure may damage: skin (scleroderma), bones (acro-osteolysis), blood vessels in the hands (Raynaud's Syndrome). Suspected of causing genetic defects. Suspected of damaging fertility or the unborn child. Reproductive effects and testes damage occurred in rats exposed to vinyl chloride. These endpoints, however, were generally noted at concentrations greater than those necessary to cause liver damage.

SIGNS AND SYMPTOMS OF EXPOSURE:

Listed below.

Inhalation (Breathing): Respiratory Tract Irritation: rhinitis, scratchy throat, cough, sore throat, runny nose, wheezing, difficulty breathing (dyspnea). Inhalation of this material may cause central nervous system depression (narcotic effects).
Skin: Skin Irritation. If spilled on skin, rapid evaporation can cause local frostbite with redness, blistering, and scaling.
Eye: Eye Irritation. Rapid evaporation can cause local frostbite with corneal and conjunctival irritation or burns. High concentrations of vapor can cause eye irritation.
Ingestion (Swallowing): Ingestion is not a likely route of exposure.

Other Health Effects: Narcotic Effects (Central Nervous System Depression): Ataxia or dizziness, drowsiness or fatigue, loss of consciousness, headache, euphoria and irritability, visual or hearing disturbances, nausea, memory loss.

Interaction with Other Chemicals Which Enhance Toxicity: Alcohol may enhance toxic effects.

****

GHS HEALTH HAZARDS:

Skin Absorbent / Dermal Route? No.

GHS: CONTACT HAZARD - SKIN: Category 2 - Causes skin irritation

GHS: CONTACT HAZARD - EYE: Category 2B - Causes eye irritation

GHS: CARCINOGENICITY:
Category 1A - May cause cancer.

Component	NTP:	IARC (GROUP 1):	IARC (GROUP 2):	OSHA:
Vinyl chloride	Listed	Group 1	Not listed	Listed

SPECIFIC TARGET ORGAN TOXICITY (Single Exposure):
Category 3 - Respiratory Tract Irritation
Category 3 - Narcotic Effects

SPECIFIC TARGET ORGAN TOXICITY (Repeated or Prolonged Exposure):
Category 1 - Liver, Blood, Nervous System, Lymphatic System, Musculoskeletal System, Respiratory System

MUTAGENIC DATA:
Category 2 - Suspected of causing genetic defects. Mutagenic in bacteria studies. Genetic studies in animals were negative in some cases and positive in others.

REPRODUCTIVE TOXICITY:
Category 2 - Suspected of damaging fertility or the unborn child. Reproductive effects and testes damage occurred in rats exposed to vinyl chloride. These endpoints, however, were generally noted at concentrations greater than those necessary to cause liver damage.

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

Aquatic Toxicity:
This material is believed to be practically non-toxic to fish on an acute basis (LC50>100 mg/L).

FATE AND TRANSPORT:

BIODEGRADATION: Vinyl chloride may degrade under anaerobic conditions.

PERSISTENCE: Tropospheric half-life is estimated to be 23 hours. If released to air, this material will remain in the gas phase. If released to soil, volatilization will occur, but material that does not volatilize may be highly mobile. If released to water, evaporation will occur.

BIOCONCENTRATION: Bioconcentration potential is low (BCF <100 or log Kow <3).

13. DISPOSAL CONSIDERATIONS

Waste from material:
Reuse or reprocess, if possible. May be subject to disposal regulations. Dispose in accordance with all applicable regulations.

Container Management:
Refer to manufacturer/supplier for information on recovery/recycling. Dispose of container in accordance with applicable local, regional, national, and/or international regulations. Container rinsate must be disposed of in compliance with applicable regulations.

14. TRANSPORT INFORMATION

LAND TRANSPORT

U.S. DOT 49 CFR 172.101:

UN NUMBER:	UN1086
PROPER SHIPPING NAME:	Vinyl chloride, stabilized
HAZARD CLASS/ DIVISION:	2.1
LABELING REQUIREMENTS:	2.1
RQ (lbs):	RQ 1 Lbs. (Vinyl chloride)

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

UN NUMBER:	UN1086
SHIPPING NAME:	Vinyl chloride, stabilized
CLASS OR DIVISION:	2.1
LABELING REQUIREMENTS:	2.1

MARITIME TRANSPORT (IMO / IMDG) Regulated

UN NUMBER:	UN1086
PROPER SHIPPING NAME:	Vinyl chloride, stabilized

HAZARD CLASS / DIVISION: 2.1
LABELING REQUIREMENTS: 2.1

15. REGULATORY INFORMATION

U.S. REGULATIONS

OSHA REGULATORY STATUS:
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200)

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
If a release is reportable under CERCLA section 103, notify the state emergency response commission and local emergency planning committee. In addition, notify the National Response Center at (800) 424-8802 or (202) 426-2675.

Component	CERCLA Reportable Quantities:
Vinyl chloride	1 lb (final RQ)

SARA EHS Chemical (40 CFR 355.30)
Not regulated

EPCRA SECTIONS 311/312 HAZARD CATEGORIES (40 CFR 370.10):
Fire Hazard, Reactive Hazard, Sudden Release of Pressure, Acute Health Hazard, Chronic Health Hazard

EPCRA SECTION 313 (40 CFR 372.65):
The following chemicals are listed in 40 CFR 372.65 and may be subject to Community Right-to Know Reporting requirements.

Component	Status:
Vinyl chloride	0.1 %

OSHA SPECIFICALLY REGULATED SUBSTANCES:
OSHA 29 CFR 1910.1017 (Vinyl chloride); The U.S. Department of Labor, Occupational Safety and Health Administration specifically regulates manufacturing, handling and processing of vinyl chloride. Such regulations have been published at 29 CFR 1910.1017.

OSHA PROCESS SAFETY (PSM) (29 CFR 1910.119):
The PSM standard may apply to processes which involve a flammable liquid or gas in a quantity of 10,000 pounds (4535.9 kg) or more.

NATIONAL INVENTORY STATUS

U.S. INVENTORY STATUS: Toxic Substance Control Act (TSCA): All components are listed or exempt.

TSCA 12(b): This product is not subject to export notification.

Canadian Chemical Inventory: All components of this product are listed on either the DSL or the NDSL.

STATE REGULATIONS

Component	California Proposition 65 Cancer WARNING:	California Proposition 65 CRT List - Male reproductive toxin:	California Proposition 65 CRT List - Female reproductive toxin:	Massachusetts Right to Know Hazardous Substance List	New Jersey Right to Know Hazardous Substance List	New Jersey Special Health Hazards Substance List
Vinyl chloride 75-01-4	Listed	Not Listed	Not Listed	Listed	2001	carcinogen; flammable - fourth degree; mutagen

Component	New Jersey - Environmental Hazardous Substance List	Pennsylvania Right to Know Hazardous Substance List	Pennsylvania Right to Know Special Hazardous Substances	Pennsylvania Right to Know Environmental Hazard List	Rhode Island Right to Know Hazardous Substance List
Vinyl chloride 75-01-4	Listed	Listed	Present	Present	Not Listed

CANADIAN REGULATIONS

• This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations

WHMIS - Classifications of Substances:

• A - Compressed Gas
• B1 - Flammable Gas
• D2A - Poisonous and Infectious Material; Materials causing other toxic effects - Very toxic material
• D2B - Poisonous and Infectious Material; Materials causing other toxic effects - Toxic material
• F - Dangerously reactive material

16. OTHER INFORMATION

Prepared by: OxyChem Corporate HESS - Product Stewardship

Rev. Date: 06-Apr-2015

HMIS: (SCALE 0-4) (Rated using National Paint & Coatings Association HMIS: Rating Instructions, 2nd Edition)

Health Rating: 2* **Flammability Rating:** 4 **Reactivity Rating:** 1

NFPA 704 - Hazard Identification Ratings (SCALE 0-4)

Health Rating: 2 **Flammability:** 4 **Reactivity Rating:** 2

VINYL CHLORIDE (MONOMER)

Reason for Revision:
• Revised Major Health Hazards: SEE SECTION 2
• Revised GHS Information: SEE SECTION 2
• Updated First Aid Measures: SEE SECTION 4
• PPE recommendations have been modified: SEE SECTION 8
• Toxicological Information has been revised: SEE SECTION 11
• Updated Disposal Considerations. SEE SECTION 13
• Updated Transportation Information: SEE SECTION 14

IMPORTANT:
The information presented herein, while not guaranteed, was prepared by technical personnel and is true and accurate to the best of our knowledge. NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTY OR GUARANTY OF ANY OTHER KIND, EXPRESSED OR IMPLIED, IS MADE REGARDING PERFORMANCE, SAFETY, SUITABILITY, STABILITY OR OTHERWISE. This information is not intended to be all-inclusive as to the manner and conditions of use, handling, storage, disposal and other factors that may involve other or additional legal, environmental, safety or performance considerations, and OxyChem assumes no liability whatsoever for the use of or reliance upon this information. While our technical personnel will be happy to respond to questions, safe handling and use of the product remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any Federal, State, local or foreign laws

OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, safety data sheets, training and access to written records. We request that you, and it is your legal duty to, make all information in this Safety Data Sheet available to your employees

End of Safety Data Sheet

MATERIAL SAFETY DATA SHEET

ALCONOX®

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Union REACH Regulations

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	**ALCONOX®**
CHEMICAL FAMILY NAME:	Detergent.
PRODUCT USE:	Critical-cleaning detergent for laboratory, healthcare and industrial applications
U.N. NUMBER:	Not Applicable
U.N. DANGEROUS GOODS CLASS:	Non-Regulated Material
SUPPLIER/MANUFACTURER'S NAME:	Alconox, Inc.
ADDRESS:	30 Glenn St., Suite 309, White Plains, NY 10603. USA
EMERGENCY PHONE:	**TOLL-FREE in USA/Canada** 800-255-3924
	International calls 813-248-0585
BUSINESS PHONE:	914-948-4040
DATE OF PREPARATION:	May 2011
DATE OF LAST REVISION:	February 2008

SECTION 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a white granular powder with little or no odor. Exposure can be irritating to eyes, respiratory system and skin. It is a non-flammable solid. The Environmental effects of this product have not been investigated.

US DOT SYMBOLS

Non-Regulated

CANADA (WHMIS) SYMBOLS

EUROPEAN and (GHS) Hazard Symbols

Signal Word: **Warning!**

EU LABELING AND CLASSIFICATION:

Classification of the substance or mixture according to Regulation (EC) No1272/2008 Annex 1
EC# 205-633-8 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 268-356-1 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 231-838-7 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 231-767-1 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 207-638-8 Index# 011-005-00-2
EC# 205-788-1 This substance is not classified in the Annex I of Directive 67/548/EEC

GHS Hazard Classification(s):

Eye Irritant Category 2A

Hazard Statement(s):

H319: Causes serious eye irritation

Precautionary Statement(s):

P260: Do not breath dust/fume/gas/mist/vapors/spray
P264: Wash hands thoroughly after handling
P271: Use only in well ventilated area.
P280: Wear protective gloves/protective clothing/eye protection/face protection/

Hazard Symbol(s):

[Xi] Irritant

Risk Phrases:
R20: Harmful by inhalation
R36/37/38: Irritating to eyes, respiratory system and skin

Safety Phrases:
S8: Keep container dry
S22: Do not breath dust
S24/25: Avoid contact with skin and eyes

HEALTH HAZARDS OR RISKS FROM EXPOSURE:

ACUTE: Exposure to this product may cause irritation of the eyes, respiratory system and skin. Ingestion may cause gastrointestinal irritation including pain, vomiting or diarrhea.

CHRONIC: This product contains an ingredient which may be corrosive.

TARGET ORGANS: ACUTE: Eye, respiratory System, Skin CHRONIC: None Known

SECTION 3 - COMPOSITION and INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	CAS #	EINECS #	ICSC #	WT %	HAZARD CLASSIFICATION; RISK PHRASES
Sodium Bicarbonate	144-55-8	205-633-8	1044	33 - 43%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	268-356-1	Not Listed	10 – 20%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Tripolyphosphate	7758-29-4	231-838-7	1469	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Tetrasodium Pyrophosphate	7722-88-5	231-767-1	1140	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Carbonate	497-19-8	207-638-8	1135	1 - 10%	HAZARD CLASSIFICATION: [Xi] Irritant RISK PHRASES: R36
Sodium Alcohol Sulfate	151-21-3	205-788-1	0502	1 – 5%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Balance of other ingredients are non-hazardous or less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).					

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard *JIS Z 7250: 2000*.

SECTION 4 - FIRST-AID MEASURES

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with contaminated individual.

EYE CONTACT: If product enters the eyes, open eyes while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.

SKIN CONTACT: Wash skin thoroughly after handling. Seek medical attention if irritation develops and persists. Remove contaminated clothing. Launder before re-use.

INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if breathing dificulty continues.

INGESTION: If product is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice. Take a copy of the label and/or MSDS with the victim to the health professional.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin, or eye problems may be aggravated by prolonged contact.

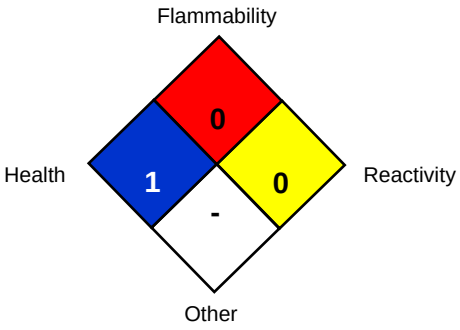
RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

SECTION 5 - FIRE-FIGHTING MEASURES

FLASH POINT: Not Flammable
AUTOIGNITION TEMPERATURE: Not Applicable
FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): NA Upper (UEL): NA
FIRE EXTINGUISHING MATERIALS: As appropriate for surrounding fire. Carbon dioxide, foam, dry chemical, halon, or water spray.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is non-flammable and has no known explosion hazards.
Explosion Sensitivity to Mechanical Impact: Not Sensitive.
Explosion Sensitivity to Static Discharge: Not Sensitive
SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING SYSTEM



HMIS RATING SYSTEM

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD (BLUE)	1
FLAMMABILITY HAZARD (RED)	0
PHYSICAL HAZARD (YELLOW)	0

PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Sect 8		See Sect 8

For Routine Industrial Use and Handling Applications

Hazard Scale: **0** = Minimal **1** = Slight **2** = Moderate **3** = Serious **4** = Severe * = Chronic hazard

SECTION 6 - ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Personnel should be trained for spill response operations.
SPILLS: Contain spill if safe to do so. Prevent entry into drains, sewers, and other waterways. Sweep, shovel or vacuum spilled material and place in an appropriate container for re-use or disposal. Avoid dust generation if possible. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

SECTION 7 - HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing dusts generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Containers of this product must be properly labeled. Store containers in a cool, dry location. Keep container tightly closed when not in use. Store away from strong acids or oxidizers.

SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/GUIDELINES:

Chemical Name	CAS#	ACGIH TWA	OSHA TWA	SWA
Sodium Bicarbonate	144-55-8	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium Tripolyphosphate	7758-29-4	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Tetrasodium Pyrophosphate	7722-88-5	5 mg/m³	5 mg/m³	5 mg/m³
Sodium Carbonate	497-19-8	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust
Sodium Alcohol Sulfate	151-21-3	10 mg/m³ Total Dust	15 mg/m³ Total Dust	10 mg/m³ Total Dust

Currently, International exposure limits are not established for the components of this product. Please check with competent authority in each country for the most recent limits in place.

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use local exhaust ventilation to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Based on test data, exposure limits should not be exceeded under normal use conditions when using Alconox Detergent. Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Use chemical resistant gloves to prevent skin contact.. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate to prevent contact (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE:	Solid
APPEARANCE & ODOR:	White granular powder with little or no odor.
ODOR THRESHOLD (PPM):	Not Available
VAPOR PRESSURE (mmHg):	Not Applicable
VAPOR DENSITY (AIR=1):	Not Applicable.
BY WEIGHT:	Not Available
EVAPORATION RATE (nBuAc = 1):	Not Applicable.
BOILING POINT (C°):	Not Applicable.
FREEZING POINT (C°):	Not Applicable.
pH:	9.5 (1% aqueous solution)
SPECIFIC GRAVITY 20°C: (WATER =1)	0.85 – 1.1
SOLUBILITY IN WATER (%)	>10% w/w
COEFFICIENT OF WATER/OIL DIST.:	Not Available
VOC:	None
CHEMICAL FAMILY:	Detergent

SECTION 10 - STABILITY and REACTIVITY

STABILITY: Product is stable
DECOMPOSITION PRODUCTS: When heated to decomposition this product produces Oxides of carbon (COx)
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids and strong oxidizing agents.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Contact with incompatible materials and dust generation.

SECTION 11 - TOXICOLOGICAL INFORMATION

TOXICITY DATA: Toxicity data is available for mixture:

CAS# 497-19-8 LD50 Oral (Rat)	4090 mg/kg
CAS# 497-19-8 LD50 Oral (Mouse)	6600 mg/kg
CAS# 497-19-8 LC50 Inhalation (Rat)	2300 mg/m³ 2H
CAS# 497-19-8 LC50 Inhalation (Mouse)	1200 mg/m³ 2H
CAS# 7758-29-4 LD50 Oral (Rat)	3120 mg/kg
CAS# 7758-29-4 LD50 Oral (Mouse)	3100 mg/kg
CAS# 7722-88-5 LD50 Oral (Rat)	4000 mg/kg

SUSPECTED CANCER AGENT: None of the ingredients are found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.
IRRITANCY OF PRODUCT: Contact with this product can be irritating to exposed skin, eyes and respiratory system.
SENSITIZATION OF PRODUCT: This product is not considered a sensitizer.
REPRODUCTIVE TOXICITY INFORMATION: No information concerning the effects of this product and its components on the human reproductive system.

SECTION 12 - ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.
ENVIRONMENTAL STABILITY: No Data available at this time.
EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plants or animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on this product's effects on aquatic life.

SECTION 13 - DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

SECTION 14 - TRANSPORTATION INFORMATION

US DOT; IATA; IMO; ADR:

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.
PROPER SHIPPING NAME: Non-Regulated Material
HAZARD CLASS NUMBER and DESCRIPTION: Not Applicable
UN IDENTIFICATION NUMBER: Not Applicable
PACKING GROUP: Not Applicable.
DOT LABEL(S) REQUIRED: Not Applicable
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): Not Applicable
MARINE POLLUTANT: None of the ingredients are classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B)

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS:
This product is not classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:
This product is not classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):
This product is not classified as Dangerous Goods, by rules of IATA:

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION:
This product is not classified as Dangerous Goods by the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):

This product is not classified by the United Nations Economic Commission for Europe to be dangerous goods.

SECTION 15 - REGULATORY INFORMATION

UNITED STATES REGULATIONS

SARA REPORTING REQUIREMENTS: This product is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows: None

TSCA: All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.

SARA 311/312:

Acute Health: Yes Chronic Health: No Fire: No Reactivity: No

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): None

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): None of the ingredients are on the California Proposition 65 lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: All of the components of this product are on the DSL Inventory

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This product is categorized as a Controlled Product, Hazard Class D2B as per the Controlled Product Regulations

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION:

Classification of the mixture according to Regulation (EC) No1272/2008. See section 2 for details.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: All components of this product are listed on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory if Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftliste List of Toxic Substances:	Listed
U.S. TSCA:	Listed

SECTION 16 - OTHER INFORMATION

PREPARED BY: Paul Eigbrett Global Safety Management, 10006 Cross Creek Blvd. Suite 440, Tampa, FL 33647

Disclaimer: To the best of Alconox, Inc. knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness is not guaranteed and no warranties of any type either express or implied are provided. The information contained herein relates only to this specific product.

ANNEX:

IDENTIFIED USES OF ALCONOX® AND DIRECTIONS FOR USE

Used to clean: Healthcare instruments, laboratory ware, vacuum equipment, tissue culture ware, personal protective equipment, sampling apparatus, catheters, tubing, pipes, radioactive contaminated articles, optical parts, electronic components, pharmaceutical apparatus, cosmetics manufacturing equipment, metal castings, forgings and stampings, industrial parts, tanks and reactors. Authorized by USDA for use in federally inspected meat and poultry plants. Passes inhibitory residue test for water analysis. FDA certified.

Used to remove: Soil, grit, grime, buffing compound, slime, grease, oils, blood, tissue, salts, deposits, particulates, solvents, chemicals, radioisotopes, radioactive contaminations, silicon oils, mold release agents.

Surfaces cleaned: Corrosion inhibited formulation recommended for glass, metal, stainless steel, porcelain, ceramic, plastic, rubber and fiberglass. Can be used on soft metals such as copper, aluminum, zinc and magnesium if rinsed promptly. Corrosion testing may be advisable.

Cleaning method: Soak, brush, sponge, cloth, ultrasonic, flow through clean-inplace. Will foam—not for spray or machine use.

Directions: Make a fresh 1% solution (2 1/2 Tbsp. per gal., 1 1/4 oz. per gal. or 10 grams per liter) in cold, warm, or hot water. If available use warm water. Use cold water for blood stains. For difficult soils, raise water temperature and use more detergent. Clean by soak, circulate, wipe, or ultrasonic method. Not for spray machines, will foam. For nonabrasive scouring, make paste. Use 2% solution to soak frozen stopcocks. To remove silver tarnish, soak in 1% solution in aluminum container. RINSE THOROUGHLY—preferably with running water. For critical cleaning, do final or all rinsing in distilled, deionized, or purified water. For food contact surfaces, rinse with potable water. Used on a wide range of glass, ceramic, plastic, and metal surfaces. Corrosion testing may be advisable.

SAFETY DATA SHEET

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Hydrochloric Acid, 31 – 36.7%

Product Name: Hydrochloric Acid, 31 – 36.7%

Identified Uses: acid etching, steel pickling, oil and gas, ore and mineral, food processing, pharmaceutical, organic chemical synthesis

Company Information:
ASHTA Chemicals Inc.
P.O. Box 858
Ashtabula Ohio 44005
Phone: (440) 997-5221
Fax: (440) 998-0286
24-hour Emergency Phone: CHEMTREC: (800) 424-9300

SECTION 2: HAZARDS IDENTIFICATION

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

GHS label elements, including precautionary statements:

Signal Word: **Danger**

Pictogram(s):

Hazard Statements	
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.

Precautionary Statements	
P234	Keep only in original container.
P261	Avoid breathing dust/ fume/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water. Shower.

P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P403 + P233	Store in a well-ventilated place. Keep container with a resistant inner liner.
P405	Store locked up.
P406	Store in corrosive resistant stainless steel container with a resistant inner liner.
P501	Dispose of contents/ container to an approved waste disposal plant.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms:

CHEMICAL NAME:	Hydrochloric acid
TRADE NAME:	Hydrochloric acid, 31 – 36.7%
SYNONYMS:	Muriatic acid, Chlorohydric acid, Hydrogen Chloride
C.A.S:	7647-01-0
EC:	231-595-7
WHMIS:	D2A, E
CHEMICAL FORMULA:	HCl (in aqueous solution)
CHEMICAL FAMILY:	Inorganic Acid

SECTION 4 FIRST AID MEASURES

Description of first aid measures:
Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. If breathing is difficult, give humidified air. Give oxygen, but only by a certified physician. Consult a physician.

In case of skin contact
Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. 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. Remove contact lenses if present and easy to do. Continue rinsing eyes during transport to medical facility.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth thoroughly with water. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Consult a physician.

SECTION 5 FIRE FIGHTING MEASURES

Flash Point (Method):	Non-combustible.
Extinguishing Media:	Use extinguishing agents compatible with acid and appropriate for the burning material. Use water spray to keep fire-exposed containers cool.
Auto Ignition Temp:	Non-combustible.
Special Fire Fighting Procedures:	Wear self-contained breathing apparatus and full protective clothing. In case of fire and/or explosion do not breathe fumes. Use standard firefighting procedures and consider the hazards of other involved materials.
Unusual Fire/Explosion Hazards:	Releases flammable hydrogen gas when reacting with metals.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Environmental Precautions:
Use closed systems when possible. Provide local exhaust ventilation where vapor or mist may be generated. Avoid discharge into drains, water courses or onto the ground.

Containment and Cleaning:
Follow preplanned emergency procedures. Only properly equipped, trained, functional personnel should attempt to contain a leak. All other personnel should be evacuated from the danger area. Using full protective equipment, apply appropriate emergency device or other securement technology to stop the leak if possible.

Small Spill:	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: neutralize the residue with a dilute solution of sodium carbonate.
Large Spill:	Corrosive liquid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to knock down vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that vapor is not present at a concentration level above TLV.

SECTION 7: HANDLING AND STORAGE

Precautions to be taken for handling and storage:
Wear appropriate personal protective equipment. Do not get in eyes, on skin, on clothing. Do not breathe mist or vapor. Observe good industrial hygiene practices. Do not empty into drains. Use caution when combining with water; DO NOT add water to acid, ALWAYS add acid to water while stirring to prevent release of heat, steam and fumes. Store in a well-ventilated place. Store away from incompatible materials. Store closed containers in a clean, cool, open or well ventilated area. Keep out of sun.

SECTION 8: EXPOSURE CONTROL/PERSONAL PROTECTION

Principal Component: Hydrochloric Acid
Occupational Exposure Limits:
Regulatory Limits:

Component	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Hydrochloric Acid Mixture	---	---	5 ppm 7.59 mg/m^3

ACGIH TLV = 5 ppm (7.59 mg/m^3) TWA

NIOSH IDLH = 50 ppm (as HCl, 2010)

Exposure Controls:

Eye Protection: Tightly fitting safety goggles. Face shield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Respiratory Protection: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose 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).

Other 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.

Ventilation Recommended: Exhaust ventilation is required to meet PEL limits.

Glove Type Recommended: Wear neoprene, nitrile, butyl rubber or PVC gloves to prevent exposure.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties:

Appearance	Colorless to light yellow liquid
Odor	Pungent (irritating/strong)
Odor Threshold	0.3ppm (can cause olfactory fatigue)
pH	<1 (in aqueous solution)
Melting point/freezing point	-30°C (-22°F)
Initial boiling point	>100°C (>212°F)
Flash point	Not applicable
Auto-ignition Temp	Not applicable
Evaporation rate	No data available

Decomposition temperature	No data available
Flammability (solid, gas)	Not combustible
Upper/lower flammability or explosive limits	Not combustible
Water solubility	100%
Molecular Weight	36.46
Relative Density (Specific Gravity)	1.16 (32% HCl solution) 1.19 (36.5% HCl solution)
Bulk Density	8.75 lbs/gal (32% HCl solution) 9.83 lbs/gal (36.5% HCl solution)
Vapor Density (air = 1)	1.267 at 20 °C
Vapor Pressure	84 mm Hg @ 20°C
Partition Coefficient: n-octanol/water	No data available

SECTION 10: STABILITY AND REACTIVITY

Stability: Hydrochloric acid is stable under normal conditions and pressures.

Conditions to avoid: Incompatible materials, metals, excess heat, bases.

Incompatibility: Bases, amines, metals, permanganates, (e.g. potassium permanganate), fluorine, metal acetylides, hexalithium disilicide.

Hazardous decomposition products: Hydrogen chloride, chlorine, hydrogen gas.

Polymerization: Hazardous polymerization WILL NOT occur.

SECTION 11: TOXICOGICAL INFORMATION

Information on likely routes of exposure:

Inhalation: Vapors and mist will irritate throat and respiratory system and cause coughing.

Skin contact: Causes skin burns.

Eye contact: Causes eye burns.

Ingestion: Harmful if swallowed. Causes digestive tract burns. Ingestion may produce burns to the lips, oral cavity, upper airway, esophagus and possibly the digestive tract.

Symptoms related to the physical, chemical and toxicological characteristics:

Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Information on toxicological effects:

Acute toxicity: Harmful if swallowed.

Skin corrosion/irritation: Causes severe skin burns and eye damage.

Serious eye damage/eye Irritation: Causes serious eye damage.

Respiratory sensitization: Not available.

Skin sensitization:	No data available.
Germ cell mutagenicity:	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity:	This product is not considered to be a carcinogen by IARC, ACGIH, NTP or OSHA.
Reproductive toxicity:	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure:	May cause respiratory irritation.
Specific target organ toxicity - repeated exposure:	No data available.
Aspiration hazard:	Not available.
Chronic effects:	Prolonged inhalation may be harmful.

Components Species Test Results:
Hydrochloric acid (CAS# 7647-01-0)

Rat - Inhalation LC_{50}:	3124 ppm, (1 hour)
Rabbit - Dermal LD_{50}:	5010 mg/kg

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity:	Because of the low pH of this product, it would be expected produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems.
Aquatic Toxicity:	This material is toxic to fish and aquatic organisms. Most aquatic species do not tolerate pH lower than 5.5 for any extended period.
Fish Toxicity:	Fish LC_{50} Mosquito fish: 282 mg/l, 96 hours Fish LC_{50} Bluegill: 3.6 mg/l, 48 hours
Persistence and degradability:	Not biodegradable. Hydrochloric acid will likely be neutralized to chloride by alkalinity present in natural environment..
Bioaccumulative Potential:	No data available.
Mobility in soil:	Hydrochloric acid will be neutralized by naturally occurring alkalinity. The acid will permeate soil, dissolving some soil material and will then neutralize.
Other adverse effects:	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation

SECTION 13: DISPOSAL CONSIDERATIONS

Collect and reclaim or dispose in sealed containers at a properly licensed waste disposal site. This material , if not neutralized, must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national or international regulations.

SECTION 14: TRANSPORT INFORMATION

Shipping:

Usual Shipping Containers:	Tank cars, bulk tankers.
Usual Shelf Life:	Indefinite (life of containers).
Storage/Transport Temperatures:	Ambient.

Suitable Storage:

Materials/Coatings:	Teflon, Tygon, Rubber, PVC and polypropylene materials.

D.O.T. Information:

Labeling:	Corrosive
D.O.T. Identification Number	UN 1789
D.O.T. Shipping Name:	Hydrochloric Acid
Hazard Class:	8
Packing Group:	II
Hazard Guide:	157
Placard:	UN 1789

SECTION 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:
Hydrochloric Acid CAS#: 7647-01-0

SARA 311/312 Hazards
Acute health hazard, reactive hazard.

Massachusetts Right To Know Components
Hydrochloric Acid CAS#: 7647-01-0
Pennsylvania Right To Know Components
Hydrochloric Acid CAS#: 7647-01-0
New Jersey Right To Know Components
Hydrochloric Acid CAS#: 7647-01-0

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.

OSHA PSM TPQ:
CAS# 7647-01-0 is regulated under OSHA PSM ***only*** if anhydrous or >37% HCl.

Toxic Substances Control Act (TSCA):
Hydrochloric Acid CAS#: 7647-01-0

Comprehensive Environmental Response Compensation Liability Act: (CERCLA)
Hydrochloric Acid CAS#: 7647-01-0

SECTION 16 OTHER INFORMATION

NFPA Rating:
Health hazard: 3
Fire Hazard: 0
Reactivity Hazard: 1

This information is drawn from recognized sources believed to be reliable. ASHTA Chemicals, Inc. Makes no guarantees or assumes any liability in connection with this information. The user should be aware of changing technology, research, regulations, and analytical procedures that may require changes herein. The above data is supplied upon the condition that persons will evaluate this information and then determine its suitability for their use. Only U.S.A regulations apply to the above.

Version 1.0	For the new GHS SDS Standard	Revision Date: 12/31/2014
Version 1.1	Graphics updated	Revision Date: 3/9/2015
Version 1.2	Title updated	Revision Date: 6/2/2015
Version 1.3	Section 9 changes	Revision Date: 7/30/2015

SAFETY DATA SHEET

Nonflammable Gas Mixture: Isobutylene / Nitrogen / Oxygen

Section 1. Identification

GHS product identifier : Nonflammable Gas Mixture: Isobutylene / Nitrogen / Oxygen

Other means of identification : Not available.

Product use : Synthetic/Analytical chemistry.

SDS # : 002103

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : GASES UNDER PRESSURE - Compressed gas

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : Contains gas under pressure; may explode if heated.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction.

Prevention : Use and store only outdoors or in a well ventilated place.

Response : Not applicable.

Storage : Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Not applicable.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

CAS number/other identifiers

CAS number : Not applicable.

Product code : 002103

Ingredient name	%	CAS number
Nitrogen	75 - 80.5	7727-37-9
oxygen	19.5 - 23.5	7782-44-7
2-methylpropene	0.0001 - 1.13	115-11-7

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Section 4. First aid measures

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

None.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Section 8. Exposure controls/personal protection

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas.

Color : Not available.

Melting/freezing point : -140.7°C (-221.3°F) This is based on data for the following ingredient: 2-methylpropene. Weighted average: -211.14°C (-348.1°F)

Critical temperature : Lowest known value: -146.95°C (-232.5°F) (nitrogen).

Odor : Not available.

Odor threshold : Not available.

pH : Not available.

Flash point : Not available.

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : Highest known value: 1.94 (Air = 1) (2-methylpropene). Weighted average: 1.01 (Air = 1)

Gas Density (lb/ft ^{3}) : Weighted average: 0.07

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: reducing materials and combustible materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Section 11. Toxicological information

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Section 12. Ecological information

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1956	UN1956	UN1956	UN1956	UN1956
UN proper shipping name	COMPRESSED GAS, N.O.S. (nitrogen, oxygen)	COMPRESSED GAS, N.O.S. (nitrogen, oxygen)	COMPRESSED GAS, N.O.S. (nitrogen, oxygen)	COMPRESSED GAS, N.O.S. (nitrogen, oxygen)	COMPRESSED GAS, N.O.S. (nitrogen, oxygen)
Transport hazard class(es)	2.2 	2.2 	2.2 	2.2 	2.2 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	-	**Explosive Limit and Limited Quantity Index** 0.125 **Passenger Carrying Road or Rail Index** 75	-	-	-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): All components are listed or exempted.

Clean Air Act (CAA) 112 regulated flammable substances: 2-methylpropene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Sudden release of pressure

Composition/information on ingredients

No products were found.

State regulations

Massachusetts : The following components are listed: NITROGEN; OXYGEN (LIQUID); 2-METHYLPROPENE

New York : None of the components are listed.

New Jersey : The following components are listed: NITROGEN; OXYGEN; ISOBUTYLENE; 1-PROPENE, 2-METHYL-

Pennsylvania : The following components are listed: NITROGEN; OXYGEN; 1-PROPENE, 2-METHYL-

Canada inventory : All components are listed or exempted.

International regulations

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: Not determined.
Korea inventory: All components are listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Section 15. Regulatory information

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

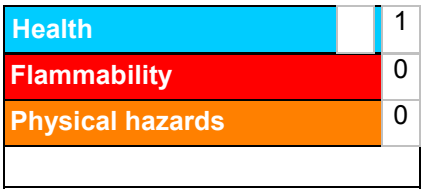
WHMIS (Canada) : Class A: Compressed gas.

CEPA Toxic substances: None of the components are listed.
Canadian ARET: None of the components are listed.
Canadian NPRI: The following components are listed: Butene (all isomers)
Alberta Designated Substances: None of the components are listed.
Ontario Designated Substances: None of the components are listed.
Quebec Designated Substances: None of the components are listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 1/23/2015.

Date of issue/Date of revision : 1/23/2015.

Date of previous issue : No previous validation.

Version : 0.01

Section 16. Other information

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Appendix B
Glove Selection Guideline

APPENDIX B: GLOVE SELECTION GUIDELINE

HAZARD	EXAMPLE TASKS	ANSI CUT/ABRASION RATING*	REPRESENTATIVE GLOVE
Impact Hazards, Med/Heavy Duty Puncture Cut	Drilling/direct push activities. Construction. Heavy materials handling. Power tools. Air knifing. Excavation.	ANSI Cut and Abrasion Resistance **Level 5** **EN 388 4521**	Hexarmor®Chrome Hexarmor® GGT5 Hexarmor® L5 Hexarmor® SteelLeather III Ironclad® Kong Glove
Med/Heavy Duty Puncture Cut Oil/Solvent Resistant	Tasks where materials are treated with oil or solvents.	ANSI Cut and Abrasion Resistance **Level 3 - 4** **EN 388 4522**	Ansell Alpha-Tec ® Memphis® Ultra Tech Nitrile Cut & Splash Best® Neoprene 6780 Hexarmor™ TenX Threesixty
Medium Duty Cut/Puncture Gloves with Oily Surface Grip	Light materials handling, wet service	ANSI Cut and Abrasion Resistance **Level 3** **EN 388 44xx**	Best®Zorb-It Ultimate HV 4567 Ansell® Cut Protective Glove 97-505 Ansell HyFlex® 11-511 Ansell HyFlex® 11-624
Med/Heavy Duty Cut/Puncture	Light Materials Handling. System O&M. Use of Hand Tools. Hand Augering. Heavy Equipment Operator.	ANSI Cut and Abrasion Resistance **Level 2** **EN 388 33xx**	Perfect Fit® PF570 Hexarmor® Level Six 9010/9012 Ironclad® Cut Resistant Glove Ansell HyFlex® 11-511 Ansell HyFlex® 11-624 Ansell® Cut Protective Glove 97-505
Light Duty Cut/Puncture Abrasion Only	Handling soil and Groundwater Samples. Opening spoons. Well construction.	ANSI Cut and Abrasion Resistance **Level 2 - 4** **EN 388 21xx**	Memphis® Ninja Max N9676GL Memphis® UltraTech Dyneema 9676 Memphis® Ninja Ice (Cold Weather) Ansell HyFlex® 11-511 Ansell® Cut Protective Glove 97-505 Ansell® Powerflex 80-813 Ironclad™ Workforce
Light Duty Glove Cut/Abrasion (used under nitrile gloves)	Groundwater Sampling.	ANSI Cut and Abrasion Resistance **Level 2** **EN 388 21xx**	Ansell HyFlex® 11-500 Ansell HyFlex® 11-624 Ansell GoldKnit
* Reference to ANSI and EN 388 glove testing standards. Listed gloves meet the standards in the table, but are not the only gloves that meet the standard.			
This selection chart is not intended to address all chemical hazards. Gloves used for chemical protection shall provide cut/puncture resistance, or be used in tandem with cut/puncture protection. Nitrile gloves used for environmental sampling must be used in tandem with a cut/puncture resistant glove.			
Gloves available in high visibility colors have shown to be effective and are preferred.			

Appendix C
Heat & Cold Stress

COLD STRESS

Ambient air temperatures during site activities may create cold stress for on-site workers. Procedures for recognizing and avoiding cold stress must be followed. Cold stress can range from frostbite to hypothermia. The signs and symptoms of cold stress are listed below.

Frostbite is defined as the actual freezing of one or more layers of skin. In severe cases, organs and structures below the skin can become frozen. Usually, body areas exposed to the most cold, and least body warmth, are affected first. These areas include fingers, toes, ears, and the tip of your nose. Frostbite is characterized by pain and loss of dexterity in the affected limb. The tissue initially appears reddened, but may progress to white, blue, or black.

> **FIRST AID:** Bring the affected employee indoors and call the local emergency clinic. Rewarming of frostbitten parts is best left to a medical doctor in a controlled setting.

Hypothermia is the condition that occurs when the body's natural warming mechanisms (muscle activity and shivering) cannot counteract the loss of body heat to the environment. The onset of hypothermia is greatly hastened by being wet. Hypothermia is marked by severe, uncontrollable shivering. The patient will show signs of excessive fatigue, drowsiness, irritability, or euphoria. As hypothermia progresses, the patient will begin to lose consciousness, blood pressure will drop, shivering will cease, and the patient may slip into a coma and possibly die.

> **FIRST AID:** If these symptoms occur, remove the patient to a warm, dry place. If clothing is wet, remove and replace with dry clothing. Keep the patient warm, but not overheated. The patient should be gradually rewarmed to prevent shock. If the patient is conscious and alert, warm liquids should be provided. Coffee and other caffeinated liquids should be avoided because of diuretic and circulatory effects. Notify the emergency clinic if conditions worsen, the patient loses consciousness, or the patient has an altered mental status. Have the patient transported to an emergency facility.

General Precautions. The reduction of adverse health effects from cold exposure can be achieved by adopting the following work practices.

- Provide adequate insulating clothing to maintain core temperature at 98.6° F if work is to be performed in air temperatures below 40° F. Wind chill cooling rates and the cooling power of air are critical factors. The higher the wind speed and the lower the air temperature in the work area, the greater the insulation value of the protective clothing should be.
- If the air temperature is 32° F or less, hands should be protected by mittens/gloves.
- If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of clothing should be impermeable to water. With more severe work under such conditions, the outer layer should be water repellent, and the outer layer should be changed as it becomes wet. The outer garments should include provisions for easy ventilation in order to prevent wetting of the inner layer by sweat.
- If available clothing does not give adequate protection to prevent cold injury, work should be modified or suspended until adequate clothing is available, or until weather conditions improve.
- For prolonged work, heated shelters should be available. Workers should be encouraged to use these at regular intervals, with the frequency depending on the severity of the environmental exposure. When entering the shelter, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit heat evaporation, or a change of work clothing should be provided.

- Warm, sweet drinks, such as hot cocoa or soup, should be available at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of diuretic and circulatory effects.
- The weight and bulk of cold-weather gear should be included in estimating the required work performance and weights to be lifted in the field.

Workers should be instructed in safety and health procedures regarding cold work environments as part of the pre-work safety meeting. The training program should include instruction in preventing, recognizing, and treating cold stress conditions.

Wind Chill Chart

Wind (mph) \ Temperature (°F)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	29	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

HEAT STRESS

There is a potential for heat stress from the use of protective clothing and climate conditions. One or more of the following procedures may be employed to alleviate potential heat stress problems in the event that site conditions warrant the use of personal protective equipment (PPE), or ambient temperatures exceed 85° F. Heat stress training must be emphasized during the daily safety meetings, and adequate supplies of potable water must be provided to workers each day.

General Precautions. Provide plenty of liquids. To replace body fluids (water and electrolytes) lost because of sweating, use a 0.1 percent saltwater solution, more heavily salted foods, or commercial drink mixes. The commercial mixes may be preferable for those employees on a low sodium diet. Employees on low sodium diets, or other special diets, are advised to contact their personal physician for recommendations regarding appropriate electrolyte replacement fluids/beverages.

In extremely hot weather, conduct operations in early morning or evening and rotate shifts of workers

wearing impervious clothing. Install mobile showers and/or hose-down facilities to reduce body temperature and cool protective clothing.

Ensure that adequate shelter is available for breaks to protect personnel against heat, which can decrease physical efficiency and increase the probability of accidents.

Acclimatization for workers not accustomed to working in elevated temperature environments will be considered and implemented as appropriate in accordance with American Conference of Governmental and Industrial Hygienists (ACGIH) Guidelines.

Heat Stress Monitoring.

For monitoring the body's recuperative ability toward excess heat, one or more of the following techniques should be used as a screening mechanism. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70° F or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceed 80° F, regardless of the use of Personal Protective Equipment (PPE), workers will be monitored for heat stress after every work period.

Good hygienic standards must be maintained by the employee to aid in the prevention of heat stress illnesses. At a minimum, frequent changes of clothing and daily showering should occur with clothing being allowed to dry during rest periods. Persons who notice skin problems should immediately inform their supervisor.

Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 25 percent. The HR is then measured again, once each minute for 2 minutes (a total of three measurements), after the initial rest period measurement. The HR should decrease by ten beats per minute between each measurement (a total reduction of 20 beats). If the HR does not decrease, the work period should be reduced by an additional 25 percent.

Body temperature can be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99°F. If it is greater than 99°F, the next work period should be shortened by 25 percent. The OT should be measured again at the end of the rest period to make sure that it has dropped below 99° F.

Effects of Heat Street

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat loading, a number of physical reactions can occur. The severity of these reactions ranges from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to severe (fatal).

Heat-related illnesses include:

Heat rash (also known as prickly heat rash) is caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Heat rash decreases the ability to tolerate heat as well as being a nuisance. Signs are not limited to, but may include, a red prickly rash.

FIRST AID: Employees exhibiting signs of heat rash will be directed to shower and change into clean, dry clothing.

Heat cramps are caused by profuse perspiration with inadequate fluid intake and electrolyte replacement (especially salts). Signs are muscle spasms and pain in the extremities and abdomen, and may occur several hours after work has stopped.

FIRST AID: Employees showing signs of heat cramps will be directed to lie in a cool, shady area, and drink cool fluids. If symptoms persist or worsen, the employee will be transported to an emergency facility.

Heat exhaustion is caused by increased stress on various organs to meet increased demands to cool the body. Signs are shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

FIRST AID: Employees with signs of heat exhaustion will be brought to a cool, shady location and given fluids. After recovering, the employee will be dismissed for the day. If employee is unconscious, or conditions persist, the employee will be transported to a hospital.

Heat stroke is the most severe form of heat stress. The body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; and/or coma.

FIRST AID: HEAT STROKE IS A MEDICAL EMERGENCY. Employees will be brought to a cool area, aggressively treated by removing constricting clothes and applying wet towels or ice packs, and transported without delay to an emergency facility.

Appendix D
COVID-19 Guidelines for Field Activities

1. PURPOSE

The purpose of this Pandemic Program (Program) is to protect our employees' health, improve preparedness and response, and minimize the negative impact on TRC's ability to service clients during a pandemic disease event. This Program will be managed in conjunction with TRC's Business Continuity Plan (BCP) and Crisis Management Committee program.

2. SCOPE

This procedure applies to TRC employees.

3. DEFINITIONS

Pandemic: Refers to an epidemic that has spread over several countries or continents, usually impacting a large number of people. A pandemic includes:

- Healthcare services not being available (they are already full at present with the usual ailments).
- Schools, churches and other public places not being open.
- Borders are partially or fully closed, especially airports, leaving people (our families, employees, business partners, customers and suppliers) "stranded".
- Essential materials and supplies may be limited due to distribution chains that are affected by the travel restrictions or absentee workers supporting those transportation means.
- Essential services around utilities, food distribution/access and banking systems may not be at "normal levels"; access to cash flow could be tight.
- People may not be willing to or able to come to work.

Avian influenza: A virus that infects birds especially poultry and variations have been known to be transmitted to humans. One strain, H5N1 is highly pathogenic to humans and limited vaccine is available.

COVID-19: Commonly referred to as the "coronavirus". COVID-19 is a new coronavirus not previously seen in humans that can cause upper respiratory illness with fever, cough, and difficulty breathing.

Influenza pandemic: Occurs when a new influenza virus emerges and spreads around the world as most people do not have immunity.

H1N1: Commonly referred to as the "swine flu" because it has been found in farm animals and can be transmitted to humans.

Seasonal influenza: Regional common influenza that is routine and vaccines are readily available.

Vaccine: Pre-emptive treatment in the form of a shot or nasal mist specific to a viral strain that increases a person's immunity and ability to resist infection.

US Department of State Travel Advisory Levels: Levels and definitions issued in 2018 by the US Department of State include the following:

- **Level 1 – Exercise Normal Precautions:** This is the lowest advisory level for safety and security risk. There is some risk in any international travel. Conditions in other countries may differ from those in the United States and may change at any time.
- **Level 2 – Exercise Increased Caution:** Be aware of heightened risks to safety and security. The Department of State provides additional advice for travelers in these areas in the Travel Advisory. Conditions in any country may change at any time.
- **Level 3 – Reconsider Travel:** Avoid travel due to serious risks to safety and security. The Department of State provides additional advice for travelers in these areas in the Travel Advisory. Conditions in any country may change at any time.
- **Level 4 – Do Not Travel:** This is the highest advisory level due to greater likelihood of life-threatening risks. During an emergency, the U.S. government may have very limited ability to provide assistance. The Department of State advises that U.S. citizens not travel to the country or leave as soon as it is safe to do so. The Department of State provides additional advice for travelers in these areas in the Travel Advisory. Conditions in any country may change at any time.

4. RESPONSIBILITIES

4.1 The SVP, Director of Corporate EHS and the Director, Corporate EHS and Compliance are responsible for the following:

- Implement this Program throughout TRC.
- Define roles and responsibilities necessary to effectively implement this Program.
- Facilitate communications to employees and management during pandemic events.
- Periodically review the effectiveness of this Program and modify as necessary to ensure it remains current and effective.

4.2 Corporate EHS Team are responsible for the following:

- Assist the SVP, Director of Corporate EHS and the Director, Corporate EHS and Compliance of the implementation of this Program throughout TRC.
- Facilitate communication to HR and Project Managers/Supervisors regarding employees impacted by pandemic.

4.3 Office Safety Coordinators are responsible for the following:

- Communicate the requirements of this Program to office personnel.
- Work with Office Managers to verify hand-hygiene products are available in the office and appropriate office sanitizing methods are practiced.
- Promote other risk mitigation methods (e.g., social distancing, minimize room occupancies, etc.).

4.4 Project Managers and Supervisors are responsible for the following:

- Consult with the SVP, Director of Corporate EHS and Director, Corporate EHS and Compliance, and monitor travel advisories for the geographic areas where employees are either working at or will be traveling to soon.
- Assist with implementing the health and travel precautions recommended by the respective authorities and TRC.
- Notify clients of project delays due to travel restrictions.
- Communicate and support mitigation strategies to employees.
- Assist with identifying State and local travel restrictions and requirements to conduct work (e.g., wear face coverings).

4.5 Employees are responsible for the following:

- Notify supervision or the Safety Department of symptoms associated with the pandemic.
- Follow health and travel precautions in accordance with this Program and guidance provided by TRC leadership.
- Review health and travel advisories issued by the government and health organizations prior to travelling outside the United States or to locations within the United States that may be considered at risk.
- Provide feedback on the effectiveness of this Program to Project Managers/Supervisors and Office Safety Coordinators to improve the effectiveness of this Program.

5. PROCEDURES

5.1 Work Site Risk Assessment

- A pandemic disease presents a serious health risk and could prevent TRC from serving clients. The risk to employee health and the business will vary based on the geographic area of the pandemic and the potential severity of the disease.

- The SVP, Director of Corporate EHS and/or the Director of Corporate EHS and Compliance will develop and facilitate the risk assessment process in consultation with members of the executive team and the Crisis Management Committee to assess the potential impact of a pandemic on domestic and international business and associated travel (e.g. quarantines, border closures, etc.).

- The risk assessment process will follow guidelines provided by current governmental agencies, including the Center for Disease Control (CDC), World Health Organization (WHO), and the US Department of State. Community public health, emergency management, and other sources will also be monitored.

- Employees who develop symptoms associated with the pandemic shall immediately notify their supervisor or a member of the Corporate EHS Team regarding the development of symptoms and their recent history of close contact with other employees and clients.
- Based on the risk assessment process, employees will be placed into one of the following categories:

  - **Low Risk:** Exposure risk (caution) jobs are those that do not require contact with people known to be, or suspected of being, infected with a disease nor frequent close contact with the general public. Workers in this category have minimal occupational contact with the public and other coworkers.

  - **Medium Risk:** Exposure risk jobs include those that require frequent and/or close contact with people who may be infected with a disease, but who are not known or suspected patients. In areas without ongoing community transmission, workers in this risk group may have frequent contact with travelers who may return from international locations with widespread transmission of a disease. In areas where there is ongoing community transmission, workers in this category may have contact be with the general public (e.g., in schools, high-population-density work environments, and some high-volume retail settings).

  - **High Risk:** Exposure risk jobs are those with high potential for exposure to known or suspected sources of a disease. Workers in this category include healthcare delivery and support staff (e.g., doctors, nurses, and other hospital staff who must enter patients' rooms) exposed to known or suspected patients.
  - **Very High**: Exposure risk jobs are those with high potential for exposure to known or suspected sources of a disease during specific medical, postmortem, or laboratory procedures. Workers in this category include healthcare workers and healthcare or laboratory personnel collecting or handling specimens from known or suspected patients.

- Employees who are classified as medium or high risk will be required to self-isolate and refrain from returning to work in accordance with section 5.3 of this program.
- Additionally, the risk assessment will consider the essential/critical components of TRC's business operation that need to be conducted during the pandemic.

5.2 Health Risk Assessment and Quarantine

- The SVP, Director of Corporate EHS and/or the Director of Corporate EHS and Compliance will facilitate a self-quarantine and return to work process for employees that have been impacted by the pandemic. Employees will be placed into one of three categories based on their exposure to the pandemic.
    - **Category 1:** Employee reporting symptoms and/or receives negative test result for a disease.
    - **Category 2:** Employee suspects exposure to a disease but does not develop symptoms.
    - **Category 3:** Employee receives a positive test for a disease.
- No matter the category, all employees shall notify the SVP, Director of Corporate EHS and/or the Director of Corporate EHS and Compliance regarding the development of symptoms, suspected exposure or positive test. Upon notification to the Corporate EHS Team will notify HR and work the employees and Supervisor/Project Manager to make appropriate client notifications.
- Employees of each category will be required to quarantine for the appropriate amount of time based on the medical opinion of the employee's third-party medical provider and the best available guidance from government agencies such the CDC.
- Employees can continue working from home during self-quarantine if approved by their supervisor. Employees who are not able to work at home will coordinate benefits with TRC's Human Resources Department.

5.3 Clearance to Return to Work After Illness

- Prior to returning to work after a quarantine has been issued to an employee, the employee shall receive a medical clearance from a third-party medical provider and provide a copy the Corporate EHS Team. Examples for each category are listed here:
    - **Category 1**: Employee must receive clearance to return to work from third party medical provider (WorkCare is an option for employees).
    - **Category 2**: Employee can return work following quarantine period provided they remain symptom free. Telephonic healthcare provider such as WorkCare may be optional.

- **Category 3**: Recovered employee provides Safety and HR clearance from third party medical provider prior to returning to work.

Please reference section 5.7 for COVID-19 and Appendix A CP052.1 Field Guidelines COVID-19 specific guidance.

5.4 Communication

- TRC will provide periodic updates through internal & external communications when a pandemic is imminent and ongoing includes, but is not limited to:
  - Notification to employees of operational changes.
  - Provide frequent updates about the pandemic status.
  - Provide advisories and alerts as conditions change.
  - Monitor local, state, and federal pandemic updates.
- Internal Communication
  - Internal communication will be provided to employees to educate them about pandemic diseases and current mitigation methods.
  - Health and travel information will be closely monitored by the Crisis Management Committee. Necessary mitigation strategies and pandemic status will be routinely provided to employees through regular business communications which may include e-mail, Safety Alerts, electronic mass communication systems (i.e., Honeywell/Everbridge), telephone, etc.
- External Communication
  - Project Managers will keep clients informed of project schedules and potential delays due to travel advisories and impacts to supply chains.

5.5 Pandemic Response by Pandemic Phase

- Currently the World Health Organization (WHO) has created various phases for a pandemic.
  - **Phase 1:** No viruses circulating among animals have been reported to cause infections in humans.
  - **Phase 2:** An animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans and is therefore considered a potential pandemic threat.

- **Phase 3:** An animal or human-animal influenza reassortment virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. However, limited transmission under such restricted circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.
- **Phase 4:** Characterized by verified human-to-human transmission of an animal or human-animal influenza reassortment virus able to cause "community-level outbreaks." The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic. Any country that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed, and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a forgone conclusion.
- **Phase 5:** Characterized by human-to-human spread of the virus into at least two countries in one WHO region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.
- **Phase 6:** This pandemic phase, is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way.
- During the post-peak period, pandemic disease levels in most countries with adequate surveillance will have dropped below peak observed levels. The post-peak period signifies that pandemic activity appears to be decreasing; however, it is uncertain if additional waves will occur and countries will need to be prepared for a second wave.
- In the post-pandemic period, influenza disease activity will have returned to levels normally seen for seasonal influenza. It is expected that the pandemic virus will behave as a seasonal influenza virus. At this stage, it is important to maintain surveillance and update pandemic preparedness and response plans accordingly. An intensive phase of recovery and evaluation may be required.

5.6 Mitigation Strategies

TRC will follow health and travel precautions issued by the respective authorities. One or more of the following precautions may be implemented based on business condition and guidance from authorities.

5.6.1 Telecommute:

- Many TRC employees have the ability to telecommute. Employees are encouraged to stay at home when ill, when having to care for ill family members, or when caring for children due to school closure. TRC also offers Personal Time Off (PTO) as an option for employees.
- Employees should stay at home when sick or otherwise experience symptoms that are consistent with the pandemic disease.

5.6.2 Infection Control Measures:

Infection control is an essential component of pandemic management and a component of public health measures. Essential measures include:

- Practice frequent hand washing. According to the CDC, washing hands with soap and water is the best way to get rid of germs in most situations. If soap and water are not readily available, you can use an alcohol-based hand sanitizer that contains at least 60% alcohol. You can tell if the sanitizer contains at least 60% alcohol by looking at the product label.
- Obtain immunizations recommended by healthcare providers to help avoid disease.
- Practice social distancing to increase the space between employee work areas and decreasing the possibility of contact by limiting large or close contact gatherings and avoid shaking hands.
- Frequently disinfect all areas that are likely to have frequent hand contact (like doorknobs, faucets, handrails).

5.7 Travel

Prior to traveling outside the United States, employees and project managers should review the current travel advisory levels that are posted on the United States Department of State. These advisories provide safety and security information intended for US travelers who are intending to travel outside the United Sates. The travel advisory system includes the following levels:

- **Level 1 – Exercise Normal Precautions**
- **Level 2 – Exercise Increased Caution**
- **Level 3 – Reconsider Travel**
- **Level 4 – Do Not Travel**

TRC's Crisis Management Committee will periodically monitor travel advisory levels and will provide company guidance on business travel to areas with active travel advisories.

5.8 COVID-19

Following TRC's Health and Safety Management System, field activities related to COVID-19 were assessed based on four risk levels, best practices were developed based on tasks, self-quarantine and return to work process, and symptoms and precautions were identified (**Appendix A Field Guidelines COVID-19**). Additionally, a COVID-19 Questionnaire (**Appendix B**) should be used to determine the health of TRC and subcontractors' employees at a project.

6. TRAINING

TRC has a Pandemic: Slowing the Spread course available to employees through the TRC Academy. Employees may complete this course if they want further information on illness prevention and avoiding the spread of disease. This course discusses disease containment strategies and disease prevention.

7. EVALUATION

The plan and emergency communication strategies will be periodically reviewed to ensure it remains current and effective. Performance of this plan during actual events will be considered for continual improvement.

8. REFERENCES/RELATED DOCUMENTATION

CP048 TRC Business Continuity Plan

CP053 Crisis Management Committee Program

CP054 COVID-19 Back to Work Program

9. APPENDICIES

A. CP052.1 Field Guidelines COVID-19

B. CP052.2 COVID-19 Questionnaire for Onsite Workers

10. REVISION HISTORY

Revision Number	Revision Date	Summary of Revision	Modified by
0	5/3/10	New Document	Gary Ritter
1	6/23/15	Minor Revisions to previous program	Mike Glenn
2	3/3/20	Updated to reflect COVID-19 and included as part of the HSMS	Mike Glenn and Todd Woletz
3	3/17/20	Added COVID-19 Field Guidelines	Tim Johnson
4	3/24/20	Added COVID-19 Questionnaire for Onsite Workers	Tim Johnson
5	3/27/20	Revised COVID-19 Field Guidelines and add COVID-19 information to program	Tim Johnson
6	4/1/20	Revised COVID-19 Questionnaire for Onsite Workers	Tim Johnson
7	4/22/20	Added Self-Quarantine, Return to Work Guidance, and Office Reopening Guidance	Andy Boehm, Tim Johnson, Todd Woletz, and Mike Caro
8	5/6/20	Minor Revisions to Training Section and Appendix A	Tim Johnson
9	5/12/20	Revisions to COVID-19 Symptoms	Tim Johnson
10	6/19/20	Revisions to COVID-19 Symptoms	Tim Johnson

Attachment A
CP052.1 Field Guidelines COVID-19

1. ASSESSING FIELD ACTIVITIES FOR COVID-19 RISK

Following TRC's health and safety management system, work activities should be assessed to identify possible hazards and the precautions necessary to mitigate risk to an acceptable level, including risks associated with COVID-19. TRC is following the US Occupational Safety and Health Administration's (OSHA) risk assessment guidance for COVID-19. Project-specific controls that are developed through the risk assessment process must be communicated to project employees and also listed in the project Health and Safety Plan.

1.1. Risk Assessment

To determine appropriate precautions, OSHA has divided job tasks into four risk exposure levels: very high, high, medium, and lower risk. The majority of TRC's work is considered Low risk.

- **Very High:** Exposure risk jobs are those with high potential for exposure to known or suspected sources of COVID-19 during specific medical, postmortem, or laboratory procedures. Workers in this category include healthcare workers and healthcare or laboratory personnel collecting or handling specimens from known or suspected COVID-19 patients.
    - **Precautions:** TRC does not engage in Very High-risk work.
- **High:** Exposure risk jobs are those with high potential for exposure to known or suspected sources of COVID-19. Workers in this category include healthcare delivery and support staff (e.g., doctors, nurses, and other hospital staff who must enter patients' rooms) exposed to known or suspected COVID-19 patients.
    - **Precautions:** TRC does not engage in High-risk work.
- **Medium:** Exposure risk jobs include those that require frequent and/or close contact with (i.e., within 6 feet of) people who may be infected with COVID-19, but who are not known or suspected COVID-19 patients. In areas without ongoing community transmission, workers in this risk group may have frequent contact with travelers who may return from international locations with widespread COVID-19 transmission. In areas where there is ongoing community transmission, workers in this category may have contact be with the general public (e.g., in schools, high-population-density work environments, and some high-volume retail settings).
    - **Precautions**
        - Continue to follow the CDC's guidelines for social distancing and hand hygiene.
        - Where appropriate, limit client and third-party access to the worksite or restrict access to only certain workplace areas.
        - Consider strategies to minimize face-to-face contact (e.g., drive through windows, phone-based communication, telework).

  - Employees and Project Managers with medium exposure risk may need to wear some combination of gloves (i.e., nitrile), a face mask (or ½ mask tight-fitting respirator), and/or a face shield or goggles. PPE ensembles for workers in the medium exposure risk category will vary by work task, the results of the hazard assessment, and the types of exposures workers have on the job.

- **Lower:** Exposure risk (caution) jobs are those that do not require contact with people known to be, or suspected of being, infected with COVID-19 nor frequent close contact with (i.e., within 6 feet of) the general public. Workers in this category have minimal occupational contact with the public and other coworkers.
  - **Precautions** – While OSHA does not recommend specific controls for Low-risk work, TRC will continue to follow the CDC's primary precautions including social distancing and hand hygiene.

1.2. Best Practices

TRC has identified additional best practices that can be used to further mitigate potential exposure to COVID-19. In addition, the CDC's COVID-19 guidelines which include social distancing and hand hygiene, the following options should be considered.

- **Travel**
  - Drive in separate vehicles
    - If vehicle has two passengers, both passengers should wear face coverings
  - Consider completing tasks alone
  - Sanitize your hands after using the fuel pump
  - Sanitize interior surfaces of rental vehicles
  - Driving instead of flying
- **Project Sites**
  - Use disposable chemical resistant gloves (i.e., nitrile) when disinfectant wipes are not available
  - Schedule work during "off hours" when less people are around
  - Wait until 3 days after last person left the area, if possible
  - Wear a face covering if you can't work alone
    - Ensure proper planning and hydration is considered during pre-task planning to limit potential of heat illness while wearing a face covering
  - Consider using a ½ mask tight-fitting respirator when N95 masks are not available (if deemed appropriate)
  - Contact clients via telephone or video conference instead of face-to-face meetings

- If you need to enter a home or office that is occupied, please consider the following.
  - Conduct a survey of the occupants to identify if there are any individuals who are have COVID-19 symptoms or are at high risk.
  - Wear a face covering or N95/KN95
  - Wear nitrile gloves
  - If you are going into an area with older or individuals with compromised health, please consider wearing Tyvek.
  - All PPE should be removed and disposed of after you leave each location to reduce the chances of cross contamination.
  - This is not an all-inclusive list but some of the recognized best practices and the Corporate EHS Team should be consulted to help develop a plan.

- **Construction sites**
  - Avoid "tailgate meetings" or "water cooler meetings" without following social distancing protocols
  - Avoid sharing pens/pencils
  - Safety Meetings should be held in groups of 10 or less and should observe 6' personal distance
  - Face coverings are recommended to be worn by TRC and their subcontractors
  - Stagger lunch times to minimize social gatherings; consider eating in separate areas
  - All lunch waste, bottles and cans should be disposed of immediately after use
  - Never share PPE (hard hats, high visibility vests, personal floatation device, safety glasses, etc.
  - Avoid community coffee pots in field offices
  - Provide disposable paper cups at drinking stations
  - Wear gloves when operating equipment and if possible, limit one operator to a piece of equipment. Sanitize controls after use
  - No sharing hand tools
  - Set up hand cleaning or sanitizing stations at various locations on the site, ideally near port-o-lets
  - Put your clothing directly in the washing machine at the end of shift
  - Limit number of workers in confined spaces as much as possible
  - Use telephones or Teams meetings to avoid face-to-face meetings when possible

2. SYMPTOMS AND PRECAUTIONS FOR COVID-19

2.1. Background

The 2019 novel coronavirus, or COVID-19, is a new respiratory virus first identified in Wuhan, Hubei Province, China. It's called a "novel" — or new — coronavirus, because it is a coronavirus that has not been previously identified.

Both the COVID-19 and influenza (flu) are respiratory illnesses, which have similar symptoms. Both are contagious and both can be mild or severe, even fatal in rare cases. The key difference between the novel coronavirus and influenza is we know what to expect from the flu.

2.2. Symptoms and Steps to Follow If You Develop Symptoms

Symptoms and Warning Signs	Take the following steps
Symptoms may appear **2-14 days after exposure** to the virus. People with these symptoms may have COVID-19: • **Fever (≥ 100.4°F) or chills** • **Cough** • **Shortness of breath or difficulty breathing** • **Fatigue** • **Muscle or body aches** • **Headache** • **New loss of taste or smell** • **Sore throat** • **Congestion or runny nose** • **Nausea or vomiting** • **Diarrhea** This list is not all inclusive. Refer to the CDC Website for additional information.	1. Notify your field and direct supervisor that you feel ill. 2. Supervisor shall notify Office Practice Leader/Practice Leader, Mike Glenn (949-697-7418), and your HR Business Partner immediately. 3. Immediately isolate yourself and return to your place of lodging (return home if nearby). 4. Contact your personal healthcare provider asap (consider using the Cigna app) for evaluation and follow their instructions. 5. Update your field and direct supervisor of your health and work status (e.g., when you expect to return to work). 6. If you're diagnosed with COVID-19 or are instructed to self-quarantine, notify Mike Glenn (949-697-7418) and your HR Business Partner immediately. This communication will be treated as confidential.

Symptoms and Warning Signs	Take the following steps
If you develop any of the following **emergency warning signs:** • **Trouble breathing** • **Persistent pain or pressure in the chest** • **New confusion** • **Inability to wake or stay awake** • **Bluish lips or face** This list is not all inclusive so please consult with your medical provider for further guidance.	1. Get medical attention immediately. 2. If you're diagnosed with COVID-19, notify Mike Glenn (949-697-7418) and your HR Business Partner immediately. This communication will be treated as confidential.

Source: CDC COVID-19 Symptoms https://www.cdc.gov/coronavirus/2019-ncov/about/symptoms.html

2.3. COVID-19 Self-Quarantine and Return to Work Process

- The SVP, Director of Corporate EHS and/or the Director, Corporate EHS and Compliance will facilitate a self-quarantine and return to work process for employees that have been impacted by the COVID-19. Employees will be placed into one of three categories based on their exposure to the pandemic.
    - **Category 1:** Employee reporting symptoms and/or receives negative test result of COVID-19.
    - **Category 2:** Employee suspects exposure to COVID-19 but does not develop symptoms.
    - **Category 3:** Employee receives a positive test for COVID-19.
- No matter the category all employees shall notify a member of the Corporate EHS Team regarding the development of symptoms, suspected exposure or positive test. Upon notification to the Corporate EHS Team will notify HR and work the employees Supervisor/Project Manager to make appropriate client notifications.
- Employees of each category will be required to quarantine for the appropriate amount of time based on the medical opinion of a third-party medical provider and the best available guidance from government agencies such the Center for Disease Control (CDC).
- Prior to returning to work after a quarantine has been issued to an employee, the employee shall receive a medical clearance from his/her third-party medical provider and provide a copy the Corporate EHS Team. Examples for each category are listed here:
    - **Category 1:** Employee must receive clearance to return to work from third party medical provider (WorkCare is an option for employees).
    - **Category 2:** Employee can return work following quarantine period of 14 days provided they remain symptom free. Telephonic healthcare provider such as WorkCare may be optional.

- **Category 3:** Recovered employee, must be symptom free without medication for at least 72 hours and at least 10 days from initial symptoms, provides Safety and HR clearance from third party medical provider prior to returning to work.

2.4. Transmission

COVID-19 can be spread from person to person through droplets caused by an infected person coughing, sneezing or talking and can be spread by an infected person for several days before their symptoms appear.

2.5. Precautions

- Wear face coverings in settings where social distancing measure are difficult to maintain.
- Practice Social Distancing
  - Practice social distancing by avoiding large gatherings and maintaining distance (at least 6 feet) from others when possible.
  - Do not share eating or drinking utensils, avoid close conversation, and other direct physical contact like hand shaking. “Close contact” does not include activities such as walking by a person or briefly sitting across an office.
- Hand Hygiene
  - According to the CDC, washing hands with soap and water is the best way to get rid of germs in most situations. If soap and water are not readily available, you can use an alcohol-based hand sanitizer that contains at least 60% alcohol. You can tell if the sanitizer contains at least 60% alcohol by looking at the product label.
- Practice good respiratory hygiene – covering mouth and nose when coughing or sneezing, using tissues and disposing of them correctly.
- Obtain immunizations recommended by healthcare providers to help avoid disease.
- Early self-isolation of those feeling unwell, feverish and having other symptoms of flu.
- Avoiding touching your eyes, nose or mouth.
- Frequently disinfect all areas that are likely to have frequent hand contact (like doorknobs, faucets, handrails).

2.6. Client Meetings/Interactions

Be aware of any restrictions or requirements that clients have in place regarding visiting client facilities or attending meetings. Verify with supervisor/project managers prior to visiting client facilities or meetings in person.

Attachment B
CP052.2 COVID-19 Questionnaire for Onsite Workers

The safety of our employees and their families, subcontractors, clients, and visitors is TRC's highest priority. As the COVID-19 pandemic continues to evolve and spread, TRC will continue to monitor the CDC, WHO, and local agencies in order to provide up-to-date information to protect all of those in our community.

To prevent the spread of COVID-19 and reduce the potential risk of exposure to our employees, subcontractors, and visitors, we request all personnel involved with on-site project-related work complete this assessment questionnaire. This questionnaire will be completed upon arrival to the jobsite and prior to conducting any job-related tasks. Your participation is important to help us take precautionary measures to protect you and everyone on our team.

Date: _____

Name: _____

Company/Organization: _____

Email Address: _____

Phone Number: _____

Project Name: _____

1. Do you have signs of a fever or measured temperature equal to or above 100.4°F, a dry cough, tiredness, or trouble breathing within the past 72 hours?
   ☐ Yes ☐ No
2. Have you had "close contact" with an individual diagnosed with COVID-19? "Close contact" means living in the same household as a person who has tested positive for COVID-19, caring for a person who has tested positive for COVID-19, being within 6 feet of a person who has tested positive for COVID-19 for 15 minutes or more, or coming in direct contact with secretions (for example, sharing utensils or being coughed on) from a person who has tested positive for COVID-19 while the person was symptomatic.
   ☐ Yes ☐ No
3. Have you, or anyone inside your residence been exposed to someone else who is currently being quarantined by a doctor or a local public health official?
   ☐ Yes ☐ No

Be aware that your client may have additional requirements as well. Please consult the COVID-19 Client Documents on TRCNet to review your client's guidance. Only personnel who answer "No" to all questions listed above will be granted site access. **Copies of completed questionnaires are to be maintained onsite with the HASP and project documents. If the answer is "Yes" to question 1, please contact your Supervisor, Office Practice Leader/OPL, Mike Glenn, and your HR Business Partner.**

Appendix E
Tailgate Meeting/ COVID Daily Checklist

Project Name: _____ Project Number: _____

Work Location: _____ Date: _____

Tasks Performed: _____ Time: _____ AM PM

Client Name: _____ Submitted By: _____

Weather: _____

Refuge Area: _____

First Aid/CPR Persons: _____

Potential Hazards: _____

For Emergencies Dial 911 For Non-Emergencies Dial WorkCare (888) 449-7787

Personal Protective Equipment Required

	Yes	*No*	*Specify*
Clothing	☐	☐	_____
FR, reflective vest, chemical, other (specify)			
Eye/Face	☐	☐	_____
Safety glasses, goggles, face shield, other (specify)			
Respirator	☐	☐	_____
1/2 face, full face, other (specify)			
Foot Protection	☐	☐	_____
Safety toe, EH rated, rubber boots, other (specify)			
Hand Protection	☐	☐	_____
Kevlar, chemical, EH, other (specify)			
Head Protection	☐	☐	_____
hard hat, electrical hazard, other (specify)			
Fall Protection	☐	☐	_____
body harness, lifelines, barricades, other (specify)			
Hearing Protection	☐	☐	_____
Other: _____			

Procedures/Programs Required	*Yes*	*No*
Confined Space	☐	☐
Hot Work	☐	☐
Signs/Barricades	☐	☐
LOTO/Energy Control	☐	☐
Scaffolds/Aerial Lifts	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐
Employee Certification/Training Required		
HAZWOPWER	☐	☐
Asbestos Awareness	☐	☐
Asbestos Inspector	☐	☐
XRF Trained	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐

Additional Considerations

Work Procedures: ☐ Dig Safe
☐ Working clearances ☐ _____
☐ _____

People: ☐ Worker fatigue ☐ Other site activities
☐ Public safety ☐ Pedestrian control ☐ Experience
☐ Traffic control ☐ Other utilities
☐ _____

Tools/Equipment: ☐ Eye wash ☐ First Aid Kit
☐ Inspection of tools/equipment
☐ Specialized tools/equipment
☐ Correct tool/equipment for the job
☐ _____

Special Precautions: ☐ Environmental
☐ Condition of structures ☐ Weather conditions
☐ Lighting conditions ☐ Terrain ☐ Water bodies
☐ Adjacent structures
☐ _____

If Conditions CHANGE…Stop Work, Review and Revise the Plan!!

Hazards Associated with the Job

☐ Hazardous Chemicals	☐ Heavy Equipment	☐ Slip/Trip and Falls	☐ Work in Active Rail ROW	☐ Confined space
☐ Biological Waste	☐ Hostile Individual(s)	☐ Traffic Hazards	☐ Work in Active Substation	☐ Hot Work
☐ Asbestos	☐ Ladder	☐ Trenches Excavations	☐ Animals/Insects	☐ Radioactive Materials
☐ Dust	☐ Lighting	☐ Utilities	☐ Plants	☐ Boom/Scissor Lift
☐ Edges/Material Handling	☐ Manual Lifting	☐ Water/Boat Safety	☐ _____	☐ _____
☐ Electricity	☐ Pressurized Fluids/Gases	☐ Weather (hot/cold)	☐ _____	☐ _____

List all hazards associated with this task	**Signature of Crew Members Present**
Barriers to eliminate/control above hazards?	
Supervisor Signature Date	

Post Task Safety Analysis

Did any injuries or incidents occur today? If yes, explain.
☐ Yes ☐ No
Was the injury or incident reported the safety department?
☐ Yes ☐ No ☐ N/A
What problems did you have with today's work assignment?
What can we do tomorrow to improve performance?

Appendix F
WorkCare Program Information

EARLY INCIDENT INTERVENTION®

Immediate Access to Medical Advice for Work Related Incidents

(888) 449-7787

INTRODUCTION

WorkCare, Inc. (WorkCare) and TRC have partnered together to promote Incident Intervention®, a resource designed to support company safety goals/targets—while reducing runaway-costs associated with workplace injuries and illnesses.

PURPOSE

Early Incident Intervention provides TRC employees with **IMMEDIATE** telephonic access to WorkCare clinicians at the time of a presumed, non-emergency workplace injury or illness. Clinicians provide expert guidance on the evaluation of symptoms, appropriate first aid, and the need for additional medical evaluation or treatment.

When utilizing this service within the first hour of an incident, known as the "Golden Hour," licensed medical staff can guide the case so that medical evaluation and treatment are rendered appropriately.

> ***"…helps the worker traverse the unpredictable terrain of work-related injuries and illness."***

PRINCIPLES OF EARLY INCIDENT INTERVENTION

- Utilizes principles of the "Golden Hour."
- Provides workers immediate clinician support at the time of an incident.
- Focuses on providing the right care, at the right time in the proper setting.

BENEFITS FOR EMPLOYEES

- Instant access to a medically qualified professional for evaluation of symptoms and possible outcomes.
- Professional guidance on appropriate first aid measures and medications.
- Professional advice regarding the need for additional medical evaluation or treatment.

BENEFITS FOR TRC

- Point of contact for emergency and non-emergency medical clinicians.
- Triages the incident to determine risk and urgency, delivering interventions that are consistent with medical guidelines for the specified injury and illness.
- Maintains communication with clinicians to ensure accurate and timely reporting.

Appendix G
Safe Catch Form

Safe Catch Report

A “Safe Catch” is a potential hazard or incident that has not resulted in any personal injury. Unsafe working conditions, unsafe employee behaviors, improper use of equipment or use of malfunctioning equipment have the potential to cause work related injuries. It is everyone’s responsibility to report and/or correct these potential incidents immediately. Please complete this form as a means to report these “Good Catch” situations and submit to your local OSC Representative and Mike Glenn, SVP/National Safety Director.

Complete ALL field entries:

Employee Name:		Date:	
Location:		Office:	
Project Number:		Practice:	

Conditions

Please check all appropriate conditions:

☐ Unsafe Act	☐ Unsafe Condition	☐ Unsafe Equipment	☐ Unsafe Use of Equipment

Description of Incident or Potential Hazard:

Task Performed at Time of Incident:

Causes (Primary and Contributing):

Corrective Action(s) Taken (remove the hazard, replace, repair, or retrain):

Employee Signature:		Date Completed:	

Our Mission: To reduce the frequency of incidents by applying local lessons learned globally.

If you have any questions about this report or would like additional information, please reference Compliance Program CP019 TRC Incident Response and Lessons Learned Program, located on TRCNET or contact Mike Glenn, SVP/National Safety Director at mglenn@trcsolutions.com.

Appendix H
Incident Reporting

TRC Incident Reporting Guidelines

Incident Response:

1. For life threatening injuries and medical emergencies call 911 or go to the closest emergency room.
2. An injured worker must report an injury to their supervisor immediately.
3. Supervisor is required to complete The TRC Incident Report Form within 24 hours of the reported accident and forward to Bill Russell at Sargent & Associates with a copy to Mike Glenn.

   Bill Russell – Sargent &Associates
   Office: (978) 256-7459; Fax: (978) 256-4941
   bill@sargentandassociates.com

   Mike Glenn, National Safety Director
   Office: (949) 727-7347; Mobile: (949) 697-7418
   mglenn@trcsolutions.com

4. WorkCare can provide assistance in providing first aid advice and directing an injured worker to non-emergency medical care. WorkCare is a service that provides 24/7 access to an Occupational Healthcare physician or clinician.

   WorkCare Incident Intervention
   (888) 449-7787

Return to Work:

1. The injured worker is responsible for providing the Supervisor with a copy of the doctor's note detailing the injury and "return to work" status within 24 hours of the doctor's visit. The supervisor must email or fax the completed TRC Incident Report and Doctor's notes to Sargent & Associates.
2. Sargent & Associates will contact the injured worker and the Supervisor to confirm the facts surrounding the injury.
3. Sargent & Associates will report the injury to the workers' compensation insurance carrier, Zurich.

4. Zurich may contact the injured worker and supervisor to conduct an accident investigation.
5. Sargent & Associates will maintain communication with all parties in order to monitor the medical treatment, and the injured worker's return to work status. They will act as liaison between the injured worker, TRC, and Zurich.
6. Sargent & Associates will work with TRC's Health & Safety, Human Resources, and/or Supervisors to determine if modified duty work is an option, until the injured worker is able to return to full duty work activities.

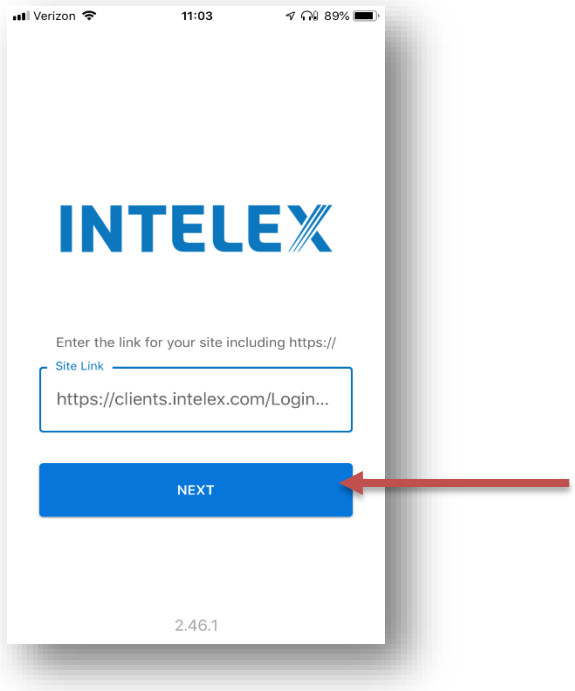
Incident Investigation:

1. All incidents that result in injuries that require reporting for OSHA recordkeeping purposes and all high potential first aid and near miss events require an incident investigation.
2. The Supervisor with assistance from the National Safety Director and/or Safety Coordinator, must complete the incident investigation report/contributing cause analysis within 7 days of the incident and must develop a corrective action plan within 14 days of the incident.

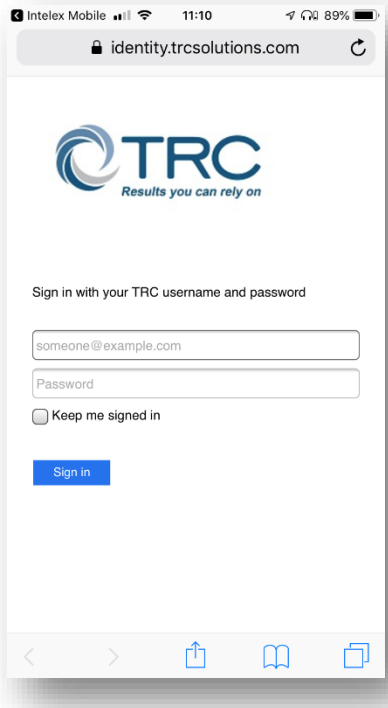
Intelex Mobile Application

How to Download, Setup, and Use

1. Download mobile application
    a. iTunes
    b. Google Play
2. Setup of mobile application
    a. Type in https://clients.intelex.com/Login3/TRCSolutionsinc/ in “Site Link” area and press next



    b. Enter your TRC credentials for TRC Authentication process and complete authentication

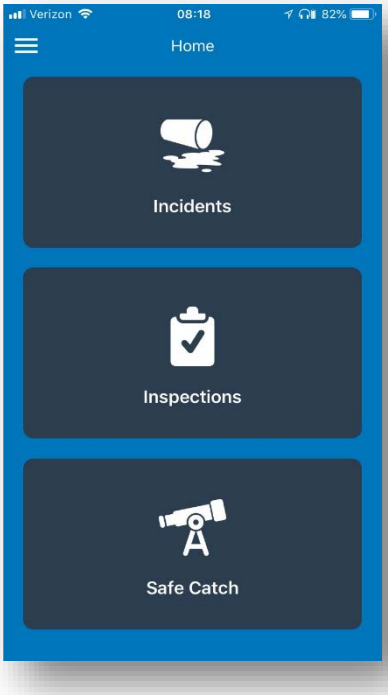


c. Approve the authentication

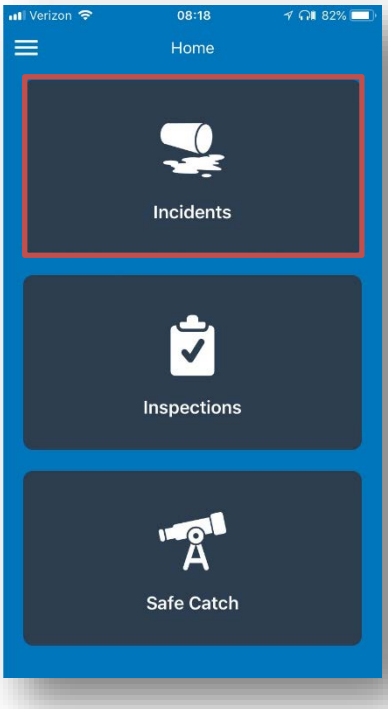
d. A PIN request will then be made. Please enter in your own personal four-digit PIN that will need to be used when using the mobile application.

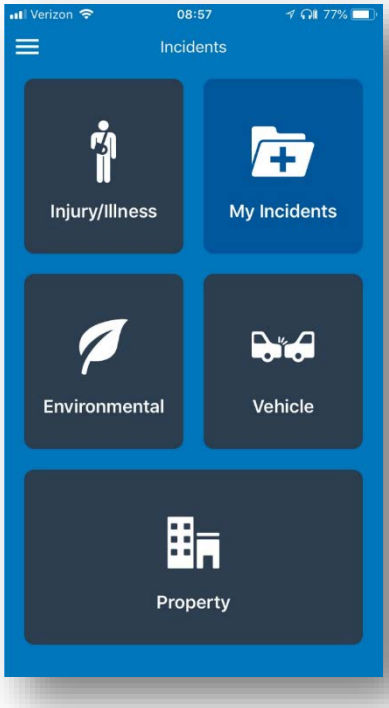
3. Mobile Application

a. Home Screen

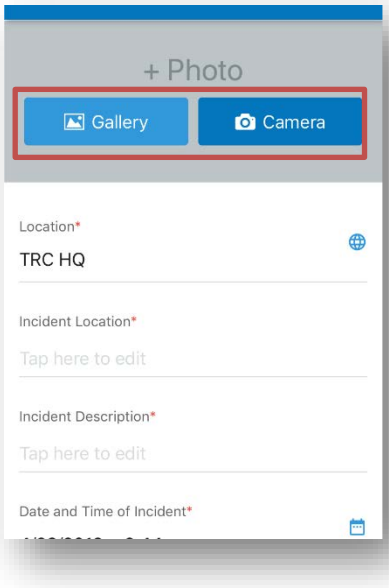


b. Enter an Incident or Near Miss by selecting “Incidents” and then the appropriate incident type

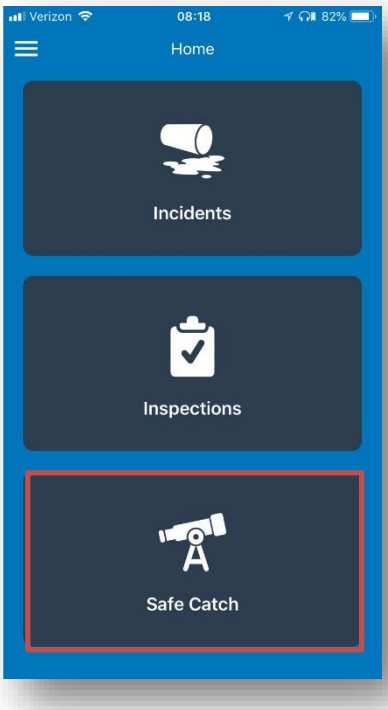


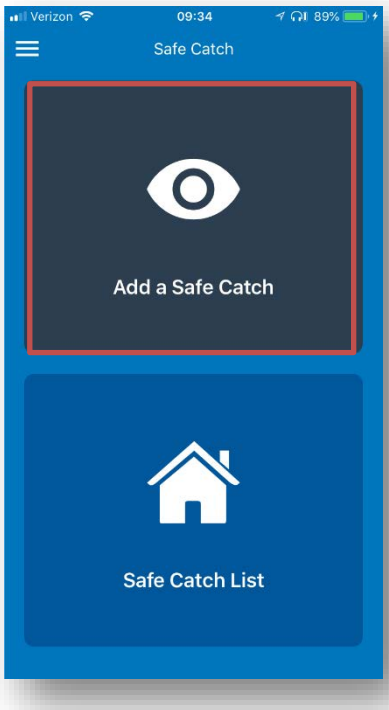


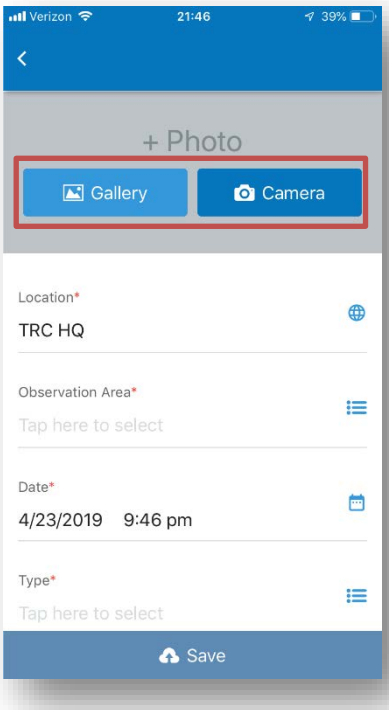
c. Pictures of the incident can be included in the report



d. To enter a Safe Catch, select the safe catch tile from main menu and then “Add a Safe Catch”. Pictures of the safe catch can be included as well.

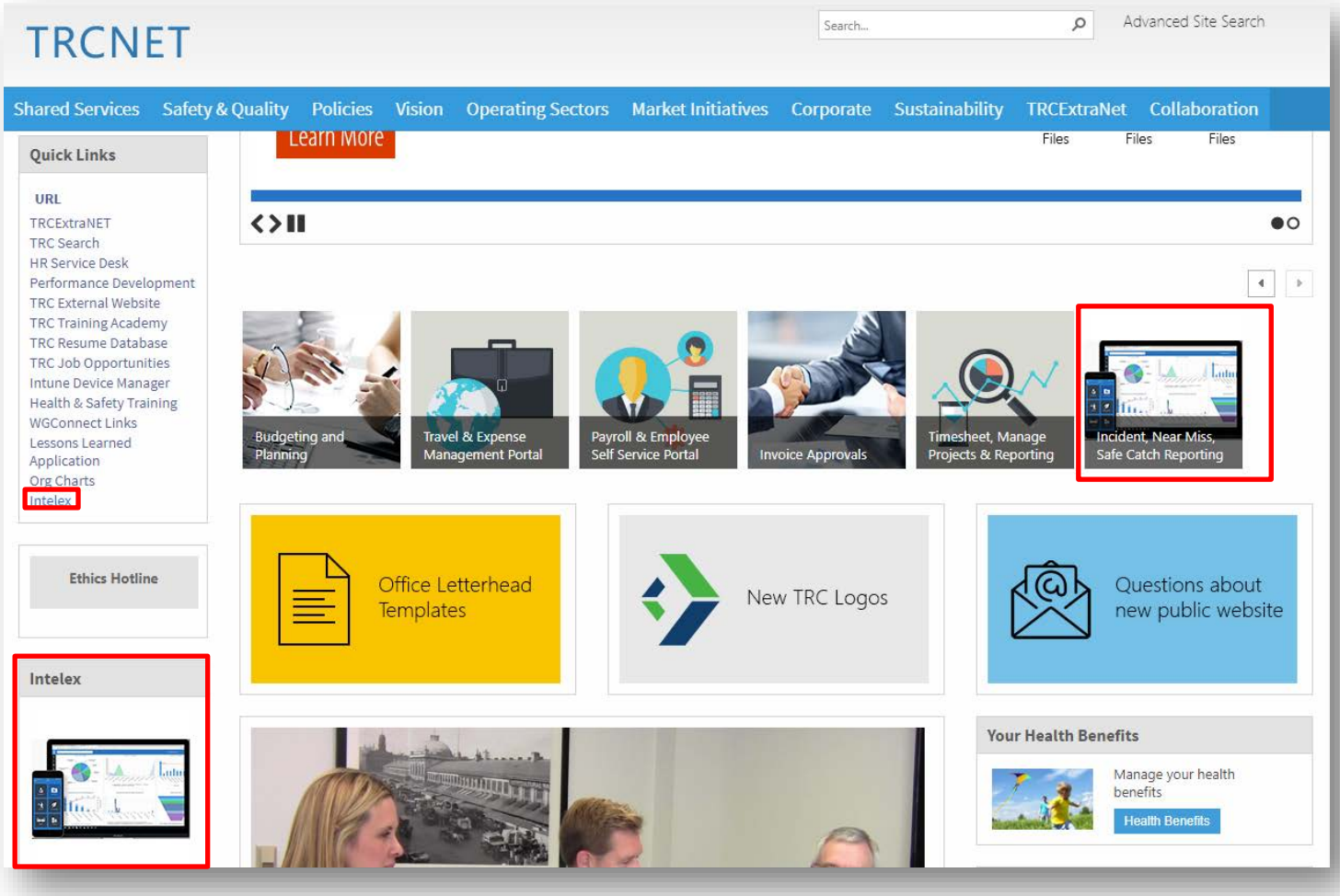




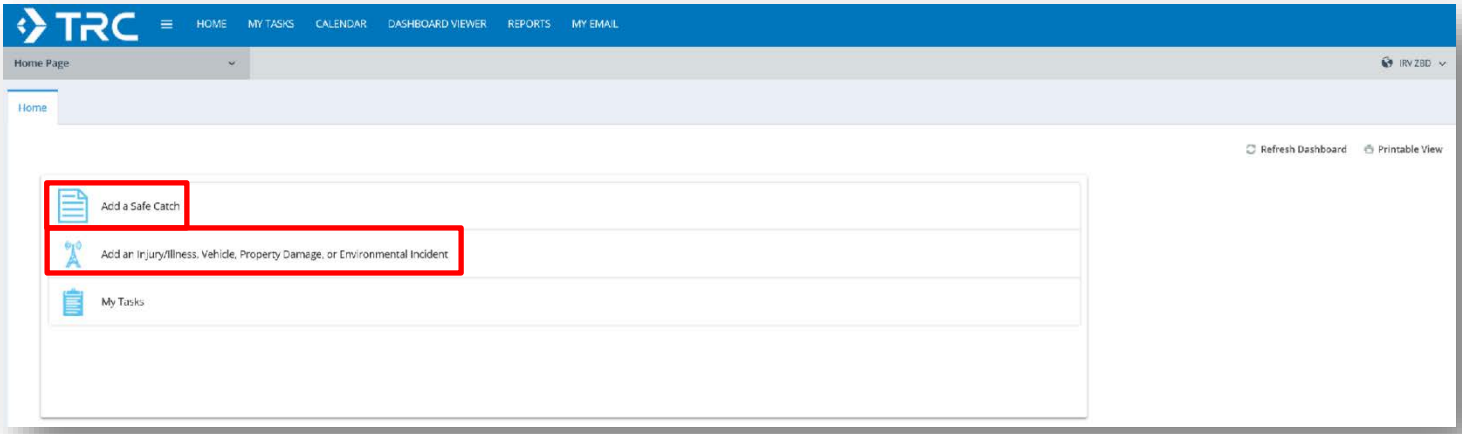


Intelex Web Application
How to Access and Use

1. Accessing Web Application
    a. Go to the TRCNet homepage. Click on one of the three locations on the homepage to access the Intelex Web Application through single sign on.



2. Use of Web Application

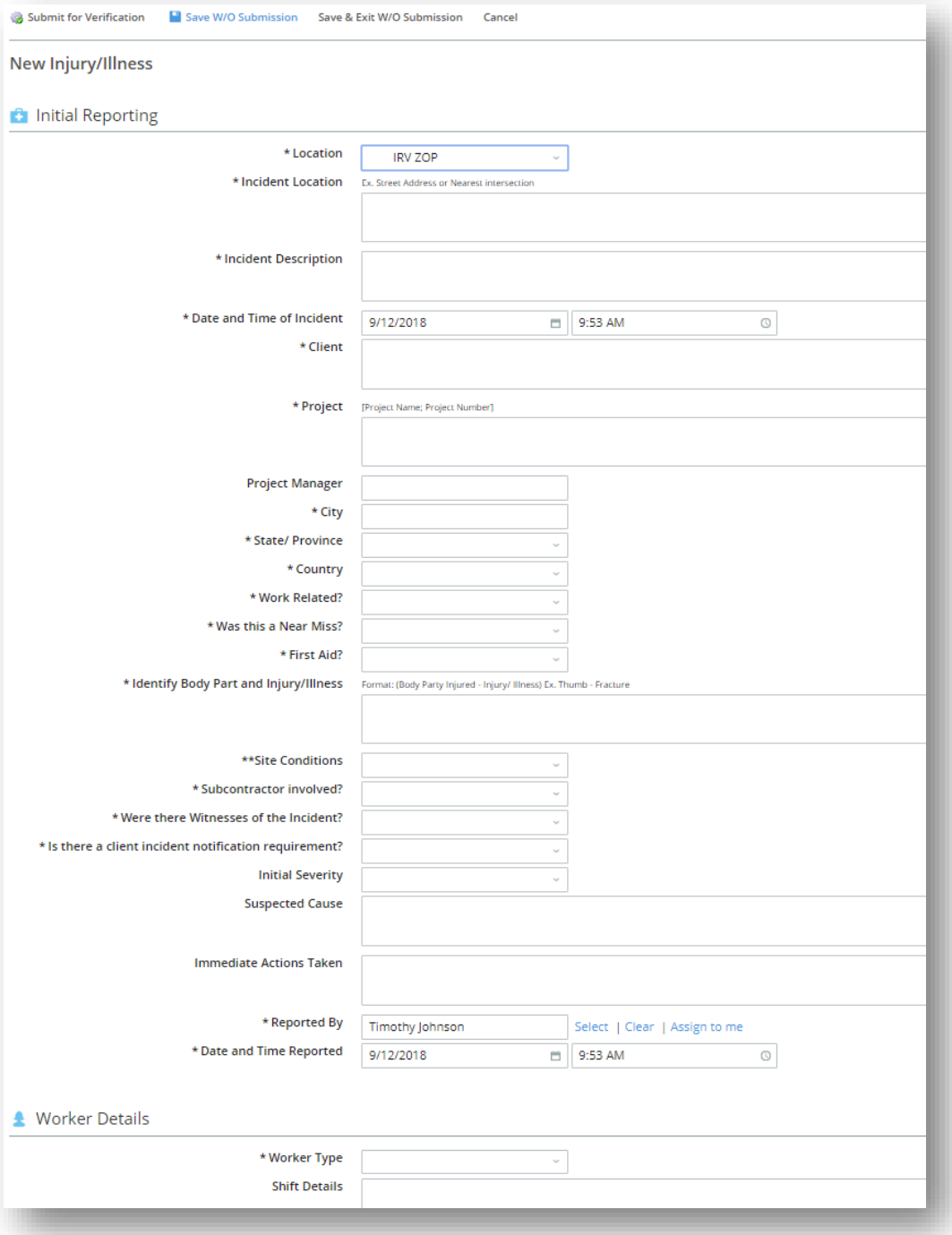


a. Dashboard
   i. You will arrive to a dashboard once you are in the Intelex Web Application.
   ii. You can enter the following incidents by using the “Add Incident” button.
      - Injury/Illness
      - Vehicle
      - Property Damage
      - Environmental
   iii. You can enter a Safe Catch by selecting the “Add Safe Catch” button.

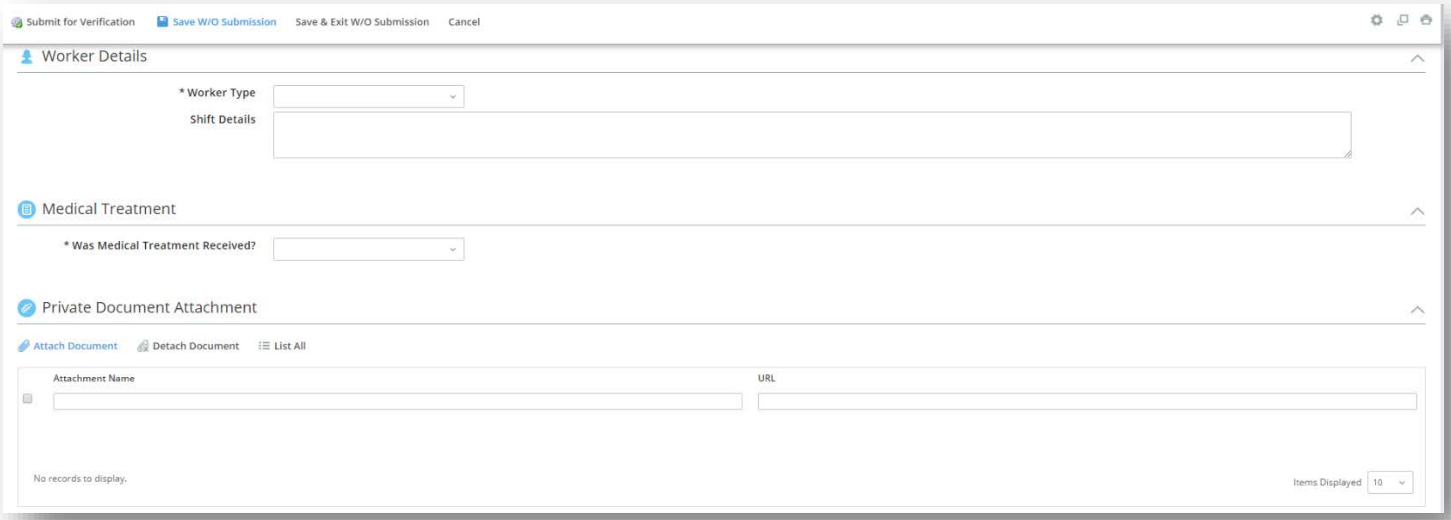
b. Entering of an Incident (Injury/Illness, Property, Vehicle, Environmental, or Near Miss)

i. The same information is gathered for entering incidents in Intelex as the existing TRC Incident Notification Report. There is a Near Miss selection in each incident type.

ii. All items with a star (*) are required to be completed.

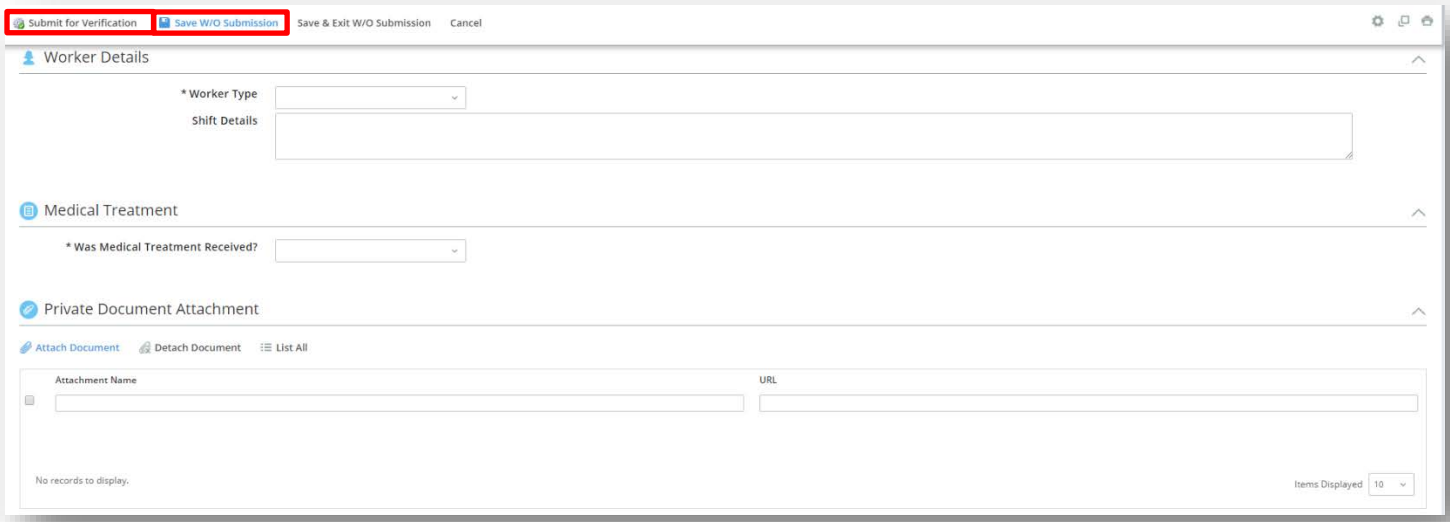


iii. Pictures and other pertinent documents can be uploaded as well by including them in the "Private Document Attachment" area.

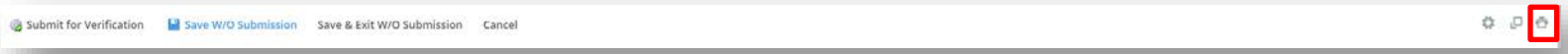


iv. Once the form has been completed, the record should either be "Submit for Verification" or "Save W/O Submission". Here are the definitions of each action.

- Submit for Verification submits the record and moves this incident into the next workflow stage which is Verification. In Verification, the Corporate Safety Department will then be able to review the record and verify that all the details of the incident are correct.
- Save W/O Submission saves the record but does not move the record into the next stage of workflow. This allows you to gather additional details regarding this incident or have the record reviewed by another person by printing out the record. See next step on how to print.



v. If everything is ready for submittal, but you would want another person (supervisor, project manager, Office Practice Leader, etc.) review this submittal by printing the document. Click on image of printer to print or convert record to a pdf.

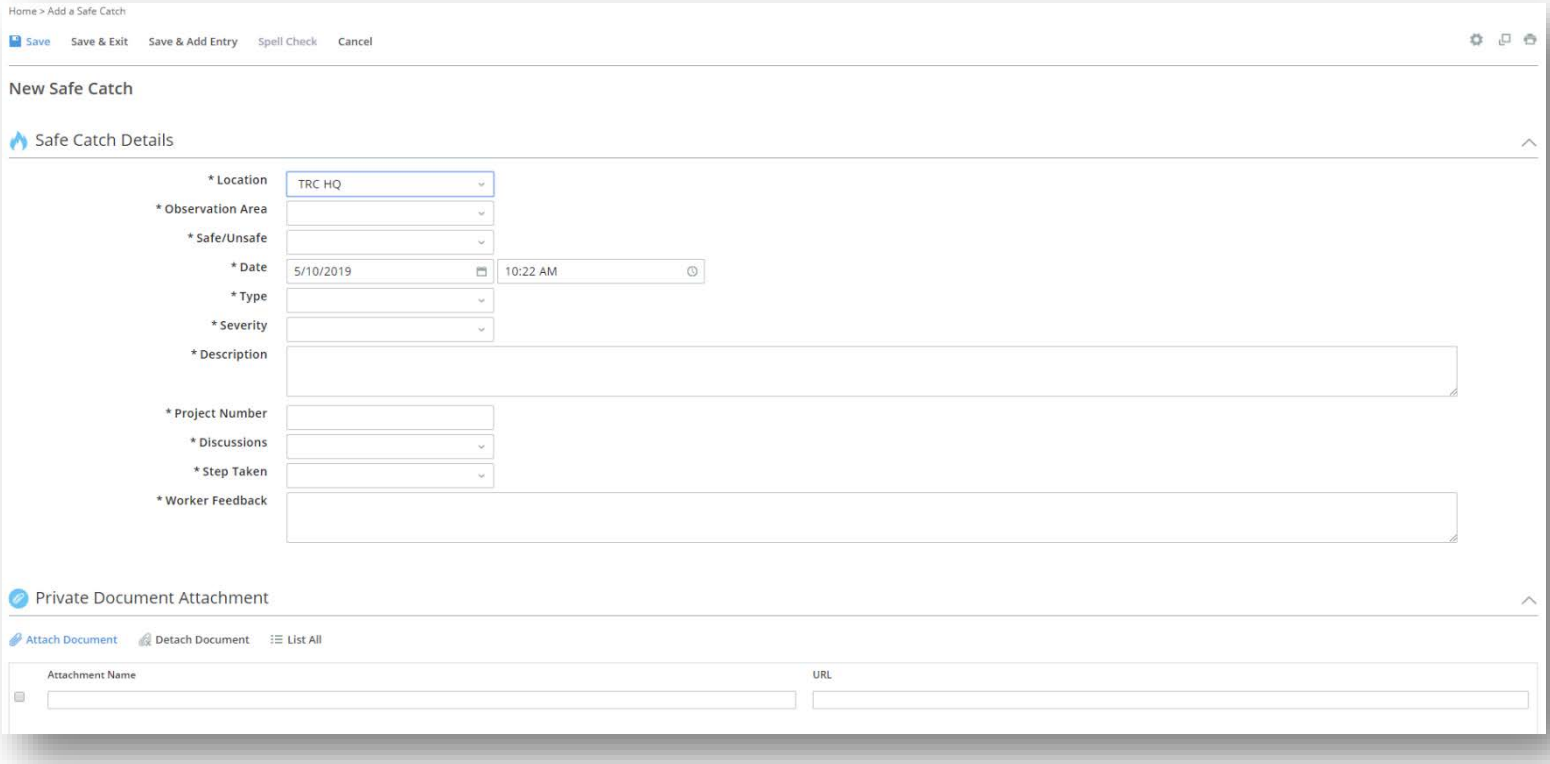


c. Entering a Safe Catch

i. The same information is gathered for entering incidents in Intelex as the existing TRC Safe Catch Report.

ii. All of the starred (*) items are required to be entered before the record can be saved.

iii. If there are pictures or documents, they can be uploaded in the “Private Document Attachment”, similar to the Incident application.



AUTO INCIDENT REPORT

EMPLOYEE INFORMATION (V-1):

Name: _____ Phone: ( ) _____

Sector/Practice: _____ Office Location: _____

Supervisor's Name: _____ Supervisor's Phone: ( ) _____

Project #: _____ Client's Name: _____

Driver's License #: _____ State: _____

VEHICLE INFORMATION (V-1):

Year/Make/Model of Vehicle: _____

License Plate #: _____ Vehicle ID # (VIN): _____

Circle Point of Contact:

Was Vehicle Drivable? ☐ Yes ☐ No

Personal: ☐ Yes Rental: ☐ Yes Fleet: ☐ Yes

Rental Company

INCIDENT INFORMATION:

Date of Incident: _____ Time of Incident: _____ A.M. _____ P.M. Photos Taken: ☐ Yes ☐ No

Location of Incident: _____ City/State: _____

Were The Authorities Contacted? Police: ☐ Yes ☐ No Ambulance: ☐ Yes ☐ No Fire: ☐ Yes ☐ No

Name of Police Dept: _____ Case #: _____ Officer Name: _____

Were Citations Issued? ☐ Yes ☐ No If Yes, To Whom? _____

Citation Number: _____

Were There Any Witnesses? ☐ Yes ☐ No If Yes, Please Provide Name, Address and Phone Below:

Witness Name: _____ Witness Phone: ( ) _____

Witness Address: _____

Traffic Conditions (i.e., heavy, light): _____ Weather Conditions (i.e., dry, wet, ice, fog): _____

WorkCare Contacted? ☐ Yes ☐ No

TRC Driver Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No

Front Seat Passenger Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No

Rear Driver Side Passenger Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No

Rear Passenger Side Passenger Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No

Describe Injuries:

Describe Damage to Property Other Than Motor Vehicles (i.e., guardrails, mailboxes, etc.):

AUTO INCIDENT REPORT

OTHER DRIVER & VEHICLE INFORMATION (V-2):

Driver's Name: _____ Driver's Phone: ( ) _____

Driver's Address: _____

Owner's Name (If different than driver): _____ Owner's Phone: ( ) _____

Owner's Address: _____

Year/Make/Model of Vehicle: _____ License Plate #: _____ State: _____

Circle Point of Contact: 

Was Vehicle Drivable? ☐ Yes ☐ No

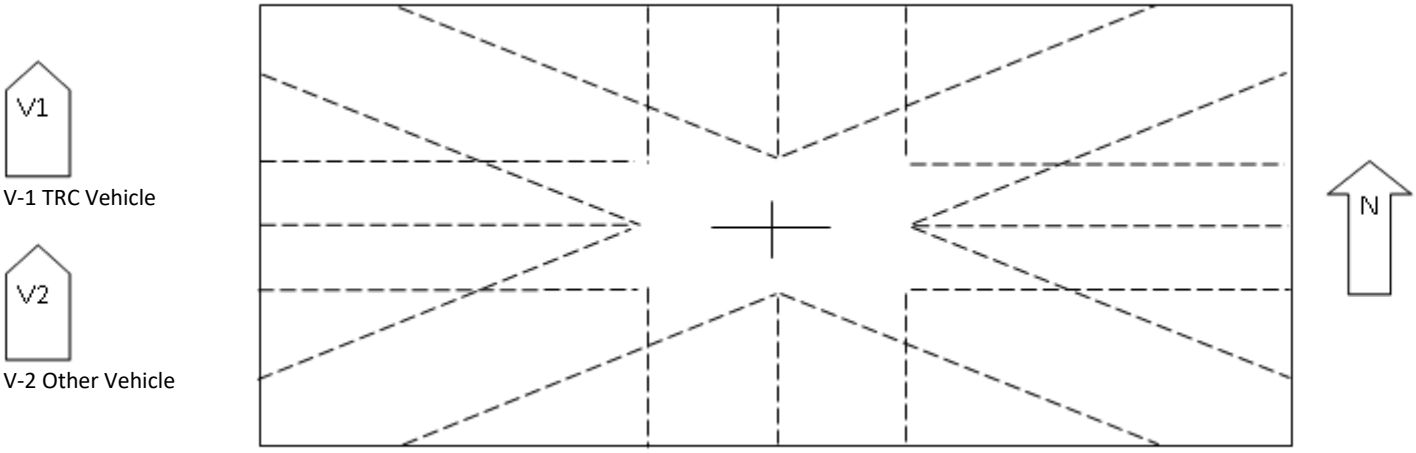
Insurance Company Name: _____ Policy Number: _____

Insurance Company Phone: ( ) _____ Number of Passengers in Vehicle: _____

List Persons Injured: _____

Were Any Other Vehicles Involved in Incident? ☐ Yes ☐ No If yes, provide details below:

PLEASE DESCRIBE THE INCIDENT AND COMPLETE THE DIAGRAM BELOW. Be sure to indicate as many details as possible (i.e., How many lanes in each direction; Were there any turn lanes; What kind of traffic controls were there – light, stop sign, yield sign, Positions of vehicles on impact).



Completed By: _____ Signature: _____

INCIDENT NOTIFICATION REPORT

(To be completed immediately after an Injury, Illness, Incident or Significant Near Miss by Employee's Supervisor and Employee involved)

Incident Category

☐ Injury/Illness ☐ Near Miss/Loss ☐ Property Damage ☐ Other

1 Incident Location: _____

2 Project #: _____

3 Client: _____

4 Date Incident Occurred: _____ Time: _____

5 Date Incident Reported: Time:

TRC Employee Information

6 Name: _____ Phone: _____

7 Office: _____ Address: _____

8 Supervisor Name: _____ Phone: _____

9 Title or Occupation: _____

10 Sector/Practice:

Incident Description

11 Task Performed/Description of Incident:

12 Conditions at the Time of Incident (weather, lighting, etc.):

13 Description of Property Damage:

Employee Injury or Illness Description

14 Describe the Injury or Illness:

15 First Aid/Medical Treatment Administered:

16 Was WorkCare Contacted? ☐ Yes ☐ No

17 Name of Doctor's Office, Clinic or Hospital: _____

18 Address: Phone:

INCIDENT NOTIFICATION REPORT

(To be completed immediately after an Injury, Illness, Incident or Significant Near Miss by Employee's Supervisor and Employee involved)

Subcontractor Involvement

19 Was a subcontractor involved? ☐ Yes ☐ No

20 Name of Company: _____

21 Address: _____

22 Contact Name: _____ Phone: _____

23 Description of the Incident:

Witness Information

24 Were there witnesses to the incident? ☐ Yes ☐ No

25 Name(s) Address(es) Number(s)

_____

_____

Immediate Corrective Actions

26 Describe the Immediate Corrective Actions Taken:

Client Notification

27 Is there a client incident notification requirement? ☐ Yes ☐ No

28 Contact Name _____

29 Date of Notification: _____ Time: _____

30 Notification Method:

Supervisor: _____ Signature: _____ Date: _____

Employee: Signature: Date:

TRC Incident Reporting Guidelines

Incident Response:

1. For life threatening injuries and medical emergencies call 911 or go to the closest emergency room.
2. An injured worker must report an injury to their supervisor immediately.
3. Supervisor is required to complete The TRC Incident Report Form within 24 hours of the reported accident and forward to Bill Russell at Sargent & Associates with a copy to Mike Glenn.

   Bill Russell – Sargent &Associates
   Office: (978) 256-7459; Fax: (978) 256-4941
   bill@sargentandassociates.com

   Mike Glenn, National Safety Director
   Office: (949) 727-7347; Mobile: (949) 697-7418
   mglenn@trcsolutions.com

4. WorkCare can provide assistance in providing first aid advice and directing an injured worker to non-emergency medical care. WorkCare is a service that provides 24/7 access to an Occupational Healthcare physician or clinician.

   WorkCare Incident Intervention
   (888) 449-7787

Return to Work:

1. The injured worker is responsible for providing the Supervisor with a copy of the doctor's note detailing the injury and "return to work" status within 24 hours of the doctor's visit. The supervisor must email or fax the completed TRC Incident Report and Doctor's notes to Sargent & Associates.
2. Sargent & Associates will contact the injured worker and the Supervisor to confirm the facts surrounding the injury.
3. Sargent & Associates will report the injury to the workers' compensation insurance carrier, Zurich.

4. Zurich may contact the injured worker and supervisor to conduct an accident investigation.
5. Sargent & Associates will maintain communication with all parties in order to monitor the medical treatment, and the injured worker's return to work status. They will act as liaison between the injured worker, TRC, and Zurich.
6. Sargent & Associates will work with TRC's Health & Safety, Human Resources, and/or Supervisors to determine if modified duty work is an option, until the injured worker is able to return to full duty work activities.

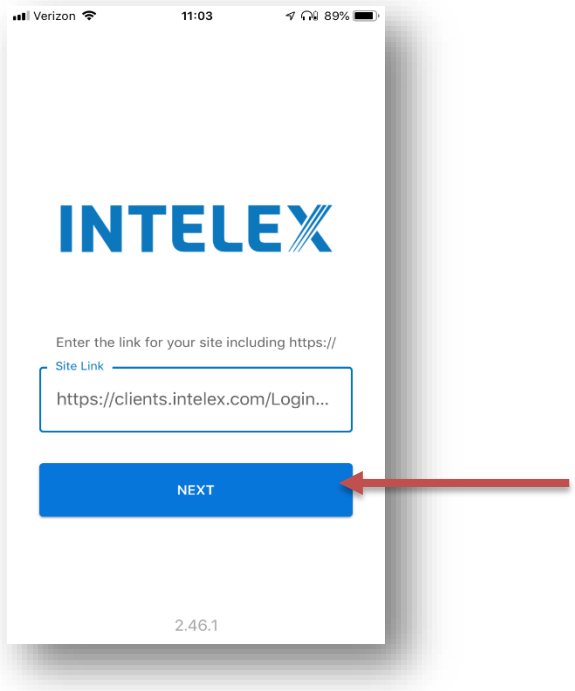
Incident Investigation:

1. All incidents that result in injuries that require reporting for OSHA recordkeeping purposes and all high potential first aid and near miss events require an incident investigation.
2. The Supervisor with assistance from the National Safety Director and/or Safety Coordinator, must complete the incident investigation report/contributing cause analysis within 7 days of the incident and must develop a corrective action plan within 14 days of the incident.

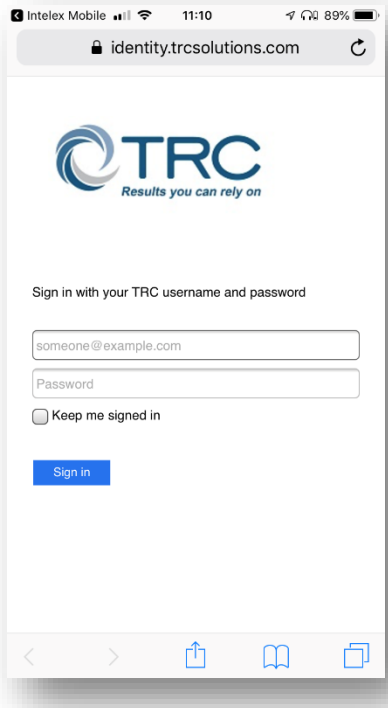
Intelex Mobile Application

How to Download, Setup, and Use

1. Download mobile application
    a. iTunes
    b. Google Play
2. Setup of mobile application
    a. Type in https://clients.intelex.com/Login3/TRCSolutionsinc/ in “Site Link” area and press next



    b. Enter your TRC credentials for TRC Authentication process and complete authentication

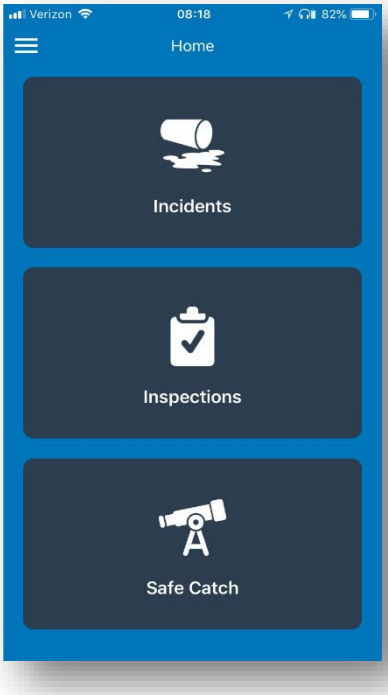


c. Approve the authentication

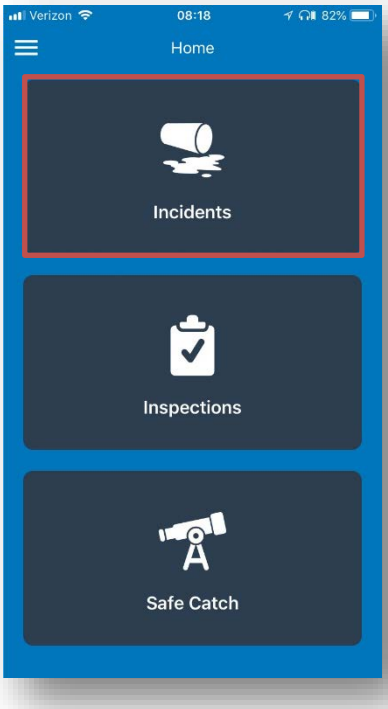
d. A PIN request will then be made. Please enter in your own personal four-digit PIN that will need to be used when using the mobile application.

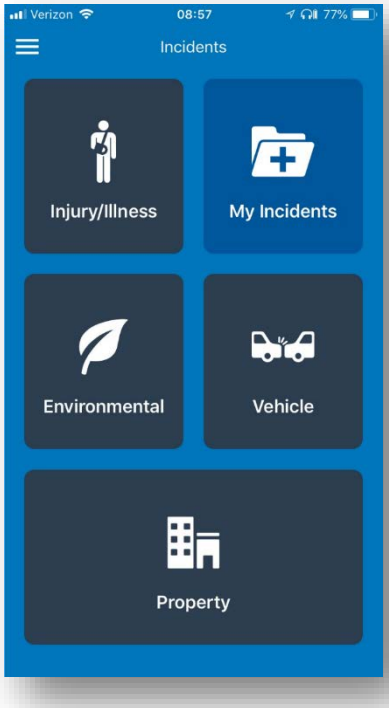
3. Mobile Application

a. Home Screen

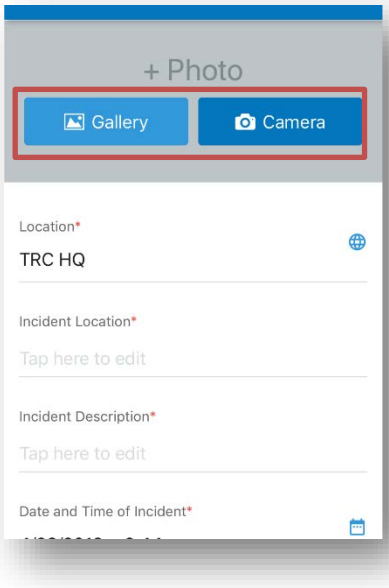


b. Enter an Incident or Near Miss by selecting “Incidents” and then the appropriate incident type

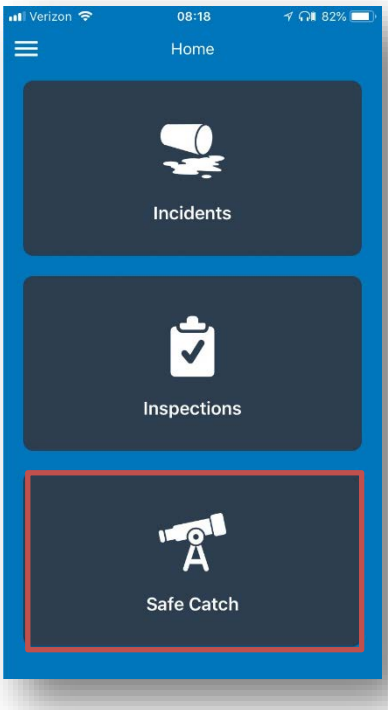


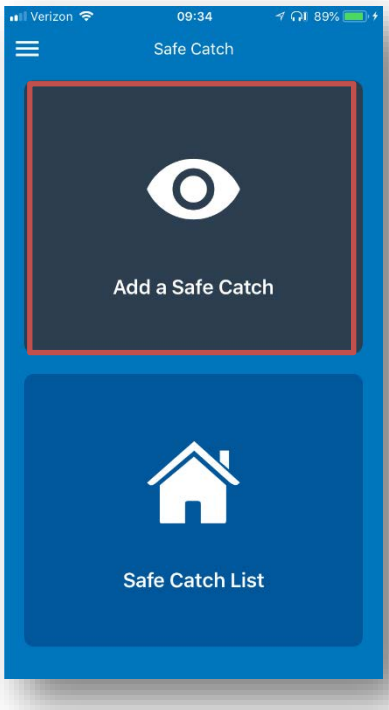


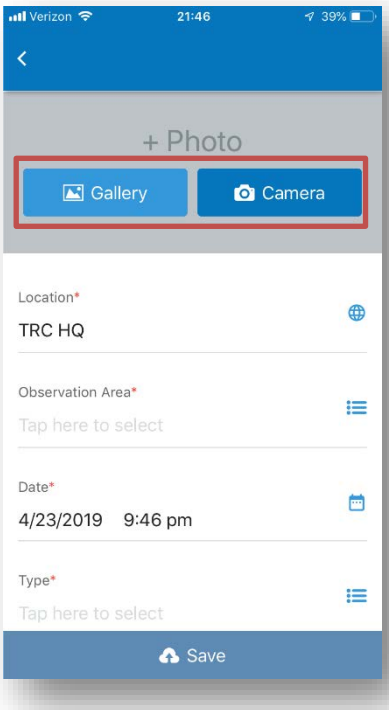
c. Pictures of the incident can be included in the report



d. To enter a Safe Catch, select the safe catch tile from main menu and then “Add a Safe Catch”. Pictures of the safe catch can be included as well.

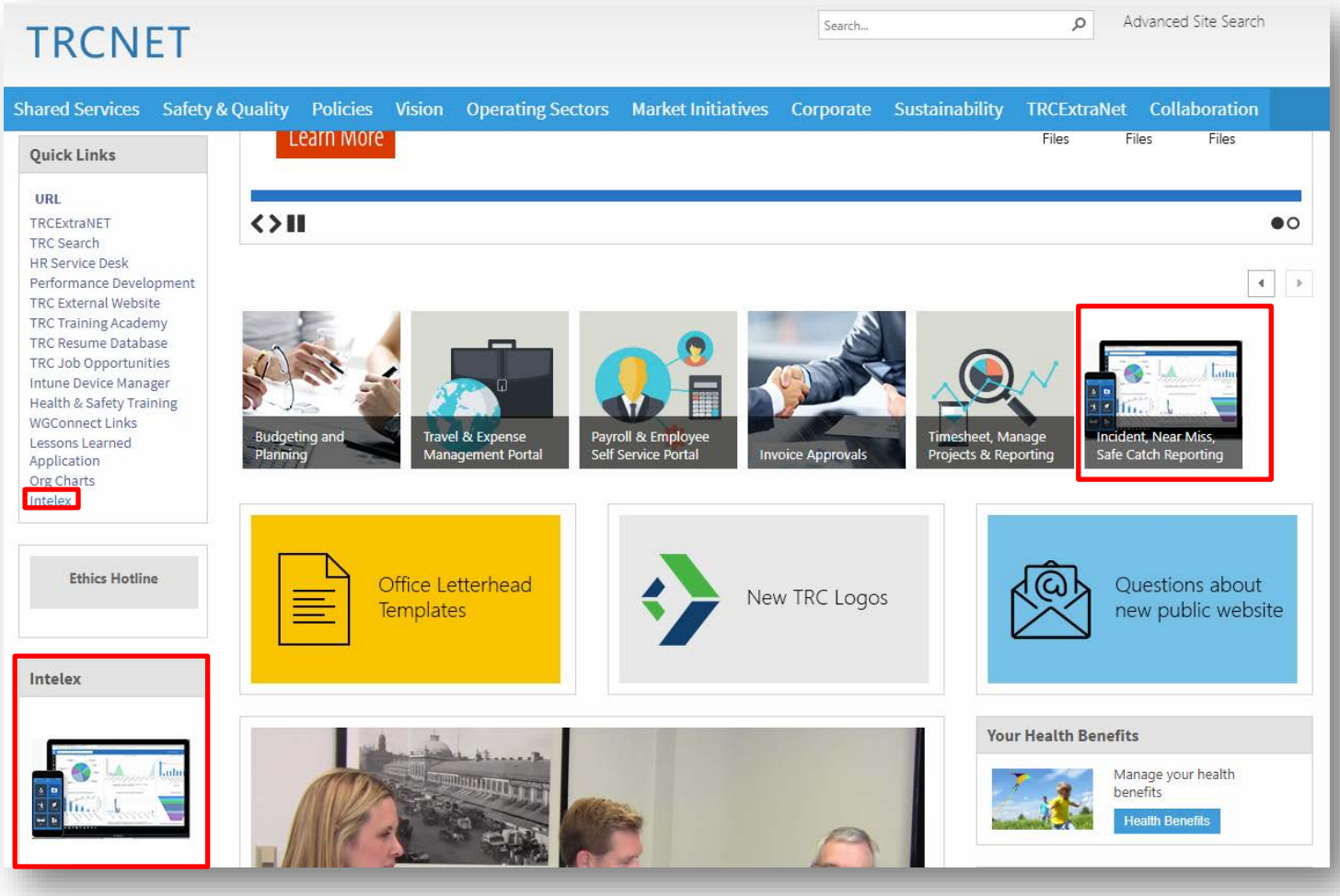




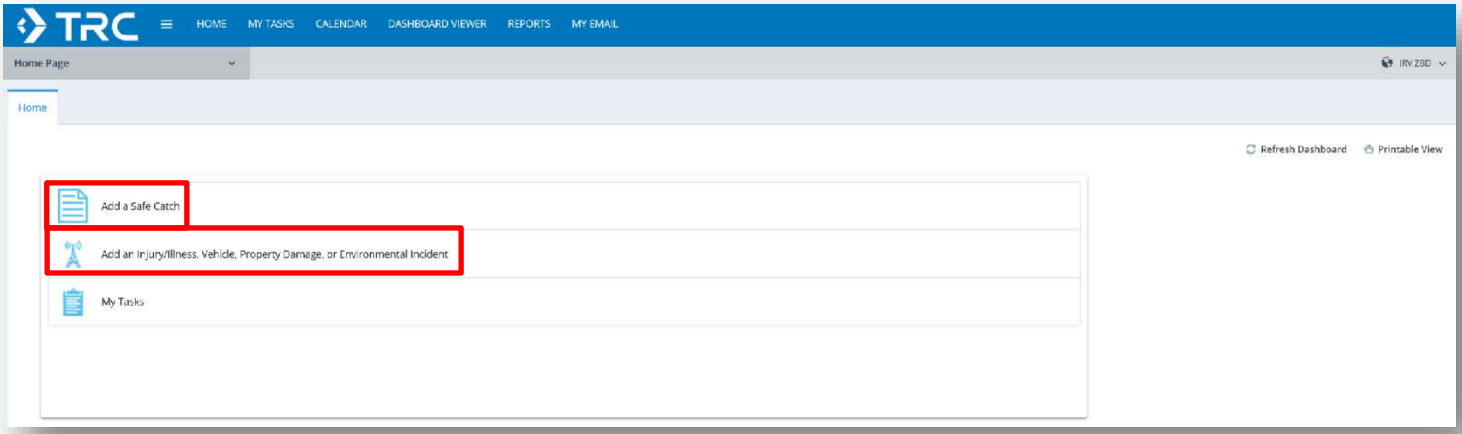


Intelex Web Application
How to Access and Use

1. Accessing Web Application
    a. Go to the TRCNet homepage. Click on one of the three locations on the homepage to access the Intelex Web Application through single sign on.



2. Use of Web Application

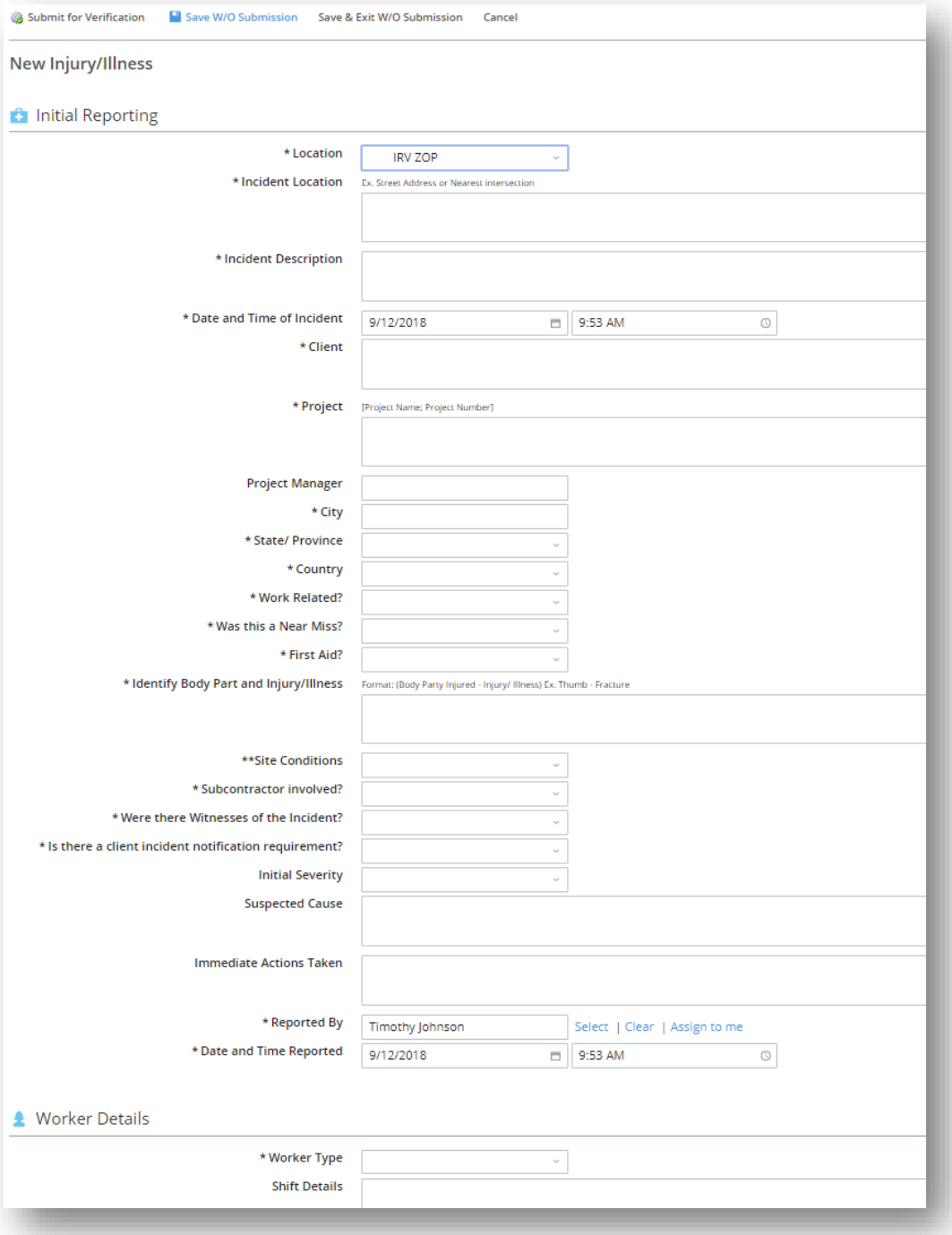


a. Dashboard
   i. You will arrive to a dashboard once you are in the Intelex Web Application.
   ii. You can enter the following incidents by using the “Add Incident” button.
      - Injury/Illness
      - Vehicle
      - Property Damage
      - Environmental
   iii. You can enter a Safe Catch by selecting the “Add Safe Catch” button.

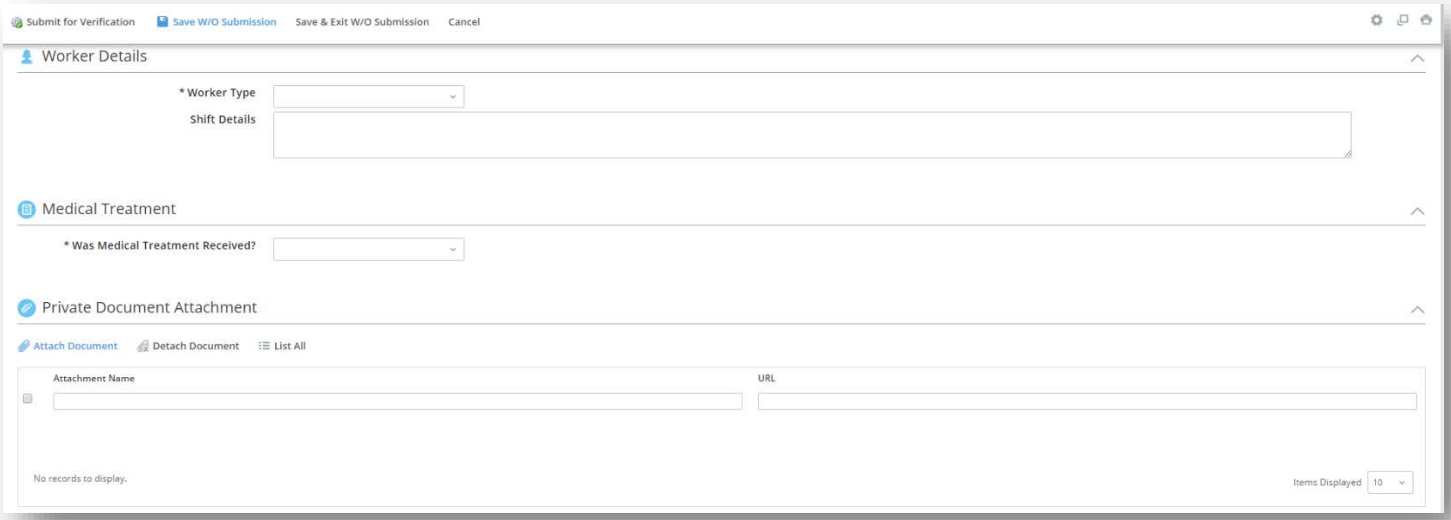
b. Entering of an Incident (Injury/Illness, Property, Vehicle, Environmental, or Near Miss)

i. The same information is gathered for entering incidents in Intelex as the existing TRC Incident Notification Report. There is a Near Miss selection in each incident type.

ii. All items with a star (*) are required to be completed.

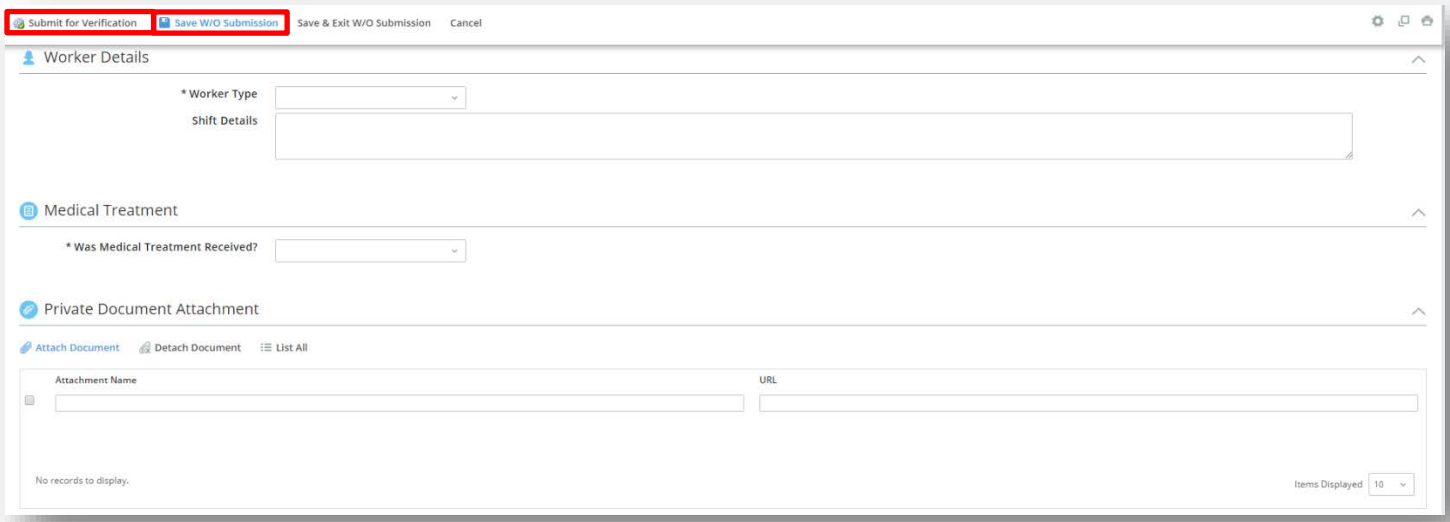


iii. Pictures and other pertinent documents can be uploaded as well by including them in the "Private Document Attachment" area.

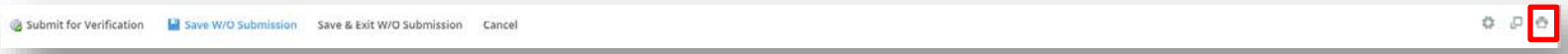


iv. Once the form has been completed, the record should either be "Submit for Verification" or "Save W/O Submission". Here are the definitions of each action.

- Submit for Verification submits the record and moves this incident into the next workflow stage which is Verification. In Verification, the Corporate Safety Department will then be able to review the record and verify that all the details of the incident are correct.
- Save W/O Submission saves the record but does not move the record into the next stage of workflow. This allows you to gather additional details regarding this incident or have the record reviewed by another person by printing out the record. See next step on how to print.



v. If everything is ready for submittal, but you would want another person (supervisor, project manager, Office Practice Leader, etc.) review this submittal by printing the document. Click on image of printer to print or convert record to a pdf.

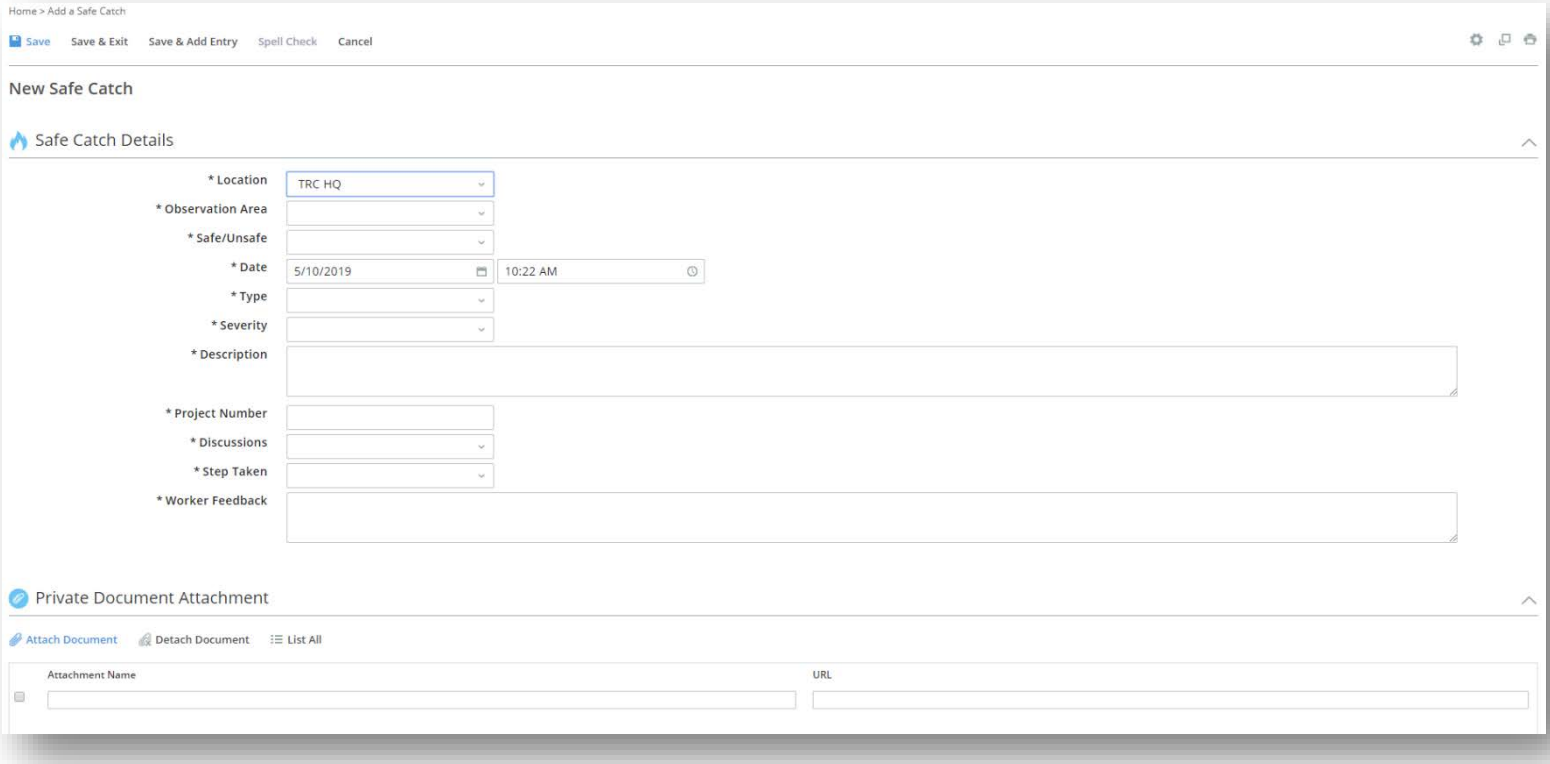


c. Entering a Safe Catch

i. The same information is gathered for entering incidents in Intelex as the existing TRC Safe Catch Report.

ii. All of the starred (*) items are required to be entered before the record can be saved.

iii. If there are pictures or documents, they can be uploaded in the “Private Document Attachment”, similar to the Incident application.



AUTO INCIDENT REPORT

EMPLOYEE INFORMATION (V-1):

Name: _____ Phone: ( ) _____

Sector/Practice: _____ Office Location: _____

Supervisor's Name: _____ Supervisor's Phone: ( ) _____

Project #: _____ Client's Name: _____

Driver's License #: _____ State: _____

VEHICLE INFORMATION (V-1):

Year/Make/Model of Vehicle: _____

License Plate #: _____ Vehicle ID # (VIN): _____

Circle Point of Contact:

Was Vehicle Drivable? ☐ Yes ☐ No

Personal: ☐ Yes Rental: ☐ Yes Fleet: ☐ Yes

Rental Company

INCIDENT INFORMATION:

Date of Incident: _____ Time of Incident: _____ A.M. _____ P.M. Photos Taken: ☐ Yes ☐ No

Location of Incident: _____ City/State: _____

Were The Authorities Contacted? Police: ☐ Yes ☐ No Ambulance: ☐ Yes ☐ No Fire: ☐ Yes ☐ No

Name of Police Dept: _____ Case #: _____ Officer Name: _____

Were Citations Issued? ☐ Yes ☐ No If Yes, To Whom? _____

Citation Number: _____

Were There Any Witnesses? ☐ Yes ☐ No If Yes, Please Provide Name, Address and Phone Below:

Witness Name: _____ Witness Phone: ( ) _____

Witness Address: _____

Traffic Conditions (i.e., heavy, light): _____ Weather Conditions (i.e., dry, wet, ice, fog): _____

WorkCare Contacted? ☐ Yes ☐ No

TRC Driver Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No

Front Seat Passenger Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No

Rear Driver Side Passenger Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No

Rear Passenger Side Passenger Injured? ☐ Yes ☐ No Medical Treatment Received? ☐ Yes ☐ No

Describe Injuries:

Describe Damage to Property Other Than Motor Vehicles (i.e., guardrails, mailboxes, etc.):

AUTO INCIDENT REPORT

OTHER DRIVER & VEHICLE INFORMATION (V-2):

Driver's Name: _____ Driver's Phone: ( ) _____

Driver's Address: _____

Owner's Name (If different than driver): _____ Owner's Phone: ( ) _____

Owner's Address: _____

Year/Make/Model of Vehicle: _____ License Plate #: _____ State: _____

Circle Point of Contact: 

Was Vehicle Drivable? ☐ Yes ☐ No

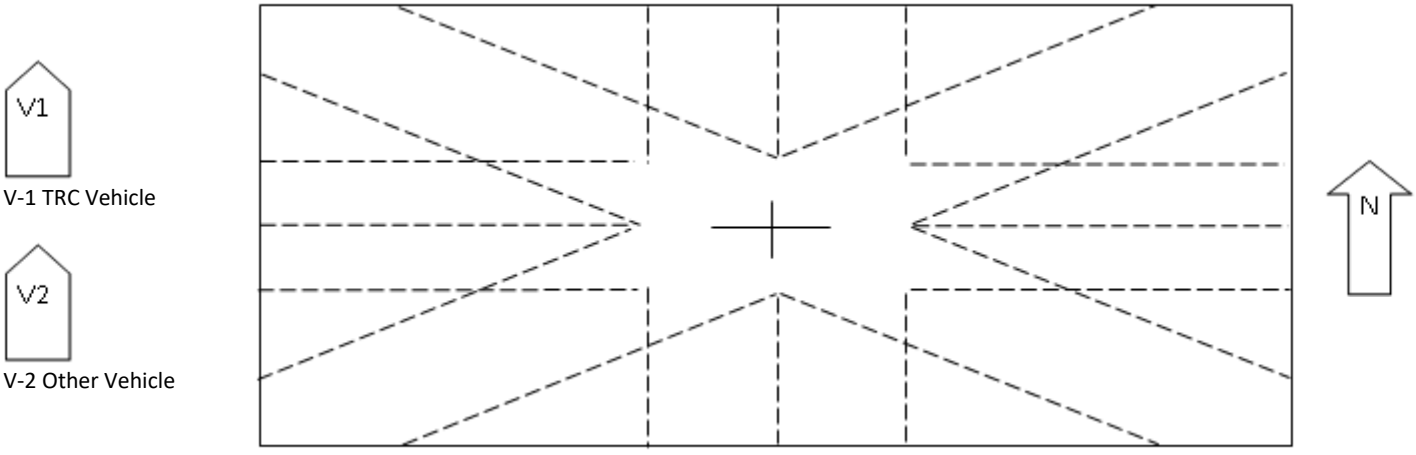
Insurance Company Name: _____ Policy Number: _____

Insurance Company Phone: ( ) _____ Number of Passengers in Vehicle: _____

List Persons Injured: _____

Were Any Other Vehicles Involved in Incident? ☐ Yes ☐ No If yes, provide details below:

PLEASE DESCRIBE THE INCIDENT AND COMPLETE THE DIAGRAM BELOW. Be sure to indicate as many details as possible (i.e., How many lanes in each direction; Were there any turn lanes; What kind of traffic controls were there – light, stop sign, yield sign, Positions of vehicles on impact).



Completed By: _____ Signature: _____

INCIDENT NOTIFICATION REPORT

(To be completed immediately after an Injury, Illness, Incident or Significant Near Miss by Employee's Supervisor and Employee involved)

Incident Category

☐ Injury/Illness ☐ Near Miss/Loss ☐ Property Damage ☐ Other

1 Incident Location: _____

2 Project #: _____

3 Client: _____

4 Date Incident Occurred: _____ Time: _____

5 Date Incident Reported: Time:

TRC Employee Information

6 Name: _____ Phone: _____

7 Office: _____ Address: _____

8 Supervisor Name: _____ Phone: _____

9 Title or Occupation: _____

10 Sector/Practice:

Incident Description

11 Task Performed/Description of Incident:

12 Conditions at the Time of Incident (weather, lighting, etc.):

13 Description of Property Damage:

Employee Injury or Illness Description

14 Describe the Injury or Illness:

15 First Aid/Medical Treatment Administered:

16 Was WorkCare Contacted? ☐ Yes ☐ No

17 Name of Doctor's Office, Clinic or Hospital: _____

18 Address: Phone:

INCIDENT NOTIFICATION REPORT

(To be completed immediately after an Injury, Illness, Incident or Significant Near Miss by Employee's Supervisor and Employee involved)

Subcontractor Involvement

19 Was a subcontractor involved? ☐ Yes ☐ No

20 Name of Company: _____

21 Address: _____

22 Contact Name: _____ Phone: _____

23 Description of the Incident:

Witness Information

24 Were there witnesses to the incident? ☐ Yes ☐ No

25 Name(s) Address(es) Number(s)

_____

_____

Immediate Corrective Actions

26 Describe the Immediate Corrective Actions Taken:

Client Notification

27 Is there a client incident notification requirement? ☐ Yes ☐ No

28 Contact Name _____

29 Date of Notification: _____ Time: _____

30 Notification Method:

Supervisor: _____ Signature: _____ Date: _____

Employee: Signature: Date:

Appendix I
Acknowledgement

PERSONAL ACKNOWLEDGEMENT

A component of the Health and Safety Plan (HASP), designed to provide personnel safety during this subsurface investigation requires that you receive training as described in the HASP prior to working at this site. Additionally, you are required to read and understand the HASP. When you have fulfilled these requirements, please sign and date this personal acknowledgement:

Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date

APPENDIX B
QUALITY ASSURANCE PROJECT PLAN

MTA LONG ISLAND RAIL ROAD

ARCH STREET YARD

LONG ISLAND CITY, NEW YORK

QUALITY ASSURANCE PROJECT PLAN
FOR
SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

Prepared for:

METROPOLITAN TRANSPORTATION AUTHORITY

LONG ISLAND RAIL ROAD

Prepared by:

TRC ENGINEERS, INC.

NEW YORK, NEW YORK

FEBRUARY 2021

MTA LIRR – ARCH STREET YARD
QUALITY ASSURANCE PROJECT PLAN FOR
SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

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1.0 QUALITY ASSURANCE PROJECT PLAN

1.1 Objective and Scope

The Long Island Railroad (LIRR) entered into a Voluntary Cleanup Agreement (NYSDEC Index Nos. W1-0993-04-04 and W2-0994-04-04) with the New York State Department of Environmental Conservation (NYSDEC) and Metropolitan Transportation Authority (MTA) in order to investigate and remediate the LIRR Arch Street Yard (the Yard). The Yard is currently owned by the LIRR and is approximately eight acres in size. The area of the Yard that is subject to the VCA, is an approximately 0.3-acre portion of the Yard designated as NYSDEC Site No. V00733 (herein referred to as "the Site").

A Remedial Action Work Plan (RAWP) dated October 2019 was developed for the Site to address a residual area of "hot-spot" of chlorinated volatile organic compound (VOC) contaminated subsurface soil and groundwater in a discrete area of the Yard to the south of the tracks. As discussed in detail in the October 2019 RAWP, remedial activities to be completed at the Site will include the injection of amendments to stimulate chemical and biological reduction of chlorinated VOCs, as well as the implementation of institutional controls. However, it was determined that additional evaluation of Site surface soil was necessary to determine if a soil cover or cap would be required as part of the remedy. A Supplemental Remedial Investigation (SRI) Work Plan, dated 2021, has been prepared to address these data gaps. SRI activities include the collection and laboratory analysis of fifteen surface soil samples for VOCs and semi-volatile organic compounds (SVOCs).

The purpose of this Quality Assurance Project Plan (QAPP) is to develop and describe the detailed sample collection and analytical procedures that will ensure high quality data for the environmental sampling that will be completed by TRC Engineers, Inc. (TRC) throughout implementation of the SRI Work Plan. It should be noted, TRC has prepared this QAPP based on a prior submission to NYSDEC by D&B Architects & Engineers, P.C. (D&B) in September 2018.

1.2 Data Usage

The data generated from the sampling covered by this QAPP will be utilized for various purposes depending on the type of sampling performed. The summary below provides a brief description of the sampling activities that may be undertaken in support of the SRI to be completed at the Site. Additional details on the SRI to be completed at the Site are provided in the February 2021 SRI Work Plan. Data generated during the SRI will be evaluated to determine if a soil cap/cover shall be included in the RAWP.

1.3 Sampling Program Design and Rationale

The following presents a general discussion of the sampling that may be conducted in support of remedial activities to be conducted at the Site.

- Surface Soil – Surface soil samples will be collected on-site from borings as part of the SRI to: determine the extent of impacted surface soil.

1.4 Analytical Parameters

Soil samples collected from the Site will be analyzed for VOCs via United States Environmental Protection Agency (USEPA) Methods 5035 and 8260 (using the En Core sampling method). Additionally, soil samples will be analyzed for SVOCs via USEPA Method 8270.

Table 1-1 presents a summary of the parameters/sample fractions to be analyzed with the typical sample location, type of sample, sample matrix, type of sample container, method of preservation, holding time and analytical method.

1.5 Data Quality Requirements

Data quality requirements and assessment are provided in the 7/05 NYSDEC ASP, which includes the detection limit for each parameter and sample matrix. Note that quantification limits, estimated accuracy, accuracy protocol, estimated precision and precision protocol are determined

by the laboratory and will be in conformance with the requirements of the 2005 NYSDEC ASP, where applicable. Table 1-2 presents a summary of the data quality requirements.

Table 1-1

SUMMARY OF MONITORING PARAMETERS/SAMPLE FRACTIONS

Sample Location	Sample Type	Sample Matrix	Sample Fraction	Container Type/Size/No.	Sample Preservation	Maximum Holding Time	Analytical Method
Surface Soil Samples	Grab	Soil	TCL VOCs	En Core Sampler/3 or equivalent	Cool to 4°C	2 days after VTSR for prep/10 days for analysis	7/05 NYSDEC ASP, USEPA Methods 5035 and 8260
Groundwater Monitoring Wells/Groundwater Probes	Grab	Soil	TCL SVOCs	Glass/amber/8 oz./3 ICHEM 300 series or equivalent	Cool to 4°C	14 days after VTSR for analysis	7/05 NYSDEC ASP, USEPA Method 8270

VTSR - Verified time of sample receipt at the laboratory.
Most recent versions of the analytical methods will be utilized.
QA/QC samples will be collected based upon the frequency of sampling and the final number and schedule of samples collected. Details regarding sampling frequency for the SRI are defined in the SRI Work Plan.

Table 1-2

DATA QUALITY REQUIREMENTS
OBJECTIVES FOR PRECISION AND ACCURACY

Parameter	Sample Matrix	CRDL*	Estimated Accuracy	Accuracy Protocol**	Estimated Precision	Precision Protocol**
Volatile Organics	Solid	5-10 ug/kg	0.87 – 2.48 ug/l	Vol. IB, Chapter 4, Method 8260, Table 7	0.11 – 4.00 ug/l	Vol. IB, Chapter 4, Method 8260, Table 7
Base Neutrals	Solid	10-50 ug/kg	0.29 – 1.23 ug/l	Vol. IV, Part XIX Method 8270, Table 7	0.13 – 1.05 ug/l	Vol IV, Part XIX Method 8270, Table 7
Acid Extractables	Solid	10-50 ug/kg	0.29 – 1.23 ug/l	Vol. IV, Part XIX Method 8270, Table 7	0.13 – 1.055 ug/l	Vol. IV, Part XIX Method 8270, Table 7

*Contract Required Detection Limits.
**Reference: NYSDEC 7/05 ASP and EPA/600/R-08/092

Table 1-2 (continued)

DATA QUALITY REQUIREMENTS
OBJECTIVES FOR PRECISION AND ACCURACY

Matrix/Parameter	Precision %	Accuracy %
Soil		
VOCs[(a)]	See Table 1-2a	See Table 1-2a
SVOCs[(a)]	See Table 1-2b	See Table 1-2b

Notes:

(a) Accuracy will be determined as percent recovery of surrogate spike compounds and matrix spike compounds. Surrogate and matrix spike compounds for VOCs and SVOCs are listed in Tables 1-2a and 1-2b, respectively. Precision will be estimated as the relative standard deviation of the percent recoveries per matrix.

Source: NYSDEC ASP

Table 1-2a

DATA QUALITY REQUIREMENTS
ACCURACY AND PRECISION REQUIREMENTS FOR VOCs

	Low/Medium Soil	
	Spike Recovery Limits (%)	Precision %
Surrogate Compound		
Toluene-d8	84 – 138	--
4-Bromofluorobenzene	59 – 113	--
1,2-Dichloroethane-d4	70 – 121	--
Matrix Spike Compound		
1,1-Dichloroethene	59 – 172	≤ 22
Trichloroethane	62 – 137	≤ 24
Chlorobenzene	60 – 133	≤ 21
Toluene	59 – 139	≤ 21
Benzene	66 – 142	≤ 21

Source: NYSDEC ASP

Table 1-2b

DATA QUALITY REQUIREMENTS
ACCURACY AND PRECISION REQUIREMENTS FOR SVOCs

	Low/Medium Soil	
	Spike Recovery Limits (%)	Precision %
Surrogate Compound		
Phenol-d5	28-142	--
2-Fluorophenol	26-141	--
2,4,6-Tribromophenol	29-150	--
Nitrobenzene-d5	30-150	--
2-Fluorobiphenyl	19-182	--
Terphenyl-d14	24-191	--
Matrix Spike Compound		
Anthracene	27-158	≤ 20
Acenaphthene	32-146	≤ 20
Acenaphthylene	28-155	≤ 20
Benzo(a)anthracene	27-159	≤ 20
Benzo(b)fluoranthene	21-171	≤ 20
Benzo(k)fluoranthene	26-165	≤ 20
Benzo(g,h,i)perylene	10-177	≤ 20
Benzo(a)pyrene	26-157	≤ 20
Chrysene	23-166	≤ 20
Dibenzo(a,h)anthracene	18-147	≤ 20
Fluoranthene	26-155	≤ 20
Fluorene	17-166	≤ 20
Indeno(1,2,3-cd)pyrene	10-188	≤ 20
Phenanthrene	30-149	≤ 20
Pyrene	22-173	≤ 20

Note: Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis.

The methods of analysis will be in accordance with SW-846 and 7/05 NYSDEC ASP. Specific analytical procedures and laboratory QA/QC descriptions are not included in this QAPP, but will be available upon request from the laboratory selected to perform the analyses. The laboratory will be New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified for organic and inorganic analyses.

1.5.1 Data Representativeness

Representative samples will be collected as follows:

- Surface Soil (Boring) – Samples will be collected using a decontaminated hand auger.

1.5.2 Data Comparability

All data will be presented in the units designated by the methods specified by a NYSDOH ELAP certified laboratory and the 7/05 NYSDEC ASP. In addition, sample locations, collection procedures and analytical methods from earlier studies will be evaluated for comparability with current procedures/methods.

1.5.3 Data Completeness

The acceptability of 100% of the data is desired as a goal for this project. The acceptability of less than 100% complete data, meeting all laboratory Quality Assurance/Quality Control (QA/QC) protocols/standards, will be evaluated on a case-by-case basis.

The laboratory utilized to perform the analyses on the soil and groundwater samples will provide NYSDEC ASP Category B Deliverables. All data will be provided in the NYSDEC EQuIS format.

1.6 Detailed Sampling Procedures

Environmental samples will be collected from different locations throughout the Site as part of activities completed in support of the SRI. These will include surface soil samples. Sample locations will consist of soil borings.

General sampling approaches and equipment are described in this section. A summary of the sampling program for the SRI is detailed in the SRI Work Plan

When collecting the samples, care will be taken to maintain sample integrity by preserving its physical form and chemical composition to as great an extent as possible. An appropriate sampling device (i.e., decontaminated or dedicated equipment) will be utilized to transfer the sample into the sample container. Every effort will be made to ensure that the sample is a proper representation of the matrix from which it was collected. The sample will be transferred into the sample container as quickly as possible. Soil samples to be analyzed for VOCs will be collected using the En Core sampling method in accordance with USEPA Method 5035.

Several steps will be taken after the transfer of the soil sample into the sample container that are necessary to properly complete collection activities. Once the sample is transferred into the appropriate container, the container will be capped and, if necessary, the outside of the container will be wiped with a clean paper towel to remove excess sample material. The container will not be submerged in water in an effort to clean it. Rather, if necessary, a clean paper towel moistened with distilled/deionized water will be used.

The sample container will be properly labeled. Information such as the sample identification number, location, collection time and sample description will be recorded in the field log book. Associated paper work (e.g., Chain of Custody forms) will then be completed and will stay with the sample. The samples will be packaged in a manner that will allow the appropriate storage temperature to be maintained during transportation to the laboratory. Samples will be delivered to the laboratory within 24 hours of collection.

Proper personal protective equipment and monitoring equipment (if determined to be necessary) will be used at all times during sample collection to further maintain sample integrity and protection of worker health and safety.

1.6.1 Sample Identification

All samples collected will be labeled with a sample identification code. The code will identify the sample type (sample matrix), sample location, sample depth and collection date, as appropriate. Samples will be labeled according to the following system:

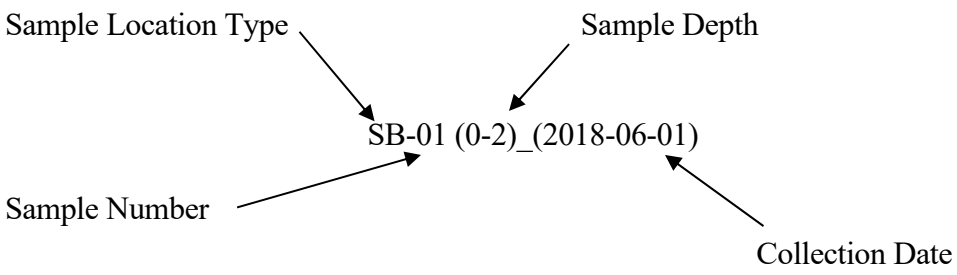
Sample Location Type: – Soil Boring "SB"

Sample Number: – Each sample location will be designated with a number. For soil samples, a depth will be provided which will correspond to the depth in feet at which the sample was collected below grade (e.g., 0-2). This number will likely be recorded in parentheses.

Collection Date: – The date of collection will be included in the sample identification as an eight-digit number as follows (year-month-day).

Quality Assurance/ Quality Control (QA/QC): – A "MS" for Matrix Spike, "MSD" for Matrix Spike Duplicate, "FB" for Field Blank or "TB" for Trip Blank, as appropriate, will be attached to the end of the sample identification name

Based on the above sample identification procedures, an example of a sample label may be:



1.6.2 Sample Handling, Packaging and Shipping

All analytical samples will be placed in the appropriate sample containers as specified in 7/05 NYSEC ASP. The holding time criteria identified in the ASP will be followed, as specified in Table 1-1.

Prior to packaging any samples for transportation to the laboratory, the sample containers will be checked for proper identification and compared to the field log book for accuracy. The samples will then be wrapped with a cushioning material and placed in a cooler (or laboratory shuttle) with a sufficient quantity of bagged ice to maintain the samples at 4°C until arrival at the laboratory.

All necessary documentation required to accompany the samples during transportation will be placed in a sealed plastic bag and taped to the underside of the cooler lid. The cooler will then be sealed with fiber (duct) tape or clear packing tape, and custody seals will be placed in such a manner that any opening of the cooler prior to arrival at the laboratory can be detected.

All samples will be shipped to ensure receipt at the laboratory within 24 hours of sample collection in accordance with ASP requirements. The laboratory will be notified prior to the shipment of the samples.

1.6.3 Soil (Boring)

The following procedure will be utilized for the collection of soil samples from soil borings:

- Be certain that the sample location is noted on Location Sketch.
- Remove laboratory-supplied precleaned sample container from sample cooler, label container with an indelible marker and fill out Chain of Custody Form.
- Drive the hand auger to the desired sampling depth.

- Retrieve the soil core and immediately after opening it, obtain an organic vapor measurement with a PID.

- Samples for VOC analysis will be collected immediately using the En Core sampling method in accordance with USEPA Method 5035. If warranted, for any remaining analyses, remove a sample aliquot from the soil probe using a disposable scoop or sterile wooden tongue depressor, place into the open sample container and replace the container cover.

- Return the sample container to the cooler.

- If reusable, decontaminate the sampling equipment according to the procedures described in Section 1.7.

- Place all disposable personal protective equipment and disposable sampling equipment into a 55-gallon drum or other approved container for disposal.

1.7 Decontamination Procedures

Whenever possible, all field sampling equipment should be sterile/disposable and dedicated to a particular sampling location. In instances where this is not possible, a field cleaning/decontamination procedure will be used in order to mitigate cross-contamination between sample locations. A decontamination station/pad will be established for all field activities if field decontamination is necessary. This will be an area located at some distance from the sampling locations so as not to adversely impact the decontamination procedure while still allowing the sampling teams to keep equipment handling to a minimum after decontamination.

1.7.1 Field Decontamination Procedures

All non-disposable equipment will be decontaminated at appropriate intervals (e.g., prior to initial use, prior to moving to a new sampling interval or location, and prior to leaving the site). Different decontamination procedures are used for the various types of equipment utilized to collect the samples. When designing a field decontamination program, it is advisable to initiate environmental sampling in the area of the site with the lowest contaminant probability and proceed through to the areas of highest suspected contamination.

1.7.2 Decontamination Procedure for Sampling Equipment

All Teflon, polyethylene and stainless steel sampling equipment will be decontaminated utilizing the following procedure:

- Wash thoroughly with non-residual detergent (e.g., Alconox) and clean potable tap water using a brush to remove particulate matter or surface film.
- Steam clean (if necessary).
- Rinse thoroughly with tap water.
- Rinse thoroughly utilizing distilled or deionized water and air dry.

The first step, a soap and water wash, is designed to remove all visible particulate matter and residual oils and grease. Pressure washing will be utilized followed by a steam cleaning, if necessary. This step will be followed by a tap water rinse and a distilled/deionized water rinse to remove detergent.

1.8 Laboratory Sample Custody Procedures

A NYSDOH ELAP certified laboratory meeting the requirements for sample custody procedures, including cleaning and handling sample containers and analytical equipment, will be used. The Standard Operating Procedures of the laboratory selected to undertake the analysis of environmental samples for this program will be available upon request.

1.9 Field Management Documentation

Proper management and documentation of the field activities is essential to ensure that all necessary work is conducted in accordance with this QAPP in an efficient and high quality manner. Field management procedures will include maintaining a daily Field Log Book, following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if required), preparing a location sketch for sampling points in the field log, recording sample information in the field log and completing Daily Equipment Calibration Logs.

Boring and well construction logs, if necessary, will be completed in the office. Proper completion of these forms and the field log book are necessary to support the consequent actions that may result from the sample analysis. This documentation will support that the samples were collected and handled properly.

1.9.1 Location Sketch

For each sampling point, a location sketch will be completed in the field log using permanent references and distances to the sampling point noted, if possible. Photographs may also be utilized.

1.9.2 Sample Information

At each sampling location, sample information will be recorded in the field log including, but not limited to, the following information:

- Sample location identification;
- Field sample identification number;
- Date and time of sample collection;
- Sample matrix;
- Method of sample collection and any factor that may affect its quality adversely;
- Well information (groundwater only);
- Field test results; and
- Analysis to be performed.

1.9.3 Chain of Custody

A Chain of Custody (COC) form will be completed and is initiated at the laboratory with container preparation and transportation to the Site. The COC remains with the samples at all times

and bears the name of the person assuming responsibility for the samples. This person is tasked with ensuring secure and proper handling of the containers and samples. When the form is complete, it should indicate that there were no lapses in sample accountability.

A sample is considered to be in an individual's custody if any of the following conditions are met:

- It is in the individual's physical possession; or
- It is in the individual's view after being in his or her physical possession; or
- It is secured by the individual so that no one can tamper with it; or
- The individual puts it in a designated and identified secure area.

In general, COC forms are provided by the laboratory contracted to perform the analytical services. At a minimum, the following information shall be provided on these forms:

- Project name and address
- Project number
- Sample identification number
- Sample collection date
- Sample collection time
- Sample location
- Sample type/matrix
- Analysis requested
- Number of containers and volume collected
- Remarks (e.g., preservation, special handling, etc.)
- Sampler(s) name(s) and signature(s)
- Spaces for relinquished by/received by signature and date/time.

For this particular project, COC forms provided by the laboratory will be utilized.

The COC form is completed and signed by the person performing the sampling activities. The original form travels with the samples and will be signed and dated each time the samples are relinquished to another party, until it reaches the laboratory or analysis is completed. The field sampler maintains a copy of the COC form and a copy is retained for the project file. Each sample container will also be labeled with an indelible marker with a minimum of the following information:

- Sample number
- Analysis to be performed
- Date and time of collection
- Sampler's initials

A copy of the completed COC form is returned by the laboratory with the analytical results.

1.9.4 Field Log Book

Field log books will be bound and should have consecutively numbered, water resistant pages. All pertinent information regarding the Site and sampling procedures will be documented. Notations will be made in log book fashion, noting the time and date of all entries. Information recorded in the log book should include, but is not limited to, the following:

The first page of the log book will contain the following information:

- Project name and address
- Name, address and phone number of field contact
- Waste generator and address, if different from above

- Type of process (if known) generating waste
- Name, address and phone number of subcontractors and contact persons

Daily entries are made for the following information:

- Weather conditions
- Purpose of sampling
- Location of sampling points
- Number(s) and volume(s) of sample(s) collected
- Description of sample location and sampling methodology
- Date and time of sample collection and personnel arrival and departure
- Geologic description of each sample interval, if applicable
- Collector's sample identification number(s)
- Sample distribution and method of storage and transportation
- References, such as sketches of the sample location or photographs of sample collection with dimensions
- Field observations, including results of field analyses (e.g., pH, temperature, specific conductance, etc.), water levels, drilling logs, and organic vapor and dust readings
- Signature of personnel responsible for completing log entries.

1.9.5 Field Changes and Corrective Actions

Whenever there is a required or recommended sampling change or correction, it will be noted in the field log by the Field Operations Manager, with approval by the TRC Project Manager.

1.10 Calibration Procedures and Preventive Maintenance

The following information regarding equipment will be maintained at the Site:

- Equipment calibration and operating procedures which will include provisions for documentation of frequency, conditions, standards and records reflecting the calibration procedures, methods of usage and repair history of the measurement system. Calibration of field equipment will be completed daily at the sampling site so that any background contamination can be taken into consideration and the instrument calibrated accordingly.
- A schedule of preventive maintenance tasks, consistent with the instrument manufacturer's specific operation manuals that will be carried out to minimize down time of the equipment.
- Critical spare parts, necessary tools and manuals will be on hand to facilitate equipment maintenance and repair.

Calibration procedures and preventative maintenance, in accordance with the NYSDEC 7/05 ASP, for laboratory equipment, will be contained in the laboratory's standard operating procedures (SOP) which will be made available upon request.

1.11 Performance of Field Audits

During field activities, if determined to be necessary, the QA/QC Officer may accompany sampling personnel into the field, verify that the Site sampling program is being properly implemented and detect and define problems so that resolutions can be determined and implemented. All findings will be documented and provided to the Field Operations Manager.

1.12 Control and Disposal of Contaminated Material

During sampling activities, contaminated water may be generated from decontamination water. In addition, contaminated materials may include spent protective clothing, spent disposable sampling equipment and wastes generated as a result of equipment decontamination.

Any contaminated materials generated as a result of the field program will be contained in U.S. Department of Transportation (DOT) 55-gallon drums, or an approved equivalent container, and staged in a designated area for subsequent waste characterization. Each drum will be identified by the type of material contained.

DOT-approved 55-gallon drums will be available for disposal of spent protective clothing and disposable sampling equipment, if any. These drums will be marked and labeled as containing personnel protective and sampling equipment. These drums will not be sampled. All drums will be sealed and staged on-site to await proper off-site disposal.

1.13 Documentation, Data Reduction and Reporting

A NYSDOH ELAP-certified laboratory meeting the New York State requirements for documentation, data reduction and reporting will be used for all laboratory analysis. All data will be cataloged according to sampling locations and sample identification nomenclature that is described in this QAPP. The laboratory analysis will be reported in the NYSDEC ASP Category B deliverables format, as well as Electronic Data Deliverables (EDDs in EQuIS format). The EDDs will be submitted to the NYSDEC.

NYSDEC "Sample Identification and Analytical Requirement Summary" and "Sample Preparation and Analysis Summary" forms (for organic and inorganic analysis, if deemed necessary) will be completed and included with each data package. The sample tracking forms are required and supplied by the 7/05 NYSDEC ASP.

1.14 Data Validation

Summary documentation regarding data validation will be completed by the laboratory using NYSDEC forms contained in the 7/05 NYSDEC ASP and submitted with the data package.

A Data Usability Summary Report (DUSR) will be prepared in lieu of a full data validation. The analytical and usability processes will be conducted in conformance with the NYSDEC ASP

dated July 2005 and NYSDEC DER-10, as well as USEPA National Functional Guidelines for Data Validation and USEPA Region 2 Data Validation SOPs.

The DUSR will be prepared by reviewing and evaluating the analytical data. The parameters to be evaluated in reference to compliance with analytical method protocols include all chain of custody forms, holding times, raw data (instrument print out data and chromatograms), calibrations, blanks, spikes, controls, surrogate recoveries, duplicates and sample data. If available, field sampling notes will also be reviewed, and any quality control problems will be evaluated as to their effect on the usability of the sample data.

The DUSR will describe the samples and analytical parameters reviewed. Data deficiencies, analytical protocol deviations and quality control problems will be described and their effect on the data discussed. Resampling and reanalysis recommendations will be made, if necessary.

The DUSR shall be prepared by a data validator who meets the NYSDEC personnel requirements in DER-10.

The following is a description of the two-phased approach to data validation which will be used for evaluation of the data. The first phase is called checklisting and the second phase is the analytical quality review, with the former being a subset of the latter.

- Checklisting - The data package will be checked for correct submission of the contract required deliverables, correct transcription from the raw data to the required deliverable summary forms and proper calculation of a number of parameters.

- Analytical Quality Review - The data package will be closely examined to recreate the analytical process and verify that proper and acceptable analytical techniques have been performed. Additionally, overall data quality and laboratory performance will be evaluated by applying the appropriate data quality criteria to the data to reflect conformance with the specified, accepted QA/QC standards and contractual requirements.

At the completion of the data validation, a Data Usability Summary Report section will

be prepared by the data validator and included in the final report submitted to the NYSDEC.

1.15 Performance and System Audits

A NYSDOH ELAP certified laboratory, which has satisfactorily completed performance audits and performance evaluation samples, shall be used to perform sample analyses on this project.

1.16 Corrective Action

A NYSDOH ELAP certified laboratory shall meet the requirements for corrective action protocols, including sample "cleanup" to attempt to eliminate/mitigate "matrix interference." Sample "cleanup" is not required for samples to be analyzed for volatile organic compounds.

1.17 Method Blanks/Holding Blanks

A method blank is an aliquot of laboratory water or soil which is spiked with the same internal and surrogate compounds as the samples. The purpose of the method blank is to define and determine the level of laboratory background contamination. Frequency, procedure and maximum laboratory containment concentration limits are specified in the 7/05 NYSDEC ASP. A holding blank is an aliquot of analyte-free water that is stored with the environmental samples in order to demonstrate that the samples have not been contaminated during laboratory storage. This blank will be analyzed using the same analytical procedure as the samples.

1.18 Matrix Spikes/Matrix Spike Duplicates and Field Duplicates

Matrix spike samples are quality control procedures, consistent with 7/05 NYSDEC ASP specifications, used by the laboratory as part of its internal Quality Assurance/Quality Control program. The matrix spikes (MS) and matrix spike duplicates (MSD) will be aliquots of a designated sample (water or soil) which are spiked with known quantities of specified compounds. These QA/QC samples will be used to evaluate the matrix effect of the sample upon the analytical

methodology, as well as to determine the precision of the analytical method used. A matrix spike blank will be an aliquot of analyte-free water, prepared in the laboratory, and spiked with the same solution used to spike the MS and MSD. The matrix spike blank (MSB) will be subjected to the same analytical procedure as the MS/MSD and used to indicate the appropriateness of the spiking solution by calculating the spike compound recoveries. The procedure and frequency regarding the MS, MSD and MSB samples are defined in the 7/05 NYSDEC ASP.

Field blind duplicate samples will be collected to demonstrate the accuracy of field screening and unvalidated laboratory data with limited analytical deliverables. One blind duplicate sample will be collected for every 20 soil samples. The location to be sampled in duplicate will be selected at random and the sample identification will be coded to show the sample as a blind duplicate.

1.20 Field Blank (Field Rinsate Blank)/Equipment Blank

If necessary, field blank samples may be collected. The field blank will consist of an aliquot of analyte-free water, supplied by the laboratory, which is opened in the field and is generally poured over or through a sample collection device after it has been decontaminated, collected in a sample container and returned to the laboratory as a sample for analysis. In this manner, it is a check on sampling procedures and cleanliness (decontamination) of sampling devices. Generally, a field blank will be collected for a "batch" of sample matrices collected in the same manner (such as water and soil/sediment) up to a maximum of 20 samples. Field blanks will be analyzed for the same suite of chemicals analyzed for in the environmental samples collected in that "batch." Field blanks will not be analyzed when using dedicated or disposable (one use only) sampling equipment unless directed otherwise.