



*A Service-Disabled Veteran-Owned Small Business
and HUBZone Certified Small Business*

Site Safety and Health Plan For the Lawrence Aviation Industries (LAI)

**Contract: EP-S2-05-01
Task Order 017**

Submitted to:



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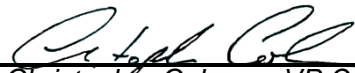
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**Site Safety and Health Plan
For the
Lawrence Aviation Industries (LAI)**

Task Order: 017

NEIE Contract No. EP-S2-05-01

Site Safety and Health Plan Approvals



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April 8, 2010

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LIST OF ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
APR	Air Purifying Respirator
CNS	Central Nervous System
CPC	Chemical Protective Clothing
CPR	Cardiopulmonary Resuscitation
ECRP	Emergency Contingency and Response Plan
EPA	Environmental Protection Agency
FID	Flame Ionization Detector
FOSC	Federal On-Scene Coordinator
GFCI	Ground fault circuit interrupter
H&S	Health and Safety
HSM	Health and Safety Manager
SSHP	Site Specific Health and Safety Plan
IDLH	Immediately Dangerous to Life and Health
LEL	Lower Exposure Limit
MSDS	Material Safety Data Sheet
MSHA	Mining Safety and Health Administration
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Administration
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PMO	Project Management Office
PPE	Personal Protective Equipment
RM	Response Manager

LIST OF ACRONYMS (continued)

SAP	Sampling and Analysis Plan
SCBA	Self-Contained Breathing Apparatus
SOP	Standard Operating Procedure
SHSO	Site Health and Safety Officer
STEL	Short-Term Exposure Limit
TLV	Threshold Limit Value
TWA	Time Weighted Average
UL	Underwriters Laboratory
USCG	U.S. Coast Guard
VOC	Volatile Organic Compound
WBGT	Wet Bulb Globe Temperature
WP	Work Plan

1.0 INTRODUCTION

This Site Specific Health and Safety Plan (SSHP) establishes personnel protection standards and mandatory safety procedures for all activities associated with engineering and remedial projects conducted by NEIE, Inc. (NEIE) personnel, subcontractors, and consultants. The SSHP is designed to cover employees, subcontractors, site visitors and any other person authorized to enter controlled work zones under NEIE management. If employees become involved in work activities not covered in the SSHP, the SSHP will be amended as needed to incorporate approved health and safety procedures.

1.1 Policy

It is the policy of NEIE to provide a safe and healthy workplace for all employees, subcontractors, and consultants in compliance with government regulations and client specifications. Effective programs which protect workers and ensure regulatory compliance are a vital corporate priority. NEIE bases all of its operations on the principle that all occupational illnesses, accidents, and injuries are preventable. If an assignment cannot be done safely, it will not be done unless and until work modifications are in place so that assignment can be done safely. Successful safety performance requires every individual's continuous involvement, teamwork, and leadership. Everyone is responsible and accountable for safety.

1.2 Objective

The objective of this SSHP is to ensure that safe working conditions exist at the work site under NEIE's management. The safety organization and procedures have been established based on anticipated potential hazards and personnel protection measures have been selected accordingly.

The SSHP addresses the following:

- Safety responsibilities
- Recommended standard operating procedures (List of Appendices)
- Personnel responsibilities
- Work procedures
- Exposure monitoring and levels of personnel protection
- Site organization and control
- Decontamination
- Hazard awareness training
- Medical surveillance.
- Communication (General)

Applicability extends to NEIE personnel, NEIE's subcontractors, and visitors inclusive of our client personnel and representatives. Work performed under this contract will comply with applicable Federal, State, and Local Safety and Occupational Health laws and regulations. Through careful planning and implementation of corporate and site-specific safety protocols, NEIE will strive for zero accidents and incidents on the project.

The development and preparation of this SSHP has been based on site-specific information provided to NEIE. Should any unforeseen hazard become evident during the performance of the work, the representative shall bring such hazard to the attention of NEIE Project Manager and Corporate Safety Manager for resolution. In the interim, NEIE will take necessary actions to maintain safe working conditions in order to safeguard on-site personnel, visitors, the public, and the environment. Modifications of any portion or provisions of the SSHP will be requested in writing by the Project Manager, and authorized in writing by the Corporate Safety Manager. No changes to the SSHP will be allowed until the item has been reviewed and an addendum prepared and approved by NEIE responsible managers.

All site personnel working on this project for the United States Environmental Protection Agency (USEPA) will be required to read and verify compliance with the provisions of this SSHP and specific appendices. In addition, personnel will be expected to comply with relevant OSHA requirements such as but not limited to site safety guidelines, excavation safety requirements, training, and personal protective equipment.

1.3 References

During development of this SSHP consideration was given to current safety and health standards as defined by the USEPA, Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH). Specifically, the following reference sources have been utilized in the development of this SSHP:

- OSHA Regulations: 29 CFR 1910 and 1926
- USEPA Standard Operating Safety Guides, June 1992
- NIOSH/OSHA/Coast Guard (USCG)/USEPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities"
- NIOSH Pocket Guide to Chemical Hazards, Publication 2005-149, September 2005
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values for Chemical Substances and Chemical Agents, 2009
- Hazardous Waste Handbook for Health & Safety, Martin, Lappets, Prather, 1987
- Handbook of Toxic and Hazardous Chemicals and Carcinogens, Sitting, 1985
- ATSDR ToxFAQs

In addition to the above-referenced documents, NEIE has established a comprehensive and realistic Safety, Health and Environmental Program; based on past experience, sound engineering practice, employee training and enforcement of Safety and Health regulations to prevent unreasonable Safety and Health risks.

1.4 Site History

The Lawrence Aviation Industries (LAI) Superfund site, listed on the National Priorities List in 2000 due to their potential responsibility for contaminating groundwater and private drinking water wells. LAI's corporate predecessor was Ledkote Products Co. of New York. In Port Jefferson Station since 1952, Ledkote produced items including lead gutters and spouts for roof drains. Since 1959, the 42-acre LAI facility has manufactured products from titanium sheet metal, including golf clubs and products for the aeronautics industry, under LAI name.

Past disposal practices have resulted in a variety of contaminant releases including trichloroethene (TCE), tetrachloroethene (PCE), acid wastes, oils, sludge, metals, and other plant wastes. In an effort to clean up the facility in 1980, LAI reportedly crushed more than 1600 drums, allowing their liquid contents including TCE, PCE, and other chemicals to spill onto unprotected soil. Previous investigations in the site vicinity suggest that releases of hazardous substances from the facility have affected site soils, groundwater, surface water and sediment down gradient of the site.

A human health risk assessment was prepared to assess the potential human health risk in the absence of any remedial action. Human health risks associated with using groundwater for future LAI and Outlying Parcels residents are above the EPA acceptable range.

Under a work assignment received by the EPA, a remedial investigation/feasibility study (RI/FS) of the Site soils and groundwater was performed by CDM from August 2003 to May 2005. The RI included soil and groundwater screening, surface water and sediment sampling, soil sampling, and multi-port monitoring well installation and sampling. The results of these investigations are presented in the Outlying Parcels Technical Memorandum (CDM 2004a), Final Technical Memorandum (CDM 2004b), and RI Report (CDM 2006a). The RI documented a volatile organic compound (CVOC) contaminated plume originating at the LAI site. The predominant VOCs, or contaminants of concern (COC), in the groundwater plume originating from the LAI site are TCE and PCE. To a lesser extent, other VOCs such as: chloromethane (CM), 1,1-dichloroethene, methyl tert-butyl ether (MTBE), 1,1-dichloroethane (DCA), cis-dichloroethene (DCE), chloroform and 1,1,1-trichloroethane (TCA) are also known to be present. Report (CDM 2006b), which presented remedial alternatives, was completed in July 2006. The Record of Decision (ROD) was signed on September 29, 2006. CDM conducted a pre-design investigation from November 2007 to June 2008 to collect additional information required for the Remedial Design (RD). The pre-design investigation effort included:

- Monitoring well installation including groundwater screening samples at selected screening depths to further refine information on groundwater contamination.
- Collection of two rounds of groundwater samples and synoptic water level measurements from monitoring wells
- Aquifer testing
- Subsurface soil sampling at the LAI facility.

2.0 ORGANIZATION AND RESPONSIBILITIES

The responsibility for Safety and Health extends throughout our organization from top management to every employee. Each employee is responsible for reviewing, understanding, and complying with this SSHP, the Corporate Safety Program and all associated health and safety requirements. For this reason, it is each person's duty to notify the management personnel if a hazardous condition is identified and to make "stop work" calls if the condition represents an immediate danger to life or health, until the SSHO can make a further determination.

The following are the NEIE project personnel positions and responsibilities for this project.

2.1 ERRS Program Manager

NEIE ERRS Program Managers report to the President of NEIE. These managers are responsible for the following:

- Establishment of requirements, objectives, and staff responsibilities of the corporate health and safety program.
- Establishment of basic corporate policy regarding health and safety risk management and compliance.
- Allocation of required resources for developing and implementing the Corporate health and safety program.
- Implementing periodic reviews, audits, and continuous improvement measures to ensure that the program is current and complete and that it is being properly implemented.

2.2 Safety and Health Manager (SHM)

Responsible to the Program Manager, the Safety and Health Manager formulates, administers and coordinates programs for the company to reduce the risk of loss due to employee injury, regulatory non-compliance, general liability, fire, theft or damage. The Safety and Health Manager will develop written detailed policies and procedures covering elements in the Safety, Health and Environmental Program. The Safety and Health Manager will:

- Be responsible for the development, implementation, oversight and enforcement of the SSHP.
- Visit the site as needed for the duration of activities, to audit the effectiveness of the SSHP.
- Be available for emergencies.
- Provide consultation as needed to ensure that the SSHP is fully implemented.
- Coordinate any modifications to the SSHP with the Program Manager.

2.3 Response Manager

The Response Manager reports to the ERRS Program Manager. His responsibilities include coordinating project activities and serving as the primary liaison with the USEPA Contracting Officer Representative (COR). The Response Manager requires that all work be performed in compliance with this SSHP, the NEIE's Safety, Health and Environmental Program and/or the client's safety program including all applicable local, state and federal regulations. This person shall impress upon all subcontractors' supervisory personnel a sense of responsibility and accountability of each individual to maintain a safe workplace and to work in a safe manner. The Response Manager is responsible for:

- Effective health and safety management on job site.
- Working with the Health and Safety Manager to ensure the Site Specific Safety Plan has been completed for each job before on-site work begins.
- Formally designates the Site Health and Safety Officers for ensuring health and safety competence on each project team.
- Conducts safety inspections on a regular basis (based upon size and complexity at least weekly).

2.4 Project Superintendent/Foreman

The Project Superintendent supervises and coordinates all field crew member activities relating to on-site operations. The Project Superintendent has the operational responsibility for the implementation of the SSHP on this project. This includes establishing an attitude of concern for safety matters by initiating prompt corrective action of hazards brought to his attention and ensuring that the project safety and health requirements are initiated and observed by all project personnel.

The Superintendent plans and requires that all work be performed in compliance with this SSHP, the NEIE's Safety, Health and Environmental Program and/or the client's safety program including all applicable local, state and federal regulations. He shall impress upon all subcontractors' supervisory personnel a sense of responsibility and accountability of each individual to maintain a safe workplace and to work in a safe manner.

2.5 Site Safety and Health Officer (SSHO)

Under the direction of the SHM, the Site Safety and Health Officer (SSHO) shall be responsible for the implementation of this SSHP and for the daily coordination of safety activities with the Project Superintendent/Foreman to ensure that the planned work objectives reflect adequate safety and health considerations. The SSHO will maintain a complete copy of this plan (and its supplements and addenda) at the site during all field activities and assure that all workers and visitors are familiar with it. He/she will perform site-specific training and briefing sessions for employee(s) prior to the start of field activities at the site and a briefing session each day before starting work. He/she will ensure the availability, proper use and maintenance of specified personal protective equipment, decontamination, and other safety and health equipment. He/she will maintain a high level of safety awareness among team members and communicate pertinent matters to them promptly. **For this project the SSHO will be a co-lateral duty position.** The Site Safety and Health Officer is responsible for the following.

- Coordinating with the Project manager for the implementation of a Site Health & Safety Plan (SSHP).
- Supervising the day-to-day implementation of the site-specific health and safety plan and program.
- Coordinate and conduct daily safety meetings.
- Assist and represent the Safety and Health Manager in on-site training and the day-to-day on-site implementation and enforcement of the accepted SSHP.
- Interact with project personnel on health and safety matters.
- Perform air monitoring (personal and ambient) as required.
- Assist Response Manager with enforcing the requirements of the site-specific programs.
- Have the authority to ensure site compliance with specified safety and health requirements, Federal, state and OSHA regulations and all aspects of the SSHP. This includes, but is not limited to: activity hazard analyses, air monitoring; use of PPE, decontamination site control; standard operating procedures used to minimize hazards; safe use of engineering controls; the emergency response plan; confined space entry procedures; spill containment program; and preparation of records. This will be accomplished by performing a daily safety and health inspection and documenting results on the Daily Safety Inspection Log.
- Stop work activities if unacceptable health or safety conditions exist, and take necessary action to re-establish and maintain safe working conditions.
- Consult and coordinate any modifications to the SSHP with the Safety and Health Manager, the Site Superintendent, and the Contracting Officer.
- Conduct accident investigations and prepare accident reports.
- Complete all required Health and Safety related documentation on a timely basis.

2.6 Occupational Physician

Under the direction of the Safety and Health Manager, the Occupational Physician will be responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1910.120(f), and 1926.53(f). The Occupational Physician will provide the Safety and Health Manager with a written opinion of each employee's ability to perform hazardous remedial work.

2.7 Subcontractors

Subcontractors utilized during source removal action will be covered by this SSHP and will be provided a copy of the plan prior to commencing work. The NEIE's SSHP will verify that subcontractor employee training; medical clearance, and respirator fit test records are current and will monitor and enforce compliance with the established plan and standard operating procedures. As with all site personnel, subcontractors will be briefed on the provisions of this plan and attend all daily toolbox and weekly safety meetings

NEIE will continually monitor a subcontractor's safety performance. NEIE will observe subcontractors for hazards or unsafe practices that are both readily observable and occur in common work areas. The SSHO will note subcontractor work practices on the daily Safety and Health report. If non-compliance or unsafe conditions or practices are observed, the subcontractor safety representative will be notified and corrective action will be required. The subcontractor will determine and implement necessary controls and corrective actions. If repeat non-compliance/unsafe conditions are observed, the subcontractor will be required to stop affected work until adequate corrective measures are implemented.

2.8 All Personnel

Project personnel, inclusive of subcontractors who may be exposed to hazardous materials or conditions on a site are responsible for understanding and complying with the requirements specified and must sign a statement that they have read, understood, and will abide by the Site Health and Safety Plan. Failure to comply with a Site Health and Safety Plan will result in disciplinary action that could lead to removal from a site or termination.

Visitors will not be allowed to enter an Exclusion or Contamination Reduction Zone unless they have:

- Completed the requirements for training and medical surveillance.
- Read and understand the Site-Specific Health and Safety Plan.
- Received permission of the Project Manager and the SHSO.

2.9 Recordkeeping and Data Management

Proper recordkeeping and data management are essential in implementing the health and safety program. The forms associated with the recordkeeping and data management requirements must be completed in an accurate, timely fashion and filed with the appropriate entities. It is the responsibility of the HSM or the SSHO to ensure that the forms are properly completed. Completed forms will be kept and maintained by NEIE. Subcontractors will also be responsible for keeping a copy of the forms pertaining to their personnel. These records shall be maintained for five years.

3.0 SITE TASKS AND OPERATIONS

A Work Plan has been developed in accordance with the requirements of the Task Order. The Work Plan has been prepared by NEIE for the USEPA Project activities in an effort to mitigate the threats to the public health, welfare and the environment posed by the contamination at the Site, the proposed removal action will include interim measures that include installation of a groundwater extraction and treatment system to reduce the concentrations of volatile organic compounds (VOCs) in areas adjacent to nearby streams. Ground water will be pumped from wells located in the contamination plume and treated by air stripping and activated carbon. The treated water will be discharged to Old Mill Creek approximately 300 feet upstream of the Barnum Avenue Bridge. Large quantities of sediment have filled the creek immediately upstream and downstream of the culvert that conveys Old Mill Creek under Barnum Avenue. In order to ensure the discharge from the groundwater treatment system can flow through the culvert the sediment accumulations upstream, downstream and in the culvert will be removed.

NEIE will develop Activity Hazard Analysis (AHA) for major phases of the work. A major phase of work is defined as an operation involving a type of activity presenting hazards not experienced in previous operations or where a new subcontractor or work crew is to perform the specified phase. The analysis will define the activity being performed and identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard. Refer to **Appendix A - "Activity Hazard Analysis"**. An AHA shall also be prepared when new tasks are added, job situations change, or when it becomes necessary to alter safety requirements. Work will not proceed on a particular task/work area until the AHA has been reviewed and a preparatory meeting has been conducted.

4.0 HAZARD/RISK ANALYSIS

Hazardous waste sites can cause a multitude of health and safety concerns, any of which can result in serious injuries and/or illnesses of workers. Some hazards are a function of the physical, biological or chemical nature of the site itself. Others are a direct result of the construction being done. A preliminary evaluation of the potential hazards has been made and is presented within this section. This evaluation included the use of historical information obtained from the client/owner and by an on-site inspection. Based upon the information provided to NEIE regarding the primary historical uses of the property and the knowledge of the current conditions, an overall safe approach will be determined based upon “worst case” information.

The most significant risks from project are: work at elevated heights and electrical tie-ins for the mitigation system.

Presented below are the hazards and the safety procedures that will be followed to carry out the scope of work.

Operations will be performed in accordance with the site plans.

4.1 Hazard Control Program

Due to the nature of this project, there is a potential for physical and chemical hazards. Potential physical safety hazards and chemical hazards associated with the project are further outlined below.

4.1.1 Safety/Physical Hazards

Potential physical safety hazards that may be encountered during the execution of this project are presented below.

4.1.1.1 Heavy Equipment Operations

Considerations for controlling the movement of personnel and equipment in a construction area are vitally important to any project, as injuries may occur while working with or adjacent to such equipment. This category includes all operations that utilize moving heavy equipment: backhoes, excavators, loaders, graders, dozers, roll-off boxes/dewatering boxes, and trucks. NEIE will take every precaution necessary to ensure the safety of the residents and the on-site personnel during traffic movement operations.

All workers will adhere to all applicable standards and regulations while operating heavy equipment at the site. Operators will be trained and experienced in the use and maintenance of the equipment they are operating. Equipment will be inspected on a daily basis to identify any worn parts, and/or unsafe conditions. Any unsafe equipment will be removed from service until safety defects can be corrected. Equipment operators will not leave their machine unattended while it is running. All equipment will have electronic backup alarms. Each piece of equipment will be equipped with a 5 lb ABC fire extinguisher. No vehicles or equipment will be operated in a careless or unsafe manner. Personnel will wear high visibility reflective vests when working around equipment/vehicles. All personnel will stay a minimum of 4 ft clear of the operational area of the equipment.

During removal action, it is often necessary to have a worker direct the operator. In these cases, close communication between the operator and the laborer is of critical importance. One designated person will give signals to the operator of both equipment and vehicles in the work area. Workers should not take any action unless

they have made eye contact with the operator and clearly communicated their intentions. In addition, all machines are equipped with back-up alarms, which are checked daily and repaired immediately. Truck traffic will be controlled by a flagger/spotter, as required.

Maintenance and inspection of vehicles and heavy equipment is a vital part of the overall safety program. As part of the preventative maintenance, all equipment is checked for properly functioning safety devices (e.g., backup alarms, brakes, lights, fire extinguishers, etc.) Before each piece of equipment leaves the shop it must pass a safety checklist. All rental equipment is subjected to a similar inspection when delivered to the job site. Any piece of rental equipment that fails the inspection must be repaired by the vendor before it is accepted for use. In addition, all equipment is inspected in the field prior to the start of each day's activities. If a superintendent, operator, or safety officer detects a defect, the equipment is taken out of service and a properly qualified mechanic is dispatched from the shop to make the repairs on-site.

4.1.1.2 Vehicle Traffic

Due to the nature of work associated with work on the Old Mill Creek and on the Barnum Avenue Bridge traffic control measure will be required. Coordination with the local police will be necessary to block this road during work that requires the heavy equipment to be staged on or near the bridge to access the creek sediment for removal. A police detail, traffic control barriers and signs, and personnel will be required to wear safety vests meeting ANSI standards will be necessary.

Considerations for controlling the movement of personnel and equipment are vitally important to any project, as injuries may occur while working with or adjacent to such equipment. All workers will adhere to all applicable standards and regulations while operating vehicles at the hospitals or clinics. Operators will be trained and experienced in the use. Equipment will be inspected on a daily basis to identify any worn parts, and/or unsafe conditions. Any unsafe equipment will be removed from service until safety defects can be corrected.

4.1.1.3 Ground Personnel Contact

Movement of mobile equipment and motor vehicles, particularly in tight or congested areas, poses a potential safety hazard to field personnel as well as the operator. Whenever ground personnel must work in the vicinity of heavy equipment or multiple small vehicles, ground personnel will wear brightly colored, high visibility safety vests. Heavy equipment should have backup lights and alarms, and appropriate safety equipment (rollover protective structures, emergency shutoff in case of rollover, seat belts, etc.). In addition, the field team member on the ground is to guide the operator when backing up or entering the treatment system work area, when the operator does not have full view of the area, and when the terrain is hazardous. It is essential that the operator is aware of the location of all field personnel whenever equipment is being moved in work areas. Ground personnel working near mobile equipment who are unable to leave the area are to make eye contact with the operator, alert him to their presence, and move cautiously at all times. Operators should lower booms or buckets before ground personnel approach the equipment. The field team will be responsible for controlling access of heavy equipment onto the work site and informing all personnel where and when equipment will be moved.

4.1.1.5 Roll-overs

Roll-overs are primarily a result of operating mobile equipment, such as the aerial lift, or vehicles on steep slopes, unstable surfaces, such as those which may be encountered at the Site, or when making sharp turns at unsafe speeds. Injuries from roll-overs can be fatal, particularly when the operator is thrown from the vehicle or equipment. Each operator will carefully survey the route to be traveled checking for overhead obstructions, holes, slopes, ditches or other potential hazards prior to moving the equipment. Seat belts are to be used by all operators. At no time will vehicles or other heavy equipment be operated at speeds that directly disregard existing conditions at the Site or access roads (e.g., weather, traffic, intersections, roadway width, grade). Heavy equipment that is left unattended shall be made immobile by grounding of buckets or by insertion of chock blocks under wheels or tracks.

4.1.1.6 Excavation/Trenching Hazards

The hazard associated with excavation is low to moderate. In general, the main hazards encountered during soil excavation is the cave in of excavation sides with possible burial or crushing of workers. Causes of cave ins may include: (a) absence of shoring, (b) misjudgment of stability, (c) defective shoring, and (d) undercut sides. Other potential hazards include: falling during access/egress, while monitoring or dismounting equipment, or stumbling into excavation. An overhead hazard can result from material, tools, rock, and/or soil falling into the excavation. Flammable atmospheres may also be encountered in excavation.

The competent person will be onsite during all excavation activities, the competent person will conduct inspection of the excavation daily, as dictated by activities being performed, after a rain storm, when fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom, or other similar conditions occur.

If there is any possibility that the trench or excavation could contain a hazardous atmosphere, atmospheric testing must be conducted prior to entry. Employees will not be permitted to work in a hazardous and/or toxic atmosphere.

Excavation, loading and stockpiling will be performed in accordance with the Work Plan. Excavation/trenches, regardless of the depth or width, will be barricaded. The use of raised berms, caution signs and caution tape will be instituted to protect both the public and other personnel on the site. The excavation area will be delineated with caution tape during operations and barricaded/secured with safety fence at the end of each workday. Adequate means of exit, such as ladders, steps, ramps or other safe means of egress, will be provided and be within 25 feet of lateral travel.

Where personnel are required to enter excavations over 4 ft in depth, sufficient stairs, ramps, or ladders will be provided to require no more than 25 ft. of lateral travel. At least two means of exit will be provided for personnel working in excavations. Where the width of the excavation exceeds 100 ft, two or more means of exit will be provided on each side of the excavation.

4.1.1.7 Drill Rig Operations

During drill rig operations, employees can have suspended loads dropped on them, be caught behind a load or stationary object, be struck by counterweights, be caught in moving parts, or be exposed to elevated work. They occur for a wide variety of reasons, but all injuries can be prevented by the following prudent practices:

- Spot-check the work area to identify hazards.
- Ensure safe operation of the drill rig, operations should only be performed by qualified personnel.
- Wear protective equipment including hard hat, safety glasses, safety footwear, and gloves.
- Be attentive to detail, know where the equipment dangers zones exists.
- A safety barrier keeping non-drill rig employees away from operation should be established.

4.1.1.8 Cranes

NEIE will only use cranes and other hoisting equipment that is in safe working order. All crane equipment brought onto the project site will be inspected for structural integrity, smooth operational performance, and proper functioning of all critical safety devices in accordance with the crane manufacturer's specifications. This inspection will be performed by the NEIE's site supervisor and site safety officer, and the crane operator.

- All equipment not conforming to the operational and safety requirements set forth during this inspection will not be put into service until all necessary repairs are made to the satisfaction of the inspection group. If any existing job cranes are to be used, they shall be inspected by a certified inspection agency prior to use.
- Only qualified crane operators familiar with the equipment to be used will be permitted to operate the crane. Subcontractors will supply proof of their operators' capability and experience to operate the crane in a safe manner.
- All hooks, slings, and other fittings shall be of correct size for the work to be done and shall have sufficient strength to safely sustain the loads imposed on them.
- Employees shall refrain from standing or walking beneath crane booms.
- In the event of emergency repair work of hoisting equipment with a suspended load, the area below the load shall be barricaded and the load blocked up or otherwise supported.
- Employees are not to ride loads, hooks, medicine balls, or slings suspended from hoisting equipment.
- Side pulls shall be avoided in all cases. The load must be directly under the hoist.
- The safety latch on the hook of hoisting equipment must be in a closed position.
- Use of deformed or defective hooks, rings, pins, shackles, or other lifting attachments is prohibited. Chain or wire rope shall be free of kinks, sharp bends, or twists.

4.1.1.9 Rigging Components

Rigging components will be inspected daily by members of the rigging team. In addition, allowable wire breaks and wear on hoisting ropes will follow *The Handbook of Rigging for Construction and Industrial Operations*, third edition, W.E. Rossnagel.

- Each sling is to be marked or tagged with its rated capacity.
- Slings are not to be used with loads in excess of their rated capacity.
- Wire-rope slings are to be immediately removed from service if any of the following conditions are present:
 - Six randomly distributed broken wires in one rope lay, or three broken wires in one strand in one rope lay.
 - Wear or scraping of 1/3 the original diameter of outside individual wires.
 - Kinking, crushing, bird caging, or any other damage resulting in distortion of the wire-rope structure.
 - Evidence of heat damage.
 - End attachments that are cracked, deformed, or worn.
 - Hooks that have been opened more than 15 percent of the normal throat opening, measured at the narrowest point, or twisted more than 10 degrees from the plane of the unbent hook.
 - Corrosion of the rope or end attachments.

4.1.1.10 Material Handling

Various materials and equipment may be handled manually during project operations. Care should be taken when lifting and handling heavy or bulky items to avoid back injuries. The following fundamentals address the proper lifting techniques that are essential in preventing back injuries:

- The size, shape, and weight of the object to be lifted must first be considered. Multiple employees or the use of mechanical lifting devices are required for heavy objects.
- The anticipated path to be taken by the lifter should be considered for the presence of slip, trip, and fall hazards.
- The feet will be placed far enough apart for good balance and stability (typically shoulder width).
- The worker will get as close to the load as possible. The legs will be bent at the knees.
- The back will be kept as straight as possible and abdominal muscles should be tightened.
- Twisting motions should be avoided when performing manual lifts.

- To lift the object, the legs are straightened from their bending position.
- A worker will never carry a load that cannot be seen over or around.

When placing an object down, the stance and position are identical to that for lifting. The legs are bent at the knees and the object lowered. When two or more workers are required to handle the same object, workers will coordinate the effort so that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each worker, if possible, will face the direction in which the object is being carried. In handling bulky or heavy items, the following guidelines will be followed to avoid injury to the hands and fingers:

- A firm grip on the object is essential; leather gloves will be used if necessary.
- The hands and object will be free of oil, grease, and water which might prevent a firm grip, and the fingers will be kept away from any points that could cause them to be pinched or crushed, especially when setting the object down.
- The item will be inspected for metal slivers, jagged edges, burrs, and rough or slippery surfaces prior to being lifted.

4.1.1.11 Elevated Work

4.1.1.11.1 Elevated Work during steel erection and roof installation

Work to be conducted during steel erection and roof installation will require the use of 100% fall protection measures. A static line will be used for personnel to attach to allow free movement on the roof and ensure fall protection is used 100% of the time during all operations. Each employee will be required to wear a full-body harness and a lanyard with a deceleration device attached to the static line during all roofing operations (roof removal and replacement). The following outlines some additional precautions.

- General:
 - A horizontal life line will be run across the top of the roof and shall be anchored according to specifications. It shall be designed, installed, and used under the supervision of a qualified person as part of the complete fall arrest system. The line and anchors shall be designed to hold all intended employees with a minimum safety factor of 2; and
 - A separated vertical life line will be used for each employee.
- Roof Bracket Scaffolds
 - Must be constructed to fit the pitch of the roof and provide a level of support to meet the minimum requirements of 1926.452(h)(1);
 - Brackets must be anchored in place by nails unless it is impractical to use, when nails are not

used, brackets must be secured with first-grade manila rope of at least ¾-inch diameter or equivalent; and

- Must be used in conjunction with the fall protection system described above.
- **Crawling Boards (Chicken Ladders)**
 - Crawling boards must be extended from the roof peak to the eaves when used in roof construction, repair or maintenance;
 - Crawling boards must be secured to the roof by: ridge hooks, or means that provide equivalent strength and durability that minimally meet 1926.452(m)(2);
 - Crawling boards must be not less than 10 inches wide and 1-inch thick;
 - Cleats must be equal in length to the width of the board, be spaced at equal intervals not to exceed 24-inches, and have a minimum cross sectional area of 1x1-1/2 inches; and
 - Crawling boards shall be used with a fall protection system.

4.1.1.11.2 Vehicle-Mounted Elevated and Rotating Work Platforms

Elevated work on vehicle-mounted elevated and rotating work platforms pose numerous safety risks. The following outlines the safety precautions to be undertaken to prevent work injury during use.

- **General:**
 - Vehicle-mounted elevating and rotating work platforms shall be designed and constructed in accordance with ANSI/SIA A92.2 standards;
 - Vehicle-mounted elevated and rotating work platforms shall be operated, inspected, tested and maintained as specified by the operators manual;
 - Records of inspection conducted shall be maintained at the work site;
 - Only personnel trained in the use of the vehicle-mounted elevated and rotating work platform shall be authorized to operate the equipment;
 - This training shall consist of reading and understanding the manufacturer's operating manual and associated rule and instructions, or trained by a qualified person on the content; and
 - The training shall also include understanding all decals, warnings, restrictions, and instructions.
- **Transporting:**
 - An aerial lift truck shall not moved when the boom is elevated in a working position with personnel in the basket except for equipment that is specifically designed for this type of operation; and

- Before moving an aerial lift, the boom shall be inspected to see that it is properly cradled and outriggers are in stowed position.
- Operating Practices:
 - When outriggers are used, they shall be positioned on pads or a solid surface and brakes are to be set; and
 - Wheel chocks shall be in place before use.
- Fall Protection:
 - Employees shall ALWAYS stand firmly on the floor of the basket and shall NOT sit or climb on the edge of the basket or use planks, ladders or other devices to obtain a work position;
 - A full-body harness with a lanyard with a deceleration device shall be worn; and
 - The lanyard shall be anchored to the device at only designed anchor points provide on the equipment. Anchoring to the railing or chocking the lanyard IS PROHIBITED.

4.1.1.11.3 Ladder Safety

Work conducted from use of ladders pose numerous safety risks. The following outlines the safety precautions to be undertaken to prevent work injury during use.

- Use:
 - No work requiring lifting of heavy materials or substantial exertion shall be done from ladders;
 - Ladders shall have slip-resistant feet;
 - Ladders shall not be moved, shifted, or extended while occupied;
 - The top or top step of a step-ladder shall not be used as a step;
 - Ladders shall be inspected for visible defects on a daily basis and before each use. Broken or damaged ladders are to be tagged and taken out of service;
 - Ladders shall be restricted for their intended use;
 - Ladders shall not be climbed by more than one person at a time.
 - When ladders are used for access, they shall be extended a minimum of three (3) feet above the access area and shall be secured at top and bottom.

4.1.1.11.4 Scaffolds

Scaffolds and their components shall meet the requirements contained in ANSI A10.8 and be capable of supporting without failure at least 4 times the maximum anticipated load. Scaffold system components that are subject to bending moment shall be capable of providing a resisting moment of at least 4 times the tipping moment.

- **General:**

- Scaffolds shall be plumb and level;
- Scaffolds shall bear on base plates upon mudsills or other adequate foundation;
-

- **Stairtowers**

- Stairtower shall be positioned such that their bottom step is not more than 24 inches (61 cm) above the scaffold supporting level.
- A stairrail consisting of a toprail and a midrail shall be provided on each side of each scaffold stairway.
- The toprail of each stairrail system shall also be capable of serving as a handrail, unless a separate handrail is provided.
- Handrails, and toprails that serve as handrails, shall provide an adequate handhold for employees grasping them to avoid falling.
- Stairrail systems and handrails shall be surfaced to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.
- The ends of stairrail systems and handrails shall be constructed so that they do not constitute a projection hazard.
- Handrails and toprails that are used as hand rails, shall be at least 3 inches (7.6 cm) from other objects.
- Stairrails shall be not less than 28 inches (71 cm) nor more than 37 inches (94 cm) from the upper surface of the stairrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.
- A landing platform at least 18 inches (45.7 cm) wide by at least 18 inches (45.7 cm) long shall be provided at each level.
- Each scaffold stairway shall be at least 18 inches (45.7 cm) wide between stairrails.

- Treads and landings shall have slip-resistant surfaces.
- Stairways shall be installed between 40 degrees and 60 degrees from the horizontal.
- Guardrails meeting the requirements of paragraph (g)(4) of this section shall be provided on the open sides and ends of each landing.
- Riser height shall be uniform, within ¼ inch (0.6 cm) for each flight of stairs. Greater variations in riser height are allowed for the top and bottom steps of the entire system, not for each flight of stairs.
- Tread depth shall be uniform, within ¼ inch, for each flight of stairs.

- **Load tower**

The following control measures should be implemented for tower scaffolds.

- Construct the tower with modular, frame, or tube and coupler scaffolding.
- Ensure the tower is resting on firm level ground with the wheels or feet properly supported. Do not use bricks or building blocks to take the weight of any part of the tower.
- Ensure the height of a tower scaffold, from the bottom of the scaffold to the working/load surface, is no greater than three times the minimum base dimension, unless otherwise specified by the manufacturer, supplier or designer.
- Use alternative height to base ratios or extra support if the scaffold is:
 - a. sheeted or likely to be exposed to strong winds;
 - b. loaded with heavy equipment or materials;
 - c. used to hoist heavy materials or support rubbish chutes;
 - d. used for operations involving heavy or awkward equipment (for example, grit blasting or water-jetting); and
- Bracing:
 - a. Frames and panels must be connected by **cross, horizontal, or diagonal braces**, alone or in combination, which secure vertical members together laterally. [1926.452(c)(2)]
 - b. As frames are stacked, cross braces must be of such length as will automatically keep the scaffold **plumb, level, and square**. [1926.452(c)(2)]
 - c. All brace connections must be secured to **prevent dislodging** [1926.452(c)(2)].
- Guys, Ties and Braces:
 - a. When a supported scaffold reaches a height that is more than **four times its minimum base dimension (4:1)**, it must be restrained by guys, ties, or braces to **prevent it from tipping**. [1926.451(c)(1)]
 - b. Guys, ties, and braces must be installed at locations where horizontal scaffold components **support both inner and outer legs**. [1926.451(c)(1)(i)]

- c. Guys, ties, and braces must be installed according to the scaffold manufacturer's recommendations or at the **closest horizontal member to the 4:1 height ratio** and be repeated every 20 vertical feet for narrow scaffolds (3 feet or less in width), and every 26 vertical feet for scaffolds greater than 3 feet in width. [1926.451(c)(1)(ii)]
- d. Ties, guys, braces, or outriggers shall be used to prevent tipping of supported scaffolds bearing **eccentric loads, such as cantilevered work platforms**. [1926.451(c)(1)(iii)]

4.1.1.11.5 Work at Elevated Height – Ladder Safety

Work conducted from use of ladders pose numerous safety risks. The following outlines the safety precautions to be undertaken to prevent work injury during use.

- Use:
 - No work requiring lifting of heavy materials or substantial exertion shall be done from ladders;
 - Ladders shall have slip-resistant feet;
 - Ladders shall not be moved, shifted, or extended while occupied;
 - The top or top step of a step-ladder shall not be used as a step;
 - Ladders shall be inspected for visible defects on a daily basis and before each use. Broken or damaged ladders are to be tagged and taken out of service;
 - Ladders shall be restricted for their intended use;
 - Ladders shall not be climbed by more than one person at a time.
 - When ladders are used for access, they shall be extended a minimum of three (3) feet above the access area and shall be secured at top and bottom.

4.1.1.12 Steel Erection

All system-engineered metal buildings shall comply with the minimum OSHA requirements as outlined in 29 CFR 1926 Subpart R. All structural columns must be anchored by at least four anchor bolts.

Rigid frames must have 50 percent of their bolts, or the number of bolts specified by the manufacturer (whichever is greater) installed and tightened on both sides of the web adjacent to each flange before the hoisting equipment is released.

Construction loads are prohibited from:

- being placed on any inadequately secured structural steel framework and
- being placed beyond any area 8 feet from the center-line of the primary support member.

When girts or eave struts share common connection holes:

- at least one bolt must remain securely in place for the connection of the first member;
- a field-attached seat or similar connection device supplied by the manufacturer may be used in lieu of the bolt; and
- both ends of all cold-formed or steel joists must be fully bolted/welded to the support structure before:
 - releasing the hoisting cables,
 - allowing an employee on the joists, or
 - allowing any construction loads on the joists.

Purlins and girts are prohibited from:

- being used as an anchorage point for a fall-arrest system, unless written approval is obtained from a qualified person;
- being used as a walking/working surface when installing safety systems, until:
 - - all permanent bridging is installed, and
 - fall protection is provided

4.1.1.13 Hand and Power Tools

Hand and power tools are used for various site activities. Procedures for using hand and power tools are as follows:

- General Safety Precautions:
 - Persons using power tools will be trained in their use;
 - Tools shall be inspected prior to each use;
 - Ground Faults must be present on all electrical tools;
 - Only tools in good condition will be used;
 - Tools will be kept clean;
 - Guards and shields will be kept on all tools;
 - Air couplings will be secured; and
 - Proper eye protection is critical when using power tools. At a minimum, safety glasses will be required during site operations. Where appropriate, full-face shields will be utilized in addition to

the glasses.

- **Pneumatic Tools:**
 - Safety clips or retainers shall be installed and maintained;
 - Pressure shall be shut off and exhausted from the line before disconnecting the line from any tool or connection;
 - Safety lashing shall be provided at connections between the hose and at all quick makeup connections; and
 - Hoses shall not be used for hoisting or lowering.
- **Power Tools**
 - Guards shall be kept in place;
 - Reciprocating, rotating, and moving parts of equipment shall be guarded;
 - All woodworking machinery shall be operated and maintained in accordance with ANSI 01.1;
 - Radial arm power saws shall be equipped with an automatic brake; and
 - Radial arm power saws shall be installed in such a manner that the cutting head will return to the starting position when released by the operator.

4.1.1.14 Hand Tools

Hand tools are used for various site activities. Procedures for using hand tools are as follows:

- Only tools in good condition will be used.
- Tools will be kept clean.
- Proper eye protection is critical when using power tools. At a minimum, safety glasses will be required during site operations. Where appropriate, full-face shields will be utilized in addition to the glasses.

4.1.1.15 Electrical

All electrical wiring and equipment shall be a type listed by a nationally recognized testing laboratory for the specific application for which it is to be used. All electrical work shall comply with applicable National Electrical Safety Code (NESC), National Electric Code (NEC), OSHA and USCG regulations. Electrical work shall be performed by Qualified Personnel with verifiable credentials who are familiar with applicable code requirements. Verifiable credentials consist of State, National and/or Local Certifications or Licenses that a Master or Journeyman Electrician may hold, depending on work being performed.

Before starting work, existing conditions shall be evaluated and determined. Such conditions shall include, but not be limited to, location and voltage of energized lines and equipment, conditions of poles, and location of circuits and equipment including power and communication lines and fire alarm circuits.

- Electric equipment and lines shall be considered energized until determined to be de-energized by tests, or other means, and grounds applied.
- New lines or equipment may be considered de-energized and worked as such where the lines or equipment are grounded or where the hazard of induced voltages is not present and adequate clearances or other means are implemented to prevent contact with energized lines or equipment.
- Bare wire communication conductors on power poles or structures shall be treated as energized lines unless protected by insulating materials suitable for the highest voltage that may be accidentally applied to the line.
- The operating voltage of equipment and lines shall be determined before working on or near energized parts.

4.1.1.16 Noise Exposure

Noise is generated during source removal action in such operations as transportation of materials and operation of heavy construction equipment. Noise has been defined as unwanted sounds. The human ear can tolerate a certain amount of sound without any harmful effects. Personnel will be provided protection against the effects of hazardous noise exposure whenever sound-pressure levels exceed 85 dB(A) steady-state expressed as a time-weighted average (TWA) or 140 dB(A) Sound-pressure level limits.

The NEIE's standard allows 85 dB(A) for a full 8 hours and for a lesser time when the levels exceed 85 dB(A). It is usually safe to assume that if you need to shout to be heard at arms length, the noise level is at 90 dB(A) or above. Hearing protection will be utilized by personnel operating or working around construction equipment or power tools. Based on the nature of activities to be performed on site, the use of heavy equipment, power tools and other noise producing devices, NEIE personnel are enrolled in a Hearing Conservation Program that meets the requirements of OSHA regulation 29 CFR 1910.95 as part of our Medical Surveillance Program.

Based upon NEIE's past experience, it is known that the noise levels emanating from the operation of the heavy equipment often exceed what is allowable for worker exposure. Consequently, equipment operators and personnel working near the equipment are required to wear hearing protection. Hearing protection equipment is provided by NEIE.

4.1.1.17 Slip/Trip/Fall

Slip/trip/hit/fall injuries are the most frequent of all injuries to workers. They occur for a wide variety of reasons, but all injuries can be prevented by the following prudent practices:

- Spot-check the work area to identify hazards.
- Establish and utilize a pathway, which is most free of slip and trip hazards.
- Beware of trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain.
- Carry only loads that you can see over.
- Keep work areas clean and free of clutter, especially in storage rooms and walkways.
- Communicate hazards to on-site personnel
- Secure all loose clothing, ties, and remove jewelry while around machinery.
- Report and/or remove hazards.
- Keep a safe buffer zone between workers using equipment and tools.
- Workers must take particular care when walking on the geotextile-working mat.

4.1.1.18 Cold Stress (Seasonally Applicable)

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10° F with a wind velocity of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18° F. As a general rule, the greatest incremental increase in wind chill occurs when a wind velocity of 5 mph increases to 10 mph. Additionally, evaporation of water removes heat from the substrate. Thus, the body suddenly cools when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

Extreme cold for a short time may cause severe injury to the surface of the body. Areas of the body that have high surface-area-to-volume ratio such as fingers, toes, and ears are the most susceptible.

Frostbite of the extremities can be categorized into the following:

- Frost nip or initial frostbite: characterized by sudden blanching or whitening of the skin.
- Superficial frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep frostbite: tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages: (1) shivering, (2) apathy, listlessness, sleepiness, and sometimes rapid cooling of the body to less than 95° F, (3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate, (4) freezing of the extremities, and finally (5) death. In addition to the requirements below, all project personnel will comply with the cold stress TLV recommended by ACGIH. The minimum requirements to control against cold stress are as follows:

Thermal socks, long cotton underwear, hard hat liners, and other cold weather gear can aid in the prevention of hypothermia.

- Blankets, warm drinks (other than caffeinated coffee), and warm break areas are essential.
- The overall goal is to keep from getting wet. If one does get wet, dry off and change clothes.
- Cold stress training should be reviewed during the winter months.

4.1.1.19 Heat Stress (Seasonally Applicable)

Heat stress may be a hazard for workers wearing protective clothing even if the temperature is moderate. The same protective materials that shield the body from chemical exposure prevent heat and moisture from dissipating. Personal protective clothing can therefore create a hazardous condition. Depending on the ambient temperature and the work being performed, heat stress can occur very rapidly - within as little as 15 minutes.

In its early stages, heat stress can cause discomfort and inattention, resulting in impaired functional abilities that can threaten the safety of both the individual and his co-workers. Personnel will be instructed to recognize the symptoms of the onset of heat stress. While it is not anticipated that heat stress monitoring will be required for this project, the SSHO may periodically check all personnel working in thermal stress areas to ensure that the symptoms are recognized. Frequency of heat stress monitoring and checks for symptoms of heat stress will increase with rises in air temperature, humidity, and the degree of exposure to high temperature areas.

An ambient temperature of 72.5° F when workers are in Level C or higher, will be used as an action level to implement pulse monitoring, oral temperatures and administrative controls, including rest breaks and work rotation, to prevent employees from experiencing heat-related health effects including weight loss. The guidance for workers wearing permeable clothing is specified in the current version of the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values for Heat Stress.

The following parameters should be used when monitoring workers:

Heart rate - Count the radial pulse as early as possible in the rest period to ensure a more accurate reading. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period at the same length. If, at the end of the following work period, the heart rate still exceeds 110 beats per minute, shorten the work period again by one-third.

Oral Temperature - The utilization of oral temperature applies to the time immediately after the worker leaves the contamination reduction zone. Using a clinical thermometer, take the temperature for three minutes. If the oral temperature exceeds 99.6 F (37.6 C), shorten the next work cycle by one-third, without a change to the rest period. If the oral temperature still exceeds 99.6 F (37.6 C) at the end of the following work period, shorten the next work cycle by one-third. Do not permit a worker to perform duties requiring a semipermeable or impermeable garment if the oral temperature exceeds 100.6 F (38.1C). Ear canal readings are a valid method to monitor the temperature of workers who remain in the contamination reduction zone.

The oral temperature shall not exceed 100.4° F. If an employee's pulse rate exceeds the maximum age-adjusted heart rate ($0.7(220-AGE)$), and/or the oral temperature exceeds 100.4° F, the employee shall be required to stop work and rest at the work site or move to an air-conditioned room after proper decontamination. The affected employee may be allowed to return to work after his/her pulse rate has dropped below 100 beats per minute. The SSHO in consultation with the affected employee, and medical personnel if necessary, shall determine whether an employee is ready to return to work. Fluids shall be provided and rest breaks will be taken. The frequency of breaks will increase with the temperature. Such things as cooling vest; portable fans and breaks in air-conditioned areas shall be used if necessary.

When practicable, the most labor-intensive tasks should be carried out during the coolest part of the day. If necessary, a work/rest regimen will be instituted. The work/rest regimen consists of alternating periods of work and rest. The duration of these alternating periods will depend on the environmental conditions at the job site, i.e., the Wet Bulb Globe Temperature, duration and type of activities performed.

A worker who becomes irrational or confused or collapses on the job should be considered a heat stroke victim, and medical help should be called immediately. Early recognition of symptoms and prompt emergency treatment is the key to aiding someone with heat stroke. While awaiting the ambulance, begin efforts to cool the victim down by performing the following:

- Move the victim to a cooler environment and remove outer clothing.
- Wet the skin with water, and fan vigorously or repeatedly apply cold packs or immerse the victim in a tub of cool (not ice) water.
- If no water is available, fanning will help promote cooling.

Any individual showing susceptibility to heat stress will be referred to a physician for evaluation. In addition, the use of prescription drugs can also contribute to the effects of heat stress and will be considered during the assignment of work. Cool (50°-60°F) water or a sport drink, such as Gatorade will be made available to workers and encourage them to drink small amounts frequently, e.g., one cup every 20 minutes. Ample supplies of liquids will be placed close to the work area.

4.1.1.20 Flammable Materials

The use of flammable materials for fuels, cleaners, or polyethylene piping creates a potential for fire. Controls for such materials are as follows.

- Ignition sources will be excluded from any area where flammable materials are present (used or stored).
- Equipment on site shall be bonded and grounded, spark proof, and explosion resistant, as appropriate. Particular attention to bonding/ grounding shall be made during transfer of flammable/combustible liquids and when ventilation equipment is in use.
- There will be no smoking on the job site. If there are smokers on site, they will be provided with a designated smoking area.
- Fuels used by on-site personnel will be stored in approved safety containers designed for that purpose.
- Fuels will be stored in a common location to be determined by the SHSO. This common fuel storage location, once established, will be marked with warning signs "Flammable Liquid" and "No Smoking."
- All electrical appliances used will be UL approved for the potential hazards of the atmospheres in which they will be used.
- Fire extinguishers consistent with OSHA 1910.150 and will be kept in sufficient number of locations to

allow on-site personnel the opportunity to extinguish incipient fires.

4.1.1.21 Mechanical and Flame Cutting Equipment

Hot work (i.e., welding, cutting, brazing, etc.) can be hazardous as an ignition source and as a source of airborne contaminants. The latter is especially true when cutting on painted and/or contaminated metal. Any hot work that would take place near flammable materials in tanks or in a confined space can present an explosion hazard. Cutting equipment and compressed gas cylinders present potential physical, electrical, tripping, and flammable hazards such as welding flash and welding burns. The following outline some controls.

- All hot work shall be performed in accordance with Subpart Q of the OSHA General Industry Standard (29 CFR 1910.251-.257) and with Hot Work Procedures.
- No hot work shall be performed without a Hot Work Permit.
- The area where hot work is to be performed shall be inspected by a qualified person recognized by NEIE H&S staff. This qualified person shall issue a Hot Work Permit.
- Cutting, welding, or other operations that produce excessive heat, open sparks, or flames will not be permitted within 100 feet of a potential liquid fuel source.
- Sacrificial anodes, if used, will be attached using a cold method.
- Extinguishing capabilities equal to or greater than two 10-pound ABC multipurpose dry chemical fire extinguishers will be available in the immediate vicinity of hot work.

4.1.1.22 Fire

Fire is a potential hazard associated with the on-site activities. Local fire and police department telephone numbers will be posted in a visible area in the support zone in the on-site office trailer. Smoking is prohibited within the exclusion zone, and will be confined to an area located in the support zone and away from any flammable materials. All heavy equipment will be supplied with Type B fire extinguishers and additional Type ABC fire extinguishers will be located in the support zone. All personnel on-site will be instructed on the use and locations of all on-site fire extinguishers. Each fire extinguisher will be inspected regularly during field activities to make certain that it is in operable condition.

4.1.1.23 Confined Space

A confined space is defined as a job location large enough for a body to enter, a location where there is limited or restricted access/egress, and a location that is not designed for continuous human occupancy. Hazards associated with confined space include potentially higher than normal chemical concentrations, flammable atmospheres, potential for asphyxiation, entrapment or potential physical exposures. Any work in a confined space should be performed following NEIE confined space procedures.

4.1.1.24 Underground Utilities

Before any intrusive activities begin, NEIE will determine the location of underground utilities (sewers, telephone, fuel, electric, water lines, or any other underground installations) that may be encountered during the removal action. NEIE will notify DIGSafely NEW YORK ONE CALL CENTER at (800) 962-7962 for a mark out of utilities in the operational area. For more information on New York's ONE CALL CENTER contact (800) 272-4480

4.1.1.25 Housekeeping

Housekeeping hazards can produce congestion, disorder, dirt, waste, trash, and other obstacles and can lead to slips, trips, and fall potentials. Such accidents can result in strains, sprains, broken bones, contusions, fractured ribs, and fatalities. Work areas shall be kept sufficiently clean and orderly so that work activities can proceed in an efficient and safe manner such that safety and quality are maintained. These areas will be adequately lighted, ventilated, protected, and accessible as appropriate for the work being performed.

- Machinery and equipment will be arranged and stored to permit safe, efficient work activities and to provide ease in cleaning. Tools and accessories will be safely stored in cabinets, racks, or other suitable devices out of traffic areas.
- Sufficient waste containers and receptacles will be provided in appropriate locations and will be emptied regularly. Work areas and floors will be maintained free of material, debris, obstructions, foreign materials, or slippery substances such as oil, water, and grease.
- Aisles, traffic areas, and exits will be maintained free of materials and debris. Flammable and combustible materials will be stored in approved containers, appropriately labeled, and properly disposed. Waste rags will be stored in metal containers to preclude spontaneous combustion. Flammable and combustible materials will be stored in dedicated, ventilated storage rooms in accordance with OSHA Standards. Personnel will be held accountable for keeping their work areas clear of housekeeping hazards.

4.1.2 Potential Biological Hazards

Of potential concern are poisonous spiders and snakes, poisonous/irritating plants (poison oak, poison ivy), and stinging insects, particularly those to which individuals may have developed allergies (i.e., bees, wasps). Individuals with allergies to insect stings (bees, wasps, etc.) should notify the Site H&S Coordinator and other supervisory personnel. Tailgate safety briefings should identify potential locations of poisonous plants and dense foliage where insects or snakes may be hidden. A first aid kit will be available to treat minor insect bites and stings. Adherence to safe work practices such as not reaching into dark places or picking up rocks and other objects, inspecting clothing and exposed skin for presence of ticks periodically during the day, and wearing steel-toed safety boots, long-sleeve shirts, and heavy leather work gloves when removing or contacting vegetation.

4.1.2.1 Poisonous Plants

Poison ivy and poison oak can result in rashes and blisters within a couple of hours or days after contact. The irritation comes from the plant resin and through itching and scratching can be carried from the original point of contact to other areas of the body. Following contact, it is best to remove one's clothing and wash the skin with copious changes of soap and water, being careful not to rupture any blister that may have formed. For mild cases application of a simple soothing lotion (calamine should be in the first aid kit) should be enough; but in severe exposures there may be a raised body temperature indicating the need for medical attention.

4.1.2.2 Spiders and Other Insects

Although most spiders are harmless, there are two species that pose a potential hazard: the brown recluse or violin spider (*Lox osceles reclusa*), and the black widow (*Latrodectus mactans*). Spider bites, although rarely fatal, are often quite painful. Symptoms may include severe pain in the area of the bite, profuse sweating, nausea, abdominal cramps, and difficulty breathing and speaking. Field personnel are reminded to exercise extreme caution when working in dark, damp, covered areas since spiders are typically found in these locations.

First aid procedures for minor insect bites and stings include: cold applications, use of soothing lotions (e.g., calamine), and for a bee sting, removal of the venom, stinger, and venom sac. If the bite or sting is from a poisonous spider or produces a severe reaction, implement the following procedures: calm and keep the victim from moving about, preferably in a prone position and immediately transport to the nearest medical emergency facility. If the victim cannot be transported to a hospital and emergency assistance is not immediately available, the field team should remove the venom sac with the Sawyer extractor, immobilizing the bitten extremity and keeping it below the heart, and, if necessary, provide artificial respiration and CPR. However, it is essential to get the victim to a hospital immediately.

If a tick is attached to the skin, gently pull it out with tweezers, being careful not to squeeze the tick's body, clean the bitten area with antiseptic and watch for any rash. If possible save the tick in a bottle for later identification. Certain ticks (*ixodes* spp.) commonly found on deer, but also on dogs and mice, are

vectors (carriers/transmitters) of the bacterium *Borrelia burgdorferi*, the cause of Lyme disease. The tick must feed for approximately 48 hours for the bacterium to be transmitted, and even then the risk of infection is only 4 percent in individuals bitten by an infected tick. Nevertheless, since Lyme disease in rare cases causes transient heart problems, chronic arthritis, and nervous system disorders, check for ticks, especially on hairy parts of the body following activities in high grass and brush. If bitten by a tick, watch for the characteristic rash within five weeks of the bite (ring of redness surrounding a central pale area) which is often accompanied by flu-like symptoms and pain in the muscles and joints, especially the knees.

4.1.2.3 Snakes

Snake bites are serious and should be treated as though from a venomous snake, such as a rattlesnake (triangular head, thick body, pits between the eyes and nostrils, generally 4 to 6 feet long, blotched brownish, gray or red coloration, characteristic rattles). Seek medical attention immediately, transport the victim to the nearest medical facility (see Table 1 for telephone numbers and Figure 3A and 3B for directions). Signs and symptoms of venomous poisoning include swelling, pain, and tingling at the bite site, tingling and a metallic taste in the mouth, fever, chills, blurred vision, and muscle tremors. Even if the bite is not from a venomous snake there is a real possibility of tetanus. The following first aid steps should be followed while transporting the individual to the emergency room or waiting for medical assistance, if the victim cannot be moved:

- Calm the victim and keep hydrated and comfortable;
- Immobilize the affected area and keep at or below the level of the heart;
- Remove rings, watches, and other constrictive items before swelling starts; and
- Gently clean the wound with an antiseptic soap and apply sterile dressing, don't apply ice or attempt to cut the bite site and suck out the venom.

The immediate goal should be safe and rapid transport to the emergency room without undue anxiety or activity that may accelerate absorption of the venom. A short walk is acceptable if the patient feels up to it and if no other alternative is available. A suction device, such as a Sawyer Extractor, can be used to effectively remove up to 30 percent of the venom if applied within three minutes of the bite. An Extractor, which is applied without incision, should be maintained in the first aid kit and used when indicated and certainly when there may be a delay in getting emergency medical treatment.

Personnel should remember that snake bites are preventable events. Most individuals that are bitten see the snake, but then take actions that put them at risk. Give snakes a wide berth, move away and the snake will not chase you. Always look before you step over an object, and before you turn over a rock or log, or place your hand in a crevice. Complete outdoor tasks during daylight hours. Personnel should always wear protective clothing (heavy leather work gloves, thick leather safety boots, long-sleeve shirts) when working in areas with tall grass or potential

snake habitat.

4.1.2.4 Other Wild and Domestic Animals

Other animal hazards that could be encountered include wild and domestic animals, primarily dogs. Most wild animals will be frightened away, but the more domestic they are, the less likely they will run. Beware of skunks and porcupines that do not flee or raise their tails vertically, you could become a target for noxious excretions or quills. The following guidelines are recommended to avoid animal attacks in the field:

- Surprising animals and thereby provoking an attack can be avoided by making noise when entering wooded or covered areas.
- Make a wide detour around all animals that are observed.
- If animals are present at the Site that pose a potential threat and cannot be scared away, return to the field trailer and notify the local animal control agency, or forest ranger.

Watch out for rodent nests; rodent infestations could pose a potential health hazard (rodents may carry hantaviruses, the causative agent of hemorrhagic fever); inhalation or ingestion of urine, feces or saliva, even aerosols, from infected rodents could transmit the virus to workers.

Bats could also be encountered. They are essentially harmless; less than 1 percent are infected with rabies, and attacks are rare. Nevertheless, of the 25 cases of human rabies diagnosed over the past 18 years in the USA, 22 were linked to bats. If there is an incident where someone may have been scratched, bitten, or even touched by a bat, wash the area with soap and water and get medical advice immediately. Anti-rabies treatment may be necessary.

4.1.3 Chemical Hazards

The predominant VOCs, or contaminants of concern (COC), in the groundwater plume originating from the LAI site are TCE and PCE. To a lesser extent, other VOCs such as: chloromethane (CM), 1,1-dichloroethene, methyl tert-butyl ether (MTBE), 1,1-dichloroethane (DCA), cis-dichloroethene (DCE), chloroform and 1,1,1-trichloroethane (TCA) are also known to be present. Material Safety Data Sheets are found in **Appendix B**.

4.1.3.1 Exposure Route

A primary exposure route of concern at the site is contact with the contaminated groundwater. Air monitoring will be performed to assess the effectiveness of the mitigation system using direct reading instruments (such as PID and FID), will be used. Direct contact of the skin and eyes with contaminated material is an important route of exposure. To protect workers against dermal contact, they will wear specified protective clothing, and safety glasses for operations involving potential exposure to hazardous materials.

Although ingestion should be the least significant route of exposure, employees will be made aware of ways in which this type of exposure can occur and methods to avoid such exposure. Deliberate ingestion of chemicals is unlikely. Personal hygiene habits that provide a route of entry for chemicals will be restricted. Proper decontamination procedures will reduce/eliminate potential of ingesting hazardous materials. Site personnel will wash their hands, face and other exposed parts of their skin before eating or smoking.

4.1.3.2 Trichloroethene (TCE)

Trichloroethene (TCE) is a nonflammable, colorless liquid at room temperature which has a sweet odor and evaporated easily. It vapor pressure at 25 degrees C is 74mmHg and density at 20 degrees C is 1.465 g/ml. It melting and boiling point are -87.1 degree C and 86.7 degrees C, respectively. Currently, TCE is primarily used as a solvent to degrease metals for fats, waxes, resins and oils. It is used in the manufacturing of other chemicals. TCE is a probable human carcinogen. Humans are exposed to TCE through ingestion, inhalation and dermal routes. The primary target organs are the liver, kidney, central nervous system, cardiovascular system, hematopoietic system and reproduction. Some health effects of TCE include headaches, dizziness, poor concentration, impaired heart function, unconsciousness, nerve, kidney, and liver damage, and death.

The Occupational Safety and Health Administration (OSHA) has set an average permissible exposure limit of 100 ppm to protect workers during each 8-hour work shift in a 40-hour workweek and a ceiling of 200 ppm that shall not be exceeded at any time.

4.1.3.3 Volatile Organic Compounds

Although reports of drums containing solvents have not been reported an outline of some basic hazards related to volatile chemicals has been presented in this section. Most VOC are listed as probable or known human carcinogens. VOCs generally enter the body through ingestion, inhalation and dermal routes. The primary target organs are the liver, kidney, central nervous system, cardiovascular system, hematopoietic system and reproduction. Some health effects of VOCs include headaches, dizziness, poor concentration, impaired heart function, unconsciousness, nerve, kidney, and liver damage, and death.

4.1.3.3.1 Chloromethane

Chloromethane is a clear, colorless gas (vapor) that is difficult to smell. It has a faintly sweet, nonirritating odor at high levels in the air. It is a naturally occurring chemical that is made in large amounts in the oceans and is produced by some plants and rotting wood and when such materials as grass, wood, charcoal, and coal burn. Chloromethane is also produced industrially, but most of it is destroyed during use. It is used mainly in the production of other chemicals such as silicones, agricultural chemicals, and butyl rubber. Chloromethane was used widely in refrigerators in the past, but generally this use has been taken over by newer chemicals such as Freon.

If the levels are high enough (over a million times the natural level in outside air), brief exposures to chloromethane can have serious effects on the nervous system, including convulsions, coma, and death. Exposure can cause staggering, blurred and double vision, dizziness, fatigue, personality changes, confusion, tremors, uncoordinated movements, nausea, and vomiting. These symptoms can last for several months or more, but complete recovery is possible. Exposure to chloromethane has also had harmful effects on the liver, kidney, heart rate, and blood pressure.

The Occupational Safety and Health Administration (OSHA) has set an average permissible exposure limit of 50 parts of chloromethane per million parts of workroom air (50 ppm) to protect workers during each 8-hour work shift in a 40-hour workweek. The exposure limit recommended by the National Institute for Occupational Safety and Health (NIOSH) is 100 ppm for each 8-hour workshift in a 40-hour workweek.

4.1.3.3.2 1,1-dichloroethene

1,1-Dichloroethene is an industrial chemical that is not found naturally in the environment. It is a colorless liquid with a mild, sweet smell. It is also called vinylidene chloride. 1,1-Dichloroethene is used to make certain plastics, such as flexible films like food wrap, and in packaging materials. It is also used to make flame retardant coatings for fiber and carpet backings, and in piping, coating for steel pipes, and in adhesive applications.

Exposure to 1,1-dichloroethene occurs mainly in the workplace. Breathing high levels of 1,1-dichloroethene can affect the liver, kidney, and central nervous system. This chemical has been found in at least 515 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

The main effect from breathing high levels of 1,1-dichloroethene is on the central nervous system. Some people lost their breath and fainted after breathing high levels of the chemical. Breathing lower levels of 1,1-dichloroethene in air for a long time may damage your nervous system, liver, and lungs. Workers exposed to 1,1-dichloroethene have reported a loss in liver function, but other chemicals were present.

OSHA has set an occupational exposure limit of 1 ppm of 1,1-dichloroethene in workplace air for an 8-hour workday, 40-hour workweek. NIOSH currently recommends that workers breathe as little 1,1-dichloroethene as possible.

4.1.3.3.3 Methyl tert-butyl ether (MTBE)

Methyl *tert*-butyl ether (MTBE) is a flammable liquid which is used as an additive in unleaded gasoline. Drinking or breathing MTBE may cause nausea, nose and throat irritation, and nervous system effects.

MTBE has been found in at least 11 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

MTBE has a distinctive, disagreeable odor. It is made from blending chemicals such as isobutylene and methanol, and has been used since the 1980s as an additive for unleaded gasolines to achieve more efficient burning.

Breathing small amounts of MTBE for short periods may cause nose and throat irritation. Some people exposed to MTBE while pumping gasoline, driving their cars, or working in gas stations have reported having headaches, nausea, dizziness, and mental confusion. However, the actual levels of exposure in these cases are unknown. In addition, these symptoms may have been caused by exposure to other chemicals.

There are no data on the effects in people of drinking MTBE. Studies with rats and mice suggest that drinking MTBE may cause gastrointestinal irritation, liver and kidney damage, and nervous system effects.

The EPA has issued guidelines recommending that, to protect children, drinking water levels of MTBE not exceed 4 milligrams per liter of water (4mg/L) for an exposure of 1-10 days, and 3 mg/L for longer-term exposures.

The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended an exposure limit of 40 parts of MTBE per million parts of air (40 ppm) for an 8-hour workday, 40-hour workweek.

4.1.3.3.4 1,1-dichloroethane (DCA)

1,1-Dichloroethane (DCA) is a colorless, oily liquid with a sweet odor. It evaporates easily at room temperature and burns easily. It does not occur naturally in the environment.

In the past, 1,1-dichloroethane was used as a surgical anesthetic, but it is no longer used this way. Today it is used primarily to make other chemicals, to dissolve substances such as paint, varnish, and finish removers, and to remove grease.

Very limited information is available on the effects of 1,1-dichloroethane on people's health. The chemical was discontinued as a surgical anesthetic when effects on the heart, such as irregular heart beats, were reported.

Studies in animals have shown that 1,1-dichloroethane can cause kidney disease after long-term exposure to high levels in air. Delayed growth was seen in the offspring of animals who breathed high concentrations of the chemical during pregnancy.

The EPA requires that spills or accidental releases into the environment of 1,000 pounds or more of 1,1-dichloroethane be reported to the EPA.

OSHA has set an occupational exposure limit of 100 milligrams of 1,1-dichloroethane per cubic meter of air (100 mg/m³) for an 8-hour workday, 40-hour workweek.

NIOSH currently recommends that a level of 12,150 mg/m³ be considered immediately dangerous to life and health. This is the exposure level of 1,1-dichloroethane that is likely to cause permanent health problems or death.

4.1.3.3.5 1,1-dichloroethene

1,1-Dichloroethene is an industrial chemical that is not found naturally in the environment. It is a colorless liquid with a mild, sweet smell. It is also called vinylidene chloride. 1,1-Dichloroethene is used to make certain plastics, such as flexible films like food wrap, and in packaging materials. It is also used to make flame retardant coatings for fiber and carpet backings, and in piping, coating for steel pipes, and in adhesive applications.

The main effect from breathing high levels of 1,1-dichloroethene is on the central nervous system. Some people lost their breath and fainted after breathing high levels of the chemical. Breathing lower levels of 1,1-dichloroethene in air for a long time may damage your nervous system, liver, and lungs. Workers exposed to 1,1-dichloroethene have reported a loss in liver function, but other chemicals were present.

The EPA has set a limit in drinking water of 0.007 parts of 1,1-dichloroethene per million parts of drinking water (0.007 ppm). EPA requires that discharges or spills into the environment of 5,000 pounds or more of 1,1-dichloroethene be reported.

NIOSH currently recommends that workers breathe as little 1,1-dichloroethene as possible.

4.1.3.3.6 Chloroform

Chloroform is a colorless liquid with a pleasant, nonirritating odor and a slightly sweet taste. It will burn only when it reaches very high temperatures. In the past, chloroform was used as an inhaled anesthetic during surgery, but it isn't used that way today. Today, chloroform is used to make other chemicals and can also be formed in small amounts when chlorine is added to water. Other names for chloroform are trichloromethane and methyl trichloride.

Breathing about 900 parts of chloroform per million parts air (900 ppm) for a short time can cause dizziness, fatigue, and headache. Breathing air, eating food, or drinking water containing high levels of chloroform for long periods of time may damage your liver and kidneys. Large amounts of chloroform can cause sores when chloroform touches your skin.

It isn't known whether chloroform causes reproductive effects or birth defects in people.

The EPA drinking water limit for total trihalomethanes, a class of chemicals that includes chloroform, is 100 micrograms per liter of water (100 µg/L).

4.1.3.3.7 1,1,1-trichloroethane (TCA)

1,1,1-Trichloroethane is a synthetic chemical that does not occur naturally in the environment. It also is known as methylchloroform, methyltrichloromethane, trichloromethylmethane, and α -trichloromethane. Its registered trade names are chloroethene NU® and Aerothene TT®.

No 1,1,1-trichloroethane is supposed to be manufactured for domestic use in the United States after January 1, 2002 because it affects the ozone layer. 1,1,1-Trichloroethane had many industrial and household uses, including use as a solvent to dissolve other substances, such as glues and paints; to remove oil or grease from manufactured metal parts; and as an ingredient of household products such as spot cleaners, glues, and aerosol sprays.

If you breathe air containing high levels of 1,1,1-trichloroethane for a short time, you may become dizzy and lightheaded and possibly lose your coordination. These effects rapidly disappear after you stop breathing contaminated air. If you breathe in much higher levels, you may become unconscious, your blood pressure may decrease, and your heart may stop beating. Whether breathing low levels of 1,1,1-trichloroethane for a long time causes harmful effects is not known. Studies in animals show that breathing air that contains very high levels of 1,1,1-trichloroethane damages the breathing passages and causes mild effects in the liver, in addition to affecting the nervous system. There are no studies in humans that determine whether eating food or drinking water contaminated with 1,1,1-trichloroethane could harm health. Placing large amounts of 1,1,1-trichloroethane in the stomachs of animals has caused effects on the nervous system, mild liver damage, unconsciousness, and even death. If your skin contacts 1,1,1-trichloroethane, you might feel some irritation. Studies in animals suggest that repeated exposure of the skin might affect the liver and that very large amounts may cause death. These effects occurred only when evaporation was prevented.

EPA regulates the levels of 1,1,1-trichloroethane that are allowable in drinking water. The highest level of 1,1,1-trichloroethane allowed in drinking water is 0.2 parts 1,1,1-trichloroethane per 1 million parts of water (0.2 ppm).

OSHA has set a limit of 350 parts 1,1,1-trichloroethane per 1 million parts of air (350 ppm) in the workplace.

4.1.4 Exposure Route

A exposure route of concern at the site is through inhalation and dermal contact. Work will be performed in the minimum of **Level D PPE** during major construction operations and **Level D (Modified)** for any work where exposure to contaminated groundwater may occur. Direct contact of the skin and eyes with contaminated material

is another important route of exposure. To protect workers against dermal contact, they will wear specified protective clothing and self contained breathing apparatus for operations involving potential exposure to hazardous materials. Proper personal decontamination procedures will be emphasized during remedial construction activities.

Although ingestion should be the least significant route of exposure, employees will be made aware of ways in which this type of exposure can occur and methods to avoid such exposure. Deliberate ingestion of chemicals is unlikely. Personal hygiene habits that provide a route of entry for chemicals will be restricted. Proper decontamination procedures will reduce/eliminate potential of ingesting hazardous materials. Site personnel will wash their hands, face and other exposed parts of their skin before eating or smoking.

4.1.5 Operational Chemicals/Hazard Communication Program

Operational chemicals may be brought to the project-site for use in activities supporting the source removal action. These chemicals are used for fuels in operating heavy equipment, glues for welding pipes, painting, etc. OSHA under the Hazard Communication Standard (29 CFR 1910.1200) regulates operational chemicals use. MSDSs for operational chemicals are kept on file at the site. An inventory list of the anticipated operational chemicals (Hazardous Chemical Inventory List) for use at the project will be maintained at the site and updated as new material is received.

4.1.6 Engineering Controls

The use of engineering controls for the protection of personnel is the first means of mitigation. This involves the elimination of hazards and the isolation of the workers from the hazards. Implementation of engineering controls can reduce the need for personal protective equipment by separating the worker from the contaminated material. During the source removal action vapors and dust may be generated. The Site Superintendent and SSHO will be constantly alert to the possibility of unacceptable vapor levels.

4.1.7 Standard Operating Procedures (SOPs)

The following is a list of the Standard Operating Procedures used as it relates to safety by NEIE. NEIE personnel should use a SOP as it is applicable to their specific job site. A list of NEIE SOPs can be found in **Appendix C**.

5.0 SAFETY AND HEALTH TRAINING

Consistent with OSHA's 29 CFR 1910.120 regulation covering Hazardous Waste Operations and Emergency Response, all Site personnel who will be performing source removal action, intrusive sampling, emergency response operations, or come in contact with contaminated material are required to be trained in accordance with the standard.

5.1 General Hazardous Waste Operation Training

Prior to arrival on-site, NEIE will be responsible for certifying that the employees meet the requirements of pre-assignment training, consistent with OSHA 29 CFR 1910.120 paragraph (e)(3). NEIE will provide documentation certifying that each general Site worker has received a minimum of 40 hours of instruction off site, and a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor. All personnel must also receive 8 hours of refresher training annually. At no time should anyone be working on-site without the minimum training requirements. Consistent with OSHA 29 CFR 1910.120 paragraph (e)(4), individuals designated as Site Supervisors require an additional 8 hours of training. A certificate of Worker/Visitor Acknowledgement will be completed and submitted for each site worker and visitor who will enter the contamination reduction zone, and/or exclusion zone.

5.2 Site-Specific Training

All personnel working at the Site during source removal action will review this SSHP with the SSHO. Personnel will sign an acknowledgment form to document their review and agreement to comply with the provisions of the SSHP. The SSHO will be responsible for training Site visitors in the hazard associated with the Site, to explain emergency procedures and instruct them in the use of protective gear required during the visit. Visitors meeting requirements of HAZWOPER may be allowed in the Exclusion Zone if conditions permit and if escorted by the SSHO.

Prior to commencement of onsite field activities, all site employees will attend a site-specific safety and health training session. The Site Safety and Health Officer will ensure that personnel are familiar with the requirements of this Site-Specific Safety and Health Plan. The initial session will consist of the contents of this SSHP and specific procedures developed for the project. The SSHO shall also provide initial site-specific training for replacement employees.

5.3 Safety Meetings

A well-ordered flow of information is essential to a good safety program. NEIE, through a program of safety meetings at all levels, intends to accomplish the goals of safety awareness, education, and participation.

The SSHO shall conduct daily safety meetings with ALL on-site personnel. An opportunity shall be provided for employees to voice safety-related concerns. The SSHO will submit a synopsis of each meeting including topics covered, safety-related concerns, action items to be addressed, status of previous items and a signed attendance list.

5.4 Hazard Communication Training

OSHA's standard for hazard communication requires that all workers be informed of potentially hazardous materials used in their work area. NEIE provides employees with information and training on hazardous chemicals at their work site at the time of their initial assignment, annually, and whenever a new chemical is introduced into their work site that could present a potential hazard. Personnel are briefed on the general requirements of the OSHA hazard communication standard and duty-specific hazards by their immediate supervisor before they begin any duties on the work site. Personnel transferred from another site are also briefed on the duty-specific hazards by their immediate supervisor before they begin any duties on the work site.

6.0 MEDICAL SURVEILLANCE PROGRAM

The Medical Surveillance Program is designed to track the physical condition of employees on a regular basis as well as survey pre-employment or baseline conditions prior to potential exposures. The Medical Surveillance Program is a part of the overall NEIE Safety and Health program.

6.1 Baseline Medical Monitoring

Each employee must receive a baseline physical, which can be part of an annual medical monitoring program, prior to being permitted to enter the Exclusion Zone or Contamination Reduction Zone. NEIE's Occupational Physician as suggested by NIOSH/OSHA/USCG/EPA's Occupational Safety & Health Guidance Manual has determined the content of the physical for Hazardous Waste Site Activities.

The medical surveillance provided to the employee includes a judgment by the medical examiner of the ability of the employee to use either positive- or negative-pressure respiratory protection equipment. Any employee found to have a medical condition, which could directly or indirectly be aggravated by exposure to these site contaminants, or by the use of respiratory equipment, will not be employed for the project. A copy of the medical examination is provided at the employee's request.

The employees will be informed of any medical conditions that would result in work restriction or that would prevent them from working at hazardous waste sites. A certificate of Worker/Visitor Acknowledgement will be completed and submitted for each site worker and visitor who will enter the contamination reduction zone, and/or exclusion zone.

6.2 Periodic Monitoring

In addition to a baseline physical, all employees require a physical every 12 months unless the advising physician believes a shorter interval is appropriate. The Occupational Physician has prescribed an adequate medical evaluation, which fulfills OSHA 29 CFR 1910.120 requirements. The pre-assignment medical outlined above is applicable.

All personnel working on the Site that enter an active Exclusion or Contamination Reduction Zone will verify currency (within 12 months) with respect to medical monitoring. NEIE will obtain a copy of the physician's written opinion detailing the employee's ability to perform hazardous waste site work.

At termination of employment or reassignment to an activity or location that does not represent a risk of exposure to hazardous substances, an employee may be required to take an exit physical. If his/her last physical was within the last 6 months, the advising medical consultant has the right to determine adequacy and necessity of an exit exam.

6.3 Exposure/Injury/Medical Support

As a follow-up to an injury or possible exposure above established exposure limits, all employees are entitled to and encouraged to seek medical attention and physical testing. Depending upon the type of exposure, it is critical to perform follow-up testing within 24-48 hours. It will be up to the occupation physician to advise the type of test required to accurately monitor for exposure effects.

The occupational physician must evaluate any employee, who develops a time loss illness exceeding one

working day, or injury during the period of the contract. A written statement indicating the employee's fitness, signed by the occupational physician must be submitted prior to the employee entering the work site.

6.4 Medical Records

The results of medical testing and full medical records will be maintained in accordance with 29 CFR Part 1910.1020. A copy of the medical certification will be kept on the Site for each person entering the Contamination Reduction Zone and Exclusion Zone.

7.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

This section provides an outline of the PPE and guidelines that will be implemented to minimize chemical, physical, and biological exposures and accidents during source removal action. Where engineering controls and job hazard analyses do not eliminate all job hazards, employees will (where appropriate) wear PPE.

These include items such as, hard hats, face shields, safety goggles, glasses, hearing protection, foot guards, gloves etc. The SSHO will ensure that equipment selected will meet the following requirements:

- It will be appropriate for the particular hazard.
- It will be maintained in good condition.
- It will be properly stored when not in use, to prevent damage or loss.
- It will be kept clean, fully functional and sanitary.
- Must meet all applicable ANSI standards.

Personal clothing and jewelry can present additional safety hazards. Supervisors will ensure that workers wear appropriate clothing, which will not interfere with the PPE. All PPE will be selected in accordance with 29 CFR

1910.132. NEIE will provide proper PPE to all employees. All protective clothing will be properly used, stored, selected, and maintained.

7.1 PPE Hazard Assessment

Selection of the appropriate PPE is a complex process, which should take into consideration a variety of factors. Key factors involved in this process are identification of the hazards, or suspected hazards, routes of potential exposure to employees (inhalation, skin absorption, ingestion, and eye or skin contact); and the performance of the PPE materials (and clothing seams) in providing a barrier to these hazards. The amount of protection provided by PPE is material-hazard specific. That is, protective equipment materials will protect well against some hazardous substances and poorly, or not at all, against others. In many instances, protective equipment materials cannot be found which will provide continuous protection from the particular hazardous substance. In these cases, the breakthrough time of the protective material should exceed the work duration.

Other factors in this selection process to be considered are matching the PPE to the employee's work requirements and task-specific conditions. The durability of PPE materials, such as tear strength and seam strength, should be considered in relation to the employee's tasks. The effects of PPE in relation to heat stress and task duration are a factor in selecting and using PPE. In some cases layers of PPE may be necessary to provide sufficient protection, or to protect expensive PPE inner garments, suits or equipment.

The following are guidelines, which NEIE uses to select PPE. Based on the site characterization and analysis performed during the source removal action, a combination of PPE has been selected from the different protection levels (i.e., A, B, C, D Modified or D) as being suitable to the hazards of the work to be performed. Section 3.0 of this plan characterizes and analyzes, the chemical and physical hazards, specific tasks/operations, routes of exposure, and concentrations of contaminants. Characteristics, capabilities and limitations are summarized in this

section.

- Level A: The highest level of skin, eye, and respiratory protection (**Level A PPE is not anticipated on this project**).
- Level B: Should be worn when the highest level of respiratory protection is needed, but a lower level of skin protection is needed, compared to that of level A (**Level B PPE is not anticipated on this project**).
- Level C: Should be worn when the criteria for using air-purifying respirators are met, and a lesser or the same level of skin protection is needed, compared to that of level B (**Level C PPE is not anticipated on this project**).
- Level D Modified: Should be worn when respiratory protection is not warranted but minimal dermal protection is necessary (ie. Nitrile gloves, Tyveks etc.).
- Level D: Level D provides minimal protection against chemical hazards. A work uniform consisting of coveralls and/or long pants and sleeves may be worn in any area without the potential for significant respiratory or skin contact hazards.

Personal Protective Equipment alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound work practices.

7.1.1 Head Protection

All personnel shall wear a hard hat that meets the requirements and specifications in ANSI Safety Requirements for Industrial Head Protection Z89.1-1969. Exceptions to this requirement are personnel in the site office and rest and eating areas.

7.1.2 Hand Protection

Outer gloves used on the Site for source removal action shall be either chemical resistant or general purpose. The appropriate glove shall be determined by the SSHO for a specific work task. Chemical resistant gloves shall be selected using appropriate chemical degradation guides. Cotton work gloves will be worn when work activities require the handling of sharp and rough-surfaced objects.

7.1.3 Eye/Face Protection

No contact lenses are allowed in the Exclusion Zone (EZ) and Contamination Reduction Zone (CRZ). All personnel in the CRZ and EZ shall wear Eye/Face protection. Double eye protection will be required when power-washing equipment during decontamination. All eye/face protection provided shall be ANSI Z87-1989 approved.

7.1.4 Footwear

Footwear will be steel-toed safety boots. Chemical-resistant outer boot covers are to be worn in the Exclusion Zone, Contamination Reduction Zone. Boot racks will be provided in the CRZ for drying of outer boots.

7.2 Levels of Protection

The level of protection must correspond to the level of hazards known or suspected for the specific work activity.

7.2.1 Level D

Level D equipment will be worn when there are no chemical hazards present. Typical use is during site setup/demobilization in the support zone of a site. The following outlines the PPE for level D:

- Work uniform (Long pants and Shirt)
- Hard hat
- Steel-toed safety boots (with disposable overboots, as required)
- Safety glasses
- Leather or heavy cloth gloves (as needed)
- Hearing Protection (when working around noise generating equipment)

7.2.2 Level D Modified

Level D Modified protection will be worn as the minimum work uniform. It will not be worn in any work area with respiratory or skin hazards. The following criteria allow the use of Level D protection: direct reading instruments indicate levels from background to 5 ppm above background in the breathing zone; and the specific work function precludes splashes, immersion, or potential for unexpected inhalation of any chemicals.

Level D equipment, used as appropriate, is as follows:

- Coveralls or work uniform
- Tyvek (style TY 122) coveralls or equivalent
- Outer gloves: leather, cotton, neoprene or nitrile (based on chemical hazard and compatibility)
- Inner gloves: latex or nitrile (doubled)
- Steel-toed safety boots
- Hard hat
- Safety glasses

- Hearing protection

7.2.3 Level C (Not Anticipated)

Level C protection will be worn during product transfer operations and where probable exposure to site contaminants is likely. The following criteria allow the use of Level C protection: direct reading instruments indicate levels from background to < 25 ppm above background in the breathing zone; and Oxygen concentrations between 19.5% and 21%; LEL levels less than 10%.

Level C equipment, used as appropriate, is as follows:

- Coveralls or work uniform
- Tychem SL (style SL 122) coveralls or equivalent (where splash hazards exist);
- Tyvek (style TY122) Suits inner;
- Outer gloves: leather, cotton, neoprene or nitrile (based on chemical hazard and compatibility)
- Inner gloves: latex or nitrile (doubled)
- Steel-toed safety boots
- Boot covers
- Hard hat
- Full-faced respirator with combination organic vapor equipped with P-100 filter. (a simple P-100 cartridge is appropriate for asbestos work)

7.3 Initial Levels of Protection

Based upon the nature of the site and the tasks to be performed, the initial levels of protection to be used are outlined in **Table, “Initial Levels of Protection”**. This table lists each work task and the initial level of protection. The initial level of protection is defined as that level in which work commences.

Once the need for PPE is established, a careful evaluation of the hazards is necessary so that a selection can be made that minimizes the risk to the user. For chemical situations, knowing the hazard includes being aware of: the type of chemical, the physical state (liquid, solid or gas), and the physiological effect (toxic, corrosive, etc.). Knowing the level of exposure is also important when selecting protective clothing and equipment. After the appropriate level of PPE has been determined, the choice of Chemical Protective Clothing (CPC) material must be considered. Among the most important factor in selecting the appropriate CPC is chemical resistance. **Table 1, “Initial Level of Protection”** identifies the CPC as they relate to each task.

Table – Initial Levels of Protection		
Task	CPC	Level of PPE
Mobilization/Demobilization	None	Level D
Site Preparation	Work Gloves, safety glasses, hard hat, steel-toed boots;	Level D
Dredging at Old Mill Creek	Nitrile Inner Gloves; Nitrile Outer Gloves, safety glasses; hard hat; steel-toed boots; boot covers; , Tyvek (TY122) Suits inner, work gloves as necessary. Hearing Protection must be worn around heavy equipment operations.	Level D (Modified)
General Construction Operations	Work Gloves, safety glasses, hard hats, steel-toed boots and hearing protection must be worn around noise generating equipment.	Level D
Well Installation/yard piping	Nitrile Inner Gloves; Nitrile Outer Gloves, safety glasses; hard hat; steel-toed boots; boot covers; , Tyvek (TY122) Suits inner, work gloves as necessary. Hearing Protection must be worn around heavy equipment operations.	Level D (Modified) Note: Level D Modified may be worn based upon contact with contaminated water.
Waste Disposal	Nitrile Inner Gloves; Nitrile Outer Gloves; safety glasses; hard hat, steel-toed boots, boot covers. Tyvek (TY122) suits.	Level D (Modified)

7.4 Respiratory Protection Program

7.4.1 Policy

In accordance with 29 CFR 1910.134 and EPA guidelines for workers at hazardous waste sites, NEIE has established a Respiratory Protection Program to protect employees from contracting occupational diseases/illnesses caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors. Although the nature of hazardous waste sites precludes the use of most engineering controls, NEIE is committed to instituting such controls when feasible. It is NEIE policy that respirators shall be provided when such equipment is necessary to protect the health of employees.

Respirators shall be properly selected, fit-tested, and maintained. The environment shall be monitored for contaminants. Furthermore, employees using respirators shall be medically qualified and properly trained in respirator use. The NEIE's "Respiratory Protection Program" in compliance with OSHA 29 CFR 1910.134 can be in NEIE SOPs HS-017.

8.0 AIR MONITORING PLAN

The air monitoring program addressed in this section has been developed to aid in the appropriate selection of personal protective equipment, engineering controls, and work practices as well as to document exposures to on-site personnel. The requirements of this section are specifically designed to meet the requirements of OSHA 1910.120, 1910.1000, the TLVs (ACGIH), and existing Health and Safety Procedures enforced by NEIE.

8.1 Periodic Monitoring

Periodic monitoring shall be conducted when the possibility of an increased airborne concentration or flammable atmosphere has developed. The following situations will necessitate monitoring to determine if exposures have risen:

- When work begins for each task at different locations on the site.
- When contaminants other than those previously identified are being handled.
- When a different type of operation is initiated.
- When weather conditions change.
- When conducting maintenance operations where peak concentrations are suspected.

8.2 Frequency and Duration

Real-time air monitoring will be conducted periodically each day when work operations involve the potential exposure to site contaminants of concern. Work areas with the potential for unacceptable exposures, flammable atmospheres, or oxygen deficiency will have a photoionization detector (PID), and an O₂/LEL-oxygen meter in continuous use. Chemical sorbent tubes may be used periodically during field construction and installation activities during certain operations when peak (high) concentrations may be present.

During operations, frequent monitoring will be conducted using a PID or a flame ionization detector (FID) instrument. The instrument used will be capable of detecting the organic contaminants known to be present. When not actively used for testing, this instrument will be placed in a continuous operating mode near the area with the highest potential airborne contamination.

A combination combustible gas/oxygen meter will be used to make frequent tests during intrusive operations at the container opening, excavation, and work area. When not being actively used, this instrument will be placed in a continuous operating mode near the area with the highest potential contamination.

The frequency and duration of air monitoring may be increased at the discretion of the SHSO. Sampling will be increased during intrusive work and will be decreased if the results prove exposures to be at acceptable levels. Project Management staff including the Project Managers, the SHSO, and/or their qualified designees will work together to identify:

- When peak concentrations may be encountered.
- When and where unusual contaminants may be present.
- Where site personnel are concerned about airborne contaminant concentrations and request air sampling to be performed.

8.3 Types of Air Monitoring and Sampling

The air monitoring program will include real-time, direct reading instruments which will allow site personnel to respond immediately to changes in site hazards, rather than waiting for laboratory analysis of samples.

8.4 Equipment Maintenance, Calibration, and Operation

Air monitoring equipment will be maintained and calibrated according to the established sampling and analytical methods and the manufacturer's instructions and recommendations. Real-time instrument maintenance and calibration data will be recorded by the SHSO on the NEIE calibration log and/or in the Health and Safety logbook.

Real-time particulate monitoring instruments will be zeroed at least once a day. Air sampling pumps (used for any type of air monitoring) will be calibrated with a primary or secondary standard before and after each use.

Real-time vapor monitoring instruments will be calibrated to a test gas at least once a day, and more often if the instrument is thought to be unreliable.

Calibration requirements must be specific to the model used. Instruments used to measure total volatile organic compounds will be calibrated daily before site entry and the following information will be recorded:

- Date
- Time
- Site name
- Calibration gas: concentration and identity
- Meter scale
- Span potentiometer setting
- Difficulties
- Calibrator's name (printed)
- Probe type
- Battery charge status
- Pre-calibration reading
- Post-calibration reading

8.5 Air Monitoring

Air monitoring will be performed during all operations. The following outlines the action levels:

LEL

<10% LEL (ambient atmosphere)

Continue monitoring

>10% LEL

Stop work and evacuate affected areas until levels <10% are measured.

Oxygen

<19.5% O₂

Stop work and evacuate affected area until levels are >19.5% but <25% O₂ are measured in ambient air, or >19.5% but <23.5% O₂ is measured in a confined space.

>19.5% to 21% (ambient atmosphere)

Acceptable O₂ levels for ambient atmosphere continue monitoring.

>21% (ambient atmosphere)

Fire/explosion hazard potential, stop work and consult NEIE Safety Manager

VOCs (using PID)

<5 ppm

Continue work.

5-25 ppm

Up-grade to Level C PPE

>25 ppm

Up-grade to Level B PPE and contact NEIE Safety Manager

8.6 Reporting of Air Sampling Results

Results of all air monitoring (real-time and integrated) will be provided to personnel on site. Integrated air sampling results will be submitted into the respective employee medical record for assistance in the annual medical monitoring program. Monitoring results will be reviewed at the daily safety meeting.

9.0 ACCIDENT PREVENTION PROCEDURES/PRACTICES

9.1 Medical and First Aid Requirements

First-aid kits/stations and required contents are maintained in a serviceable condition. Unit-type kits have all items in the first-aid kit individually wrapped, sealed, and packaged in comparable sized packages. First-aid stations will be located as close as practicable to the highest concentration of personnel. First-aid stations will be well-marked and available to personnel during all working hours. First-aid stations will be equipped with a first-aid kit, the size of which will be dependent upon the number of personnel normally employed at the work site.

Emergency telephone numbers and Route to the Area Hospital will be clearly posted and easily visible at all times. There should be OSHA posters prominently displayed and warning signs posted for any known or potential hazard(s) present. Material Safety Data Sheets (MSDS) must be available on the job site at all times.

9.2 Hazardous Substances

When hazardous substances are used in the workplace, the hazard communication program dealing with Material Safety Data Sheets (MSDS), labeling and employee training will be in operation. MSDS materials will be readily available for each hazardous substance used. A training program plus regular question and answer sessions on dealing with hazardous materials will be given to keep employees informed. The program will include an explanation of what an MSDS is and how to use and obtain one; MSDS contents for each hazardous substance or class of substances; explanation of the "Right to Know"; identification of where employees can see the employer's written hazard communication program and where hazardous substances are present in their work area; the health hazards of substances in the work area, how to detect their presence, and specific protective measures to be used; as well as informing them of hazards of non-routine tasks and unlabeled pipes.

9.3 Housekeeping

A policy of trash removal and the maintenance of good housekeeping practices should be implemented on all jobsites. The accumulation of construction debris may pose a significant fire hazard in addition to tripping and falling hazards.

Good housekeeping practices are the result of planning and organization. All personnel on the site must work together to maintain a clean worksite. The prompt removal of waste materials will permit a free flow of traffic through the work areas. Daily, or more frequent, inspections will be conducted by the general contractor to verify that the housekeeping controls are in place and being enforced.

Housekeeping activities in themselves may pose health hazards such as exposures to dusts, biological agents, and discarded chemicals. Liquid and solid waste chemicals must be placed in leak-proof containers for proper disposal.

10.0 SITE CONTROL MEASURES

This section outlines site control measures to be implemented to minimize potential exposure to and accidental spread of hazardous substances during source removal action. Listed below are the work zones that shall be established. The zone boundaries may be modified as necessary as new information becomes available.

10.1 Work Zones

The Site will be divided into Exclusion, Contamination Reduction and Support Zones. It should be recognized that the Site control zones will be modified continually. A map showing the work zones will be updated daily and posted in the Site office. The SSHO will review the location of work zones at the daily safety briefing.

The SSHO and at least one person who have completed Supervisor's Training will be present at the Site whenever work is performed in the Exclusion Zone or Contamination Reduction Zone.

10.1.1 Exclusion Zone (EZ)

This zone, commonly known as the Hot Zone, is where there will be direct contact with the potentially contaminated material. PPE shall be required in this zone. The SSHO shall enforce these requirements. The level of PPE required shall be based on hazard, Site condition and air monitoring performed. The outer boundary of the Exclusion Zone will be delineated with orange safety fence. Modification to the size and boundary of the Exclusion Zone will be made in the field by the SSHO based on operations and wind direction. The Exclusion Zone may be subdivided into different areas of contamination and different levels of PPE may be assigned based upon the expected type and degree of hazard.

All activities in exclusion zone will be conducted using the "buddy system". This involves a buddy who is able to provide his or her partner with assistance, observe for signs of chemical or heat exposure, check integrity of PPE and go for help when needed.

10.1.2 Contamination Reduction Zone (CRZ)

This zone, commonly known as the Warm Zone, is where workers and equipment shall be decontaminated. This shall minimize the spread of contaminants from the Exclusion Zone into clean areas. The Contamination Reduction Zone will consist of the area located in front of or next to the exclusion zone so that personnel or equipment exiting the EZ can be decontaminated and doff the PPE. Emergency equipment to be located in this

Area will include eye wash stations, fire extinguishers, first aid kits and other appropriate equipment. The Contamination Reduction Zones or personal decontamination stations will be established adjacent to the Exclusion Zones. These stations will provide a means for prompt removal of potentially contaminated outer PPE at a location convenient to operations.

10.1.3 Support Zone

This zone, commonly known as the Clean Zone, is considered to be uncontaminated. This area shall be used as a storage area for operations equipment and where break and toilet and shower facilities will be located.

11.0 PERSONAL HYGIENE AND DECONTAMINATION

Decontamination (Decon) is the process of removing or neutralizing potentially harmful contaminants that have accumulated on personnel and equipment in order to reduce the spread of contamination outside the work area. Decontamination is critical to the Safety and Health of Site workers and it protects the community by minimizing the off-site migration of contaminants. One of the most important aspects of controlling contaminated material migration is the prevention of the spread of contamination. Good contamination prevention will minimize employee and public exposure.

All personnel and equipment leaving the Exclusion Zone must be decontaminated in the Contamination Reduction Zone prior to entering the Support Zone. The decontamination process is composed of a series of steps performed in a specific sequence. The basic concept is that more heavily contaminated items will be decontaminated and removed first, followed by decontamination and removal of inner, less contaminated items.

11.1 Personal Decontamination

Personnel exiting the Exclusion Zone during source removal action at the Site shall follow the procedure below.

As the worker leaves the Exclusion Zone, he places his equipment and tools in the Exclusion Zone or Contamination Reduction Zone. After the worker places his equipment and tools down, gross contamination will be removed from outer clothing and boots. Workers will then remove their outer boots and outer gloves and place them in plastic garbage bag-lined containers.

Respiratory protection will be washed and triple rinsed at a washing and rinsing station.

Once outer gloves are removed, workers will remove all outer garments and place them in plastic garbage bag lined containers. Once workers are fully decontaminated and all garments are removed, workers will remove inner gloves.

The level and complexity of the decontamination stations will be job and chemical specific. Below outlines a typical decontamination set-up based upon level of protection.

Level D Modified Decontamination

Station 1: Dry Decon

Deposit equipment used on site (tools, sampling devices and containers, monitoring equipment clipboards, etc.) in separate containers with plastic liners.

Deposit all PPE used into a plastic container.

Equipment: Various size containers
 Plastic liners

Level C Decontamination**Station 1: Segregated Equipment Drop**

Deposit equipment used on site (tools, sampling devices and container, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in separate containers with plastic liners. Each piece of equipment will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.

Equipment: Various sized containers
Plastic liners
Plastic drop cloths

Station 2: Outer Garments, Boots, and Gloves Wash and Rinse

Scrub reusable outer boots, gloves, and chemical-resistant suit with decontamination solution or detergent/water. Rinse gloves, boots, and garments with clean water into plastic bucket.

Equipment: Two containers (30 to 50 gallons)
Water
Detergent
Scrub brush, long-handled

Station 3: Outer Boots and Gloves Removal

Remove outer boots and gloves with accompanying tape. Tape should be placed in a container with a plastic liner.

Equipment: One container (30 to 50 gallons)
Plastic liner
Bench or stool

Station 4: Canister/Cartridge Change

If a worker leaves the Exclusion Zone to change the canister/cartridge of his/her respirator, this is the last step in the decontamination procedure. Once the worker's canister/cartridge is exchanged, the outer gloves and boot covers are donned with joints taped. The worker may then return to the Exclusion Zone. All used canisters or cartridges will be disposed of at the end of the work day and fresh ones installed before start of work.

Equipment: Respirator canisters/cartridges
Tape
Extra gloves
Boot covers (if worn)

Station 5: Boots, Gloves, and Outer Garment Removal

Remove boots, gloves (inner), and outer garment. The outer chemical-resistant garment and inner gloves should be deposited in a plastic-lined container.

Equipment: Container (30 to 50 gallons)
Bench or stool
Plastic liners

Station 6: Respiratory Protection Removal

Remove the respirator, deposit the used cartridges in a plastic-lined container, and wipe the face piece with clean water and paper towels.

Equipment: Container (30 to 50 gallons)
Plastic liners
Paper towels
Detergent solution
Rinse water

Station 7: Field Wash and/or Decontamination Unit

Wash hands and face and shower as soon as possible.

Equipment: Water
Soap
Wash basins/buckets

11.2 Equipment Decontamination

Nearly all contractor hardware (not consumable) is considered to be recoverable. As such, they will be decontaminated using the proper equipment, i.e. wet paper towels and water.

11.3 Decontamination Residue

Decontamination residue consists of disposable PPE (such as Tyvek, gloves, tape, etc.) Decontamination residue will be bagged and removed daily from the residence location. Due to the nature of the work the PPE will be disposed of with municipal trash.

11.4 Personal Hygiene and Sanitation

Hands and face shall be thoroughly washed before eating, smoking, drinking, chewing gum or tobacco.

When possible, avoid contact with contaminated materials.

An adequate supply of potable water will be provided to the employees working at the Site. Clearly labeled potable containers will be used to dispense drinking water. Containers will be cleaned at the beginning of each

day. The containers will be equipped with taps to access the water. Clean disposable cups will be provided daily.

Eating, drinking, smoking, chewing gum or tobacco or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited during source removal action except in designated eating or smoking areas outside the Exclusion and Contaminant Reduction Zones. NEIE employees, subcontractor employees, and service personnel are required to thoroughly decontaminate themselves prior to entering the Support Zone.

12.0 EMERGENCY CONTINGENCY PLAN

This section describes the emergency response plan that shall be implemented by NEIE employees to handle emergencies. The nature of the project, the contaminants present and the activities planned for the site are such that there is little potential for an emergency, which would result in a significant release of hazardous substances, and in any way threaten the adjoining community. However, there is always the potential at any construction site for emergency situations to occur which threaten the on-site workers. Possible examples of emergency situations during source removal action include equipment fires, or contact of equipment with overhead power lines. In all of these cases, procedures will be implemented to minimize the possibility of an emergency situation. The procedures outlined below are designed to ensure that the workforce reacts quickly and appropriately to emergency situations, thereby protecting the health and well being of the individual workers. It is expected that modifications may be necessary upon actual site set-up and conditions.

12.1 Pre-Emergency Planning

During the site safety briefings held daily, all employees will be informed of the location of this plan, the procedures outlined in this plan, and the communication systems and evacuation routes to be used during an emergency.

On a continual basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency.

A coordination meeting with local emergency response agencies (fire, police, rescue and medical facility) will be conducted prior to work starting at the site. The site activities and potential hazards that may be encountered by responders will be reviewed during this meeting.

12.2 Personnel Responsibilities

All on-site employees have a role in mitigating an emergency incident. The RM has primary responsibility for responding to and directing emergency response operations to correct emergency situations. This includes taking appropriate measures to ensure the safety of site personnel and the public. He is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. The SSHO shall assist and advise the RM, and will direct any emergency medical responses.

The following is an outline of job titles and corresponding responsibilities during an emergency.

- The RM directs emergency response activities; serves as liaison with appropriate Client and Client representative personnel and subcontractors. In the event of an emergency the RM will be the Incident Commander.
- The Site Safety and Health Officer recommends that work be stopped if any operation threatens worker or public health or safety. Advises Site Manager of emergency procedures if necessary. Provides emergency medical care on site. Notifies emergency services. The SSHO will assume the responsibility of Incident Commander if RM is off-site.

12.3 Evacuation Routes and Procedures

In the event of an emergency that necessitates an evacuation of the site, on-site personnel shall be notified to leave the area by immediate emergency exit. An alternate method of communication will be the use of a portable air horn sounded in regularly spaced, repeated blasts.

During an evacuation, all non-emergency radio transmissions shall cease. The SSHO, in conjunction with the Project Superintendent, shall control the scene until the appropriate municipal and state agencies arrive and a site specific Incident Command System (ICS) should be implemented. Since site conditions, i.e., wind direction, precipitation, and work location, change often, the SSHO will determine the appropriate evacuation procedures.

All personnel shall assemble/muster at the Contamination Reduction Zone (CRZ) or Support Zone. Access to the site will be restricted.

12.4 Medical Treatment/First Aid

If necessary, the injured or sick party shall be taken to Hospital– Please refer to **Attachment D – “Route to Hospital Map”** and directions to the area hospital. Route to the area hospital will be posted and easily visible at all times.

Both the Site Superintendent and the Site Safety and Health Officer are trained in CPR and First Aid and have first aid kits for use in a medical emergency. First Aid Kits will be located in the main support area, Contamination Reduction Zone and at the work activity locations. Eyewash stations will be available at the Contamination Reduction Zone. Eyewash stations will be of the pressurized, 15-minute discharge type. On-site employees have a basic knowledge of first aid and will assist the Site Superintendent and SSHO. Community emergency services (EMS, Fire, and Police) shall be notified immediately if their resources are needed on site. The SSHO shall prepare and post a map - “Hospital Map and Directions”, at various locations though out the site.

12.5 Emergency Alarms/Notifications and Procedures

When any emergency occurs on-site, the on-site SSHO and Project Superintendent shall be notified immediately. The Project Superintendent or the SSHO shall notify the client and his representatives. Please refer to the Table below – “Emergency Telephone Numbers” and **Attachment E – Emergency Telephones**. Emergency Telephones will be posted and easily visible at all times.

12.6 Spill Response and Control Plan

The purpose of this section is to define practices and procedures for the prevention, containment and cleanup of accidental discharges of hazardous substances during the project. These substances include both the contaminated material managed as a result of the remedial project, such as contaminated soils and decontamination liquids, and construction materials typically found on any construction site, such as lubricating fluids, diesel fuel, gasoline, etc.

Spill prevention applies to all types of spills and can be described as the first and simplest approach to spill control. Human error is a major contributing factor to spills and releases. An awareness of spill consequences, preventive measures and countermeasures will greatly reduce spill occurrences. A sound prevention program includes careful work practices, constant inspection, and immediate notification and correction of deficiencies. In the event that a

spill does occur, proper containment and cleanup procedures must then be followed in order to reduce the effect of the spill.

12.6.1 Prevention

Prevention of unnecessary spills is of first priority. Prevention measures include:

- Operators and drivers will exercise extreme caution when transporting material around the site.
- When removing hoses from machines an appropriate and adequate supply of absorbents will be on hand. A supply of the following absorbents will be kept on-site: oil sorbent booms, rolls and pillows, universal towels and sheets and vermiculite.
- Hoses will be capped when not connected to their appropriate fitting.
- All containers will be inspected daily for decay. No open container shall be exposed to rainfall, snowfall, etc. without being emptied and cleaned of residue.
- All equipment will be inspected for leaks before and after service.
- Storage of material such as fuels, oils, and solvents on-site will be limited to the minimum required. All fluids will be stored in individual fluid containers appropriate and approved for the material. Most of the individual fluid containers will be further secured by storage in large, locked tool and equipment storage containers. Drums or other containers too large to be stored in containers will be stored raised off the ground on a liner and covered by plastic.

13.0 INSPECTION AND REPORTING

13.1 Safety and Health Inspections

Safety and Health inspections will be conducted to discover, through specific, methodical auditing, checking, or inspection procedures, conditions and work practice that lead to job accidents and illnesses.

The Health And Safety Manager shall be responsible for ensuring that inspections are conducted at the frequency stated; reviewing the Daily Safety and Inspection Logs for completeness, thoroughness, and trends; performing bi-monthly project inspections; and training site personnel on proper inspection techniques.

The Health and Safety Officer shall be responsible for ensuring that daily inspections are conducted; reviewing the inspections findings and corrective actions for applicability and thoroughness; and providing the site management personnel with a summary of inspection findings.

13.2 Incident Reports

Incident reporting will ensure an immediate report on all incident/accidents and to provide an effective follow-up for corrective action in order to eliminate unsafe practices and unsafe conditions. An Incident/Accident Form must be completed within 24 hours of the Incident/Accident. This report is utilized in the event of injuries, off-site releases, utility breaks, or accidents. Immediately following the incident/accident, the Site Superintendent and the Site Safety and Health Officer will initiate an Incident/Accident Investigation.

14.0 ACKNOWLEDGEMENT

By their signature, the following undersigned certify that this Health and Safety Plan has been read, or otherwise communicated to them. They further certify that they completely understand this plan and will follow its procedures for the protection of the health and safety of all persons entering upon this site.

NAME

DATE

ATTACHMENT A

Activity Hazard Analysis (AHAs)

Attachment A
Activity Hazard Analysis

Project Identification: Lawrence Aviation Site Task Order 017		Location: Port Jefferson, NY		US EPA Region II	
Phase of Work: Mobilization/Demobilization/Site Restoration		Analysis Performed By: Drew Shelby		Analysis Approved By: Tricia Sumner	
TASK		POTENTIAL HAZARDS		CONTROL MEASURES	
Mobilization/demobilization Site Restoration Support Area Setup/Take Down		Slips/Trips/Falls		Keep working areas free of debris/materials Continuously evaluate area for potential causes of slip/trips/falls Wear proper sampling boots and PPE that fit and are in good condition Communicate potential hazards to co-workers	
		Strains/Sprains		Use proper lifting techniques Stretching prior to any physical labor Pay attention to the walking/working surface	
		Vehicle/Equipment Accidents		Daily equipment inspection required by operators Equipment use by experienced operators Use spotters when backing up equipment and/or vehicles Use all equipment according to the operators manual Ensure clearances for personnel, overhead lines, and physical obstacles when operating	
		Biological hazards		Be aware of biological hazards in work area Continuously evaluate work areas for biological hazards Avoid contact with animals and insects Avoid contact with poisonous plants Communicate potential hazards to co-workers	
		Electrical Hazards		All electrical work will be performed by a licensed and registered electrician	
		Overhead Hazards		Ensure clearances for personnel and physical obstacles when operating vehicles Hard-hats shall be worn in areas with identified overhead hazards	
		Fire Protection		Smoking is prohibited inside the exclusion zone. Fire extinguishers will be inspected when brought on-site	
		Walking/Working Surfaces		Be aware of uneven surfaces and unusual slopes Avoid debris outcrop areas Wear appropriate foot protection	
		Cold/Heat Stress		Work rest regiments will be followed. Communicate potential heat/cold stress-related hazards to co-workers Observe co-workers for signs of heat/cold stress.	
EQUIPMENT USED		INSPECTION REQUIREMENTS		TRAINING REQUIREMENTS	
Level D		Daily Inspections of equipment		Site-specific training on site hazards	

Attachment A
Activity Hazard Analysis

Project Identification: Lawrence Aviation Site Task Order 017		Location: Port Jefferson, NY		US EPA Region II	
Phase of Work: Fence Installation		Analysis Performed By: Drew Shelby		Analysis Approved By: Tricia Sumner	
TASK		POTENTIAL HAZARDS		CONTROL MEASURES	
Fence Installation		Auger/Drilling Equipment		Loose clothing and jewelry will not be worn. Only trained operators will operate equipment. Unnecessary personnel will stay out of the established safety zone. Communicate potential hazards to co-workers	
		Slips/Trips/Falls		Keep working areas free of debris/materials Continuously evaluate area for potential causes of slip/trips/falls Avoid working on uneven terrain	
		Leaking containers and drums		Inspect drums prior to movement for rust and leaks Inspect drums to determine contents Look for signs that the drums may be under pressure Overpack drums which are suspect to leaking Have adequate spill control materials available	
		Overhead Hazards		All equipment will maintain safe clearance from energized electrical lines. All personnel will wear hardhats meeting ANSI Z87.	
		Strains/Sprains		Proper lifting techniques Stretching prior to any physical labor Pay attention to the walking/working surface	
		Dangerous weather conditions		Review local weather reports Continuously check weather conditions. Discontinue work if it appears that dangerous weather Communicate any potential dangerous weather conditions to co-workers Identify "safe areas" prior to field activities, if dangerous weather approaches	
		Struck by falling and/or moving objects		Daily Inspection required by operators. Equipment use by experienced operators. Use all equipment according to operator's manual. Ensure clearances for personnel; overhead lines and physical obstacles when operating.	
		Hand Tools		Use all tools and equipment according to manufacturer specifications. Inspection before use. Remove broken or damaged tool's). Tools should be used for the intended purpose. Properly store and handle tools.	
		Fire/Explosion		Smoking is prohibited inside the exclusion zone. A fire extinguisher will be located by drilling equipment Fire extinguishers will be inspected when brought on-site. When working in areas where flammable vapors may be present, care must be taken with tools and equipment that may be sources of ignition. O2 and LEL will be monitored as outlined in Section 7.0 of the SSHP.	
		Cold Stress		Work rest regiments will be followed. Communicate potential cold stress-related hazards to co-workers Observe co-workers for signs of cold stress.	
Noise		Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers.			
EQUIPMENT USED		INSPECTION REQUIREMENTS		TRAINING REQUIREMENTS	
Level D Bobcat/Auger		Daily Inspections equipment		Site-specific training on site hazards Only qualified operators will be used	

Attachment A
Activity Hazard Analysis

Phase of Work: Culvert and Creek Cleaning - Old Mill Creek	Analysis Performed By: Drew Shelby	Analysis Approved By: Tricia Sumner	US EPA Region II
TASK	POTENTIAL HAZARDS	CONTROL MEASURES	
Removal of sediment and debris Old Mill Creek	Exposure to site contaminants	Wear safety glasses, polycoated tyvek/saranex coveralls, nitrile gloves and overboots Minimize potential exposures time through decon techniques Use care in handling decon supplies and waste streams Communicate potential hazards to co-workers	
	Slips/Trips/Falls	Keep working areas free of debris/materials Continuously evaluate area for potential causes of slip/trips/falls Avoid working on uneven terrain Wear proper sampling boots and PPE that fit and are in good condition	
	Vehicular Traffic	Coordination with the local police will be necessary for partial or full road closure Traffic control signs and barrier to protect workers from traffic is required All personnel will ANSI approved safety vests.	
	Drowning Hazards	Dependant upon the water height in the creek PFDs may be required.	
	Confined Space Entry Culvert Entry	Confined Space Entry Procedures will be followed. Continuous air monitoring will be performed. Only qualified personnel will be involved in entry operations. Ventilation will be used as necessary to maintain safe entry parameters. Personnel will maintain communication at all times.	
	Overhead Hazards	All equipment will maintain safe clearance from energized electrical lines. All personnel will wear hardhats meeting ANSI Z87.	
	Strains/Sprains	Proper lifting techniques Stretching prior to any physical labor Pay attention to the walking/working surface	
	Dangerous weather conditions	Review local weather reports Continuously check weather conditions. Discontinue work if it appears that dangerous weather Communicate any potential dangerous weather conditions to co-workers Identify "safe areas" prior to field activities, if dangerous weather approaches	
	Struck by falling and/or moving objects	Daily Inspection required by operators. Equipment use by experienced operators. Use all equipment according to operator's manual. Ensure clearances for personnel; overhead lines and physical obstacles when operating.	
	Pumps and Hoses	All large pumps for water diversion will be maintained by properly trained personnel All lines will be tied/leased to prevent accidental release	
	Fire Protection	Smoking is prohibited inside the exclusion zone. A fire extinguisher will be located by drilling equipment Fire extinguishers will be inspected when brought on-site. When working in areas where flammable vapors may be present, care must be taken with tools and equipment that may be sources of ignition.	
	Cold Stress	Work rest regiments will be followed. Communicate potential cold stress-related hazards to co-workers Observe co-workers for signs of cold stress.	
	Noise	Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers.	
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
Level D (Modified) Pumps, Excavators, Dump Truck, Roll-off/ Dewatering boxes, Vacuum Truck	Daily Inspections equipment	Site-specific training on site hazards Only qualified operators will be used	

Attachment A
Activity Hazard Analysis



Phase of Work: Excavation	Analysis Performed By: Drew Shelby	Analysis Approved By: Tricia Sumner	US EPA Region II
TASK	POTENTIAL HAZARDS	CONTROL MEASURES	
Excavation - footer, slab area, yard piping installation	Exposure to site contaminants	Wear safety glasses, polycoated tyvek/saranex coveralls, nitrile gloves and overboots Minimize potential exposures time through decon techniques Use care in handling decon supplies and waste streams Communicate potential hazards to co-workers	
	Slips/Trips/Falls	Keep working areas free of debris/materials Continuously evaluate area for potential causes of slip/trips/falls Avoid working on uneven terrain Wear proper sampling boots and PPE that fit and are in good condition	
	Excavations: cave-in, utilities, Falling loads, atmospheric hazards	<ul style="list-style-type: none"> Follow Excavation SOP requirements, including: <ul style="list-style-type: none"> (Competent Person) Conduct daily inspections Contact underground utility service locator to define utility locations Inspect excavation area for signs of utilities. Protect from cave-in by sloping or benching Protect excavation from water run-in or accumulation Demarcate and protect excavation to prevent entry by vehicles, equipment or personnel Protect personnel from falling loads from equipment Test for and control hazardous atmospheres Maintain minimum 10-foot clearance from all overhead utilities	
	Overhead Hazards	All equipment will maintain safe clearance from energized electrical lines. All personnel will wear hardhats meeting ANSI Z87.	
	Strains/Sprains	Proper lifting techniques Stretching prior to any physical labor Pay attention to the walking/working surface	
	Dangerous weather conditions	Review local weather reports Continuously check weather conditions. Discontinue work if it appears that dangerous weather Communicate any potential dangerous weather conditions to co-workers Identify "safe areas" prior to field activities, if dangerous weather approaches	
	Struck by falling and/or moving objects	Daily Inspection required by operators. Equipment use by experienced operators. Use all equipment according to operator's manual. Ensure clearances for personnel; overhead lines and physical obstacles when operating.	
	Hand Tools	Use all tools and equipment according to manufacturer specifications. Inspection before use. Remove broken or damaged tool(s). Tools should be used for the intended purpose. Properly store and handle tools.	
	Fire Protection	Smoking is prohibited inside the exclusion zone. A fire extinguisher will be located by drilling equipment Fire extinguishers will be inspected when brought on-site. When working in areas where flammable vapors may be present, care must be taken with tools and equipment that may be sources of ignition.	
	Cold/Heat Stress	Work rest regiments will be followed. Communicate potential cold/heat stress-related hazards to co-workers Observe co-workers for signs of cold/heat stress.	
	Noise	Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers.	
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	

Attachment A
Activity Hazard Analysis

Project Identification: Lawrence Aviation Site Task Order 017		Location: Port Jefferson, NY		US EPA Region II	
Phase of Work: Transportation/Disposal		Analysis Performed By: Tricia Sumner		Analysis Approved By: Chris Coleson	
TASK		POTENTIAL HAZARDS		CONTROL MEASURES	
Transportation and Disposal (Mill Creek Sediments/Debris)		Exposure to site contaminants		Wear safety glasses, tyvek coveralls, nitrile gloves and overboots Minimize potential exposures time through decon techniques Use care in handling decon supplies and waste streams Communicate potential hazards to co-workers Use care in handling decon supplies and waste streams	
		Slips/Trips/Falls		Communicate potential hazards to co-workers Keep working areas free of debris/materials Continuously evaluate area for potential causes of slip/trips/falls Secure equipment and supplies in boat Wear proper sampling boots and PPE that fit and are in good condition Communicate potential hazards to co-workers	
		Strains/Sprains		Proper lifting techniques Stretching prior to any physical labor Pay attention to the walking/working surface	
		Vehicle/Equipment Accidents		Daily equipment inspection required by operators Equipment use by experienced operators Use all equipment according to the operators manual Ensure clearances for personnel, overhead lines, and physical obstacles when operating. Do not exceed lifting capacity	
		Overhead Hazards		Ensure clearances for personnel and physical obstacles when operating vehicles Hard-hats shall be worn in areas with identified overhead hazards	
		Fire Protection		Smoking is prohibited inside the exclusion zone. A fire extinguisher will be located by the work area Fire extinguishers will be inspected when brought on-site.	
		Dangerous weather conditions		Review local weather reports Continuously check weather conditions. Discontinue work if it appears that dangerous weather Communicate any potential dangerous weather conditions to co-workers Identify "safe areas" prior to field activities, if dangerous weather approaches	
EQUIPMENT USED		INSPECTION REQUIREMENTS		TRAINING REQUIREMENTS	
Level D/Modified Level D Dump Trucks		Daily Inspections of equipment		Site-specific training on site hazards	

ATTACHMENT B

Material Safety Data Sheets (MSDS)

MSDS Material Safety Data Sheet		24 Hour Emergency Telephone: 908-859-2151 CHEMTREC: 1-800-424-9300
From: Mallinckrodt Baker, Inc. 222 Red School Lane Phillipsburg, NJ 08865		National Response in Canada CANUTEC: 613-996-6666
 		Outside U.S. and Canada Chemtrec: 703-527-3887
NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.		
All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.		

TRICHLOROETHYLENE

MSDS Number: T4940 --- Effective Date: 09/14/00

1. Product Identification

Synonyms: Trichloroethene; TCE; acetylene trichloride; Ethinyl trichloride

CAS No.: 79-01-6

Molecular Weight: 131.39

Chemical Formula: C₂HCl₃

Product Codes:

J.T. Baker: 5376, 9454, 9458, 9464, 9473, 9474

Mallinckrodt: 8598, 8600, 8633

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Trichloroethylene	79-01-6	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN

**IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT.
SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on
level and duration of exposure.**

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)

Flammability Rating: 1 - Slight

Reactivity Rating: 1 - Slight

Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD;
PROPER GLOVES

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Vapors can irritate the respiratory tract. Causes depression of the central nervous system with symptoms of visual disturbances and mental confusion, incoordination, headache, nausea, euphoria, and dizziness. Inhalation of high concentrations could cause unconsciousness, heart effects, liver effects, kidney effects, and death.

Ingestion:

Cases irritation to gastrointestinal tract. May also cause effects similar to inhalation. May cause coughing, abdominal pain, diarrhea, dizziness, pulmonary edema, unconsciousness. Kidney failure can result in severe cases. Estimated fatal dose is 3-5 ml/kg.

Skin Contact:

Cause irritation, redness and pain. Can cause blistering. Continued skin contact has a defatting action and can produce rough, dry, red skin resulting in secondary infection.

Eye Contact:

Vapors may cause severe irritation with redness and pain. Splashes may cause eye damage.

Chronic Exposure:

Chronic exposures may cause liver, kidney, central nervous system, and peripheral nervous system effects. Workers chronically exposed may exhibit central nervous system depression, intolerance to alcohol, and increased cardiac output. This material is linked to mutagenic effects in humans. This material is also a suspect carcinogen.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, cardiovascular disorders, impaired liver or kidney or respiratory function, or central or peripheral nervous system disorders may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

5. Fire Fighting Measures

Fire:

Autoignition temperature: 420C (788F)

Flammable limits in air % by volume:

lcl: 8; ucl: 12.5

Explosion:

A strong ignition source, e. g., a welding torch, can produce ignition. Sealed containers may rupture when heated.

Fire Extinguishing Media:

Use water spray to keep fire exposed containers cool. If substance does ignite, use CO₂, dry chemical or foam.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting

spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

Trichloroethylene:

-OSHA Permissible Exposure Limit (PEL):

100 ppm (TWA), 200 ppm (Ceiling),

300 ppm/5min/2hr (Max)

-ACGIH Threshold Limit Value (TLV):

50 ppm (TWA) 100 ppm (STEL);

listed as A5, not suspected as a human carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area.

Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.

Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear, colorless liquid.

Odor:

Chloroform-like odor.

Solubility:

Practically insoluble in water. Readily miscible in organic solvents.

Specific Gravity:

1.47 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

87C (189F)

Melting Point:

-73C (-99F)

Vapor Density (Air=1):

4.5

Vapor Pressure (mm Hg):

57.8 @ 20C (68F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Will slowly decompose to hydrochloric acid when exposed to light and moisture.

Hazardous Decomposition Products:

May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong caustics and alkalis, strong oxidizers, chemically active metals, such as barium, lithium, sodium, magnesium, titanium and beryllium, liquid oxygen.

Conditions to Avoid:

Heat, flame, ignition sources, light, moisture, incompatibles

11. Toxicological Information

Toxicological Data:

Trichloroethylene: Oral rat LD50: 5650 mg/kg; investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

This material has been linked to mutagenic effects in humans.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Trichloroethylene (79-01-6)	No	Yes	2A

12. Ecological Information

Environmental Fate:

When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:

The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TRICHLOROETHYLENE

Hazard Class: 6.1

UN/NA: UN1710

Packing Group: III

Information reported for product/size: 5GL

International (Water, I.M.O.)

Proper Shipping Name: TRICHLOROETHYLENE

Hazard Class: 6.1

UN/NA: UN1710

Packing Group: III

Information reported for product/size: 5GL

International (Air, I.C.A.O.)

Proper Shipping Name: TRICHLOROETHYLENE

Hazard Class: 6.1

UN/NA: UN1710

Packing Group: III

Information reported for product/size: 5GL

15. Regulatory Information

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-----\Chemical Inventory Status - Part 1\-----
Ingredient                                     TSCA  EC   Japan  Australia
-----
Trichloroethylene (79-01-6)                   Yes  Yes   Yes    Yes
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-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea DSL   NDSL  Phil.
-----
Trichloroethylene (79-01-6)                   Yes  Yes   No    Yes
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-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-   -SARA 313-
RQ   TPQ   List  Chemical Catg.
-----
Trichloroethylene (79-01-6)                   No    No    Yes    No
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-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     -RCRA-      -TSCA-
CERCLA  261.33  8 (d)
-----
Trichloroethylene (79-01-6)                   100        U228      No
```

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: No information found.

Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 1 Reactivity: 0

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

Label Precautions:

Do not get in eyes, on skin, or on clothing.

Do not breathe vapor.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Keep away from heat and flame.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician. Note to physician: Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8, 11.

Disclaimer:

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INFORMATION.**

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)



MATERIAL SAFETY DATA SHEET

PRODUCT NAME: METHYL CHLORIDE

1. Chemical Product and Company Identification

BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (908) 464-8100

24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

TELEPHONE NUMBER: (905) 501-1700

24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802

EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: METHYL CHLORIDE
CHEMICAL NAME: Chloromethane
COMMON NAMES/SYNONYMS: Chloromethane
TDG (Canada) CLASSIFICATION: 2.1
WHMIS CLASSIFICATION: A, D2B, D2A, B1

PREPARED BY: Loss Control (908)464-8100/(905)501-1700

PREPARATION DATE: 6/1/95

REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA ¹	TLV-ACGIH ²	LD ₅₀ or LC ₅₀ Route/Species
Chloromethane FORMULA: CH ₃ Cl CAS: 74-07-3 RTECS #: PA6300000	> 99.5	100 ppm TWA 200 ppm Ceiling	50 ppm TWA 100 ppm STEL Skin	LC ₅₀ 15,200 mg/m ³ /30m (rat)

¹ As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

² As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

Inhalation of high concentrations of this compound may cause dizziness and interfere with normal heart rhythm. Exposure to this material may result in toxicity to the liver and kidneys. Flammable. Decomposes into phosgene and other toxic gases under fire conditions.

ROUTE OF ENTRY:

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion No
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MSDS: G-96

Revised: 6/7/96

Page 1 of 7

PRODUCT NAME: METHYL CHLORIDE

HEALTH EFFECTS:

Exposure Limits Yes	Irritant Yes	Sensitization No
Teratogen No	Reproductive Hazard No	Mutagen No
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:

None anticipated as product is a gas at room temperature.

SKIN EFFECTS:

None anticipated as product is a gas at room temperature.

INGESTION EFFECTS:

Ingestion unlikely.

INHALATION EFFECTS:

Slight Exposure: Appearance of drunkenness, staggering, dizziness, nausea and possible hiccups. These effects may be delayed for several days.

Moderate Exposure: Mental confusion and possible temporary loss of consciousness.

Severe Exposure: Abdominal pains, vomiting, extreme nervousness or trembling to convulsions and death.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

Individuals with anemia, diseases of the central nervous system or diseases of the kidney or liver should not be exposed to methyl chloride.

NFPA HAZARD CODES

Health: 1
Flammability: 4
Reactivity: 1

HMIS HAZARD CODES

Health: 1
Flammability: 4
Reactivity: 1

RATINGS SYSTEM

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

4. First Aid Measures

EYES:

Flush eyes immediately with lukewarm water for at least 15 minutes. A physician should see the patient promptly.

SKIN:

Remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER!

INGESTION:

None required.

INHALATION:

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Revised: 6/7/96

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PRODUCT NAME: METHYL CHLORIDE

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF EXTREME FIRE AND EXPLOSION HAZARDS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area and given artificial resuscitation and supplemental oxygen. Medical assistance should be sought immediately. The physician should be instructed not to use adrenaline as a stimulant in cases of methyl chloride poisoning. Further treatment should be symptomatic and supportive.

5. Fire Fighting Measures

Conditions of Flammability: Flammable		
Flash point: 32 °F (0 °C)	Method: Open cup	Autoignition Temperature: 1170 °F (632 °C)
LEL(%): 8.1		UEL(%): 17.2
Hazardous combustion products: Phosgene, Carbon Monoxide, Chloride		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

FIRE AND EXPLOSION HAZARDS:

Reacts with moisture in air or with water to form hydrochloric acid. It also forms explosive mixtures with air. If flame is extinguished and flow of gas continues, increase ventilation to prevent explosive mixture formation in low areas or pockets.

EXTINGUISHING MEDIA:

Carbon dioxide or dry chemical.

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should use self-contained breathing apparatus to protect them from toxic combustion products. If possible, stop the flow of gas and allow fuel to consume itself. Use water spray to cool adjacent areas.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Electrical Classification:

Group C (See NFPA No. 70).

Most metals corrode with wet methyl chloride. Anhydrous methyl chloride (water content less than a dew point of -40°F (-40°C)) can be handled in carbon or stainless steel, copper and bronze. Gasketing materials should be of Teflon® or Kel-F®.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<100 psig) piping or

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PRODUCT NAME: METHYL CHLORIDE

systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect containers from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where containers are stored to exceed 130°F (54°C). Containers should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty containers should be segregated. Use a "first in-first out" inventory system to prevent full containers being stored for excessive periods of time. Post "NO SMOKING OR OPEN FLAMES" signs in the storage or use area. There should be no sources of ignition in the storage or use area.

For additional storage recommendations, consult Compressed Gas Association's Pamphlet P-1.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS¹:

INGREDIENT	% VOLUME	PEL-OSHA ²	TLV-ACGIH ³	LD ₅₀ or LC ₅₀ Route/Species
Chloromethane FORMULA: CH ₃ Cl CAS: 74-87-3 RTECS #: PA6300000	> 99.5	100 ppm TWA 200 ppm Ceiling	50 ppm TWA 100 ppm STEL Skin	LC ₅₀ 15,200 mg/m ³ /30m (rat)

¹ Refer to individual state or provincial regulations, as applicable, for limits which may be more stringent than those listed here.

² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:

Hood with forced ventilation. Use local exhaust to prevent accumulation above the exposure limit. Mechanical (Gen.): In accordance with electrical codes.

EYE/FACE PROTECTION:

Safety goggles or glasses

SKIN PROTECTION:

Protective Gloves: Neoprene or Butyl rubber. Do not use PVC or polyethylene.

RESPIRATORY PROTECTION:

Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:

Safety shoes, safety shower, eyewash "fountain", faceshield.

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PRODUCT NAME: METHYL CHLORIDE

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure at STP	: 73.4	psia
Vapor density at STP (Air = 1)	: 1.45	
Evaporation point	: Not Available	
Boiling point	: -10.8	°F
	: -23.8	°C
Freezing point	: 143.7	°F
	: -97.6	°C
pH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H2O)	: Very slightly	
Odor threshold	: Not Available	
Odor and appearance	: Colorless gas with a slightly sweet odor; liquid is water white.	

10. Stability and Reactivity

STABILITY:

Stable at temperatures below 750°F (399°C). Hydrolyzes slowly below 212°F (100°C).

INCOMPATIBLE MATERIALS:

Reacts with zinc, its alloys and galvanized iron. Explodes on contact with magnesium. Reacts with aluminum & its alloys to form methylated aluminum compounds which are flammable in air. Reacts explosively with sodium & alkali metals.

HAZARDOUS DECOMPOSITION PRODUCTS:

Hydrogen chloride, carbon monoxide, phosgene, chloride and chlorine.

HAZARDOUS POLYMERIZATION:

Will not occur.

11. Toxicological Information

REPRODUCTIVE:

Reproductive toxicity observed in male rats following an inhalation exposure of 2000 ppm for 6 hours.
Developmental defects observed following inhalation exposure of pregnant female rats to 1500 ppm for 6 hours.

MUTAGENIC:

Unspecified human mutagenic data is available for this substance.

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PRODUCT NAME: METHYL CHLORIDE

OTHER:

When inhaled, it enters the body cells where hydrolysis to hydrochloric acid and methyl alcohol occurs. This results in degenerative changes to the lungs, brain, kidney and liver. Methyl chloride is readily absorbed into the body, but is very slowly given up, resulting in the possibility of latent toxicological effects. In fatal cases, autopsy has shown congestion of the lungs, liver and kidneys

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Methyl Chloride	Methyl Chloride
HAZARD CLASS:	2.1	2.1
IDENTIFICATION NUMBER:	UN 1003	UN 1003
SHIPPING LABEL:	FLAMMABLE GAS	FLAMMABLE GAS

Additional Marking Requirement: If net weight of product \geq 100 pounds, the container must be also marked with the letters "RQ".

Additional Shipping Paper Description Requirement: If net weight of product \geq 100 pounds, the shipping papers must be also marked with the letters "RQ".

15. Regulatory Information

Chloromethane is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

SARA TITLE III NOTIFICATIONS AND INFORMATION

Releases of chloromethane in quantities equal to or greater than the reportable quantity (RQ) of 100 pounds are subject to reporting to the National Response Center under CERCLA, Section 304 SARA Title III.

SARA TITLE III - HAZARD CLASSES:

Acute Health Hazard
Chronic Health Hazard
Fire Hazard
Sudden Release of Pressure Hazard

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PRODUCT NAME: METHYL CHLORIDE

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT BY VOLUME
74-87-3	CHLOROMETHANE	> 99.5

This information must be included on all MSDSs that are copied and distributed for this material.

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

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USE OR DISCLOSURE OF DATA CONTAINED ON THIS SHEET IS SUBJECT TO THE RESTRICTION ON THE NOTICE PAGE OF THIS PROPOSAL.

	Tel: 514-956-7503 Fax: 514-956-7504 Internet: www.megs.ca E-mail: support@megs.ca	
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Montreal	St-Laurent	Tel : 514-956-7503	Fax : 514-956-7504
Ottawa	Nepean	Tel : 613-226-4228	Fax : 613-226-4229
Quebec	Quebec	Tel : 418-834-7447	Fax : 418-834-3774

1,1,-DICHLOROETHYLENE- MATERIAL SAFETY DATA SHEET

TABLE OF CONTENTS:

1. [Chemical Product and Company Identification](#)
2. [Composition, Information on Ingredients](#)
3. [Hazards Identification](#)
4. [First Aid Measures](#)
5. [Fire Fighting Measures](#)
6. [Accidental Release Measures](#)
7. [Handling and Storage](#)
8. [Exposure Controls, Personal Protection](#)
9. [Physical and Chemical Properties](#)
10. [Stability and Reactivity](#)
11. [Toxicological Information](#)
12. [Ecological Information](#)
13. [Disposal Considerations](#)
14. [Transport Information](#)
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16. [Other Information](#)

24 Hour EMERGENCY CONTACT

U.S- CHEMTREC 1-800-424-9300

CANADA- CANUTEC 613-996-6666

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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Matheson Tri-Gas, Inc.

The telephone numbers listed below are emergency numbers, please contact your local branch for routine inquiries.

USA	CANADA
959 Route 46 East	530 Watson Street
Parsippany, New Jersey	Whitby, Ontario
07054-0624 USA	L1N 5R9 Canada
Phone: 973-257-1100	Phone: 905-668-3570

SUBSTANCE: 1,1-DICHLOROETHYLENE

SYMBOL: C₂H₂Cl₂

TRADE NAMES/SYNONYMS:

1,1-DICHLOROETHENE; 1,1-DICHLOROETHYLENE; VDC; VINYLIDENE CHLORIDE
MONOMER; VINYLIDENE DICHLORIDE; VINYLIDENE CHLORIDE, INHIBITED; RCRA U078;
UN 1303; C2H2CL2; MAT25070; RTECS KV9275000

CHEMICAL FAMILY: halogens

CREATION DATE: Jan 24 1989

REVISION DATE: Mar 16 1999

2. COMPOSITION, INFORMATION ON INGREDIENTS

[Up to Table of](#)

[Contents](#)

COMPONENT: 1,1-DICHLOROETHYLENE

CAS NUMBER: 75-35-4

EC NUMBER (EINECS): 200-864-0

PERCENTAGE: >99.9

COMPONENT: 4-METHOXYPHENOL

CAS NUMBER: 150-76-5

EC NUMBER (EINECS): 205-769-8

PERCENTAGE: 0.02000

3. HAZARDS IDENTIFICATION

[Up to Table of Contents](#)

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=4 REACTIVITY=2

WHMIS CLASSIFICATION: BD2

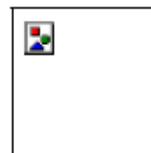
EC CLASSIFICATION (ASSIGNED):

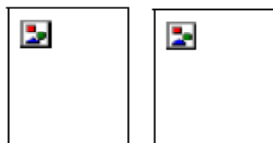
F+ Extremely Flammable

Xn Harmful

R 12-20-40

EC Classification may be inconsistent with independently-researched data.



**EMERGENCY OVERVIEW:****Color:** colorless**Physical Form:** volatile liquid**Odor:** faint odor, sweet odor**Major Health Hazards:** harmful if swallowed, respiratory tract irritation, skin irritation, eye irritation, central nervous system depression**Physical Hazards:** Flammable liquid and vapor. Vapor may cause flash fire. May polymerize. Containers may rupture or explode. May form peroxides during prolonged storage.**POTENTIAL HEALTH EFFECTS:****INHALATION:****Short Term Exposure:** irritation, symptoms of drunkenness, lung congestion, liver damage, convulsions**Long Term Exposure:** kidney damage, tumors**SKIN CONTACT:****Short Term Exposure:** irritation (possibly severe)**Long Term Exposure:** same as effects reported in short term exposure**EYE CONTACT:****Short Term Exposure:** irritation (possibly severe), eye damage**Long Term Exposure:** same as effects reported in short term exposure**INGESTION:****Short Term Exposure:** same as effects reported in short term exposure**Long Term Exposure:** same as effects reported in short term exposure**CARCINOGEN STATUS:****OSHA:** N**NTP:** N**IARC:** N

4. FIRST AID MEASURES[Up to Table of Contents](#)

INHALATION:

Remove from exposure immediately. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Get medical attention.

SKIN CONTACT:

Remove contaminated clothing, jewelry, and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention, if needed.

EYE CONTACT:

Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.

INGESTION:

If vomiting occurs, keep head lower than hips to help prevent aspiration. Get medical attention, if needed.

5. FIRE FIGHTING MEASURES

[Up to Table of Contents](#)

FIRE AND EXPLOSION HAZARDS:

Severe fire hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive above flash point. Containers may rupture or explode if exposed to heat.

EXTINGUISHING MEDIA:

alcohol resistant foam, carbon dioxide, regular dry chemical, water

Large fires: Use alcohol-resistant foam or flood with fine water spray.

FIRE FIGHTING:

Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. 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 is impossible 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: Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Water may be ineffective.

FLASH POINT:

14 F (-10 C)

LOWER FLAMMABLE LIMIT:

5.6%

UPPER FLAMMABLE LIMIT:

11.4%

AUTOIGNITION:

855 F (457 C)

FLAMMABILITY CLASS (OSHA):

IA

6. ACCIDENTAL RELEASE MEASURES

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AIR RELEASE:

Reduce vapors with water spray. Stay upwind and keep out of low areas.

SOIL RELEASE:

Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.

WATER RELEASE:

Collect with absorbent into suitable container. Collect spilled material using mechanical equipment.

OCCUPATIONAL RELEASE:

Avoid heat, flames, sparks and other sources of ignition. Remove sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Reportable Quantity (RQ): Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE[Up to Table of Contents](#)

Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Store in a cool, dry place. Store in a well-ventilated area. Keep in the dark. Keep separated from incompatible substances. Store outside or in a detached building. Store with flammable liquids. Store in a tightly closed container. Containers must have overpressure release device. Avoid heat, flames, sparks and other sources of ignition. Keep separated from incompatible substances. Monitor inhibitor content. Avoid exposure to low temperatures or freezing. May form explosive peroxides. Store in a tightly closed container. Avoid contact with light. Store in a cool, dry place. Monitor inhibitor content. Do not evaporate or distill to dryness. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION[Up to Table of Contents](#)**EXPOSURE LIMITS:****1,1-DICHLOROETHYLENE:**

1 ppm (4 mg/m³) OSHA TWA (vacated by 58 FR 35338, June 30, 1993)

5 ppm (20 mg/m³) ACGIH TWA

20 ppm (80 mg/m³) ACGIH STEL

VENTILATION: Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from

NIOSH and/or OSHA.

At any detectable concentration -

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Escape -

Any air-purifying respirator with a full facepiece and an organic vapor canister.

Any appropriate escape-type, self-contained breathing apparatus.

For Unknown Concentrations or Immediately Dangerous to Life or Health -

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

[Up to Table of Contents](#)

PHYSICAL STATE: liquid

COLOR: colorless

PHYSICAL FORM: volatile liquid

ODOR: faint odor, sweet odor

MOLECULAR WEIGHT: 96.64

MOLECULAR FORMULA: C₂H₂CL₂

BOILING POINT: 86-90 F (30-32 C)

FREEZING POINT: -188 F (-122 C)

VAPOR PRESSURE: 400 mmHg @ 14.8 C

VAPOR DENSITY (air=1): 3.4

SPECIFIC GRAVITY (water=1): 1.213

WATER SOLUBILITY: 0.04% @ 20 C

PH: Not available

VOLATILITY: Not available

ODOR THRESHOLD: 500 ppm

EVAPORATION RATE: Not available

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

SOLVENT SOLUBILITY:

Soluble: organic solvents

10. STABILITY AND REACTIVITY[Up to Table of Contents](#)**REACTIVITY:**

May form explosive peroxides. Avoid contact with temperatures above -40 C. Avoid contact with heat, air, light or moisture and monitor inhibitor content. May polymerize. Closed containers may rupture violently.

CONDITIONS TO AVOID:

Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

INCOMPATIBILITIES:

metals, acids, oxidizing materials

HAZARDOUS DECOMPOSITION:

Thermal decomposition products: phosgene, halogenated compounds, oxides of carbon

POLYMERIZATION:

May polymerize. Avoid contact with heat or light and monitor inhibitor content.

11. TOXICOLOGICAL INFORMATION[Up to Table of Contents](#)**VINYLDENE CHLORIDE:****TOXICITY DATA:**

6350 ppm/4 hour(s) inhalation rat LC50; 200 mg/kg oral rat LD50

CARCINOGEN STATUS:

IARC: Human Inadequate Evidence, Animal Limited Evidence, Group 3; ACGIH: A3 -Animal Carcinogen

LOCAL EFFECTS:

Irritant: inhalation, skin, eye

ACUTE TOXICITY LEVEL:

Toxic: ingestion

Slightly Toxic: inhalation

TARGET ORGANS:

central nervous system, liver

TUMORIGENIC DATA:

Available.

MUTAGENIC DATA:

Available.

REPRODUCTIVE EFFECTS DATA:

Available.

12. ECOLOGICAL INFORMATION[Up to Table of Contents](#)



USE OR DISCLOSURE OF DATA CONTAINED ON THIS SHEET IS SUBJECT TO THE RESTRICTION ON THE NOTICE PAGE OF THIS PROPOSAL.

ECOTOXICITY DATA:

FISH TOXICITY:

74000 ug/L 96 hour(s) LC50 (Mortality) Bluegill (*Lepomis macrochirus*)

INVERTEBRATE TOXICITY:

224000 ug/L 96 hour(s) LC50 (Mortality) Opossum shrimp (*Mysidopsis bahia*)

ALGAL TOXICITY:

>712000 ug/L 96 hour(s) EC50 (Photosynthesis) Diatom (*Skeletonema costatum*)

ENVIRONMENTAL SUMMARY:

Moderately toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

[Up to Table of Contents](#)

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U078. Hazardous Waste Number(s): D029. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 0.7 mg/L. Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

[Up to Table of Contents](#)

U.S. DOT 49 CFR 172.101. SHIPPING NAME-UN NUMBER; HAZARD CLASS; PACKING GROUP; LABEL:

Vinylidene chloride, inhibited-UN1303; 3; I; Flammable liquid



15. REGULATORY INFORMATION

[Up to Table of Contents](#)

U.S. REGULATIONS:

TSCA INVENTORY STATUS: Y

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CERCLA SECTION 103 (40CFR302.4): Y

1,1-Dichloroethylene: 100 LBS RQ

SARA SECTION 302 (40CFR355.30): N

SARA SECTION 304 (40CFR355.40): N

SARA SECTION 313 (40CFR372.65): Y

1,1-Dichloroethylene

SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40CFR370.21):

ACUTE: Y

CHRONIC: Y

FIRE: Y

REACTIVE: Y

SUDDEN RELEASE: Y

OSHA PROCESS SAFETY (29CFR1910.119): N

STATE REGULATIONS:

California Proposition 65: N

EUROPEAN REGULATIONS:**EC NUMBER (EINECS):** 200-864-0**EC RISK AND SAFETY PHRASES:**

R 12	Extremely flammable.
R 20	Harmful by inhalation.
R 40	Possible risks of irreversible effects.
S 2	Keep out of reach of children.
S 7	Keep container tightly closed.
S 16	Keep away from sources of ignition - No smoking.
S 29	Do not empty into drains.

CONCENTRATION LIMITS:C_≥12.5% Xn R 20-40

1%≤C<12.5% Xn R 40

16. OTHER INFORMATION[Up to Table of Contents](#)

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Methyl tert-butyl ether MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl tert-butyl ether	Contact Information:
Catalog Codes: SLM2152	Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396
CAS#: 1634-04-4	US Sales: 1-800-901-7247 International Sales: 1-281-441-4400
RTECS: KN5250000	Order Online: ScienceLab.com
TSCA: TSCA 8(b) inventory: Methyl tert-butyl ether	CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
CI#: Not available.	International CHEMTREC, call: 1-703-527-3887
Synonym:	For non-emergency assistance, call: 1-281-441-4400
Chemical Name: Methyl tert-Butyl Ether	
Chemical Formula: C ₅ H ₁₂ O	

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methyl {tert-}butyl ether	1634-04-4	100

Toxicological Data on Ingredients: Methyl tert-butyl ether: ORAL (LD50): Acute: 4000 mg/kg [Rat]. 5960 mg/kg [Mouse]. VAPOR (LC50): Acute: 23576 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator).
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance is toxic to lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 224°C (435.2°F)

Flash Points: CLOSED CUP: -28°C (-18.4°F).

Flammable Limits: LOWER: 2.5% UPPER: 15.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use alcohol foam, water spray or fog

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

Flammable liquid.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Characteristic. (Strong.)

Taste: Not available.

Molecular Weight: 88.15 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 55.2°C (131.4°F)

Melting Point: -109°C (-164.2°F)
Critical Temperature: Not available.
Specific Gravity: 0.7405 (Water = 1)
Vapor Pressure: 245 mm of Hg (@ 20°C)
Vapor Density: 3.1 (Air = 1)
Volatility: 100% (v/v).
Odor Threshold: Not available.
Water/Oil Dist. Coeff.: Not available.
Ionicity (in Water): Not available.
Dispersion Properties: See solubility in water, methanol, diethyl ether.
Solubility:
Soluble in methanol, diethyl ether.
Partially soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.
Instability Temperature: Not available.
Conditions of Instability: Not available.
Incompatibility with various substances: Not available.
Corrosivity: Non-corrosive in presence of glass.
Special Remarks on Reactivity: Not available.
Special Remarks on Corrosivity: Not available.
Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.
Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 4000 mg/kg [Rat].
Acute toxicity of the vapor (LC50): 23576 ppm 4 hour(s) [Rat].
Chronic Effects on Humans: The substance is toxic to lungs, the nervous system, mucous membranes.
Other Toxic Effects on Humans:
Extremely hazardous in case of ingestion.
Very hazardous in case of skin contact (irritant), of inhalation.
Hazardous in case of skin contact (permeator).
Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Methyl tert-butyl ether : UN2398 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: Methyl tert-butyl ether

Massachusetts RTK: Methyl tert-butyl ether

TSCA 8(b) inventory: Methyl tert-butyl ether

SARA 313 toxic chemical notification and release reporting: Methyl tert-butyl ether

CERCLA: Hazardous substances.: Methyl tert-butyl ether

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).

CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable.

R38- Irritating to skin.

R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.

Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet 1,1-Dichloroethane MSDS

Section 1: Chemical Product and Company Identification

Product Name: 1,1-Dichloroethane	Contact Information:
Catalog Codes: SLD3280	Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396
CAS#: 75-34-3	US Sales: 1-800-901-7247 International Sales: 1-281-441-4400
RTECS: KI0175000	Order Online: ScienceLab.com
TSCA: TSCA 8(b) inventory: 1,1-Dichloroethane	CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
CI#: Not available.	International CHEMTREC, call: 1-703-527-3887
Synonym:	For non-emergency assistance, call: 1-281-441-4400
Chemical Name: 1,1-Dichloroethane	
Chemical Formula: C ₂ H ₄ Cl ₂	

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
{1,1-}Dichloroethane	75-34-3	100

Toxicological Data on Ingredients: 1,1-Dichloroethane: ORAL (LD50): Acute: 725 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified 2 (Reasonably anticipated.) by NTP. A1 (Not classifiable for human or animal.) by ACGIH.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].

The substance is toxic to kidneys, lungs, liver, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 458°C (856.4°F)

Flash Points: CLOSED CUP: -17°C (1.4°F). OPEN CUP: -6°C (21.2°F).

Flammable Limits: LOWER: 5.6% UPPER: 11.4%

Products of Combustion: These products are carbon oxides (CO, CO₂), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid.

Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth,

sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, alkalis.

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 100 STEL: 250 (ppm) from ACGIH (TLV) [1999]

TWA: 100 (ppm) from OSHA (PEL)

Australia: TWA: 200 (ppm)

Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Oily liquid.)

Odor: Chloroform like odor (Slight.)

Taste: Not available.

Molecular Weight: 98.96 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 57.3°C (135.1°F)

Melting Point: -96.9°C (-142.4°F)



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Critical Temperature: 261.5°C (502.7°F)
Specific Gravity: 1.175 (Water = 1)
Vapor Pressure: 180 mm of Hg (@ 20°C)
Vapor Density: 3.44 (Air = 1)
Volatility: Not available.
Odor Threshold: 120 ppm
Water/Oil Dist. Coeff.: Not available.
Ionicity (in Water): Not available.
Dispersion Properties:
 Partially dispersed in diethyl ether.
 See solubility in water, diethyl ether.
Solubility: Partially soluble in diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.
Instability Temperature: Not available.
Conditions of Instability: Not available.
Incompatibility with various substances: Reactive with oxidizing agents, alkalis.
Corrosivity: Corrosive in presence of aluminum.
Special Remarks on Reactivity: Not available.
Special Remarks on Corrosivity: Will attack some forms of plastic and rubber
Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.
Toxicity to Animals: Acute oral toxicity (LD50): 725 mg/kg [Rat].
Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2 (Reasonably anticipated.) by NTP. A4 (Not classifiable for human or animal.) by ACGIH.
DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].
 The substance is toxic to kidneys, lungs, liver, central nervous system (CNS).
Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Special Remarks on Toxicity to Animals: Not available
Special Remarks on Chronic Effects on Humans: Not available.
Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification:

CLASS 3: Combustible liquid with a flash point greater than 37.8°C (100°F).
Marine pollutant

Identification : 1,1-Dichloroethane : UN2362 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65 (no significant risk level): 1,1-Dichloroethane
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: 1,1-Dichloroethane
Rhode Island RTK hazardous substances: 1,1-Dichloroethane
Pennsylvania RIK: 1,1-Dichloroethane
Florida: 1,1-Dichloroethane
Minnesota: 1,1-Dichloroethane
Massachusetts RTK: 1,1-Dichloroethane
New Jersey: 1,1-Dichloroethane
New Jersey spill list: 1,1-Dichloroethane
TSCA 8(b) inventory: 1,1-Dichloroethane
TSCA 8(a) PAIR: 1,1-Dichloroethane
TSCA 8(d) H and S data reporting: 1,1-Dichloroethane: June 1999
TSCA 12(b) one time export: 1,1-Dichloroethane
SARA 313 toxic chemical notification and release reporting: 1,1-Dichloroethane: 1%
CERCLA: Hazardous substances.: 1,1-Dichloroethane: 1000 lbs. (453.6 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):



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R11- Highly flammable.
R22- Harmful if swallowed.
R37/38- Irritating to respiratory system
and skin.
R41- Risk of serious damage to eyes.
R52- Harmful to aquatic organisms.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.

Lab coat.

Vapor respirator. Be sure to use an
approved/certified respirator or
equivalent. Wear appropriate respirator
when ventilation is inadequate.

Splash goggles.

Section 16: Other Information


References: Not available.

Other Special Considerations: Not available.

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1,1,-DICHLORETHYLENE- MATERIAL SAFETY DATA SHEET

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24 Hour EMERGENCY CONTACT

U.S.- CHEMTREC 1-800-424-9300

CANADA- CANUTEC 613-996-6666

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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Matheson Tri-Gas, Inc.

The telephone numbers listed below are emergency numbers, please contact your local branch for routine inquiries.

USA

959 Route 46 East
Parsippany, New Jersey
07054-0624 USA
Phone: 973-257-1100

CANADA

530 Watson Street
Whitby, Ontario
L1N 5R9 Canada
Phone: 905-668-3570

SUBSTANCE: 1,1-DICHLOROETHYLENE

SYMBOL: C₂H₂Cl₂

TRADE NAMES/SYNONYMS:

1,1-DICHLOROETHENE; 1,1-DICHLOROETHYLENE; VDC; VINYLIDENE CHLORIDE MONOMER; VINYLIDENE DICHLORIDE; VINYLIDENE CHLORIDE, INHIBITED; RCRA U078; UN 1303; C₂H₂CL₂; MAT25070; RTECS KV9275000

CHEMICAL FAMILY: halogens

CREATION DATE: Jan 24 1989

REVISION DATE: Mar 16 1999

2. COMPOSITION, INFORMATION ON INGREDIENTS

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COMPONENT: 1,1-DICHLOROETHYLENE

CAS NUMBER: 75-35-4

EC NUMBER (EINECS): 200-864-0

PERCENTAGE: >99.9

COMPONENT: 4-METHOXYPHENOL

CAS NUMBER: 150-76-5

EC NUMBER (EINECS): 205-769-8

PERCENTAGE: 0.02000

3. HAZARDS IDENTIFICATION

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NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=4 REACTIVITY=2

WHMIS CLASSIFICATION: BD2

EC CLASSIFICATION (ASSIGNED):

F+ Extremely Flammable

Xn Harmful

R 12-20-40

EC Classification may be inconsistent with independently-researched data.



EMERGENCY OVERVIEW:

Color: colorless

Physical Form: volatile liquid

Odor: faint odor, sweet odor

Major Health Hazards: harmful if swallowed, respiratory tract irritation, skin irritation, eye irritation, central nervous system depression

Physical Hazards: Flammable liquid and vapor. Vapor may cause flash fire. May polymerize. Containers may rupture or explode. May form peroxides during prolonged storage.

POTENTIAL HEALTH EFFECTS:

INHALATION:

Short Term Exposure: irritation, symptoms of drunkenness, lung congestion, liver damage, convulsions

Long Term Exposure: kidney damage, tumors

SKIN CONTACT:

Short Term Exposure: irritation (possibly severe)

Long Term Exposure: same as effects reported in short term exposure

EYE CONTACT:

Short Term Exposure: irritation (possibly severe), eye damage

Long Term Exposure: same as effects reported in short term exposure

INGESTION:

Short Term Exposure: same as effects reported in short term exposure

Long Term Exposure: same as effects reported in short term exposure

CARCINOGEN STATUS:

OSHA: N

NTP: N

IARC: N

4. FIRST AID MEASURES

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INHALATION:

Remove from exposure immediately. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Get medical attention.

SKIN CONTACT:

Remove contaminated clothing, jewelry, and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention, if needed.

EYE CONTACT:

Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.

INGESTION:

If vomiting occurs, keep head lower than hips to help prevent aspiration. Get medical attention, if needed.

5. FIRE FIGHTING MEASURES

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FIRE AND EXPLOSION HAZARDS:

Severe fire hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive above flash point. Containers may rupture or explode if exposed to heat.

EXTINGUISHING MEDIA:

alcohol resistant foam, carbon dioxide, regular dry chemical, water

Large fires: Use alcohol-resistant foam or flood with fine water spray.

FIRE FIGHTING:

Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. 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 is impossible 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: Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Water may be ineffective.

FLASH POINT:

14 F (-10 C)

LOWER FLAMMABLE LIMIT:

5.6%

UPPER FLAMMABLE LIMIT:

11.4%

AUTOIGNITION:

855 F (457 C)

FLAMMABILITY CLASS (OSHA):

IA

6. ACCIDENTAL RELEASE MEASURES

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AIR RELEASE:

Reduce vapors with water spray. Stay upwind and keep out of low areas.



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SOIL RELEASE:

Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.

WATER RELEASE:

Collect with absorbent into suitable container. Collect spilled material using mechanical equipment.

OCCUPATIONAL RELEASE:

Avoid heat, flames, sparks and other sources of ignition. Remove sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. Reportable Quantity (RQ): Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-0002 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE[Up to Table of Contents](#)

Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Store in a cool, dry place. Store in a well-ventilated area. Keep in the dark. Keep separated from incompatible substances. Store outside or in a detached building. Store with flammable liquids. Store in a tightly closed container. Containers must have overpressure release device. Avoid heat, flames, sparks and other sources of ignition. Keep separated from incompatible substances. Monitor inhibitor content. Avoid exposure to low temperatures or freezing. May form explosive peroxides. Store in a tightly closed container. Avoid contact with light. Store in a cool, dry place. Monitor inhibitor content. Do not evaporate or distill to dryness. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION[Up to Table of Contents](#)**EXPOSURE LIMITS:****1,1-DICHLOROETHYLENE:**

1 ppm (4 mg/m³) OSHA TWA (vacated by 58 FR 35338, June 30, 1993)

5 ppm (20 mg/m³) ACGIH TWA

20 ppm (80 mg/m³) ACGIH STEL

VENTILATION: Provide local exhaust ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from

NIOSH and/or OSHA.

At any detectable concentration -

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Escape -

Any air-purifying respirator with a full facepiece and an organic vapor canister.

Any appropriate escape-type, self-contained breathing apparatus.

For Unknown Concentrations or Immediately Dangerous to Life or Health -

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.

Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

[Up to Table of Contents](#)

PHYSICAL STATE: liquid

COLOR: colorless

PHYSICAL FORM: volatile liquid

ODOR: faint odor, sweet odor

MOLECULAR WEIGHT: 96.64

MOLECULAR FORMULA: C₂H₂Cl₂

BOILING POINT: 86-90 F (30-32 C)

FREEZING POINT: -188 F (-122 C)

VAPOR PRESSURE: 400 mmHg @ 14.8 C

VAPOR DENSITY (air=1): 3.4

SPECIFIC GRAVITY (water=1): 1.213

WATER SOLUBILITY: 0.04% @ 20 C

PH: Not available

VOLATILITY: Not available

ODOR THRESHOLD: 500 ppm

EVAPORATION RATE: Not available

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

SOLVENT SOLUBILITY:

Soluble: organic solvents



USE OR DISCLOSURE OF DATA CONTAINED ON THIS SHEET IS SUBJECT TO THE RESTRICTION ON THE NOTICE PAGE OF THIS PROPOSAL.

10. STABILITY AND REACTIVITY[Up to Table of Contents](#)**REACTIVITY:**

May form explosive peroxides. Avoid contact with temperatures above -40 C. Avoid contact with heat, air, light or moisture and monitor inhibitor content. May polymerize. Closed containers may rupture violently.

CONDITIONS TO AVOID:

Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

INCOMPATIBILITIES:

metals, acids, oxidizing materials

HAZARDOUS DECOMPOSITION:

Thermal decomposition products: phosgene, halogenated compounds, oxides of carbon

POLYMERIZATION:

May polymerize. Avoid contact with heat or light and monitor inhibitor content.

11. TOXICOLOGICAL INFORMATION[Up to Table of Contents](#)**VINYLDENE CHLORIDE:****TOXICITY DATA:**

6350 ppm/4 hour(s) inhalation-rat LC50; 200 mg/kg oral-rat LD50

CARCINOGEN STATUS:

IARC: Human Inadequate Evidence, Animal Limited Evidence, Group 3; ACGIH: A3 -Animal Carcinogen

LOCAL EFFECTS:

Irritant: inhalation, skin, eye

ACUTE TOXICITY LEVEL:

Toxic: ingestion

Slightly Toxic: inhalation

TARGET ORGANS:

central nervous system, liver

TUMORIGENIC DATA:

Available.

MUTAGENIC DATA:

Available.

REPRODUCTIVE EFFECTS DATA:

Available.

12. ECOLOGICAL INFORMATION[Up to Table of Contents](#)

ECOTOXICITY DATA:

FISH TOXICITY:

74000 ug/L 96 hour(s) LC50 (Mortality) Bluegill (*Lepomis macrochirus*)

INVERTEBRATE TOXICITY:

224000 ug/L 96 hour(s) LC50 (Mortality) Opossum shrimp (*Mysidopsis bahia*)

ALGAL TOXICITY:

>712000 ug/L 96 hour(s) EC50 (Photosynthesis) Diatom (*Skeletonema costatum*)

ENVIRONMENTAL SUMMARY:

Moderately toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

[Up to Table of Contents](#)

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U078. Hazardous Waste Number(s): D029. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 0.7 mg/L. Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

[Up to Table of Contents](#)

U.S. DOT 49 CFR 172.101. SHIPPING NAME-UN NUMBER; HAZARD CLASS; PACKING GROUP; LABEL:

Vinylidene chloride, inhibited-UN1303; 3; I; Flammable liquid



15. REGULATORY INFORMATION

[Up to Table of Contents](#)

U.S. REGULATIONS:

TSCA INVENTORY STATUS: Y

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CERCLA SECTION 103 (40CFR302.4): Y

1,1-Dichloroethylene: 100 LBS RQ

SARA SECTION 302 (40CFR355.30): N

SARA SECTION 304 (40CFR355.40): N

SARA SECTION 313 (40CFR372.65): Y

1,1-Dichloroethylene

SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40CFR370.21):

ACUTE: Y

CHRONIC: Y

FIRE: Y

REACTIVE: Y

SUDDEN RELEASE: Y

OSHA PROCESS SAFETY (29CFR1910.119): N

STATE REGULATIONS:

California Proposition 65: N

EUROPEAN REGULATIONS:

EC NUMBER (EINECS): 200-864-0

EC RISK AND SAFETY PHRASES:

R 12	Extremely flammable.
R 20	Harmful by inhalation.
R 40	Possible risks of irreversible effects.
S 2	Keep out of reach of children.
S 7	Keep container tightly closed.
S 16	Keep away from sources of ignition - No smoking.
S 29	Do not empty into drains.

CONCENTRATION LIMITS:C \geq 12.5% Xn R 20-401% \leq C<12.5% Xn R 40

16. OTHER INFORMATION[Up to Table of Contents](#)

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Health	2
Fire	0
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Chloroform MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chloroform	Contact Information:
Catalog Codes: SLC1888, SLC5044	Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396
CAS#: 67-66-3	US Sales: 1-800-901-7247 International Sales: 1-281-441-4400
RTECS: FS9100000	Order Online: ScienceLab.com
TSCA: TSCA 8(b) inventory: Chloroform	CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
CI#: Not available.	International CHEMTREC, call: 1-703-527-3887
Synonym: Trichloromethane; Methane, trichlor-	For non-emergency assistance, call: 1-281-441-4400
Chemical Name: Chloroform	
Chemical Formula: CHCl ₃	

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Chloroform	67-66-3	100

Toxicological Data on Ingredients: Chloroform: ORAL (LD50): Acute: 695 mg/kg [Rat]. 36 mg/kg [Mouse]. 820 mg/kg [Guinea pig]. DERMAL (LD50): Acute: >20000 mg/kg [Rabbit]. VAPOR (LC50): Acute: 47702 mg/m 4 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects: CARCINOGENIC EFFECTS: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, heart. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances: Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: May explode if it comes in contact with aluminum powder, lithium, perchlorate, pentoxide, bis(dimethylamino)dimethylstannane, potassium, potassium-sodium alloy, sodium (or sodium hydroxide or sodium methoxide), and methanol.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions: Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as metals, alkalis.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, Light

Incompatibility with various substances: Reactive with metals, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Light Sensitive. Incompatible with triisopropyl phosphine, acetone, disilane, fluorine, strong bases and reactive metals (aluminum, magnesium in powdered form), light.

Special Remarks on Corrosivity: It will attack some forms of plastics, rubber, and coatings.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation.

Toxicity to Animals: WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 36 mg/kg [Mouse]. Acute dermal toxicity (LD50): >20000 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 47702 mg/m 4 hours [Rat]. 3

Chronic Effects on Humans: CARCINOGENIC EFFECTS: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, heart.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May affect genetic material (possible mutagen) and cause adverse reproductive effects(embryotoxicity and fetotoxicity) Suspected carcinogen (tumorigenic) and teratogen based on animal data. Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans: Acute Potential Health Effects: Skin: Causes skin irritation and may cause chemical burns. Eye: Causes eye irritation, burning pain and reversible injury to corneal epithelium. Inhalation: Causes irritation of the respiratory system (mucous membranes). May affect behavior/Nervous system (CNS depressant, fatigue, dizziness, nervousness, giddiness, euphoria, loss of coordination and judgement, weakness, hallucinations, muscle contraction/spasticity, general anesthetic, spastic paralysis, headache), anorexia (neurological and gastrointestinal symptoms resembling chronic alcoholism), and possibly coma and death. May affect the liver, kidneys and gastrointestinal tract (nausea, vomiting). Ingestion: Causes gastrointestinal tract irritation (nausea, vomiting). May affect the liver, urinary system (kidneys), respiration, behavior/nervous system (symptoms similar to inhalation), and heart. Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect the liver (hepatitis, jaundice, hepatocellular necrosis), metabolism (weight loss), respiration (fibrosis, pneumoconiosis), behavior/central nervous system (symptoms similar to acute inhalation), blood, musculoskeletal system, and kidneys. Ingestion: Prolonged or repeated ingestion may affect the liver, kidneys, metabolism (weight loss), endocrine system (spleen), blood (changes in cell count).

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 43.8 mg/l 96 hours [Trout].

BOD5 and COD: Not available.

Products of Biodegradation: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal: Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Chloroform UNNA: UN1888 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations: California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Chloroform California prop. 65 (no significant risk level): Chloroform: 0.02 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Chloroform New York release reporting list: Chloroform Rhode Island RTK hazardous substances: Chloroform Pennsylvania RTK: Chloroform Massachusetts RTK: Chloroform New Jersey: Chloroform California Director's List of Hazardous Substances (8 CCR 339): Chloroform Tennessee: Chloroform TSCA 8(b) inventory: Chloroform TSCA 8(d) H and S data reporting: Chloroform: effective: 6/1/87; sunset: 6/1/97 SARA 302/304/311/312 extremely hazardous substances: Chloroform SARA 313 toxic chemical notification and release reporting: Chloroform CERCLA: Hazardous substances.: Chloroform: 10 lbs. (4.536 kg)

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R20/22- Harmful by inhalation and if swallowed. R38- Irritating to skin. R40- Possible risks of irreversible effects. S36/37- Wear suitable protective clothing and gloves.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment: Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 11/06/2008 12:00 PM

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Health	2
Fire	1
Reactivity	0
Personal Protection	H

Material Safety Data Sheet 1,1,1-Trichloroethane MSDS

Section 1: Chemical Product and Company Identification

Product Name: 1,1,1-Trichloroethane	Contact Information:
Catalog Codes: SLT4180, SLT2167, SLT3460	Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396
CAS#: 71-55-6	US Sales: 1-800-901-7247 International Sales: 1-281-441-4400
RTECS: KJ2975000	Order Online: ScienceLab.com
TSCA: TSCA 8(b) inventory: 1,1,1-Trichloroethane	CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
CI#: Not available.	International CHEMTREC, call: 1-703-527-3887
Synonym:	For non-emergency assistance, call: 1-281-441-4400
Chemical Formula: CH ₃ CCl ₃	

Section 2: Composition and Information on Ingredients

Composition:		
Name	CAS #	% by Weight
{1,1,1-}Trichloroethane	71-55-6	100
Toxicological Data on Ingredients: 1,1,1-Trichloroethane: ORAL (LD50): Acute: 9600 mg/kg [Rat]. 6000 mg/kg [Mouse]. DERMAL (LD50): Acute: 15800 mg/kg [Rabbit]. VAPOR (LC50): Acute: 18000 ppm 4 hour(s) [Rat].		

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of ingestion. Hazardous in case of skin contact (irritant, permeator), of inhalation. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to lungs, the nervous system, liver, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 537°C (998.6°F)

Flash Points: Not available.

Flammable Limits: LOWER: 7.5% UPPER: 12.5%

Products of Combustion: These products are carbon oxides (CO, CO₂), halogenated compounds.

Fire Hazards in Presence of Various Substances: Slightly flammable to flammable in presence of oxidizing materials, of acids, of alkalis.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Slightly explosive to explosive in presence of oxidizing materials, of acids, of alkalis.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.



USE OR DISCLOSURE OF DATA CONTAINED ON THIS SHEET IS SUBJECT TO THE RESTRICTION ON THE NOTICE PAGE OF THIS PROPOSAL.

Large Spill:

Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage:

Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 350 STEL: 440 CEIL: 440 (ppm) from ACGIH (TLV) [1995]

TWA: 1900 STEL: 2460 CEIL: 2300 (mg/m³) from ACGIH [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 133.41 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 74.1°C (165.4°F)

Melting Point: -32.5°C (-26.5°F)

Critical Temperature: Not available.

Specific Gravity: 1.3376 (Water = 1)



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Vapor Pressure: 100 mm of Hg (@ 20°C)

Vapor Density: 4.6 (Air = 1)

Volatility: Not available.

Odor Threshold: 400 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 6000 mg/kg [Mouse].
Acute dermal toxicity (LD50): 15800 mg/kg [Rabbit].
Acute toxicity of the vapor (LC50): 18000 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: The substance is toxic to lungs, the nervous system, liver, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion.
Hazardous in case of skin contact (irritant, permeator), of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Detected in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information



USE OR DISCLOSURE OF DATA CONTAINED ON THIS SHEET IS SUBJECT TO THE RESTRICTION ON THE NOTICE PAGE OF THIS PROPOSAL.

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : 1,1,1-Trichloroethane : UN2831 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: 1,1,1-Trichloroethane

Massachusetts RTK: 1,1,1-Trichloroethane

TSCA 8(b) inventory: 1,1,1-Trichloroethane

SARA 313 toxic chemical notification and release reporting: 1,1,1-Trichloroethane

CERCLA: Hazardous substances.: 1,1,1-Trichloroethane

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

DSCL (EEC):

R38- Irritating to skin.

R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.

Lab coat.

Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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ATTACHMENT C***Standard Operating Procedures (SOPs)***

List of NEIE Safety Standard Operating Procedures

SOP Number	Title	Revision	Date
HS -001	Injury and Illness Prevention Program	01	2/09
HS-002	Codes of Safe Work Practices	01	2/09
HS-003	Responsibilities of Safety Officer	01	2/09
HS-004	Medical Program	01	2/09
HS-005	Biological Hazards	01	2/09
HS-008	Safety Training	01	2/09
HS-009	Drug and Alcohol Free Workplace	01	2/09
HS-010	Workplace Violence Prevention Plan	01	2/09
HS -011	Fire Safety	01	11/08
HS-011A	Hot Work	01	2/09
HS-012	Electrical Safety	01	11/08
HS-012A	Lockout/Tagout Procedures	01	2/09
HS-013	Chemical Safety	01	11/08
HS-013A	Chemical Labeling	01	11/08
HS-013B	Chemical Storage	02	2/09
HS-014	Hazard Communication	02	2/09
HS-015	Emergencies	01	11/08
HS-016	Protective Equipment	02	2/09
HS-017	Respiratory Protection Program Plan	02	2/09
HS-018	Noise/Hearing Conservation	02	2/09
HS-019	Tools	01	11/08
HS-020	Ladder and Scaffolds	01	11/08
HS-021	Mechanical Guarding	01	11/08
HS-022	Material Handling	01	11/08
HS-023	Concrete and Masonry Construction	01	11/08
HS-024	Fall Protection	02	02/09
HS-024A	Fall Protection Systems Criteria and Practices	01	02/09
HS-024B	Fall Protection Training Requirements	01	11/08
HS-025	Scaffolds	01	11/08
HS-026	Tool Box Talks	01	11/08
HS-027	Environmental Safety	01	11/08
HS-027A	Heat Stress	01	11/08
HS-02B	Cold Stress	01	11/08
HS-027C	Animals and Wildlife	01	11/08
HS-028	Confined Space	01	11/08
HS-029	Hazard Sign/Warnings	01	11/08
HS-030	Traffic and Transportation	01	11/08
HS-031	Motor Vehicle Operations	01	11/08
HS-032	Barricades & Access Control	01	11/08
HS-033	Excavation & Trenching	01	11/08
HS-034	Compaction Equipment	01	11/08
HS-035	Rock Crushing and Drilling	01	11/08

USE OR DISCLOSURE OF DATA CONTAINED ON THIS SHEET IS SUBJECT TO THE RESTRICTION ON THE NOTICE PAGE OF THIS PROPOSAL.



SOP Number	Title	Revision	Date
HS-036	Hazardous Spill Prevention Control and Countermeasures Program	01	11/08
HS-037	Emergency Plan for Hazardous Spills	01	11/08
HS-038	Process Safety Management Compliance	01	11/08
HS-039	Working Over or Near Water	01	11/08
HS-039A	Safe Boat Operations	02	2/09
HS-040	Sanitation	01	11/08

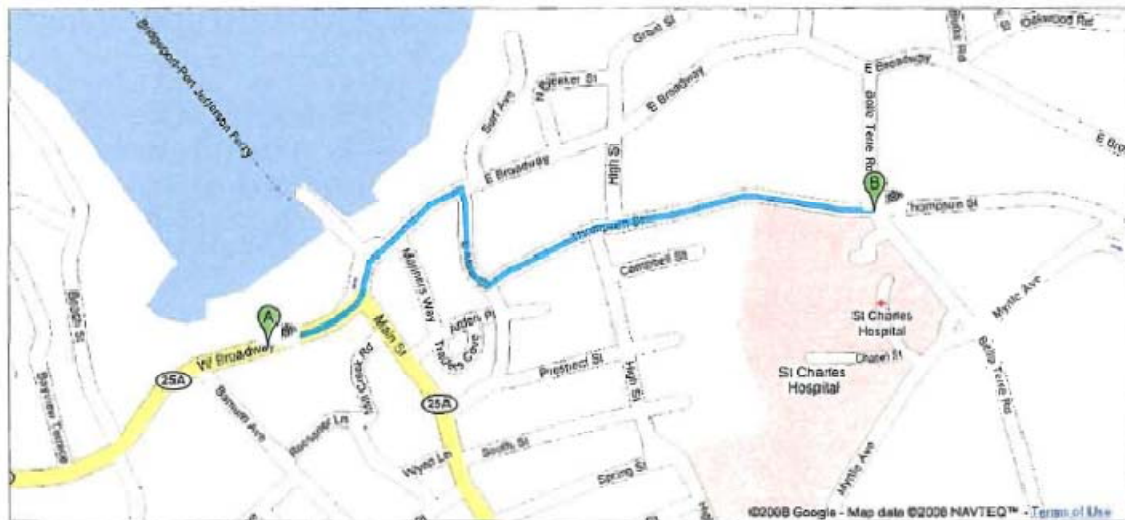
ATTACHMENT D***Route to the Hospital***

Hospital Map and Directions



Start **Port Jefferson, NY**
End **Saint Charles Hospital**
200 Belle Terre Road, Port Jefferson, NY 11777

Travel **0.7 mi – about 2 mins**



Port Jefferson, NY

Drive: 0.7 mi – about 2 mins

1. Head **east** on **W Broadway/RT-25A** toward **Main St/RT-25A** 0.2 mi
Continue to follow W Broadway
- ➔ 2. Turn **right** at **E Main St** 0.1 mi
- ➔ 3. Turn **left** at **Thompson St** 0.4 mi
1 min



Saint Charles Hospital
200 Belle Terre Road, Port Jefferson, NY 11777

These directions are for planning purposes only. You may find that construction projects, traffic, or other events may cause road conditions to differ from the map results.

Map data ©2008 NAVTEQ™

ATTACHMENT E***Emergency Telephone Numbers***

Emergency Telephone Numbers

Emergency Telephone Numbers	
Police Department	911
Fire Department	911
Ambulance	911
Hospital	(631) 474-6000
Poison Control	(800) 424-9300
Chemical Transportation Emergency Center	(800) 424-9300
National Response Center	(800) 424-8802
ERRS PM – T. Sumner	(508) 341-5628 (cell)
VP Operations – C. Coleson	(508) 962-2582 (cell)
Response Manager (RM) – T. Williams	(908) 202-4842 (cell)