



Health and Safety Plan

Former Chemoil Refinery
2020 Walnut Avenue
Signal Hill, CA

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SITE-SPECIFIC HEALTH AND SAFETY PLAN

The following Health and Safety Plan (HASP) has been developed for use by all contractors and subcontractors performing work on the former Chemoil site (Site) in relation to Site redevelopment. All Site personnel must adhere to the practices and procedures specified in the Site HASP. This HASP is intended for above ground site work and work in excavations that do not require respiratory protection for vapor concentrations. Field monitoring is required during excavation work to confirm any requirements for Level C respiratory protection. In addition, the HASP will need to be revised should field measurements of vapor concentrations in worker breathing zones exceed Level C full-facepiece negative pressure respirator assigned protection factors (OSHA Publication No. 3352-02). Each contractor and their subcontractors must review the Site HASP and agree to accept and abide by the Site HASP. Each individual contractor working on the Site will be required to prepare their own HASP (Contractor HASP), which identifies specific hazards and safety requirements that are pertinent to their individual work scopes. Individual Contractor HASPs must be at least as stringent as all of the health and safety requirements outlined within this Site HASP and must comply with all Federal and State health and safety regulations that apply to their work.

All contractors, subcontractors, and their employees shall indicate acceptance of this Site HASP by signing this document prior to commencing work at the Site. However, if any contractor commences work at the Site without indicating acceptance, the contractor shall be deemed to have accepted the HASP and the terms herein and the failure to execute and return a copy of this notice shall not be relevant to such interpretation. This HASP is intended to comply with the California Division of Occupational Safety and Health (Cal-OSHA) regulation governing Hazardous Waste Operations and Emergency response, found in CCR Title 8, Section 5192.

HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT

This form is to be signed by all contractor personnel, subcontractor personnel, and client representatives who will be present during Site work. This Health and Safety Plan (HASP) Acknowledgement must be signed prior to the person commencing work at the project Site.

By placing my signature below, I certify the following:

- I have read the HASP;
- I fully understand its requirements and will comply;
- I will not endanger myself or others by performing unsafe acts;
- Any questions concerning the HASP have been answered;
- I have the certifications and training required;
- I will follow all safety directives set forth in the Plan and/or dictated by the Site Superintendent, the Field Safety Officer (FSO), or his/her designee as long as I am present at this Site.

Personnel also understand that on a daily basis, mandatory tailgate safety meetings will be held prior to starting the day's activities and attended by all on-site project personnel. Project personnel also acknowledge that they agree to perform all activities in a safe manner in accordance with the HASP. The purpose of the safety meetings is to discuss potential hazards, control measures and other pertinent information needed for communicating potential project hazards of activities at the Site.

Printed Name	Signature	Company	Date

Printed Name	Signature	Company	Date

EXECUTIVE SUMMARY

This Site Health and Safety Plan (Site HASP) describes the minimum safety procedures that must be followed during project activities related to property redevelopment of the Former Chemoil Refinery at 2020 Walnut Avenue in Signal Hill (the Site). In addition to the typical hazards that are present during most field work (e.g., slip, trip, and fall hazards, hazards due to heat or cold stress, inclement weather, insect and poisonous plant hazards, and hazards associated with operating a motor vehicle), the following is a summary of potential hazards that are specific to this Site and to the work being conducted:

Main Site Hazards (check all applicable boxes)

<input checked="" type="checkbox"/> Slip/Trip/Fall	<input checked="" type="checkbox"/> Cold Stress	<input checked="" type="checkbox"/> Heat Stress	<input checked="" type="checkbox"/> Extreme Weather
<input checked="" type="checkbox"/> Biological	<input checked="" type="checkbox"/> Organic/Inorganic Chemicals	<input checked="" type="checkbox"/> High Noise	<input checked="" type="checkbox"/> Construction Traffic
<input checked="" type="checkbox"/> Vehicular Traffic	<input checked="" type="checkbox"/> Respirable Particles	<input checked="" type="checkbox"/> Excavations	<input checked="" type="checkbox"/> Buried/Overhead Utilities
<input type="checkbox"/> Non-Ionizing Radiation	<input checked="" type="checkbox"/> Security	<input type="checkbox"/> ASTs/USTs	<input type="checkbox"/> Man lift/Cherry Picker Use
<input type="checkbox"/> Work Over 6' High*	<input checked="" type="checkbox"/> Hand/Portable Power Tools	<input type="checkbox"/> Oxygen Deficiency	<input checked="" type="checkbox"/> Construction
<input type="checkbox"/> Blasting Agents	<input checked="" type="checkbox"/> Confined Spaces	<input type="checkbox"/> Welding or Hot Work	<input type="checkbox"/> Chemical Mixing**
<input type="checkbox"/> Lockout/Tag out	<input checked="" type="checkbox"/> Forklift Use	<input type="checkbox"/> Other (<i>specify</i>)	
<input type="checkbox"/> Scaffold Use	<input type="checkbox"/> Portable Ladders	<input type="checkbox"/> Other (<i>specify</i>)	

The following work practices must be observed during Site activities:

- Avoid contact with debris of unknown origins.
- Do not smoke outside of designated smoking areas or in vehicles/machinery or when refueling a vehicle or heavy equipment. Also, do not smoke until your hands have been washed.
- Wear appropriate personal protective equipment (PPE); gloves, ear plugs, etc., in specified areas and during specified tasks as defined in this HASP and task-specific job safety analyses (JSAs).
- Practice hazardous material avoidance – potentially contaminated soil and liquid should be handled in such a manner as to minimize contact with the material.
- Only persons directly involved with the construction activities will be permitted to enter the Exclusion Zone around the heavy equipment.
- All personnel must make confirmed eye contact with heavy equipment operators before entering the danger area of any piece of equipment. The danger area is all areas where the equipment can reach while operating or in the path of travel when moving
- When operating heavy equipment, stop work when people are nearby.

- Use caution when operating heavy equipment to avoid injury to you, other workers, and to avoid damage to the equipment or nearby objects.
- Notify staff when dust control or vapor suppression measures are needed.
- Report accidents, near misses, or potentially unsafe work practices immediately to the Site Superintendent or FSO.
- You are expected to stop any unsafe job, task, or activity that may be an imminent danger to personnel, equipment, or property.
- Observe fellow Site workers for signs of heat or cold stress, illness, or other signs of distress and notify the Site Superintendent or FSO immediately when any such condition is suspected.
- Do not engage in horseplay at any time.
- Maintain a drug- and alcohol-free work environment at all times.
- Demand that people on Site follow these safety rules regardless of who they work for, their experience, or purpose for being on the Site.
- Escort individuals who are not familiar with the Site HASP to the office trailer or back to their vehicle.
- Check for live currents before beginning any electrical work, but after you have completed appropriate lockout-tag out procedures.
- Each individual is directly responsible for maintaining sanitary conditions. Ensure all trash generated is properly disposed of, do not allow food to be left out or spilled onto the ground. Clean up your area after you eat including table wipe down.
- Do not allow anyone other than HAZWOPER-trained Site workers to come into contact with impacted soils, or to remove soils from the Site for any reason.

1.0 PROJECT AND SITE INFORMATION

1.1 SITE NAME AND ADDRESS

Former Chemoil Refinery
2020 Walnut Avenue, Signal Hill, CA

1.2 SITE DESCRIPTION

The property known as the former Chemoil Refinery is located at 2020 Walnut Avenue in Signal Hill, California (Site) (Figure 1, Appendix A). The Site was developed as an oil refinery in 1922. The MacMillan-Ring Free Oil Company owned and operated the facility from 1922 until 1988. Chemoil Corporation purchased the refinery in August 1988 and operated it until February 1994. From early 1994 to early 1997, the refinery was shut down with occasional operation of its waste water system. Operation of the waste water system was discontinued and all of the above ground structures were dismantled in early 1997. It has been reported that all known below ground structures, including piping, sumps, footings, and foundations, were also removed at that time. The current property owner of title is Signal Hill XC, LLC.

The Site is approximately 8.2 acres, located north of the intersection of East 20th Street, East Wesley Drive, Walnut Avenue, and Alamos Avenue. The Site is divided into an Eastern Parcel, situated immediately east of Walnut Avenue and a Western Parcel, situated immediately west of Walnut Avenue (Figure 2, Appendix A). The Eastern Parcel encompasses approximately 2.4 acres and the Western Parcel encompasses approximately 5.8 acres. Historically, the Western Parcel has been divided into sub-parcels, with a northern sub-parcel (north of E 21st Street) and a southern sub-parcel (south of E 21st Street). The division of the Site into the above-indicated parcels is shown on Figure 2.

The refinery and supporting structures were dismantled early 1997. The northern sub-parcel of the Western Parcel is a rectangular-shaped parcel and was formerly occupied by approximately 40 above ground storage tanks (AST), truck loading racks, and support structures such as warehouses. The southern sub-parcel of the Western Parcel is triangular in shape and was formerly occupied by approximately 25 ASTs, boilers, heater units, loading racks, and a cooling tower. The Eastern Parcel, which is somewhat rectangular in shape, with the exception of its southern perimeter was formerly occupied by six ASTs as well as support structures (warehouse, offices, laboratory, and maintenance facilities). The oldest active area of the Site lies within the southern sub-parcel of the Western Parcel, where crude oil processing related activities took place. Currently the Site is vacant and does not contain any above ground storage tanks or known underground storage tanks (UST).

1.3 GENERAL PROJECT INFORMATION

This Health and Safety Plan (HASP) has been developed to establish the health and safety procedures required to minimize potential hazards to personnel who will be performing the work or involved in field monitoring and assistance during construction activities at the Former Chemoil Refinery at 2020 Walnut Avenue in Signal Hill. A map of the Site and a Hospital Map are provided in Appendix A. To date, Site investigations have indicated

total petroleum hydrocarbons (TPH) and petroleum-related volatile organic compounds (VOCs) are the primary contaminants of concern.

Site grading and excavation activities will be performed by Xebec Development and their subcontractors. Field monitoring and soil characterization sampling, as necessary, will be performed by a qualified environmental consultant. In addition, some Site investigation activities involving on-going environmental remediation may be done concurrently. These activities may include soil borings with a drill rig, monitoring or vapor well installations, well destruction, etc. performed by the environmental consultant and their subcontractors. A brief description of the anticipated project tasks is presented below.

- 1) Mobilization/Demobilization
- 2) Utility Location
- 3) Site grading and excavation
- 4) Soil boring, hydropunch, monitoring well, cone penetrometer, and soil vapor well installation and sampling
- 5) Groundwater monitoring
- 6) Installation of site wide soil vapor remediation system
- 7) Well destruction
- 8) Stockpile construction and management
- 9) Contaminated soil loading and truck transport operations
- 10) Trenching and new utility installation
- 11) Traffic control
- 12) Dust and organic vapor monitoring and suppression

2.0 KEY PROJECT PERSONNEL AND RESPONSIBILITIES

Table 2-1 includes the roles, names, contact information, and responsibilities of Apex personnel, Apex subcontractors, and other individuals associated with the health and safety leadership of this project. This page must be posted on-site.

TABLE 2-1: Key Project Health & Safety Personnel

<i>Role</i>	<i>Person</i>	<i>Contact Information</i>	<i>Responsibilities</i>
Operations Manager (OM)	R/E Solutions - TBD	Office: Cell:	Final authority in approving the HASP and ensuring that the project team is supplied with the training, equipment and materials necessary for a safe work environment.
Site Superintendent	Xebec - TBD	Office: Cell:	Final authority in daily field operations, including daily work tasks, schedules, and health and safety oversight.
Field Safety Officer (FSO)	Xebec - TBD	Office: Cell:	Implementing HASP on a day-to-day basis. Determine the effectiveness of the decontamination procedures. Recognize significant health and safety (H&S) hazards and utilize STOP WORK authority when appropriate.
Client Contact	Steve Christie	Office: 562-284-5005 Cell: 213-378-7697	--
Local First Responders	Fire and police	911	--
Local Hospital (Appendix A)	Long Beach Memorial Hospital	562-933-2000	--

3.0 EMPLOYEE TRAINING AND MEDICAL SURVEILLANCE REQUIREMENTS

Contractor personnel working on-site (including their on-site supervisors) who may be exposed to hazardous substances, health hazards, or safety hazards will not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility and medically qualified to perform the work. In addition to specified general training, all personnel performing activities at the Site shall receive training specific to the chemicals known to be present in subsurface areas in accordance with California Code of Regulations (CCR) Title 8, Section 5192, the Hazard Communication Standard. The Site Superintendent will work closely with the on-site construction managers and FSO to ensure safety precautions are followed during all construction activities. All Site workers will conform to their individual company's Injury and Illness Prevention Plans (IIPPs), in accordance with CCR Title 8, Section 3203, as well as the mandated safety practices outlined within this Site HASP and their specific Contractor HASPs. Prior to mobilization, all Site workers are required to have the following training and medical surveillance [Check all that apply]:

TABLE 3-1: Training and Medical Surveillance Requirements

	Req	Rec	NA			Req	Rec	NA
40-Hour HAZWOPER (1)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Respiratory Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Current 8-Hour HAZWOPER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Medical Clearance (fit for duty)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8-Hour HAZWOPER Supervisor	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(2)	Respirator Clearance/Fit Test	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24-Hour HAZWOPER	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Blood Lead and ZPP (3)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Current CPR and First Aid	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Hazardous Materials Awareness Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10-Hour Construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Personal Protective Equipment training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Competent person training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(4)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Confined Space Entry/Rescue	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fall Protection Training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The FSO or Site Superintendent will verify that Site personnel have received all appropriate training as required by this HASP prior to their arriving on-site by reviewing written training documentation. Copies of the written training documentation will be retained in the project file on-site. Contractor personnel will not be allowed to work at the site unless said training documentation has been provided.

Notes:

- (1) HAZWOPER = Hazardous Waste Operations and Emergency Response
- (2) Supervisor personnel only.
- (3) ZPP = zinc protoporphyrin
- (4) At least 1 person on site each shift.

4.0 FIELD ACTIVITIES

4.1 MAJOR PROJECT TASKS

Major tasks to be performed by on-site contractors and subcontractors, which have the potential to expose workers to impacted Site media or physical construction hazards, include the following:

- Mobilization/Demobilization;
- Utility Location;
- Site grading and excavation;
- Soil boring, monitoring well and soil vapor well installation, cone penetrometer testing;
- Soil, groundwater, and soil vapor sampling
- Groundwater monitoring;
- Installation of Site-wide soil vapor remediation system;
- Well destruction;
- Stockpile construction and management;
- Contaminated soil loading and truck transport operations;
- Trenching and new utility installation;
- Dust and organic vapor monitoring and suppression;
- Traffic control.

All of the tasks outlined above will fall under the requirements of this Site HASP. In addition, each individual contractor working on the Site will be required to prepare and follow their own HASP (Contractor HASP) which identifies specific hazards and safety requirements that are pertinent to their individual work scope. In addition, each individual contractor working on the Site will be required to prepare their own HASP (Contractor HASP), which identifies specific hazards and safety requirements that are pertinent to their individual work scopes. Individual Contractor HASPs must be at least as stringent as all of the health and safety requirements outlined within this Site HASP and must comply with all Federal and State health and safety regulations that apply to their work. Safe Work Practices (SWPs) or Job Safety Analyses (JSAs) will be prepared by each individual contractor for their specific construction task. Contractors will be required to submit their Contractor HASPs to the project Operations Manager. The Operations Manager aided by the Site Superintendent and/or FSO will review and approve all Contractor HASPs, including required SWPs and/or JSAs specific to each contractor's specific scope of work. Contractor HASPs must additionally comply with Cal OSHA safe work practices.

4.2 SITE PERSONNEL JOB TASKS & CERTIFICATION REQUIREMENTS

Workers with the following job descriptions will be engaged in activities conducted at the Site:

Technical/Field Personnel – This group includes qualified personnel serving in various supervisory functions ranging from management and direction to inspection of soils and other applicable potential safety hazards regarding the work being performed and the technical knowledge and experience to remove the hazards prior to field activities beginning or continuing.

Laborers – Field laborers will be utilized during completion of all work activities. In addition to providing assistance where needed for those activities listed in Section 4.1, other work duties will include, but are not limited to, general site and equipment upkeep and maintenance.

Laborer activities will be rotated throughout the day to reduce ergonomic incidents and will be performed approximately eight hours per working day.

Site Visitors - Visitors to the Site will be considered in the HASP as technical personnel listed above. Site visitors must follow all health and safety requirements, including donning personal protective equipment required in this document. Site visitors must have an escort to enter locations other than the support zone.

4.3 PERSONNEL AND SUBCONTRACTORS ONSITE

4.3.1 RESPONSIBILITIES OF ON-SITE PERSONNEL

At a minimum, the Site Superintendent, FSO, and laborers will be necessary to complete the majority of project tasks. Key personnel are listed in Table 2-1 in Section 2. A general description of key field personnel responsibilities is listed below.

4.3.1.1 Field Safety Officer

The responsibilities of the FSO include the following:

- Supervising environmental monitoring, evaluating on-site conditions (e.g., weather and chemical hazard information) and implementing the HASP and any modifications to it with concurrence from the OM.
- Ensuring the overall health and safety of Site workers by making them aware of potential hazards and the provisions of the contractors' HASP, as well as ensuring they are familiar with all Site-specific emergency procedures.
- Implementing dust and fugitive vapor monitoring.
- Ensuring that all contractors supply to their workers the proper PPE and that the workers are properly trained in the use of the PPE.
- Stopping work and directing the evacuation of the work site when unacceptable health or safety risks exist or as outlined in this HASP.
- Being on-site during construction activities to ensure daily compliance with Site health and safety requirements.
- Evaluating the efficacy of the onsite decontamination procedures
- Conducting Tailgate Safety Meetings or assigning personnel to conduct them.
- Conducting Site inspections at the project Site (see the Site Inspection Form in Appendix D.
- Providing overall supervisory control for health and safety protocols in effect for the project.
- Monitoring and maintaining control of staff health and safety training.
- Evaluating on-site conditions.
- Providing an initial health and safety orientation to Site workers and visitors.
- Establishing and ensuring compliance with Site control areas and procedures.
- Preparing incident reports, as necessary.
- Reviewing training and medical records prior to Site work.
- Supervising decontamination of personnel and equipment when needed.
- Supervising distribution, proper use, maintenance and disposal of personal protective equipment (PPE).
- Maintaining health and safety records on-site.

- Coordinating the protection of the surrounding community from potential hazards associated with project activities.

4.3.1.2 Site Superintendent

The safety responsibilities of the Site Superintendent include the following (if applicable):

- Scheduling of daily field tasks.
- Communicating daily field tasks to on-site contractors during the daily tail gate meeting.
- Providing appropriate resources to the FSO to allow implementation of this Site HASP.
- Emergency action and spill response coordination/reporting.

4.3.1.3 Operations Manager

The safety responsibilities of the Operations Manager include the following (if applicable):

- Review and approval of the HASP.
- Periodically reviewing Site Inspection checklists and Tailgate Safety Meeting Forms.
- Reviewing training and medical records prior to Site work.
- Reviewing and documenting personal and ambient air monitoring.
- Performing periodic field audits to verify H&S implementation during Site work.
- Maintaining project files with training and medical information in the office for the duration of the project.

4.3.1.4 Field Laborers

The responsibilities of the Laborers include the following (if applicable):

- Conducting field activities involving:
 - § Operation of heavy equipment, power and hand tools.
 - § Site grading and excavation.
 - § Loading and stockpiling soils.
 - § Site development and construction activities.
 - § Other miscellaneous tasks.

5.0 HAZARD IDENTIFICATION AND CONTROL

5.1 JOB SAFETY ANALYSES

Prior to initiating any new project activity, or when there is a change in Site conditions, the FSO will review contractors' task-specific JSA and assist contractors with completing JSAs, if necessary. Contractors are required to prepare and submit JSAs for their task activities to be reviewed by the Operations Manager with assistance from the FSO. The JSA will list the hazards associated with the project activity as well as associated control strategies. JSAs for some of the tasks listed in Section 4.1 are located in Appendix B.

5.2 SITE INSPECTIONS

The FSO or designee will inspect the job Site at the initiation of the project and at least weekly thereafter using the Site Inspection Checklist in Appendix D as a guide. Completed checklists will be retained in the Site safety file. FSO project files will also be inspected to determine if appropriate documentation has been filed.

5.3 STOP WORK AUTHORITY

All Site personnel have the authority, without fear of reprimand or retaliation to:

- Immediately stop any work activity that presents a danger to the Site team or the public; and
- Get involved, question and rectify any situation or work activity that is identified as not being in compliance with this Site HASP or with Contractor-specific HASPs.

It is the duty and right of all Site workers to exercise their "Stop Work Authority" whenever Site workers, members of the public or the local environment are at risk. This means that all Site workers are expected to stop an activity in the event of an unsafe condition or an unsafe act with no fear of repercussions. The "stop work/pause work" may include discussion with other workers, subcontractors or management or the FSO to resolve work related issues, address potential unsafe conditions, and/or clarify work instructions, etc.

Site managers have a responsibility to support all "stop work/pause work" intervention implemented by Site workers. Management shall support and assist in resolving issues resulting from an employee's "stop work/pause work" concerns and ensure no actions are taken as retribution against anyone that raises safety concerns to stop an activity they believe is unsafe.

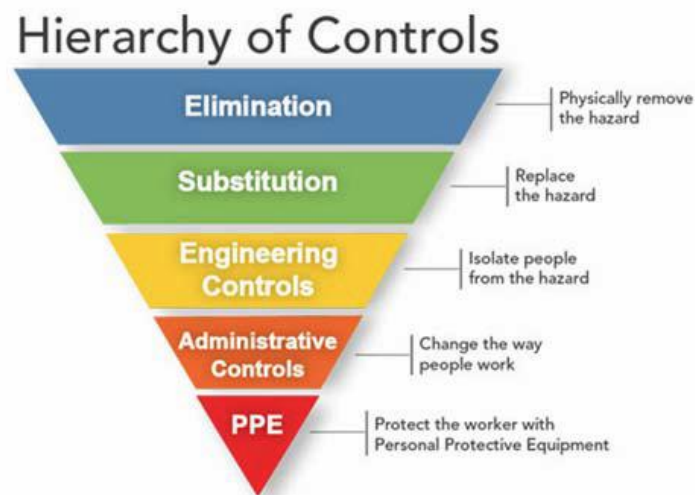
5.4 SITE CONTROL MEASURES

The Site control strategy is based on the hierarchy of controls, published by The National Institute for Occupational Safety and Health (NIOSH), regarding controlling exposures to occupational hazards. The Hierarchy of Controls incorporates approaches that address both controlling the release of contaminants to the environment, and the protection of workers. Detailed, Site-specific engineering, administrative, and PPE controls for the former Chemoil Site are provided in this Site HASP.

Elimination and Substitution Controls: In general, the most effective method of protecting potential human receptors, including the construction worker, are ones that eliminate or substitute the hazard. The elimination/substitution approach, as it relates to the construction worker exposure to soil, has been addressed to the greatest extent possible through the design of both the grading plan and geotechnical work.

Engineering Controls: Engineering controls are favored over administrative and personal protective equipment (PPE) for controlling worker exposures because they are designed to remove the hazard at the source before it comes in contact with the worker. Engineering controls including vapor suppression and dust control will be part of the Site control strategy for protecting the construction worker.

Administrative and PPE Controls: The potential hazards related to construction worker exposure to soil during property redevelopment cannot be completely eliminated by the top three tiers of site control shown in the hierarchy triangle. Consequently, administrative and PPE controls, including utilizing 40-hour OSHA-trained construction workers, preparation and implementation of a site-specific Health and Safety Plan, air monitoring, and PPE will be utilized to protect workers. This approach is typical in the industry for the protection of construction workers at sites similar to the former Chemoil property.



6.0 PHYSICAL HAZARDS

Physical hazards are present on all project sites. Those checked below have been identified as potentially present at the project Site. These hazards must be mitigated or controlled. The means to control the hazards are identified in the JSAs and SWPs developed for the specific tasks to be performed.

TABLE 6-1: Main Site Hazards

<input checked="" type="checkbox"/> Slip/Trip/Fall	<input checked="" type="checkbox"/> Cold Stress	<input checked="" type="checkbox"/> Heat Stress
<input checked="" type="checkbox"/> Biological	<input checked="" type="checkbox"/> Organic/Inorganic Chemicals	<input checked="" type="checkbox"/> High Noise
<input checked="" type="checkbox"/> Vehicular Traffic	<input checked="" type="checkbox"/> Respirable Particles	<input checked="" type="checkbox"/> Excavations
<input type="checkbox"/> Non-Ionizing Radiation	<input checked="" type="checkbox"/> Security	<input type="checkbox"/> ASTs/USTs
<input type="checkbox"/> Work Over 6' High	<input checked="" type="checkbox"/> Hand/Portable Power Tools	<input type="checkbox"/> Oxygen Deficiency
<input type="checkbox"/> Blasting Agents	<input type="checkbox"/> Confined Spaces*	<input type="checkbox"/> Welding or Hot Work*
<input type="checkbox"/> Lockout/Tagout*	<input checked="" type="checkbox"/> Forklift Use	<input checked="" type="checkbox"/> Other: Heavy Equipment Operation
<input type="checkbox"/> Scaffold Use*	<input type="checkbox"/> Portable Ladders	<input type="checkbox"/> Other
<input checked="" type="checkbox"/> Extreme Weather	<input type="checkbox"/> Manlift/Cherry Picker Use	<input type="checkbox"/> Other
<input checked="" type="checkbox"/> Construction Traffic	<input checked="" type="checkbox"/> Construction	<input type="checkbox"/> Other
<input checked="" type="checkbox"/> Buried/Overhead Utilities	<input type="checkbox"/> Chemical Mixing	<input type="checkbox"/> Other

Ensure the appropriate programs are implemented, permits prepared and all documentation is completed and maintained for those site hazards identified with an asterisk (*).

7.0 CHEMICAL HAZARDS

Chemicals may be introduced into the body by ingestion, inhalation, or absorption through the skin. Since not all chemicals have the same level of toxicity, the length of time for the exposure and the concentration of the chemical are important in determining the risk. Inhalation and skin contact are the most common routes of entry. Chemicals can be introduced into the body by ingestion when chemicals present on the hands are transferred to food or cigarettes.

Based on historical soil and groundwater sampling, the following constituents of concern identified in Table 7-1 may be encountered at the Site. Universal Chemical Safety Data Cards (SDS) for the constituents of concern are located in Appendix F.

It should be noted that, while lead was reported to be present in soils, exposure to personnel is not expected to exceed the current action level of 30 micrograms per cubic meter of air. All personnel performing Site tasks shall receive training in general compliance with the Cal-OSHA lead in construction standard, CCR Title 8, Section 1532.1.

TABLE 7-1: Constituents of Concern

<input type="checkbox"/> Friable asbestos	<input type="checkbox"/> Vinyl chloride	<input checked="" type="checkbox"/> Toluene
<input type="checkbox"/> RCRA metals	<input type="checkbox"/> Inorganic arsenic	<input checked="" type="checkbox"/> Ethylbenzene
<input checked="" type="checkbox"/> Lead	<input type="checkbox"/> Cadmium	<input checked="" type="checkbox"/> Xylene
<input checked="" type="checkbox"/> Benzene	<input type="checkbox"/> Formaldehyde	<input checked="" type="checkbox"/> Polyaromatic hydrocarbons (PAHs)
<input type="checkbox"/> Trichloroethylene (TCE)	<input checked="" type="checkbox"/> Fuel oils	<input type="checkbox"/> Polychlorinated biphenyl (PCBs)
<input type="checkbox"/> Tetrachloroethylene (PCE)	<input type="checkbox"/> Methylene chloride	<input type="checkbox"/> Chromium (VI)
<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input checked="" type="checkbox"/> Other: Methyl tert-butyl ether (MTBE)
<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Other
<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Other

Table 7-2 identifies chemicals that may be used by contractors at the Site as part of the project. The SDSs for these chemicals are located in Appendix F.

TABLE 7-2: Chemicals Used for Project Execution

<input checked="" type="checkbox"/> Alconox or Liquinox	<input type="checkbox"/> Calibration gas (Methane)	<input type="checkbox"/> Isopropyl alcohol
<input checked="" type="checkbox"/> Hydrochloric acid (HCl)*	<input checked="" type="checkbox"/> Calibration gas (Isobutylene)	<input type="checkbox"/> Household bleach (NaOCl)
<input checked="" type="checkbox"/> Nitric acid (HNO ₃)*	<input type="checkbox"/> Calibration gas (Pentane)	<input type="checkbox"/> Sulfuric acid (H ₂ SO ₄)*
<input checked="" type="checkbox"/> Sodium hydroxide (NaOH)*	<input checked="" type="checkbox"/> Calibration gas (4-gas mixture)	<input type="checkbox"/> Hexane
<input type="checkbox"/> Other (specify)	<input checked="" type="checkbox"/> Other: calibration gas (hexane)	<input checked="" type="checkbox"/> Other: Simple Green™
<input type="checkbox"/> Other (specify)	<input type="checkbox"/> Other (specify)	<input type="checkbox"/> Other (specify)

*NOTE: Eyewash solution shall be readily available on ALL projects where corrosive materials are used or stored, including sample preservatives.

TABLE 7-3: Exposure Data

Materials Present or Suspected at Site	Highest Reported Concentration (specify units and sample medium)	Exposure Limit (specify ppm or mg/m ³)	IDLH Level (specify ppm or mg/m ³)	Primary Hazards of the Material (explosive, flammable, corrosive, toxic, volatile, radioactive, biohazard, oxidizer, or other)	Symptoms and Effects of Acute Exposure	Ionization Potential (eV)
Total Petroleum Hydrocarbons – gasoline (TPHg)	Water: 40,200 ug/L; Soil: 19,000 mg/kg Soil Vapor: 85,000,000 ug/m ³	PEL = None REL = None TLV = None Skin Hazard ☒	None	Flammable, toxic	Irritation: eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid); possible liver, kidney damage; [potential occupational carcinogen]	--
Benzene	Water: 3,770 ug/L; Soil: 11,000 mg/kg; Soil vapor: 802,000 ug/m ³	PEL = 1 ppm REL = 0.1 ppm TLV = 0.5 ppm Skin Hazard ☒	500 ppm	Toxic, flammable	Irritation: eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]	9.24 eV
Methyl tert-butyl ether (MTBE)	Water: 160 ug/L; Soil: Not detected; Soil vapor: Not detected	PEL = None REL = None TLV = 50 ppm Skin Hazard ☒	None	Highly flammable	Drowsiness; dizziness; headache; weakness; unconsciousness; dry skin, redness; abdominal pain, nausea, vomiting; eye irritation	--
PEL = OSHA Permissible Exposure Limit REL = NIOSH Recommended Exposure Limit TLV = ACGIH Threshold Limit Value IDLH = Immediately Dangerous to Life or Health ug/L = microgram per liter ug/m ³ = micrograms per cubic meter of air mg/kg = milligram per kilogram mg/m ³ = milligram per cubic meter eV = electronvolt						

8.0 AIR MONITORING

8.1 AMBIENT AIR MONITORING

When there is a question of employee exposure to hazardous concentrations of substances to assure the proper selection of engineering controls, work practices, and PPE, ambient air monitoring will be conducted by the FSO as well as representatives from contractors and subcontractors. The monitoring will be conducted to ensure that no worker is exposed to chemicals above their respective exposure limits without the proper PPE. Ambient air monitoring results will be recorded in the project field documentation or the Ambient Air Monitoring Form or in the project file book. Additional monitoring should be conducted under any of the following circumstances.

- Work begins on a different portion of the Site;
- Change in job tasks;
- Change in weather;
- Change in ambient levels of hazardous constituents as indicated by the sense of smell or changes in the physical appearance of the soil or ground water;
- When there are visible dust emissions;
- When new hazardous substances are encountered;
- Soil excavation, soil loading, or other soil disturbing activities; and
- Third-party exposure considerations (i.e., perimeter air monitoring)

Table 8-1 will be consulted to determine appropriate instrumentation; action levels and relevant actions required to be performed by the field team if the action levels are exceeded. Respiratory protection is selected based on occupational exposure limits of the constituents at the site and the potential for exposure to vapors and dust from site activities.

Direct reading instrumentation will be calibrated daily per manufacturer's instructions. Cylinders of the appropriate calibration gas will be required for field work lasting longer than one day.

TABLE 8-1: Monitoring Equipment and Response Action

Monitoring Equipment: All monitoring equipment on site must be calibrated before and after each use and results recorded.				
Instrument (Check all required)	Task	Instrument Reading	Action Guideline	Comments
<input type="checkbox"/> Combustible gas indicator model:	<input type="checkbox"/> 1	0 to 10% LEL	Monitor; evacuate if confined space	
	<input type="checkbox"/> 2	10 to 25% LEL	Potential explosion hazard	
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4	>25% LEL	Explosion hazard; interrupt task; evacuate site	
	<input type="checkbox"/> 5			
<input type="checkbox"/> Oxygen meter model:	<input type="checkbox"/> 1	>23.5% Oxygen	Potential fire hazard; evacuate site	
	<input type="checkbox"/> 2	23.5 to 19.5% Oxygen	Oxygen level normal	
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4	<19.5% Oxygen	Oxygen deficiency; interrupt task; evacuate site	
	<input type="checkbox"/> 5			
<input checked="" type="checkbox"/> Photoionization detector model: <input type="checkbox"/> 11.7 eV <input checked="" type="checkbox"/> 10.6 eV <input type="checkbox"/> 10.2 eV <input type="checkbox"/> 9.8 eV	<input type="checkbox"/> 1	Any response above background to 5 ppm above background	Level D is acceptable	Action levels must be determined based on the COCs and concentrations identified in the media sampled. If no COC concentrations are known, then use 5 ppm sustained within the breathing zone as your action level until the contaminants are identified.
	<input type="checkbox"/> 2			
	<input type="checkbox"/> 3	5 ppm above background	Level C (not anticipated)	
	<input type="checkbox"/> 4	10 ppm above background	Discontinue work	
	<input type="checkbox"/> 5			
<input type="checkbox"/> Flame ionization detector model:	<input type="checkbox"/> 1	Any response above background to ppm above background	Level C is acceptable Level B is recommended	Action levels must be determined based on the COCs and concentrations identified in the media sampled. If no COC concentrations are known, then use 5 ppm sustained within the breathing zone as your action level until the contaminants are identified.
	<input type="checkbox"/> 2			
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			
<input type="checkbox"/> Detector tube models:	<input type="checkbox"/> 1	Specify:	Specify:	The action level for upgrading the level of protection is one-half of the contaminant's PEL. If the PEL is reached, evacuate the site and notify a safety specialist.
	<input type="checkbox"/> 2			
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			
<input checked="" type="checkbox"/> Other (specify): Dust monitor	<input type="checkbox"/> 1	Specify: 50 µg/M3 at perimeter fence	Specify: Increase dust control measures. If ineffective, discontinue work.	
	<input type="checkbox"/> 2			
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			

8.2 PERSONAL AIR MONITORING

It is not anticipated that personal air monitoring will be necessary for this project. However, it may be pertinent to conduct personal air monitoring by the FSO when there is a question of employee exposure to hazardous concentrations of substances to assure the proper selection of engineering controls, work practices, and PPE. Additional monitoring should be conducted under any of the following circumstances.

- Work begins on a different portion of the Site;
- Change in job tasks;
- The task method changes;
- Change in ambient levels of hazardous constituents as indicated by the sense of smell or changes in the physical appearance of the soil or groundwater;
- Make the monitoring routine (quarterly) based on Site activities;
- When there are visible dust emissions;
- When new hazardous substances are encountered; and
- During high-risk operations (e.g., drum opening, or handling of leaking drums, or when working in areas with obvious liquid contamination).

It may also be necessary to perform periodic personal air monitoring by the FSO depending on Site activities and possibilities for exposure; or if during ambient air monitoring, action levels in Table 8-1 are routinely exceeded.

8.3 PERSONAL PROTECTIVE EQUIPMENT

The level of PPE selected for a task is based on the following:

- Administrative and engineering controls currently in place;
- Potential physical hazards that may be encountered while completing the task;
- Type and measured concentration of the chemical substance(s) in the ambient atmosphere and its toxicity;
- Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to work being done; and
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be better identified. PPE required for the project is identified in Table 8-2. All PPE used at the Site shall be used in accordance to manufacturer specifications and in general compliance with CCR Title 8, Section 1514.

TABLE 8-2: Personal Protective Equipment

	Req	Rec	NA		Req	Rec	NA
Steel Toe Boots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outer Disposable Boots	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Safety Glasses Shields	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Indirect Vented Goggles	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Hi Vis Vest (Specify Class 2/3):	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Poly-Coated Tyvek	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hi Vis Shirt	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Dust Mask	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Hard Hat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Full-Face Respirator*	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Fire Resistant Clothing (FRC)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Half-Face Respirator with OV cartridge*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hearing Protection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inner Chemical Gloves	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Work Gloves – Type: Task Dependent, Use as needed	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other: Fabric coverall	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outer Chemical Gloves: Task Dependent, Use as needed	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tyvek Suit *	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TABLE 8-3: Personal Protection Equipment Requirements

PPE Level	Ensemble Components	Tasks Requiring Use
Level D Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.	<ul style="list-style-type: none"> Long pants and shirt with sleeves or coveralls. Safety-toed footwear. Safety glasses with molded side shields. Hard hat. General purpose work gloves if task does not involve water, wet materials or direct soil contact. Nitrile or latex gloves for tasks that involve water, wet materials, or direct contact with soil. Hearing protection. High visibility traffic vest. 	All Site activities. If mixing oxidant requires an air purifying respirator, see Level C PPE requirements.
Level C * Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.	Level D and the following: <ul style="list-style-type: none"> Air purifying respirator (APR) with combination organic vapor/high efficiency particulate air (HEPA) cartridges. Full face APR must be used in situations where the chemical exposure may affect all mucous membranes. Splash resistant Tyvek coveralls. Goggles and face shield (when half-face respirator is worn). 	If ambient air or personal monitoring indicates action levels of COC have been exceeded. Any other circumstance where engineering controls are not functioning properly or any other scenario where the FSO or PM agree that it's necessary to perform work safely.
Level B Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection is needed.	Not anticipated to be required	
Level A	Not authorized for this project	

PPE Level	Ensemble Components	Tasks Requiring Use
Should be worn when the highest level of respiratory, skin, and eye protection is needed.		

In addition to summarizing the general PPE requirements for tasks performed at the Site, Table 8-3 also serves as the written certification that the PPE Hazard Assessment has been conducted. The PPE requirements for each task must be identified in the JSAs and SWPs developed for the specific tasks to be performed.

8.4 RESPIRATORY PROTECTION

Respiratory protection is not anticipated to be necessary on this project, for activities involving limited, shallow disturbances of site soils. Airborne monitoring by direct read instrument shall be utilized continuously throughout the project in order to verify concentrations of known site contaminants. The type of respiratory protection required will be based on the results of ambient air and/or personal monitoring, the results of any models used to predict ambient air concentrations, and the professional judgment of either the FSO or the OM. Respiratory protection requirements are outlined in Table 8-1 and Table 8-3. If respiratory protection becomes necessary, all respirator usage shall be in compliance with the Cal-OSHA Respiratory Protection Standard, CCR Title 8, Section 5144.

9.0 SOIL HANDLING PROCEDURES

9.1 DESIGNATED AREAS

Contractors or personnel working at the Site should be aware that there may be locations with contaminants that exceed soil screening levels. The planned redevelopment has been divided into three (3) Designated Areas for the purpose of soil screening, segregation, analysis and re-use/disposal. The three Designated Areas are as follows:

- The East Parcel;
- The Northwest Parcel; and
- The Southwest Parcel.

Excavated soil from these areas shall not be combined with one another nor should soil be moved to a different area from its origin.

9.2 GENERAL SITE CONTROL AND SOIL HANDLING PROCEDURES

The following procedures shall be followed during all soil intrusive activities conducted during property redevelopment:

- Any stockpiled soil shall be covered with plastic sheeting or tarps and will not be stockpiled in or near storm drains;
- Specified areas shall be identified and used for stockpiling soil that does not pass field screening to minimize cross-contamination with clean soil;
- The access to the excavated areas shall be controlled to prevent unauthorized persons accessing exposed soil; and
- Access to the work zones where soil will be disturbed shall be controlled using caution tape, cones, fencing, steel plates, or other measures to clearly designate the active work area and to prevent access by the public.

9.3 DUST/VAPOR CONTROL MEASURES

As necessary, dust control measures shall be utilized during all excavation, soil segregation, soil stockpiling, transport, and compaction activities to prevent or control surface and air movement of dust from disturbed soil surfaces. As necessary, the following dust control measures shall be utilized:

- Exposed surface soils will be sprayed with potable water to suppress dust and vapor emissions;
- Should water spray be ineffective, areas where unacceptable vapors are observed will be sprayed with other vapor suppressing products including Simple Green™, a biodegradable soap or specially formulated vapor suppression products. Sufficient quantities of these materials and mixing/application equipment will be kept on-site for rapid use if field observations indicate they are necessary;
- Should water spray be ineffective for dust suppression, dust control palliatives will be applied;
- Soils that are excavated and stockpiled on-site will be covered with plastic sheeting to prevent vapor and dust emissions.

- All active construction activities within the Designated Areas shall be watered at least twice daily;
- All trucks hauling soil, sand, or other loose materials excavated from the Site shall be covered or shall maintain at least two feet of freeboard; and
- If visible soil material is carried onto adjacent public streets, the streets shall be swept with water sweepers as necessary to maintain them free of material.

9.4 DECONTAMINATION

Decontamination procedures shall be developed and followed to minimize the equipment contamination during excavation activities. The procedures should include removing loose soil from the vehicle exterior using dry methods, such as brushing, scraping or vacuuming. Soil not removed by dry methods should be cleaned by pressure washing or steam cleaning. Vehicles shall not leave the property before decontamination. See Section 12.0 for vehicle and personal decontamination procedures.

9.5 STORM WATER CONTROL

Storm water pollution controls shall be implemented to minimize sediment runoff in storm water, which could include soil containing contaminants of concern (COC). Procedures to prevent erosion and sediment runoff from the Site shall include grading the Site, installing storm water control devices (BMPs) such as temporary earth berms or erecting silt fences around the perimeter of exposed soil at the Site. Straw bale barriers or sediment traps are required to protect any existing catch basins or drainage channels.

9.6 FIELD SCREENING AND SOIL SEGREGATION

During any Site preparation activities, visual observation and field screening measurements will be conducted by the FSO. Initial field screening measurements and observations will be noted and documented on field forms consisting of the following:

- Odorous soil;
- Stained or discolored soil;
- Presence of free-phase petroleum product;
- Any encountered subsurface features; and
- Photoionization detector (PID) field screening readings, further detailed in the following section.

9.7 PID FIELD SCREENING METHODOLOGY

A PID or other organic vapor detecting device shall be present during grading and excavation activities. Field screening using a PID shall be conducted pursuant to South Coast Air Quality Management District (SCAQMD) Rule 1166 and shall be conducted continuously by the FSO during soil intrusive activities. PID field screening procedures are summarized as follows:

- The PID shall be calibrated daily, utilizing isobutylene gas or other equivalent method with prior approval from SCAQMD;

- The PID probe inlet should be placed no more than three inches from the surface of the excavated soil, and while slowly moving the probe across the soil surface, the instrument readout shall be observed; and
- The maximum meter reading shall be recorded at a minimum of every 15 minutes on a Rule 1166 Soil Monitoring Record.

9.8 TRIGGER LEVELS

The following trigger levels and associated actions will be implemented during intrusive fieldwork at the Site:

PID Measurement or Visual Condition	Required Mitigation Measures
Less than 50 parts per million by volume (ppmv) with no visual or odor indicators	<ul style="list-style-type: none"> • Stockpiled as Site soils for reuse.
Greater than 50 ppmv but less than 1,000 ppmv or less than 50 ppmv but with visual or odor indicators	<ul style="list-style-type: none"> • Affected work area and soil load sprayed with water and/or vapor suppressant; • Placed in segregated stockpiles, bins or drums for additional laboratory analysis; • Stockpiles covered with plastic sheeting and are secured so that no portion of the contaminated soil is exposed to the atmosphere. During handling of the stockpile, only the working face of the stockpile may be uncovered; and • May not be used as backfill for the Site without prior approval from SCAQMD and LARWQCB.
Greater than 1,000 ppmv	<ul style="list-style-type: none"> • SCAQMD notification within one hour of detection; • Affected work area and soil load sprayed with water and/or vapor suppressant; and • Soil immediately loaded into SCAQMD approved sealed containers or loaded in trucks for immediate offsite disposal, unless prior written approval from SCAQMD.

9.9 STOCKPILE MANAGEMENT AND SOIL REUSE/DISPOSAL REQUIREMENTS

In general, field observations (i.e., visual staining, strong odors, PID readings of greater than 50 ppmv) will serve as the first line of screening. Soil with PID readings of less than 50 ppmv will be segregated from contaminated soil and will be reused during redevelopment activities.

9.10 HANDLING OF CONTAMINATED SOIL

As mentioned previously, soil that is field screened and determined to contain greater than 1,000 ppmv when measured within three inches of the soil with a calibrated PID will be directly loaded into SCAQMD-approved sealed containers or loaded in trucks for offsite disposal, unless prior written approval from SCAQMD is received.

Soil that is field screened and determined to contain greater than 50 ppmv (but less than 1,000 ppmv) or appears impacted by visual/odor screening observations will be staged in stockpiles no greater than 1,000 cubic yards and will be characterized for offsite disposal or onsite treatment with prior approval from SCAQMD and LARWQCB. The stockpiles will be placed on plastic liner of 30-mil or greater. During construction, the piles will be lightly sprayed with water and covered with plastic sheeting of 10-mil or greater. Plastic sheeting will be secured with sandbags.

Soil that is planned for offsite disposal will be sampled in accordance with the receiving facilities' guidelines. Approximate sampling frequency is as follows:

- A minimum of one (1) 4-point composite sample will be collected from stockpiles of less than 100 cubic yards;
- Three (3) 4-point composite soil samples per 500 cubic yards in a stockpile containing up to 1,000 cubic yards; and
- Five (5) 4-point composite soil samples for the first 1,000 cubic yards and one (1) sample for each additional 500 cubic yards in a stockpile containing up to 5,000 cubic yards.

*It should be noted that the engineering controls stated throughout this section will be implemented while completing any soil excavation on Site in order to ensure that all workers (Apex employees, subcontractors, etc.) will be conducting work in a safe environment.

10.0 MEDICAL SUPPORT REQUIREMENTS

First aid supplies will be made available to all personnel on-site. A list of first aid supplies on-hand at the project Site include:

- A first aid and blood borne pathogen kit; and
- Emergency eyewash station/kits.

For the duration of the project, at least one individual currently certified to render emergency first aid and/or CPR will be present during all work activities. Additional medical surveillance will be provided for employees who are injured, become ill or develop signs or symptoms due to possible occupational exposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.

10.1 KEY EMERGENCY TELEPHONE NUMBERS

	LOCATION/NAME	PHONE	CELL PHONE
Police/Fire/Ambulance	--	911	--
Police Non-Emergency	2745 Walnut Avenue Signal Hill, CA 90755	562-989-7200	--
Fire Non-Emergency	1320 N. Eastern Ave Los Angeles, CA	323-881-2411	--
Hospital: Long Beach Memorial Hospital	2801 Atlantic Ave Long Beach, CA 90806	562-933-2000	--
Poison Control Center	--	1-800-876-4766	--
Operations Manager	R/E Solutions		
Site Superintendent	Xebec		
Field Safety Officer (FSO)	Xebec		
Spill Response Contractor	Patriot Environmental		
Local Governing Authority (DEP, EPA, USCG, etc.)	Los Angeles RWQCB (Region 4)	--	--

A Site to hospital map and directions are provided in Appendix A.

11.0 SITE INFRASTRUCTURE, CONTROL, AND GENERAL RULES

11.1 ADMINISTRATIVE CONTROLS

This Site HASP will be reviewed and followed by all personnel working at the Site. This Site HASP requires that all personnel performing soil disturbance activities are trained to work on contaminated sites and have, at a minimum, completed the 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training pursuant to CCR Title 8, Section 5192. HAZWOPER training is a health and safety standard enacted by Cal-OSHA specifically designed to train and educate workers to be safe while they perform work on contaminated sites. In addition to worker training requirements, the Site HASP includes a project hazard analysis, air monitoring requirements, trigger levels, and general health and safety requirements. As stated previously, this Site HASP stipulates the minimum health and safety requirement necessary for all Site workers. Contractor-specific HASPs will provide additional health and safety requirements for specific project tasks, which may include such activities as hot work, confined space entry, working at heights, etc. Contractor-specific health and safety requirements will be presented as JSAs or SWPs within their specific HASPs and will be reviewed and approved by the OM and FSO prior to allowing contractors to conduct work on site.

The property is currently surrounded with a chain link perimeter fence; this fence will be maintained through Site redevelopment activities with fence screening material added to reduce wind effects at the Site. Hand-held vapor analyzing devices (such as a photoionization detector [PID]) and dust monitors will be used to measure vapor and dust concentrations at both the worker breathing zones and at the fence perimeter. These devices provide real-time measurements of Site conditions. The organic vapor concentration limits for safe work conditions are defined in the HASP. Trigger levels to stop work until vapor concentrations decrease, implement engineering controls to reduce vapor and dust emissions, or to increase PPE (further detailed below) are included in the HASP.

11.2 INFRASTRUCTURE

11.2.1 Smoking and Eating Areas

Smoking will only be allowed in designated areas. Upon mobilization at the site, the FSO will establish smoking areas per site-specific or client-specific requirements. Individuals caught smoking outside the designated smoking areas will be subject to disciplinary action up to and including immediate termination. It is recommended that smokers wash their hands before smoking.

Upon mobilization at the Site, the FSO will establish eating and break areas per site-specific or client-specific requirements. Eating will only be allowed in the designated areas and the areas will be maintained in a clean and sanitary condition. Employees will wash their hands before entering eating areas.

11.2.2 Sanitation and Potable Water

Drinking water will be provided in the form of individual, bottled water containers. Potable and non-potable water containers and portable toilets will comply with CCR Title 8 Sections 1524 and 1526. A sink with potable water or other equipment will be provided for hand washing prior to eating.

11.2.3 Safety Equipment

A first aid kit containing first aid items for minor incidents, spill kits, fire extinguishers, and temporary emergency eyewash stations will be maintained at the Site and in field vehicles in easily accessible locations. The first aid kits will be inspected periodically to ensure the contents are unexpired. For the purposes of this project, all first aid kits present on site shall be maintained in compliance with CCR Title 8, Section 1512.

The FSO will be responsible for ensuring that all fire extinguishers are inspected monthly as required by CCR Title 8, Section 1922 (Portable Fire Fighting Equipment), for the duration of the project. The monthly inspections will be documented on a tag attached to each extinguisher or a master list of fire extinguishers and their location. If the duration of the project exceeds one year, the FSO will contract with an outside vendor to perform the annual maintenance on all fire extinguishers.

Portable spill kits and containment materials will be located near areas where chemicals are stored or transferred. Bulk chemicals such as gasoline and diesel will be stored on-site to fuel equipment.

Portable eye wash stations or emergency eyewash/shower stations will be inspected monthly and located within immediate accessibility to the site workers.

11.2.4 Communications

Cell phones will be used for communication at the Site. Cell phones should not be used while driving any type of vehicle unless hands-free technology is in use. No cell phones may be used while operating equipment onsite.

11.3 GENERAL SITE RULES

The following general rules will be adhered to at all times:

- All personnel entering the Site must check in with the FSO.
- All individuals entering the Site must demonstrate to the FSO that they have been adequately trained as defined in Section 3.
- All individuals must be familiar with emergency communication methods and how to summon emergency assistance.
- Use of alcoholic beverages before and during Site operations, is absolutely forbidden. Alcohol should also not be used immediately after Site work hours as it can reduce the body's ability to detoxify compounds absorbed into the body as the result of minor exposures and may have negative effects with exposure to other chemicals. In addition, alcoholic beverages will dehydrate the body and intensify the effects of heat stress.
- Horseplay of any type is forbidden.
- All unsafe acts and conditions will be immediately reported to the FSO, who will document such conditions in the field log. The FSO will be responsible for ensuring that the unsafe act and condition is corrected as quickly as possible.
- No smoking, eating, chewing gum or tobacco, taking medication, or applying cosmetics will be allowed only in pre-designated Support-Zone locations. Wash hands and face thoroughly prior to conducting the activities in the Support Zone.
- Smoking, matches, and lighters are only allowed in the designated smoking area.

- Avoid contact with potentially contaminated substances, or hazardous substances. Avoid, whenever possible, kneeling on the ground, or leaning or sitting on trucks, equipment or the ground. Do not place equipment on potentially contaminated surfaces.
- If PPE becomes torn or saturated with contaminated material, immediately leave the Exclusion Zone, go through the decontamination steps, and replace the affected PPE. Additionally, wash any exposed skin thoroughly with soap and water.
- Use of the buddy system will be used at all times. Working alone is not permitted.
- The FSO will be responsible for determining what Site work can be performed safely in the rain and at what point work will cease due to either quality or safety issues. In the event of thunder and/or lightning, all work will be suspended until 15 minutes have elapsed from the last clap of thunder or flash of lightning. During rain, lightning and/or thunder events, Site workers should seek shelter in either a building or vehicle.

12.0 DECONTAMINATION PROCEDURES

Decontamination involves the orderly controlled removal of contaminants from both personnel and equipment. The purpose of decontamination procedures is to prevent the spreading of contaminated materials into uncontaminated areas. All Site personnel should limit contact with contaminated wastewater and equipment in order to reduce the need for extensive decontamination. The FSO will continuously evaluate the efficacy of the decontamination procedures and adjust them as necessary to prevent migration of contaminants out of the contamination reduction zone.

If necessary, equipment and materials used in the decontamination process for Site-related activities may include the following:

- High pressure/hot water cleaning using only potable water;
- Phosphate-free detergent;
- Five-gallon bucket;
- Potable water;
- Distilled water;
- Paper towels; and
- Brushes.

12.1 PERSONNEL DECONTAMINATION

If necessary, the following procedures will be utilized for personnel decontamination:

1. Clean rubber boots with water;
2. Utilize fabricated boot wash stations;
3. Remove all PPE and dispose of the PPE in the designated waste receptacles;
4. Re-usable PPE (e.g., respirators, hard hats, etc.) that has potentially come into contact with contaminants will be washed and air dried; and
5. Wash hands and any skin that may have come in contact with affected soil or ground water with moistened disposable towels, such as baby wipes, or soap and water.

12.2 EQUIPMENT DECONTAMINATION

If necessary, the following will be required for equipment and tool decontamination:

- Before leaving the work area, excess contamination will be removed from the equipment and tools and placed in approved, properly labeled containers.
- A decontamination area will be designated for cleaning all equipment that has been in contact with the site materials before leaving the site. All decontamination will be conducted on a pad with an impermeable synthetic liner and fluid-containment berm. Equipment will be placed on the pad and dry brushed. If soils are not effectively removed by this method, the equipment will be rinsed, brushed and/or steam cleaned to remove any contamination.
- Bermed areas will be used to contain decontamination water.
- Disposal of fluids generated from the decontamination process will be in accordance with approved work plans.

- Disposal of all solids collected within the decontamination pad and the pad liner will be in accordance with applicable local regulations.
- For major equipment, where dry brushing is not effective in removing soils, utilize a soap and/or water rinse and steam cleaning with temperature between 160 degrees to 180 degrees Fahrenheit with a pressure at or greater than 1,200 pounds per square inch (psi) will be the minimum required procedure.

13.0 SPILL CONTAINMENT PROGRAM

It is not anticipated that spills will occur during the project activities. The spill containment program for this project will involve the use of preventative measures in order to reduce the potential for environmental releases of chemicals used during construction. These preventative measures may include the following:

- Equipment inspection;
- Staging equipment on containment pads;
- Equipment operators to remain present and directly observe refueling activities;
- The use of secondary containment;
- The use of containment pools and absorbent padding on-site; and
- General housekeeping practices.

If project activities involve the use of drums or other containers, the drums or containers will meet the appropriate Department of Transportation (DOT) regulations and will be inspected, and their integrity assured prior to being moved. Operations will be organized so as to minimize drum or container movement. Drums or containers that cannot be moved without failure will be packed into an appropriate container.

13.1 SPILL PREVENTION

Spillage of any material should be avoided. The following precautions will be implemented to prevent a potential release:

1. Bulk containers will be placed in a secure location as approved by the FSO and/or OM;
2. Bulk container tanks will be demarked by cones and caution tape to limit untrained personnel from the area;
3. Bulk container tanks and other chemical storage will be located within secondary containment large enough to contain any spills or leaks;
4. Chemical storage will be inspected daily to evaluate the area for leaks; and
5. Any spill will be immediately contained with absorbent materials or contained within spill containment pools.

Daily safety inspections including visual inspection of areas where chemicals are stored, transported, or applied (e.g., discoloration, staining, presence of oxidized metals or other conditions that may indicate the presence of chemical), will be conducted to ensure a release to the environment has not occurred.

13.2 SPILL RESPONSE AND FOLLOW UP

The Site Superintendent or FSO should immediately call 911 to initiate emergency response if:

1. An uncontrolled release of a chemical occurs;
2. An injury requiring medical attention occurs;
3. In the event of a fire; or
4. If any other conditions warrant.

After contacting emergency response services, the Site Superintendent or FSO should immediately notify field personnel in remote areas of the Site using cell phone or two-way radio, or other signal such as an air horn that emergency response services have been activated. After notification, Site field personnel should immediately avoid the impacted area, evacuate to

designated assembly area, or take cover. If Site conditions warrant, an Emergency Response subcontractor for the Site will be contacted and mobilized to the Site. Refer to the emergency phone number list provided in Section 10.1.

13.2.1.1 Spill Response

If necessary, small spills of less than 10 gallons that can be contained (i.e., not in drains or streams), will be handled by field personnel by containing the released material using absorbent materials from spill kits and conveying the released material to stay within site boundaries. Absorbent materials used in the containment process will be disposed of with hazardous materials being transported off-site. Larger and uncontrolled releases will require notification and activation of the fire department.

13.2.1.2 Spill Follow Up

If a spill has occurred and been contained appropriately, visual monitoring will be conducted to confirm that the event does not result in adverse effects to the environment. In addition, procedures outlined in the previous section will be followed to reduce any spills or leaks. The incident will be reported to the Operations Manager and client representatives.

- The OM will immediately determine if any reporting is required to local or state agencies.
- If Site conditions warrant, the Emergency Response subcontractor for the Site will be contacted and mobilized to the Site.

14.0 EMERGENCY RESPONSE AND EQUIPMENT

14.1 EMERGENCY RESPONSE IN THE EVENT OF A RELEASE

It is not anticipated that during project activities there will be a release of site chemicals. In the event of a release of hazardous materials, absorbent padding and temporary spill containment pools will be used to contain any spills or leaks. In the event that there is a larger spill, which is difficult to contain, emergency response procedures will be conducted by the fire department listed in Section 9.1. Spill containment procedures prior to the HazMat subcontractor arrival are as follows:

1. Don protective face shield, safety glasses, chemical-resistant clothing (coated Tyvek coverall, rubber boots and neoprene gloves);
2. Deactivate any pressurized additions and clear personnel from the spill area to avoid expanding the affected area; and
3. Remove the source of the spill and contain spilled liquids with non-combustible absorbent materials (PIGs, soil, etc.). Contain the release effluent to the Site and use berms to convey large amounts of released materials to stay within the property line.

If personnel are exposed to specific chemicals at the Site, consult the chemical-specific SDS or card for first aid procedures.

14.2 EMERGENCY EQUIPMENT

Emergency equipment will be maintained at the Site for potential use. Specific equipment includes:

- A first aid kit;
- Personal protection equipment (safety glasses/goggles, gloves, Tyvek suits, boot covers);
- Spill kit at multiple locations including absorbent materials and spill containment pools (if applicable);
- Hand tools necessary to clean broken glass;
- Fire extinguishers;
- Portable emergency eyewash station;
- Notification capabilities via cell phone/radio devices; and
- Additional ancillary support equipment (e.g., emergency response personnel, 24-hour emergency response subcontractor) necessary to support operations, if necessary.

If necessary, additional equipment will be mobilized to the Site as necessary (e.g., temporary water storage tanks).

14.3 PERSONNEL ROLES AND LINES OF AUTHORITY

The Site Superintendent and FSO have primary responsibility for handling emergency situations. This includes taking appropriate measures to ensure the health and safety of Site personnel and the public. The FSO will be responsible for evacuating any personnel and providing decontamination and arranging for medical treatment or first aid for any person injured or requiring medical attention.

Possible actions may involve the evacuation of personnel from the Site area and ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up

reports completed. All site personnel will assist, as directed by the Site Superintendent, in case of an emergency.

14.4 EMERGENCY ALARMS

If an emergency arises, the FSO will inform subcontractors working on-site, and give instructions for appropriate actions. A hand-held air horn shall be used to alert all Site personnel that an emergency is in progress.

14.5 EVACUATION PROCEDURES AND ROUTES

In the event of an emergency requiring evacuation to an Assembly Point, the FSO, or designee, will be responsible to account for the presence of all project team members and subcontractors on-site at the time of the emergency. When evacuating, it is important to be aware of the prevailing wind direction and evacuate upwind or crosswind.

Evacuation should occur through the main entry fence gate at each property parcel. However, if there is an emergency to avoid near the main fence gate, a secondary evacuation path will be designated by the FSO. All evacuees will make their way to the Assembly Point.

14.6 RESPONDING TO EMERGENCIES

In the event of an actual or suspected incident where personal injury or illness occurs, the FSO and assistants should take the following actions sequentially as listed:

- Don appropriate PPE, if necessary;
- Remove the exposed or injured person(s) from immediate danger;
- Contact local authorities by calling 911;
- Decontaminate affected personnel as appropriate;
- Obtain ambulance transport to the local hospital in the event of any injury or illness deemed to require medical surveillance or treatment; and
- Evacuate other personnel until it is safe for work to resume.

14.7 REPORTING EMERGENCIES

At the earliest time practicable following the occurrence of the emergency situation, the Site Superintendent or FSO will contact the OM to advise them of the situation. The OM will then be responsible for promptly informing the following parties about the emergency.

- Injured/involved personnel's supervisor; and
- Client Contact.

In the case of an Incident, the FSO will promptly begin formal documentation of an investigation into the root causes of the Incident following the occurrence of the incident.

14.8 RESTARTING WORK FOLLOWING AN EMERGENCY

The FSO will determine when it is safe to resume work at the Site following an emergency. Note that if there is any doubt regarding the safe condition of the area, work will not recommence until all safety issues are resolved.

If the emergency is facility related, the FSO and Site Superintendent will inform subcontractors when it is safe to resume work.

14.9 EMERGENCY DRILLS

In accordance with the HAZWOPER standard emergency response, plans will be rehearsed regularly as part of the overall training program for Site operations. The frequency of this drill (rehearsal) is outlined on Table 14-1. Drills do not need to be elaborate. A table-top scenario during the daily tailgate safety meeting is an adequate drill.

TABLE 14-1: *Emergency Drill Frequency*

Project Duration	Drill Frequency
Less than 30 days	None, cover during review/sign-off of HASP
Greater than one month but less than one year	Once
Greater than one year	Annually

15.0 PROJECT SAFETY PROGRAMS

15.1 UTILITY CLEARANCE

A utility clearance program must be implemented prior to any project-related ground disturbance activities. This process applies to all projects where contractors or subcontractors are performing ground disturbance activities. At a minimum, Underground Service Alert (DigAlert) will be notified at least 72 hours prior to any ground disturbance. Additional utility clearance activities may include contacting private locate services (suggested) and performing hand clearing/vacuum extraction to a minimum depth of 5 feet below the ground surface to verify the presence or absence of utilities.

Where utilities are identified, excavations will be cleared by hand within five feet of the underground utility location.

16.0 SITE SAFETY BRIEFINGS

16.1 COMMUNICATION AND REVIEW OF THE HASP

An initial review of the Site-specific HASP will be held either prior to mobilization or after mobilization but prior to commencing work at the Site to communicate HASP details and answer questions to individuals working at the Site. HASP review will be completed in conjunction with Site orientation. The following topics will be addressed during the briefing:

- Names of the FSO, Site Superintendent, and any designated alternates;
- Hazardous chemicals that may be encountered during on-site activities;
- Physical hazards that may be encountered on-site;
- Special training requirements and safe work practices;
- Work tasks;
- Emergency communication signals, codes, and location of emergency contact information;
- Emergency procedures for safety events, fires, and hazardous material incidents; and
- Emergency evacuation routes and designated Assembly Point.

16.2 DAILY SAFETY MEETING

A daily safety meeting will be conducted each morning. The daily safety meeting will include a discussion of the following health & safety-related topics, among others:

- Who is doing what, where and how;
- The potential for overlapping site operations;
- Review of JSA(s) for the day's task(s);
- Changes to the HASP or JSAs;
- Discussion of recent Incidents or safety observations; and
- Comments from the project personnel.

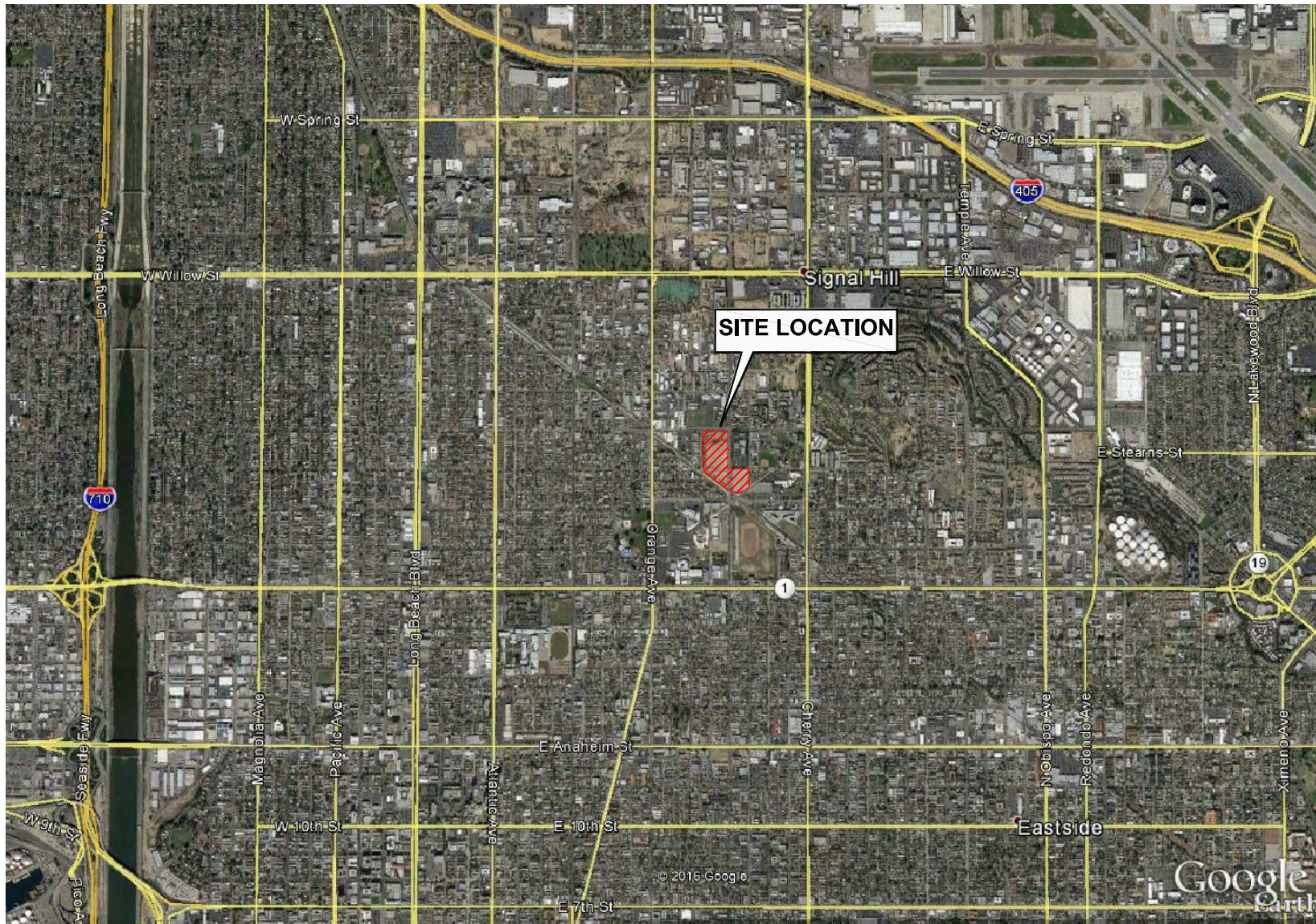
The meetings will be documented on the Daily Tailgate Safety Meeting form found in Appendix G.

16.3 AUDITING AND HASP REVISIONS

Selected project field activities and project files shall be audited periodically. A full Site audit for conformance with the HASP will occur at least once per year. Project documentation audits may be conducted periodically for shorter project tasks.

Revisions made to the Site HASP in response to audit feedback, lessons learned from incidents, or other reasons will be explained to all Site personnel at the first daily tailgate safety meeting following the institution of the HASP revision.

APPENDIX A
Site Location Map and Map to Hospital



FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.
XXX

DATE
10/16/16

DR. BY:
ZA

APP. BY:
KD

SITE LOCATION MAP

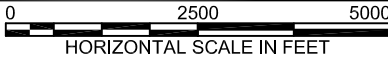
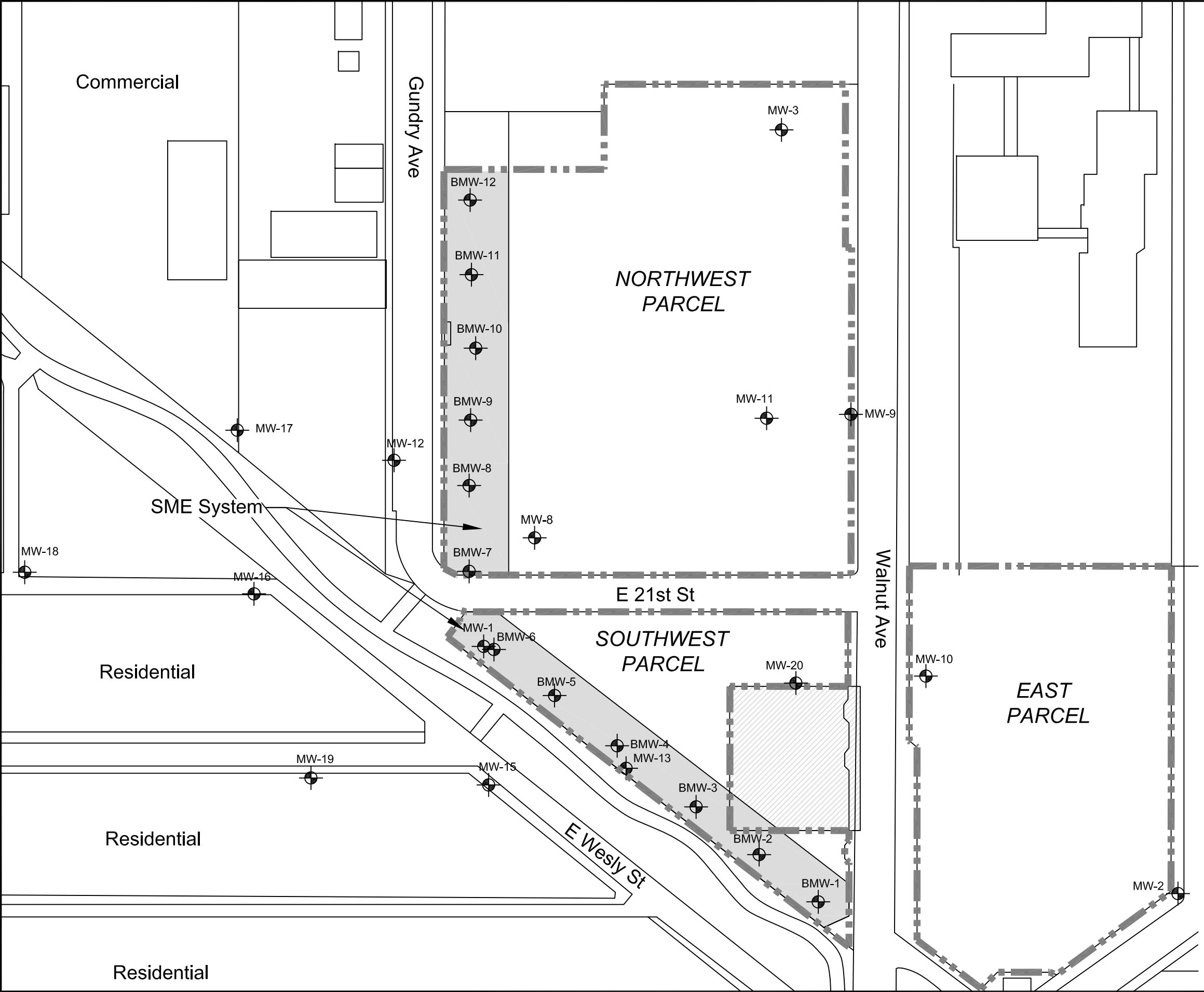


FIGURE
1

Y:_Sharing\Chem\Oil Refinery\Health and Safety\Revised HASP 10-2018\Fig.2-Site Map.dwg



LEGEND

- Site Boundary
- MW-16
- Groundwater Monitoring Well Locations
- SME
- Subsurface Metabolic Enhancement

SITE MAP

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
	02/08/17	ZA	KD

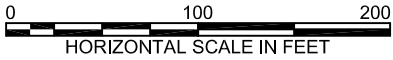
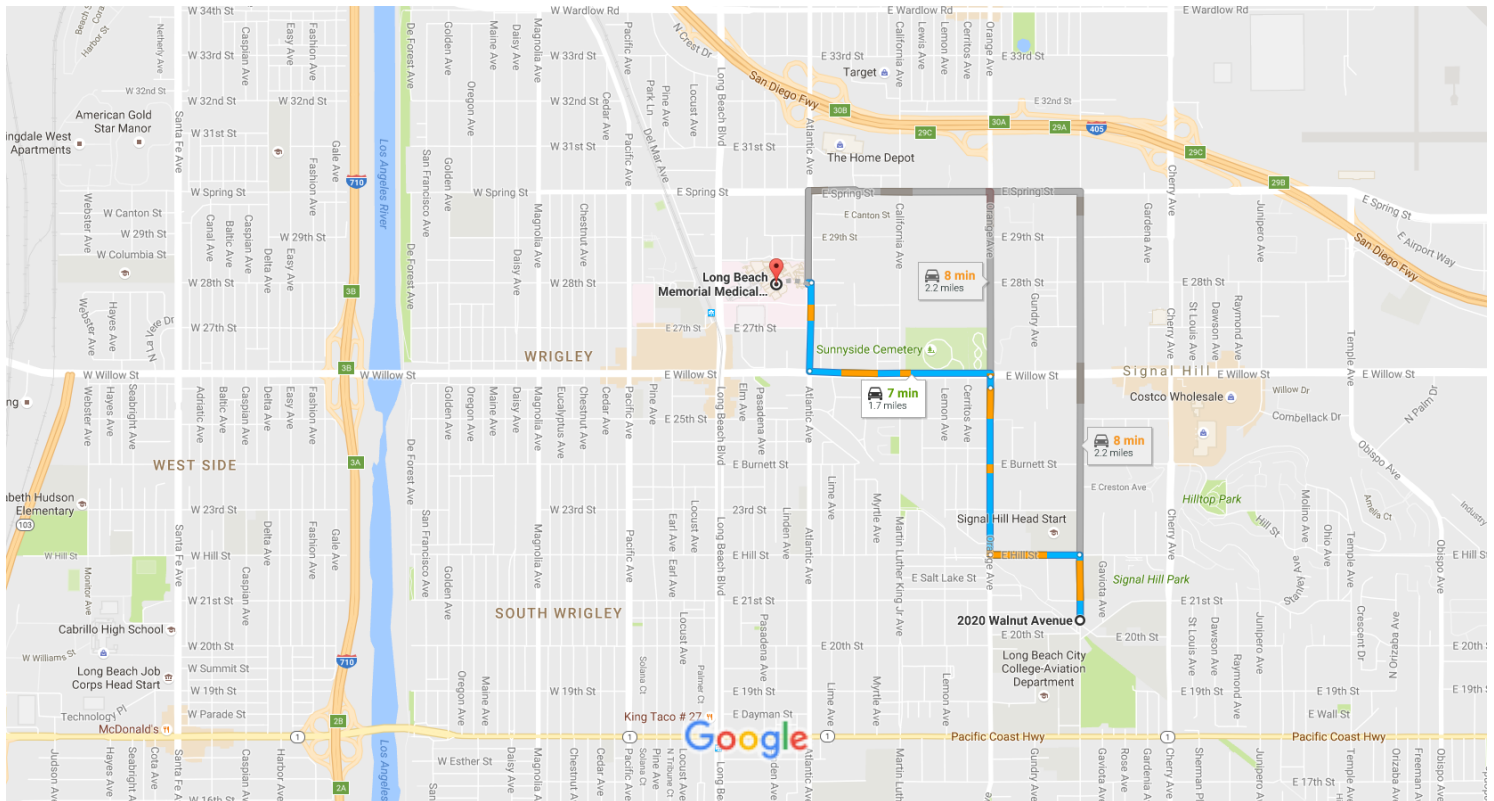


FIGURE
2



2020 Walnut Avenue, Signal Hill, CA 90755 to Long Beach Memorial Medical Center Emergency


Drive 1.7 miles, 7 min




Map data ©2016 Google 1000 ft

2020 Walnut Avenue


Signal Hill, CA 90755

- 


1. Head north on N Walnut Ave toward E 21st St

0.2 mi
- 


2. Turn left onto E Hill St

0.2 mi
- 


3. Turn right onto Orange Ave

0.5 mi
- 


4. Keep left to stay on Orange Ave

171 ft
- 

5. Turn left at the 1st cross street onto E Willow St

0.5 mi
- 

6. Turn right onto Atlantic Ave

0.2 mi
- 

7. Make a U-turn at E 28th St

62 ft

Long Beach Memorial Medical Center Emergency

2801 Atlantic Avenue, Long Beach, CA 90806

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

APPENDIX B
Job Safety Analyses

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Weather conditions (heat, cold, rain, lightning) must also be considered.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
Typical work	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that chemical exposure is possible, wear chemical resistant gloves, aprons, etc.	Weather related incidents. Automobile accidents. Slips, trips and falls.	<ul style="list-style-type: none"> ● Check weather reports daily. Project visits will not be performed during inclement weather. Sampling may be performed during light rain mist. Wear raincoats. ● Drive at speed limit or less as needed to keep safe distance from vehicle in front, avoid short stops.
Typical work.		Cold Stress.	<ul style="list-style-type: none"> ● For temperatures below 40 °F, adequate insulating clothing must be worn. If the temperature is below 20 °F, workers will be allowed to enter a heated shelter at regular intervals. Warm, sweet drinks should be available. Coffee intake should be limited. ● No one should begin work or return to work from a heated shelter with wet clothes. Workers should be aware of signs of cold stress, such as heavy shivering, pain in fingers or toes, drowsiness or irritability. Onset of any of these signs are indications for immediate return to a heated shelter.
Typical work.		Heat Stress	<ul style="list-style-type: none"> ● Discuss health effects and symptoms during daily production meetings. ● Drink water regularly, i.e., at least one cup every 20-30 minutes depending upon level of effort and PPE worn. ● Breaks should be taken in an area cooler than the work area. ● Monitor temperature and relative humidity using WBGT meter.
Typical work	High-top steel toed and shank shoes or rubber boots, light colored long sleeved shirt, long pants, and leather gloves.	Insect bites, (to include black-legged or deer ticks)	<ul style="list-style-type: none"> ● Tuck pants into socks or boot tops to reduce or prevent insect exposure to the skin, or wear high rubber boots. ● Apply DEET to the skin and clothing to serve as a repellant, (for ticks) and insect repellant for other insects. ● Use Permethrin on clothing (Note: Permethrin kills insects (ticks) on contact and must be applied in advance to permit drying). ● Daily check for the presence of insects (ticks) and their immediate removal. (Note: This is of obvious importance, and especially noteworthy since infection with Lyme disease requires at least 36 hours of tick attachment).
No eating, drinking, or smoking on-site.		Ingestion of contaminants.	<ul style="list-style-type: none"> ● Use proper personal hygiene practices. ● Use proper decontamination practices.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Weather conditions (heat, cold, rain, lightning) must also be considered.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
<p>site.</p> <p>No facial hair that would interfere with respirator fit.</p>			<ul style="list-style-type: none"> ● Exit Exclusion Zone and wash hands, face & neck before eating, drinking or smoking. ● Utilize appropriate spectacle kit with the respirator in use. ● Shave each morning before using respirator. Ensure that no facial hair interferes with respirator seal area.
<p>A safety meeting shall be held each day, even if there is only one person working on the project on any given day.</p>			<ul style="list-style-type: none"> ● Topics will always include the work scheduled for the day and restatement of the hazards and means to avoid them. Other topics may be extricated from the list included in the HASP. ● Use Daily Tailgate Safety Meeting for logging the topics discussed.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Weather conditions (heat, cold, rain, lightning) must also be considered.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
Mobilize with proper equipment/supplies for Utility Locating.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, ear plugs/muffs, and leather gloves. (Foam earplugs with an NRR of 33).	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	<ul style="list-style-type: none"> ● Start project with Daily Health and Safety Briefing . ● Follow safe driving procedures. ● Employ safe lifting procedures. ● Make sure sub-contractors are aware of their responsibilities for labor, equipment and supplies. ● Review permit conditions.
Set up necessary traffic control. See site-specific HASP for detailed plan.	Wear reflective vest for traffic; steel toed and shank shoes, hardhat, safety glasses with side shields, ear plugs/muffs and leather gloves as necessary.	Potentially can be struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	<ul style="list-style-type: none"> ● Use buddy system for placing traffic control. ● Create a traffic control plan to address traffic issues. Refer to Traffic Control Plan drawing in the site-specific HASP. ● Adhere to approved Traffic Control Plans when working in roadways. ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if an Approved Traffic Control Plan is not available.
Perform Utility Locating, marking utility locations with paint.	Wear reflective vest for traffic; steel toed and shank shoes, hardhat, safety glasses with side shields, ear plugs/muffs and leather gloves as necessary.	Potentially can be struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement. Muscle strains/sprains from lifting equipment.	<ul style="list-style-type: none"> ● Adhere to approved traffic control plan ● Use proper lifting techniques.
Clean site/demobilize.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work.	Traffic. Safety hazard left on site. Lifting hazards.	<ul style="list-style-type: none"> ● Use buddy system as necessary to remove traffic control. ● Leave site clean of refuse and debris. ● Clearly mark/barricade any borings that need later topping off or curing. ● Notify site personnel of departure, final well locations and any cuttings/purge water left onsite. ● Use proper lifting techniques

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each work day. Weather conditions (heat, cold, rain, lightning) must also be considered.			
① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
Mobilize with proper equipment/supplies for the work objective.	Gather necessary PPE. Reflective vest, steel toed boots, hardhat, safety glasses with side shields, full body harness, shock absorbing lanyard(s), fall limiter(s), and leather gloves for the non-chemical aspects of work. Bring an air purifying respirator with combination organic vapor/HEPA P-100 cartridges, and other PPE as needed, Nitrile gloves or their equivalent, foam earplugs with an NRR of 33, Tyvek, poly coated chemical resistant suit or its equivalent, as needed.	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	<ul style="list-style-type: none"> Follow safe driving procedures. Employ safe lifting procedures. Review permit conditions. Review all JSA and ensure the risks have all been covered in the JSA(s). Perform pre-job meeting with the Project Manager.
Perform Tailgate Safety Meeting	Wear reflective vest, steel toed boots, hardhat, safety glasses with side shields, and leather gloves.	One can potentially be struck by vehicle during safety meeting. Vehicle accident as a result of improper traffic control equipment placement.	<ul style="list-style-type: none"> Start project with Daily Health and Safety Meeting. Make sure sub-contractors are aware of their responsibilities for labor, equipment, and supplies. Review permit conditions and HASP. Complete ATW and other pertinent permits.
Assessment of the excavation(s)	Wear reflective vest, steel toed boots, hardhat, safety glasses with side shields, and leather gloves.	Explosion/fire. Slip, trip and fall hazards. Exposure to chemical hazards. Injury from heavy equipment. Soil collapse and fall injury.	<ul style="list-style-type: none"> DO NOT GO NEAR THE EXCAVATION UNTIL FULLY ASSESSED. Perform initial and periodic visual inspections of the excavation sides, base, and upper surface. See attached <i>Required Safety Practices</i>. Items to note and consider. Does the excavation: 1) have properly sloped, benched or shored sides (discuss with on-site OSHA Competent Person), 2) have proper ventilation, 3) have heavy equipment within 5 feet of the edge, 4) have soil piled within 2 feet of the edge, 5) have surface cracks, sidewall cracks, or sloughing, 6) have free-standing water or have water entering the hole, 7) have adequate entry/egress pathways (see OSHA and applicable state requirements). Conduct air monitoring above excavation area as outlined in monitoring in accordance with site-specific HASP. Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of working location, readily available.
Working near deep (>6 feet) excavations (SEE WORKING AT HEIGHTS JSA)	Reflective vest, steel toed boots, hardhat, safety glasses with side shields, full body harness, shock absorbing lanyard(s) or fall limiter(s), and leather gloves for the non-chemical aspects of work.	Explosion/fire. Slip, trip and fall hazards. Exposure to chemical hazards.	<ul style="list-style-type: none"> Working near excavations greater than 6-feet deep with non-sloped walls should be avoided. Assess alternatives to completing work. Maintain required excavation setbacks for workers and equipment and monitor condition of sidewalls and surrounding ground conditions.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each work day. Weather conditions (heat, cold, rain, lightning) must also be considered.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
		Soil collapse and fall injury.	<ul style="list-style-type: none"> Keep work area clear of tripping or slipping hazards. Have an OSHA Competent Person prepare an <i>Excavation Inspection Form/Permit to Work</i> prior to proceeding with the activities.
Working near deep (>20 feet) excavations (SEE WORKING AT HEIGHTS JSA)	Reflective vest, steel toed boots, hardhat, safety glasses with side shields, full body harness, shock absorbing lanyard(s) or fall limiter(s), and leather gloves for the non-chemical aspects of work..	Explosion/fire. Slip, trip and fall hazards. Exposure to chemical hazards. Injury from heavy equipment. Soil collapse and fall injury.	<ul style="list-style-type: none"> Working near excavations greater than 20-feet deep with non-sloped walls should be avoided. Assess alternatives to completing work. Contact Mark Labrenz should no alternative to completing work be identified. Have an OSHA Competent Person prepare an <i>Excavation Inspection Form/Permit to Work</i> prior to proceeding with the activities.
Entering an Excavation	ENTERING AN EXCAVATION IS NOT ALLOWED UNDER THIS JSA.	Explosion/fire. Slip, trip and fall hazards. Exposure to chemical hazards. Injury from heavy equipment. Soil collapse and fall injury.	<ul style="list-style-type: none"> ENTRANCE INTO AN EXCAVATION SHALL ONLY BE DONE AFTER COMPETENT PERSON HAS GIVEN AUTHORITY TO ENTER.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each work day. Weather conditions (heat, cold, rain, lightning) must also be considered.			
① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
Mobilize with proper equipment/supplies for the work objective.	Gather necessary PPE. Reflective vest, steel toed boots, hardhat, safety glasses with side shields, full body harness, shock absorbing lanyard(s), fall limiter(s), and leather gloves for the non-chemical aspects of work. Bring an air purifying respirator with combination organic vapor/HEPA P-100 cartridges, and other PPE as needed, Nitrile gloves or their equivalent, foam earplugs with an NRR of 33, Tyvek, poly coated chemical resistant suit or its equivalent, as needed.	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	<ul style="list-style-type: none"> Follow safe driving procedures. Employ safe lifting procedures. Review permit conditions. Review all JSA and ensure the risks have all been covered in the JSA(s). Perform pre-job meeting with the Project Manager.
Perform Tailgate Safety Meeting	Wear reflective vest, steel toed boots, hardhat, safety glasses with side shields, and leather gloves.	One can potentially be struck by vehicle during safety meeting. Vehicle accident as a result of improper traffic control equipment placement.	<ul style="list-style-type: none"> Start project with Daily Health and Safety Meeting. Make sure sub-contractors are aware of their responsibilities for labor, equipment, and supplies. Review permit conditions and HASP. Complete ATW and other pertinent permits.
Assessment of the excavation(s)	Wear reflective vest, steel toed boots, hardhat, safety glasses with side shields, and leather gloves.	Explosion/fire. Slip, trip and fall hazards. Exposure to chemical hazards. Injury from heavy equipment. Soil collapse and fall injury.	<ul style="list-style-type: none"> DO NOT GO NEAR THE EXCAVATION UNTIL FULLY ASSESSED. Perform initial and periodic visual inspections of the excavation sides, base, and upper surface. See attached <i>Required Safety Practices</i>. Items to note and consider. Does the excavation: 1) have properly sloped, benched or shored sides (discuss with on-site OSHA Competent Person), 2) have proper ventilation, 3) have heavy equipment within 5 feet of the edge, 4) have soil piled within 2 feet of the edge, 5) have surface cracks, sidewall cracks, or sloughing, 6) have free-standing water or have water entering the hole, 7) have adequate entry/egress pathways (see OSHA and applicable state requirements). Conduct air monitoring above excavation area as outlined in monitoring in accordance with site-specific HASP. Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of working location, readily available.
Working near deep (>6 feet) excavations (SEE WORKING AT HEIGHTS JSA)	Reflective vest, steel toed boots, hardhat, safety glasses with side shields, full body harness, shock absorbing lanyard(s) or fall limiter(s), and leather gloves for the non-chemical aspects of work.	Explosion/fire. Slip, trip and fall hazards. Exposure to chemical hazards. Injury from heavy equipment.	<ul style="list-style-type: none"> Working near excavations greater than 6-feet deep with non-sloped walls should be avoided. Assess alternatives to completing work. Contact Mark Labrenz should no alternative to completing work be identified. Maintain required excavation setbacks for workers and equipment and monitor condition of sidewalls and surrounding ground conditions.

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Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each work day. Weather conditions (heat, cold, rain, lightning) must also be considered.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
		Soil collapse and fall injury.	<ul style="list-style-type: none"> Keep work area clear of tripping or slipping hazards. Have an OSHA Competent Person prepare an <i>Excavation Inspection Form/Permit to Work</i> prior to proceeding with the activities.
Working near deep (>20 feet) excavations (SEE WORKING AT HEIGHTS JSA)	Reflective vest, steel toed boots, hardhat, safety glasses with side shields, full body harness, shock absorbing lanyard(s) or fall limiter(s), and leather gloves for the non-chemical aspects of work..	Explosion/fire. Slip, trip and fall hazards. Exposure to chemical hazards. Injury from heavy equipment. Soil collapse and fall injury.	<ul style="list-style-type: none"> Working near excavations greater than 20-feet deep with non-sloped walls should be avoided. Assess alternatives to completing work. Contact Mark Labrenz should no alternative to completing work be identified. Have an OSHA Competent Person prepare an <i>Excavation Inspection Form/Permit to Work</i> prior to proceeding with the activities.
Entering an Excavation	ENTERING AN EXCAVATION IS NOT ALLOWED UNDER THIS JSA.	Explosion/fire. Slip, trip and fall hazards. Exposure to chemical hazards. Injury from heavy equipment. Soil collapse and fall injury.	<ul style="list-style-type: none"> ENTRANCE INTO AN EXCAVATION SHALL ONLY BE DONE AFTER COMPETENT PERSON HAS GIVEN AUTHORITY TO ENTER.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Weather conditions (heat, cold, rain, lightning) must also be considered.

① Job Steps	② Personal Protective Equipment	③ Potential Hazard	④ Critical Actions
Trenching / Excavating	Steel toed shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that chemical exposure is possible, wear chemical resistant gloves, aprons, etc.	Backhoes, loaders, excavators, forklifts, etc. may cause physical harm. Contact with overhead and/or underground utilities can cause damage to property and physical harm.	<ul style="list-style-type: none"> ● Stay clear of heavy equipment unless properly trained to operate. ● On-ground personnel should always be aware of your position with respect to the equipment's range to avoid being hit by the equipment. ● Operator should always be aware of surroundings, and must always keep ground personnel supporting the excavation work in sight. ● Operator must make sure that the equipment is in proper and safe working order. ● Reverse alarms should be checked for proper operation. Equipment with alarms not functioning must not be used until repaired. ● Check areas for overhead utilities and contact Underground Service Alert (USA) at least two full work days prior to digging. ● Equipment operators should maintain safe offsets from trench/excavation edges to avoid trench collapses and equipment from falling into the open pits.
Drilling	Steel toed shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that chemical exposure is possible, wear chemical resistant gloves, aprons, etc.	Drilling rig may cause physical harm. Contact with overhead and/or underground utilities can cause damage to property and physical harm.	<ul style="list-style-type: none"> ● Stay clear of equipment unless properly trained to operate. ● Avoid non-drilling crew personnel from operating or assisting with the drilling operations. ● Be aware of your position with respect to the equipment's range to avoid being hit by the equipment. ● Operator should always be aware of surroundings, and not leave the equipment unattended. ● Operator must make sure that the equipment is in proper and safe working order. ● Emergency shut-off equipment and other integrated safety devices must be properly functioning
A safety meeting shall be held each day, even if there is only one person working on the project on any given day.			<ul style="list-style-type: none"> ● Topics will always include the work scheduled for the day and restatement of the hazards and means to avoid them. Other topics may be extricated from the list included in the HASP. ● Use Daily Tailgate Safety Meeting Form for logging the topics discussed.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday.		
⚠ Potential Hazard	🛡 Personal Protective Equipment	🚨 Critical Actions
Exposure to extreme weather.	<ul style="list-style-type: none"> ● Safety glasses or goggles; ● Hard hat; ● High visibility shirt and/or ANSI rated traffic vest if working in street; ● Steel-toed boots; hearing protection; and cut resistant gloves. ● Additional PPE may be required in the Health & Safety Plan (HASP). Also refer to the HASP for required traffic control, air monitoring, and emergency procedures. 	<ul style="list-style-type: none"> ● Dress for the situation – Rain gear, rain boot with steel toes, extreme weather gear and/or warm clothing, hard hat liners or stocking cap under hard hat ● Bring spare dry clothing for trip home ● Do not wear loose clothing such as scarves, coat tail, or cuffs ● Rain gear and clothing with permanently attached hoods is not to be used. ● All hoods must be of the break-away type (Velcro or snaps)
Fall – Slips, Trips and Falls.	<ul style="list-style-type: none"> ● Safety glasses or goggles; ● Hard hat; ● High visibility shirt and/or ANSI rated traffic vest if working in street; ● Steel-toed boots; hearing protection; and cut resistant gloves. ● Additional PPE may be required in the Health & Safety Plan (HASP). Also refer to the HASP for required traffic control, air monitoring, and emergency procedures. 	<ul style="list-style-type: none"> ● Wear boots with good non-skid soles ● Survey the area for slippery location ● Salt or sand slick areas ● Do not use plastic sheeting ● Avoid elevated surfaces such as the rig deck ● Check area for obstructions ● Avoid stepping in puddles ● Increase housekeeping efforts - do not leave tools laying on the ground *
Lightning Strikes	<ul style="list-style-type: none"> ● N/A 	<ul style="list-style-type: none"> ● If lightning is seen or thunder is heard, shut down operations and if time permits, lower the mast and get away from the drill rig ● Evacuate to a safe area, secure building or cab of alternate truck ● After the last observation of lightning and/or thunder, wait 30 minutes before resuming work to insure danger has past.
High winds.	<ul style="list-style-type: none"> ● Safety glasses or goggles; ● Hard hat; ● High visibility shirt and/or ANSI rated traffic vest if working in street; ● Steel-toed boots; hearing protection; and cut resistant gloves. ● Additional PPE may be required in the Health & Safety Plan (HASP). Also refer to the HASP for required traffic control, air monitoring, and emergency procedures. 	<ul style="list-style-type: none"> ● Secure anything that can become flying debris ● Follow weather and news reports so you know how much danger you're facing. ● Have open communication with all personnel involved in the task. Consider if it is safe to continue to work.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday.

① Potential Hazard	② Personal Protective Equipment	③ Critical Actions
Out of control vehicles	<ul style="list-style-type: none"> ● Safety glasses or goggles; ● Hard hat; ● High visibility shirt and/or ANSI rated traffic vest if working in street; ● Steel-toed boots; hearing protection; and cut resistant gloves. ● Additional PPE may be required in the Health & Safety Plan (HASP). Also refer to the HASP for required traffic control, air monitoring, and emergency procedures. 	<ul style="list-style-type: none"> ● Avoid setting up at the bottom of the hill without substantial barricades such as cement K-rail or heavy equipment ● All vehicle traffic areas should have substantial barricades ● While spotting vehicles, stay out of line of traffic and potential skid zone ● When walking out of protected areas, increase awareness of vehicles and their reduced ability to stop
Falling or dropped objects	<ul style="list-style-type: none"> ● Safety glasses or goggles; ● Hard hat; ● High visibility shirt and/or ANSI rated traffic vest if working in street; ● Steel-toed boots; hearing protection; and cut resistant gloves. ● Additional PPE may be required in the Health & Safety Plan (HASP). Also refer to the HASP for required traffic control, air monitoring, and emergency procedures. 	<ul style="list-style-type: none"> ● Take extra precautions with heavy objects such as increase use of the buddy system – required for awkward shaped or objects over 50 lbs.
Driving	<ul style="list-style-type: none"> ● N/A 	<ul style="list-style-type: none"> ● Do a thorough pre-trip inspection ● Ensure windshield and other windows are clean inside and outside ● Clean headlights and tail lights before all traveling and as needed ● Drive at an appropriate speed for the weather conditions decrease speed when raining, snowing , etc. ● Increase following distance to 8 seconds

APPENDIX C
Applicable Safe Work Practices

Wet Utility Programs – Maintenance, Inspection and Repair

Safe Work Practice (SWP) – SWP-001

The Wet Utility Program includes maintenance, inspection and repair activities associated with storm water and sanitary waste apertures, including but not limited to storm water inlet structures, drains, basins, outfalls, waste water treatment plants and sanitary lift stations.

This Safe Work Practice (SWP) is not intended to supersede written Confined Space or Fall Protection Program found in the Health and Safety Manual. The intent of this SWP is to provide guidance to all personnel who perform these activities as part of the Wet Utility Programs or similar programs. Personnel are required to abide by these practices.

Confined Space

A confined space as defined by the Occupational Safety and Health Administration (OSHA) is a space that:

- Has limited or restricted means of entry or exit;
- Is large enough for a person to enter to perform tasks; and
- Not designed or configured for continuous occupancy.

A permit-required confined space includes the potential for a significant hazard to be present such as a hazardous atmosphere, physical hazard (engulfment), or has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls.

For the purpose of this SWP, at a minimum, all storm water and sanitary waste structures greater than 4-feet in depth will be considered PERMIT-REQUIRED confined spaces unless otherwise re-classified. Depending on their configuration, other spaces that are less than 4-feet in depth that meet the OSHA definition may also meet the requirement of a confined space.

If you are unsure if a space is considered a confined space or a permit-required confined space, **STOP WORK** and contact your local Safety representative for assistance.

Confined Space Entry

Breaking the plane but not bodily entering the confined space:

Breaking the plane of a confined space with any body part is confined space entry. Therefore, a Confined Space competent person must be on-site to identify the confined space hazards and understand the means to mitigate those hazards. **The competent person must monitor the confined space for atmospheric hazards prior to “breaking the plane” of the confined space.** If atmospheric monitoring does not identify an atmospheric hazard and there are no additional potential hazards, the confined space can then be re-classified as Non-Permit Required Confined Space.

Bodily entering the Confined Space:

During the task activities, if personnel must bodily enter the confined space, entry procedures must follow the full confined space program. At a minimum, the following steps must be followed:

- Atmospheric testing of all levels of the confined space prior to initial entry and **continuously** while work within the confined space is being performed.
- If an atmospheric hazard is present, **continuous forced air ventilation** must be applied to the confined space prior to and during the confined space entry activities.
- Provide a non-entry rescue system such as a tri-pod winch system during vertical entry. Entry personnel must don a full body harness and be tied off to the winch system.
- Personnel are **NOT** to use the existing ladder systems within the structures unless they have been assessed and verified as undamaged and in good condition, suitable for the task, by the competent person. Depending on the configuration of the structure, extension ladders may be used to gain access, however, non-entry rescue systems must still be implemented.

The best practice would be to consider alternate means of completing the tasked activity to eliminate the need to enter or “break the plane” of a confined space to eliminate the confined space hazard. However, fall protection or prevention must be considered if the space is greater than 6-feet in depth.

Fall Prevention

Personnel must be aware of both confined space and fall hazards when working in the Wet Utility Program. Open underground spaces, including manholes, lift stations and valve pits pose many safety risks including falls. When working around openings, it is important to protect yourself from falling into the space below. These spaces shall only be kept open during such times as work is actively being performed and only if the nature of the work requires the space to be open. The area surrounding the opening should be kept free of any obstructions or tripping hazards.

Prior to opening a space, cones, caution tape or other barrier(s) must be placed adjacent to the opening to warn of its presence and to alert unauthorized persons who may attempt to enter the work area. Workers must perform any required work in a manner that prevents a fall into the opening.

In the cases where work must be performed adjacent to or over top of an open manhole or inlet structure that has a depth of greater than 6-feet, a fall prevention system must be implemented. Forms of fall protection/prevention systems include:

- Use of temporary guardrails around the open structure;
- Personal fall arrest system (full body harness, lanyard, tie-off);

- Minimizing the opening of the structure so that one cannot bodily fall into the opening (temporary grates, plywood, plates, etc.) suitable of supporting, without failure, at least twice the weight of the employees and materials that may be imposed on the temporary cover; and
- Safety monitoring/awareness.

Temporary guardrails, minimizing the opening of the structure or the use of a personal fall arrest system are the primary options to be implemented when working over an opening with a depth greater than 6-feet. Only when other standard fall protection methods are deemed unfeasible (i.e. use of anchorage points for attachment of personal fall arrest equipment), the competent person may implement a safety monitoring program. The Safety Monitoring Program will be administered by the designated competent person (i.e. Safety Monitor) and the specifics of the program and the factors used to determine the unsuitability of the other fall protection systems must be documented.

The safety monitor must:

- Be competent in the recognition of fall hazards. 29 CFR 1926.502(h)(1)(i);
- Warn workers when it appears that they are unaware of fall hazards or when the workers are acting in an unsafe manner. 29 CFR 1926.502(h)(1)(ii);
- Be on the same walking or working surfaces as the workers and be able to see them. 29 CFR 1926.502(h)(1)(iii);
- Be close enough to the work operations to speak directly with workers. 29 CFR 1926.502(h)(1)(iv); and
- Have no other duties to distract them from their monitoring function. 29 CFR 1926.502(h)(1)(v).

The Safety Monitor must be available at the work area at all times when working near the open structure. If at all possible, minimize the length of time need for the structure to be open.

Training

Confined Space

All personnel working in the vicinity of a confined space must have Confined Space Awareness training. Awareness level training is designed to provide general knowledge of confined spaces and the ability to identify permit required confined spaces, recognize hazards and keep themselves safe.

Any personnel who access or enter a confined space, including breaking the plane, must have confined space training that included detailed instruction for entry into a confined space, including:

- Roles and responsibilities of Authorized Entrants, Attendants and Supervisors;
- Entry procedures;
- Rescue procedures;
- Understanding of atmospheric monitoring equipment; and
- CPR/First Aid.

Fall Prevention

All affected personnel working in the vicinity of an open hole must receive training in fall protection and prevention. Training must cover the following:

- Types of fall hazards;
- Procedures for erecting, maintaining, disassembling and inspection fall protection equipment;
- Roles and responsibilities;
- Handling and storage equipment; and
- The OSHA Fall Protection Standard.

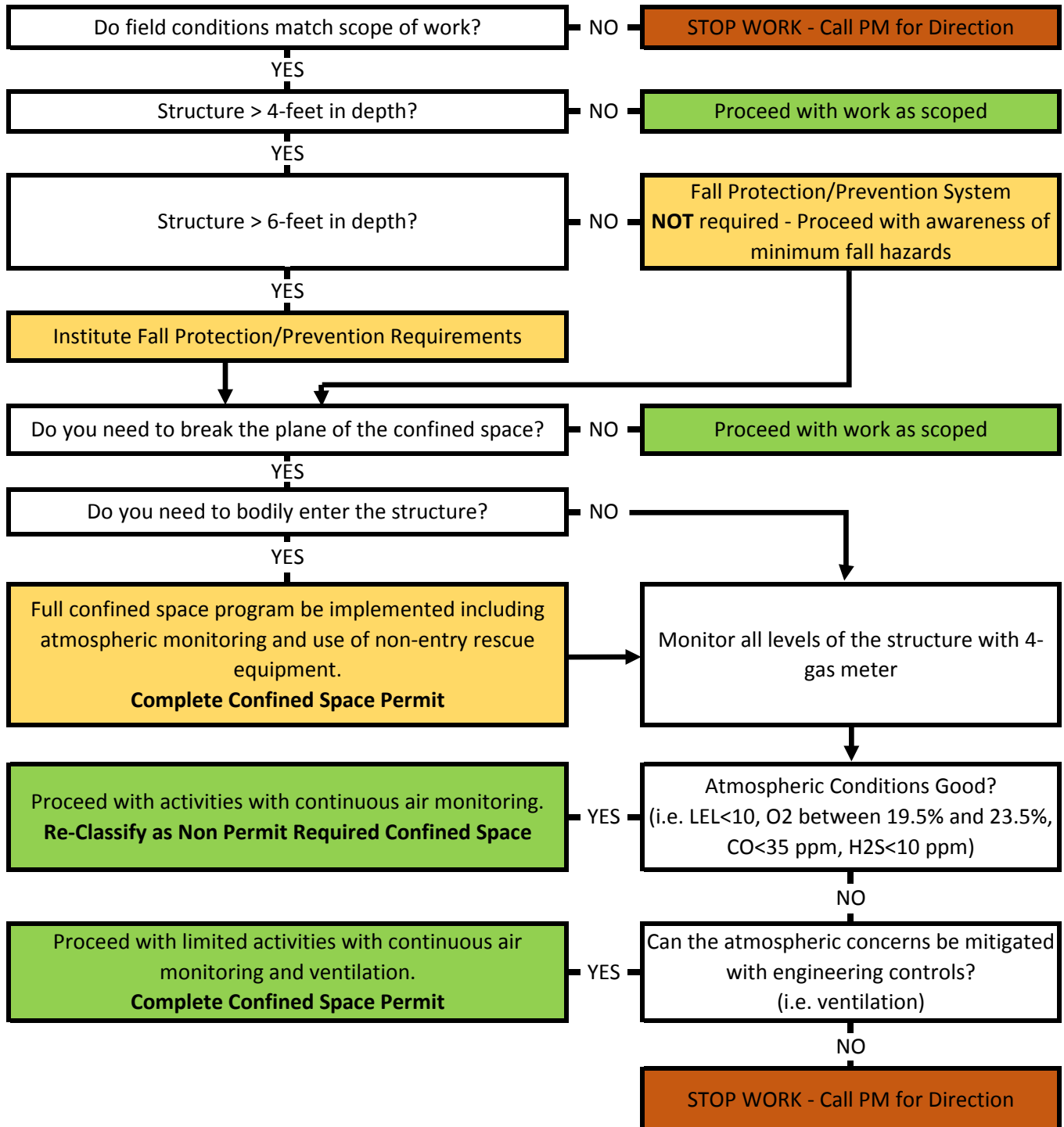
Frequency and Documentation

Training in confined space awareness, confined space entry and fall protection must be received annually to ensure employee awareness and competency. Training may be provided internally by the designated Competent Person and must be documented. Certificates of completion must be provided to personnel who have completed the training. Employees are responsible for uploading the training certificates into the Knowledge Sharing site on Apex's SUMMIT intranet.

Competent Person

Competent Person is one who has the training, experience, and is capable of identifying existing and predictable hazards in the surrounding or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them. A person competent in understanding both confined space and fall hazards must be assigned to projects where these hazards are present.

Wet Utility - Maintenance, Inspection and Repair Safe Work Practice Decision Matrix



APPENDIX D
Site Inspection Checklist

Site Safety Inspection Report

Project Name: _____ Project Number: _____

Inspected by: _____ Date: _____

Office: _____ Division #: _____

Supervisors and/or management are required to conduct a minimum two Site Safety Inspections annually on project sites; however, all employees are strongly encouraged to perform Site Safety Inspections monthly for long term projects (greater than 2 weeks) and once per project for short term projects (less than 2 weeks). Comments and corrective actions are required for all negative (N) responses.

Employees On-Site:	Type of Work Performed:

	Y	N	N/A	COMMENTS
1. HASP				
• HASP available on site for review?				
• HASP signed by all contractors and personnel?				
• Phone no. and directions for the nearest medical center available?				
• Have JSAs been prepared for each task?				
• Tail gate meetings up to date?				
• Are copies of past meetings maintained in the project files/HASP?				
• Are first aid supplies readily accessible?				
• Client contact information available?				
• Has site authority been defined?				
• Are all required PPE available?				
• Are SDS's available for hazardous material on site?				
• GOAL being implemented?				
2. Housekeeping				
• General neatness of work area?				
• Equipment/Supplies stored properly?				
• Are slip, trip, fall hazards marked or removed?				
3. Electrical				
• Ground fault circuit interrupters being used?				
• Are flexible cords and cables protected from damage?				
• Have any damaged extension cords been removed from service?				
4. Personal Protective Equipment				
• Hard hats are being worn?				
• Safety glasses are being worn?				
• Respirators are used when required?				
• Hearing protection being worn when required?				

Site Safety Inspection Report

Project Name: _____ Project Number: _____

Inspected by: _____ Date: _____

Office: _____ Division #: _____

	Y	N	N/A	COMMENTS
• Traffic vests being worn?				
• Safety shoes are being worn?				
5. Hand, Power & Powder Actuated Tools				
• Hand tools inspected regularly? Are damaged tools removed from service?				
• Guards in place on machines, such as saws/line trimmers?				
• Right tool being used for job at hand?				
• Operators of power actuated tools are licensed?				
6. Ladders				
• Ladders extend at least 36" above the support location?				
• Ladders are secured to prevent slipping, sliding, or falling?				
• Ladders with split or missing rungs taken out of service?				
• Stepladders used in fully open position?				
• No stepping at top three rungs of ladder?				
• Are ladders positioned at the proper angle (4:1 ratio)				
• Only 1 person on any ladder?				
7. Trenches, Excavation & Shoring				
• Competent person on hand inspecting daily?				
• Excavations over 5' in depth are shored or sloped back?				
• Materials are stored at least two feet from trench?				
• Equipment is a safe distance from edge of trench or excavation?				
• Ladders provided every 25' in trench more than 4' deep?				
• Have underground utility installations been located?				
8. Material Handling				
• Materials are properly stored or stacked?				
• Employees are using proper lifting methods?				
• Tag lines are used to guide loads?				
• Proper number of workers for each operation?				
9. Safety Observations (unsafe acts, unsafe conditions, near miss, incidents, safe behaviors)				

Inspector Signature: _____ Date: _____

APPENDIX E
Universal Chemical Safety Data Cards



Material Safety Data Sheet

Hydrochloric acid 6N

MSDS# 89586

Section 1 - Chemical Product and Company Identification

MSDS Name: Hydrochloric acid 6N
Catalog Numbers: SA56-1, SA56-200, SA56-4, SA56-500
Synonyms: Muriatic acid; Chlorohydric acid; Hydrogen chloride solution.
Company Identification: Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
For information in the US, call: 201-796-7100
Emergency Number US: 201-796-7100
CHEMTREC Phone Number, US: 800-424-9300

Section 2 - Composition, Information on Ingredients

Risk Phrases: 34 37

CAS#: 7647-01-0
Chemical Name: Hydrogen chloride
%: 22
EINECS#: 231-595-7
Hazard Symbols: C

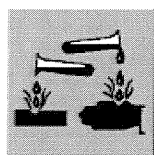
Risk Phrases:

CAS#: 7732-18-5
Chemical Name: Water
%: 78
EINECS#: 231-791-2
Hazard Symbols:

Text for R-phrases: see Section 16

Hazard Symbols:

T C



Risk Phrases:

23 35

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! May be harmful if swallowed. May cause fetal effects based upon animal studies. Causes eye and skin burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. Corrosive to metal. Target Organs: Respiratory system, teeth, eyes, skin.

Potential Health Effects

Eye: May cause irreversible eye injury. Vapor or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns. May cause painful sensitization to light.
Skin: May be absorbed through the skin in harmful amounts. Contact with liquid is corrosive and causes severe burns and ulceration.

- Ingestion: May cause circulatory system failure. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract.
- Inhalation: May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract. Exposure to the mist and vapor may erode exposed teeth. Causes corrosive action on the mucous membranes.
- Chronic: Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. May cause fetal effects. Laboratory experiments have resulted in mutagenic effects. Prolonged exposure may cause conjunctivitis, photosensitization, and possible blindness.

Section 4 - First Aid Measures

- Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes). SPEEDY ACTION IS CRITICAL!
- Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
- Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Give milk of magnesia.
- Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
- Notes to Physician: Do NOT use sodium bicarbonate in an attempt to neutralize the acid.
- Antidote: Do NOT use oils or ointments in eye.

Section 5 - Fire Fighting Measures

- General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Not flammable, but reacts with most metals to form flammable hydrogen gas. Use water spray to keep fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Reaction with water may generate much heat which will increase the concentration of fumes in the air. Containers may explode when heated.
- Extinguishing Media: For large fires, use water spray, fog, or alcohol-resistant foam. Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Do NOT get water inside containers. Do NOT use straight streams of water. Most foams will react with the material and release corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out. For small fires, use carbon dioxide (except for cyanides), dry chemical, dry sand, and alcohol-resistant foam.
- Autoignition Temperature: Not applicable.
- Flash Point: Not applicable.
- Explosion Limits: Lower: Not available
- Explosion Limits: Upper: Not available
- NFPA Rating: health: 3; flammability: 0; instability: 1;

Section 6 - Accidental Release Measures

- General Information: Use proper personal protective equipment as indicated in Section 8.
- Spills/Leaks: Large spills may be neutralized with dilute alkaline solutions of soda ash (sodium carbonate, Na_2CO_3), or lime (calcium oxide, CaO). Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Provide ventilation. Do not get water inside containers. A vapor suppressing foam may be used to reduce vapors. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.

Section 7 - Handling and Storage

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. Do not breathe dust, mist, or vapor. Do

Handling: not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes. Use caution when opening. Keep from contact with moist air and steam.

Storage: Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store in metal containers. Do not store near flammable or oxidizing substances (especially nitric acid or chlorates).

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hydrogen chloride	2 ppm Ceiling	50 ppm IDLH	5 ppm Ceiling; 7 mg/m3 Ceiling
Water	none listed	none listed	none listed

OSHA Vacated PELs: Hydrogen chloride: None listed Water: None listed

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Personal Protective Equipment

Eyes: Wear chemical splash goggles and face shield.

Skin: Wear neoprene or polyvinyl chloride gloves to prevent exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid

Color: colorless to slight yellow

Odor: strong, pungent

pH: 0.01

Vapor Pressure: 5.7 mm Hg @ 0 deg C

Vapor Density: 1.26

Evaporation Rate: > 1.00 (N-butyl acetate)

Viscosity: Not available

Boiling Point: 81.5 - 110 deg C @ 760 mmHg

Freezing/Melting Point: -74 deg C (-101.20°F)

Decomposition Temperature: Not available

Solubility in water: Miscible

Specific Gravity/Density: 1.0-1.2

Molecular Formula: HCl.H₂O

Molecular Weight: 36.46

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid:

Mechanical shock, incompatible materials, metals, excess heat, exposure to moist air or water, bases.

Incompatibilities with Other Materials

Bases, acetic anhydride, alkali metals, aluminum, amines, copper, copper alloys, fluorine, iron, sodium hydroxide, steel, sulfuric acid, vinyl acetate, zinc, potassium permanganate, cesium acetylene carbide, rubidium acetylene carbide, rubidium carbide, sodium, chlorosulfonic acid, oleum, carbonates, perchloric acid, calcium phosphide, metal oxides, acetates, cesium carbide, beta-propiolactone, ethyleneimine, propylene oxide, lithium silicides, alcohols + hydrogen cyanide, 2-aminoethanol, ammonium hydroxide, calcium carbide, 1,1-difluoroethylene, ethylene diamine, magnesium boride,

mercuric sulfate, uranium phosphide.

Hazardous

Decomposition
Products

Hydrogen chloride, chlorine, carbon monoxide, carbon dioxide, hydrogen gas.

Hazardous

Polymerization

Will not occur.

Section 11 - Toxicological Information

RTECS#:

CAS# 7647-01-0: MW4025000 MW4031000

CAS# 7732-18-5: ZC0110000

RTECS:

CAS# 7647-01-0: Inhalation, mouse: LC50 = 1108 ppm/1H;

Inhalation, mouse: LC50 = 20487 mg/m3/5M;

Inhalation, mouse: LC50 = 3940 mg/m3/30M;

Inhalation, mouse: LC50 = 8300 mg/m3/30M;

Inhalation, rat: LC50 = 3124 ppm/1H;

Inhalation, rat: LC50 = 60938 mg/m3/5M;

LD50/LC50: Inhalation, rat: LC50 = 7004 mg/m3/30M;

Inhalation, rat: LC50 = 45000 mg/m3/5M;

Inhalation, rat: LC50 = 8300 mg/m3/30M;

Oral, rabbit: LD50 = 900 mg/kg;

RTECS:

CAS# 7732-18-5: Oral, rat: LD50 = >90 mL/kg;

Carcinogenicity:

Hydrogen chloride - IARC: Group 3 (not classifiable)

Water - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

Other:

Rinsed with water test: Administration into the eye (rabbit) = 5 mg/30sec (Mild).

Section 12 - Ecological Information

Ecotoxicity:

Fish: Bluegill/Sunfish: 3.6 mg/L; 48Hr; Lethal (unspecified)

Fish: Bluegill/Sunfish: LC50; 96 Hr; pH 3.0-3.5

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT

Shipping Name: HYDROCHLORIC ACID

Hazard Class: 8

UN Number: UN1789

Packing Group: II

Canada TDG

Shipping Name: Not available

Hazard Class:

UN Number:

Packing Group:

USA RQ: CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T C

Risk Phrases:

R 23 Toxic by inhalation.

R 35 Causes severe burns.

Safety Phrases:

S 1/2 Keep locked up and out of reach of children.

S 9 Keep container in a well-ventilated place.

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 7647-01-0: 1

CAS# 7732-18-5: Not available

Canada

CAS# 7647-01-0 is listed on Canada's DSL List

CAS# 7732-18-5 is listed on Canada's DSL List

Canadian WHMIS Classifications: E, D2A

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 7647-01-0 is listed on Canada's Ingredient Disclosure List

CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.

US Federal

TSCA

CAS# 7647-01-0 is listed on the TSCA
Inventory.

CAS# 7732-18-5 is listed on the TSCA
Inventory.

REVIEWED

DATE: JUNE 7/2012
Chatterford

Section 16 - Other Information

MSDS Creation Date: 7/06/1999

Revision #7 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.

**AIR LIQUIDE**

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: NON-FLAMMABLE GAS MIXTURE

Containing One or More of the Following Components in a Nitrogen Balance Gas:
Oxygen 0-23.5%; Isobutylene, 0.0005-0.9%

SYNONYMS: Not Applicable

CHEMICAL FAMILY NAME: Not Applicable

FORMULA: Not Applicable

Document Number: 50054

Note: The Material Safety Data Sheet is for this gas mixture supplied in cylinders with 33 cubic feet (935 liters) or less gas capacity (DOT - 39 cylinders). This MSDS has been developed for various gas mixtures with the composition of components within the ranges listed in Section 2 (Composition and Information on Ingredients). Refer to the product label for information on the actual composition of the product.

PRODUCT USE:	Calibration of Monitoring and Research Equipment
SUPPLIER/MANUFACTURER'S NAME:	AIR LIQUIDE AMERICA CORPORATION
ADDRESS:	821 Chesapeake Drive Cambridge, MD 21613
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300
BUSINESS PHONE:	1-410-228-6400 General MSDS Information 1-713/868-0440 Fax on Demand: 1-800/231-1366

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	
Oxygen	7782-44-7	0 - 23.5%	There are no specific exposure limits for Oxygen.					
Isobutylene	115-11-7	0.0005 - 0.9%	There are no specific exposure limits for Isobutylene.					
Nitrogen	7727-37-9	Balance	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

NE = Not Established.

C = Ceiling Limit.

See Section 16 for Definitions of Terms Used.

NOTE : All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product is a colorless, odorless gas. Releases of this product may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated. Isobutylene, a component of this gas mixture, may cause drowsiness and other central nervous system effects in high concentrations; however, due to its low concentration in this gas mixture, this is unlikely to occur.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this product is by inhalation.

INHALATION: Due to the small size of an individual cylinder of this product, no unusual health effects from over-exposure to the product are anticipated under routine circumstances of use. The chief health hazard associated with this gas mixture is when this product contains less than 19.5% Oxygen and is released in a small, poorly-ventilated area (i.e. an enclosed or confined space). Under this circumstance, an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The effects associated with various levels of oxygen are as follows:

CONCENTRATION OF OXYGEN

OBSERVED EFFECT

12-16% Oxygen:	Breathing and pulse rate increase, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea, vomiting, collapse, or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Over-exposure to this gas mixture may cause the following health effects:

ACUTE: Due to the small size of the individual cylinder of this product, no unusual health effects from exposure to the product are anticipated under routine circumstances of use. The most significant hazard associated with this gas mixture when it contains less than 19.5% oxygen is the potential for exposure to oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, unconsciousness, and death. The skin of a victim of over-exposure may have a blue color. Additionally, Isobutylene, a component of this gas mixture, may cause drowsiness or central nervous system effects in high concentrations; however, due to its low concentration in this gas mixture, this is unlikely to occur.

CHRONIC: There are currently no known adverse health effects associated with chronic exposure to this gas mixture.

TARGET ORGANS: Respiratory system.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	1
FLAMMABILITY		(RED)	0
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			B
EYES	RESPIRATORY	HANDS	BODY
See Section 8			
For routine industrial applications			

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn.

No unusual health effects are anticipated after exposure to this product, due to the small cylinder size. If any adverse symptom develops after over-exposure to this product, remove victim(s) to fresh air as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary.

4. FIRST-AID MEASURES (Continued)

Victim(s) who experience any adverse effect after over-exposure to this product must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

5. FIRE-FIGHTING MEASURES

FLASH POINT, (method): Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

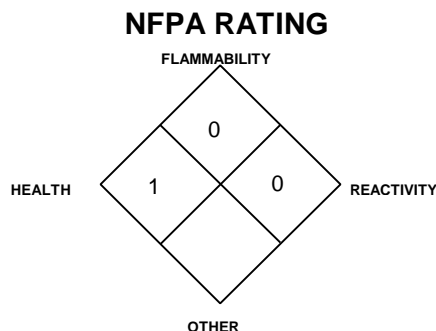
FIRE EXTINGUISHING MATERIALS: Non-flammable gas mixture. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.



6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Due to the small size and content of the cylinder, an accidental release of this product presents significantly less risk of an oxygen deficient environment and other safety hazards than a similar release from a larger cylinder. However, as with any chemical release, extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate immediate area. Such releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for oxygen. Oxygen levels must be above 19.5% before non-emergency personnel are allowed to re-enter area.

If leaking incidentally from the cylinder, contact your supplier.

7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly-ventilated area; exposures to fatal concentrations of this product could occur without any significant warning symptoms, due to oxygen deficiency. Do not attempt to repair, adjust, or in any other way modify cylinders containing this gas mixture. If there is a malfunction or another type of operational problem, contact nearest distributor immediately.

STORAGE AND HANDLING PRACTICES: Cylinders should be firmly secured to prevent falling or being knocked-over. Cylinders must be protected from the environment, and preferably kept at room temperature (approximately 21°C; 70°F). Cylinders should be stored in dry, well-ventilated areas, away from sources of heat, ignition, and direct sunlight. Protect cylinders against physical damage.

Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. These cylinders are not refillable. **WARNING! Do not refill DOT 39 cylinders. To do so may cause personal injury or property damage.**

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: WARNING! Compressed gases can present significant safety hazards. During cylinder use, use equipment designed for these specific cylinders. Ensure all lines and equipment are rated for proper service pressure.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: No special ventilation systems or engineering controls are needed under normal circumstances of use. As with all chemicals, use this product in well-ventilated areas. If this product is used in a poorly-ventilated area, install automatic monitoring equipment to detect the levels of oxygen.

RESPIRATORY PROTECTION: No special respiratory protection is required under normal circumstances of use. Use supplied air respiratory protection if oxygen levels are below 19.5% or unknown during emergency response to a release of this product. If respiratory protection is required for emergency response to this product, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent State standards.

EYE PROTECTION: Safety glasses.

HAND PROTECTION: No special protection is needed under normal circumstances of use.

BODY PROTECTION: No special protection is needed under normal circumstances of use.

9. PHYSICAL and CHEMICAL PROPERTIES

Unless otherwise specified, the following information is for Nitrogen, the main component of this gas mixture.

GAS DENSITY @ 32°F (0°C) and 1 atm: 0.072 lbs/ ft³ (1.153 kg/m³)

BOILING POINT: -195.8°C (-320.4 °F)

FREEZING/MELTING POINT @ 10 psig -210°C (-345.8°F)

SPECIFIC GRAVITY (air = 1) @ 70°F (21.1°C): 0.906

pH: Not applicable.

SOLUBILITY IN WATER vol/vol @ 32°F (0°C) and 1 atm: 0.023

MOLECULAR WEIGHT: 28.01

EVAPORATION RATE (nBuAc = 1): Not applicable.

EXPANSION RATIO: Not applicable.

ODOR THRESHOLD: Not applicable.

SPECIFIC VOLUME (ft³/lb): 13.8

VAPOR PRESSURE @ 70°F (21.1°C) psig: Not applicable.

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

The following information is for this gas mixture.

APPEARANCE AND COLOR: This product is a colorless, odorless gas.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no unusual warning properties associated with a release of this product.

10. STABILITY and REACTIVITY

STABILITY: Normally stable in gaseous state.

DECOMPOSITION PRODUCTS: The thermal decomposition products of Isobutylene include carbon oxides. The other components of this gas mixture do not decompose, per se, but can react with other compounds in the heat of a fire.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Titanium will burn in Nitrogen (the main component of this product). Lithium reacts slowly with Nitrogen at ambient temperatures. A component of this product (Isobutylene) are also incompatible with strong oxidizers (i.e. chlorine, bromine pentafluoride, oxygen difluoride, and nitrogen trifluoride).

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials. Cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicology data are available for the components of this product:

NITROGEN: There are no specific toxicology data for Nitrogen. Nitrogen is a simple asphyxiant, which acts to displace oxygen in the environment.

ISOBUTYLENE:
LC₅₀ (inhalation, rat) = 620,000 mg/kg/4 hours
LC₅₀ (inhalation, mouse) = 415,000 mg/kg

11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: The components of this gas mixture are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and IARC; therefore, they are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: Not applicable.

SENSITIZATION TO THE PRODUCT: This gas mixture is not known to cause sensitization in humans.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: No mutagenicity effects have been described for this gas mixture.

Embryotoxicity: No embryotoxic effects have been described for this gas mixture.

Teratogenicity: No teratogenicity effects have been described for this gas mixture.

Reproductive Toxicity: No reproductive toxicity effects have been described for gas mixture.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by over-exposure to the components of this product.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary; treat symptoms; eliminate exposure.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for the components of this gas mixture.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: The components of this gas mixture occur naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas. The following environmental data are applicable to the components of this product.

OXYGEN: Water Solubility = 1 volume Oxygen/32 volumes water at 20°C. Log K_{ow} = -0.65

NITROGEN: Water Solubility = 2.4 volumes Nitrogen/100 volumes water at 0°C. 1.6 volumes Nitrogen/100 volumes water at 20°C.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plant and animal life.

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

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Cylinders with undesired residual product may be safely vented outdoors with the proper regulator. For further information, refer to Section 16 (Other Information).

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Compressed gases, n.o.s. (Nitrogen, Oxygen)

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not applicable.

DOT LABEL(S) REQUIRED: Non-Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 126

MARINE POLLUTANT: The components of this gas mixture are not classified by the DOT as Marine Pollutants (as defined by 49 CFR 172.101, Appendix B).

14. TRANSPORTATION INFORMATION (Continued)

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Note: DOT 39 Cylinders ship in a strong outer carton (overpack). Pertinent shipping information goes on the outside of the overpack. DOT 39 Cylinders do not have transportation information on the cylinder itself.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: This product is subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

COMPONENT	SARA 302	SARA 304	SARA 313
Oxygen	NO	NO	NO
Nitrogen	NO	NO	NO
Isobutylene	NO	NO	NO

SARA THRESHOLD PLANNING QUANTITY: Not applicable.

TSCA INVENTORY STATUS: The components of this gas mixture are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

OTHER U.S. FEDERAL REGULATIONS:

- No component of this product is subject to the requirements of CFR 29 1910.1000 (under the 1989 PELs).
- Isobutylene is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 pounds.
- The regulations of the Process Safety Management of Highly Hazardous Chemicals are not applicable (29 CFR 1910.119).
- This gas mixture does not contain any Class I or Class II ozone depleting chemicals (40 CFR Part 82).
- Nitrogen and Oxygen are not listed as Regulated Substances, per 40 CFR, Part 68, of the Risk Management for Chemical Releases. Isobutylene is listed under this regulation in Table 3 as Regulated Substances (Flammable Substances), in quantities of 10,000 lbs (4,553 kg) or greater.

OTHER CANADIAN REGULATIONS: This gas mixture is categorized as a Controlled Product, Hazard Class A, as per the Controlled Product Regulations.

STATE REGULATORY INFORMATION: The components of this gas mixture are covered under the following specific State regulations:

Alaska - Designated Toxic and Hazardous Substances: No.

California - Permissible Exposure Limits for Chemical Contaminants: Nitrogen.

Florida - Substance List: Oxygen, Isobutylene.

Illinois - Toxic Substance List: No.

Kansas - Section 302/313 List: No.

Massachusetts - Substance List: Oxygen, Isobutylene.

Michigan - Critical Materials Register: No.

Minnesota - List of Hazardous Substances: No.

Missouri - Employer Information/Toxic Substance List: No.

New Jersey - Right to Know Hazardous Substance List: Oxygen, Nitrogen, Isobutylene.

North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.

Pennsylvania - Hazardous Substance List: Oxygen, Nitrogen, Isobutylene.

Rhode Island - Hazardous Substance List: Oxygen, Nitrogen.

Texas - Hazardous Substance List: No.

West Virginia - Hazardous Substance List: No.

Wisconsin - Toxic and Hazardous Substances: : No.

CALIFORNIA PROPOSITION 65: No component of this product is on the California Proposition 65 lists.

16. OTHER INFORMATION

INFORMATION ABOUT DOT-39 NRC (Non-Refillable Cylinder) PRODUCTS

DOT 39 cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material or waste. Residual gas in this type of cylinder is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packaged in these cylinders are Nonflammable n.o.s., UN 1956. A small percentage of calibration gases packaged in DOT 39 cylinders are flammable or oxidizing gas mixtures.

For disposal of used DOT-39 cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that employed with other DOT containers such as spray paint cans, household aerosols, or disposable cylinders of propane (for camping, torch etc.). When feasible, we recommended recycling for scrap metal content. Air Liquide America will do this for any customer that wishes to return cylinders to us prepaid. All that is required is a phone call to make arrangements so we may anticipate arrival. Scrapping cylinders involves some preparation before the metal dealer may accept them. We perform this operation as a service to valued customers who want to participate.

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about the handling of compressed gases can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102. Telephone: (703) 412-0900.

P-1 *"Safe Handling of Compressed Gases in Containers"*
AV-1 *"Safe Handling and Storage of Compressed Gases"*
 "Handbook of Compressed Gases"

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
 9163 Chesapeake Drive, San Diego, CA 92123-1002
 619/565-0302
 Fax on Demand: 1-800/231-1366



This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of Air Liquide America Corporation's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this product is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.

LIQUINOX MSDS

Section 1 : PRODUCT AND COMPANY IDENTIFICATION

Chemical family: Detergent.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency 800-255-3924.

phone number: 813-248-0585 (outside of the United States).

Supplier: Same as manufacturer.

Product name: Liquinox

Section 2 : INGREDIENT INFORMATION

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE

Section 3 : HAZARD IDENTIFICATION

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of acute exposure

Eye contact: May cause irritation.

Skin contact: Prolonged and repeated contact may cause irritation.

Inhalation: May cause headache and nausea.

Ingestion: May cause vomiting and diarrhea.
May cause gastric distress.

Effects of chronic exposure: See effects of acute exposure.

Section 4 : FIRST AID MEASURES

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

- Eye contact:** Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.
- Inhalation:** Remove victim to fresh air.
If irritation persists, seek medical attention.
- Ingestion:** Do not induce vomiting, seek medical attention.
Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.

Section 5 : FIRE FIGHTING MEASURES

- Flammability:** Not flammable.
- Conditions of flammability:** Surrounding fire.
- Extinguishing media:** Carbon dioxide, dry chemical, foam.
Water
Water fog.
- Special procedures:** Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.
Use water spray to cool fire exposed containers.
- Auto-ignition temperature:** Not available.
- Flash point (°C), method:** None
- Lower flammability limit (% vol):** Not applicable.
- Upper flammability limit (% vol):** Not applicable.
- Explosion Data**
- Sensitivity to static discharge:** Not available.
- Sensitivity to mechanical impact:** Not available.
- Hazardous combustion products:** Oxides of carbon (COx).
Hydrocarbons.
- Rate of burning:** Not available.
- Explosive power:** Containers may rupture if exposed to heat or fire.

Section 6 : ACCIDENTAL RELEASE MEASURES

- Leak/Spill:** Contain the spill.
Prevent entry into drains, sewers, and other waterways.
Wear appropriate protective equipment.
Small amounts may be flushed to sewer with water.
Soak up with an absorbent material.
Place in appropriate container for disposal.
Notify the appropriate authorities as required.

Section 7 : HANDLING AND STORAGE

- Handling procedures and equipment:** Protect against physical damage.
Avoid breathing vapors/mists.

Wear personal protective equipment appropriate to task.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Avoid extreme temperatures.
Launder contaminated clothing prior to reuse.

Storage requirements: Store away from incompatible materials.
Keep containers closed when not in use.

Section 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

Precautionary Measures

Gloves/Type:



Wear appropriate gloves.

Respiratory/Type: None required under normal use.

Eye/Type:



Safety glasses recommended.

Footwear/Type: Safety shoes per local regulations.

Clothing/Type: As required to prevent skin contact.

Other/Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

Exposure limit of material: Not available.

Section 9 : PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Liquid.

Appearance & odor: Odourless.
Pale yellow.

Odor threshold (ppm): Not available.

Vapour pressure @ 20°C (68°F):
(mmHg): 17

Vapour density (air=1): >1

Volatiles (%)

By volume: Not available.

Evaporation rate (butyl acetate = 1): < 1.

Boiling point (°C): 100 (212F)

Freezing point (°C): Not available.

pH: 8.5

Specific gravity @ 20 °C: (water = 1).
1.083

Solubility in water (%): Complete.

**Coefficient of water\oil
dist.:** Not available.

VOC: None

Chemical family: Detergent.

Section 10 : STABILITY AND REACTIVITY

Chemical stability: Product is stable under normal handling and storage conditions.

Conditions of instability: Extreme temperatures.

**Hazardous
polymerization:** Will not occur.

**Incompatible
substances:** Strong acids.
Strong oxidizing agents.

**Hazardous
decomposition products:** See hazardous combustion products.

Section 11 : TOXICOLOGICAL INFORMATION

**LD50 of product, species
& route:** > 5000 mg/kg rat oral.

**LC50 of product, species
& route:** Not available.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Section 12 : ECOLOGICAL INFORMATION

Environmental toxicity: No data at this time.

Environmental fate: No data at this time.

Section 13 : DISPOSAL CONSIDERATIONS

Waste disposal: In accordance with local and federal regulations.

Section 14 : TRANSPORT INFORMATION

ADR CLASSIFICATION: Not regulated.

**Special shipping
information:** Not regulated.

Section 15 : REGULATORY INFORMATION

**Canadian Regulatory
Information**

WHMIS classification: Not controlled.

DSL status: Not available.

**USA Regulatory
Information**

SARA hazard categories sections 311/312: Immediate (Acute) Health Hazard: No.
Delayed (Chronic) Health Hazard: No.
Fire Hazard: No.
Sudden Release of Pressure: No.
Reactive: No.

SARA Section 313: None

TSCA inventory: All components of this product are listed on the TSCA inventory.

**EU Regulatory
Information**

European Union (EU) Regulatory Information: EU labeling not required.
This product is not dangerous as defined by the European Union.

EU Risks: Not applicable.

EU Safety: S2: Keep out of the reach of children.

EINECS#: CAS# 25155-30-0 - EINECS# 246-680-4.

EU Symbols: Not applicable.

NFPA

Health Hazard: 1

Flammability: 0

Physical hazard: 0

Section 16 : OTHER INFORMATION

Supplier MSDS date: 2007/10/04

Data prepared by: Global Safety Management
3340 Peachtree Road, #1800
Atlanta, GA 30326

Phone: 877-683-7460

Fax: (877) 683-7462

Web: www.globalsafetynet.com

Email: info@globalsafetynet.com.

General note: This material safety data sheet was prepared from information obtained from various sources, including product suppliers and the Canadian Center for Occupational Health and Safety.

SAFETY DATA SHEET

1. Identification

Product identifier: NITRIC ACID

Other means of identification

Synonyms: Aqua Fortis, Azotic Acid

CAS No.: 7697-37-2

Recommended use and restriction on use

Recommended use: Not available.

Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company Name: Quality Environmental Containers, Inc.
Address: 607 Industrial Park Road • PO Box 1160
Beaver, WV 25813
Telephone: Customer Service: 800-255-3950
e-mail: info@qecusa.com

Emergency telephone number:
Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard classification

Physical hazards

Oxidizing liquids	Category 3
Corrosive to metals	Category 1

Health hazards

Skin corrosion/irritation	Category 1A
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Unknown toxicity

Acute toxicity, oral	65 %
Acute toxicity, dermal	65 %
Acute toxicity, inhalation, vapor	100 %
Acute toxicity, inhalation, dust or mist	100 %

Unknown toxicity

Acute hazards to the aquatic environment	65 %
Chronic hazards to the aquatic environment	65 %

Label elements

Hazard symbol:



Signal word: Danger

Hazard statement: May intensify fire; oxidizer.
May be corrosive to metals.
Causes severe skin burns and eye damage.

Precautionary statement

Prevention: Wear protective gloves/protective clothing/eye protection/face protection. Wash hands thoroughly after handling. Keep only in original container. Keep away from heat. Keep/Store away from clothing/combustible materials. Take any precaution to avoid mixing with combustibles. Use only outdoors or in a well-ventilated area.

Response: In case of fire: Use water spray, foam, dry powder or carbon dioxide for extinction. Immediately call a POISON CENTER/doctor. IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Absorb spillage to prevent material damage.

Storage: Store locked up. Store in corrosive resistant container with a resistant inner liner. Store in a well-ventilated place. Keep container tightly closed.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Mixtures

Chemical identity	Common name and synonyms	CAS number	Content in percent (%)*
NITRIC ACID		7697-37-2	10 - 70%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Call a physician or poison control center immediately. Do NOT induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation:	Move to fresh air. Call a physician or poison control center immediately. If breathing stops, provide artificial respiration. If breathing is difficult, give oxygen.
Skin contact:	Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician or poison control center immediately. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.
Eye contact:	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Call a physician or poison control center immediately. In case of irritation from airborne exposure, move to fresh air. Get medical attention immediately.

Most important symptoms/effects, acute and delayed

Symptoms:	Corrosive to skin and eyes. Causes digestive tract burns. Spray mists may cause respiratory tract irritation.
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Indication of immediate medical attention and special treatment needed

Treatment:	Treat symptomatically. Symptoms may be delayed.
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5. Fire-fighting measures

General fire hazards:	Strong oxidizer - contact with other material may cause fire.
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Suitable (and unsuitable) extinguishing media

Suitable extinguishing media:	Water spray, fog, CO2, dry chemical, or regular foam.
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Unsuitable extinguishing media:	None known.
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Specific hazards arising from the chemical:	Oxidizing Contact with combustible material may cause fire. Fire may produce irritating, corrosive and/or toxic gases.
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Special protective equipment and precautions for firefighters

Special fire fighting procedures:	Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out.
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Special protective equipment for fire-fighters:	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
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6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	Keep unauthorized personnel away. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Use personal protective equipment. See Section 8 of the MSDS for Personal Protective Equipment. Ventilate closed spaces before entering them. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
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Methods and material for containment and cleaning up:

Keep combustibles (wood, paper, oil, etc.) away from spilled material. Stop leak if possible without any risk. Do not absorb in sawdust or other combustible materials. Absorb spill with vermiculite or other inert material. Collect in a non-combustible container for prompt disposal. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.

Notification Procedures:

Dike for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk. Inform authorities if large amounts are involved.

Environmental precautions:

Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling:

Keep away from combustible material. Do not get in eyes, on skin, on clothing. Wash hands thoroughly after handling. Do not eat, drink or smoke when using the product. Do not taste or swallow. Never add water to acid! Never pour water into acid/base. Dilute by slowly pouring the product into water while stirring.

Conditions for safe storage, including any incompatibilities:

Do not store in metal containers. Store away from heat and light. Keep away from combustible material. Keep containers closed when not in use. Store in a cool, dry place. Keep container in a well-ventilated place.

8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Chemical identity	Type	Exposure Limit values	Source
NITRIC ACID	TWA	2 ppm	US. ACGIH Threshold Limit Values (2011)
	STEL	4 ppm	US. ACGIH Threshold Limit Values (2011)
	STEL	4 ppm 10 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	REL	2 ppm 5 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	PEL	2 ppm 5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	TWA	2 ppm 5 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	STEL	4 ppm 10 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)

Appropriate engineering controls

No data available.

Individual protection measures, such as personal protective equipment

General information:

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area.

Eye/face protection:

Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection:

Chemical resistant gloves

Other:	Wear suitable protective clothing.
Respiratory protection:	In case of inadequate ventilation use suitable respirator. Chemical respirator with acid gas cartridge.
Hygiene measures:	Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.

9. Physical and chemical properties

Appearance

Physical state:	Liquid
Form:	Liquid
Color:	Colorless to slightly yellow
Odor:	Pungent
Odor threshold:	No data available.
pH:	1 (0.1 molar aqueous solution)
Melting point/freezing point:	-42 °C
Initial boiling point and boiling range:	122 °C
Flash Point:	Not applicable
Evaporation rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	No data available.
Flammability limit - lower (%):	No data available.
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	6.4 kPa
Vapor density:	2.5
Relative density:	1.41 (20 °C)
Solubility(ies)	
Solubility in water:	Soluble
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	No data available.

10. Stability and reactivity

Reactivity:	Reacts violently with strong alkaline substances.
Chemical stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	Hazardous polymerization does not occur. Decomposes on heating.
Conditions to avoid:	Reacts violently with strong alkaline substances. Avoid contact with strong reducing agents. Excessive heat. Contact with incompatible materials.
Incompatible materials:	Alcohols. Reducing agents. Metals. Alkalies.
Hazardous decomposition products:	Nitrogen Oxides By heating and fire, corrosive vapors/gases may be formed.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	May cause burns of the gastrointestinal tract if swallowed.
Inhalation:	May cause damage to mucous membranes in nose, throat, lungs and bronchial system.
Skin contact:	Causes severe skin burns.
Eye contact:	Causes serious eye damage.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral	
Product:	No data available.
Dermal	
Product:	No data available.
Inhalation	
Product:	No data available.
Specified substance(s):	
NITRIC ACID	LC 50 (Rat, 4 h): 65 mg/l
Repeated dose toxicity	
Product:	No data available.

Skin corrosion/irritation

Product:	Causes severe skin burns.
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Serious eye damage/eye irritation

Product:	Causes serious eye damage.
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Respiratory or skin sensitization

Product:	Not a skin nor a respiratory sensitizer.
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Carcinogenicity

Product:	This substance has no evidence of carcinogenic properties.
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IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:

No carcinogenic components identified

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):

No carcinogenic components identified

Germ cell mutagenicity

In vitro

Product: No mutagenic components identified

In vivo

Product: No mutagenic components identified

Reproductive toxicity

Product: No components toxic to reproduction

Specific target organ toxicity - single exposure

Product: None known.

Specific target organ toxicity - repeated exposure

Product: None known.

Aspiration hazard

Product: Not classified

Other effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish

Product: No data available.

Specified substance(s):

NITRIC ACID LC 50 (Fish, 48 h): 100 - 330 mg/l Mortality

Aquatic invertebrates

Product: No data available.

Specified substance(s):

NITRIC ACID LC 50 (Cockle (Cerastoderma edule), 48 h): 330 - 1,000 mg/l Mortality
LC 50 (Green or European shore crab (Carcinus maenas), 48 h): 180 mg/l Mortality

Chronic hazards to the aquatic environment:

Fish

Product: No data available.

Aquatic invertebrates

Product: No data available.

Toxicity to Aquatic Plants

Product: No data available.

Persistence and degradability

Biodegradation

Product: Expected to be readily biodegradable.

BOD/COD ratio

Product: No data available.

Bioaccumulative potential

Bioconcentration factor (BCF)

Product: No data available on bioaccumulation.

Partition coefficient n-octanol / water (log Kow)**Product:** No data available.**Mobility in soil:** The product is water soluble and may spread in water systems.**Other adverse effects:** The product may affect the acidity (pH-factor) in water with risk of harmful effects to aquatic organisms.**13. Disposal considerations****Disposal instructions:** Discharge, treatment, or disposal may be subject to national, state, or local laws.**Contaminated packaging:** Since emptied containers retain product residue, follow label warnings even after container is emptied.**14. Transport information****DOT**

UN number:	UN 2031
UN proper shipping name:	Nitric acid
Transport hazard class(es)	
Class(es):	8, 5.1
Label(s):	8, 5.1
Packing group:	II
Marine Pollutant:	No

IMDG

UN number:	UN 2031
UN proper shipping name:	NITRIC ACID
Transport hazard class(es)	
Class(es):	8, 5.1
Label(s):	8, 5.1
EmS No.:	F-A, S-Q
Packing group:	II
Marine Pollutant:	No

IATA

UN number:	UN 2031
Proper Shipping Name:	Nitric acid
Transport hazard class(es):	
Class(es):	8, 5.1
Label(s):	8, 5.1
Marine Pollutant:	No
Packing group:	II

15. Regulatory information**US federal regulations****TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)****US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

NITRIC ACID Reportable quantity: 1000 lbs.

Superfund amendments and reauthorization act of 1986 (SARA)

Hazard categories

☒ Acute (Immediate) ☒ Chronic (Delayed) ☒ Fire ☐ Reactive ☐ Pressure Generating

SARA 302 Extremely hazardous substance

Chemical identity	RQ	Threshold Planning Quantity
NITRIC ACID	1000 lbs.	1000 lbs.

SARA 304 Emergency release notification

Chemical identity	RQ
NITRIC ACID	1000 lbs.

SARA 311/312 Hazardous chemical

Chemical identity	Threshold Planning Quantity
NITRIC ACID	500lbs

SARA 313 (TRI reporting)

Chemical identity	Reporting threshold for other users	Reporting threshold for manufacturing and processing
NITRIC ACID	10000 lbs	25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

NITRIC ACID Reportable quantity: 1000 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

NITRIC ACID Threshold quantity: 15000 lbs

US state regulations

US. California Proposition 65

No ingredient regulated by CA Prop 65 present.

US. New Jersey Worker and Community Right-to-Know Act

NITRIC ACID Listed

US. Massachusetts RTK - Substance List

NITRIC ACID Listed

US. Pennsylvania RTK - Hazardous Substances

NITRIC ACID Listed

US. Rhode Island RTK

NITRIC ACID Listed

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EINECS, ELINCS or NLP:	On or in compliance with the inventory
Japan (ENCS) List:	On or in compliance with the inventory
China Inv. Existing Chemical Substances:	Not in compliance with the inventory.
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Japan ISHL Listing:	Not in compliance with the inventory.
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16. Other information, including date of preparation or last revision

NFPA Hazard ID



Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe
 OXY: Oxidizer

Issue date:	06-04-2014
Revision date:	No data available.
Version #:	2.0
Further information:	No data available.

Disclaimer:

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SAFETY DATA SHEET

1. Identification

Product identifier: Sodium Hydroxide, Solution, 0.1 - 2.0 N

Other means of identification

CAS No.: 1310-73-2

Recommended use and restriction on use

Recommended use: Not available.

Restrictions on use: Not known.

Details of the supplier of the safety data sheet

Manufacturer

Company Name: Quality Environmental Containers, Inc.
Address: 607 Industrial Park Road • PO Box 1160
Beaver, WV 25813

Telephone: Customer Service: 800-255-3950

E-mail: info@qecusa.com

Emergency telephone number:

CHEMTREC: 1-800-424-9300

2. Hazard(s) identification

Hazard Classification

Physical Hazards

Corrosive to metals Category 1

Health Hazards

Skin Corrosion/Irritation Category 1A

Serious Eye Damage/Eye Irritation Category 1

Unknown toxicity - Health

Acute toxicity, inhalation, vapor	100 %
Acute toxicity, inhalation, dust or mist	100 %

Unknown toxicity - Environment

Chronic hazards to the aquatic environment	1 %
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Label Elements

Hazard Symbol:



Signal Word:	Danger
Hazard Statement:	May be corrosive to metals. Causes severe skin burns and eye damage.
Precautionary Statement	
Prevention:	Keep only in original container. Wash thoroughly after handling. Do not breathe dust/fume/gas/mist/vapors/spray. Wear protective gloves/protective clothing/eye protection/face protection.
Response:	Absorb spillage to prevent material damage. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician. IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Storage:	Store locked up. Store in corrosive resistant container with a resistant inner liner.
Disposal:	Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.
Other hazards which do not result in GHS classification:	None.

3. Composition/information on ingredients

Mixtures

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
SODIUM HYDROXIDE		1310-73-2	0.8 - 8%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information:	Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.
Ingestion:	Call a physician or poison control center immediately. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Inhalation:	Move to fresh air. Get medical attention if symptoms persist. Apply artificial respiration if victim is not breathing. If breathing is difficult, give oxygen.
Skin Contact:	Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician or poison control center immediately. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Call a physician or poison control center immediately.

Most important symptoms/effects, acute and delayed

Symptoms: Corrosive to skin and eyes.

Hazards: Corrosive.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General Fire Hazards: The product is non-combustible. Product is highly caustic.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: The product is non-combustible. Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media: None known.

Specific hazards arising from the chemical: Fire may produce irritating, corrosive and/or toxic gases. Product is highly caustic. Wear appropriate protective gear if spilled during fire fighting.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Keep unauthorized personnel away. Keep upwind. Ventilate closed spaces before entering them. Use personal protective equipment. See Section 8 of the SDS for Personal Protective Equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Methods and material for containment and cleaning up: Neutralize spill area and washings with dilute acetic acid. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.

Notification Procedures: Dike for later disposal. Stop the flow of material, if this is without risk. Prevent entry into waterways, sewer, basements or confined areas. Inform authorities if large amounts are involved.

Environmental Precautions: Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.

7. Handling and storage

Precautions for safe handling: Avoid inhalation of vapors and spray mists. Do not get in eyes, on skin, on clothing. Do not eat, drink or smoke when using the product. Use only with adequate ventilation. Wash hands thoroughly after handling.

Conditions for safe storage, including any incompatibilities: Do not store in metal containers. Keep container tightly closed in a cool, well-ventilated place. Store in a dry place.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

Chemical Identity	type	Exposure Limit Values	Source
SODIUM HYDROXIDE	Ceiling	2 mg/m ³	US. ACGIH Threshold Limit Values (2011)
	Ceil_Time	2 mg/m ³	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	PEL	2 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	Ceiling	2 mg/m ³	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)

Appropriate Engineering Controls Adequate ventilation should be provided so that exposure limits are not exceeded.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Eye/face protection: Wear safety glasses with side shields (or goggles). Wear face shield if there is risk of splashes.

Skin Protection

Hand Protection: Chemical resistant gloves

Other: Wear suitable protective clothing and gloves.

Respiratory Protection: In case of inadequate ventilation use suitable respirator.

Hygiene measures: Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.

9. Physical and chemical properties

Appearance

Physical state: liquid
Form: liquid
Color: Colorless

Odor: Odorless

Odor threshold: No data available.

pH: 14

Melting point/freezing point:	-4 °C
Initial boiling point and boiling range:	102 °C
Flash Point:	not applicable
Evaporation rate:	As water
Flammability (solid, gas):	Not applicable.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	No data available.
Flammability limit - lower (%):	No data available.
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	No data available.
Vapor density:	No data available.
Relative density:	1.05 (20 °C)
Solubility(ies)	
Solubility in water:	Soluble
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	No data available.

10. Stability and reactivity

Reactivity:	Reacts violently with strong acids.
Chemical Stability:	Material is stable under normal conditions.
Possibility of Hazardous Reactions:	Hazardous polymerization does not occur.
Conditions to Avoid:	Heat. Contact with incompatible materials.
Incompatible Materials:	Oxidizing agents. Acids. Contact with metals may evolve flammable hydrogen gas. Nitromethane. Halogens.
Hazardous Decomposition Products:	None known.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	May cause burns of the gastrointestinal tract if swallowed.
Inhalation:	May cause damage to mucous membranes in nose, throat, lungs and bronchial system.
Skin Contact:	Causes severe skin burns.
Eye contact:	Causes serious eye damage.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral	
Product:	No data available.

Dermal

Product: ATEmix (Rabbit): 13,750 mg/kg

**Inhalation
Product:** No data available.

**Repeated dose toxicity
Product:** No data available.

**Skin Corrosion/Irritation
Product:** Causes severe skin burns.

**Serious Eye Damage/Eye Irritation
Product:** Causes serious eye damage.

**Respiratory or Skin Sensitization
Product:** Not a skin sensitizer.

**Carcinogenicity
Product:** This substance has no evidence of carcinogenic properties.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ Cell Mutagenicity

**In vitro
Product:** No mutagenic components identified

**In vivo
Product:** No mutagenic components identified

**Reproductive toxicity
Product:** No components toxic to reproduction

**Specific Target Organ Toxicity - Single Exposure
Product:** None known.

**Specific Target Organ Toxicity - Repeated Exposure
Product:** None known.

**Aspiration Hazard
Product:** Not classified

Other effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

**Fish
Product:** No data available.

Specified substance(s):

SODIUM HYDROXIDE LC 50 (Western mosquitofish (*Gambusia affinis*), 96 h): 125 mg/l Mortality

Aquatic Invertebrates

Product: No data available.

Specified substance(s):

SODIUM HYDROXIDE EC 50 (Water flea (*Ceriodaphnia dubia*), 48 h): 34.59 - 47.13 mg/l Intoxication

Chronic hazards to the aquatic environment:

Fish

Product: No data available.

Aquatic Invertebrates

Product: No data available.

Toxicity to Aquatic Plants

Product: No data available.

Persistence and Degradability

Biodegradation

Product: There are no data on the degradability of this product.

BOD/COD Ratio

Product: No data available.

Bioaccumulative Potential

Bioconcentration Factor (BCF)

Product: No data available on bioaccumulation.

Partition Coefficient n-octanol / water (log K_{ow})

Product: No data available.

Mobility in Soil:

The product is water soluble and may spread in water systems.

Other Adverse Effects:

The product may affect the acidity (pH-factor) in water with risk of harmful effects to aquatic organisms.

13. Disposal considerations

Disposal instructions:

Discharge, treatment, or disposal may be subject to national, state, or local laws. Since emptied containers retain product residue, follow label warnings even after container is emptied.

Contaminated Packaging:

Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN Number:	UN 1824
UN Proper Shipping Name:	Sodium hydroxide solution
Transport Hazard Class(es)	
Class(es):	8
Label(s):	8
Packing Group:	II
Marine Pollutant:	Not a Marine Pollutant
Special precautions for user:	—

IMDG

UN Number:	UN 1824
UN Proper Shipping Name:	SODIUM HYDROXIDE SOLUTION
Transport Hazard Class(es)	
Class(es):	8
Label(s):	8
EmS No.:	F-A, S-B
Packing Group:	II
Marine Pollutant:	Not a Marine Pollutant
Special precautions for user:	—

IATA

UN Number:	UN 1824
Proper Shipping Name:	Sodium hydroxide solution
Transport Hazard Class(es):	
Class(es):	8
Label(s):	8
Marine Pollutant:	Not a Marine Pollutant
Packing Group:	II
Special precautions for user:	—

15. Regulatory information

US Federal Regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
 None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

<u>Chemical Identity</u>	<u>Reportable quantity</u>
SODIUM HYDROXIDE	1000 lbs.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
 Acute (Immediate)

SARA 302 Extremely Hazardous Substance
 None present or none present in regulated quantities.

SARA 304 Emergency Release Notification

<u>Chemical Identity</u>	<u>Reportable quantity</u>
SODIUM HYDROXIDE	1000 lbs.

SARA 311/312 Hazardous Chemical

<u>Chemical Identity</u>	<u>Threshold Planning Quantity</u>
SODIUM HYDROXIDE	10000 lbs

SARA 313 (TRI Reporting)

None present or none present in regulated quantities.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

<u>Chemical Identity</u>	<u>Reportable quantity</u>
SODIUM HYDROXIDE	Reportable quantity: 1000 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

None present or none present in regulated quantities.

US State Regulations

US. California Proposition 65

No ingredient regulated by CA Prop 65 present.

US. New Jersey Worker and Community Right-to-Know Act

Chemical Identity
SODIUM HYDROXIDE

US. Massachusetts RTK - Substance List

Chemical Identity
SODIUM HYDROXIDE

US. Pennsylvania RTK - Hazardous Substances

Chemical Identity
SODIUM HYDROXIDE

US. Rhode Island RTK

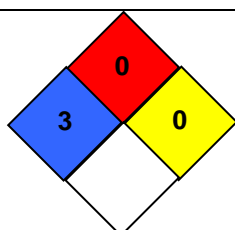
Chemical Identity
SODIUM HYDROXIDE

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EU EINECS List:	On or in compliance with the inventory
EU ELINCS List:	Not in compliance with the inventory.
Japan (ENCS) List:	On or in compliance with the inventory
EU No Longer Polymers List:	Not in compliance with the inventory.
China Inv. Existing Chemical Substances:	On or in compliance with the inventory
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Switzerland Consolidated Inventory:	Not in compliance with the inventory.
Japan ISHL Listing:	Not in compliance with the inventory.
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16. Other information, including date of preparation or last revision

NFPA Hazard ID



	Flammability
	Health
	Reactivity
	Special hazard.

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe; RNP - Rating not possible

Issue Date: 08-28-2015

Revision Date: No data available.

Version #: 1.1

Further Information: No data available.

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MATERIAL SAFETY DATA SHEET

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHS Inc.
P.O. Box 64089
Mail station 525
St. Paul, MN 55164-0089

Transportation Emergency (CHEMTREC): 1-800-424-9300
Technical Information: 1-651-355-8443
MSDS Information: 1-651-355-8438

PRODUCT NAME: Regular, Midgrade & Premium
Unleaded Gasoline

MSDS: 0147- M6A0 - Rev. F (12/24/03)

COMMON NAME: Unleaded Gasoline, Premium Unleaded
Gasoline

CHEMICAL FORMULA: Mixture

CHEMICAL NAME: Light Petroleum Distillate

CHEMICAL FAMILY: Mixed Petroleum Hydrocarbon

Section 2 - COMPOSITION AND INFORMATION ON INGREDIENTS

INGREDIENTS	PERCENTAGES PEL (OSHA) (by weight)	TLV (ACGIH)	CAS #
<u>Product</u>			
Gasoline (Mixture)	100	300 ppm TWA 500 ppm STEL	8006-61-9
<u>Ingredients</u>			
Toluene	< 20	100 ppm TWA 150 ppm STEL	108-88-3
Xylene Isomers	< 20	100 ppm TWA 150 ppm STEL	1330-20-7
Benzene	< 6	1 ppm TWA 5 ppm STEL	71-43-2
1,2,4-Trimethylbenzene	< 5	25 ppm TWA	95-63-6
Ethyl Benzene	< 3	100 ppm TWA 125 ppm STEL	100-41-4

(TWA) - Time Weighted Average is the employee's average airborne exposure in any 8-hour work shift of a 40-hour work week which shall not be exceeded.

(STEL) - Short Term Exposure Limit is the employee's 15-minute time weighted average exposure which shall not be exceeded at any time during a work day unless another time limit is specified.

Section 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Reddish golden brown liquid with gasoline odor - HIGHLY FLAMMABLE LIQUID.

DANGER! Contains Benzene. Cancer Hazard. Can cause kidney, liver and blood disorders.

OSHA HAZARD CLASS

Based on OSHA definitions, the following ingredients in this product are hazardous. The OSHA physical and health hazard categories are shown below. **Note: CHS has not conducted specific toxicity tests on this product. Our hazard evaluation is based on information from similar products, the ingredients, technical literature, and/or professional experience.**

Gasoline - Flammable, toxic, irritant, target organ (CNS)
 Toluene - Flammable, toxic, irritant, target organ (CNS)
 Xylene - Flammable, toxic, irritant
 Benzene - Flammable, irritant, carcinogen, target organ (kidney, liver, blood)
 1,2,4-Trimethylbenzene - Flammable, toxic, irritant, target organ (CNS, blood)
 Ethylbenzene - Flammable, toxic, irritant

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Dermal, Ingestion.

ACUTE EFFECTS OF OVER EXPOSURE:

Eyes - Slight to moderate eye irritation.

Skin - Moderately irritating; causes redness, drying of skin.

Inhalation - Irritating to mucous membranes and respiratory tract. Causes dizziness, irritation of eyes, nose and throat, signs of intoxications. Can act as a simple asphyxiant.

Ingestion - Burning of the throat and stomach, loss of consciousness, convulsions, cyanosis, congestion and capillary hemorrhaging of the lungs and internal organs. Possible pneumonia (if vomited), loss of consciousness, and death.

CHRONIC EFFECTS OF OVER EXPOSURE: Suspect carcinogen from long term exposure studies on laboratory animals. Recent studies with laboratory animals have shown that gasoline vapors caused kidney damage and kidney cancer in rats and liver cancer in mice.

Mouse skin painting studies have shown that petroleum middle distillates (boiling range of 100-700°F) can cause skin cancer when repeatedly applied and never washed from the animal's skin. The relative significance of this to the skin and the resulting skin effects (irritation, cell damage, etc.) may play a role in the tumorigenic response. Studies have shown that washing the animal's skin with soap and water between treatments greatly reduces the carcinogenic effect of some petroleum oils.

A few studies have indicated that workers exposed many years to high concentrations of benzene have a slightly higher incidence of leukemia. Benzene can also be toxic to the blood and blood-forming tissues. For additional information on employee monitoring, information and training, medical surveillance, methods of compliance, etc., refer to the OSHA benzene standard, CFR 1910.1028.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: May aggravate pre-existing dermatitis, respiratory illness, or other conditions which have the same symptoms or effects as stated above.

CARCINOGENICITY:

Unleaded Gasoline - NTP: <u>No</u>	IARC: <u>No</u>	OSHA: <u>No</u>
Benzene - NTP: <u>Yes</u>	IARC: <u>Yes</u>	OSHA: <u>Yes</u>

Section 4 - FIRST AID MEASURES

EMERGENCY AND FIRST AID PROCEDURES:

Eye Contact - If material comes in contact with the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids until medical attention can be obtained.

Skin Contact - Remove contaminated clothing. Wash affected areas with soap and water. If irritation or redness develops, seek medical attention.

Inhalation - Move person away from source of exposure and into fresh air. If symptoms persist, seek immediate medical attention. Apply artificial respiration or cardiopulmonary resuscitation if not breathing. Get medical attention.

Ingestion - Never give anything by mouth to an unconscious person. Do **not** induce vomiting. Aspiration of material into the lungs due to vomiting can cause chemical pneumonitis which can be fatal. If spontaneous vomiting occurs, keep head below hips to prevent aspiration of liquid into lungs and monitor for breathing difficulty. Seek medical attention immediately. Keep victim warm and quiet.

Section 5 - FIRE - FIGHTING MEASURES

FLASH POINT: -40°F (TCC)

AUTO IGNITION TEMP: 495-850°F

FLAMMABLE LIMITS IN AIR

LOWER

UPPER

% BY VOLUME

1.4

7.6

EXTINGUISHING MEDIA: Dry Chemical, Foam, Carbon Dioxide (CO₂), Water (fog pattern).

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective on flames, but should be used to keep fire-exposed containers cool. Large fires, such as tank fires, should be fought with caution. If possible, pump the contents from the tank and keep adjoining structures cool and protect personnel. Avoid spreading burning liquid with water used for cooling purposes. Do not flush down public sewers. The use of a self-contained breathing apparatus and protective clothing is recommended for fire fighters. Avoid inhalation of vapors.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Highly volatile material. Flowing gasoline can be ignited by self-generated static electricity; containers should be bonded and grounded. Vapors may travel along the ground to a source of ignition (pilot light, heater, electric motor) some distance away. Containers, drums (even empty) can explode when heat (welding, cutting, etc.) is applied.

HAZARD RATINGS:

NFPA 704:

Health- 1

Fire- 3

Reactivity- 0

HMIS:

Health- 2

Fire- 4

Reactivity- 0

Section 6 - ACCIDENTAL RELEASE MEASURES

STEPS TO TAKE IF MATERIAL IS RELEASED OR SPILLED: Notify emergency response personnel as appropriate. If facility or operation has an "Oil or Hazardous Substance Contingency Plan", "Spill Prevention Control & Countermeasures (SPCC) Plan" or equivalent, activate its procedures. REMOVE ALL SOURCES OF IGNITION. Keep unnecessary people away; isolate hazard area and deny entry. Contain spill if possible. Small spills can be removed with inert absorbent. Dike area of large spill to prevent run-off to sewers, streams, etc. Ventilate area. Avoid breathing vapors. Use appropriate personal protective equipment during clean up. Contact fire authorities and notify appropriate Federal, State, and Local agencies.

Section 7 - HANDLING AND STORAGE

HANDLING AND STORING: Transport, handle and store in accordance with OSHA Regulation 29 CFR 1910.106, and applicable D.O.T. Regulations. Store in tightly closed containers in a dry cool place, away from sources of heat or ignition. Ground and bond all transfer and storage equipment and equip with self-closing valves, pressure vacuum bungs and flame arrestors. **Caution:** Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting, welding or other of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flame, heat, sparks or other sources of ignition. Do not siphon gasoline by mouth.

WARNING: Danger! Contains Benzene. Cancer Hazard. Can cause kidney, liver and blood disorders. **Other:** Do not siphon gasoline by mouth. May cause irritation to eyes, skin and respiratory system. Avoid liquid, mist and vapor contact. Harmful or fatal if swallowed. Aspiration hazard, can enter lungs and cause damage. May cause irritation or be harmful if inhaled or absorbed through the skin. Flammable Liquid. Vapors may explode.

Section 8 - EXPOSURE CONTROL - PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate ventilation to keep vapors below permissible concentrations.

RESPIRATORY EQUIPMENT: Use appropriate NIOSH-approved respiratory protection where atmospheric concentrations may exceed acceptable exposure limits. Self-contained breathing apparatus or supplied air respiratory protection required for entry into tanks, vessels, or other confined spaced containing gasoline.

EYE PROTECTION: Chemical type goggles or face shield where contact with liquid or mist may occur.

PROTECTIVE CLOTHING: Wear impervious clothing and gloves when contact with skin may occur. **OTHER (SAFETY SHOWERS, EYE WASH STATIONS, ETC.):** Emergency eye wash station and safety shower where operations and exposure warrant. Loading, unloading, tank gauging, etc., remain upwind.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Reddish golden brown liquid

ODOR: Gasoline odor (odor threshold approximately 10 ppm).

BOILING POINT: 760 mmHg @ 80°F

SPECIFIC GRAVITY (water=1): .72

VAPOR PRESSURE: 400 mmHg @ 68°F

VAPOR DENSITY (air=1): 4

SOLUBLE IN WATER: Negligible

EVAPORATION RATE (ether=1): Slower

pH: N/D

Section 10 - STABILITY AND REACTIVITY

STABILITY

STABLE X (At room temperature and pressure. See handling and storage section)

UNSTABLE _____

INCOMPATIBILITY -

CONDITIONS TO AVOID: Heat, sparks, flame, build-up of static electricity, and other sources of ignition should be avoided.

MATERIALS TO AVOID: Strong oxidizing agents, halogens, strong acids, and alkalies.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide, and hydrocarbons.

HAZARDOUS POLYMERIZATION: Has not been reported to occur under normal temperatures and pressures.

Section 11 - TOXICOLOGY INFORMATION

Note: CHS has not conducted specific toxicity tests on this product.

Section 12 - ECOLOGICAL INFORMATION

Note: CHS has not conducted specific ecological tests on this product.

Section 13 - DISPOSAL CONSIDERATION

WASTE DISPOSAL PROCEDURES: Recycle as much of the recoverable product as possible. Do not flush to drain or storm sewer or otherwise release to the environment. Dispose of non-recyclable material as a RCRA hazardous waste, complying with federal, state and local regulations. Note: Re-evaluation of this product may be required by the user at the time of disposal, since the product uses, transformations, mixtures and processes may change classification to non-hazardous or hazardous for reasons other than, or in addition to ignitable.

Section 14 - TRANSPORTATION

DOT PROPER SHIPPING NAME: Gasoline*

DOT HAZARD CLASS: Flammable Liquid*

DOT IDENTIFICATION NUMBER: UN 1203

DOT EMER. RESPONSE GUIDE NO.: 128

*EFFECTIVE 10/1/93 DOT's HM-181 changes how materials are classified. Proper Shipping Name - **Gasoline**; Hazard Class - **3**; UN/NA Identification #- **UN 1203**; **Packing Group II**; Placard - **FLAMMABLE**

Section 15 - REGULATORY INFORMATION

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

<u>CAS Number</u>	<u>Chemical Name</u>	<u>Percent by Weight</u>
108-88-3	Toluene	Up to 18.1%
1330-20-7	Xylene	Up to 15.3%
71-43-2	Benzene	Up to 5.3%
95-63-6	1,2,4 Trimethylbenzene	Up to 4.8%
100-41-4	Ethylbenzene	Up to 2.6%

SARA SECTION 311-312 HAZARD CATEGORIES (40 CFR 370.2):

FIRE: Yes **SUDDEN RELEASE OF PRESSURE:** No **REACTIVE:** No **ACUTE:** Yes **CHRONIC:** Yes

Section 16 - OTHER INFORMATION

Updated By: Hue Lam

DATE: December 24, 2003

Title: EHS Compliance Specialist

Supersedes: September 8, 2003

Reason for Issue: Company Name Change

THE INFORMATION CONTAINED IN THIS MSDS RELATES ONLY TO THE SPECIFIC MATERIAL IDENTIFIED. IT DOES NOT COVER USE OF THAT MATERIAL IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY PARTICULAR PROCESS. IN COMPLIANCE WITH 29 C.F.R. 1910.1200(g), CHS HAS PREPARED THIS MSDS IN SEGMENTS, WITH THE INTENT THAT THOSE SEGMENTS BE READ TOGETHER AS A WHOLE WITHOUT TEXTUAL OMISSIONS OR ALTERATIONS. CHS BELIEVES THE INFORMATION CONTAINED HEREIN TO BE ACCURATE, BUT MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY, EXPRESS OR IMPLIED, ABOUT THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THE INFORMATION OR ABOUT THE FITNESS OF CONTENTS HEREIN FOR EITHER GENERAL OR PARTICULAR PURPOSES. PERSONS REVIEWING THIS MSDS SHOULD MAKE THEIR OWN DETERMINATION AS TO THE MATERIAL'S SUITABILITY AND COMPLETENESS FOR USE IN THEIR PARTICULAR APPLICATIONS.



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Comenius - European Cooperation on School Education

Hands-on Science (H-Sci) Project: Chemical Safety Database

Chemical Safety Data: Benzene



Common synonyms	None
Formula	C_6H_6
Physical properties	Form: colourless liquid Stability: Stable, but very flammable Melting point: 5.5 C Water solubility: negligible Specific gravity: 0.87
Principal hazards	Benzene is a carcinogen (cancer-causing agent). Very flammable. The pure material, and any solutions containing it, constitute a fire risk.
Safe handling	Benzene should NOT be used at all unless no safer alternatives are available. If benzene must be used in an experiment, it should be handled at all stages in a fume cupboard. Wear safety glasses and use protective gloves.
Emergency	Eye contact: Immediately flush the eye with plenty of water. Continue for at least ten minutes and call for immediate medical help. Skin contact: Wash off with soap and water. Remove any contaminated clothing. If the skin reddens or appears damaged, call for medical aid.

	If swallowed: Call for immediate medical help.
Disposal	It is dangerous to try to dispose of benzene by washing it down a sink, since it is toxic, will not dissolve and presents a fire risk. It is probable that trying to dispose of benzene in this way will also break local environmental rules. Instead, retain in a safe place in the laboratory (well away from any source of ignition) for disposal with other flammable, non-chlorinated solvents.
Protective equipment	Safety glasses. If gloves are worn, PVA, butyl rubber and viton are suitable materials.
Further information	Benzene Chemicals in the HSci database More extensive safety data

Link to the [Oxford HSci web site](#)

We have tried to make this information as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy.

We have not verified this information, and cannot guarantee that it is up-to-date.

Oxford, February 27, 2004



Comenius - European Cooperation on School Education

Hands-on Science (H-Sci) Project: Chemical Safety Database

Chemical Safety Data: Toluene



Common synonyms	Methylbenzene, phenylmethane
Formula	C_7H_8
Physical properties	<p>Form: colourless liquid Stability: Stable, but very flammable. Melting point: -93 C Boiling point: 111 C Triple point: -93 C Critical temperature: 320 C Critical pressure: 41 bar Enthalpy of vaporisation: 38 kJ mol^{-1} Enthalpy of sublimation: 43.1 kJ mol^{-1} Water solubility: negligible Specific gravity: 0.865</p>
Principal hazards	<p>Toluene is toxic if swallowed or inhaled. It is also harmful in contact with the skin. Toluene is very flammable, so presents a significant fire risk. There is some evidence that repeated exposure to toluene may cause reproductive harm.</p>

Safe handling	<p>Wear safety glasses.</p> <p>The working area must be well ventilated to prevent the build-up of toluene vapour.</p> <p>Make sure that any sources of ignition, such as Bunsen burners, hot plates and hot air guns, are removed before you start work.</p>
Emergency	<p>Eye contact: Immediately flush the eye with plenty of water. Continue for at least ten minutes and call for medical help.</p> <p>Skin contact: Wash off with soap and water. Remove any contaminated clothing. If the skin reddens or appears damaged, call for medical aid. Note that clothes soaked in toluene will be very flammable, so should be removed in an area in which there is no risk that they might catch fire.</p> <p>If swallowed: Call for immediate medical help.</p>
Disposal	<p>Toluene should be stored in a "non-chlorinated waste" container for subsequent disposal.</p>
Protective equipment	<p>Safety glasses. If gloves are required, polyvinyl alcohol is recommended.</p>
Further information	<p><u>Toluene</u> <u>Chemicals in the HSci database</u> <u>More extensive safety data</u></p>

Link to the [Oxford HSci web site](#)

We have tried to make this information as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

Oxford, January 22, 2004

Safety (MSDS) data for ethylbenzene

General

Synonyms: phenylethane, EB, ethylbenzol, ethyl benzene

Molecular formula: C_8H_{10}

CAS No: 100-41-4

EC No: 202-849-4

Physical data

Appearance: colourless liquid

Melting point: -95 C

Boiling point: 136 C

Vapour density: 3.7

Vapour pressure: 10 mm Hg at 20 C

Specific gravity: 0.867

Flash point: 15 C

Explosion limits: 1 % - 6.7 %

Autoignition temperature: 432 C

Stability

Stable. Incompatible with oxidizing agents. Flammable.

Toxicology

May be harmful by inhalation, ingestion or through skin contact. Causes severe eye irritation. Skin and respiratory system irritant. Experimental teratogen. Narcotic in high concentration.

Toxicity data

(The meaning of any abbreviations which appear in this section is given [here.](#))

ORL-RAT LD50 3500 mg kg⁻¹

SKN-RBT LD50 17800 mg kg⁻¹

IHL-GPG LCLO 10000 ppm

Irritation data

(The meaning of any abbreviations which appear in this section is given [here.](#))

SKN-RBT 15 mg/24h open mld.

Risk phrases

(The meaning of any risk phrases which appear in this section is given [here.](#))

R10 R36 R37 R38.

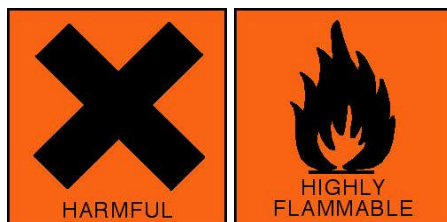
Personal protection

Safety glasses. Good ventilation.

[Return to [Physical & Theoretical Chemistry Lab. Safety home page.](#)]

This information was last updated on April 14, 2005. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

Safety (MSDS) data for xylenes



General

Synonyms: dimethylbenzene, xylol

Molecular formula: $C_6H_4(CH_3)_2$ This is a mixture of the three xylenes, m-xylene (CAS 108-38-3), o-xylene (CAS 95-47-6) and p-xylene (CAS 106-42-3), and often also contains ethyl benzene (CAS 100-41-4).

CAS No: 1330-20-7

EINECS No:

Physical data

Appearance: colourless liquid

Melting point: -48 C

Boiling point: 137 C

Vapour density: 3.7 (air = 1)

Vapour pressure: 5.1 mm Hg at 20 C

Density ($g\ cm^{-3}$): 0.87

Flash point: 27 C (closed cup)

Explosion limits: 1.1 - 7%

Autoignition temperature:

Water solubility:

Stability

Stable. Highly flammable - incompatible with strong oxidizing agents.

Toxicology

Harmful if swallowed or inhaled. Eye, skin and respiratory irritant. May act as a narcotic. Typical TLV/TWA 100 ppm.

Toxicity data

(The meaning of any abbreviations which appear in this section is given [here.](#))

ORL-RAT LD50 4300 mg kg⁻¹

SCU-RAT LD50 1700 mg kg⁻¹

Transport information

Personal protection

Safety glasses, good ventilation. Remove sources of ignition from the working area.

[Return to [Physical & Theoretical Chemistry Lab. Safety home page.](#)]

This information was last updated on September 4, 2003. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

Safety (MSDS) data for tert-butyl methyl ether



General

Synonyms: methyl tert-butyl ether, MTBE, 2-methoxy-2-methylpropane, butyl methyl ether, t-butyl methyl ether, TBME, tert-butoxymethane, 1,1-dimethylethyl methyl ether, methyl 1,1-dimethylethyl ether

Molecular formula: $C_5H_{12}O$

CAS No: 1634-04-4

EINECS No: 216-653-1

Physical data

Appearance: 55.2 C

Melting point: -109 C

Boiling point:

Vapour density:

Vapour pressure: 245 mm Hg at 20 C

Density ($g\ cm^{-3}$): 0.741

Flash point: -10 C

Explosion limits:

Autoignition temperature:

Stability

Stable, but may form explosive peroxides in contact with air. Extremely flammable - note low flash point. Incompatible with strong oxidizing agents.

Toxicology

Possible carcinogen. Harmful by inhalation, ingestion or through skin contact. Irritant. Typical OEL 100 mg/m³.

Toxicity data

(The meaning of any abbreviations which appear in this section is given [here.](#))

ORL-RAT LD50 4000 mg kg⁻¹

IPN-MUS LD50 2400 mg kg⁻¹

IHL-RAT LC50 23500 ppm.

Risk phrases

(The meaning of any risk phrases which appear in this section is given [here.](#))

R12 R20 R21 R22 R36 R37 R38.

Transport information

(The meaning of any UN hazard codes which appear in this section is given [here.](#))

UN No 2398. Packing group II. Major hazard class 3.0.

Personal protection

Safety glasses, good ventilation. Take precautions against the build-up of peroxides in storage.

Safety phrases

(The meaning of any safety phrases which appear in this section is given [here.](#))

S16 S26 S36.

[Return to [Physical & Theoretical Chemistry Lab. Safety home page.](#)]

This information was last updated on March 9, 2005. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

APPENDIX F
Daily Tailgate Safety Meeting Form

DAILY TAILGATE MEETING FORM

Instructions: A H&S Tailgate Meeting must be held daily prior to starting field activities. All field personnel, including subcontractors, involved in the day's activities, must be present for the meeting or presented a review of the meeting discussion. The daily meeting must be documented on the Daily Tailgate Meeting form and maintained with the project documents.

DATE:	TIME:	PROJECT NO:	CLIENT:
PROJECT SITE:		MEETING CONDUCTED BY:	SIGNATURE:
SITE ADDRESS:			

LIST TODAY'S WORK ACTIVITY/TASKS IN BOXES BELOW:

MANDATORY SAFETY TOPICS – ALL PROJECTS

- | | | | |
|--|--|--|--|
| <input type="checkbox"/> Emergency Procedures (muster/meeting points) | <input type="checkbox"/> Task Specific JSA Review | <input type="checkbox"/> Incident Intervention Procedures | <input type="checkbox"/> What could go wrong today? |
| <input type="checkbox"/> SDSs and PPE Locations | <input type="checkbox"/> STOP WORK AUTHORITY | <input type="checkbox"/> Fire Extinguisher Location | <input type="checkbox"/> Emergency Contact Information |
| | <input type="checkbox"/> First Aid Kit Location | <input type="checkbox"/> Training and Medical Surveillance | <input type="checkbox"/> Eye Wash Station Location |
| <input type="checkbox"/> Manual lifting: strains / sprains <input type="checkbox"/> Excavation / trenching | | | |

SITE SPECIFIC SAFETY TOPICS

- | | | | |
|---|---|---|---|
| <input type="checkbox"/> Noise hazards | <input type="checkbox"/> Heat and cold stress | <input type="checkbox"/> Confined space entry | <input type="checkbox"/> Electrical hazards |
| <input type="checkbox"/> Dust and vapor control | <input type="checkbox"/> Spill response | <input type="checkbox"/> Orderly site and housekeeping | <input type="checkbox"/> Hot work permits |
| <input type="checkbox"/> Buried & overhead utility loc. | <input type="checkbox"/> Smoking in designated area | <input type="checkbox"/> Heavy equipment and drill rigs | <input type="checkbox"/> Portable tool safety & awareness |
| <input type="checkbox"/> Ladder safety | <input type="checkbox"/> Monitoring requirements | <input type="checkbox"/> Decontamination procedures | <input type="checkbox"/> Vehicular traffic |
| <input type="checkbox"/> Fall protection | <input type="checkbox"/> Manlift/Cherry Picker Use | <input type="checkbox"/> Chemical hazards | <input type="checkbox"/> Biological hazards |
| <input type="checkbox"/> Personal Protective Equipment | <input type="checkbox"/> Other - | <input type="checkbox"/> Lock Out Tag Out (LOTO) | <input type="checkbox"/> Work over 6-ft height |
| | | <input type="checkbox"/> Other - | <input type="checkbox"/> Other - |

PARTICIPANT SIGNATURES

PRINT NAME	SIGNATURE	COMPANY NAME

☐ Check here if JSA required field modification

☐ Check here if additional pages